C 84473 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE SPECIAL EXAMINATION, APRIL 2020

Printing Technology

PT 14 602—MICROPROCESSOR AND IMAGE GENERATION

(2014 Admissions)

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Explain indirect program memory addressing of 8086 microprocessor.
2. List all 16 bit registers in 8086 and write their functions.
3. Explain Type 0 : Divide by Zero Interrupt dedicated interrupt in 8086.
4. Draw architecture of 8086 and label it.
5. Draw the flag register format of microprocessor 8086.
6. Explain the Register addressing mode of 8051 microcontroller with an example.
7. Explain how stack is implemented in 8051.
8. With diagram, explain the operation of port 1 of 8051.
9. Explain the format of following MATLAB commands :

   (i) fplot ; (ii) X label ; (iii) legend ; (iv) axis.
10. Find roots of an algebraic equation $f(x) = X^2 - 2X - 3$ using MATLAB function roots. Also elaborate use of poly command in MATLAB.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. Explain the Addressing modes in 8086 microprocessor with an example.

Or

12. Explain the logical instructions in 8086 microprocessor with an example.
13. Explain with appropriate diagram a typical minimum mode of 8086 system.

Or

14. Draw and discuss a typical maximum mode 8086 system.

Turn over

15. Explain the different interrrupts of 8051.

Or

16. Explain the modes of operation of timers/counters of 8051 with diagram.

17. Write a Matlab script file if Sam gets paid compound interest at a rate defined at 5 % per annum. Calculate his resulting investment each year and after 10 years. Change the rate on the 8th year to 5.75 %.

Or

18. Write the Matlab script file to find the first element of the Fibonacci sequence with at least 6 digits using while loop.

(4 × 15 = 60 marks)

C 84472 (Pages : 3) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2014 ADMISSIONS) SPECIAL EXAMINATION, APRIL 2020

Printing Technology

PT 14 601—DESIGN OF MACHINE ELEMENTS – 1

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions from* 1 *to* 10.
Missing data, if any can be suitably assumed.
Each question carries 5 *marks.*

1. How is stress related to strain under elastic limit ? Explain using a suitable sketch.
2. What are the points a design engineer should consider before deciding the factor of safety ? List any five.
3. What are the advantages of chain drives over belt drives ? List any five.
4. What are the advantages of rolling contact bearings over sliding contact bearings ? List any five.
5. What are the important physical characteristics of a good bearing material?
6. Explain the principle of hydrodynamic bearing and its limitation.
7. List the expected properties in a good shaft material. What are the materials that are commonly used in shafts ?
8. Discuss the various types of shafts and different types of stresses developed in it.
9. Sketch the different types of end connections for a helical tension spring.
10. What are the merits of use of concentric springs ?

(8 × 5 = 40 marks)

Part B

Answer **all** *the questions.*

11. (a) Design a cast iron protective type flange coupling to transmit 15 kW at 900 r.p.m from an electric motor to a compressor. The service factor may be assumed as 1.35. The following permissible stresses may be used:

Shear stress for shaft, bolt and key material = 40 MPa

Crushing stress for bolt and key = 80MPa

Shear stress for cast iron = 8MPa

Draw a neat sketch of the coupling.

Or

(b) (i) it is required to design a square key for fixing a gear on a shaft of 25 mm diameter. 15 kW power at 720 r.p.m is transmitted from the shaft to the gear. The key is made of steel $50C_4$ (S_{yt} = 460 N/mm^2) and the factor of safety is 3. The yield strength is compression can be assumed to be equal to the yield strength in tension. Determine the dimensions of the key.

(ii) Draw neat sketcher to represent saddle keys, round keys, splines and tangent keys.

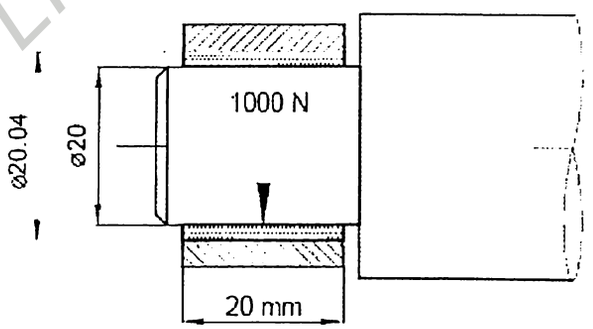
12. (a) An open belt connects two flat pulleys. The pulley diameters are 300 mm and 450 mm and the corresponding angles of lap are 160° and 210°. The smaller pulley runs at 200 r.p.m. the co-efficient of friction between the belt and the pulley is 0.25. it is found that the belt is the point of slipping when 3kW is transmitted. To increase the power transmitted two alternatives are suggested namely (i) increasing the initial tension by 10 % and (ii) increasing the co-efficient of friction by 10% by the application of suitable dressing to the belt.

Which of these two methods would be more effective ? find the percentage increase in power possible in each case.

Or

(b) A pair of helical gears are to transmit 15 kW. The teeth are 20° stub in diametral plane and have a helix angle of 45°. The pinion runs at 10,000 r.p.m. and has 80 mm pitch diameter. The gear has 320 mm pitch diameter. If the gears are made of cast steel having allowable static strength of 100 MPa ; determine a suitable module and face width from static strength considerations and check the gears for wear, given σ_{es} = 618 MPa.

13. (a) A full journal bearing has a nominal diameter of 20.0 mm and a bearing length of 20.0 mm (shown in figure below). The bearing supports a load of 1000 N and the journal design speed is 6000 r.p.m. The radial clearance has been specified as 0.02 mm. An SAE 20 oil has been chosen to be compatible with requirements elsewhere in the machine and the lubricant supply temperature is 60°C. Using the approximate method, find the temperature rise of the lubricant, the total lubricant flow rate, the minimum film thickness, the torque required to overcome friction and the heat generated in the bearing.



Or

(b) Design a journal bearing for a centrifugal pump from the following data :

Load on the journal = 20,000 N ; speed of the journal = 900 r.p.m. ; type of oil is SAE10 for which the absolute viscosity at 55°C = 0.017kg / m-s ; ambient temperature of oil = 15.5°C ; Maximum bearing pressure for the pump = 1.5 N/mm^2.

Calculate also mass of the lubricating oil required for artificial cooling, if rise of temperature of oil be limited to 10°C. Heat dissipation co-efficient = 1232 $W/m^2/°C$.

14. (a) Compare the weight, strength and stiffness of a hollow shaft of the same external diameter as that of solid shaft. The inside diameter of the hollow shaft being half the external diameter. Both the shafts have the same material and length.

Or

(b) A close coiled helical spring is required to absorb 1.5 kN.m energy. The spring should have mean coil diameter 250 mm and spring rate 10 N/mm. Design the spring take G = 80 GPa.

(4 × 15 = 60 marks)

C 84466 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE SPECIAL EXAMINATION, APRIL 2020

Electrical and Electronics Engineering

EE 14 604—MICROPROCESSORS AND MICROCONTROLLERS

(2014 Admissions)

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

I. 1 Give the operation of maximum mode of 8086 microprocessor.

2 Draw the pin out of 8086 microprocessor.

3 Explain the term nonmaskable interrupts.

4 List the features of Macros.

5 Write an assembly language program to search a number in a string using 8086.

6 Write an assembly language program for finding square root of an number.

7 List the features of 8251.

8 Write an assembly language program to place the contents of external memory location 8000H into accumulator using 8051.

9 Compare and contrast jump and loop instructions.

10 Discuss the concept of interrupts in 8051.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

II. 1 Discuss the Minimum and Maximum mode operation of 8086.

Or

2 Enumerate the concept of Memroy Decoding in 8086 microprocessor.

3 Write an assembly language program to determine the largest number in an array of n numbers using 8086 microprocessor.

Or

4 Write an assembly language program to convert 8 bit ASCII to BCD number.

Turn over

5 With a program, explain the concept of Interfacing LED display.

Or

6 Illustrate the concept of DMA Contrdler.

7 Illustrate the term Serial Communication Interfaces with the various types of communication.

Or

8 Explain the Arithmetic Instructions of 8051 microcontroller and give the program by treating *r*6-*r*7 and *r*4-*r*5 and two 16 bit registers. Perform subtraction between them. Store the result in 20h (lower byte) and 21h (higher byte).

(4 × 15 = 60 marks)

C 84465 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. DEGREE SPECIAL EXAMINATION, APRIL 2020

Electrical and Electronics Engineering

EE 14 603—ELECTRICAL MACHINES–III

(2014 Admisssions)

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*

I. (a) Draw the Torque-slip characteristics of 3ϕ induction motor. How the curves get affected if rotor resistance is varied?

(b) Compare slip ring and squirrel cage induction motor.

(c) What is meant by single phasing in a 3-phase induction motor ? What are its effects on the performance of induction motor?

(d) How is the speed of a 3ϕ induction motor controlled by varying the stator voltage?

(e) What are the effects of space harmonics on a 3ϕ induction motor?

(f) Explain why a single-phase induction motor does not self start.

(g) Briefly explain the principle of operation of Induction generator. Write down any 3 applications.

(h) Explain the factors to be considered for the choice of specific loadings of an induction motor.

(i) Briefly explain the principle of operation of reluctance motor.

(j) What are the advantages and disadvantages of switched reluctance motor? Give any two applications of it.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*

II. (a) Draw the circle diagram from no load blocked rotor test of a 3-phase, 14.92 kW, 400 V, 6 pole induction motor from the following test results.

No load test : 400 V, 11A, Pf = 0.2

Blocked rotor test : 100 V, 25A, Pf = 0.4

Rotor cu loss in half of total cu loss at stand still.

Find (a) Line current ; (b) Slip ; (c) Efficiency ; and (d) Power factor at full load.

Or

Turn over

(b) Derive the expression for developed torque in a 3ϕ induction motor and find the condition for maximum torque under running condition.

(c) Develop the equivalent circuit of a 3ϕ induction motor and explain how the mechanical power developed is taken care in the equivalent circuit.

(7 + 8 = 15 marks)

III. (a) Explain the construction and working of double cage induction motor. Draw its torque-slip characteristics and equivalent circuit.

(b) With the help of a neat diagram, explain the working of star-delta starter.

(10 + 5 = 15 marks)

Or

(c) Discuss any three methods of speed control of 3ϕ induction motor.

IV. (a) A 15 KW, 440 V, 4 pole, 50 Hz, 3-phase induction motor is built with a stator bore 0.25 m and a core length of 0.16 m. The specific electric loading is 23000 ampre conductions per metre. Using the data of this machine, determine the cone dimensions, number of stator slots and number of stator conductors for a 11 KW, 460 V, 6 pole, 50 Hz motor. Assume a full load efficiency of 84% and power factor of 0.82 for each machine. The winding factor is 0.955.

Or

(b) Draw the Torque-slip characteristics of 1ϕ induction motor and explain the characteristics using double field revolving theory.

(c) With the help of a neat diagram, explain the working of split phase motor and shaded pole single-phase induction motor.

(10 + 5 = 15 marks)

V. (a) Explain in detail about the construction and working principle of permanent magnet Bruschless DC motor.

Or

(b) With the help of a neat diagram, explain the working and characteristics of stepper motor.

(c) Explain the principle of operation and construction of linear induction motor.

(8 + 7 = 15 marks)

[4 × 15 = 60 marks]

C 84464 (Pages : 3) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 ADMISSIONS] SPECIAL EXAMINATION, APRIL 2020

Electrical and Electronics Engineering

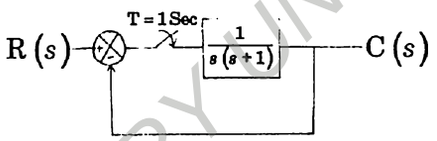
EE 14 602—LINEAR CONTROL SYSTEM

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Determine the transfer function of a series RLC circuit.
2. List and define the time domain specifications.
3. Obtain the unit step response of a first order system.
4. Derive the transfer function of an armature controlled d.c. motor.
5. Derive an expression for peak time of a second order system.
6. State and explain Nyquist stability criterion.
7. Derive the transfer function of a zero order hold circuit.
8. Derive the transfer function of hydraulic system.
9. Derive an expression for rise time.
10. Find the pulse transfer function for the error sampled system given :

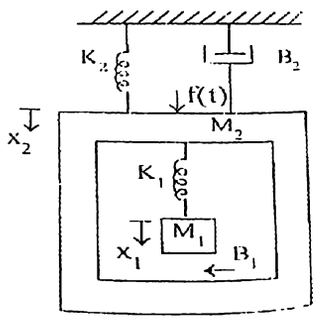


(8 × 5 = 40 marks)

Part B

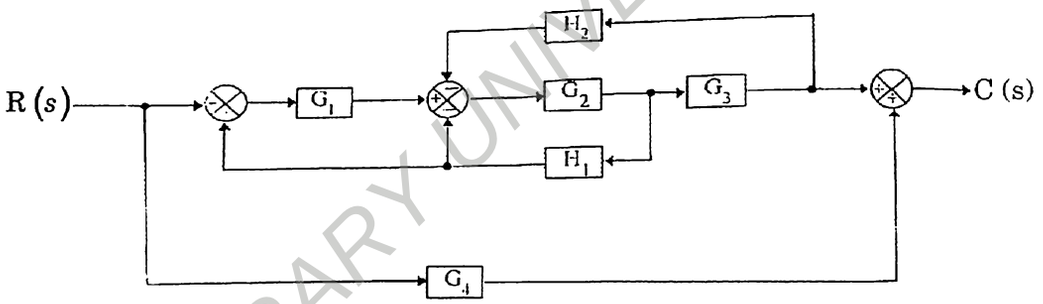
Answer **all** *questions.*
Each question carries 15 *marks.*

11. (a) Determine the transfer function $X_1(s)/F(s)$ for the system shown below :



Or

(b) Convert the block diagram to signal flow graph and determine the transfer function using Mason's gain formula.



12. (a) The unity feedback system is characterised by an open loop transfer function $G(s) = \frac{K}{s(s+10)}$. Determine the gain K so that the system will have a damping ratio of 0.5 for this value of K. Determine the settling time, peak overshoot, rise time and peak time for a unit step input.

Or

(b) The open loop transfer function of a unity feedback system is given by :

$G(s) = \dfrac{K}{(s+2)(s+4)(s2+6s+25)}$. By applying Routh criterion, discuss the stability of the closed loop system as a function of K. Determine the value of K which will cause sustained oscillations in the closed loop system. What are the corresponding oscillating frequencies ?

13. (a) Sketch the Bode diagram for the following transfer function and obtain gain and phase cross over frequencies :

$$G(s) = \frac{5(1+2s)}{(1+4s)(1+0.25s)}.$$

Or

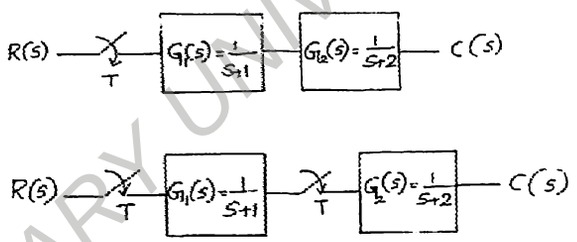
(b) The open loop transfer function of a unity feedback system is given by :

$G(s) = \dfrac{K}{s(1+0.2s)(1+0.05s)}$. Sketch the polar plot and determine the value of K such that gain margin is 18dB.

14. (a) Describe the design procedure for a lead compensator using root locus method.

Or

(b) Determine the pulse transfer function for the system represented by the block diagram.



(4 × 15 = 60 marks)

C 84463 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE SPECIAL EXAMINATION, APRIL 2020

Information Technology

IT 14 606—OBJECT ORIENTED MODELING AND DESIGN

(2014 Admissions)

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Compare the roles of actor and user.
2. With a diagram, explain the software architecture.
3. Explain the activity diagram with example.
4. Consider an example and perform the following activity in state machine diagram :

   Do an activity while in state and perform an activity upon entry of the state.
5. Draw the state diagram of vending machine.
6. State the need for composite/concurrent state in state diagram.
7. What does a message represent in a sequence diagram ? Give the format for message label.
8. Discuss the communication diagram with suitable example.
9. State the different views and diagrams in UML.
10. Consider software to be developed and used in an ATM. Derive a set of use cases to analyze the system.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. (a) Discuss about the merits and limitations of single and multiple inheritances in object oriented analysis with suitable examples.

Or

(b) Explain the different kinds of relationships between objects. Give at least one example for each kind.

12. (a) With suitable examples, illustrate the relationship between sequence diagrams and use cases.

Or

(b) Explain the interaction diagram with suitable example.

13. (a) Elaborate the composite and submachine state with suitable examples.

Or

(b) Develop a state machinet diagram for an elevator system of a building. State the assumptions you make about the system clearly.

14. (a) What is OCL ? Explain the various types of OCL expressions.

Or

(b) Explain in detail about the architecture description language.

(4 × 15 = 60 marks)

C 84462 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE SPECIAL EXAMINATION, APRIL 2020

Information Technology

IT 14 605—HUMAN COMPUTER INTERACTION

(2014 Admissions)

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **ten** *questions.*
Each question carries 2 *marks.*

1. What are two stages of visual perception of a human ?
2. Name any four interaction styles.
3. Give examples for WIMP interface.
4. Mention the important features of usability engineering.
5. What is multi-threading ? List the types of multi-threading.
6. State the purpose of heuristic evaluation.
7. List the three levels of participation in Effective Technical and Human Implementation of Computer based Systems (ETHICS).
8. Define breakdown and repair in conversion.
9. What is stopping rule in task decomposition ?
10. List the advantages of shared editor used in meeting rooms.
11. List the difficulties in augmented reality.
12. What is meant by structured information ?

(10 × 2 = 20 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

1. Write the functions of rods and cones in human eye.
2. List the advantages of touch-sensitive screens.
3. Explain the significance of white space in the screen design.
4. List the goals for evaluation of the design.
5. Mention the eight main stages of Open System Task Analysis (OSTA).

Turn over

6. Explain the process of task analysis using an example.
7. Mention the differences between email and electronic conferencing.
8. List the advantages of using meeting rooms for group discussions.

(8 × 5 = 40 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

1. (a) Explain any two devices used for virtual reality and 3D interactions.

Or

(b) Draw the general interaction framework and explain the translation from one component to another.

2. (a) Draw a block diagram and explain the role of prototyping.

Or

(b) Explain the analysis of design using heuristic evaluation.

3. (a) Draw a block diagram and explain the seven stages of soft systems methodology.

Or

(b) Explain knowledge based task analysis using an example.

4. (a) Explain how structured message systems help the recipients to solve message overload problem.

Or

(b) Discuss the working of shared editor used in meeting rooms.

(4 × 10 = 40 marks)

C 84461 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE SPECIAL EXAMINATION, APRIL 2020

Information Technology

IT 14 601—DIGITAL SIGNAL PROCESSING

(2014 Admissions)

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **ten** *questions.*
Each question carries 2 *marks.*

1. Draw the waveform for a periodic signal and non-periodic signal.
2. Differentiate analog signal and digital signal.
3. Define even and odd signal.
4. Define Fourier transform pair.
5. Find the Laplace transform of e^{10t}.
6. State the condition for the existence of Fourier series.
7. Write the equations for even and odd discrete time signals.
8. The signal has frequencies from 50 kHz to 100 kHz. Detrmine the sampling frequency.
9. Define Discrete Time Fourier Transform (DFFT).
10. State the condition for the existence of Z transforms.
11. Write the z-transform for $nu(n)$ and $-u(-n-1)$.
12. Define inverse z-transform.

(10 × 2 = 20 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

1. Sketch the following signals :
   (a) $x(t) = \pi(2t + 3)$.
   (b) $y(n) = x(4 - n)$.
2. Represent discrete time unit impulse and unit step signal in both Mathematical and Graphical form.
3. State and prove the convolution theorem with respect to Fourier transform.

Turn over

4. Explain any two properties of Laplace transform.
5. Write down the steps involved in convolution sum of discete signals.
6. What is the difference between one sided and two sided Z transform ?
7. Describe the relationship between Laplace transform and z-transform.
8. Discuss the properties of two sided z-transform.

(8 × 5 = 40 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

1. (a) Explain any two properties of convolution of discrete time signals $v[n]$ and $w[n]$ using examples.

Or

(b) Determine whether the signal $y[n] = x[n] + nx\ [n + 1]$ is memory less, time-invariant, linear, casual, BIBO stable. Justify your answer.

2. (a) Explain the properties of Continuous Time (CT) Fourier series.

Or

(b) Obtain the Fourier components of the periodic square wave signal which is symmetrical with the vertical axis at time $t = 0$.

3. (a) Determine DTFS representation for the signal $x(n) = \cos\left(\frac{n\pi}{3}\right)$. Plot the spectrum of $x(n)$.

Or

(b) Describe the periodicity and linearity property of Discrete Time Fourier Transform (DTFT).

4. (a) Determine the z-transform and region of convergence of $x(n) = a^n, n \geq 0, x(n) = 0, n < 0$.

Or

(b) Describe the time reversal and time shifting property of z-transform.

(4 × 10 = 40 marks)

C 84458 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE SPECIAL EXAMINATION, APRIL 2020

Computer Science Engineering

CS/IT 14 604—COMPUTER NETWORKS

(2014 Admissions)

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Draw the process flowchart for CSIVIA/CA used in wireless LAN and explain.
2. Discuss the various line configuration techniques with examples.
3. Explain the CRC error detection mechanism using Generator polynomial.
4. Brief the working of Data Link Layer.
5. List out the various approaches of quality of service.
6. Briefly discuss the features of UDP.
7. Write about the various services provided by the Application layer.
8. Compare TCP and UDP protocols.
9. Explain the various approaches of quality of service.
10. Briefly discuss the working of DNS.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. (a) With a neat diagram, explain the functions of various layers in OSI model.

Or

(b) List the common Ethernet standards and explain each with neat diagrams.

12. (a) Explain the various congestion control algorithms with neat diagram.

Or

(b) With suitable examples, explain distance vector and link state routing mechanisms.

13. (a) Explain the open-loop and closed-loop congestion control mechanism in detail with neat diagram.

Or

(b) Compare UDP and TCP protocols.

14. (a) What is URL ? Mention the types of URL and explain the working of Domain Name system in detail.

Or

(b) Discuss in detail about HTTP.

(4 × 15 = 60 marks)

C 84457 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE SPECIAL EXAMINATION, APRIL 2020

Computer Science Engineering

CS/IT 14 603—COMPILER DESIGN

(2014 Admissions)

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*

Each question carries 5 *marks.*

1. Why is it necessary to group the phases of the compiler ?
2. State compiler construction tools.
3. What is left recursion ? Write the rules to eliminate left recursion.
4. Construct a syntax tree for the following assignment statement :

   $a = b * -c + b * -c.$
5. Write rules for finding First and Follow sets for a given CGF :

   $E \rightarrow TA$

   $A \rightarrow +TA/\varepsilon$

   $T \rightarrow FB$

   $B \rightarrow *FB/\varepsilon$

   $F \rightarrow (E)/id$
6. Compare L-distributed and S-distributed definitions with example.
7. Explain the principal sources of optimization in detail.
8. Explain the semantic rules for generation of intermediate code.
9. Discuss the issues in design of a code generator.
10. Explain peep-hole optimization.

($8 \times 5 = 40$ marks)

Part B

Answer **all** *questions.*

Each question carries 15 *marks.*

11. (a) Explain the various phases of compiler. Illustrate the output of each phase of compilation for :

    $a = b * c + b * 7.5 + b * c$, where a is a floating point number and b, and c are integers.

    Or

    (b) Explain the compiler construction tools in detail.

12. (a) Construct LALR parser for the following :

$S \rightarrow iCtS/iCtSeS/a$

$C \rightarrow b$

Is there any conflicting entries ?

Or

(b) Explain in detail the roles and tasks of a lexical analyzer.

13. (a) Explain the top-down parsing technique with example.

Or

(b) For the grammar given below, calculate the operator precedence relation and the precedence functions :

$E \rightarrow E + E|E - E||E * E|E|E||E \wedge E|(E)|-E|id.$

14. (a) Consider the following code fragment :

```
Begin
For i:=1 to n do
For j:= 1 to n do
    C[i,j]:=0
For k:=1 to n do
    C[i,j]=C[i,j]+a[i,k]*b[k,j]
End
```

Perform the following :

(i) Partition into basic clocks.

(ii) Find the loops in the flow graph.

(iii) Perform code optimization.

Or

(b) What is a three address code ? Mention its types. How would you implement these address statements ? Explain with suitable examples.

(4 × 15 = 60 marks)

C 84456 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE SPECIAL EXAMINATION, APRIL 2020

Computer Science Engineering

CS/IT 14 602—COMPUTER GRAPHICS AND MULTIMEDIA

(2014 Admissions)

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **ten** *questions.*
Each question carries 2 *marks.*

1. Define "scene' and "viewport" for 2D images.
2. List the subareas of image processing.
3. Mention the major disadvantages of raster displays.
4. Define Vanishing point in 3D computer graphics.
5. Draw the isometric view of a house.
6. Define control to display ratio.
7. What are the factors used to classify the medium for distribution and presentation of information in computer applications ?
8. Define multimedia system.
9. Draw a sine waveform using three bit quantization.
10. List the constraints in compression in multimedia systems.
11. State the need for data compression in multimedia system.
12. What are the fundamental components of Digital Video Interactive (DVI) technology ?

(10 × 2 = 20 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

1. Compare procedural and declarative specification of graphics user interface.
2. Mention the limitations of Simple Raster Graphics Packatge (SRGP) for 2D applications.
3. Discuss the keyboard devices used in computer systems.
4. Explain bounded and un-bounded valuator inputs.
5. What are the techniques used to code the computer information ?

Turn over

6. Explain the two components in MIDI interface.
7. State the differences between Lossy and Lossless compression techniques.
8. Highlight the features of H.261 standard.

(8 × 5 = 40 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

1. (a) Draw the architecture of a raster display used in computer graphics and explain.

Or

(b) Explain the attributes in SRGP used for drawing lines and polylines using suitable examples.

2. (a) Explain the two categories of parallel projections.

Or

(b) Describe the various classifications of locator devices used in 3D computer graphics.

3. (a) Elaborate on synchronous, asynchronous and isochronous transmission modes.

Or

(b) Describe the components of MIDI synthesizer device.

4. (a) Elaborate on the types of images in MPEG.

Or

(b) Draw a block diagram and explain the steps in data compression.

(4 × 10 = 40 marks)

C 84454 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 Admission] SPECIAL EXAMINATION, APRIL 2020

Electronics and Communication Engineering

EC 14 606—SATELLITE COMMUNICATON

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. (a) State and explain Kepler's second law.
   (b) Define and illustrate Apogee.
   (c) Enumerate various orbital perturbations.
   (d) Explain TTC and M and enumerate its functions.
   (e) What are the essentials features of satellite power systems ?
   (f) Give any three examples for satellite antennas. Explain their design feature.
   (g) Describe the basic transmission theory of satellite communication.
   (h) Explain the downlink design procedure for a geostationary satellite.
   (i) What is meant by DAMA ? Describe its principles of operation.
   (j) Which frequency bands are used for satellite communication ? Justify your answer.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

2. (a) (i) Describe the significance of station keeping. (8 marks)
   (ii) Define the term angle of tilt and explain how the polar mount antenna works ? (7 marks)

Or

   (b) (i) Discuss in detail about the orbital maneuvers like inclination, ascending node, semimajor axis and eccentricty. (8 marks)
   (ii) Explain about orbital elements. (7 marks)

Turn over

3. (a) (i) Describe about antenna subsystem. (10 marks)

(ii) Discuss in detail about the spacecraft subsystem. (5 marks)

Or

(b) (i) Generate the various supportng subsystems and its structure with diagrams. (5 marks)

(ii) Design the equations for primary power of subsystems. (10 marks)

4. (a) (i) Point out the calculation of link power budget equation. (5 marks)

(ii) Identify the various types of system noise. Explain it in detail. (10 marks)

Or

(b) (i) Compute the equation caused by various factors for uplink communication. (8 marks)

(ii) Explain how the satellites are interlinked without need for intermediate ground stations. (7 marks)

5. (a) (i) Show the operation of FDMA and list how this differs from FDM. (5 marks)

(ii) What are the ways in which demand assignment may be carried out in FDMA network and explain it. (10 marks)

Or

(b) Point out the comment on pros and cons of satellite system based on TDMA. Also explain the TDMA frame format in detail with relevant diagrams. (15 marks)

[4 × 15 = 60 marks]

C 84453 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2014 ADMISSIONS) SPECIAL EXAMINATION, APRIL 2020

Electronics and Communication Engineering

EC 14 605—CONTROL SYSTEMS

Time : Three Hours Maximum : 100 Marks

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. (a) List out the properties of signal flow graph.

   (b) Write short note on open loop control system. Enlist the advantages and disadvantages.

   (c) Define the terms Gain margin and Phase margin with suitable expressions.

   (d) Derive the expressions and draw the response of first order system for unit step input.

   (e) Define steady state error and derive the expression for steady state error.

   (f) Write short note on sampling.

   (g) Find the transfer function and a single first-order differential equation relating the output $y(t)$ to the input $u(t)$ for a system described by the first-order linear state and output equations :

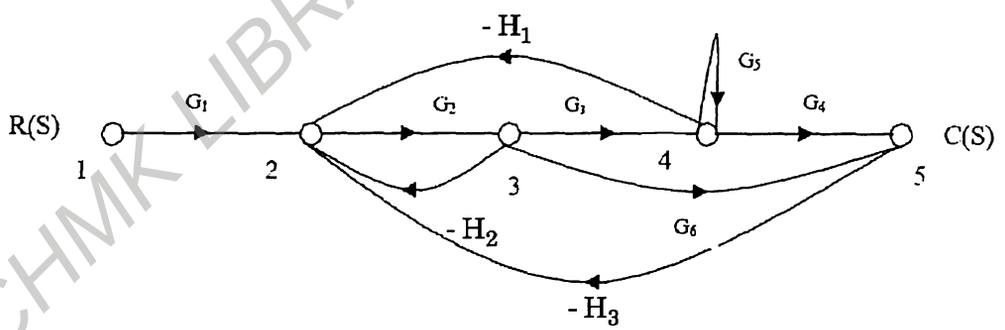
$$\frac{dx}{dt} = ax(t) + bu(t)$$
$$y(t) = cx(t) + d(t)$$

   (h) Write short note on concepts of Eigen values and eigen vectors in state space analysis.

   (i) State controllability and observability.

   (j) Explain with examples the State space representation of LTI system with multivariable systems.

2. (a) Find the overall gain $C(s) / R(s)$ for the signal flow graph shown below. (× 5 = 40 marks)



(15 marks)

Or

   (b) Explain the working of DC servo motor for position and speed control (15 marks)

Turn over

3. (a) (i) Derive the expressions and draw the response of first order system for unit step input.

(7 marks)

(ii) Draw the response of second order system for critically damped case and when input is unit step.

(8 marks)

Or

(b) Sketch the Bode plot and hence find Gain cross over frequency and Phase cross over frequency G (S) = 10/ {S (1 + 0.4S) (1 + 0.1S)}.

(15 marks)

4. (a) (i) Explain the following mapping between the S-Plane and the Z-Plane. (a) Primary strips and complementary Strips ; (b) Constant frequency loci ; and (c) Constant damping ratio loci.

(12 marks)

(ii) Explain the stability conditions of closed loop systems in the Z over in the S-plane.

(3 marks)

Or

(b) (i) List the difference between the Jury stability test and stability analysis using bilinear transformation coupled with Routh stability criterion ?

(8 marks)

(ii) Using Jury's test obtain the stability of the system whose characteristics equation is :

$Z^3 + 3.3Z^2 + 4Z + 0.8$.

(7 marks)

5. (a) Verify the observability of a control system which is represented in the state space model :

$$\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix}=\begin{bmatrix}-2 & -2\\ 1 & 0\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}+\begin{bmatrix}1\\ 1\end{bmatrix}[U] \; : Y=\begin{bmatrix}1 & 1\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}.$$

(15 marks)

Or

(b) Explain the controllability and conditions for controllability .Find the state space model in controllable canonical form :

$$Y(s)=\frac{s^3+4s-1}{s^4+s^3+s}U(s).$$

(15 marks)

[4 × 15 = 60 marks]

C 84452 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 ADMISSION] SPECIAL EXAMINATION, APRIL 2020

Electronics and Communication Engineering

EC 14 604—DIGITAL SIGNAL PROCESSING

Time : Three Hours Maximum : 100 Marks

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. (a) Find the N point circular convolution of $x_1(n)$ and $x_2(n)$ where

$$x_1(n) = x_2(n) = \begin{cases} 1, & 0 \le n \le N-1 \\ 0, & \text{elsewhere.} \end{cases}$$

(b) If X(F) evaluated at F = –0.2 is $2e^{j\pi/3}$. Find (i) $X(F)_{|F=0.2}$; (ii) $X(F)_{|F=0.8}$; (iii) $X(F)_{|F=3.2}$; (iv) $X(F)_{|F=5.8}$.

(c) Draw the transposed direct form II structure of :

$$H(Z) = \left(1 + 0.5Z^{-1} - 0.75Z^{2}\right) / \left(1 + 0.6Z^{-1} + 0.4Z^{2} - 0.2Z^{-3}\right).$$

(d) Write short note on lattice filter structure of an FIR filter.

(e) Write short notes on (i) Filter coefficient quantization and (ii) Truncation error.

(f) Determine teh poles of type I low pass Chebyshev filter that has 1 dB ripple in the pass band, a cut-off frequency (Ω_p) 1000 π, a stop band frequency of 2000 π and an attenuation of 40 dB or more for $\Omega \ge \Omega_p$.

(g) Write short note on design of FIR filter. Estimate the method of design of FIR filter.

(h) Convert the analog filter with system function $H_a(s) = S + 2/(S+1)(S+3)$ into digital filter by means of impulse invariance method.

(i) Explain the working of multiplier in Harvard architecture.

(j) Write short note on general purpose and special purpose DSP hardwares with example.

(8 × 5 = 40 marks)

Answer **all** *questions.*
Each question carries 15 *marks.*

2. (a) Explain the overlap and method for filtering of long data sequences.

Or

(b) Find the 8 point DFT of $x(n)$ = {1, 1, 0, 0, 0, 0, 0, 0} using the property of conjugate symmetry.

(15 marks)

Turn over

3. (a) Construct the block diagram and signal flow graph for the system described by equation :

$$d^2y(t)/dt^2 + 5dy/dt + 3y(t) = d^2x(t)/dt^2 + 2\,dx/dt + 5X(t).$$

Or

(b) Draw the IIR filter structure using Parallel form of IIR filter realization.

(15 marks)

4. (a) Design a linear phase low pass filter having length M = 15 cut-off frequency $\omega_c = \pi/6$ use Hamming window.

Or

(b) Design a band pass FIR filter for the following specifications cut-off frequency 400 Hz and 800 Hz sampling frequency 2000 Hz and N = 11.

(15 marks)

5. (a) Explain in detail digital hardware filters with suitable examples. (15 marks)

Or

(b) Explain the ADSP21XX processor in detail with suitable figures. (15 marks)

[4 × 15 = 60 marks]

C 84451 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE
[2014 Admission] SPECIAL EXAMINATION, APRIL 2020

Electronics and Communication Engineering

EC 14 603—VLSI DESIGN

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. (a) What is meant by sub threshold conduction ? Explain.
   (b) Explain channel length modulation.
   (c) Draw the circuit of a MOS inverter with saturated NMOS load and explain its working.
   (d) Explain carry bypass adder with necessry diagrams.
   (e) Design a 2 × 1 multiplexer using CMOS logic.
   (f) Compare the design procedures of a DRAM and SRAM.
   (g) State and explain Fick's law.
   (h) What is meant by Deal-Grove model ? Explain.
   (i) Explain SWAMI process.
   (j) With an example, explain the role of Stick diagram in VLSI design.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

2. (a) Explain in detail about Non-ideal I-V characterstics of P-MOS and N-MOS transistors.

Or

   (b) Explain in detail about the ideal I-V characteristics of a N-MOS and P-MOS device.

3. (a) Describe the design and implementation method of :
   (i) CLA adder. (7.5 marks)
   (ii) Square root carry selector adder. (7.5 marks)

Or

(b) Design the following combinational circuits using the CMOS logic :

(i) Two input NOR gate. (4 marks)

(ii) Parity generator. (4 marks)

(iii) Two input NAND gate. (4 marks)

(iv) Multiplexers. (3 marks)

4. (a) Explain with neat sketched the ion implantation process.

Or

(b) What is meant by lithography ? Explaiin various types of lithography with necessary diagrams.

5. (a) With neat diagrams, explain importantt isolation methods in VLSI design.

Or

(b) What is meant by design rules ? Write short notes on various rules n VLSI chip design.

[4 × 15 = 60 marks]

C 84450 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE
[2014 Admission] SPECIAL EXAMINATION, APRIL 2020

Electronics and Communication Engineering

EC 14 602—OPTICAL COMMUNICATION

Time : Three Hours Maximum : 100 Marks

Part A

I. Answer any *eight* questions out of ten :

1 Mention the advantages of optical fibre communication systems.

2 Explain the function of core and cladding in optical fiber.

3 Describe the dispersion on multimode fibres.

4 Discuss the effects of temperature on the performance of laser diode.

5 Explain edge emitting LEDs.

6 Write short notes on responsivity.

7 Differentiate homodyne and heterodyne systems.

8 Discuss the performance of DWDM optical system.

9 Draw and explain the basic format of STS-N SONET frame.

10 Discuss the concept of WDM with neat diagram.

(8 × 5 = 40 marks)

Part B

II. Answer *all* questions :

11 Discuss on the evolution of optical fibre communication.

Or

12 Write short notes on dispersion shifted and dispersion flattened fibres.

13 Discuss about modulation of laser diode and state the significance of thermo electric cooler in laser diodes.

Or

14 List the benefits, drawbacks and principles of avalanche photo diodes.

15 Explain ISI and equalizations.

Or

16 Enunciate on coherent systems.

17 Explain the amplification mechanism in EDFA. Discuss the possible configurations of EDFA with neat diagram.

Or

18 What are the system considerations in point to point links ? Explain in detail.

(4 × 15 = 60 marks)

C 84449 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE
[2014 Admission] SPECIAL EXAMINATION, APRIL 2020

Electronics and Communication Engineering

EC 14 601—RADIATION AND PROPAGATION

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. (a) Define the following parameters w.r.t. antenna :
   (i) Directive gain.
   (ii) Power gain.
   (b) Explain different types of aperture.
   (c) Define aperture of an antenna and find its relation with directivity.
   (d) Four sources have equal magnitude and are spaced $\lambda/2$ apart. Maximum field is to be in line with sources. Plot the field pattern of the array.
   (e) An omnidirectional (isotropic) antenna has a field pattern given by $E = 10I/r$ (V m–1), where I = terminal current (A) and r = distance (m). Find the radiation resistance.
   (f) Explain the working operation of parabolic reflector antenna in detail.
   (g) Explain the working operation of lens antenna.
   (h) How is aperture blockage in reflector antennas avoided ?
   (i) Describe the operation of Yagi Uda antenna.
   (j) Explain the following :
   (i) Critical frequency.
   (ii) Maximum usable frequency.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

2. (a) Derive the expression for radiation field and radiation resistance.

Or

(b) Write short note on :

(i) Vector potential. (ii) Modification potential.

(iii) Retarded potential. (iv) Capacitance hat.

3. (a) Derive expression for the array factor of a linear broadside array of a elements.

Or

(b) Write short notes on :

(i) Dolph-Tschebyscheff arrays. (ii) Tapering of arrays.

(iii) Binomial array. (iv) Continuous arrays.

4. (a) With neat diagrams, explain the design of long wire antenna, V and inverted V antenna.

Or

(b) Explain the principle of operation and at least one application for Microstrip antenna and fractal antenna.

5. (a) Derive an expression for effective dielectric constant of the ionosphere.

Or

(b) Write short notes on :

(i) Faraday's rotation.

(ii) Diffraction.

(4 × 15 = 60 marks)

C 84448 (Pages : 3) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE SPECIAL EXAMINATION, APRIL 2020

Civil Engineering

CE 14 606—COMPUTER APPLICATION AND OPERATIONS RESEARCH

(2014 Admissions)

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Find a real root of the equation $x^3 - 4x - 9 = 0$ by the method of false position correct to three decimal places.
2. Find the Newton Raphson method, $3x - 1 = \cos x$, the root of correct to three decimal places.
3. Solve the equations correct to two decimal places by Gauss Seidel method :

$$\begin{aligned} 7x + y + 2z &= 10 \\ x + 8y + 3z &= 8 \\ 2x + 3y + 9z &= 6. \end{aligned}$$

4. Find the larger eigen value of the matrix $\begin{bmatrix} 1 & 3 \\ 2 & 2 \end{bmatrix}$ using power method.
5. Find the polynomial $f(x)$ by using Lagrange's formula and hence find $f(15)$ for :

X	3	7	11	
$f(x)$	42	43	47	60

6. Solve $y = \left(x^3 + xy^2\right)e^{-x}, y(0) = 1$ using Taylor's series method and compute $y(0.2)$.
7. Use Simpson's one-third rule to find $\int_0^6 \frac{1}{1+x^2}\,dx$ by taking seven ordinates.
8. Find $f'(12)$ for the following data :—

X	0	10	20	30	40
$f(x)$	7	18	32	48	85

9. Solve the following assignment problem :—

	I	II	III	IV
A	8	26	17	11
B	13	28	4	26
C	38	19	18	15
D	9	26	24	10

10. Find an initial basic feasible solution to the following transportation problem :—

	I	II	III	IV	Supply
A	20	22	17	4	120
B	24	37	9	7	70
C	32	37	20	15	50
Demand	60	40	30	110	

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. (a) Apply LU factorisation method to solve the equations :

$$\begin{aligned} 8x - 3y + 2z &= 20 \\ 4x + 11y - z &= 33 \\ 6x + 3y + 12z &= 36. \end{aligned}$$

Or

(b) Solve the equations using Gauss Elimination method :

$$\begin{aligned} x + 4y - z &= -5 \\ x + y - 6z &= 12 \\ 3x - y - z &= 4. \end{aligned}$$

12. (a) Find $f(9)$ using Gauss forward and backward formula :

X :	0	4	8	12	16
$f(x)$:	14	24	32	35	40

Or

(b) Obtain the cubic spline for the data and evaluate $f(1.5)$ and $f'(1)$:

X :	1	2	3
$f(x)$:	– 8	– 1	18

13. (a) Given $y = 1 + y + x^2, y(0) = 0.5$, find $y(0.2)$ and $y(0.4)$ by using Runge-Kutta method of fourth order.

Or

(b) Estimate the value of $\int_0^2 \frac{x^2 + 2x + 1}{1 + (1+x)^4}\, dx$ using three-point Gauss quadrature.

14. (a) Using Simplex method, solve the following LPP :

Maximise $P = 50x_1 + 80x_2$

subject to $x_1 + 2x_2 \leq 32$

$3x_1 + 4x_2 \leq 84$

$x_1, x_2 \geq 0.$

Or

(b) (i) What is the purpose of mutation ? How is it implemented in genetic algorithms ?

(ii) Write short note on degeneracy.

(4 × 15 = 60 marks)

C 84447 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 Admission] EXAMINATION, APRIL 2020

Civil Engineering

CE 14 605—GEOTECHNICAL ENGINEERING—II

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Write a note on site reconnaissance.
2. Enlist the assumptions made in Boussinesq's equation.
3. What are the functions of foundations ?
4. Compare general shear failure and local shear failure.
5. List out the causes of settlement.
6. Define ultimate and allowable bearing capacity.
7. List out the types of footings.
8. Why are piles used in construction ? Enlist the use of pile foundation.
9. What do you mean by well foundation ? List out the components of well foundation.
10. Write down the static formula in pile foundation.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. (a) A rectangular area 2 m. × 4 m. carries a uniform load of 80 kN/m.^{2} at the ground surface. Find the vertical pressure at 5 m. below the center and corner of the loaded area.

Or

(b) Explain about the geophysical method of exploration.

12. (a) Derive on Terzaghi's bearing capacity of strip footing.

Or

(b) A strip footing, 1 m. wide at its base is located at a depth of 0.8 m. below the ground surface. The properties of the foundation soil are : γ = 18 kN/m.^{3} c = 30 kN/m.^{2} and $\Phi = 20°$. Determine the safe bearing capacity using a factor of safety of 3. Use Terzaghi's analysis. Assume the soil fails by local shear.

Turn over

13. (a) With the help of a neat sketch, describe how plate load test can be performed. How settlement of foundation can be arrived ?

Or

(b) A saturated soil has a compression index of 0.28. The void ratio at a stress of 12 kN/m.^{2} is 2.05 and its permeability is 35×10^{-7} mm/s, Compute :

(i) Change in void ratio if the stress is increased to 21.6 kN/m.^{2}

(ii) The settlement in (i) above if the soil stratum is 6 m. thick.

14. (a) An 8 m. long and 200 mm. diameter piles are used as foundations for a column in a uniform deposit of medium clay (q_u = 100 kN/m.^{2}). The spacing between the piles is 500 mm. There are 9 piles in the ground arranged in a square pattern. Calculate the ultimate pile load capacity of the group. Assume adhesion factor = 0.9.

Or

(b) Explain the principles of design of raft foundation.

(4 × 15 = 60 marks)

C 84446 (Pages : 3) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [SPECIAL] EXAMINATION, APRIL 2020

Civil Engineering

CE 14 604—STRUCTURAL ANALYSIS—III

(2014 Admissions)

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. A cantilever of length 15 m is subjected to a single concentrated load of 50 kN at the middle of the span. Find the deflection at the free end using flexibility matrix method. EI is uniform throughout.
2. Define flexibility and stiffness influence co-efficient.
3. List out the properties of rotation matrix and stiffness matrix.
4. Determine the stiffness matrix for the beam shown in Fig 1.

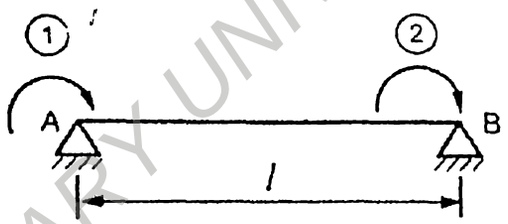


Fig 1

5. How are the basic equations of stiffness matrix obtained ?
6. Why is it necessary to transform the element stiffness matrix into global co-ordinates ?
7. Write a note on flexibility matrix method.
8. A vertical cable 3 m long has a cross-sectional area of 4 cm^2 supports a weight of 50 kN. What will be the natural period and natural frequency of the system ?
9. Write a short note on single degree of freedom (SDOF) systems.
10. A one kg mass is suspended by a spring having a stiffness of 1 N/mm. Determine the natural frequency and static deflection of the spring.

(8 × 5 = 40 marks)

Turn over

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. a) Analyse the given loaded truss shown in Fig 2 by compatibility method.

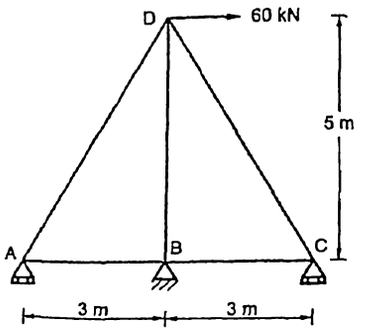


Fig 2

Or

b) Determine the forces in all members of the pin-jointed frame shown in Fig 3 by flexibility method, AE = constant.

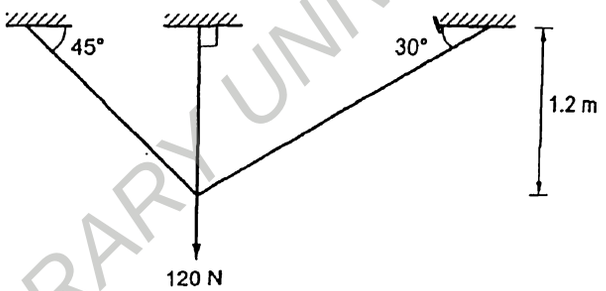
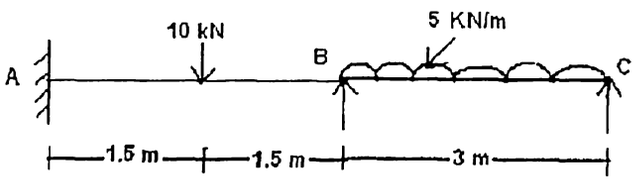


Fig 3

12. a) Analyse the continuous beam shown in Fig 4 using displacement method.



EI = constant

Fig 4

Or

b) Analyse the given frame shown in Fig 5 by equilibrium method. Draw the BMD.

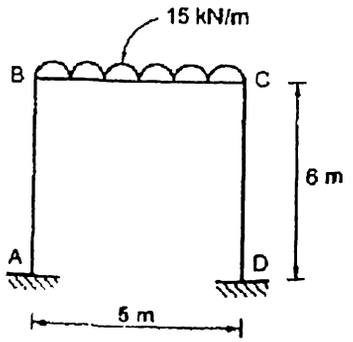


Fig 5

13. a) Analyze the given beam in fig 6 by direct stiffness method. Draw the bending moment diagram.

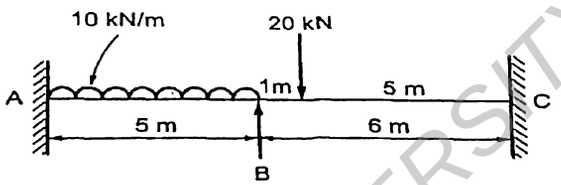


Fig 6

Or

b) Analyze the given beam in Fig 7 by direct stiffness method. Draw the bending moment diagram.

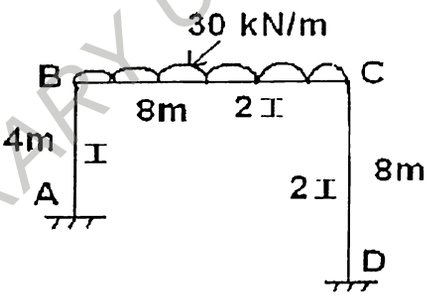


Fig 7

14. a) A system vibrating with a natural frequency of 6 Hz starts with initial amplitude (x_0) of 2cm and an initial velocity of 25 cm/sec. Determine the natural period, amplitude, maximum velocity, maximum acceleration and phase angle. Also write the equation of motion of a vibrating system.

Or

b) Formulate the characteristics equation of motion for free vibration of an undamped system to find the natural frequency.

(4 × 15 = 60 marks)

C 84445

(Pages : 2)

Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 Admission] EXAMINATION, APRIL 2020

Civil Engineering

CE 14 603—HYDROLOGY AND IRRIGATION ENGINEERING

Time : Three Hours

Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Define precipitation and probable maximum precipitation.
2. List out any five factors affecting evaporation.
3. Explain hyetograph with the help of diagram.
4. Discuss the merits and demerits of irrigation.
5. Differentiate flow irrigation and lift irrigation.
6. What are the measures adopted for preventing water logging ?
7. What are the requirements of canal outlets ?
8. Write a note on flood plain zoning.
9. Explain rational formula for computing peak flood. What are its limitations ?
10. Compare Kennedy's and Lacey's silt theories.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. (a) (i) Explain the hydrological cycle. (7 marks)

(ii) The average annual rainfall in cm. at 4 existing rain gauge stations in a basin is 105, 79, 70 and 66. If the average depth of rainfall over the basin is to be estimated within 10 % error, determine the additional number of gauges needed. (8 marks)

Or

(b) (i) Explain the various factors affecting the evaporation. (7 marks)

(ii) Write a note on infiltration capacity. (8 marks)

12. (a) (i) Write a note on drip irrigation. (7 marks)

(ii) Derive the relation between Delta and Duty. (8 marks)

Or

(b) (i) List the advantages of furrow method of irrigaton. (7 marks)

(ii) An irrigation canal has gross commanded area of 80000 hectares out of which 85 % is culturable irrigable. The intensity of irrigation of Kharif season is 30 % and if Rabi season 60 %. Find the discharge required at the head of the canal if the duty at its head is 800 hectares/cumec for Kharif season and 1700 hectares/cumec for Rabi season.

(8 marks)

13. (a) (i) Discuss the classification of canals. (8 marks)

(ii) Explain the advantages and limitatons of contour canal. (7 marks)

Or

(b) (i) Design a channel section by Lacey's theory :

- Supply discharge = 10 $m.^3$
- Average size of the bed material = 0.33 m.
- Slope = 1.5 H : 1 V

Find also the bed slope of the channel.

(8 marks)

(ii) List the advantages and disadvantages of canal lining. (7 marks)

14. (a) The ordinates of 6 hour unit hydrograph are given below :

Time (Hrs.)	*6 hour unit hydrograph ordinates (m/s)*	*Time (Hrs.)*	*6 hour unit hydrograph ordinates (m/s)*
0	0	30	3100
3	200	33	2300
6	500	36	1500
9	1000	39	1000
12	1600	42	650
15	2400	45	400
18	3500	48	250
21	4200	51	150
24	5200	54	0
27 ...	4400		

Derive 12 hour unit hydrograph of the same unit volume as of the 6 hour unit hydrograph.

Or

(b) (i) Define river training work and enlist the objectives of river training works.

(7 marks)

(ii) Write a note on flood storage basin. (8 marks)

[4 × 15 = 60 marks]

C 84444 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 ADMISSION] EXAMINATION, APRIL 2020

Civil Engineering

CE 14 602—TRANSPORTATION ENGINEERING—II

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. What do you mean by sleeper density ?
2. State the demerits of coning of wheels.
3. List out the components of permanent way.
4. State the principles of interlocking.
5. Discuss about the objectives of track alignment.
6. Compare wet docks and dry docks.
7. Write a note on piers.
8. Describe about the functions of breakwaters.
9. Discuss about automated highways.
10. Explain the benefit cost ratio method.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. (a) (i) Compare the different types of sleepers. Give all details. (7 marks)

(ii) What are the ideal requirements of rail fastenings ? (8 marks)

Or

(b) (i) Compare the maximum permissible speed for the following data on a curve of high speed B.G. for the following data :

Degree of curve = 1.2, Amount of super elevation = 8 cm. Length of transition curve = 150 m., Maximum sanctioned speed likely to be 145 kmph.

(7 marks)

(ii) Explain about various considerations for horizontal curves. (8 marks)

Turn over

12. (a) Explain about the signalling and interlocking.

Or

(b) Discuss the methods of tunnelling in hard rock.

13. (a) Enumerate the various design considerations of a harbour.

Or

(b) (i) What are the uses of dry and wet docks ? What is the role of warehouses ? (7 marks)

(ii) What is a transit shed ? List out the important factors influencing the transit shed. (8 marks)

14. (a) Explain the salient features of first, second, third and fourth road development plans in India.

Or

(b) Discuss the Highway road user's benefits.

[4 × 15 = 60 marks]

C 84443 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 ADMISSION] EXAMINATION, APRIL 2020

Civil Engineering

CE 14 601—STRUCTURAL DESIGN—II

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. What are the factors to be considered in mechanical properties of structural steel ?
2. Write the classification of connections.
3. How do you calculate the effective throat thickness ?
4. List the factors that influence the strength of tension member.
5. Define the term lug angle. Why is it not used in practice ?
6. State the possible failure modes in an axially loaded column.
7. Explain the various types of stiffeners.
8. Explain the term web crippling.
9. List out the different components of roof trusses.
10. Write a note on gantry girder.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. (a) Design a lap joint between the two plates each of the width 120 mm. if the thickness of the one plate is 16 mm. and the other is 12 mm. The joint has to transfer a design load of 160 kN. The plates are Fe410 grade. Use bearing type bolts.

Or

(b) Design a double cover butt joint for connecting 400 mm. × 15 mm. flats. Assuming allowable stress as per IS : 800. Find the efficiency of the joint.

12. (a) Design a double angle tension member connected on each side of a 10 mm. thick gusset plate to carry an axial factored load of 375 kN. Use 20 mm. black bolt. Assume shop connection.

Or

(b) Design a slab for a column ISHB 300 @ 577 N/mm., carrying a factored load 1000 kN. M20 concrete is used for foundation. Provide welded connection between column and base plate.

13. (a) An ISMB 500 section is used as a beam over a span of 6 m. with simply supported ends. Determine the maximum factored uniformly distributed load that the beam can carry if the end as restrained against torsion but compressive flange is laterally unsupported.

Or

(b) Design a steel column of rolled steel "I" section to carry an axial load of 500 kN. The column is 4 m. long and it is effectively held in position at both ends, but restrained against rotation at one end only. Take yield stress = 250 N/mm.^{2}

14. (a) Determine the basic wind intensity for an industrial building situated in Chennai using the following data :

Life of structure = 50 years
Size of building = 20 m. × 40 m.
Height of eve board = 10 m.
Topography : Slope < 3 degree
Slope : 1 in 4.

Or

(b) Design the purlin for the following specifications :—

Span of truss = 12 m c/c
Pitch = 1/5th of span
Spacing of truss = 5 m c/c
Spacing of purlins = 1.5 m c/c
Load from roofing materials = 200 N/m.^{2}
Wind load = 1200 N/m.^{2}

Use Angle section.

(4 × 15 = 60 marks)

C 84441 (Pages : 4) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 ADMISSION] EXAMINATION, APRIL 2020

Applied Electronics and Instrumentation Engineering

AI 14 601—ENGINEERING ECONOMICS AND PRINCIPLES OF MANAGEMENT

Time : Three Hours Maximum : 100 Marks

Section 1 (Engineering Economics) (50 Marks)

Part A

Answer any **four** *questions.*
Each question carries 5 *marks.*
Use of interest tables is allowed.

1. Describe the scope of 'Engineering Economics'.
2. Following are the cost data pertaining to a company for the year 2019 :

   Fixed cost = Rs.80,00,000 ; Variable cost per unit = Rs. 400 ; Selling price per unit = Rs. 800 ; Producion quantity = 2,40,000 units.

   From the above data, determine (i) Breakeven quantity ; (ii) Contribution ; and (iii) Margin of safety.
3. Describe GDP and GNP.
4. What is meant by 'time value of money' ? What are regarded as 'future value', 'series compound factor' and 'effective interest rate' ?
5. A bank gives a loan to a company to purchase a machine for the price of Rs.50,00,000 at an interest rate of 12 % compounded annually. This amount should be repaid in 10 yearly equal installments. Determine the installment amount that the company has to pay to the bank.

(4 × 5 = 20 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

6. (a) (i) Describe the characteristics of demand and supply. (5 marks)

   (ii) With the aid of a graph, describe about market equilibrium. (10 marks)

   Or

   (b) Describe any three methods of measuring national income. (15 marks)

7. (a) (i) A project costs Rs. 10,00,000 and yields annual cash inflows of Rs.2,00,000, Rs. 3,00,000, Rs. 4,00,000 and Rs. 5,00,000 in the first, second, third and fourth years respectively. Calculate the payback period.

(10 marks)

(ii) Under what circumstances, value analysis is applied in manufacturing companies.

(5 marks)

Or

(b) (i) From the following particulars presented below, compute the net present value of projects A and B :

Particulars	*Year*	*Project A*	*Project B*
Investments (in Rs.)		8,00,000	10,00,000
	1st	1,00,000	5,00,000
	2nd	2,00,000	4,00,000
Annual cash	3rd	3,00,000	2,00,000
inflows in Rs.	4th	4,00,000	1,00,000
	5th	5,00,000	1,00,000

State the project which should be chosen based on the net present value.

(15 marks)

Or

(ii) A company is planning to purchase an Electrically Operated Travelling (EOT) crane. In addition to improving the material handling, the installation of EOT crane will provide safety, easiness of operations and high speed benefits. Three models of EOT cranes are under consideration for purchase. The estimated benefits and costs that are associated with each model are presented below :

Particulars	*Model A*	*Model B*	*Model C*
Initial cost in Rs.	20,00,000	25,00,000	30,00,000
Annual benefit in Rs.	1,80,000	2,00,000	2,50,000
Benefits through safety in Rs.	1,00,000	1,50,000	2,50,000
Benefits through easiness of operation in Rs.	2,00,000	2,00,000	1,50,000
Benefits through high speed operation in Rs.	50,000	50,000	1,00,000
Operation and maintenance cost in Rs.	1,20,000	1,60,000	2,00,000

The interest rate is 12 % and the life of each model of EOT crane is estimated at 20 years. Calculate the benefit cost ratio for each model of EOT crane. Suggest the model of EOT crane which the company should purchase if benefit cost ratio is the selection criterion.

(15 marks)

[2 × 15 = 30 marks]

Section 2 (Principles of Management) (50 Marks)

Part A

Answer any **four** *questions.*
Each question carries 5 *marks.*

1. Describe the activities carried out under 'planning' function of management.
2. Describe the meaning and characteristics of operational decisions.
3. What are 'incentives' ? What are the different types of incentives offered to the industrial workers ?
4. A fabrication concern, for the year 2018-2019 had factory overheads of Rs. 4,00,000 and the direct labour cost of Rs. 1,20,000. Determine the percentage overhead using percentage of direct labour cost method. If the production orders 'A' and 'B' had direct labour costs of Rs. 6,000 and Rs. 10,000 respectively, determine the overhead cost for each production order.
5. The time required to carry out the activities of a project is presented below :

Activity	*Time required to carry out the activity in days*
1—2	5
2—4	10
4—6	5
1—3	2
3—5	10
5—6 ...	5

Draw the CPM network of the above project and determine the total duration of the above project. Also, determine the slack of each activity.

(4 × 5 = 20 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

6. (a) Briefly enumerate Henry Fayol's 14 principles of management. (15 marks)

Or

(b) (i) What are the basic requirements of 'industrial relations programme' of a manufacturing organization.

(5 marks)

(ii) Enumerate the steps followed to settle industrial disputes by employing 'collective bargaining'.

(10 marks)

Turn over

7. (a) (i) Enumerate the steps to be followed to plan and prepare advertisement in a car manufacturing company.

(5 marks)

(ii) Describe about the advertisng media and their applicability in specific situations and environments.

(10 marks)

Or

(b) From the following balances extracted at the close of the year ended 31st March, 2019, prepare the 'profit and loss account' and balance sheet of a manufacturing company by name ABC :

Item	*Amount in* Rs.
Sales	6,00,000
Salaries	5,00,000
Rent	30,000
Printing and Stationery	9,000
Bad debts	3,000
Travelling expenses	60,000
Rent received on sub-letting ...	10,000
Cash in hand	4,000
Cash in bank	8,000
Capital	20,000
Creditors	10,000
Debtors	4,000

(15 marks)

[2 × 15 = 30 marks]

C 84440 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2020

Printing Technology Engineering

PT 09 L01—DIGITAL PREPRESS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *the questions.*
Each question carries 2 *marks.*

1. Name the basic stages in the creation of a digital page and a complete digital print.
2. Define Focal Length of Lenses.
3. List different types of data formats used in digital prepress.
4. Define colour management.
5. List the advantages of digital sheet assembly.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

1. Explain the new development that are possible in prepress with new technologies.
2. Describe the principles of image scanning and color separation in digital photography.
3. What are the different types of storage media used in digital prepress ? Explain the classificaton.
4. Explain the image reproduction process using colour management.
5. Explain the digital imposition workflow.
6. How does tone value influence in printing ?

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

1. (a) Explain the image dependent effects and related corrections that can be made on the output results.

Or

(b) What is print characteristic curve ? Explain its importance.

Turn over

2. (a) Describe in detail the digital photography and colour management.

Or

(b) Explain with neat diagrams the different types of scanners used in digital prepress.

3. (a) What is RIP ? Brief. Explain the structure and functions of RIP.

Or

(b) Explain the use of network and its concepts in digital prepress and its components.

4. (a) Describe about various digital proofing and their limitations.

Or

(b) Write an essay on colour management and standardization.

(4 × 10 = 40 marks)

C 84439 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2020

Printing Technology Engineering

PT 09 603—DESIGN OF MACHINE ELEMENTS

Time : Three Hours Maximum : 70 Marks

Assume missing data suitably.
Use of design data hand book is permitted.

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Define strain.
2. Draw a neat sketch of Muff coupling and label the different parts in it.
3. Define addendum and deddendum with respect to spur gear.
4. What is meant by hydrodynamic theory ?
5. What do you mean by critical speed in design of shafts ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Draw the stress-strain for a MS. Explain the salient features in it.
7. Explain various types of initial stresses in threaded fasteners due to static loading.
8. Explain the phenomenon of slip and creep in belt drives.
9. Draw sketches of ball bearing and roller bearing. Explain each of them in brief.
10. List the basic assumptions used in hydrodynamic lubricated bearings.
11. Explain the following terms used in helical springs :

    (i) Free length ; (ii) Solid height ; (iii) Spring rate ; (iv) Spring index ; (v) Active and inactive coils.

(4 × 5 = 20 marks)

Part C

All *questions are compulsory with choice to answer any* **one** *between the sub-questions. Each question carries* 10 *marks.*

12. (a) Sketch and explain the following types of keys :

(i) Sunk key ; (ii) Saddle key ; (iii) Tangent key ; (iv) Splines ; (v) Round key.

Or

(b) Design a muff coupling used to connect two steel shafts transmitting 50 kW power at 500 rpm. The material for shaft and key is plain carbon steel for which allowable shear and crushing stress may be taken as 40 MPa and 70 MPa respectively. The muff is made up of CI and allowable shear stress may be assumed to be 14 N/mm.^{2} Assume maximum torque transmitted is 5 % more than that of mean torque.

13. (a) Design a single reduction parallel helical gears for speed reduced having 5 : 1 speed ratio. It is to be capable of transmitting the full load rating of 15 kW for at 1000 rpm of pinion. Use chrome nickel steel for pinion and C 45 steel for gear. Select class III type gears. Check for dynamic and limiting wear load. The helix angle is 230 for the gear wheels. The profile is full depth involute of 200 pressure angle. Is surface treatment essential ? Provide justification. Also evaluate the dynamic strength of the gear.

Or

(b) Select a V-belt drive to transmit 9 kW from a shaft rotating at 1200 rpm to a parallel shaft to run at 300 rpm. The approximate center distance is 1.2 m.

14. (a) Design a journal bearing for a pump from the following data :—

Load on the journal = 25000 N, speed of the journal = 1000 rpm, type of oil is SAE 10, for which the absolute viscosity at 55° C. = 0.017 kg./m-s; ambient temperature of oil = 24°C.; maximum bearing pressure for the pump = 2.0 N/mm.^{2} Heat dissipation coefficient = 1232 W/m.^{2}/°C.

Or

(b) A journal bearing with a diameter of 400 mm. and length of 250 mm. carries a load of 30 kN, when the journal speed is 250 rpm. The diametral clearance is 0.002. If possible the bearing is to operate at 35° C. ambient temperature without external cooling with a maximum oil temperature of 90° C. If external cooling is required it is to be as little as possible to minimise the required oil flow and heat exchanger size.

15. (a) A spring loaded safety valve for a boiler is required to blow off at pressure of 0.8 MPa. The diameter of valve seat is 90 mm. and maximum lift of valve is of 10 mm. Design a suitable spring for the valve assuming the spring index as 7. Provide an initial compression of 30 mm. Take allowable shear stress at 420 MPa and G = 80 GPa.

Or

(b) Design a leaf spring for the following specificatons : Total load = 140 kN ; Number of springs supporting the load = 4 ; Maximum number of leaves = 10 ; Span of the spring = 1000 mm.; Permissible deflection = 80 mm. Take Young's modulus, E = 200 kN/mm.^{2} and allowable stress in spring material as 600 MPa.

(4 × 10 = 40 marks)

C 84438 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2020

Printing Technology Engineering

PT 09 602—INSTRUMENTATION AND CONTROL

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Define resolution of a measuring instrument.
2. Define Linearity of a measuring instrument.
3. Name the various types of strain gauges for different applications.
4. Define Accelerometer.
5. Define Nyquist stability criteria.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Explain the construction and working of LVDT with a neat sketch.
7. Derive an expression for gauge factor of strain gauge in terms of Poisson ratio.
8. Explain with sketch monochromatic radiation pyrometer.
9. State and explain laws of thermocouple ? What are the applications of these laws ?
10. Differentiate between Open loop and Closed loop control system.
11. Derive an expression for the transfer function of any one of the control system.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. (a) Explain the measurement of pressure using U-tube manometer.

Or

(b) Discuss the constructional features of Bourdon-tube pressure gauge.

13. (a) Explain the operation of Ballard circuit using strain gauge and Wheatstone bridge circut. Also compare both the circuits.

Or

(b) Define : (i) Flat grid ; (ii) Foil grid ; (iii) Moisture Proofing ; (iv) Calibration ; (v) Rosette.

14. (a) Discuss about the different techniques to measure the torque.

Or

(b) Explain about the proper orientation of gauge for the measurement of axial and bending strain.

15. (a) With suitable examples bring out the advantages of closed loop system over open loop system.

Or

(b) Draw the block diagram of a closed loop system. Also explain why negative feedback is invariably preferred in such systems.

(4 × 10 = 40 marks)

C 84437 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2020

Information Technology Engineering

IT/CS/PTCS 09 604—DATABASE MANAGEMENT SYSTEMS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Differentiate File systems and Database management system.
2. What is logical data independence ?
3. Write the Tuple relational calculus expression to find the number of employees working in sales department in the given relation employee. Employee (SSN-No, Name, Department).
4. Define triggers.
5. When is a functional dependency said to be trivial ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Explain the Database Management System architecture with a neat diagram.
7. What are the needs for the development of relational databases ?
8. Discuss about the techniques used for placing file records on disks.
9. Define 3NF and Boyce-Codd NF. Explain with suitable examples.
10. Discuss the ACID properties of a transaction. Give relevant example.
11. Discuss two phase locking protocol. Give relevant example.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. (a) Construct an ER diagram for a company, which sells and services cars. The company keeps information about customers who purchase one or more cars, the sales person who is responsible for the sale and service details for each car is maintained. (Assume minimum of 4 attributes on each entity type).

Or

(b) Explan the following terms with suitable example :

(i) Primary key ; (ii) Candidate key ; (iii) Super key ; (iv) On delete cascade.

13. (a) What is RAID ? List the different levels in RAID technology and explain its features.

Or

(b) Explain the different types of indexes. Which of these indexes are dense and which are not ?

14. (a) List the operations of the relational algebra and explain with suitable examples.

Or

(b) Explain in detail about decomposition using multi-valued dependencies.

15. (a) Explain about the various security issues in statistical databases and explain ARIES recovery algorithm.

Or

(b) Why is concurrency control needed ? Explain lost update. Inconsistent retrievals and uncommitted dependency anomalies.

(4 × 10 = 40 marks)

C 84436 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2020

Information Technology Engineering

IT/CS/PTCS 09 603—COMPUTER NETWORKS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Write the advantages of the distance vector routing technique.
2. Define WiMAX.
3. List the significance of using the fast Ethernet technique.
4. What is the use of presentation layer ?
5. What is TCP/IP ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Explain the cell switching with example.
7. Discuss about Wi-Fi technology.
8. What is subnetting ? Also state which classes of IP address can be subnetted.
9. Discuss briefly about Multicast addresses.
10. Highlight the features of UDP and briefly discuss the same.
11. Discuss how TCP provides reliability using error control.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. (a) How does a Token Ring LAN operate ? Discuss. List the two different basic transmission technologies that can be used to setup wireless LAN's.

Or

(b) Discuss in detail about the wireless LAN MAC sublayers. Also discuss about the high speed networks.

Turn over

13. (a) State the major difference between Distance Vector Routing and Link State Routing. Discuss how these techniques work.

Or

(b) What is the global internet ? Explain its working in detail.

14. (a) Discuss about the network address translation technique.

Or

(b) Discuss briefly about four variants of PIM and also explain in detail about DVMRP.

15. (a) Discuss connection establishment and connection release in TCP. Also discuss about the strategies used to avoid congession in TCP.

Or

(b) Explain in detail about the following :

(i) DNS.

(ii) HTTP.

(4 × 10 = 40 marks)

C 84434 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2020

Computer Science and Engineering

CS/PTCS 09 605—COMPUTER GRAPHICS

Time : Three Hours Maximum : 70 Marks

Part A (Short Answer Questions)

Answer **all** *questions in one* **or** *two sentences.*
Each question carries 2 *marks.*

1. Draw a labelled diagram of shadow mask CRT.
2. List any four properties of Bezier curve.
3. How polygon is represented in computer graphics system ?
4. Give the equation for Window to Viewport Transformation.
5. How can you generate Pie chart ?

(5 × 2 = 10 marks)

Part B (Analytical/Problem Solving Questions)

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Rasterize the line from (– 1, 1) to (5, – 8) using Bresenhams line drawing algorithm.
7. Describe 3-D scaling along with its matrix representation.
8. Describe the 2-D transformation matrix for rotation about arbitrary point.
9. Describe any two text mode graphics function with syntax.
10. Determine the blending function for uniform periodc B-Spline curve for $n = 4$, $d = 4$.
11. Discuss how can you compute the vanishing point in 3D?

(4 × 5 = 20 marks)

Part C (Descriptive/Analytical/Problem Solving Questions)

Answer **all** *questions.*
Each question carries 10 *marks.*

12. (a) Explain Random Scan displays and Raster Scan displays. Differentiate them.

Or

(b) Describe Sutherland-Cohen algorithm and compare it with explicit line clipping algorithm.

Turn over

13. (a) Write C code form drawing circle using mid point circle generation algorithm.

Or

(b) Explain a method to rotate an object about an axis that is not parallel to the co-ordinate axis with neat block diagram and derive the transformation matrix for the same.

14. (a) List four types of curve generations. Describe B-Spline method for curve generation.

Or

(b) Prove that rotation followed by translation is not same as translation followed by rotation in three dimensions.

15. (a) Discuss the three-dimensional composite transformation.

Or

(b) What are all the two types of projections ? Explain in detail.

(4 × 10 = 40 marks)

C 84435 (Pages : 3) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2020

Information Technology Engineering

IT/CS/PTCS 09 602—COMPILER DESIGN

Time : Three Hours Maximum : 70 Marks

Part A (Short Answer Questions)

Answer **all** *questions.*
Each question carries 2 *marks.*
One / two sentences.

1. State the responsibilities of a back end and front end of a compiler.
2. Give the hierarchical structure of a programming language.
3. What is a LL (1) grammar ? When a grammar is not said to be a LL (1) grammar ?
4. Define a basic block and a flow graph.
5. State the purpose of Next-Use information in a code generator.

(5 × 2 = 10 marks)

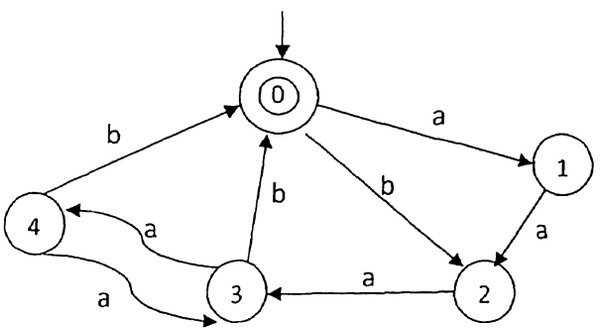
Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*
Analytical / Problem solving questions.

1. Write down the regular expression for the following C language constructs :

   Integer constant, C identifier, Exponential and String literal

2. Minimize the following DFA :



3. Construct a Finite Automata foe the regular expression $(x+y)^* y(x+y)$.

4. Consider the following grammar

   $S \to A \qquad A \to A + A \mid B + + \qquad B \to y$

   Draw the parse tree for the input "$y + + + y + +$"

5. Explain when an attribute is considered to be synthesized and inherited attribute.

6. Show the relation between a Basic block and a flow graph with an example.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*
Descriptive / Analytical / Problem solving questions.

12. (A) Consider the following expression $a^*(b \mid a)bb$:

    a) Construct a DFA foe the regular expression above using the subset construction algorithm.

    b) Use the algorithm foe state minimisation to construct a minimised DFA for the same.

    c) Trace for the string $w = aabbb$.

Or

(B) What is the role of an lexical analyzer ? Design a lexical analyzer for the keywords BEGIN, END, ELSE, IF, THEN, identifier, constant and the relational operators $>, >=, <., <=, <>, =$.

13. (A) Consider the following grammar and determine if it's LL (1) grammar.

$S \to aS \mid Ab \qquad A \to XYZ \mid C \qquad X \to cS \mid C$
$Y \to dS \mid C \qquad Z \to eS$

What will happen if we add the production $X \to bS$? Explain.

Or

(B) Construct an SLR (1) parsing table for the following grammar and trace for the string zxy for acceptance or rejection.

$G \to S \quad S \to x \quad S \to Ay \quad A \to Bx \quad B \to z$

14. (A) Explain about a three address statement ? Write the quadruples for the following statement.

$-(x+y)*(r+s)-(x+y+r)$.

State the syntax directed translation for the assignment statement.

Or

(B) State the issues related to syntax directed translation of control statements. Show the semantic actions for the control statements.

15. (A) What are the transformation functions that help in defining a quality of target code with respect to local and global levels ? Explain with examples.

Or

(B) Explain code optimization and describe the issues in a simple code generator.

(4 × 10 = 40 marks)

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2020

Mechanical Engineering

ME/AM/AN 09 L03—INDUSTRIAL MAINTENANCE

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. State the purposes of industrial maintenance.
2. What is preventive maintenance ?
3. What is meant by unbalance in vibration ?
4. What is Ferrography ?
5. Define MTBF.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Explain the applications of transducers for vibration measurement.
7. Discuss the common forms of misalignment.
8. Explain vibration signature analysis.
9. What is spectral oil analysis ? Describe its procedure.
10. A system is composed of two independent and identical active units and at least one unit must operate normally for the system success. Each unit's constant failure rate is 0.0008 failures per hour. Calculate the system mean time to failure and reliability for a 150 hour mission.
11. Explain reliabiilty estimation using exponential distribution function.

(4 × 5 = 20 marks)

Part C

Answer **all** *the questions.*
Each question carries 10 *marks.*

12. (a) Discuss different types of industrial maintenance with examples.

Or

(b) What is condition monitoring ? Discuss various methods of condition monitoring.

13. (a) Explain the following :

(i) Spectral analysis.

(ii) Proximity analysis.

Or

(b) Discuss the condition monitoring of ball and roller bearings using shock pulse analysis.

14. (a) Explain various types of non-destructive testing. State its merits and limitations.

Or

(b) Explain with neat sketches, corrosion monitoring using acoustic emission method.

15. (a) Write short notes on the following :—

(i) Maintainability.

(ii) Failure rate.

Or

(b) Discuss the evaluation of reliability in series and parallel configuration with examples.

(4 × 10 = 40 marks)

C 84432 (Pages : 3) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2020

Mechanical Engineering

ME/PTME/AM 09 605—COMPUTER INTEGRATED MANUFACTURING

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Define distributed numerical control (DNC).
2. What is post-processing in computer-assisted part programming ?
3. Differentiate dedicated storage policy and randomized storage policy of AS/RS.
4. Find the advantage of optical character recognition technology over bar code technology.
5. What is control resolution in a robot positioning system ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. State the disadvantages of implementing NC technology.
7. Write short notes on different types of CNC software.
8. Develop the APT geometry statements to define the hole positions of the part in Figure 1. Use the lower left corner of the part as the origin in the *x-y* axis system. Consider that the points are defined 10 mm above part surface for convenience.

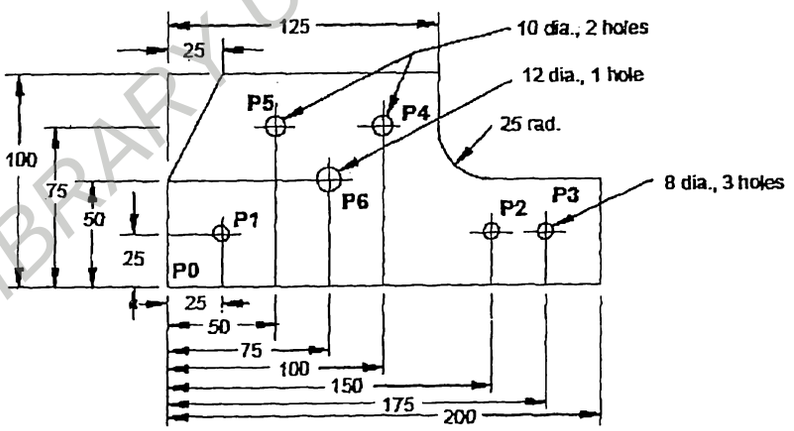


Figure 1

Turn over

9. What are the various factors that influence AS/RS throughput ?

10. Describe the functions of the material handling and storage system in a flexible manufacturing system.

11. Using the notation scheme for defining manipulator configurations, draw diagrams of the following robots : (a) TRT, (b) TRL, (c) TRT : R, (d) RR : T.

(1 + 1 + 1.5 + 1.5)

[4 × 5 = 20 marks]

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. a) Discuss the different classification of NC machine tool systems.

Or

b) Explain the different methods to improve machine accuracy and productivity.

13. a) Develop the part program to drill the holes in the part shown in Figure 2. The part is 12.0 mm thick. Cutting speed =100 m/min and feed = 0.06 mm/rev. Use the lower left corner of the part as the origin in the x-y axis system. Write the part program in the word address format using absolute positioning.

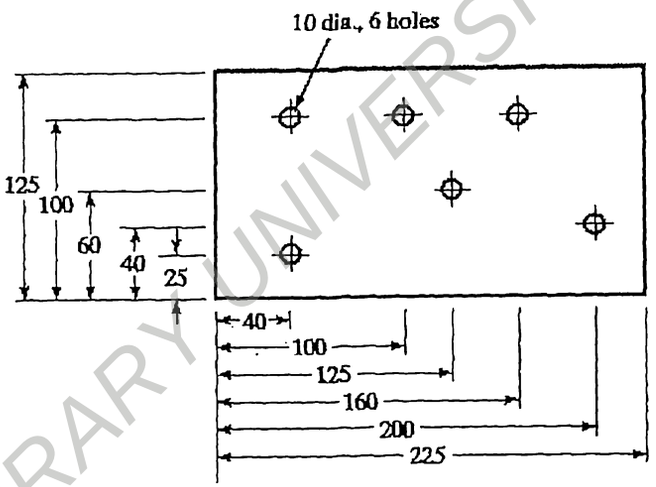


Figure 2

Or

b) The outline of the part shown in Figure 1 is to be profile milled using a 30 mm diameter end mill with four teeth. The part is 15 mm thick. Cutting speed = 150 mm/min and feed = 0.085 mm/tooth. Use the lower left corner of the part as the origin in the *x-y* axis system. Two of the holes in the part have already been drilled and will be used for clamping the part during profile milling. Develop the part program in the word address format. Use absolute positioning.

14. a) Discuss the following : (i) Types of AGVs and (ii) Types of AS/RS.

(5 + 5 = 10 marks)

Or

b) What is production flow analysis (PFA)? Discuss the steps involved in PFA procedure.

15. a) Discuss about FMS Planning and Implementation Issues.

Or

b) Compare Mechanical, Suction, and Magnetic Grippers. Suggest a suitable Gripper for the component shown in Figure 3. Justify your selection with the appropriate reason.

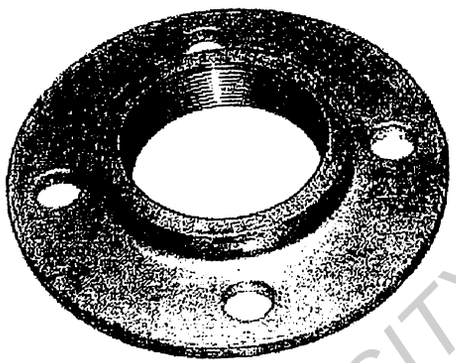


Figure 3 Cast Iron Flange

[4 × 10 = 40 marks]

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2020

Mechanical Engineering

ME/PTME 09 604—OPERATIONS RESEARCH

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

I. 1 List the different phases of OR.

2 Distinguish between Slack and Surplus variables in LPP.

3 Write the Mathematical model of transportation problem.

4 Differentiate between Pure and Mixed strategy.

5 What is dynamic programming ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

II. 6 Using graphical method, solve the following LPP :

Maximize $Z = 2x_1 + 3x_2$

Subject to

$x_1 - x_2 \leq 2$

$x_1 + x_2 \geq 4$

and $x_1, x_2 \geq 0$.

7 Solve the following LPP by Simplex method :

Maximize $Z = 3x_1 + 4x_2$

Subject to $2x_1 + 5x_2 \leq 120$

$4x_1 + 2x_2 \leq 80$

and $x_1, x_2 \geq 0$.

8 Find the basic feasible solution to the following using North West Corner rule :—

		To E	F	G	H	Availability
From	A	4	8	10	16	100
	B	7	2	3	1	200
	C	5	9	11	2	300
	Requirement	160	240	105	95	

9 Solve the assignment problem for maximizing the profit. The profit matrix is given below. (Profit in rupees) :

		Machines P	Q	R	S
Job	A	51	53	54	50
	B	47	50	48	50
	C	49	50	60	61
	D	63	64	60	60

10 For the pay-off matrix given below, find the optimal strategies for the players and value of the game :

		Player B B_1	B_2
Player A	A_1	8	– 3
	A_2	– 3	1

11 A super market has two girls ringing up sales at the counters. If the service time for each customer is exponential with mean 4 minutes and if people arrive in Poisson at the rate of 10 an hour :

(a) What is the probability of having to wait for service ?

(b) What is the expected percentage of idle time for each girl ?

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

III. (a) (i) A company produces two types of leather belts A and B. A is of superior quality and B is of inferior quality. The respective profits are of ` 10 and ` 5 per belt. The supply of raw material (leather) is sufficient for making 850 belts per day. For belt A special type of buckle is required and only 500 are available per day. There are 700 buckles available for belt B per day. Belt A needs twice as much time as that required for belt B and the company can produce 500 belts if all of them were of the type A. Formulate a linear programming model for the above problem.

(6 marks)

(ii) What are the advantages of OR ? (4 marks)

Or

(b) (i) A company produces refrigerators in Unit I and heaters in Unit II. The two products are produced and sold on a weekly basis. The weekly production cannot exceed 25 in Unit I and 36 in Unit II, due to constraints 60 workers are employed. A refrigerator requires 2 man-week of labour, while a heater requires 1 man-week of labour. The profit available is ` 600 per refrigerator and ` 400 per heater. Formulate the LPP problem.

(5 marks)

(ii) Solve the following LPP by graphically :

Maximize $Z = 3x_1 + 4x_2$

Subject to $2x_1 + 5x_2 \leq 120$

$4x_1 + 2x_2 \leq 80$

and $x_1, x_2 \geq 0$.

(5 marks)

IV. (a) Solve the following LPP by Big-M method :

Maximize $Z = 2x_1 + x_2 + x_3$

Subject to $4x_1 + 6x_2 - 3x_3 \leq 8$

$3x_1 - 6x_2 + 4x_3 \leq 1$

$2x_1 + 3x_2 - 5x_3 \geq 4$

and $x_1, x_2, x_3 \geq 0$.

Or

(b) Use two-phase method to :

Maximize $Z = 2x_1 + x_2 + \frac{1}{4}x_3$

Subject to constraints $4x_1 + 6x_2 + 3x_3 \leq 8$

$3x_1 - 6x_2 - 4x_3 \leq 1$

$2x_1 + 3x_2 - 5x_3 \geq 4$

and $x_1, x_2, x_3 \geq 0$.

V. (a) A furniture company has plants in cities A, B and C which ship to four demand locations 1, 2, 3, 4 with transporting costs (in hundred rupees) as shown in table. Determine the minimum transportation cost :

	Demand locations				
Supply plant	1	2	3	4	Capacity
A	3	5	7	4	50
B	6	8	5	2	50
C	1	9	7	3	50
Requirement	20	60	30	40	

Or

(b) A company has 5 jobs to be done. The following data shows the return (in rupees) by assinging the ith machine to the jth job. Using Hungarian method, assign the 5 jobs to the 5 machines so as to maximize the total elapsed profit :

		Job				
		1	2	3	4	5
Machine	A	62	78	50	101	82
	B	71	84	61	73	59
	C	87	92	111	70	81
	D	45	64	87	77	80
	E	60	70	98	66	83

VI. (a) Following is the pay-off matrix for A :

	B				
	I	II	III	IV	V
A	2	4	3	8	4
	5	6	3	7	8
	6	7	9	8	7
	4	2	8	4	3

Using dominance property, obtain the optimum strategies for both the players and determine the value of the game.

Or

(b) An investor has Rs. 50,000 to invest. He has three alternative to choose. The estimated returns for different amounts of capital invested in each alternative are tabulated. Zero allocation returns Rs. 0. What is the optimal investment policy ?

Amount (Rs.)	Alternative		
	1	2	3
10,000	10	20	10
20,000	10	20	20
30,000	30	20	20
40,000	40	30	30
50,000	40	30	40

(4 × 10 = 40 marks)

C 84430 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2020

Mechanical Engineering

ME/PTME/AM 09 603—MACHINE DESIGN—I

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Define Factor of safety.
2. What are the different types of loads that can act on machine components ?
3. What are the two types of stresses are induced in eccentric loading of loaded joint ?
4. What are the practical applications of welded joints ?
5. List out the factor considered to design a shaft.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Explain the various general considerations that are taken into account while designing a machine element.
7. Explain the principal strain theory and its limitations.
8. Explain different types of riveted joints.
9. What do you understand by the term welded joint ? How it differs from the riveted joint ?
10. Explain the effect of keyway on the strength of a shaft.
11. Why are two universal joints after used when there is angular misalignment between two shafts ?

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. (a) A cold drawn C45 steel bar is to withstand a tensile load of 35 kN and a fluctuating load varying from 0 to 75 kN. The bar has a geometric stress concentration factor of 2.02 corresponding to fillet radius of 4.75 mm. Determine size of the bar for an infinite life and a factor of safety 2.

Or

(b) A bolt is subjected to an axial force of 10 kN with a transverse shear force of 5 kN. The permissible tensile stress at elastic limit is 100 MPa and the Poisson's ratio is 0.3 for the bolt material. Determine the diameter of the bolt required according to (i) Max. Prncipal stress theory ; (ii) Max. shear stress theory ; (iii) Max. principal strain theory ; (iv) Max. strain energy theory ; and (v) Max. distortion energy theory.

13. (a) A triple riveted lap joint is to be made between 6 mm. plates. If the safe working stresses are f_t = 84 MPa, f_s = 60 MPa and f_c = 120 MPa, calculate the rivet diameter, rivet pitch and distance between rows of rivets for the joint. Zig-zag riveting is to be used. State how the joint will fail.

Or

(b) Lead screw of a lathe has trapezoidal threads. To drive the tool carriage the screw has to exert an axial force of 20 kN. The thrust is carried by the collar. The length of the lead screw is 1.5 m. Coefficients of friction at the collar and nut are 0.1 and 0.15 respectively. Suggest suitable size of the screw and height of the nut if the permissible bearing pressure is 4 MPa.

14. (a) A 125 × 95 × 10 mm. angle is joined to a frame by two parallel fillet welds along the edge of 125 mm. length. If the angle is subjected to a static load of 180 kN, find the length of weld at the top and bottom. The allowable static load per mm. weld length is 430 N.

Or

(b) Design a close coiled helical compression spring for a service load ranging from 2250 N to 2750 N. The axial deflection of the spring for the load range is 6 mm. Assume a spring index of 5. The permissible stress intensity is 420 MPa and modulus of rigidity. G = 84 kN/mm.^{2} Neglect the effect of stress concentration. Draw a fully dimensioned sketch of the spring, showing details of the finish of the end coils.

15. (a) A machinery shaft is subjected to torsion only. The bearings are 2.40 meter apart. The shaft transmits 187.5 kW at 200 rev/min. Allow a shear stress of 42 MPa after an allowance for keyways. (i) Determine the shaft diameter for steady loading ; (ii) Determine the shaft diameter if the load is suddenly applied with minor shocks.

Or

(b) A rigid coupling is used to transmit 20 kW power at 720 rpm. There are four bolts and the pitch circle diametert of the bolts is 125 mm. The bolts are made of steel 45C8 $\left(S_{yt} = 380 \text{ N/mm.}^2\right)$ and the factor of safety is 3. Determine the diameter of the bolt.

(4 × 10 = 40 marks)

C 84429 (Pages : 4) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE
[2009 SCHEME] EXAMINATION, APRIL 2020

Mechanical Engineering

ME/PTME 09 602—FINITE ELEMENT METHOD

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *the questions.*
Each question carries 2 *marks.*

1. Define the term Finite Element.
2. Define Beam. Give some examples.
3. Write short notes on linear triangle and constant strain triangle.
4. State the principle of minimum potential energy.
5. What is meant by isoparametric element ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. For the bar element shown in Figure 1, evaluate the global stiffness matrix with respect to the $x - y$ co-ordinate system. Let the bar's cross-sectional area equal 2 in^2., length equal 60 in., and modulus of elasticity equal 30×10^6 psi. The angle the bar makes with the x-axis is 30°.

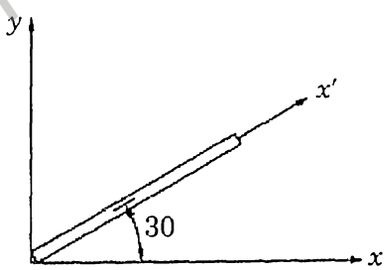
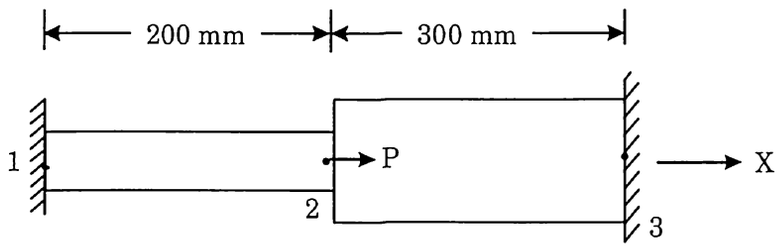


Figure 1

7. An axial load P = 300×10^3 N is applied at 20°C to the rod as shown in Figure 2. The temperature is then raised to 60°C. Assemble the K and F matrices.



Aluminium	Steel
$E_1 = 70 \times 10^9$ N/m^2	$E_2 = 200 \times 10^9$ N/m^2
$A_1 = 900$ mm^2	$A_2 = 1200$ mm^2
$\alpha_1 = 23 \times 10^{-6}$ per °C	$\alpha_2 = 11.7 \times 10^{-6}$ per °C

Figure 2

8. Derive the element stiffness matrix of truss in global co-ordinates from local co-ordinates.

9. In Figure 3, let numbered points have respective x_i of 1, 3, 5 and 8, and respective $\varnothing_i$, of 2, 2, 2 and 5. Use Lagrange's formula to obtain an interpolating polynomial. Also, find the values of $\varnothing$ at $x = 0$, at $x = 2$ and $x = 7$.

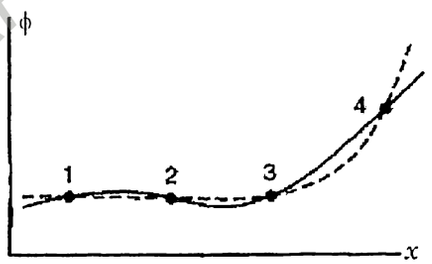


Figure 3

10. Describe Rayleigh-Ritz Method.

11. What is a Jacobian matrix of transformation ?

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. (a) Derive the relation for element stiffness of beam.

Or

(b) For the three-bar assemblage shown in Figure 4, determine the global stiffness matrix, the displacements of nodes 2 and 3, and the reactions at nodes 1 and 4. A force of 3,000 lb is applied in the x direction at node 2. The length of each element is 30 in. Let $E = 30 \times 10^6$ psi and $A = 2$ in^2 for elements 1 and 2, and let $E = 15 \times 10^6$ psi and $A = 2$ in^2 for element 3. Nodes 1 and 4 are fixed.

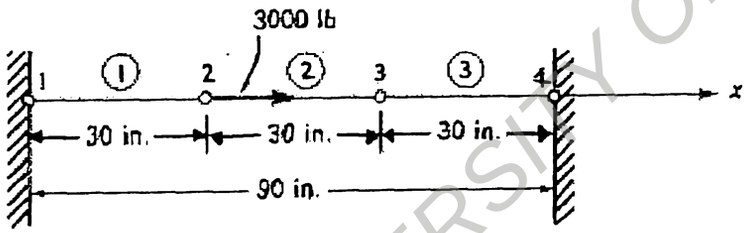


Figure 4

13. (a) Describe about exploiting sparsity of matrix though node numbering.

Or

(b) For the plane trusses in Figure 5, determine the horizontal and vertical displacements of node 1 and the stresses in each element. All elements have $E = 210$ GPa and $A = 4 \times 10^{-4}$ m^2.

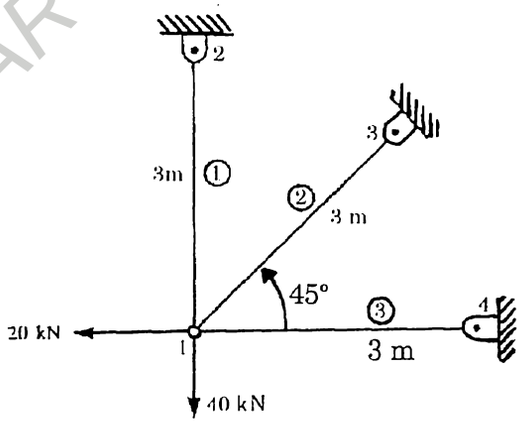


Figure 5

14. (a) A composite wall is shown in Figure 6. For element 1, K_{xx} = 5 W/m °C, for element 2 K_{xx} = 10 W/m °C, for element 3 K_{xx} = 15 W/m °C. The left end has a heat source of 600 W applied to it. The right end is held at 10 °C . Determine the left end temperature, the interface

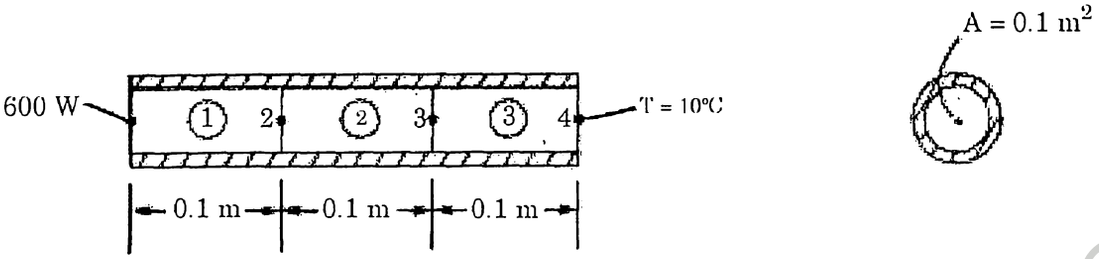


Figure 6

Or

(b) Derive the expression for unknown single variable u at any non-nodal point (x, y) in the two dimensional domain using three noded linear triangular element shown in Figure 7.

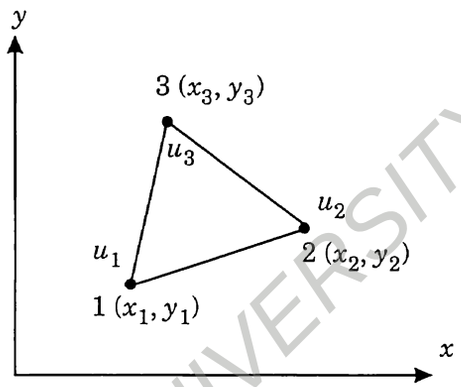


Figure 7

15. (a) For the three-noded linear strain bar iso-parametric element shown in Figure 8, determine (i) The shape functions, N_1, N_2, and N_3 ; and (ii) The strain/displacement matrix [B]. Assume the general axial displacement function to be a quadratic taken as $u = a_1 + a_2 s + a_3 s^2$.

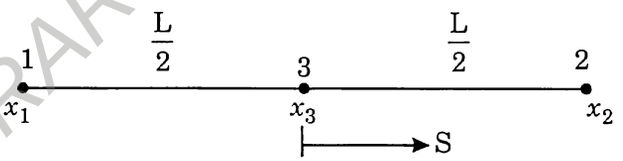


Figure 8

Or

(b) Evaluate the integral given below using two point Gaussian quadrature and compare with exact solution.

$$I = \int_{-1}^{1} \left(e^x + x^2 + \frac{1}{x+7} \right).$$

(4 × 10 = 40 marks)

C 84428 (Pages : 4) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2020

Mechanical Engineering

ME/PTME 09 601—DYNAMICS OF MACHINERY

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. What is the principle of virtual work ?
2. 'V' and radial engines do not require couple balancing—Justify.
3. What do you mean by whirling of shafts ?
4. Define logarithmic decrement and specify its practical application.
5. State Maxwell's reciprocal theorem.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. What are free-body diagrams of a mechanism ? How are they helpful in finding the various forces acting on the various members of the mechanism ?
7. State and explain D'Alembert's principle.
8. What do you mean by force balancing of linkages ? How is it achieved ? Explain.
9. Explain in what way the gyroscopic couple affects the motion of an aircraft while taking a turn.
10. Discuss the effect of damping on vibratory systems. What is meant by under-damping, overdamping and critical damping ?
11. Write a short note on vibration exciters.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. (a) For the mechanism shown in Fig. 1, find the required input torque for the static equilibrium. The lengths OA and AB are 250 mm and 650 mm respectively. F = 500 N. Also find the reaction forces at each joint.

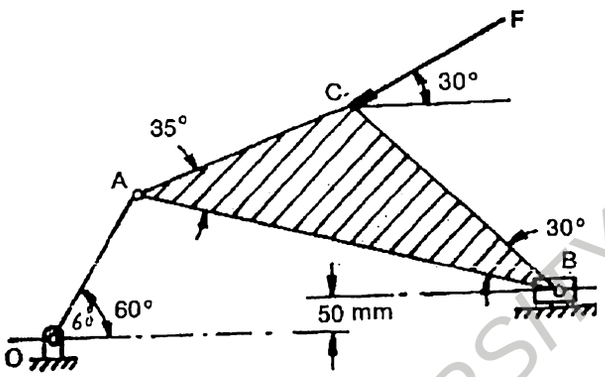


Fig. 1

Or

(b) For the crank 2, given in the Fig. 2, find the external torque to be applied to the crank for dynamic equilibrium of the mechanism. Angular acceleration of links α_3 = 104 r/s^2 counter clockwise, α_2 = 0, masses of links m_2= 10 kg, m_3 =15 kg, m_4 =10 kg. Distance of C.G of link 3 from crank pin = 40 mm, mass moments of inertia of links Ig_2 = 5000 kgmm^2, Ig_3 = 45 × 10^3 kgmm^2, acceleration of CG of links are Ag_3 = 120 m/s^2 ∠240°, Ag_4 = 72 m/s^2 ∠180°. Neglect friction and the crank is a balanced crank. The dimensions of the mechanism are as follows : O_2A = 40 mm, AB = 110 mm.

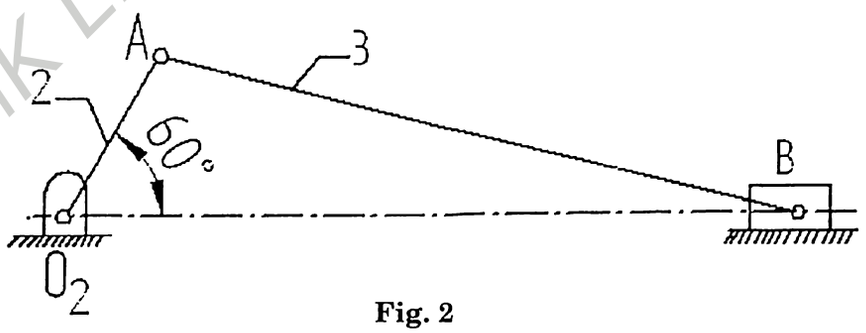


Fig. 2

13. (a) Four masses A, B, C and D are completely balanced. Masses C and D make angles of 90° and 210° respectively with B in the same sense. The planes containing B and C are 300 mm apart. Masses A, B, C and D can be assumed to be concentrated at radii of 360, 480, 240 and 300 mm respectively. The masses B, C and D are 15 kg, 25 kg and 20 kg respectively. Determine :

(i) The mass A and its angular position.

(ii) The positions of planes A and D.

Or

(b) The firing order of a six cylinder vertical four-stroke in-line engine is 1, 4, 2, 6, 3, 5. The piston stroke is 80 mm and the length of each connecting rod is 180 mm. The pitch distances between the cylinder centre lines are 80 mm, 80 mm, 120 mm, 80 mm and 80 mm respectively. The reciprocating mass per cylinder is 1.2 kg and the engine speed is 2400 rpm. Determine the out of balance primary and secondary forces and couples on the engine taking a plane midway between the cylinder 3 and 4 as the reference plane.

14. (a) A coil of spring of stiffness 40 N/mm supports vertically a load of 200 N at the free end. The motion is resisted by an oil dashpot. It is found that the amplitude at the beginning of the fourth cycle is 0.8 times the amplitude of the precious vibration. Determine the damping force per unit velocity. Also find the ratio of the frequencies of damped and undamped vibrations.

Or

(b) (i) A vibrating system consists of a mass 50 kg, a spring of stiffness 30 kN/m and a damper. The damping provided is 20 % of the critical value. Determine :

(a) The critical damping co-efficient.

(b) The natural frequency of damped vibrations.

(c) The logarithmic decrement.

(d) The time period of damped vibrations.

(ii) Derive the equation of motion of the above system from first principles.

15. (a) A shaft of 40 mm diameter and 2.5 m length has a mass of 15 kg per metre length. It is simply supported at the ends and carries three masses of 90 kg, 140 kg and 60 kg at 0.8 m, 1.5 m and 2 m respectively from the left support. Taking E = 200 GN/m^2, find the frequency of the transverse vibrations.

Or

(b) A single cylinder oil engine drives directly a centrifugal pump. The rotating mass of the engine, flywheel and the pump with the shaft is equivalent to a three rotor system as shown in Fig. 3. The mass moment of inertia of rotors A, B, C are 0.15, 0.3 and 0.09 kg/m^2. Find the natural frequency of the torsional vibration. The modulus of rigidity of shaft material being 80 GN/m^2.

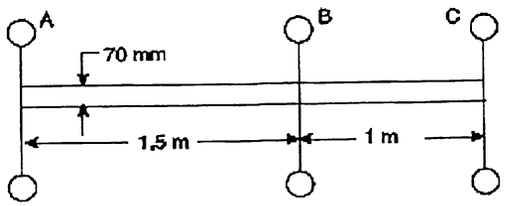


Fig. 3

(4 × 10 = 40 marks)

C 84427 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. DEGREE (2009 SCHEME) EXAMINATION APRIL 2020

Applied Electronics and Instrumentation Engineering

AI 09 L04—INFORMATION THEORY AND CODING

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

I. 1. Define self information. find the self information due to a message with probability 0.5.

2. State any four kinds of channels. Define any one of them.

3. Define hamming distance of a linear block code.

4. Write down the generator polynomials of a (7, 4) cyclic code.

5. State two differences between Linear block codes and Cyclic codes.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

II. 1. Derive the relationship between H (x, y) and conditional entropies of a communication system.

2. Explain Rate distortion function.

3. Model a Binary symmetric channel and find H (x, y) and H (y/x).

4. Derive the expression representing the error correcting capability of linear block codes.

5. Find the (7, 4) systematic and (7, 4) non-systematic cyclic code words corresponding to the data word 1101. Assume a suitable generator polynomial.

6. Design a convolutional code of constraint length 6 and rate efficiency $\frac{1}{2}$. Represent the codes in polynomial form and in matrix form.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*

III. (a) State and prove source coding theorem.

Or

(b) Encode the following sources using Huffman Code. Find the efficiency of the code in each case. comment on the result :

(i) $P(S_1) = \{0.1, 0.3, 0.2, 0.05, 0.15, 0.18, 0.02\}$

(i) $P(S_2) = \{0.25, 0.5, 0.125, 0.0625, 0.0625\}$

IV. (a) Derive the expressions for channel capacity of a BSC and BEC.

Or

(b) State and prove Information Capacity theorem.

V. (a) The parity bits of a (7, 4) linear block code are derived as below :

$$P_1 = d_1 \oplus d_2 \oplus d_3$$

$$P_2 = d_2 \oplus d_3 \oplus d_4$$

$$P_3 = d_3 \oplus d_4 \oplus d_1$$

where d_1, d_2, d_3 and d_4 are data bits. The sequence 0101001110110 is received at the receiver. Find the errors in the sequence. Assume a systematic transmission where parity bits are appended to the data bits at the tail end and data bits are represented in the order d_1, d_2, d_3 and d_4.

Or

(b) Discuss the theory on the Linear block encoding and decoding using standard arrays.

VI. (a) Find the generator polynomials of a (15, 11) cyclic code.

Or

(b) Explain the functioning of a (15, 11) cyclic coder.

(4 × 10 = 40 marks)

C 84426 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. DEGREE (2009 SCHEME) EXAMINATION APRIL 2020

Applied Electronics and Instrumentation Engineering

AI 09 605—INDUSTRIAL INSTRUMENTATION

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

1. What is the use of pressure thermometers?
2. What are the different types of gauges used to measure pressure?
3. Define Venturi.
4. What are the industrial uses of flow meters?
5. What are nuclear radiation techniques of level measurement?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

6. Explain the standards of Calibration.
7. Explain about elastic elements with LVDT.
8. Explain about the calibration of pressure gauges.
9. Explain about variable area flow meters.
10. Discuss about flow characteristics.
11. Explain about ultrasonic method of level measurement.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*

12. Discuss about thermal expansion methods in measurement of temperature.

Or

13. Define law of thermocouples and discuss about common thermocouples.
14. Explain the testing and calibration of pressure gauges.

Or

15. Discuss any one thermal conductivity gauge with a neat sketch.

Turn over

16. Discuss mass flow meters with neat sketches

Or

17. Differentiate Electromagnetic flowmeter and Vortex flow meter with neat sketches.

18. Discuss different schemes for measurement of level.

Or

19. Discuss float type of measurement of level.

(4 × 10 = 40 marks)

C 84425 (Pages : 3) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2020

Applied Electronics and Instrumentation Engineering

AI 09 604—ADVANCED CONTROL THEORY

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Define state variable analysis.
2. When a system is said to be completely state observable ?
3. Give the conditions of stability for closed loop system.
4. What is the role of controller in a process control system ?
5. What is Lyapunov stability ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Determine the transfer function of MIMO system given by :

$$\begin{bmatrix}\dot{X}_1\\ \dot{X}_2\end{bmatrix}=\begin{bmatrix}0 & 3\\ -2 & -5\end{bmatrix}\begin{bmatrix}X_1\\ X_2\end{bmatrix}+\begin{bmatrix}1 & 1\\ 1 & 1\end{bmatrix}\begin{bmatrix}U_1\\ U_2\end{bmatrix},\begin{bmatrix}Y_1\\ Y_2\end{bmatrix}=\begin{bmatrix}2 & 1\\ 1 & 0\end{bmatrix}\begin{bmatrix}X_1\\ X_2\end{bmatrix}.$$

7. Derive the mathematical model of LTI discrete time system.
8. What is sampled data systems ? Explain.
9. Describe the effect of a proportional controller on the response of a controlled process.
10. What is a discontinuous controller ? Explain its modes.
11. Write notes on analysis of robustness.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

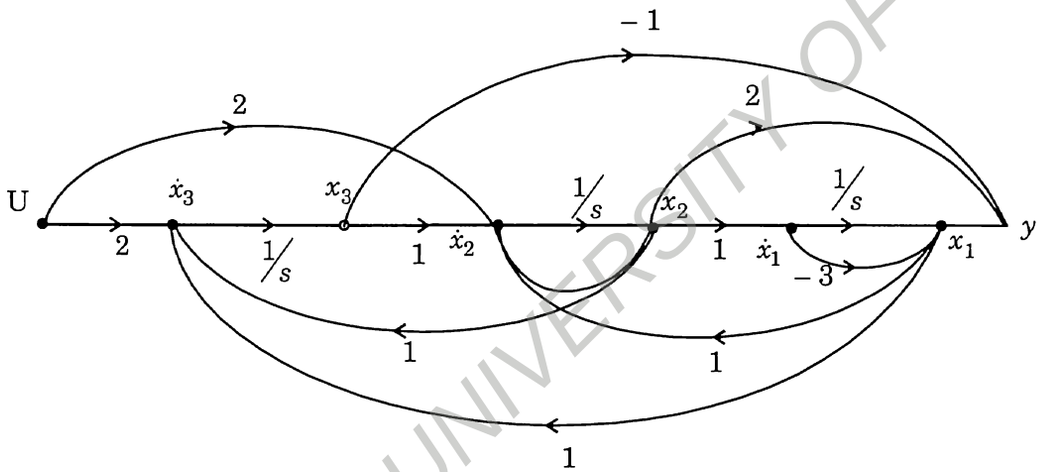
12. (a) Consider a state model with matrix A as :

$$A = \begin{bmatrix} 0 & 2 & 0 \\ 4 & 0 & 1 \\ -48 & -34 & -9 \end{bmatrix}$$

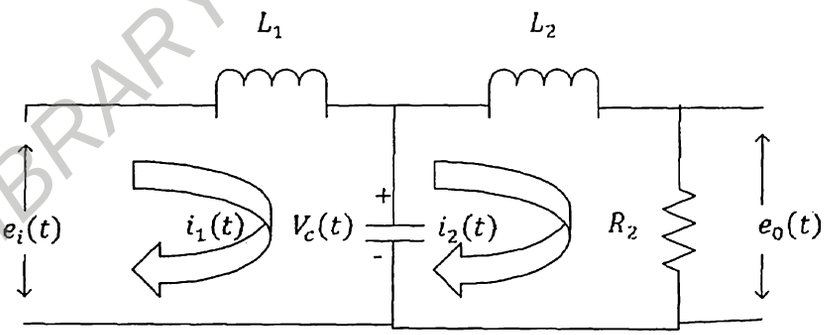
Determine : (a) characteristic equation ; (b) eigen values ; (c) Eigen vectors ; and (d) Modal matrix. Also prove that the transformation $M^{-1}AM$ yields a diagonal matrix.

Or

(b) Use controllability and observability matrices to determine the system represented by the flow graph shown in fig is completely controllable and completely observable.



13. (a) Obtain the state model of given electrical network in the standard form.



Also give the advantages of using physical variables as state variables.

(8 marks)

Or

(b) For a certain system when :

$$X(0) = \begin{bmatrix} 1 \\ -3 \end{bmatrix} \text{ then } X(t) = \begin{bmatrix} e^{-3t} \\ -3e^{-3t} \end{bmatrix}$$

while $X(0) = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$ then $X(t) = \begin{bmatrix} e^{t} \\ e^{t} \end{bmatrix}$.

Determine the system matrix A.

(2 marks)

14. (a) Explain in detail about the composite controller modes on the response of a controlled process.

Or

(b) What are the modifications of PID control ? Explain about the 2 DOF control.

15. (a) What is an internal model ? Obtain the controller design.

Or

(b) A second order system is represented by :

$$\left[\dot{X}\right] = Ax \text{ where } A = \begin{bmatrix} 0 & 1 \\ -1 & -1 \end{bmatrix}$$

Assuming Q to be Identity matrix, solve the matrix P in the equation $A^{T}P + PA = -Q$. Use lyapunov theorem and determine the stability of the origin of the system. Write the Lyapunov function V (x).

[4 × 10 = 40 marks]

C 84424 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. DEGREE (2009 SCHEME) EXAMINATION APRIL 2020

Applied Electronics and Instrumentation Engineering

AI 09 603—BIOMEDICAL INSTRUMENTATION

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

1. Give the equation for pH interms of hydrogen ion concentration in a fluid.
2. Draw the block diagram of a Magnetic blood flow meter.
3. Mention the reason for heart block and its three degrees.
4. List the important components of the blood.
5. Name two different ways in which electricity can harm the body.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

6. Explain polarization, depolarization and repolarization.
7. State and explain the objectives of Biomedical instrumentation system.
8. With neat sketch, explain Cardio vascular circulation.
9. Briefly explain Phonocardiography.
10. How the quantities of various gases in the expired air can be determined using gas chromatograph ?
11. Explain Radiation Therapy.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*

12. (a) Briefly discuss the physiological systems of the human body.

Or

(b) What is biopotential? Explain the six types of biopotential sources.

13. (a) Discuss in detail about ECG and its lead configurations.

Or

(b) With block diagram, explain Electrosphygmomanometer.

14. (a) Briefly discuss the anatomy of nervous system.

Or

(b) Explain internal and external pacemakers.

15. (a) Explain the principle of Ultrasonic Imaging System.

Or

(b) Discuss the methods of accident prevention.

(4 × 10 = 40 marks)

C 84423 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2020

Electrical and Electronics Engineering

EE/PTEE 09 601—MICROPROCESSORS AND MICROCONTROLLERS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. What is meant by saying that 8086 is a 16 bit processor ?
2. Write the features of Pentium processors.
3. Write the control word format for 8255 in BSR mode.
4. Which are all the control signals not available for 8085 maximum mode ?
5. Compare different types of Jump instructions in 8051.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. What are the special features of Pentium processors ? Explain.
7. Give details of super scalar processor of Pentium processor.
8. Give different addressing modes of 8086 processor with example.
9. Discuss how software interrupts can be used to perform arithmetic operations.
10. Explain DMA operation.
11. What are the different interrupts used in 8051 microcontroller.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. Explain the architecture of 8086 processor with block diagram.

Or

13. Write different types of interrupts in 8086. Explain.

14. Explain about BIOS interrupts. How it differ from DOS interrupt.

Or

15. Explain briefly about :

    (i) Assembler directives.

    (ii) Memory organization.

16. With block diagram, explain different modes operations of 8255.

Or

17. Explain the operation of DMA controller with necessary diagrams.

18. Explain the architecture of 8051 micro controller with necessary diagrams.

Or

19. Write the procedure of interfacing stepper motor with 8051. With the help of a program, explain how motor operation can be controlled.

(4 × 10 = 40 marks)

C 84422 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2020

Civil Engineering

CE/PTCE 09 L03—MAINTENANCE AND REPAIR OF BUILDINGS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Define maintenance.
2. What are the causes of cracks in structures.
3. List out three NDT methods.
4. What are the characteristics of good coatings ?
5. What do you mean by conservation movement ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Discuss about life expectancy of RCC structures.
7. Explain the flexible and rigid coatings with a case study.
8. Explain about jacketing technique.
9. Explain about underpinning.
10. Explain Dye penetration test.
11. What do you mean by recycling of building materials.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. Explain about the effects of earthquake in Masonry structures.

Or

13. Explain the effects of ocean in Marine Structures.

14. Explain briefly about epoxy injection process.

Or

15. Explain the causes of cracks and how to minimize it.

16. Explain about reliability principles and its applications in selection of systems for buildings.

Or

17. What are the causes and effects of dampness in building ? Explain the remedies.

18. Give the specification and performance of building materials for steel buildings.

Or

19. Give the specification and performance of building materials for RCC buildings.

(4 × 10 = 40 marks)

C 84421 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2020

Civil Engineering

CE/PTCE 09 605—TRANSPORTATION ENGINEERING—II

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *the questions.*
Each question carries 2 *marks.*

1. (a) Define gauge of a railway track.
   (b) What essential purposes are served by signalling and interlocking ?
   (c) What is a dolphin ? Write its significance.
   (d) State the different types of break waters.
   (e) What is the importance of ventilation during tunnelling ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

2. (a) Define 'creep of rail'. What are its effects ?
   (b) Briefly explain about the terms 'points' and 'crossing'.
   (c) Write short notes about wet dock.
   (d) Write short notes about drainage of tunnels.
   (e) Write short notes about lighting of tunnels.
   (f) Give the classification of signals.

(4 × 5 = 20 marks)

Part C

Answer **all** *the questions.*
Each question carries 10 *marks.*

3. (a) Sketch a typical permanent way and explain the functions and requirements of permanent way.

Or

(b) Explain various theories that have been put forward to explain the development of creep.

Turn over

4. (a) Describe the procedure involved in the annual through maintenance of a track commonly known as through packing.

Or

(b) Explain briefly about the need for rail renewal.

5. (a) Explain in detail about fenders and different ways of fending.

Or

(b) Discuss about primary classification of harbour in detail.

6. (a) Explain about Forepoling method and American method of tunnelling in soft rocks.

Or

(b) Discuss about Drift method and Pilot tunnel method of tunnelling in hard rocks.

(4 × 10 = 40 marks)

C 84420 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2020

Civil Engineering

CE/PTCE 09 604—GEOTECHNICAL ENGINEERING—II

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. What are the primary objectives of soil exploration ?
2. Define boring.
3. Define allowable bearing capacity or pressure.
4. Classify the Shallow foundations.
5. Classify the piles based on the mode of transfer of loads.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Write short note on Spacing of boring.
7. Briefly explain two categories of geophysical methods.
8. What is shallow foundation ? Briefly explain its raft foundation with neat sketch.
9. Briefly explain types of settlement.
10. Briefly explain group capacity of piles.
11. Write a note on negative skin friction in pile foundation.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. The inner diameters of sampling tube and that of cutting edge of a sampler are 70 mm. and 68 mm. respectively, their outer diameters are respectively 72 mm. and 74 mm. Determine the inside clearance, outside clearnace and area ratio of the sampler. Comment on the suitability of the sampler for collecting undisturbed sample.

Or

13. Explain the methods of boring and drilling with neat sketch.

Turn over

14. Determine the depth at which a circular footing of 2 m. diameter be placed to provide a FOS of 3, if it has to carry a safe load of 1600 kN. The soil is having angle of internal friction $\Phi = 30°$. The unit weight of the soil is 21 kN/m.^{3} Use Terazghi's analysis. ($N_q = 22$ and $N_y = 20$).

Or

15. Compute the safe bearing capacity of a square footing 1.5 m. × 1.5 m. located at a depth of 1 m. below the ground level in a soil of average density 20 kN/m.^{3}, $\phi = 20°$, $N_c = 17.7$, $N_q = 7.4$ and $N_y = 5$. Assume a suitable factor of safety and that the water table is very deep. Also compute the reduction in safe bearing capacity of the footing if the water table rises to the ground level.

16. A trapezoidal footing to be provided to support two square columns of 30 cm. and 50 cm. sides respectively column are 6 m. apart and the safe bearing capacity of soil 400 kN/m.^{2} the bigger column carries 5000 kN the smaler column 3000 kN. Design suitable size of footing, so that it does not extend beyond the faces the column.

Or

17. Discuss the design procedure for rectangular combined footing.

18. A pile is driven in uniform clay of large depth. The clay has unconfined compression strength of 90 kN/m.^{2} The pile is 30 cm. diameter and 6 m. long. Determine the safe frictional resistance of the pile, assuming a FOS of 3. Assume the adhesion factor $\alpha = 0.7$.

Or

19. A square pile group of 9 piles passes through a recently filled up material of 4.5 m. depth. The diameter of the pile is 30 cm. and pile spacing is 90 cm. centre to centre. If the unconfined compression strength of the cohesive material is 60 kN/m.^{2} and unit weight is 15 kN/m.^{3}, compute the negative skin friction of the pile group.

(4 × 10 = 40 marks)

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2020

Civil Engineering

CE/PTCE 09 603—STRUCTURAL ANALYSIS—III

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *the questions.*
Each question carries 2 *marks.*

1. Write down the equation for the degree of static indeterminacy of the pin-jointed frames, explaining the notations used.
2. Briefly mention the two types of matrix methods of analysis of indeterminate structures.
3. Define local and global co-ordinates.
4. Write down the equation of element stiffness matrix as applied to 2D plane element.
5. Define logarithmic decrement method.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Explain flexibility and stiffness matrices in '*n*' co-ordinates.
7. What are the properties of stiffness matrix ?
8. Explain briefly about the effect of support displacement and temperature changes in stiffness method of analysis.
9. Explain the direct stiffness method.
10. A machine of mass 20 kg is mounted on springs and dampers. The total stiffness of the springs is 8kN/m and the total damping is 130 Ns/m. If the system is initially at rest and a velocity of 100 mm/s is imparted to the mass, determine : (a) Displacement and velocity of the mass as a function of time ; and (b) Displacement at t = 1s.

11. Calculate the natural frequency in side sway and natural period of vibration for the frame in figure 1. If the initial displacement is 25 mm. and the initial velocity is 25 mm/sec, what is the amplitude and displacement at t = 1 sec ? Weight of the beam = 30×10^6 N. $EI_{AB} = EI_{CD} = 30 \times 10^{12}$ MPa.

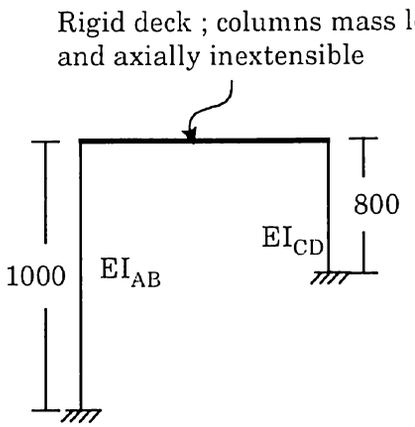


Figure 1

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. (a) Analyze the pin jointed frame using flexibility matrix. The cross sectional areas A and E for all members is the same (Refer Figure 2) :

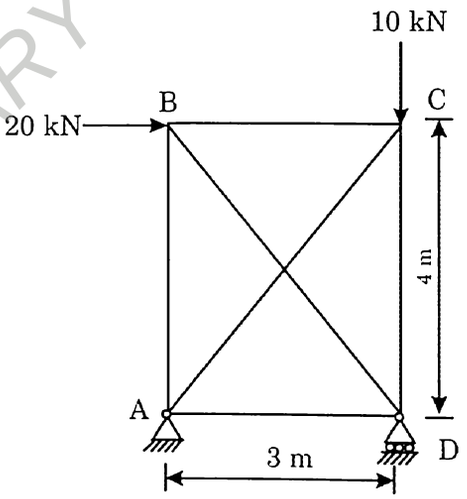


Figure 2

Or

12. (b) Determine the vertical displacement at B and rotations at B and C for the simply supported beam loaded as shown in Figure 3.

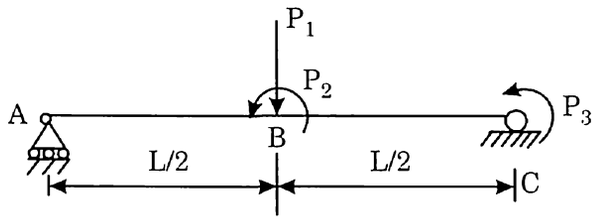


Figure 3

13. (a) For the beam shown Figure 4, use the stiffness method to: (a) Determine the deflection and rotation at B ; and (b) Determine all the reactions at supports.

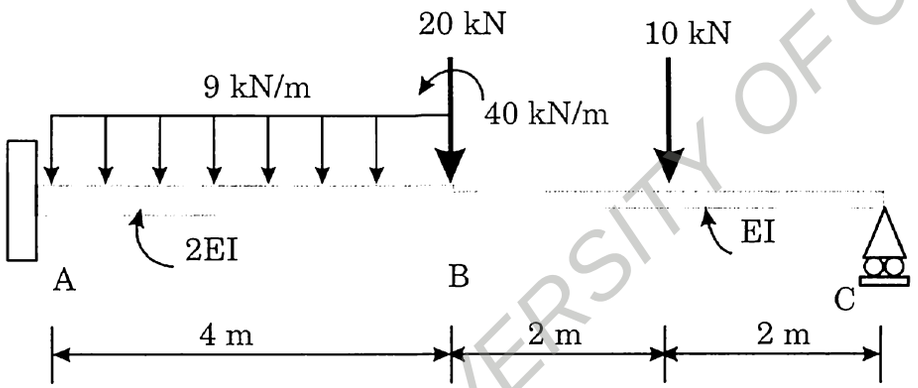


Figure 4

Or

13. (b) Using the displacement method, analyze the frame shown in Figure 5 for end moments AB and BC.

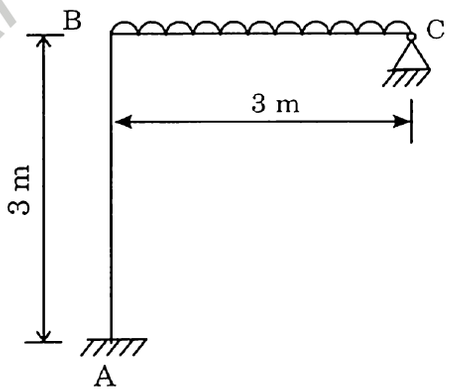


Figure 5

14. (a) Determine the forces in the truss shown in Figure 6 by the direct stiffness method. Assume that all members have the same axial rigidity.

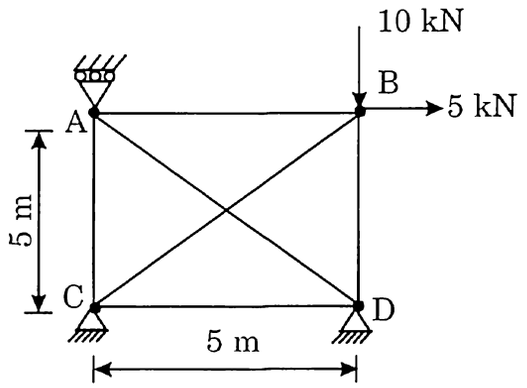


Figure 6

Or

14. (b) Derive member stiffness matrix of a truss member.

15. (a) A particle of mass 2g is making simple harmonic motion along x-axis. At distances 6 cm. and 10 cm. from the equilibrium position, the velocities of the particle are 5 cm/s and 4cm/s respectively. Find the time period of vibration, the amplitude and maximum kinetic energy.

Or

15. (b) Determine the natural frequencies and mode shape of the given system as shown in Figure 7.

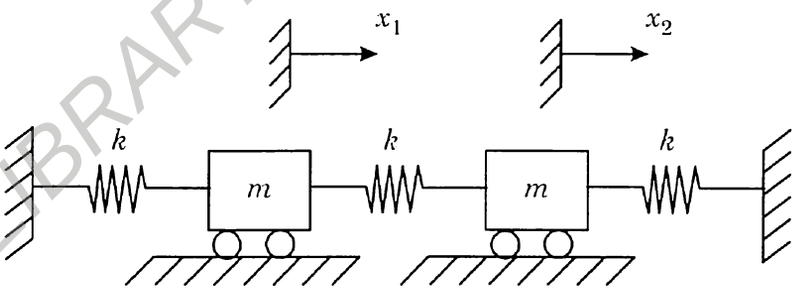


Figure 7

(4 × 10 = 40 marks)

C 84418 (Pages : 4) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2020

Civil Engineering

CE/PTCE 09 602—STRUCTURAL DESIGN—II

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *the questions.*

Each question carries 2 *marks.*

1. a) What are the various types of connections used for connecting the structural Members ?

   b) What are the advantages and disadvantages of bolted connections ?

   c) What are the loads to be considered for the design of gantry girder ?

   d) In write the formula for calculating the thickness of beam bearing plate ?

   e) Justify which IS Code gives a classification of commercial timbers and their zone distribution ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

Each question carries 5 *marks.*

2. a) Design a simply supported beam of effective span 1.5 m carrying a factored concentrated load of 360 KN at mid-span ?

   b) Determine the uniformly distributed load carrying capacity of the welded plate girder as shown in Figure 1. When it is used as a cantilever beam of 4 m effective span and checks it for shear, deflection, web buckling, web crippling. Assume stiff bearing length as 100 mm.

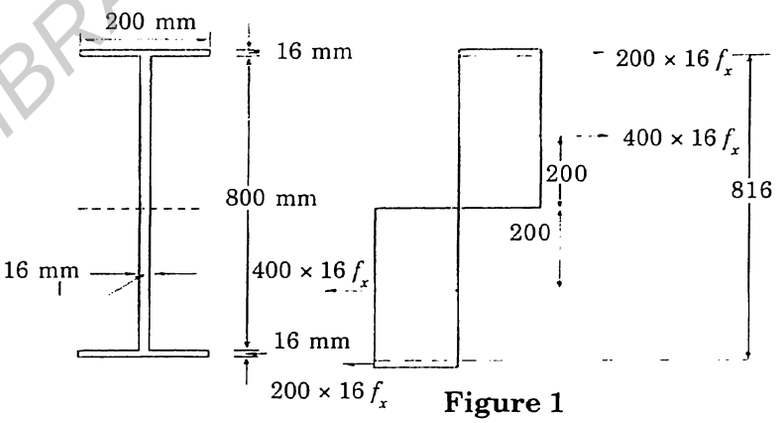


Figure 1

Turn over

c) Find the efficiency of the lap joint shown in the Figure 2. With the following data M20 bolts of grade 4.6 and Fe 410 plates are used.

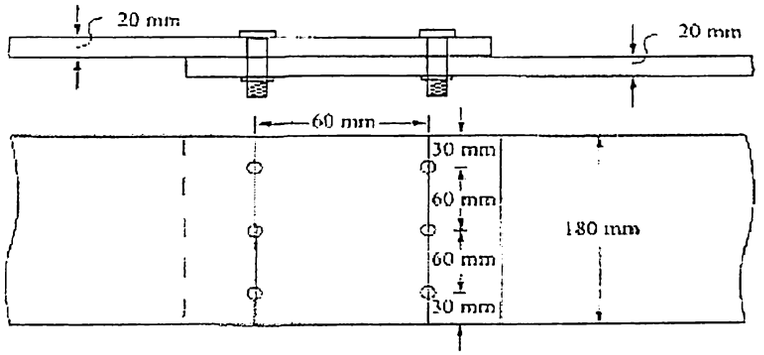


Figure 2.

d) The A tie member consists of two ISMC 250. The channels are connected on either side of a 12 mm thick gusset plate. Design the welded joint to develop the full strength of tie. However the overlap is to be limited to 400 mm.

e) Design Explain briefly about the steps involved in the design of channel purlin of a steel roof truss.

f) Find A roof truss shed is to be built in lucknow for an industry. The size of shed is 24 m × 40 m. The height of building is 12 m at the eves. Determine the basic wind pressure.

(4 × 5 = 20 marks)

Part C

Answer **all** *the questions.*
Each question carries 10 *marks.*

3. a) Design a simply supported beam of 10 m effective span carrying a total load of 60 kN/m. The depth of beam should not exceed 500 mm. the compression flange of the beam is laterally supported by floor construction. Assume stiff end bearing is 75 mm.

Or

b) Symmetric trusses of span 20 m and height 5 m are spaced at 4.5 m centre to centre. Design the channel section purlins to be placed at suitable distance to resist the following loads :

Weight of sheeting including bolts	=	171 kN/m^2
Live load	=	0.4 kN/m^2
Wind load	=	1.2 kN/m^2
Spacing of purlins	=	1.4 m

4. a) Find the maximum force which can be transferred through the double Covered butt joint shown in Figure 3. Find the efficiency of the joint. Given M20 bolts of grade 4.6 and Fe 410 steel plates are used

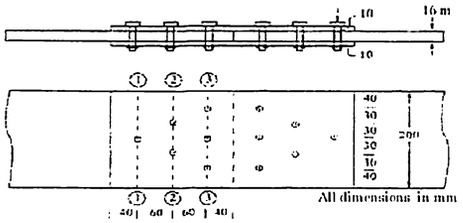


Figure 3

Or

b) Design a lap joint between the two plates each of width 120 mm, if the thickness of one plate is 16 mm and the other is 12 mm. The joint has to transfer a design load of 160 Kn. The plates are of Fe 410 grade. Use bearing type bolts.

5. a) List out the various elements of the roof truss and mark all its significance.

Or

b) Design a simply supported gantry girder to carry one electric :

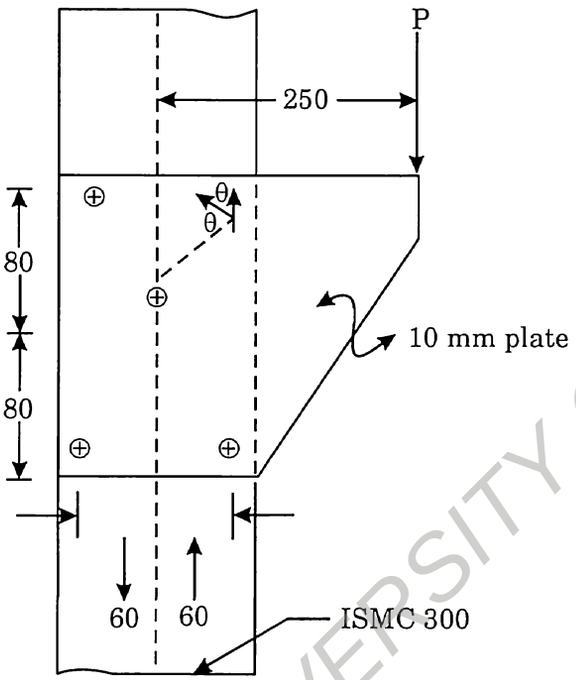
Overhead travelling crane, given

Span of the gantry crane	=	6.5 m
Span of the crane girder	=	16 m
Crane capacity	=	250 kN
Self weight of crane excluding trolley	=	280 kN
Self weight of the trolley	=	50 kN
Minimum hook approach	=	1.0 m
Distance between wheels	=	3.5 m
Self weight of ails	=	0.3 kN/m

6. a) A give 3 types of wood based panels used in timber structures and describe how they built up ?

Or

b) A bracket bolted to a vertical column is loaded as shown in Figure 4. If M20 bolts of grade 4.6 are used, determine the maximum value of factored load P which can be carried safely.



(4 × 10 = 40 marks)

C 84417 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2020

Civil Engineering

CE/PTCE 09 601—HYDROLOGY AND IRRIGATION ENGINEERING

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Draw the hydrological cycle.
2. What are the types of precipitation ?
3. Differentiate duty and delta.
4. What are the advantages of lining ?
5. What are flood banks ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Write the characteristics of run-off.
7. Briefly explain the components of hydrograph.
8. Briefly explain component and layout of diversion head works.
9. Briefly explain the Biligh's theory.
10. Briefly explain the Kennedy's theory.
11. Write a brief note on guide banks.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. Explain the unit hydrograph theory in detail.

Or

13. Write a note on :
    (a) Mass curve.
    (b) S. Hydrograph.

14. Explain with neat sketch of seepage theories in detail.

Or

15. Explain Lacey's silt theory.

16. Explain with neat sketch of Regime theory in detail.

Or

17. Explain the classification of canals.

18. Explain the types of river training works.

Or

19. Explain the unit hydrograph method of estimation of peak discharge.

(4 × 10 = 40 marks)

C 84416 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. DEGREE (2009 SCHEME) EXAMINATION APRIL 2020

Electronics and Communication Engineering

EC / PTEC 09 L01—POWER ELECTRONICS

Time : Three Hours Maximum : 70 Marks

Part A

I. Answer *all* questions :

1. What is the purpose of a snubber circuit?
2. Define the term pinch off voltage of a MOSFET.
3. Name the control strategies for chopper circuit.
4. List out the advantages of PWM inverter over square wave inverters.
5. What do you mean by the term redundancy in a UPS system?

(5 × 2 = 10 marks)

Part B

II. Answer any *four* questions :

6. Compare MOSFET and IGBT.
7. Explain the dynamic characteristics of a thyristor.
8. Explain why SCR inverters are called controlled rectifiers.
9. Explain the working principle of a DC-DC step down chopper with suitable waveforms.
10. For a single-phase a.c. regulator feeding a resistance load, show that the power factor is given by the expression $\sqrt{\left[\frac{1}{\pi}(\pi - \alpha) + \frac{\text{Sin } 2\alpha}{2}\right]}$.
11. A UPS is driving a 600 W load which has a lagging power factor of 0.8. The efficiency of the inverter is 80%. The battery voltage is 24 V d.c. Assume there is a separate charger for the battery. Determine :
    (i) KVA rating of the inverter.
    (ii) Wattage of the rectifier.
    (iii) A.H. rating of the battery for a back up time of 30 minutes.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*

Module I

12. (a) Explain the various types of power diode with neat diagrams.

Or

(b) Explain the method of turning ON a SCR using synchronized UJT trigger circuit.

Module II

13. (a) Explain the principle of operation of a single-phase SCR based parallel inverter with a neat circuit diagram.

Or

(b) Draw and explain the working of a single-phase half controller rectifier using RL loads.

Module III

14. (a) Explain the methods for controlling the speed of induction motors.

Or

(b) Discuss the working principle of a single-phase to single-phase cycloconverter with a neat circuit diagram.

Module IV

15. (a) Explain the principle of operation of a buck regulator with a neat sketch.

Or

(b) Discuss the working of an online UPS with a neat block diagram. List out the important specifications of an online UPS.

(4 × 10 = 40 marks)

SIXTH SEMESTER B.TECH. (2009 SCHEME) DEGREE EXAMINATION APRIL 2020

Electronics and Communication Engineering

EC / PTEC 09 605—OPTICAL COMMUNICATION

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

1. Give the Maxwell's equation.
2. State the difference between Spontaneous and Stimulated emission.
3. What is Inter Symbol Interference? How it is reduced?
4. Define Self-phase modulation and Cross-phase modulation.
5. What is the cross talk in WDM? Name the two types of cross talk.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

6. Explain the Mode theory for Circular Waveguides.
7. Compute the frequency range for dominant mode operation with the following data : The dielectric permittivity of the fibre core placed in air = 2.56, diameter = 1 cm and cut-off number V = 2.4048.
8. Briefly explain the operation of an injection laser diode.
9. Calculate the responsivity of an APD operating at 1.55 cm and having a quantum efficiency of 0.7 and gain 10. Also calculate the requirement of optical power for generating 20 nA current by the detector.
10. Briefly explain the various network topologies.
11. Explain Broadband EDFA.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*

12. (a) Explain Graded index fiber structure.

Or

(b) Explain dispersion in single-mode fibers.

13. (a) Discuss the various necessary characteristics of LED structures.

Or

(b) With schematic representation, explain the Pin Photodiode. A photodiode is constructed of GaAs, which has a band-gap energy of 1.43 eV at 300 K. Determine the long wavelength cut-off.

14. (a) Explain heterodyne detection. Derive an expression for the quantum limit of detection.

Or

(b) What are the loss or signal attenuation mechanisms in a fiber? Explain.

15. (a) Explain Semiconductor Optical Amplifiers (SOA). Consider an InGaAsP SOA with w = 5 μm and d = 0.5 μm. Given that $V_g = 2 \times 10^8$ m/s, if a 10 μ–w optical signal at 1550 nm enters the device, then determine the photon density.

Or

(b) Explain (i) Raman Amplifier ; (ii) Brillouin Amplifier.

(4 × 10 = 40 marks)

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2020

Electronics and Communication Engineering

EC/PTEC 09 604—CONTROL SYSTEMS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Differentiate between closed and open loop systems.
2. A unity feedback system has a open loop transfer function of $G(s) = \frac{10}{(s+1)(s+2)}$.

   Determine the steady state error for unit step input.
3. What are the generalized error co-efficients of a type-0 system ?
4. Give some examples of sampled data systems.
5. Write down the properties of state transition matrix.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Derive the transfer function of the network shown in Figure. 1

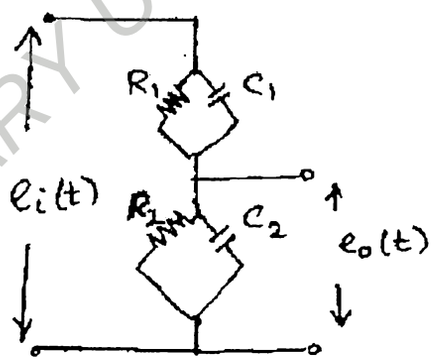


Figure. 1

7. Discuss the design procedure for lead and lag compensator.

8. A second order system is given by $\frac{C(s)}{R(s)} = \frac{25}{s^2 + 6s + 25}$. Find its rise time, peak time, peak overshoot and settling time with respect to unit step input.
9. Derive the impulse response and frequency response of Zero Order Hold system.
10. Explain the mapping between s-plane and z-plane.
11. Derive transfer function using state model for LTI system.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. a) i) Find the transfer function C(s)/R(s) of the system shown in Figure. 2

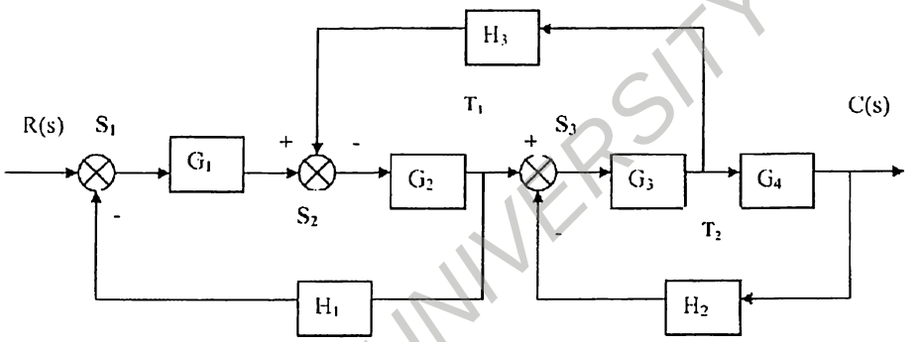


Figure. 2

(6 marks)

ii) Compare block diagram and signal flow graph reduction techniques. (4 marks)

Or

b) For the signal flow graph shown in Figure. 3 evaluate the closed loop transfer function of the system.

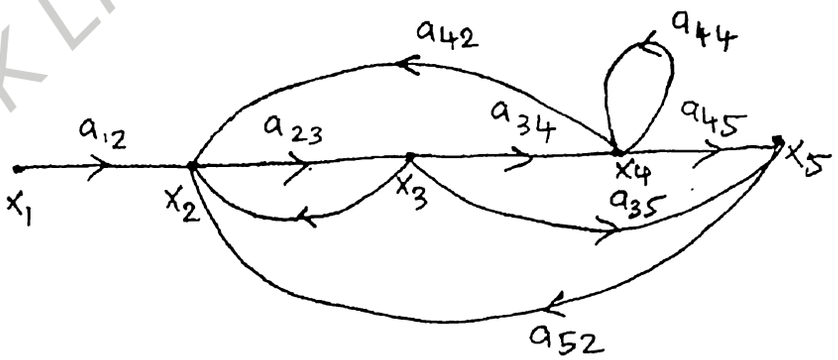


Figure. 3

13. a) The open loop transfer function of a unity feedback system is given by $G(s)=\frac{1}{s^2(1+s)(1+2s)}$.

Sketch the polar plot and determine the gain margin and phase margin.

Or

b) i) A Unity feedback system is characterized by the open loop transfer function

$$G(s)=\frac{k}{(s+2)\left(s^3+10s^2+49s+100\right)}.$$

Using Routh-Stability criterion, calculate the range of values of k for system is stable. Determine the value of k, which will cause sustained oscillations in the closed loop system. Also determine the frequency of sustained oscillations. (7 marks)

ii) State the rules for construction of the root locus for a feedback system.

(3 marks)

14. a) Consider the system shown in Figure. 4. Find the range of K for which the system is stable. Use Jury's stability criterion.

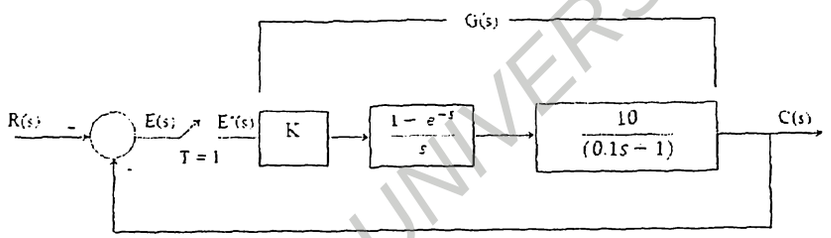


Figure. 4

Or

b) i) State and prove any four properties of Z-transform. (5 marks)

ii) Consider a discrete time LTI system described by the difference equation :

$$y(n)-\frac{3}{4}y(n-1)+\frac{1}{8}y(n-2)=x(n)+\frac{1}{3}x(n-1).$$

Obtain the unit sample response of the system. (5 marks)

15. a) i) Using cascade method decompose the transfer function $\frac{Y(s)}{U(s)}=\frac{s+3}{(s+1)(s+2)}$ and obtain the state model. (5 marks)

ii) Obtain state space representation of the electrical network in Figure. 5

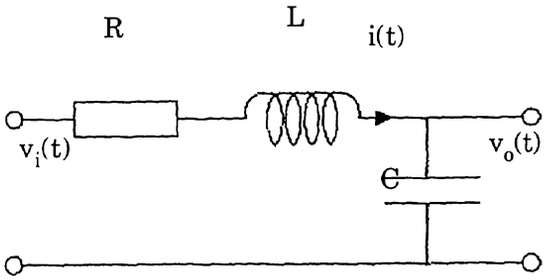


Figure. 5

(5 marks)

Or

b) i) Find the transfer matrix from the data given below :

$$A=\begin{bmatrix}-3 & 1\\ 0 & -1\end{bmatrix} B=\begin{bmatrix}1\\ 1\end{bmatrix} C=\begin{bmatrix}1 & 1\end{bmatrix} D=0.$$

(5 marks)

ii) The transfer function of the control system is given by

$$\frac{Y(s)}{U(s)}=\frac{s+2}{s^3+9s^2+26s+24}.$$

Check for controllability.

(5 marks)

[4 × 10 = 40 marks]

C 84413 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2020

Electronics and Communication Engineering

EC/PTEC/AI/EE/PTEE/BM/IC/09 602—ENGINEERING ECONOMICS AND PRINCIPLES OF MANAGEMENT

Time : Three Hours Maximum : 70 Marks

Sections 1 and 2 are to be answered in **separate** *answer-books.*

Section 1 (Engineering Economics)

Part A

Answer **all** *questions with one or two sentences.*

1. Define the term Economics. (1 mark)
2. What you understand by demand ? (2 marks)
3. What do you mean by internal rate of interest ? (2 marks)

Part B

Answer any **two** *questions.*
Each question carries 5 *marks.*

4. Briefly explain about (i) GDP ; (ii) Per Capita income ; (iii) Inflation.
5. What do you mean by "Equality between savings and investment" ? Illustrate with an example.
6. Explain the elements of cost.

(2 × 5 = 10 marks)

Part C

Answer the questions, not less than **four** *pages.*
Each question carries 10 *marks.*

7. Discuss the role of price mechanism in solving economic problems.

Or

8. Briefly discuss the economic policy reforms in India since 1991.
9. Define break-even point. From fundamentals derive an expression for break-even point. Assume suitable data as required.

Or

10. What is IRR ? With an example, illustrate the calculation of IIR of an organization.

(2 × 10 = 20 marks)

Turn over

Section 2 (Principles of Management)

Part A

Answer **all** *questions with one or two sentences.*

1. Management is an art. (1 mark)
2. Why planning is necessary for an organizaton ? Explain. (2 marks)
3. What is a ledger ? Illustrate. (2 marks)

Part B

Answer any **two** *questions.*
Each question carries 5 *marks.*

4. Why decision making is important for an organization ? Briefly explain.
5. What is balance sheet ? Why it is important for an organization ? Explain.
6. Explain how advertisement helps in marketing.

(2 × 5 = 10 marks)

Part C

Answer the questions, not less than **four** *pages.*
Each question carries 10 *marks.*

7. Briefly discuss the evolution of management theory.

Or

8. What is job evaluation ? Explain different methods of job evaluation.
9. Explain how do you plan the modernization activity of an organization with the PERT/ CPM.

Or

10. What is double entry book keeping ? Illustrate the same with suitable examples of your choice.

(2 × 10 = 20 marks)

C 84412 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2020

Electronics and Communication Engineering

EC/PTEC 09 601—VLSI DESIGN

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. What is hot carrier effect ?
2. Define the term MTTF.
3. What is photo resist ?
4. What is the need for design rule ?
5. Draw the CMOS inverter circuit.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Explain the constant voltage scaling.
7. Define clock skew and clock jitter.
8. Discuss the uses of silicon dioxide film.
9. List the different color codes used in stick diagram.
10. List the steps involved in twin tub process.
11. What are the two types of power dissipation in CMOS circuits ? Explain.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

Module I

12. Derive the expression for pull-up to pull-down ratio (Zpu/Zpd) for an *n* MOS inverter driven by another *n*MOS inverter.

Or

13. Explain the working principle of a resistive load inverter circuit.

Turn over

Module II

14. Design one transistor DRAM cell and explain.

Or

15. Draw the architecture of boundary scan test (BST) and explain the operation.

Module III

16. Explain the nuclear stopping power and electronic stopping power.

Or

17. Discuss the differences of plasma etching and RIE.

Module IV

18. Explain the concept of dielectric isolation.

Or

19. Draw the stick diagram of a CMOS inverter.

(4 × 10 = 40 marks)

C 84411 (Pages : 3) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2020

Chemical Engineering

CH/PTCH 09 603—MASS TRANSFER OPERATIONS—II

Time : Three Hours Maximum : 70 Marks

Any missing data may be suitably assumed.
Graph sheets will be provided.

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Define Reflux ratio and its significance in tower design.
2. Write the significance of Kremser-Brown Souder equation.
3. State the assumptions made in McCabe-Thiele method.
4. Write down the industrial application of leaching.
5. Define plait point in LLE.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Describe extractive distillation in detail.
7. Explain the loading and flooding in packed towers and explain the methods to avoid flooding.
8. Derive the expression for operating line equation for rectifying section and stripping section.
9. Discuss the effect of temperature on ternary LLE.
10. Derive Rayleigh's equation.
11. Discuss heap leaching.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. (a) 1000 K mol/hr. of an ethanol-propanol mixture containing 65 mole % ethanol is to be separated in a continuous plate column operating at 1 atm. pressure. The desired terminal compositions for ethanol are : $X_D = 0.92$ and $X_B = 0.07$. The feed is a saturated vapour and a total condenser is used. When the reflux ratio is four times the amount of top product, find the number of theoretical plates required for the separation. Data given : Relative volatility = 2.10.

Or

(b) A solution of carbon tetrachloride and carbon disulfide containing 50 mole % of each is to be fractionated to get a top and a bottom product of 95 mole % and 6 mole % carbon disulphide respectively. The feed is a saturated liquid at its boiling point and is fed at the rate of 5000 kg./hr. A total condenser is used and reflux returned to the top plate as a saturated liquid the equilibrium data at 1 atm. pressure is given below :

x :	0	0.06	0.11	0.26	0.39	0.53	0.66	0.76	0.86	1.0
y :	0	0.16	0.27	0.50	0.63	0.75	0.83	0.88	0.93	1.0

where x, y are mole fractions of carbon disulphide in liquid and vapour phase respectively :

(i) Determine the product rate in kg./hr.

(ii) What is the minimum reflux ratio ?

(iii) Determine the theoretical number of plates required and the feed plate location if the tower is operated at twice the minimum reflux ratio.

13. (a) (i) State the significance of thermal quality of feed in distillation design. (5 marks)

(ii) Write a note on flash distillation. (5 marks)

Or

(b) A Benzene-Toluene solution containing 50% of benzene is to be fractionated continuously in a distillation column to get a top product of 80 % benzene. The bottom product should not contain more than 12 % benzene. The feed is at its boiling point. The relative volatility is 2.5. Find the minimum reflux ratio, minimum number of theoretical plates required.

14. (a) A solute is recovered from an aqueous solution containing 20 % solute by weight using kerosene as solvent. The distribution of solute in water and kerosene may be described by $x = 6.452\ y$ where x is the kg. solute/kg. water and y is the kg. solute/kg. solvent. Calculate the final raffinate concentration if the extraction is done in 3 simple equilibrium contacts using 5.1 kg. solvent per kg. of initial solution in each stage and the number of equivalent theoretical contacts necessary to obtain the concentration of the solute in the final raffinate as 3.5 % with extraction done by counter current stage contact using 6 kg. of kerosene/kg. of aqueous solution.

Or

(b) (i) What are the various factors to be considered for the selection of a solvent in extraction ?

(5 marks)

(ii) Describe the constructional features of a centrifugal extractor. (5 marks)

15. (a) Write short note on the following :

(i) Rate of leaching. (5 marks)

(ii) Shanks system for leaching. (5 marks)

Or

(b) Explain the calculation method involved to find out the number of stages required for multistage counter current leaching with variable underflow.

[4 × 10 = 40 marks]

C 84410 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2020

Chemical Engineering

CH/PTCH 09 602—PROCESS DYNAMICS AND CONTROL

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Explain the term 'loading' in interacting systems.
2. Define load and set point variable.
3. Define reset rate.
4. Define stability.
5. Write Zeigler-Nichols formula for turning of controllers.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

1. Derive the transfer function of a CSTR in which a first order reaction takes place.
2. Explain the functioning of an electronic PI controller.
3. Discuss on supervisory control system and SCADA.
4. Discuss the effect of a proportional controller on a first order process for regulatory problem.
5. Define transportation lag and explain its effect on root locus.
6. Sketch the Bode plot for a first order plus time delay system.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

1. A thermometer having a time constant of 2 min. is placed in a temperature bath, T_i of 60°C. and after the thermometer comes to equilibrium with the bath, the temperature of the bath is suddenly increased to 85° C. for a period of 0.5 min. and the bath is brought back to 60° C. Plot the response in temperature of the thermometer.

Or

2. (a) Derive the response equation of an integrating system to a unit step input and sketch the response.

   (b) A thermocouple of time constant of 1 min. is placed in a bath at 250°C. The bath temperature increases linearly at the rate of 1° C./min. Sketch the response of the system.

3. (a) Derive the transfer function of a mercury manometer assuming the flow in the manometer to be laminar and steady-state friction law for drag force in laminar flow to apply at each instant. Write the transfer function in standard form and comment on how the parameters are related to physical nature of the problem.

   (b) Explain the following terms : (i) Overshoot ; (ii) Decay ratio ; (iii) Rise time ; (iv) Settling time ; (v) Period of oscillation.

Or

4. (a) Distinguish positive and negative feed back control systems.

   (b) Explain the functioning of a pneumatic PID controller with a neat sketch.

5. Discuss the response of a PI controller to a first order process for a step change in set point disturbance. Also, discuss the offset calculation.

Or

6. Draw the root locus diagram for the process $G(s) = \frac{K_c(0.5s+1)}{(s+1)(2s+1)}$. Calculate the value of K_c for the system to be verge of stability.

7. Find the range of K_c values for which the system with the following transfer function will remain stable under proportional feedback control using Bode stabiilty criterion :

$$y(s) = \frac{5(1-0.5s)}{(2s+1)(0.5s+1)}u(s).$$

Or

8. The process is two first order systems in series with $\tau_1 = \tau_2 = 1$ and $R_1 = R_2 = 1$. Draw Bode diagram :

   (a) Find the controller gain, K_c for proportional controller such that PM is 30°.

   (b) If a PI controller with $\tau_1 = 2$ is used what is the value of K_c for a PM of 30°.

(4 × 10 = 40 marks)

C 82362 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2020

Aeronautical Engineering

AN 09 605—COMPUTER INTEGRATED MANUFACTURING

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Describe the need for CIM.
2. Mention the elements of CIM systems.
3. Define Group Technology
4. What is meant by shop floor control ?
5. Define network topology.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Explain about the islands of automation.
7. Describe the classification and coding of GT.
8. Write a note on barcode technology.
9. Define :
   (i) Cellular manufacturing.
   (ii) Process planning.
10. Describe about CIM architecture.
11. What is meant by database terminology ?

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*

Each question carries 10 *marks.*

12. (a) What are the various activities of manufacturing plant which can be carried out through computer control ?

Or

(b) Discuss the nature and role of CIM elements.

13. (a) Explain the OPITZ coding system.

Or

(b) Define CAPP and explain the approaches of CAPP.

14. (a) Describe the phases of SFC.

Or

(b) Define FMS and explain the types of FMS.

15. (a) Discuss about the Network Topologies used in CIM Systems.

Or

(b) Briefly describe the MAP and TOP.

(4 × 10 = 40 marks)

C 82354 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2020

Biomedical Engineering

BM 09 605—BIOMEDICAL EQUIPMENTS AND BIOPHOTONICS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

1. Define Reflection.
2. What is anisotropy?
3. State the limitations of fluorescence microscopy.
4. List the classification of ventilators based on the method of inspiratory phase.
5. State the clinical applications of nerve and musclo stimulators.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

6. Write short note photochemical ablation.
7. Identity the requirements of multiphoton microscopy. Give its clinical applications.
8. Write in brief about Lab on a chip.
9. Explain the physiology of respiration.
10. List the five types of electrodes used in surgical diathermy. Give its applications.
11. Identify the three basic types of shock-wave sources of lithotripsy. Give its clinical applications.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*

12. (A) Discuss about the pathology of laser reaction in skin.

Or

(B) Elaborate the principle of working of Fluorescence lifetime imaging microscopy.

Turn over

13. (A) Discuss about the technology involved in modern fluorescence microscope.

Or

(B) Discuss the application of laser in medical diagnosis and therapy.

14. (A) Explain the mechanism of respiration with necessary illustrations.

Or

(B) Describe about the Instrumentation and applications of Raman spectroscopy in biomedical diagnosis.

15. (A) With the block diagram of solid state electro-surgical unit, explain its working principle.

Or

(B) Dicuss about the design reqirements of foetal heart rate monitor.

(4 × 10 = 40 marks)

C 82353 (Pages : 3) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2020

Biomedical Engineering

BM 09 604—CONTROL SYSTEMS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Draw the block diagrams of open loop system and closed loop system and name the blocks.
2. What is the electrical analogue of moment of inertia in torque–voltage analogy.
3. What are standard test signals ?
4. Define phase cross over frequency.
5. Define state space.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

1. Obtain the transfer function of a hydraulic system.
2. Define Mason's gain formula.
3. A second order system frequency response exhibits a resonant peak at a frequency of 3.5355 rad/sec. The system when exhibited by an unit step input, exhibits damped oscillations at 4.333 rad/sec. Determine the natural frequency of oscillations associated with this system.
4. Find the value of K for the system to be in sustained oscillations.

$$S^3 + 3KS^3 + (K + 2)\,S + 4 = 0.$$

5. Define the order and type of a system from its transfer function.
6. Write short notes on compensator.

(4 × 5 = 20 marks)

Turn over

Part C

Answer any **four** *questions.*
Each question carries 10 *marks.*

1. For the signal flow graph shown in Figure 1 determine C/R using Mason's gain formula.

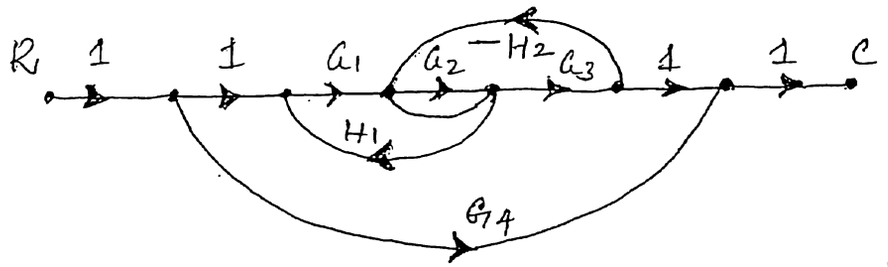


Figure 1.

Or

2. Using Mason's gain formula find C(s)/R(s) for the system shown in Figure 2.

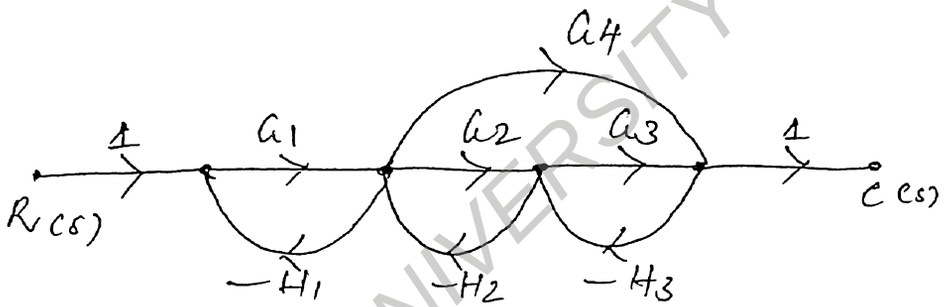


Figure 2.

3. Derive the step response of a general second order under damped system.

Or

4. Obtain the root locus of the system.

$$GH(s) = \frac{12k}{s(s+2)(s+6)}.$$

5. Sketch the polar plot for the transfer function.

$$G(s) = \frac{10}{s(s+1)(s+2)}.$$

Or

6. The open loop frequency response of a system is given as follows :

ω	2	3	4	5	6	8	10
$\lvert G(j\omega)\rvert$	7.5	4.8	3.15	2.25	1.7	1.0	0.64
$< G(j\omega)$	-118°	-130°	-140°	-150°	-157°	-170°	-180°

Sketch the polar plot and evaluate the gain margin and phase margin of the system.

7. Check the controllability an observability of given system.

$$x = \begin{bmatrix} 0 & 1 \\ -1 & -2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u \; ; y = \begin{bmatrix} 1 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}.$$

Or

8. Write short notes on :

   1. Lead compensator.
   2. Lag compensator.

(4 × 10 = 40 marks)

C 82352 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2020

Biomedical Engineering

BM 09 601—BIO–SIGNAL PROCESSING TECHNIQUES AND APPLICATIONS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

1. Mention any four of the several human physiological signals.
2. Identity the characteristics of an ECG signal.
3. AZTEC encoder a signal as {2, 50, –4, 30, –4, 50, –4, 30, –4, 50, 2, 50}.

   How many data points were originally sampled?
4. What is spectral estimation?
5. Define Autocorrelation?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

6. What circuit is used in a signal conversion system to store analog voltage levels? Draw a schematic of the circuit and explain its working in brief.
7. State the attributes to be considered when designing a biomedical signal conversion system. Give in brief about them.
8. Explain why an AZTEC reconstructed waveform is unacceptable to a cardiologist. Suggest ways to alleviate the problem.
9. After application of the TP algorithm on a signal, the data points saved are {50, 70, 30, 40}. If you were to reconstruct the original data set, what is the data sequence that would best approximate it.
10. List the steps, involved in power spectrum estimation.
11. Identify the characteristics of an EEG. List its clinical applications.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*

12. (A) A 100 Hz full wave rectified sine wave is sampled at 200 samples IS. The samples are used to directly reconstruct the waveform using a digital-to-analog converter. Will the resulting waveform be a good representation of the original signal? Explain.

Or

(B) Draw a block diagram of a counter type A/D converter. Explain its working principle.

13. (A) Given the following data set {a, a, a, a, b, b, b, b, b, c, c, c, d, d, e}. Derive the code words for the data using Huffman coding. What is the average code word length?

Or

(B) Describe in detail about the real-time QRS detection algorithm developed by Pan Tompkins.

14. (A) Investigate the potential uses of the Fourier spectrum and parameter derived there of in the analysis of biomedical signal.

Or

(B) Describe about the adaptive Markov process amplitude algorithm to model and simulate EEG.

15. (A) Describe the application of neural network techniques for monitoring depth of general anaesthesia.

Or

(B) Why is the ST segment of the ECG relevant in diagnosis? Recommend signal analysis techniques by the analysis of ST segment variation in clinical application. Describe about them.

(4 × 10 = 40 marks)

C 82340 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2020

Computer Science and Engineering

CS/PTCS 09 L04—OBJECT ORIENTED MODELLING AND DESIGN

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. What is object identifier ?
2. Describe the uses and extends associations in activity diagram.
3. List the rules to avoid bad design.
4. State the purpose of modeling a state machine diagram.
5. Write the need for using ADL.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Differentiate Actor over user with sample diagram.
7. What is the basic principle of Classes, Responsibilities, and Collaborators ?
8. How do you analyze the bank ATM using Activity patterns ?
9. Discuss in detail about Interfaces.
10. Describe about composite states with neat diagram.
11. Write short notes on OCL expressions with example.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. (a) Develop an OMT based model for a bank system. Discuss the suitability of your proposal with class.

Or

(b) Apply the usecase driven approach to short list the class names in an inventory system.

13. (a) Identify classes and their behaviors through communication modeling for Hospital Management System.

Or

(b) Draw the Interaction diagram for book renewal in Faculty Book System.

14. (a) Develop an analysis model for a student information system.

Or

(b) Explain the analysis and design of a banking system with state machine diagrams.

15. (a) Write short notes on Architecture Description Language (ADL) in detail.

Or

(b) Give a detailed note about Implementation workflow and Deployment.

(4 × 10 = 40 marks)

C 82317 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2020

Applied Electronics and Instrumentation Engineering

AI 09 L02—MULTIMEDIA COMMUNICATION

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. What are the five components of multimedia and define Text ?
2. Define resolution of an image ?
3. How do compression algorithms work ?
4. List some examples of lossy compression ?
5. Enumerate the technique is used by jpegs for compression ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Explain the components of multimedia and its applications.
7. What is importance of digital audio in multimedia and list its advantage and disadvantages.
8. Tabulate the differences between PCM, DM, ADM, DPCM.
9. Explain data compression with its types.
10. Explain in brief about lossless and lossy compression technique.
11. Enumerate the features of JPEG 2000 standard ?

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. What is meant by digital image processing explain how digital images can be represented ? Explain with diagram how filtering helps in image processing.

Or

13. How does your computer see an image ? Our eyes see the blue sky, cirrus clouds painting the sky, and the green grass, but how does a computer represent this same picture ?

14. Explain the digital compression technique used in multimedia communications.

Or

15. Explain Huffman coding with an example.

16. Explain in detail about EZW with zero tree data structure.

Or

17. Explain the method of decomposition that has gained a great deal of popularity in recent years with a simple wavelet example.

18. Explain MPEG-1 with its frames and layers.

Or

19. Explain MPEG Audio compression with Algorithm and its layers with an example.

(4 × 10 = 40 marks)

C 82316 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2020

Applied Electronics and Instrumentation Engineering

AI 09 L01—WIRELESS COMMUNICATION SYSTEMS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. What are the types of satellites ?
2. List any *two* properties of M-sequence.
3. What is frequency reuse ?
4. What are the techniques available to improve capacity in cellular systems ?
5. What are the important features of wireless markup language ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Define inclined orbit, polar orbit and equatorial orbit.
7. Write short notes on orthogonal codes.
8. Brief about walsh codes.
9. Write notes on adjacent channel interference.
10. Brief about Longley-Rice model and its modes of operation.
11. What is Bluetooth ? List some application areas of Bluetooth.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. (a) What are the different types of diversity in microwave systems ? Explain.

Or

(b) Write in detail about the system satellite link equations.

13. (a) How spread sequence is generated using PN sequences ? Also give the properties of PN sequence.

Or

(b) Elaborate about the control structure of AMPS channels with diagrams.

14. (a) Describe in detail about the concept of cell splitting to improve channel capacity of cellular systems.

Or

(b) How to design practical link budget design using Log-normal shadowing path loss model ? Explain.

15. (a) What is the most prominent standard for cordless systems ? Elaborate in detail.

Or

(b) Discuss about the general protocol architecture of Bluetooth and its different usage models.

(4 × 10 = 40 marks)

C 82175 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION APRIL 2020

Biotechnology Engineering

BT 14 604—PROCESS DYNAMICS AND CONTROL

(2014 Admissions)

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*

1. What is Linearization? Why liberalized approximate models are useful for Process Control Purposes?
2. Define Offset, Decay Ratio and Rise time.
3. Discuss the objectives and benefits of Process Control.
4. Derivative Controller can not be used alone in a Process. Discuss the reason behind it.
5. Write short notes on Controller Tuning.
6. Define the terms Crossover frequency and Resonant frequency.
7. Differentiate Frequency response analysis and Time response analysis.
8. Briefly explain about Inverse response.
9. Write short notes on Inferential Control.
10. Mention the operating Strategies for Batch Plants control.

(8 × 5 = 40 marks)

Part B

Answer **all** *the questions.*

1. (a) Explain different testing methods to identify the dynamic nature of Processes.

Or

(b) What is transfer function? How is it useful in solving Problems of Process dynamics? How do you represent transfer function by a block diagram.

2. (a) A feedback control system has the open loop transfer function

$$G = 4Kc / (s + 1)(s + 2)(s + 3).$$

Plot the root locus diagram for $0 \leq Kc \leq 20b$.

Or

(b) For the characteristics equation $S^4 + 6S^3 + 11S^2 + 36S + 120 = 0$, determine the stability using Routh criterion.

3. (a) Construct Bode diagram for the following :

   (i) P–controller.

   (ii) PI–controller.

   (iii) PID–controller.

   (5 + 5 + 5 = 15 marks)

   Or

   (b) Explain in detail the open loop method of Controller tuning.

4. (a) Explain in detail the operation of a split range control with an example process.

   Or

   (b) Write short notes on :

   (i) Supervisory control .

   (ii) Distributed control system.

   (7 + 8 = 15 marks)

   [4 × 15 = 60 marks]

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, APRIL 2019

Biomedical Engineering

BM 14 606—HOSPITAL ENGINEERING AND MANAGEMENT

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. What is public health service ? List out the concerns of public health service.
2. Define a system. What are the peculiarities of a hospital system ?
3. Explain about the deparments in a hospital.
4. Brief about the training requirement to medical staffs.
5. Discuss about the operating instruction of equipments.
6. What do you mean by calibration ? Why is it needed ?
7. List the different ways to minimize failures in electrical supply.
8. Difference between micro and macro shock.
9. List the requirements of interdepartmental computerization.
10. Brief about the changes in air filtering and stability.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. (a) Elucidate about the electrical, fire and radiation safety measures in a hospital.

Or

(b) What are the requirements and facilities needed for setting up of BME department in a hospital ? Discuss in detail.

12. (a) What are the steps involved in selection, testing, calibration and installation of a biomedical equipment ?

Or

(b) List out the purchase and contract procedures involved in procurement of a biomedical equipment.

13. (a) With neat diagram, explain about the general power and lighting systems in hospitals.

Or

(b) Describe about the UPS and voltage stabilization in a hospital. What is the requirement of voltage stabilizer ?

14. (a) Elaborate about the medical record keeping department in a hospital. Also discuss about the computerized medical record evaluation.

Or

(b) What are the various gas supply system available in a hospital ? Explain each one of them.

(4 × 15 = 60 marks)

C 60640 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2019

Mechatronics Engineering

MT 09 602—MICROPROCESSORS AND MICROCONTROLLERS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. List the different types of addressing modes.
2. What do you mean by software interrupt ?
3. State the differences between 8085 microprocessor and 8086 microprocessor.
4. Mention the characteristics of 8-bit microcontrollers.
5. Enumerate the need for analog to digital converter interfacing.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Write short notes on instruction set of 8085 microprocessor.
7. Describe in detail about programmable communication interface 8251.
8. Discuss in detail about assembler directives of 8086 microprocessor.
9. Write short notes on signal description of 8051.
10. Write a program to perform addition of four numbers using registers in 8086 microprocessor.
11. Explain in detail about numeric display interfacing.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. (a) Explain in detail about Intel 8085 architecture.

Or

(b) Discuss about the DMA controller 8257.

Turn over

13. (a) Discuss in detail about the interrupts in 8086 microprocessor.

Or

(b) Explain in detail about maximum and minimum modes of 8086 microprocessor.

14. (a) Explain in detail about the architecture of 8051.

Or

(b) Explain in detail about the addressing modes of 8051 with simple programs.

15. (a) Explain in detail about stepper motor control.

Or

(b) Discuss in detail about digital to analog converter interfacing.

(4 × 10 = 40 marks)

C 60630 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2019

Printing Technology Engineering

PT 09 601—FLEXOGRAPHY

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *the questions.*
Each question carries 2 *marks.*

1. Write notes on sheetfed flexo presses.
2. What do you mean by plate staggering ? What is its purpose ?
3. Compare rubber and photopolymer plates.
4. What are the advantages of laser engraved anilox roll ?
5. List any 4 consequences of improper web tension.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Discuss important properties of fountain roll coverings.
7. Give an account of the mechanical principles of flexography.
8. What are the reasons and consequences of fountain roller deflection ? How can you minimize it ?
9. Write notes on auxiliary equipments needed to produce printing plate.
10. Differentiate skip-outs and false skip-outs. Which are the methods of rectifying skip-outs ?
11. Discuss various doctor blade loading systems.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*

Each question carries 10 *marks.*

12. (a) Discuss different types of rewind equipments.

Or

(b) Explain possible variations in flexo presses as a coater with neat diagram.

13. (a) Discuss different methods of anilox roller cleaning.

Or

(b) With neat diagram, explain the preparation of sheet photopolymer plate with its advantages and disadvantages.

14. (a) Explain CIC press configuration with its advantages and disadvantages.

Or

(b) Explain various properties of plastic substrates to be considered to be printed by flexography.

15. (a) Describe the following problems with the possible causes and remedies :

(i) Dirty printing.

(ii) Adhesion.

(iii) Streaks.

(iv) Filling in

Or

(b) Discuss about the wide web presses and corrugated flexo press.

(4 × 10 = 40 marks)

C 60629 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2019

Biomedical Engineering

BM 09 L05—HOSPITAL ENGINEERING AND MANAGEMENT

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Mention the two main responsibilities of biomedical engineering services.
2. What is meant by BME service ?
3. What is DBMS approach ?
4. Brief about electrial safety.
5. What is fumigation ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

1. Explain the selection testing procedures of biomedical equipments.
2. Explain the installation of biomedical equipments in hospitals.
3. Explain the case study on a hospital DBMS.
4. Explain database approach to laboratory computerization.
5. Explain performance testing of isolated power supply.
6. Write short notes on sterilization procedures carried out in hospitals.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

1. Discuss about purchase and contract procedures of biomedical equipments.

Or

2. Explain the design service system followed in the hospital.

3. Explain the management of medical equipments.

Or

4. Explain the followings :
   (i) Interdepartmental computerization.
   (ii) Computerized medical record evaluation.
5. Explain the electrical safety meaasures under taken for the patient care in hospital environment.

Or

6. Explain the causes of failures of electrical supply and way to minimize them.
7. Explain the basics of air-conditioning and refrigeration.

Or

8. Explain the operation lighting and operating tables incorporated in hospitals.

(4 × 10 = 40 marks)

C 5119 (Pages : 3) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2014 SCHEME) EXAMINATION, APRIL 2021

Mechatronics

MT 14 604—MECHANICS OF MACHINERY

Time : Three Hours Maximum : 100 Marks

Part A

Answer **eight** *questions.*

Each question carries 5 *marks.*

1. Differentiate the completely constrained, successfully constrained and incompletely pair with simple sketches.
2. What are straight line motion mechanisms ? Brief about any *one* approximate straight-line motion mechanisms with kinematic diagram.
3. Brief about elliptical trammel mechanism with kinematic diagram.
4. "In a cam follower mechanism, the radial follower arrangement is generally preferred over offset follower"- Justify with sketch.
5. A disc cam lifts the radial follower to the height of 50 mm. during its 90° rotation, followed by the dwell of follower for the remaining 90° rotation of the cam. If the follower moves with simple harmonic motion, show the displacement of the follower against cam rotation graphically.
6. List the advantages and the limitations of gear drives.
7. Discuss the effect of 'odd' and 'even' number of intermediate gears in a simple gear train with kinematic diagram.
8. Write short notes about any one gear manufacturing method.
9. Brief on synthesis of planar mechanism using complex number modeling approach.
10. Compare the merits and demerits of synthesis of mechanisms using the analytical method and graphical method.

(8 × 5 = 40 marks)

Part B

11. The four-bar linkage in the posture shown in Fig. 1 is driven by crank 2 at ω_2 = 60 rad/s cw. Find the angular velocities of links 3 and 4, and the velocity of pin B and point C on link 3. AO_2 = 150 mm, BA = 300 mm, O_4O_2 = 75 mm, BO_4 = 300 mm, DA = 150 mm, and CD = 100 mm

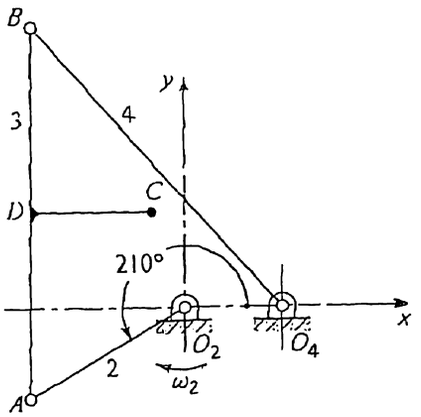


Fig. 1

Or

12. The angular velocity and angular acceleration of link 2 of the Scott-Russell linkage in the posture shown in Fig. 2 are ω_2 = 20 rad/s cw and α = 1500 rad/s^2 *cw*, respectively. Determine the velocity and acceleration of point B and the angular acceleration of link 3. AO_2 = CA = BA = 100 mm.

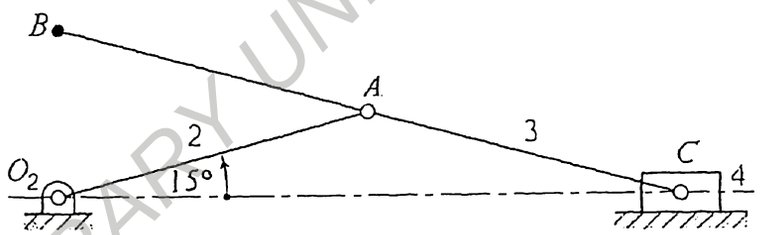


Fig. 2

13. Draw the profile of a radial cam operating knife-edge follower having a lift of 30 mm. The cam raises the follower for 150° of the rotation followed by a period of dwell for 60°. The follower descends for the next 100 ° rotation of the cam, again followed by a dwell period.

    The least radius of the cam is 20 mm. The raise and descent of the follower takes place with uniform acceleration and retardation motion.

Or

14. The following data relate to a circular cam operating a flat faced follower : Least diameter = 40 mm, lift = 12 mm, angle of action = 160°, speed = 500 r.p.m. If the period of acceleration of the follower is 60° of the retardation during the lift, determine the main dimensions of the cam and draw the cam profile.

15. A pair of spur gears with involute teeth is to give a gear ratio of 4 : 1. The arc of approach is not be less than the circular pitch and smaller wheel is the driver. The pressure angle is 14.5°. Find the least number of teeth that can be used on each wheel and the addendum of the wheel in terms of circular pitch.

Or

16. In an epicyclic gear train as shown in Fig. 3, the driving wheel A has 14 teeth and the fixed annular wheel C 100 teeth, the ratio of tooth numbers in wheels E and D is 98 : 41. If, 2.5 H.P at 1200 r.p.m is supplied to wheel A, find the speed and the direction of E and fixing torque required at C.

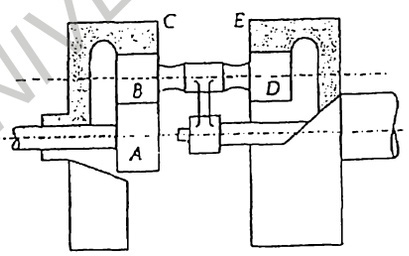


Fig. 3

17. Synthesize a four bar mechanism to generate function $y = \sin(x)$ for $0° \leq x \leq 590°$. The range of output link angle may be taken as 60° while that of input crank being 120°. Assume three precision points which are to be obtained from Chebyshev spacing. Assume fixed link to be 50 mm long and $\Phi_1 = 105°$ and $\psi_1 = 66°$.

Or

18. Enumerate the procedure to synthesize a four bar mechanism using over lay method with an example. Also, specify the advantages and limitations of overlay method.

(4 × 15 = 60 marks)

C 5117 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, APRIL 2021

Printing Technology

PT 14 606—ADVANCEMENT IN PRINTING TECHNOLOGY

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Define and explain additive manufacturing process.
2. Explain the problems involved in STL process with its solutions.
3. Explain the structure of a typical 3D printer.
4. Explain the compression and distribution of file formats in additive manufacturing.
5. Write a note on transponders used in biochip.
6. What is the market forecast for bio printing ? Explain.
7. Explain the different types of software used in 3D printing.
8. Explain the applications of printed electronics.
9. With a neat diagram, explain Aerosol printing process.
10. With a neat diagram, explain the Selective laser sintering process.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. (a) Explain the manufacturing of a model using a 3D printer with neat sketches.

Or

(b) Explain the key considerations for Additive file formats.

12. (a) Explain the advantages of 3D printing in detail.

Or

(b) Explain the following under additive manufacturing : Color specifications ; Texture specifications ; Print constellations ; Metadata ; Compression and Distribution.

13. (a) Explain the fundamentals of Tissue engineering.

Or

(b) Explain the bio printing process in detail.

14. (a) Explain the different printing technologies used in fabricating printed electronic devices.

Or

(b) Explain the different types of rapid prototyping processes.

(4 × 15 = 60 marks)

C 5116 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, APRIL 2021

Printing Technology

PT 14 605—SCREEN PRINTING AND GRAVURE

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Give an account of fabric terminology.
2. Discuss various blade profiles used in squeegee.
3. Discuss various types of stencils used in screen printing.
4. What are the features of wicket dryer ?
5. What are the functions of squeegee ?
6. Compare gravure and intaglio printing processes.
7. What are the characteristics of gravure printing process ?
8. Discuss various gravure cell configurations.
9. Describe metallized film. Explain its manufacturing process with neat diagram.
10. Explain different types of gravure impression roller coverings.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. Discuss the various factors influencing quality in screen printing process.

Or

12. A) Explain the 2 methods of measuring fabric tension in detail. (7 marks)

    B) Discuss various factors to be considered for squeegee selection. (8 marks)

Turn over

13. A) Compare sheet-fed and web-fed screen printing presses. (7 marks)

B) Explain carousel press. (8 marks)

Or

14. Explain the detailed procedure for two color screen printing including registration.

15. Explain doctor blade assembly and *four* types of doctor blade wear.

Or

16. With neat diagrams, explain the 4 methods of gravure cylinder preparation.

17. Discuss various surface preparation methods done on gravure substrates.

Or

18. Explain the 4 types of lamination methods with neat diagrams.

[4 × 15 = 60 marks]

C 5115 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, APRIL 2021

Printing Technology

PT 14 604—PRINT FINISHING AND CONVERTING

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Differentiate between pasting down and pressing in binding.
2. What is map guarding ? Explain.
3. List and explain five features of the end papers.
4. Discuss about SBS and SIS block copolymers.
5. What is meant by contact angle ? What are their significance ?
6. Differentiate between knife cut and shear cut principle.
7. Explain different styles of hand folding with suitable examples.
8. What is lamination ? List three purposes of lamination in print finishing.
9. What do you mean by applique ? How are they performed ?
10. What are the steps involved in wire stitching ?

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*

11. (a) What is meant by miscellaneous materials in print finishing department ? Give examples. (5 marks)

(b) With a neat sketch explain the process of board cutting in binding department. (10 marks)

Or

12. (a) Write a note on ISO system of paper sizes. (5 marks)

(b) Explain the preparation of cloth joint zig-zag end paper with a neat sketch. (10 marks)

13. (a) Differentiate between physical and specific theories of adhesion. (5 marks)

(b) What are 'heat curing adhesives' ? Explain three main materials used to formulate heat curing adhesives.

(10 marks)

Or

14. (a) What is meant by diffusion theory of adhesion ? When is this theory applicable ? (5 marks)

(b) What are radiation curing adhesives ? Explain the requirement and applications of such adhesives.

(10 marks)

15. (a) Differentiate between two folding principles with a neat sketch. (5 marks)

(b) With a neat sketch explain the working of stream feeder used on folding machine.

(10 marks)

Or

16. (a) Explain the purposes of die cutting in print finishing. (5 marks)

(b) With a neat block diagram illustrate the overview of cutting process. (10 marks)

17. (a) What is meant by round corner cutting ? List its purposes and applications. (5 marks)

(b) With a neat sketch illustrate the principle of thread stitching. (10 marks)

Or

18. (a) What is lamination ? List four purposes of lamination in print finishing. (5 marks)

(b) Explain the process of Otabind and Repkover lay flat adhesive binding. (10 marks)

C 5114 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, APRIL 2021

Printing Technology

PT 14 603—FLEXOGRAPHY

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions out of ten.*
Each question carries 5 *marks.*

1. With neat diagram, explain the mechanical principles of flexography.
2. Discuss various products of flexographic printing process.
3. What are the various applications of flexography ? Brief.
4. Discuss various types of originals used for plate preparation.
5. Write notes on powder-less etching of metal.
6. Define Tension. What are the consequences of improper web tension ?
7. With neat diagram, explain the working principle of manifold inking system.
8. What is a Stickyback ? Describe the 2 ways of attaching stickyback.
9. Discuss various fountain roller covering materials.
10. What do you mean by plate staggering ? What is its purpose ?

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. Explain possible variations in flexo presses as a coater with neat diagrams.

Or

12. With neat diagram, explain stack press configuration with its advantages, disadvantages and applications.

Turn over

13. With neat diagram, explain the process of preparing a solid photo-polymer plate.

Or

14. A) Write notes on bench micrometers, analog indicators and digital indicators used for rubber plate thickness measurement. (7 marks)

B) Discuss various types of special construction photopolymer plates. (8 marks)

15. With neat diagrams, explain the working principle and features of roll followers as web tension control systems.

Or

16. A) Discuss various reasons and remedies for following flexographic printing problems;

i) Adhesion ;

ii) Blocking ;

iii) Dot gain ; and

iv) Foaming.

(10 marks)

B) Write notes on surface rewinder.

(5 marks)

17. Explain the procedure for mounting and proofing a complete line job.

Or

18. Explain various steps involved in pin-registration mounting of liquid photopolymer plates and its advantages.

[4 × 15 = 60 marks]

C 5112 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, APRIL 2021

Mechanical Engineering

ME 14 606—AUTOMOBILE ENGINEERING

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Explain the construction and working principle of fuel cell with simple sketch.
2. Discuss the various parts of a piston with help of labelled sketch.
3. Describe the construction of clutch plate on a typical single plate dry clutch with the help of neat and labelled sketch.
4. List the different types of rear axles and explain the construction of rear axle used in heavy vehicle with the help of a sketch.
5. List any five merits of disc brakes over drum brakes.
6. Explain Ackermann steering principle with sketch.
7. State any five advantages of independent suspension system.
8. Explain the principle of working of a starting motor.
9. Discuss the factors that affect the heat transfer efficiency in an Air Conditioning (A/C) system.
10. Mention the various measures to control pollution from automobiles.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*

11. (a) Sketch and explain the automotive chassis with their subsystems.

Or

(b) State the merits of direct injection of petrol. Explain with line sketches about Multi-Point Fuel Injection(MPFI) and Throttle Body Injection (TBI).

Turn over

12. (a) Describe with help of a neat sketches the construction and operation of 3 + 1 speed constant mesh gear box.

Or

(b) Draw a layout of hydraulic braking system used in automotive practice. Explain the construction and working of main components of this system.

13. (a) Explain the construction and working of a telescopic type shock absorber with the help of a neat sketches.

Or

(b) Discuss the various types of wheel construction with suitable sketches.

14. (a) Explain with suitable sketch the construction and working of a three-way catalytic converter used in automotive exhaust system to control the emissions.

Or

(b) Describe the various seat belt systems used in automotive practice.

(4 × 15 = 60 marks)

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, APRIL 2021

Mechanical Engineering

ME 14 605—OPERATIONS RESEARCH

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. A company makes two kinds of belts. Belt A is of high quality and Belt B is of lower quality. The respective profits are Rs. 8 and Rs. 6 per belt. Each belt of type A requires twice as much time as belt of type B and if all belts were of type B, the company could make 1000 belts per day. The supply of leather is sufficient for 800 belts (both A and B combined). Belt A requires a fancy buckle and only 400 such buckles are available per day. There are only 700 buckles a day available for type B. Formulate the problem as LPP.

2. Solve using simplex method :

$$\text{Maximize } Z = 3X_1 + 5X_2$$
$$\text{subject to, } \quad X_1 + 2X_2 \le 2000$$
$$X_1 + X_2 \le 1500$$
$$X_2 \le 600$$
$$\text{and } X_1, X_2 \ge 0.$$

3. Distinguish between Transportation problem and Assignment problem.

4. Consider M/M/1 : α/FCFS queue. Parts arrive to a milling machine following a Poisson process at a rate of 10/hr. Machining time is exponentially distributed with a mean of 3 min. Find (i) Average number of parts in the system ; and (ii) Average waiting time in Queue.

5. Solve the following game whose payoff matrix is given in Table 1 :

Table 1

		A	
B		7	4
		5	6

6. State the necessary and sufficient condition for the existence of a feasible solution to a transportation problem.

7. What is degeneracy in a linear programming problem ? How do you identify degeneracy in simplex table ?

8. State various phases of operations research and explain in brief any *one* of them.

9. What are the multiple optimum solutions in Linear Programming problem ? Explain with an example for the multiple optimum solutions.

10. Define saddle-point, zero sum game and game value.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. (a) A mining company is taking certain kind of ore from two mines A and B. The ore is divided in to 3 quality groups x, y and z. Every week the company has to deliver 240 tons of x, 160 tons of y, 440 tons of z. The cost/day for running mine A is Rs. 3,000 and for running mine B is 2000. Each day mine A will produce 60 tons of x, 20 tons of y and 80 tons of z. Using graphical method, find the most economical production plan.

Or

(b) The manager of an oil refinery has to decide upon the optimal mix of two possible blending processes, of which the inputs and outputs per production run is presented in Table 2 :

Table 2

	Input		Output	
Process	Crude A	Crude B	Gasoline X	Gasoline Y
1	5	3	5	8
2	4	5	4	4

The maximum amount available of crude A and B is 200 units and 150 units respectively. Market requirements show that at least 100 units of gasoline X and 80 units of gasoline Y must be produced. The profits per production run from process 1 and process 2 are Rs. 3 and Rs. 4 respectively. Formulate the problem as a linear programming problem and solve by graphical method.

12. (a) Solve the following LPP using Simplex method :

Maximize $Z = 2X_1 + 5X_2$

subject to $X_1 + 2X_2 \leq 8$

$-X_1 \geq -4$

$X_2 \leq 3$

and X_1 unrestricted and $X_2 \geq 0$.

Or

(b) Solve by simplex method :

Maximize $Z = 3X_1 + 5X_2 + 4X_3$

subject to $2X_1 + 3X_2 \leq 8$

$2X_2 + 5X_3 \leq 10$

$3X_1 + 2X_2 + 4X_3 \leq 15$ and $X_1, X_2, X_3 \geq 0$.

13. (a) Solve the following transportation problem (Table 3) in which 'ai' is the availability at origin and 'bj' is the requirement at the destination and cell entries are unit costs of transportation from any origin to any destination :

Table 3

	D_1	D_2	D_3	D_4	D_5	ai
O_1	4	7	3	8	2	4
O_2	1	4	7	3	8	7
O_3	7	2	4	7	7	9
O_4	4	8	2	4	7	2
bj	8	3	7	2	2	

Or

(b) Solve the following (Table 4) assignment problem :

Table 4

	I	II	III	IV	V
A	11	17	08	16	20
B	09	07	12	06	15
C	13	16	15	12	16
D	21	24	17	28	26
E	14	10	12	11	13

14. (a) (i) A self-service store employs one casher at it is counter. 9 customers arrive on average of every 5 minutes, while the cashier can serve 10 customers in 5 minutes. Assuming Poisson distribution for arrival and exponential distribution for service. Determine average no. of customer in the system, average no. of customer in the queue, average time a customer spent in the system and average time a customer spends in the queue. (8 marks)

(ii) What are the steps involved in solution of $(2 \times n)$ and $(m \times 2)$ games ? (7 marks)

Or

(b) Arrival rate of telephone booth are accordingly Poisson distribution, with an average time of 9 minutes between 2 consecutive arrivals. The length of telephone call is assumed to be exponential distribution with mean of 3 minutes. Determine the probability that a person arriving at the boots will have to wait. Find an average Q length that forms from time to time. The telephone company will install a second booth what convinced that an arrival would expect to wait. What is the probability that an arrival will have to wait for more than 10 minutes before the phone is free. What is the probability that he/she will have to wait for more than 10 minutes before the phone is available and the call is also complete.

$(4 \times 15 = 60$ marks)

C 5110 (Pages : 3) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2014 SCHEME) EXAMINATION, APRIL 2021

Mechanical Engineering

ME 14 604—MACHINE DESIGN—I

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Explain the different phases in machine design.
2. What is stress concentration ? What are the causes of stress concentration ?
3. Discuss the factors affecting endurance limit.
4. Explicate the concept of bolts of uniform strength.
5. List out the assumptions made in designing of boiler joints.
6. What are the advantages and limitations of welded joints over riveted joints ?
7. What is nipping of laminated leaf spring ? Explain its role in spring design.
8. State the advantages and limitations of hollow shaft over solid shaft.
9. Write a short note on bushed-pin type flexible coupling.
10. Explain about Woodruff key with a neat sketch.

(8 × 5 = 40 marks)

Part B

Answer **all** *the questions.*
Each question carries 15 *marks.*

11. (a) The stresses induced in a critical point in a machine component made of steel are as follows :

$\sigma_x = 100\ N/mm^2$ $\sigma_y = 40\ N/mm^2$ $\zeta_{xy} = 80\ N/mm^2$

Calculate the factor of safety by :

(i) Maximum shear stress theory.

(ii) Maximum principal stress theory.

Assume yield point stress in simple tension = 380 N/mm^2.

Or

Turn over

(b) A bolt is subjected to a tensile load of 25 kN and a shear load of 10 kN. Determine the diameter of the bolt according to :

(i) Maximum principal stress theory.

(ii) Maximum principal strain theory.

(iii) Maximum shear stress theory.

Assume factor of safety as 2.5, yield point stress in simple tension = 300 N/mm^2, Poisson's ratio = 0.25

12. (a) A cylinder head is connected to the cylinder flange by 12 bolts. The inside diameter of the cylinder is 480 mm. and the maximum pressure inside it is restricted to 1.5 MPa. If the bolts have a permissible tensile strength of 80 MPa. Determine the size of bolts neglecting initial tightening.

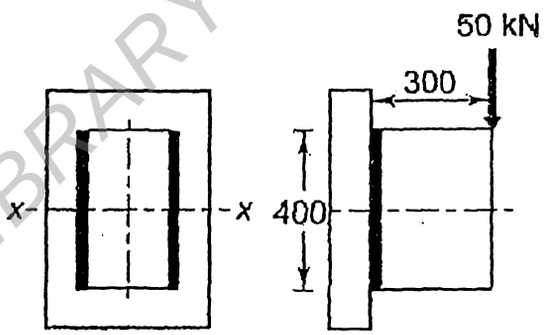
Or

(b) A double riveted double cover butt joint in plates 20 mm. thick is made with 25 mm. diameter. Rivets at 100 mm. pitch. The permissible stresses are :

$\sigma_t = 120$ N/mm^2, $\sigma_c = 150$ N/mm^2, $\zeta = 100$ N/mm^2

Find the efficiency of the joint, taking the strength of the rivets in double shear as twice than that of single shear.

13. (a) A bracket is welded to the vertical plate by means of two fillet welds as shown in Fig. Determine the size of the welds, if the permissible shear stress is limited to 70 N/mm^2.



Dimensions are in mm.

Or

(b) Design a helical spring for an engine valve. Length of the spring when the valve is open is 70 mm. and the length when closed is 80 mm. Spring load on the valve when open is 450 N and when closed is 300 N. Minimum internal diameter of the spring is 30 mm. Take permissible shear stress = 400 N/mm^2 and G = 0.8×10^5 N/mm^2.

14. (a) A shaft transmits 75 kW power at 300 r.p.m, load is gradually applied. It is also subjected to bending moment of 500 Nm, shear stress in shaft material should not exceed 40 N/mm^2. Shaft must not twist more than 2° per metre length. Modulus of rigidity is 0.8×10^5 N/mm^2. Find the diameter of the solid shaft. If the shaft chosen is hollow with inside to outside diameter ratio = 0.5, find the size of the hollow shaft.

Or

(b) Two 35 mm. shafts are connected by a flanged coupling. The flanges are fitted with 6 bolts on 125 mm. bolt circle. The shafts transmit a torque of 800 Nm. at 350 r.p.m. For the safe stresses mentioned below, calculate :

(i) Diameter of bolts

(ii) Thickness of flanges

(iii) Key dimensions

(iv) Hub length

(v) Power transmitted.

Safe shear stress for shaft material = 63 MPa.

Safe shear stress for bolt material = 56 MPa.

Safe shear stress for cast iron coupling = 10 MPa.

Safe shear stress for key material = 46 MPa.

Note : The following data books are permitted for reference :

1. PSG Design Data, DPV printers, Coimbatore.
2. Prof. Narayana Iyengar B.R, Machine Design Data Handbook.
3. K. Mahadevan, Design Data Handbook, CBS publishers.

(4 × 15 = 60 marks)

C 5109 (Pages : 4) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2014 SCHEME) EXAMINATION, APRIL 2021

Mechanical Engineering

ME 14 603—DYNAMICS OF MACHINERY

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. State and numerically illustrate the condition for static equilibrium of following planar members :
   (i) Rigid body with three forces.
   (ii) Rigid body with two forces and a moment.
2. List the procedure to find the angular acceleration of a connecting rod using Klein's construction.
3. Compare the unbalance forces due to rotating masses and reciprocating masses.
4. Define the following terms :
   (a) Co-efficient of fluctuation of speed.
   (b) Mass moment of inertia.
5. State the effect of centrifugal couple on the wheels of four wheeler, while negotiating a curve.
6. Define :
   (a) Stiffness and
   (b) Critical damping ratio.
7. Draw the graph between frequency ration and magnification factor, list any two important observations.
8. Brief about the beat phenomenon in two degree of freedom system.
9. What is torsionally equivalent shaft ? Illustrate with simple sketch.
10. State the working principle of accelerometer.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*

Each question carries 15 *marks.*

11. (a) Find the frame reactions and torque M_{12} necessary to maintain equilibrium of the four-bar linkage as shown in Fig. 1. O_2A = 87.5 mm ; AB = O_4B = 150 mm ; O_2O_4 = 50 mm ; BD=25 mm : P = 500N.

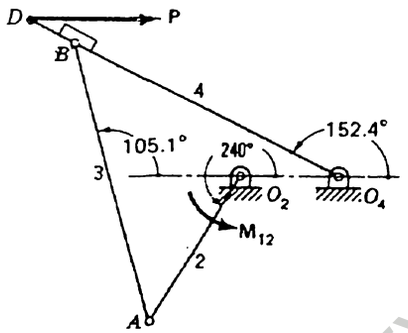


Fig. 1

Or

(b) The fig.2, shows a slider-crank mechanism with an external force F_B applied to the piston. For the given crank velocity, find all the reaction forces in the joints and the crank torque. R_{AO2} = 75 mm, R_{BA} = 300 mm, R_{G2O2} = 32 mm, R_{G3A} = 88 mm, m_2 = 0.43 kg, m_3 = 1.59 kg, m_4 = 0.283 kg, I_{G2} = 4.39 × 10^{-4} kgm^2, I_{G3} = 0.0124 × 10^{-3}kgm^2, $\omega_2 = 160\,k$ rad / s, $\alpha_2 = 0$, $\alpha_3 = 3090k$ rad / s^2 CW, A_{G2} = 805 m/s^2 at 150°, A_{G3} = 1870 m/s^2 at 158.3°, A_{G4} = 1916 m/s^2 at 180°, F_B = 360 N at 180°. Assume the coefficient of friction between the sliding surface is zero.

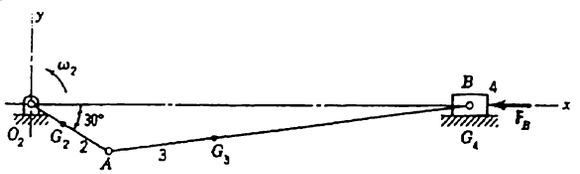


Fig. 2

12. (a) A rotor has the following properties :

Mass	*Magnitude in kg.*	*Radius in mm*	*Angle*	*Axial distance from 1st mass*
1.	9	100	0°	–
2.	7	100	60°	160 mm
3.	8	100	135°	320 mm
4.	6	100	270°	560 mm

If the shaft is balanced by two counter masses located at 100 mm radii and revolving in planes midway of planes 1 and 2, and midway of 3 and 4. determine the magnitudes of the balancing masses and their respective angular positions for complete dynamic balancing of the rotor.

Or

(b) A ship is propelled by a turbine rotor having a mass of 60 kN and speed of 2400 r.p.m. The direction of rotation of the rotor is clockwise when viewed from the stern. The radius of gyration of the rotor is 450 mm. Determine the gyroscopic effect when :

(i) The ship steers to the left in a curve of 60 m radius at a speed of 18 knots (1 knot = 1860 m/hr)

(ii) The ship pitches 7.5° above and 7.5° below the normal position and the bow is descending with its maximum velocity. The pitching motion is simple harmonic with a periodic time of 20 s.

13. (a) The mass of single degree damped vibrating system weighs 75 N and makes 24 free oscillations in 14 seconds when disturbed from its equilibrium position. The amplitude of vibration reduces to 0.2 of its initial value after five oscillations. Determine :

(i) The stiffness of the spring.

(ii) The logarithmic decrement.

(iii) The damping factor.

Or

(b) The weight of an electric motor is 125 N and it runs at 1500 r.p.m. The armature weighs 35 N and its centre of gravity lies 0.5 mm from the axis of rotation. The motor is mounted on five springs of negligible damping so that the force transmitted is one-eleventh of the impressed force. Assume that the weight of the motor is equally distributed among the five springs. Determine the stiffness of each spring, dynamic force transmitted to the base at operating speed, phase angle, dynamic force transmitted to the base at resonance and natural frequency of the system.

14. (a) Explain the need and working of dynamic vibration absorbers with an application example.

Or

(b) A 4 cylinder engine and flywheel coupled to a propeller are approximated to a 3 rotor system in which the engine is equivalent to a rotor of moment of inertia 800 kgm^2, the flywheel to a second rotor of 320 kgm^2 and the propeller to a third rotor of 200 kgm^2. The first and second rotor being connected by 50 mm diameter and 3 m long shaft and the second and third rotors being connected by a 25 mm diameter and 2 m long shaft. Neglecting the inertia of shaft, find :

(i) Natural frequency of torsional vibrations.

(ii) The positions of node ; and

(iii) The relative amplitude of vibrations. G = 84 GPa.

(4 × 15 = 60 marks)

C 5108 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, APRIL 2021

Mechanical Engineering

ME 14 602—METROLOGY AND INSTRUMENTATION

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Differentiate between the active and passive transducers.
2. With suitable examples explain the fidelity and the measuring lag.
3. Give details about the zero, first and second order instruments.
4. What is a CMM probe ? Explain the various types of probes used in CMM.
5. Explain the working of liquid in glass thermometer.
6. With a neat sketch explain the machine vision system.
7. Define R_a, R_z, R_v and t_p % with respect to surface roughness.
8. With neat sketch, explain the use of sine bar for measurement of tapered component. Also, explain how sine bar is used to measure angle of component of larger size.
9. Give details about the drag force flow meter with neat sketch.
10. Write about the calibration system in metrology.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. (a) Describe in detail the different types of dynamic errors in a measurement system.

Or

(b) Enumerate the desirable characteristics of precision measuring instruments.

Turn over

12. (a) Describe the different modes of operation of piezo electric transducers.

Or

(b) Explain the preparation of strain gauge and calibration of strain gauge.

13. (a) Explain about the thermistor and thermocouples.

Or

(b) Depict the working principle of McLeod Gauge with a neat sketch.

14. (a) Describe the measurement of effective diameter of a screw thread by two wire method using floating carriage micrometer with a help of neat sketch.

Or

(b) Suggest the suitable measuring instrument used to measure the tooth thickness of a spur gear. Explain in detail about its procedure with an appropriate sketch.

(4 × 15 = 60 marks)

C 5107 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2014 SCHEME) EXAMINATION, APRIL 2021

Mechanical Engineering

ME 14 601—GAS DYNAMICS AND JET PROPULSION

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Derive an equation for effect of mach number on compressibility.
2. Brief on the impulse function in isentropic flow.
3. Explain the flow through nozzles.
4. Write short note on the development of flow with normal shock wave.
5. Illustrate on impossibility of a shock in subsonic flow.
6. Brief on the flow with oblique shock waves.
7. Discuss on significance of fanno curves in the constant area ducts.
8. A combustion chamber in a gas turbine plant receives air at 350 K, 0.55 bar and 75 m/s. The air-fuel ratio is 29 and the calorific value of the fuel is 41.87 MJ/kg. taking y = 1.4 and Dr = 0.287 KJ/kg k, Determine the initial and final Mach numbers for the gas.
9. Brief on specific fuel consumption and specific thrust and impulse.
10. Write short notes on rocket propulsion theory.

(8 × 5 = 40 marks)

Part B

Answer **all** *question.*
Each question carries 15 *marks.*

11. (i) Air (y = 1.4, R = 287.43 KJ/kg.K) enters a straight asymmetric duct at 300 K, 3.45 bar and 150 m/s and it leaves it at 277 K, 2.058 bar and 260 m/s. the area of cross section at the entry is 500 cm^2, assuming adiabatic flow, determine : (i) Stagnation temperature ; (ii) Maximum velocity ; (iii) Mass flow rate ; and (iv) Area of cross section at exit.

Or

Turn over

(ii) Air is discharged from a reservoir at p_0 = 6.91bar and t_0 = 325 °C through a nozzle to a exit pressure of 0.98 bar. if the flowrate is 3600 kg/hr, Determine for isentropic flow : (i) Throat area, pressure and velocity ; (ii) Exit area, mach number ; and (iii) Maximum velocity.

12. (i) The state of the gas (y = 1.3 and R = 0.469 kJ/kg.K) upstream of a normal shock wave is given by the following data, Mx = 2.5, px = 2bar, Tx = 275 K. Calculate the mach number, pressure, temperature and velocity of the gas downstream of the shock.

Or

(ii) A gas (y = 1.3) at $p1$ = 345 mbar, T1 = 350 k and M1 = 1.5 is to be isentropically expanded to 138 mbar. Determine: (i) The deflection angle ; (ii) Final mach number ; and (iii) The temperature of the gas.

13. (i) A circular duct passes 8.25 kg/s. of air at an exit mach number of 0.5. the entry pressure and temperature are 3.45 bar and 38 °C respectively and the co-efficient of friction is 0.005. if the mach number at entry is 0.15. determine : (i) The diameter of the duct ; (ii) Length of the duct ; (iii) Pressure and temperature at the exit ; (iv) stagnant pressure loss ; (v) Verify the exit mach number through exit velocity and temperature.

Or

(ii) The mach number at the exit of the combustion chamber is 0.9. the ratio of the stagnation temperatures at the exit and the entry is 3.74. if the pressure and temperature of the gas at exit are 2.5 bar and 1000 °C respectively. Determine (i) The mach number, pressure and the temperature of the gas at entry ; (ii) The heat supplied per kg of the gas. (iii) The maximum heat that can be supplied. Take y = 1.3, and cp = 1.218 Kj/kg.K.

14. (i) Explain briefly about the propellant feed system of a liquid propellant rocket engine with suitable sketch.

Or

(ii) Discuss in detail the various properties of solid propellants.

(4 × 15 = 60 marks)

C 5106 **(Pages : 3)** **Name**.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, APRIL 2021

Electrical and Electronics Engineering

EE 14 606—NUMERICAL ANALYSIS AND OPTIMIZATION TECHNIQUES

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*

1. Find an approximate root of $x \log_{10} x - 1.2 = 0$ by Newton-Raphson method correct to 4 decimal places.
2. By relaxation method, solve :

   $12x + y + z = 31$, $2x + 8y - z = 24$, $3x + 4y + 10z = 58$.
3. Find the first term of the series whose second and subsequent terms are 8, 3, 0, –1,0, ...
4. Given the following data, find $y'(6)$ and the maximum value of y.

x	0	2	3	4	7	9
y	4	26	58	112	466	922

5. Using Modified Euler method, find y (0.1), y (0.2) given $\frac{dy}{dx} = x^2 + y^2, y(0) = 1$.
6. A company manufactures two products A and B. Each unit of B takes twice as long to produce as one unit of A and if the company were to produce only A it would have time to produce 2000 units per day. The availability of the raw material is sufficient to produce 1500 units per day of both A and B combined. Product B requiring a special ingredient only 600 units can be made per day. If A fetches a product of Rs. 2 per unit and B a profit of Rs. 4 per unit. Write the mathematical formulation for the LPP.
7. Explain briefly the term " Artificial " variables.
8. State Bellman's principle of optimality. Write the advantages of dynamic programming.
9. What do you mean by balanced and unbalanced transportation problems? Explain how would you convert the unbalanced problem into a balanced one ?
10. Explain the steps in the Hungarian method used for solving assignment problems.

(8 × 5 = 40 marks)

Turn over

Part B

Answer **all** *the questions.*

11. (a) Solve the following system of equations :

$10x + 2y + z = 9$; $2x + 20y - 2z = -44$; $-2x + 3y + 10z = 22$.

by Jacobi's method. Compare your results with Gauss-Seidel method and computational efficiency of them.

Or

(b) The following data gives the melting point of an alloy of zinc and lead, θ is the temperature and x is the percentage of lead. Using interpolation technique, find

(i) x when $\theta = 200$. (ii) θ when $x = 74$.

x	40	50	60	70
θ	184	204	226	250

12. (a) A rod is rotating in a plane. The following table gives the angle θ (radians) through which the rod has turned for various values of the time 't' seconds.

t	0	0.2	0.4	0.6	0.8	1.0
θ	0	0.12	0.49	1.12	2.02	3.20

Calculate the angular velocity and the angular acceleration of the rod with $t = 0.6$ seconds.

Or

(b) Find $y(0.1)$, $y(0.2)$, $y(0.3)$ from $\frac{dy}{dx} = xy + y^2$, $y(0) = 1$ by using Runge-Kutta method of fourth order and hence obtain $y(0.4)$ using Milne's method.

13. (a) Use simplex method to solve :

Minimize $Z = x_2 - 3x_3 + 2x_5$

subject to $3x_2 - x_3 + 2x_5 \leq 7$

$-2x_2 + 4x_3 \leq 12$

$-4x_2 + 3x_3 + 8x_5 \leq 10$

and $x_2, x_3, x_5 \geq 0$.

Or

(b) Use two-phase method to

Maximize $Z = 2x_1 + x_2 + 0.25\,x_3$

subject to $4x_1 + 6\,x_2 + 3x_3 \leq 8$

$3x_1 - 6\,x_2 - 4x_3 \leq 1$

$2x_1 + 3\,x_2 - 5x_3 \geq 4$

$x_1,\ x_2, x_3 \geq 0.$

14. (a) Solve the transportation problem to maximize profit.

		Destination				
		A	B	C	D	Supply
Source	S1	40	25	22	33	100
	S2	44	35	30	30	30
	S3	38	38	28	30	70
	Demand	40	20	60	30	

Or

(b) A company is faced with the problem of assigning four different salesman to four territories for promoting it's sales. Territories are not equally rich in their sales potential and the salesman also differ in their ability to promote sales. The following table gives the expected annual sales (in thousands of rupees) for each salesman if assigned to various territories. Find the assignment of salesman so as to maximize the annual sales.

Territories

		1	2	3	4
Sales man	A	60	50	40	30
	B	40	30	20	15
	C	40	20	35	10
	D	30	30	25	20

(4 × 15 = 60 marks)

C 5105 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2014 SCHEME) EXAMINATION, APRIL 2021

Electrical and Electronics Engineering

EE 14 605—DIGITAL SIGNAL PROCESSING

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Explain the properties of convolution ?
2. Compute linear and circular convolution of the two sequence $x_1(n)$ = {1, 2, 2, 2} and $X_2(n)$ = {1, 2, 3, 4}.
3. Compare it with DIT-FFT algorithms.
4. Explain in detail about direct form realization of FIR filters.
5. Write short notes on direct form to lattice structure.
6. Explain linear phase FIR structures.
7. Design an ideal band-pass filter with frequency response :

   $H_d\left(e^{jw}\right) = 1$ for $\pi/4 \le |w| \le 3\pi/4$

   $= 0$ otherwise.

   Find the value of $h(n)$ for N = 7.
8. Explain the limit cycle oscillations due to product round off and overflow errors.
9. Brief the addressing modes available in TMS320C5X processor ?
10. Explain an application of DSP processor.

(8 × 5 = 40 marks)

Turn over

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. (a) Compute the eight - point DFT of the sequence $x(n) = \{1, 1, 1, 1, 0, 0, 1, 1\}$ using the in place radix-2 DIF algorithm.

Or

(b) Explain in detail about overlap add method and overlap save method for filtering of long data sequences using DFT.

12. (a) Realize the system given by difference equation :

$y(n) = -0.1\, y(n-1) + 0.72\, y(n-2) + 0.7\, x(n) - 0.252\, x(n-2)$ in parallel form.

Or

(b) An FIR filter is given by the difference equation :

$y(n) = 2\, x(n) + 4/5\, x(n-1) + 3/2\, x(n-2) + 2/3\, x(n-3)$.

13. (a) Design a Fourth order Butterworth digital filter using bilinear transformation technique. Assume sampling period T = 2 sec.

Or

(b) Write the design steps FIR filters using windowing technique.

14. (a) Consider the transfer function $H(z) = H_1(z)\, H_2(z)$ where

$$H_1(z) = \frac{1}{1 - a_1 z^{-1}} \text{ and } H_2(z) = \frac{1}{1 - a_2 z^{-1}}.$$

Assume $a_1 = 0.5$ and $a_2 = 0.6$ and find the output round off noise power.

Or

(b) Explain the architecture of TM320 C67X DSP Processor.

(4 × 15 = 60 marks)

C 5104 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, APRIL 2021

Computer Science Engineering

CS 14 606—MANAGEMENT INFORMATION SYSTEMS

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5*marks.*

1. Explain the various components of an Information System.
2. Compare and contrast open system and closed system.
3. Why is MIS looked upon as a strategic need of management today ?
4. Compare traditional file processing with Database Management Systems.
5. Explain the need for commercial software's.
6. Draw the architecture of a communication system.
7. Explain the significance of transaction processing systems.
8. Define Expert systems ? Explain their importance in current era.
9. Briefly discuss end-means analysis.
10. How is system analysis done ? Explain.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. (a) (i) Explain the levels of management in brief. (7 marks)

(ii) Illustrate the various functions of management. (8 marks)

Or

(b) (i) Explain various system approaches used to solve problems. (8 marks)

(ii) With a neat sketch discuss the framework of an information system. (7 marks)

Turn over

12. (a) (i) Explain the hardware components of a computer. (8 marks)

(ii) Compare and contrast logical resources and physical resources. List few logical resources and physical resources of a computer.

(7 marks)

Or

(b) (i) Give an example each of the following application software : (i) Word processing software ; (ii) Image processing software ; (iii) Accounting software ; (iv) Spreadsheet software ; (v) Presentation software ; (vi) Web browser software, and (vii) Geographical Information Systems.

(7 marks)

(ii) What are the different ways of acquiring software ? (8 marks)

13. (a) (i) Explain in detail Office Automation Systems. (8 marks)

(ii) Discuss the role of Management Information System (MIS) in business processes.

(7 marks)

Or

(b) (i) Compare and contrast Decision Support System (DSS) and Group Decision Support System (GDSS).

(7 marks)

(ii) What is an Expert System ? List the requirements and characteristics of an Expert system.

(8 marks)

14. (a) What is an Information System Plan ? How should it be organized ? List the various types of Information System Plans.

(15 marks)

Or

(b) Explain in detail the security and ethical issues of information systems. (15 marks)

[4 × 15 = 60 marks]

C 5103 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2014 SCHEME) EXAMINATION, APRIL 2021

Computer Science Engineering

CS 14 605—GRAPH THEORY AND COMBINATORICS

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Explain the Chinese postman problem.
2. Discuss few challenges in real world that can be solved by the applications of graph theory.
3. Write the Ford Fulkerson algorithm.
4. What are prefix codes ? Explain their significance. Give some examples.
5. Explain the Fundamental principles of counting.
6. What is meant by Arrangements with forbidden (banned) positions ? Explain.
7. State and explain Binomial theorem.
8. Briefly explain Non-homogeneous recurrence relation.
9. Find the coefficient of x^5 in $(1 + 2x)^6 (1 - x)^7$.
10. Solve the Fibonacci relation $Fn = Fn - 1 + Fn - 2$.

($8 \times 5 = 40$ marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. (a) (i) Prove that in a complete graph with n vertices there are $(n - 1)/2$ edges-disjoint Hamiltonian circuits, if n is odd number ≥ 3.

(7 marks)

(ii) List the procedure to color a graph and find its chromatic number. What are the applications of graph coloring ?

(8 marks)

Or

Turn over

(b) (i) Explain Euler digraphs in detail. (8 marks)

(ii) Prove that, a graph G with n vertices has $n - 1$ edges and no circuits are connected.

(7 marks)

12. (a) How do you find the minimum spanning tree of a graph ? Explain. (15 marks)

Or

(b) (i) Compare balanced and unbalanced assignment problems. (7 marks)

(ii) Show that the ring sum of any two cut-sets in a graph is either a third cut set or en edge disjoint union of cut sets.

(8 marks)

13. (a) (i) Discuss the Principle of inclusion and exclusion in detail. (7 marks)

(ii) Find the number of ways of ways of arranging the word ARRANGE and out of it how many arrangements have all A's together.

(8 marks)

Or

(b) (i) Find the coefficient of $a^5 b^7$ in the expansion of $(a - 2b)^{12}$. (7 marks)

(ii) Discuss the rules of sum and product with example. (8 marks)

14. (a) (i) Is the sequence $\{a_n\}$ a solution of the recurrence relation $a_n = 8a_{n-1} - 16a_{n-2}$ if :

(i) $a_n = 0$; and (ii) $a_n = 2^n$?

(8 marks)

(ii) Find a recurrence relation and initial conditions for 1, 5, 17, 53, 161, 485....

(7 marks)

Or

(b) (i) Explain exponential generating functions in brief. Define Maclaurin series expansion of e^x and e^{-x} .

(8 marks)

(ii) Briefly explain Non-homogeneous recurrence relation and their solutions. (7 marks)

[4 × 15 = 60 marks]

C 5102 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2014 SCHEME) EXAMINATION, APRIL 2021

Computer Science Engineering

CS 14 601—EMBEDDED SYSTEM

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Compare and contrast single purpose processors and application specific processors.
2. Explain the different types of Digital Signal Processors.
3. Explain various memory types and list their significance.
4. Explain the DMS arbitration methods in brief.
5. Discuss error detection and correction mechanism in serial communication.
6. How are concurrent processors created, resumed and suspended ? Show with an example.
7. Explain the structure of a basic finite state machine.
8. What is the need of automation ? Explain.
9. Explain Intellectual Property Cores.
10. WTist is FSM synthesis ? Explain.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. (a) Explain in detail pipelining techniques with suitable examples.

Or

(b) Explain the basic design of a combinational and sequential design. How can such design be optimized ?

12. (a) Discuss in brief multiprocessor interfacing and I/O addressing.

Or

(b) With a neat sketch explain the multi-level bus architecture and illustrate its communication principles.

Turn over

13. (a) Explain in detail the Program State Machine (PSM) model.

Or

(b) Discuss in detail the implementation strategy of various inter-process communication techniques.

14. (a) Explain in detail the evolution of compilation and synthesis technology.

Or

(b) Describe the hardware/software co-design technique.

[4 × 15 = 60 marks]

C 5096 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) [2014 SCHEME] DEGREE EXAMINATION, APRIL 2021

Biotechnology Engineering

BT 14 603—FINANCIAL MANAGEMENT AND COST ESTIMATION OF PROCESS INDUSTRIES

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Write short notes on financial management.
2. What is compounding and discounting ?
3. Write a note on 'inflation'.
4. What is payback period ? Explain.
5. What is EBIT and EPS ? Explain.
6. What is capital rationing ? Explain.
7. What is working capital ?
8. Explain William's six-tenth factor.
9. Write short notes on Balance Sheet.
10. Explain about economic production charts.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. Explain about simple interest, compound interest and continuous interest.

Or

12. Explain declining balance method, double declining balance method and sum of digits method.
13. Explain about discounted cash flow methods, net present value and internal rate of return.

Or

14. Explain about financial leverage and effect of financial leverage on shareholders earnings.

15. Write a note on material cost indices, process equipment cost index.

Or

16. Explain about estimation of revenue and estimation of total product cost.

17. What is breakeven and minimum cost analysis ? Explain the critique in the use of breakeven and minimum cost analysis.

Or

18. Describe the types of cost, variables and fixed cost in detail.

(4 × 15 = 60 marks)

C 5093 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) [2014 SCHEME] DEGREE EXAMINATION, APRIL 2021

Biomedical Engineering

BM 14 605—DIGITAL SYSTEMS DESIGN

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Explain the declaration of constants, variables and signals in VHDL with examples.
2. Illustrate the use of while loop and repeat loop with suitable example.
3. Explain 'entity declaration'.
4. Write short notes on parity checker.
5. Design a VHDL program for a 9 input parity checker.
6. What is meant by adders in VHDL ?
7. What are the basic components of a module ? Explain all the components of a verilog module with neat block diagram.
8. Write a note on 'variable assignment'.
9. Explain Built-in self test.
10. Distinguish between CPLD and FPGA.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. Explain identifiers and data objects in VHDL.

Or

12. Explain the following :

    (i) Specification Declaration ; (ii) Default rules ; (iii) Instantiation.

13. Explain about decoders and multiplexers.

Or

14. Explain about BCD to excess-3 converter.

15. Explain about Datatypes and operators in verilog.

Or

16. Explain about (i) Always blocks and (ii) the concept of test bench.

17. Explain in detail the simulation/synthesis software.

Or

18. Write a detailed note on scan testing and boundary scan testing.

(4 × 15 = 60 marks)

C 5092 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, APRIL 2021

Biomedical Engineering

BM 14 602—MEDICAL IMAGING TECHNIQUES

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. What is Quantization ? Explain the different quantization techniques.
2. What is the difference between continuous and discrete functions ? Explain how a signal can be converted to discrete signal.
3. List the various scanning modes in ultrasound imaging. Explain each one of them.
4. What is the principle of scintillation crystal ? Give the characteristics of ideal deduction crystal.
5. Describe the instrumentation of SPECT.
6. What is Angiography ? Explain about time of flight technique.
7. Write short notes on Magnetic resonance imaging.
8. Describe the technique which is used to determine the areas of brain involved in specific cognitive cases.
9. List out the difference between back projection and filtered back projection.
10. State Random transform and explain.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. (a) Define SNR. Explain the amplitude, power and differential SNR.

Or

(b) What is circular convolution ? Prove the circular convolution with 2 finite fourier transform.

Turn over

12. (a) What are the other different imaging techniques which uses X-rays ? Elaborate

Or

(b) How measurement of blood velocity is done using continuous wave Doppler measurement and pulsed mode Doppler measurement. Elaborate with neat diagram.

13. (a) List the clinical application of MRI. Explain any *three* in detail.

Or

(b) Elaborate the T1 and T2 weighted imaging sequence. List out the advantages of T1 and T2 weighted imaging sequence over spin imaging sequence.

14. (a) Give the filtered back projection algorithm in detail.

Or

(b) Give the ART reconstruction algorithm in detail.

(4 × 15 = 60 marks)

C 5088 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2014 SCHEME) EXAMINATION, APRIL 2021

Aeronautical Engineering

AN 14 604—FINITE ELEMENT METHOD

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*

I. 1 Explain the three phases of finite element method.

2 If a displacement field in x direction is given by $u = 2x^2 + 4y^2 + 6xy$. Determine the strain in x direction.

3 Why polynomials are generally used as shape function ?

4 Write down the finite element equation for one-dimensional two noded bar element.

5 State the assumptions in the theory of puretorsion.

6 What is an isoparametric element ? Write the stiffness matrix for a plane frame element.

7 Obtain the finite element equations for a beam element using the Hermite shape functions.

8 What are the ways in which a three-dimensional problem can be reduced to a two-dimensional approach ?

9 Write down the expression for the shape functions for a constant strain triangular element.

10 Write down the expression for stiffness matrix in two-dimensional heat conduction and convection.

(8 × 5 = 40 marks)

Part B

Answer **all** *the questions.*

II. 1 A simply supported beam is subjected to uniformly distributed load over entire span and it is subjected to a point load at the centre of the span. Calculate the deflection using Rayleigh-Ritzmethod and compare with exact solutions.

Or

Turn over

2 A long cylinder is subjected to an external pressure of 5 MPa and fitted to a shaft diameter of 100 mm. The outside diameter of the cylinder is 150 mm. Formulate the element matrices for the cylinder using two axisymmetric elements by taking Young's modulus as 200 GPa and Poisson's ratio as 0.25. Also find the nodal displacements.

3 Derive a finite element equation for one-dimensional heat conduction with free end convection.

Or

4 A circular fin of inner diameter 200 mm and outer diameter of 300 mm transfers heat from a small motorcycle engine. If the average engine surface temperature is 2000°C, determine the temperature distribution along the fin surface. The thermal conductivity of the fin material is 20 W/m °C and the convective heat transfer co-efficient between the fin and the atmosphere is 120W/m^2 °C. Assume an atmospheric temperature of 300°C. Use at least three one-dimensional elements.

5 A long cylinder is subjected to an external pressure of 5MPa and fitted to a shaft diameter of 100 mm. The outside diameter of the cylinder is 150 mm. Formulate the element matrices for the cylinder using two axisymmetric elements by taking Young's modulus as 200 GPa and Poisson's ratio as 0.25. Also find the nodal displacements.

Or

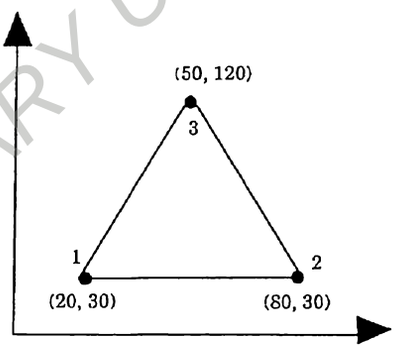
6 (a) Discuss the importance of Isoparametric concept used in FEM.

(b) Derive the element stiffness matrix of a CST element for plane stress condition.

7 Determine the shape functions for a Constant Strain Triangular (CST) element in terms of natural co-ordinate system.

Or

8 Determine the stiffness matrix for the CST Element shown in Figure. The co-ordinates are given in mm. Assume plane strain condition. E = 210 GPa, υ = 0.25 and t = 10 mm.



(4 × 15 = 60 marks)

C 5087 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2014 SCHEME) EXAMINATION, APRIL 2021

Aeronautical Engineering

AN 14 601—AERODYNAMICS—II

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*

I. 1 Explain zone of action and zone of silence for a body moving at a speed of sound.

2 Write internal energy equation for one dimensional high speed flow in general partial differential form.

3 What is under-expanding nozzle flow ?

4 State the importance of Rankine-Hugoniot relationship for shock wave.

5 Derive an expression for the correction factor to be applied to pitot-static probe readings in compressible subsonic flows.

6 Explain why shocks cannot occur in subsonic flows.

7 Air flow is discharged to sea level atmosphere through a sonic nozzle. If the air storage pressure at the reservoir is 40×10^5 N/m^2, determine the pressure, temperature density at the exit of the nozzle. Assume that the reservoir air is at ambient temperature.

8 Compare shock waves and expansion waves in a supersonic flow.

9 Explain shock reflection from a solid boundary with a suitable sketch.

10 Illustrate Prandtl-Meyer expansion round a convex corner with a neat sketch.

($8 \times 5 = 40$ marks)

Part B

Answer **all** *the questions.*

II. 1 (i) Derive the momentum equation for an inviscid compressible flow in differential form. Explain all the symbols and assumptions clearly.

(ii) What are the flow losses that are suffered by a compressible flow in variable area ducts ?

Or

2. (i) Derive the expression for pressure coefficient with and without compressibility correction.

   (ii) What are the properties of flow medium on which the velocity of sound through the medium depends upon ?

3. (i) Derive the Pandtl Normal shock relation for a perfect gas.

   (ii) State about oblique shocks.

Or

4. (i) Explain the features of two dimensional supersonic nozzle contours.

   (ii) Explain the phenomenon of choking in a nozzle ?

5 (i) Explain and Derive the Linear two-dimensional supersonic flow theory.

   (ii) Write short notes on Mach waves.

Or

6 (i) Derive the PrandtlGlauret affine transformation relations for subsonic flows.

   (ii) Write about drift and drag pitching moment.

7 (i) Explain the differences between hypersonic aero dynamics and supersonic aero dynamics in detail ?

   (ii) Write the concept of thin shock layers.

Or

8 (i) Describe the shock wave and expansion wave relations of inviscid hypersonic flows in detail.

   (ii) Write short note on hypersonic flight paths.

(4 × 15 = 60 marks)

C 5086 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, APRIL 2021

Automobile Engineering

AM 14 606—COMPOSITE MATERIALS

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Represent the commonly accepted classification scheme for composite materials as a flow diagram.
2. What are particulate composites give their applications and advantages?
3. Explain Fabrication of Thermosetting Resin Matrix Composites.
4. Explain torsion tube test with relevant ASTM standards.
5. List the various mechanical properties that are to be measured for composites.
6. Illustrate and discuss the Variations of strain and stress in a three-ply laminate.
7. Brief on elasticity methods of stiffness prediction.
8. Discuss the modes of failure in composite under transverse tensile loads.
9. Discuss about ultra-high-temperature composites that use carbon fibers in a carbon matrix.
10. Discuss about composites in smart structures with specific applications.

(8 × 5 = 40 marks)

Part B

Answer **four** *questions.*
Each question carries 15 *marks.*

11. Explain the procedure for fabrication of ceramic matrix composites.

Or

12. A glass-fiber-reinforced nylon with a fiber volume fraction of 20% is injection-molded to produce a random fiber orientation. The fiber length is 3.2 mm, and the fiber diameter is 10 μm. Calculate the elastic modulus, shear modulus, and Poisson's ratio of the random fiber composite.

Turn over

13. Explain the standard procedure to experimentally determine the density, Constituent Weight and volume Fractions along with their ASTM standards.

Or

14. Explain damage identification using acoustic evaluation technique with a neat sketch.

15. Explain the procedure to predict the transverse strength of composites.

Or

16. Explain the micro mechanics of transverse failure.

17. Explain the construction of Unidirectional, Cross-Ply, and Angle-Ply Laminates.

Or

18. Describe symmetric laminates and sets with sketches and code.

(4 × 15 = 60 marks)

C 5085 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, APRIL 2021

Automobile Engineering

AM 14 605—COMPUTER SIMULATION OF I.C. ENGINE PROCESS

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Define computer aided simulation and its advantages.
2. List the factors affecting the adiabatic flame temperature ?
3. Define heat of reaction, Q_v and Q_p.
4. Tabulate the difference between Indicated power and Brake power.
5. Define Ideal Diesel Cycle with suitable sketch.
6. Illustrate the assumptions made in Ideal Cycle Simulation ?
7. Draw P -V diagram for the part throttle operation and list its processes.
8. Draw a gear driven supercharger neatly with p-V exhaust intake loop.
9. Define progressive combustion with suitable diagram.
10. Enumerate gas exchange process and heat transfer process.

(8 × 5 = 40 marks)

Part B

Answer **one** *full question from each section.*
Each question carries 15 *marks.*

I. a) Derive the expression for H_{rp} using Steady-flow calorimeter.

Or

b) Compute the flame temperature when a chemically correct mixture of liquid $C_{10}H_{22}$ and air initially at 400 K and 1 atm, burns at constant pressure.

Turn over

II. a) Explain the working principle of CI engine with suitable diagram and draw the valve timing diagram for the same.

Or

b) Explain the heat transfer process and the different heat transfer coefficient.

III. a) Derive the expression for part throttle operation with suitable diagram.

Or

b) Explain Ideal Otto cycle and derive the expression for simulation with air as the working medium.

IV. a) Explain Engine performance simulation for pressure-crank angle, brake power and brake thermal efficiency.

Or

b) Derive Friction Calculations for the various part of power developed in the cylinder of an IC engine.

(4 × 15 = 60 marks)

C 5084 (Pages : 3) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2014 SCHEME) EXAMINATION, APRIL 2021

Automobile Engineering

AM 14 604—VEHICLE DYNAMICS

Time : Three Hours Maximum : 100 Marks

Part A

Answer **eight** *questions.*

Each question carries 5 *marks.*

1. Explain Earth Fixed Co-ordinate System with neat sketch.
2. Find the traction-limited acceleration for the rear-drive passenger car with and without a locking differential on a surface of moderate friction level. The information that will be needed is as follows in Table. 1.

Table. 1

Weights	From - 2100 lb	Rear - 1850 lb	Total - 3950 lb
CG height	21.0 in	Wheelbase -108 in	
Co-efficient of friction	0.62	Tread - 59.0 in	
Final drive ratio	2.90	Tire size -13.0 in	
Roll stiffnesses	Front -1150 ft-lb/deg	Rear - 280 ft-lb/deg	

3. Illustrate pedal force gain with a suitable diagram.
4. Explain about air dams and bumper spoilers.
5. A heavy truck weighing 72,500 lb rolls along 170 in Denver at a speed of 67 mph. The air temperature is 55° F and the barometric pressure is 26.01 in Hg. The truck is 8' wide by 13.5' high and has an aerodynamic drag coefficient of 0.65. The truck has radial-ply tires. Calculate the aerodynamic drag, the rolling resistance (according to the SAE equations), and the road load horsepower at these conditions.
6. Define side slip angle.

7. Explain MacPherson Strud with a neat sketch.

8. Determine the acceleration pitch rate for the following front-drive vehicle with no anti-lift in the front suspension, and its value if full anti-lift was designed into the suspension. Essential data are-CG height of 20.5", wheelbase of 108.5", design weight of 4549 lb, and front and rear spring rates of 287 and 174 lb/in, respectively.

9. How does the inflation pressure influence tires properties ?

10. Explain with an neat sketch about SAE tire axis system.

(8 × 5 = 40 marks)

Part B

Answer **one** *full question from each section.*

Each question carries 15 *marks.*

I. (a) Derive an expression for transverse weight shift due to drive torque.

Or

(b) Consider a light truck weighing 3635 lb, performing a full stop from 60 mph on a level surface with a brake application that develops a steady brake force of 2000 lb. Determine the deceleration, stopping distance, time to stop, energy dissipated and the brake horsepower at initial application and averaged over the stop. Neglect aerodynamic and rolling resistance forces.

II. (a) Calculate the pitch and bounce centers and their frequencies for a car with the following characteristics :

Front ride rate = 127 lb/in/wheel	Front tire load = 957 lb/wheel
Rear ride rate = 92.3 lb/in/wheel	Rear tire load = 730 lb/wheel
Wheelbase = 100.6 in	Dynamic index (DI) = 1.1

Or

(b) Illustrate with a neat sketch about steady state cornering equations.

III. (a) State equivalent trailing arm analysis with neat sketch.

Or

(b) Derive four-wheel steer for low-speed turning.

IV. (a) Explain in detail about tripped rollover.

Or

(b) Explain the cornering properties.

(i) Tire type. (7½ marks)

(ii) Load. (7½ marks)

[4 × 15 = 60 marks]

C 5083 (Pages : 3) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, APRIL 2021

Automobile Engineering

AM 14 603—VEHICLE DESIGN ENGINEERING–2

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. State the difference between Lateral Bending and Horizontal Lozenging.
2. An automobile power unit gives a maximum torque of 13.56 Nm. The clutch is of a single plate dry disc type, having an effective clutch lining of both sides of the plate disc. The coefficient of the friction is 0.3 and the maximum axial pressure is 8.29×10^4 Pa, and the external radius of the friction surface is 1.25 times the internal radius. Calculate the dimension of the clutch plate and the total axial pressures that must be exerted by the clutch springs.
3. Why is cone clutch more efficient than plate clutch ? Justify with a suitable diagram.
4. Illustrate with a neat sketch and explain about castor angle.
5. The gear ratio of the steering box is 14 : 1. When the driver applies a force of 25 N with each hand on the steering wheel of 0.38 m diameter, the torque transmitted to the drop-arm shaft is 110 Nm. Determine the percentage efficiency of the steering mechanism.
6. Explain about Compound gear train and Reverse gear train.
7. In a gearbox, the clutch shaft pinion has 14 teeth and the low gear main shaft pinion has 32 teeth. The corresponding lay shaft pinions have 36 and 18 teeth. The rear axle ratio is 3.7 : 1 and the effective radius of the rear tyre is 0.355 m. Calculate the car speed in the above arrangement at an engine speed of 2500 r.p.m.
8. How does gear synchronization take place ?
9. How is drive transmitted in de-Dion drive ?
10. What is the purpose of differential lock ?

(8 × 5 = 40 marks)

Turn over

Part B

Answer **one** *full question from each section.*
Each question carries 15 *marks.*

I. a) The load distribution between the front and the rear axle of a motor vehicle weighing 1350 kgs is that 48 % of the total load is taken by the front axle. The width of the track is 140 cm and the distance between the centers of the spring pads is 66 cm. Design a suitable I-section for the front axle assuming that the width of the flange and its thickness are 0.6 and 0.2 of the overall depth of the section respectively and the thickness of the web 0.25 of the width of the flange. Assume working stress of 915 kgf/cm^2.

Or

b) A multiple-disc clutch, steel on bronze, is to transmit 4.5 kW at 750 r.p.m. The inner radius of the contact is 40 mm and the outer radius of the contact is 70 mm. The clutch operates in oil with an expected coefficient of 0.1. The average allowable pressure is 0.35 N/mm^2. Find :

(1) The total number of steel and bronze discs ;

(2) The actual axial force required ;

(3) The actual average pressure ; and

(4) The actual maximum pressure.

II. a) Define Ackermann-linkage Geometry with analytical solution.

Or

b) Explain the characteristics of Over-steer and Under-steer ? Explain with a neat sketch.

III. a) State the construction and working principle of the constant mesh gearbox. Mention its advantages and disadvantages.

Or

b) Sketch a section through a sliding type gearbox with four forward and one reverse speed and explain clearly how the different speed ratios will be obtained in the following cases :

Gear ratio on top gear	=	1 : 1
Gear ratio on third gear	=	1.38 : 1
Gear ratio on second gear	=	2.24 : 1
Gear ratio on first gear	=	3.8 : 1

Assume countershaft or layout shaft speed is half that of the engine speed and the smallest gear is not to have less than 15 teeth.

IV. a) Explain in detail the principle, and characteristics of the following with neat sketch

(i) Hotchkiss Open-type Drive ; and

(ii) Torque-tube drive.

Or

b) An automobile engine develops 29.5 kW at 2000 r.p.m. when the torque developed is maximum. The bottom gear ratio is 3 : 1 and the back axle reduction is 4.5 : 1. The load on each driving axle is 7357.5 N when the car is fully loaded. Diameter of road wheel over the tyres is 0.71 m and the co-efficient of adhesion between tyre and rod is 0.6. If the permissible stress in the material of the shaft is not allowed to exceed 22072.5×10^4 Pa, find the diameter of the axle shaft.

(4 × 15 = 60 marks)

C 5082 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2014 SCHEME) EXAMINATION, APRIL 2021

Automobile Engineering

AM 14 602—VECHICLE TRANSPORT AND FLEET MANAGEMENT

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*

Each question carries 5 *marks.*

1. Discuss about Economy of scale in transportation.
2. "Good workers do not always make good managers".—Justify.
3. Identify the uses of job description while hiring a driver.
4. Brief about crew schedule.
5. Compare fleet management and route planning.
6. Summarize how fleet data helps in vehicle maintenance and asset tracking.
7. Review about time-based fare.
8. List the metrics to be tracked by fleet management software with examples.
9. Write short notes registration of vehicle under motor vehicle act.
10. Mention succinctly the procedure for obtaining permit under motor vehicle act.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*

Each question carries 15 *marks.*

11. Explain about breaking down the job while getting ready to instruct for Job Instruction Training. Also, prepare a job breakdown for checking the oil level in an automobile engine.

Or

12. Discuss the three biggest threats to health of drivers and how wellness programs can help drivers overcome the same.

Turn over

13. Discuss in detail about route planning.

Or

14. Elucidate the steps for developing an affordable and effective PMI programme.

15. Explain the functions of fleet management software.

Or

16. Explain different fare collection methods in detail. Also, discuss how a travel card will be better than cash transactions while travelling.

17. Discuss about licensing of drivers under motor vehicles act and associated sections.

Or

18. Discuss about third part insurance emphasizing on legal requirements under motor vehicle act, legal provisions and rights of the third party.

(4 × 15 = 60 marks)

C 5081 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, APRIL 2021

Automobile Engineering

AM 14 601—AUTOMOTIVE VIBRATIONS

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Discuss how damping can be used as a tool for controlling the excessive response of a vibration system.
2. With a neat sketch describe the various components involved in an active vibration control system.
3. Draw a bathtub curve and explain various Machine maintenance techniques. What are the merits of condition based maintenance techniques over preventive maintenance techniques ?
4. What are the types of instrumentation systems used in condition monitoring and explain any *one* of them in detail.
5. What is meant by field balancing ? What are the advantages of field balancing over shop balancing ?
6. With a neat sketch explain reverse dial indicator method for machine alignment. What are the demerits of this method ?
7. What is Structure borne sound and air borne sound ?
8. Give the advantages and applications of Rubber embedded metallic bushes.
9. Give the sources of Vibrations in vehicle.
10. Tabulate the difference between Passive and Active suspension.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. A thin disk of mass 5 kg, radius 20 cm, and attached to a spring of stiffness 2000 N/m is in equilibrium when it is subject to an applied force P =10 N. The co-efficient of friction between the disk and the surface is 0.1 :

    (a) What is the maximum displacement of the disk from its equilibrium position, assuming no slipping between the disk and the surface ?

    (b) What is the angular acceleration of the disk immediately after it reaches its maximum displacement ?

    (c) Is the no-slip assumption correct ?

Or

12. Explain in detail about the various types of vibration in a vehicle.

13. A particle of mass of 50 g is to be attached along the length of a thin bar with a length of 25 cm, mass of 200 g, and centroidal moment of inertia of 9.0×10^{-3} kg m^2. The assembly is suspended from a pin support attached at one end of the bar. The center of gravity of the bar is 15 cm from the pin support. The assembly is to be tuned such that it has a period of 1.25 s. Determine the length along the bar where the particle is to be placed.

Or

14. Define "Transmissibility". Derive an expression for motion transmissibility.

15. The equivalent mass of a SDOF of 10 kg. The system has a natural frequency of 80 rad/s. The system is at rest in equilibrium when it is subject to a time dependent force. Determine and plot the response of the system if it is subject to a force of (a) 10 sin (40t)N, (b) 10 sin(80t) N, and (c) 10 sin(82t) N

Or

16. Set up the differential equation for a single mass damper system and obtain the complete solution for the under damped condition.

17. What is whisling speed ? Obtain an expression for whisling of shaft with air damping.

Or

18. A milling machine of mass 450 kg operates at 1800 r.p.m. and has an unbalance which causes a harmonic repeated force of magnitude 20,000 N. Design an isolation system to limit the transmitted force to 4000 N, the amplitude of vibration during operation to 1 mm, and the amplitude of vibration during start-up to 10 mm. Specify the required stiffness of the isolator and the minimum mass that should be added to the machine. Assume a damping ratio of 0.05.

(4 × 15 = 60 marks)

C 5080 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, APRIL 2021

Applied Electronics and Instrumentation Engineering

AI 14 606—EMBEDDED SYSTEMS

Time : Three Hours Maximum : 100 Marks

Part A

I. Answer any *eight* questions out of ten :

1 Distinguish between GPOS and RTOS.

2 Give the applications for embedded processors.

3 Write the steps to program counters and print counts in LCD.

4 List the features of 8051 microcontroller.

5 Explain in brief on interrupts.

6 List the advantages and disadvantages of PIC microcontroller.

7 Explain addressing modes of PIC microcontroller.

8 With block diagram explain in brief on round robin with interrupts with its pros and cons.

9 Explain in brief on the basic functionalities of RTOS.

10 List the features of embedded linux.

(8 × 5 = 40 marks)

Part B

II. Answer *all* questions :

11 Explain in detail on embedded processors with its types and applications.

Or

12 In detail, with real time examples explain the real time system.

13 Explain in detail on timers and counters of 8051 with examples.

Or

14 Explain the real-world interfacing of stepper motor with 8051 microcontroller in detail.

Turn over

15 Draw the architecture of Intel 80196 microcontroller and list its features.

Or

16 Explain in detail on the addressing modes of PIC16F84.

17 Explain the terms used in RTOS. What are the factors considered for selecting RTOS ? Also list its features.

Or

18 Explain in detail on how do you pass data between RTOS tasks.

(4 × 15 = 60 marks)

C 5079 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, APRIL 2021

Applied Electronics and Instrumentation Engineering

AI 14 605—INDUSTRIAL INSTRUMENTATION

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. What is the difference between heat and temperature ?
2. Mention some of the bimetallic thermometer.
3. With a neat sketch derive and explain any *two* types of Manometers.
4. Explain Bourdon tube and its types.
5. Explain about bellows and diaphragm with neat diagram.
6. Explain briefly about vortex shedding flow meter.
7. Explain the principle of operation of Turbine flow meter.
8. What is Miniaturization ?
9. What are the types of scaling laws ?
10. List out the basic MEMS Materials.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. Explain the Bimetallic thermometer operation with neat sketch. Mention its merits and demerits.

Or

12. Briefly explain 2 lead, 3 lead and 4 lead wire RTD with necessary circuit diagram.

13. With next sketch, explain the operation of bourdon tube, also mention its advantages and disadvantages.

Or

14. With neat construction diagram explain how the pressure gauge was calibrated using dead weight tester.

15. Distinguish variable head and variable area flow meters. Explain the working principle of any *one* type of variable head flow meter with neat sketch.

Or

16. Explain the principle operation of Electromagnetic flow meter with neat sketch.

17. Explain the constructional features of micro accelerometers with neat diagram and describe it's working.

Or

18. Explain the principle of operation of different types of float type liquid measurement system with neat sketches.

(4 × 15 = 60 marks)

C 5078 (Pages : 4) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME)] EXAMINATION, APRIL 2021

Applied Electronics and Instrumentation Engineering

AI 14 604—ADVANCED CONTROL THEORY

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*

1. Determine the transfer function of the system represented in the state space model as :

$$\dot{x} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -3 & -2 & -5 \end{bmatrix} x + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u.$$

$$y = \begin{bmatrix} 1 & 0 & 0 \end{bmatrix} x.$$

2. Determine the characteristic equation and its roots from the state equations given below :

$$\dot{x}_1 = x_2$$

$$\dot{x}_2 = -100x_1 - 20x_2 + u.$$

3. A closed-loop system is used to track the sun to obtain maximum power from a photovoltaic array. The tracking system may be represented by H (*s*) = 1 and :

$$G(s) = \frac{100}{\tau s + 1}.$$

Where r = 3 seconds nominally. Calculate the time constant of the closed-loop system response.

4. A telerobot system has the matrix equations :

$$\dot{x} = \begin{bmatrix} -1 & 0 & 0 \\ 0 & -2 & 0 \\ 0 & 0 & -3 \end{bmatrix} x + \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix} u$$

$$y = \begin{bmatrix} 1 & 0 & 2 \end{bmatrix} x.$$

Determine whether the system is controllable and observable.

5. Outline the key effects of pole zero cancellation in a second order system.

6. A system has the following differential equation :

$$\dot{x} = \begin{bmatrix} -1 & 0 \\ 2 & -3 \end{bmatrix} x + \begin{bmatrix} 0 \\ 1 \end{bmatrix} r(t).$$

Determine $\Phi(t)$ and its transform $\Phi(s)$ for the system.

7. Write any five properties of z-transform.

8. Draw the schematic of a basic computer control system.

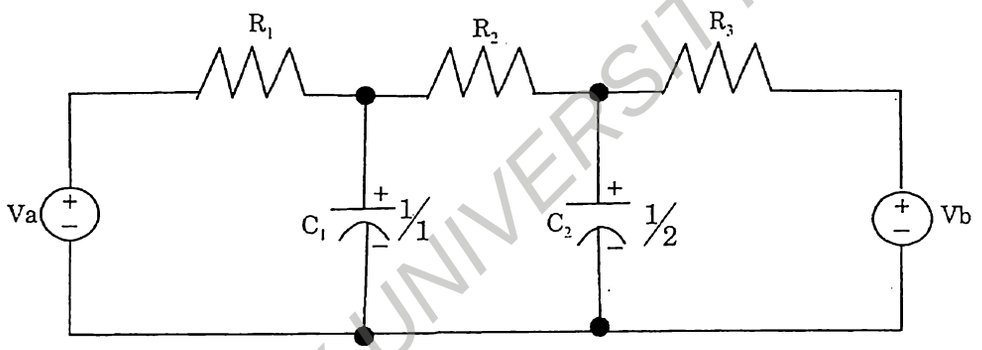
9. When a control system is said to be robust ? Define system sensitivity.

10. Explain additive and multiplicative perturbation.

(8 × 5 = 40 marks)

Part B

11. Determine a state variable differential matrix equation for the circuit shown in Figure 1 :



Or

12. A system is described by :

$\dot{x} = ax + bu$

where,

$$A = \begin{bmatrix} 1 & -2 \\ 2 & -3 \end{bmatrix}, B = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

and $x_1(0) = x_2(0) = 10$. Determine $x_1(t)$ and $x_2(t)$.

13. A process has the transfer function :

$$\dot{x} = \begin{bmatrix} -10 & 0 \\ 1 & 0 \end{bmatrix} x + \begin{bmatrix} 1 \\ 0 \end{bmatrix} u$$
$$y = \begin{bmatrix} 0 & 1 \end{bmatrix} x + [0]\, u.$$

Determine the state variable feedback gains to achieve a settling time (with a 2% criterion) of 1 second and an overshoot of about 10. Assume the complete state vector is available for feedback.

Or

14. Consider the second order system :

$$\dot{x} = \begin{bmatrix} 1 & 0 \\ -3 & -2 \end{bmatrix} x + \begin{bmatrix} 10 \\ 0 \end{bmatrix} u$$
$$y = \begin{bmatrix} 1 & 0 \end{bmatrix} x + [0]\, u.$$

Determine the observer gain matrix required to place the observer poles at $S_{1,2} = -1 \pm j$.

15. The characteristic equation of a system is :

$P(z) = z^4 - 1.2z^3 + 0.07z^2 + 0.3z - 0.08 = 0$. Determine the stability of the system using Jury's test.

Or

16. Find the response for the first four sampling instants for :

$$Y(z) = \frac{z^3 + 2z^2 + 1}{z^3 - 1.5z^2 + 0.5z}.$$

Then find y (0), y (1), y (2) and y (3).

17. Explain the direct method of Lyapunov's stability criterion.

Or

18. Consider the second order system :

$$\dot{x} = \begin{bmatrix} 1 & 0 \\ -a & -b \end{bmatrix} x + \begin{bmatrix} c_1 \\ c_2 \end{bmatrix} u$$
$$y = \begin{bmatrix} 1 & 0 \end{bmatrix} x + [0]\, u.$$

The parameters a, b, c_1 and c_2 are unknown a priori. Under what conditions is the system completely controllable ? Select valid values for a, b, c_1 and c_2 to ensure controllability.

(4 × 15 = 60 marks)

C 5077 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2014 SCHEME) EXAMINATION, APRIL 2021

Applied Electronics and Instrumentation Engineering

AI14 603—ELECTRONIC COMMUNICATION SYSTEMS

Time : Three Hours Maximum : 100 Marks

Part A

I. Answer any *eight* questions out of ten :

1 Explain in brief about communication systems and its basic elements.

2 Tabulate the difference between frequency modulation and pulse modulation.

3 List the key technologies and techniques of superheterodyne receiver.

4 Explain in brief explain the PAM with its types.

5 Explain in brief of baseband transmission and compare it with broadband.

6 Explain DPCM transmitter.

7 Explain FDM with an example.

8 Draw the block diagram of microwave communication system.

9 Draw the basic block diagram of optical fiber communication system.

10 Why it is necessary to use telemetry in an instrumentation system ?

(8 × 5 = 40 marks)

Part B

II. Answer *all* questions :

11 Explain in detail on the basic elements of communication systems with its key components and applications.

Or

12 Explain in detail on angle modulation. Also compare PM and FM.

13 Explain in detail on the AGC with its characteristics and its requirements. Explain with block diagram.

Or

14 Explain the working of FM noise suppressor with its circuit diagram.

Turn over

15 Explain in detail on the PCM with its basic elements.

Or

16 Explain with examples, the working of multiplexing in digital communication with its types.

17 Explain in detail on the satellitecommunication and its need. Also illustrate the categories of satellite communication system.

Or

18 Explain in detail on the telemetry and its components.

(4 × 15 = 60 marks)

C 5076 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2014 SCHEME) EXAMINATION, APRIL 2021

Applied Electronics and Instrumentation Engineering

AI 14 602—DIGITAL SIGNAL PROCESSING

Time : Three Hours Maximum : 100 Marks

Part A

I. Answer any *eight* questions out of ten :

1 Calculate the DFT of the sequence, $x(n) = \{1, 1, -2, -2\}$.

2 Compare the DIT and DIF radix-2 FFT.

3 What are direct (or slow) convolution and fast convolution ?

4 List the well-known design techniques for linear phase FIR filter.

5 What is Gibbs Phenomenon (or Gibbs oscillation) ?

6 List the features of FIR filter design using rectangular window.

7 Compare IIR and FIR filter.

8 Compare the digital and analog filter.

9 What are the special features of digital signal processor ?

10 What is the difference between Von Neumann and Harvard architecture ?

(8 × 5 = 40 marks)

Part B

II. 11 Compute 4-point DFT and 8-point DFT of causal three samples given by :

$$x(n) = \frac{1}{3}; 0 \le n \le 2$$
$$= 0; \text{else}$$

Show that DFT coefficients are samples of Fourier transform of $x(n)$.

Or

12 Compute 8-point DFT of the discrete time signal, $x(n) = \{1, 2, 1, 2, 1, 3, 1, 3\}$,

(a) Using radix-2 DIT FFT. (7½ marks)

(b) Using radix-2 DIF FFT. (7½ marks)

Also sketch the magnitude and phase spectrum.

Turn over

13 Design a FIR low-pass filter with cut-off frequency of 2kHz and sampling frequency of 6 kHz with 9 samples using Fourier series method. Determine the frequency response and verify the design by sketching the magnitude response.

Or

14 Design a linear phase FIR band stop filter to reject frequencies in the range 0.35π to $0.48\ \pi$ rad/sample using rectangular window, by taking 5 samples of window sequence.

15 Obtain H (z) from H (s) when T = 1 second and $H(s) = \dfrac{4s}{(s+0.5)(s+4)}$.

Or

16 Design a Chebyshev digital IIR low-pass filter using bilinear transformation by taking T = 0.5 second, to satisfy the following specifications :

$$0.9 \le \left|H\left(e^{jw}\right)\right| \le 1.0 \; ; 0 \le w \le 0.25\pi$$

$$\left|H\left(e^{jw}\right)\right| \le 0.35 \qquad ; 0.375 \le w \le \pi$$

Draw direct form-I and II structure of the filter.

17 Draw the simplified architecture of TMS320C6x processors and explain.

Or

18 Discuss the various special hardware requirements of digital signal processors.

(4 × 15 = 60 marks)

C 5075 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2021

Aeronautical Engineering

AN 09 604—AERODYNAMICS—II

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *the questions.*
Each question carries 2 *marks.*

I. 1 What is meant by Mach cone ?

2 Classify the flow regimes in terms of mach number.

3 Write the shock relation of the perfect gas.

4 How is flow over a cone different from flow over a wedge ?

5 Name some transonic area ruled aircraft.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

II. 1 Explain zone of action and zone of silence for a body moving at a speed of sound.

2 Explain Mach number spectrum.

3 What is the importance of Rankine-Hugoniot relationship for shock wave ?

4 Explain why shocks cannot occur in subsonic flows.

5 Bring out any *two* important differences between shock waves and expansion waves in a supersonic flow.

6 Illustrate Prandtl-Meyer expansion round a convex corner with a neat sketch.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

III. 1 Explain Quasi-one dimensional flow and area velocity relation.

Or

2 Air flows through a duct. The pressure and temperature at station 1 are P_1 = 0.7 atm and T_1 = 300°C, respectively. At a second station 2, the pressure is 0.5 atm. Calculate the temperature and density at the second station. Assume the flow to be isentropic.

3 Explain the reflection and intersection of shock wave and expansion wave.

Or

4 Explain the features of two dimensional supersonic nozzle contours.

5 Explain :

a) Mach waves.

b) Mach angles.

Or

6 Explain in detail about the lift, drag, pitching moment and center of pressure of supersonic profiles.

7 Explain in detail about the lift and drag divergence.

Or

8 Draw a neat sketch of transonic wind tunnel circuit and explain the function of each component.

(4 × 10 = 40 marks)

C 5066 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) [2009 SCHEME] DEGREE EXAMINATION, APRIL 2021

Biomedical Engineering

BM 09 603—MEDICAL IMAGING TECHNIQUES

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. What is Doppler effect ?
2. What is piezo-electric effect ?
3. What is X-ray imaging technique ?
4. Write a note on shim coils.
5. What is thermography ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

1. Explain the principles of A-mode scanning.
2. Briefly explain about image quality.
3. Explain the differences between SPECT and PET imaging.
4. Explain CT angiography.
5. Explain the properties of magnets to be used in MRI instrumentation.
6. Write short notes on clinical thermography.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

1. Explain the structure and operation of real time scanners.

Or

2. Explain the principles of Doppler ultrasound and colour Doppler.

Turn over

3. Explain X-ray computed tomography.

Or

4. Explain about radiation hazards and safety.

5. Explain MRI technique and clinical benefits.

Or

6. Explain tissue sensitivity and spectral analysis.

7. Explain microwave imaging, concept of fusion imaging.

Or

8. Explain in detail the method of infrared imaging.

(4 × 10 = 40 marks)

C 5064 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2021

Automobile Engineering

AM 09 602—METROLOGY AND INSTRUMENTATION

Time : Three Hours Maximum : 70 Marks

Part A (Short Answer Questions)

Answer **all** *questions.*
Each question carries 2 *marks.*

1. State Taylor's Principle of gauge design.
2. Define precision and accuracy.
3. Compare self and mutual inductance.
4. What is the use of extension heads ?
5. Define sine center.

(5 × 2 = 10 marks)

Part B (Analytical/Problem Solving Questions)

Answer any **four** *questions.*
Each question carries 5 *marks.*

1. Compare propagation uncertainty Kline and Mc Lintock approach
2. Explain the function of variable reluctance transducer.
3. Illustrate liquid in a glass thermometer with example.
4. Explain the process of wringing of slip gauge.
5. What is a sine bar ? How sine bars are used for angle measurement ?
6. Explain the method of measuring angles using angle Dekkor.

(4 × 5 = 20 marks)

Part C (Descriptive Questions)

Answer **all** *questions.*
Each question carries 10 *marks.*

1. a) Explain the classification of errors with cause and solution to overcome the errors.

Or

b) Derive first order and second order instruments and its expressions.

2. a) Explain the operation of piezoelectric crystal with neat sketches along with its simple applications.

Or

b) Explain the operation of photoelectric transducers with neat sketches.

3. a) Illustrate the construction and working of liquid in a glass thermometer.

Or

b) What are the significant factors needed for the flow metering.

4. a) With the help of neat sketches describe the construction and working of the clinometer and auto collimator.

Or

b) Describe how the measurement of external and core diameters of threads is done.

(4 × 10 = 40 marks)

C 5063 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2021

Automobile Engineering

AM 09 601—VEHICLE DYNAMICS

Time : Three Hours Maximum : 70 Marks

Part A

All questions *are* **compulsory**.

Each question carries 2 *marks.*

1. Define the term Gradability.
2. List the important requirements of braking.
3. Define the term aerodynamic drag.
4. List the functions of the suspension system.
5. List the important merits and demerits of tyre.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

Each question carries 5 *marks.*

6. Briefly explain (i) Air resistance ; and (ii) Rolling resistance of road vehicles.
7. A truck tire with vertical load of 24.78 kN travels on a dry concrete pavement with a peak value of coefficient of road adhesion $\mu_p = 0.80$. The longitudinal stiffness of the tire during braking C_s, is 224.64 kN/unit skid. Find the braking force and if the skid of tire is 20 %.
8. With suitable sketch explain the working of independent suspension system.
9. A passenger car has a weight of 21.5 kN and a wheelbase of 2.9 m. The weight distribution on the front axle is 55.5 %, and that on the rear axle is 47.5 % under static conditions. If the cornering stiffness of each of the front tires is 39.92 kN/rad and that of the rear tires is 38.25 kN/rad. Find the steady-state handling behavior of the vehicle.
10. Explain vehicle performance curve (Road speed *Vs* Tractive effort) with neat sketch.
11. Briefly discuss the (i) Cross wind tests ; and (ii) Engine cooling road test.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. (a) Consider a train with and engine handling 11 wagons. The engine mass is 75 tons. The first 3 wagon of following engine have a mass of 28 tons each. The next two 19 tons each. The sixth to tenth wagons have mass of 16 tons each and the last has a mass of 14 tons. Stiffness of each coupling is 1 MN/m. Determine the first 3 natural frequencies and corresponding mode shapes by Holzer method.

Or

(b) Explain European driving cycles with neat sketches.

13. (a) A vehicle weighs 21.24 kN including the four road wheels. Each of the wheels has a rolling radius of 33 cm and a radius of gyration of 25.4 cm, and weighs 244.6 N. The engine develops a torque of 325 N.m at 3500 r.p.m. The equivalent mass of moment of inertia of the parts rotating at engine speed is 0.733 kg-m^2. The transmission efficiency is 85 %, and the total reduction ratio of the driveline in the third gear is 4.28 to 1. The vehicle has a frontal area of 1.86 m^2, and the aerodynamic drag co-efficient is 0.38. The co-efficient of rolling resistance is 0.02. Assume density of air 1.225 kg/m^3. Find the acceleration of the vehicle on a level road under these conditions.

Or

(b) Explain about the distribution of weight of a four wheeled vehicle with neat diagram.

14. (a) The front suspension of a motor car is having an equivalent weight of 11.5 kN carried on spring stiffness 90 kN/m. Calculate the frequency of vertical natural vibration with dampers removed. If the dampers are adjusted to give total damping force 4.5 kN/m/s. Calculate the frequency of damped vibration and the ratio of second downward to downward.

Or

(b) Explain the construction and working Wishbone type suspension with neat sketches.

15. (a) Explain the step by step procedure for thread design.

Or

(b) Discuss the following :

i) Effect of driving and braking torque.

ii) Power consumed by a tyre.

(4 × 10 = 40 marks)

C 5062 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2021

Information Technology Engineering

IT 09 L05—INFORMATION RETRIEVAL

Time : Three Hours Maximum : 70 Marks

Part A (Short Answer Questions)

Answer **all** *questions.*
one / two sentences.
Each question carries 2 *marks.*

1. How the information retrieval system is related to database management system ?
2. State the advantages of XML in content development.
3. Distinguish between cataloguing and indexing.
4. Why stemming algorithms are used ?
5. List the difference between standard IR systems and the web.

(5 × 2 = 10 marks)

Part B (Analytical/Problem Solving Questions)

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Compare and contrast Digital libraries of an Information Retrieval Systems.
7. Discuss any *one* measure used for performance evaluation of IR.
8. Explain about the Hypertext linkages with an example.
9. Explain how signature files use hash functions to map word to the bit masks.
10. Discuss the concepts of exhaustively and specificity in indexing.
11. "Can we model the document characteristics of the whole Web ?" Justify it.

(4 × 5 = 20 marks)

Turn over

Part C (Descriptive/Analytical/Problem Solving Questions)

Answer **all** *questions.*

Each question carries 10 *marks.*

12. (A) Enumerate the information retrieval models based on theories and tools and Explain the Vector Space Model.

Or

(B) Explain any one of the following alternative algebraic models.

- Generalized vector space model
- Latent semantic indexing model
- Neural network model.

13. (A) What is TREC results and how it can be used in information system evaluation ?

Or

(B) Explain context queries with an example.

14. (A) Define document pre-processing. Explain the five text operations involved document pre-processing.

Or

(B) What are the various search algorithms ? Explain them in detail.

15. (A) Explain the different architectures of retrieval systems that model the Web as full-text database.

Or

(B) Explain the following :

- W3QL.
- WebSQL.
- WebLog.
- WQL.

(4 × 10 = 40 marks)

C 5061 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2021

Information Technology Engineering

IT 09 605—HUMAN COMPUTER INTERACTION

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Define Interaction.
2. What is meant by task language ?
3. Define responsiveness.
4. What is meant by iterative design ?
5. What are the mathematical counterparts used for common programming constructs ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

1. Write about the two kinds of scanner.
2. List the factors in the physical environment that affect the quality of interaction and the user's performance.
3. What is the distinction between a process-oriented and a structure-oriented design rationale technique ?
4. Mention the problems in usability engineering.
5. List the differences between task analysis and cognitive models.
6. Explain structured message systems.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

I. (a) What is Reasoning ? Explain its types.

Or

(b) Explain the devices for virtual reality and 3D interaction.

II. (a) Explain design for diversity.

Or

(b) Describe techniques for software prototyping.

III. (a) Explain about the usability principles for scrolling.

Or

(b) Discuss about status event analysis.

IV. (a) Describe the communication using video conferences.

Or

(b) Write notes on virtual reality technology.

(4 × 10 = 40 marks)

C 5060 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2021

Information Technology Engineering

IT 09 601—SOFTWARE QUALITY MANAGEMENT

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. What is meant by quality assurance ?
2. What is the need for configuration management ?
3. List the benefits of standards.
4. List out the special responsibilities of Technical Review Process.
5. Write the types of tests for measuring software quality.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Explain the business process reengineering.
7. Explain the different types of reviews conducted to ensure quality.
8. Write a note on software product nomenclature ?
9. Explain the capability levels defined in CMMI.
10. Explain the principles of software defect prevention.
11. Describe the responsibilities of configuration management team.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. (a) Explain in detail the Quality tasks and responsibilities.

Or

(b) What is total quality management ? Explain the different tools used for quality control.

13. (a) Describe how configuration management is achieved in different phases of software development lifecycle.

Or

(b) What is the purpose of testing ? Explain the six steps in testing life cycle.

14. (a) Explain the software quality criteria. Describe possible measures for each of the criteria and practical ways in which the measures could be assessed.

Or

(b) Explain different inspection training models for Quality Assurance.

15. (a) Explain the steps in preparing an organization for ISO certification.

Or

(b) (i) Explain how testing is different from inspection and debugging. (5 marks)

(ii) Why should an organization go for international standardization ? (5 marks)

[4 × 10 = 40 marks]

C 5059 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2021

Computer Science Engineering

CS/PTCS 09 L05—MANAGEMENT INFORMATION SYSTEMS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. State the difference between the data and the information.
2. What is the purpose of using cache memory ?
3. What does GUI mean ?
4. Give examples of a manger's decisional role.
5. List the advantages of remote access.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

1. With an example explain closed loop system.
2. What are the sources of information a manager uses to select software for the organization ?
3. Describe the activities performed by marketing research departments.
4. What is sales forecast ? State its importance.
5. Write about the steps in the document processing cycle.
6. How does a hacker threaten the information systems ?

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

I. (a) Discuss about the role of top management with simple structure.

Or

(b) Systems approach is used for problem solving. Explain.

II. (a) Explain database management and its advantages.

Or

(b) Discuss about the effects of system approach in information systems design.

III. (a) Compare the characteristics of a competitive tracking information system to a contact information system.

Or

(b) Explain about the types of the reports generated from a tactical information systems.

IV. (a) Write about business system planning.

Or

(b) Elaborate about the different phases of system development life cycle.

(4 × 10 = 40 marks)

C 5058 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) [2009 SCHEME] DEGREE EXAMINATION, APRIL 2021

Computer Science Engineering

CS/PTCS 09 L02—COMPUTATIONAL INTELLIGENCE

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Mention the limitations of recursion and Mathematical induction.
2. Write the principle of operation involved in multiple-path pruning.
3. What do you mean by heuristic search ?
4. Define the modal logic.
5. Define a neural network.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Write a note on Mathematical induction.
7. Explain the Island-Driven search mechanism in detail.
8. Explain about knowledge engineering in detail.
9. Write a note on first-order predicate calculus.
10. Write a note on information theory.
11. Explain about the reasoning in situated Robots.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. (a) How will you use definite clauses for context-free grammars ? Explain with an example.

Or

(b) Write in detail about building a natural language interface to a database.

13. (a) Explain the following :—

    (i) Cycle-checking.

    (ii) Iterative Deepening technique.

Or

(b) Explain in detail about Dynamic Programming and constraint satisfaction problems.

14. (a) Explain in detail about Assumption based reasoning framework.

Or

(b) Explain the Algorithms used for assumption-based reasoning.

15. (a) Explain in detail about the working of belief networks.

Or

(b) With a neat sketch, explain the Robot architecture.

(4 × 10 = 40 marks)

C 5057 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2021

Computer Science Engineering

CS/PTCS 09 L01—INFORMATION SECURITY

Time : Three Hours Maximum : 70 Marks

Part A (Short Answer Questions)

Answer **all** *questions.*
one / two sentences.
Each question carries 2 *marks.*

1. Define Direct Attacks ?
2. List out the measures to protect the Confidentiality of Information ?
3. Define Brute-force attack ?
4. Name any cryptographic keys used in PGP ?
5. List software based attacks ?

(5 × 2 = 10 marks)

Part B (Analytical/Problem Solving Questions)

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. What common mathematical constants are used in RC5 ?
7. Specify the IP security services ?
8. List the design goals of firewalls ?
9. What are the steps involved in SET Transaction ?
10. Discuss covert channel.
11. Briefly give the types of information security policies ?

(4 × 5 = 20 marks)

Turn over

Part C (Descriptive/Analytical/Problem Solving Questions)

Answer **all** *questions.*

Each question carries 10 *marks.*

12. (A) Explain Elliptic Curve Architecture.

Or

(B) Illustrate with appropriate diagrams the basic uses of Hash Function.

13. (A) Explain Authentication Functions.

Or

(B) Describe about Trusted Systems.

14. (A) What are the steps involved in SET Transaction ?

Or

(B) Discuss GSM briefly.

15. (A) Describe next generation secure computing.

Or

(B) Discuss software development in detail.

(4 × 10 = 40 marks)

C 5056 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2021

Computer Science Engineering

CS/PTCS 09 601—EMBEDDED SYSTEMS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. What is a general purpose processor ?
2. Mention the types of DRAM.
3. Write about memory hierarchy.
4. What is meant by FSM ?
5. Explain Logic synthesis.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Explain about Full custom ASIC.
7. Explain about testing and debugging.
8. Explain about common memory types.
9. Explain about the state charts language.
10. Explain Register-transfer synthesis.
11. Explain PSM model briefly.

(4 × 5 = 20 marks)

Part C

Answer part (a) **or** *(b) of each question.*
Each question carries 10 *marks.*

12. (a) Explain about basic architecture of General purpose processors.

Or

(b) Distinguish between Full-custom ASIC and Semi-custom ASIC.

13. (a) Discuss in detail about the cache memory mapping techniques.

Or

(b) Explain about Memory and its types.

14. (a) Explain about Finite state machines.

Or

(b) Explain about Inter process communication in detail.

15. (a) Explain about hardware/software co-design.

Or

(b) Explain about Intellectual property cores.

(4 × 10 = 40 marks)

C 5055 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2009 SCHEME) EXAMINATION, APRIL 2021

Mechanical Engineering

ME/AN 09 L05—TOOL ENGINEERING AND DESIGN

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

1. What is metal cutting process ?
2. List out the different types of multi-point cutting tools.
3. Define shut height.
4. State the various phases of injection moulding process.
5. Write the function of tenon blocks used in fixture.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

6. Discuss the nomenclature of drilling tool.
7. Explain different types of cutting tool materials used for metal cutting processes.
8. Describe various stages of cutting action in sheet metal shearing operations.
9. A cup 80 mm diameter and 70 mm deep is to be drawn from steel sheet of deep drawing quality 0.8 mm thick. Determine the blank diameter and punch diameter of first draw.
10. Explain the various elements of feed systems used in plastic injection mould.
11. Explain the 3-2-1 principle of location with neat sketch.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*

12. (a) Explain the nomenclature of circular internal pull broaching tool.

Or

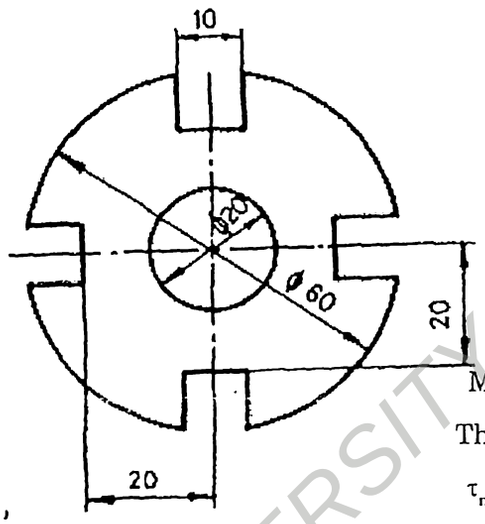
(b) Discuss the following terms with reference to a reamers by using suitable sketch.

(i) Chamfer ; (ii) Starting taper ; (iii) Helix angle ; (iv) Relieved land and (v) Radial rake angle.

13. (a) Enumerate the different types presses used for sheet metal operation and also brief the working of Open Back Inclinable (O.B.I.) press with aid suitable sketch.

Or

(b) Design a progressive cutting die to produce a component as shown in Figure 1 from 1.5 mm thick stainless steel sheet. Determine the punch and die dimensions. Sketch the strip layout and also calculate economic factor.



Material : Brass

Thickness : 15mm

$\tau_{max} = 200 N/mm^2$

14. (a) Explain the various injection moulding machine with aid of suitable sketch.

Or

(b) Discuss in detail, the sprue, runner and gate design of multi-cavity plastic injection mold.

15. (a) Enumerate basic principles applied in locating and clamping of work pieces in fixtures.

Or

(b) Explain the following by using simple sketches : (i) Nut mandrel and (ii) Strap Camp.

(4 × 10 = 40 marks)

C 5054 (Pages : 3) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2021

Mechanical Engineering

ME/PTME/AN 09 L02—COMPUTATIONAL METHODS IN ENGINEERING

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. State the order of convergence and the condition for the convergence in Newton's method.
2. What are the advantages of iterative methods over direct methods for solving a system of linear equations ?
3. State Lagrange's interpolation formula for unequal intervals.
4. Under what condition, Simpson's 3/8 rule can be applied and state the formula.
5. Write down the standard five point formula to find the numerical solution of Laplace equation.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Find a positive root of the equation $\cos x - 3x + 1 = 0$ by using iteration method.
7. Solve by Gauss-Seidel method, the following system :

   $10x - 5y - 2z = 3$; $4x - 10y + 3z = -3$; $x + 6y + 10z = -3$.

8. Using Lagrange's interpolation formula, find $y(9.5)$ from the following table :

x	7	8	9	10
y	3	1	1	9

9. Find the gradient of the road at the middle point of the elevation above a datum line of seven points of road which are given below :

x	0	300	600	900	1200	1500	1800
y	135	149	157	183	201	205	193

10. Solve $\frac{dy}{dx} = x + y$ given $y(1) = 0$ and get $y(1.1), y(1.2)$ by Euler method.

11. Solve and get $y(2)$ given $\frac{dy}{dx} = \frac{(x+y)}{2}$, $y(0) = 2, y(0.5) = 2.636, y(1) = 3.595, y(1.5) = 4.968$ by Adam's method.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. (a) Find the roots of the equations $x^3 + x^2 - 1 = 0$ that lies between 0 and 1, correct to four places of decimals using Muller's method.

Or

(b) Find all the roots of the equation $x^3 - 9x^2 + 18x - 6 = 0$ by Graeffe's root squaring method.

13. (a) By Crout's method, solve the system :

$x + y + z = 3$; $2x - y + 3z = 16$; $3x + y - z = -3$.

Or

(b) Solve the following system of equations relaxation method :

$10x - 2y - 2z = 6$; $-x + 10y - 2z = 7$; $-x - y + 10z = 8$.

14. (a) The following table gives some relation between steam pressure and temperature. Find the pressure at temperature 3721° :

T	361°	367°	378°	387°	399°
P	154.9	167.9	191.0	212.5	244.2

Or

(b) The table below gives the velocity v of a moving particle at a time t seconds. Find the distance covered by the particle in 12 seconds and also the acceleration at $t = 2$ seconds :

t	0	2	4	6	8	10	12
v	4	6	16	34	60	94	136

15. (a) Using Taylor series method, find y at $x = 0.1\,(0.1)\,0.4$ given $\frac{dy}{dx} = x^2 - y, y(0) = 1$ (correct to four decimal places).

Or

(b) Solve $u_{xx} + u_{yy} = 0$ over the square mesh of side 4 units satisfying the following boundary conditions :

(i) $u(0, y) = 0$ for $0 \le y \le 4$.

(ii) $u(4, y) = 12 + y$ for $0 \le y \le 4$.

(iii) $u(x, 0) = 3x$ for $0 \le x \le 4$.

(iv) $u(x, 4) = x^2$ for $0 \le x \le 4$.

(4 × 10 = 40 marks)

C 5048 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2021

Applied Electronics and Instrumentation Engineering

AI 09 L05—EMBEDDED SYSTEMS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. What is RTOS ?
2. Write the basic programming steps in microcontroller.
3. How bit addressing is achieved in memory ?
4. List any *four* embedded development tools and its functions.
5. Distinguish between hard real time and soft real time system.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. What is re-entrant function? Give the three rules to decide re-entrant functions.
7. What are the factors considered in the selection of an architecture in RTOS ?
8. Elaborate about the software overview of 80196 microcontroller.
9. Explain about the DAC issues in embedded system hardware.
10. Write a note on PC hardware components.
11. Differentiate between single purpose and general purpose processor.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. (a) Discuss the complete design of embedded system with an example.

Or

(b) How to create the specifications for an embedded system ? Explain it with an example.

13. (a) Elaborate about the 8051 serial communication concepts.

Or

(b) Discuss about the interfacing of keyboard and DAC to 8051 in real time.

14. (a) Draw the register file structure of PIC 16 C series of microcontroller and explain different addressing modes.

Or

(b) Explain the on-chip memory organization of PIC microcontroller.

15. (a) Explain with an example, how Round-Robin architecture works. When is it not suitable ?

Or

(b) Discuss about the function queue scheduling architecture in detail.

(4 × 10 = 40 marks)

C 5046 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2021

Applied Electronics and Instrumentation Engineering

AI 09 601—DIGITAL SIGNAL PROCESSING

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

1. State periodicity property with respect to DFT.
2. What is zero padding ? What are its uses ?
3. What is meant by radix-2 FFT ?
4. Write the steps in designing Chebyshev filter.
5. What are the different stages in pipelining ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

6. Find circular convolution for the sequence $x(n)=\{2,1,2,1\}$ and $h(n)=\{1,2,3,4\}$.
7. Apply Bilinear transformation to $H(s)=\frac{2}{(s+1)(s+2)}$ with T = 1 sec and find H (*z*).
8. List out the advantages and disadvantages of FIR filters.
9. Describe the addressing modes of TMS320C54XX processors.
10. Briefly explain the overlap save method for convolution.
11. Explain limit cycle oscillation.

(4 × 5 = 20 marks)

Part C

12. (a) Determine the 8 point DFT of the sequence $x(n)=\{1,1,1,1,1,1,0,0\}$.

Or

(b) Find the DFT of the sequence *x* (*n*) = {1, 2, 3, 4, 4, 3, 2, 1} using radix 2 algorithm.

Turn over

13. (a) Obtain the parallel form for the given system function :

$$y(n) = -0.1\,y(n-1) + 0.2y(n-2) + 3x(n) + 6.6x(n-1) + 0.6x(n-2).$$

Or

(b) Consider a second order FIR filter with system transfer function :

$$H(z) = \frac{1}{1 - 0.85z^{-1} + 0.175z^{-2}}.$$

Determine the effect of quantization on pole location of the given system function in direct form and cascade form with b = 4 bits.

14. (a) A Chebyshev low-pass filter has the following specifications :

Order of the filter = 3

Ripple in band pass = 1 dB

Cut off frequency = 100 Hz

Sampling frequency = 1 kHz

Determine H (z) of the corresponding hR digital filter using bilinear transformation technique.

Or

(b) Design a low-pass FIR filter using Hamming window to meet the following specifications :

$$H(\omega) = 1\,f \text{ or } 0 \le |\,\omega\,| \le \frac{\pi}{6}$$

$$= 0\,f \text{ or } \frac{\pi}{6} \le |\,\omega\,| \le \pi.$$

Use ten tap filter and obtain the impulse response of the desired filter.

15. (a) What are the DSP computational building blocks ? Explain with diagrams any two of them.

Or

(b) Explain in detail the TMS320 series processors. What are the prominent features of the processor ?

(4 × 10 = 40 marks)

C 5045 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) [2009 SCHEME] DEGREE EXAMINATION, APRIL 2021

Electrical and Electronics Engineering

EE/PTEE 09 L05—BIOMEDICAL ENGINEERING

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. State the difference between Active and Passive transducers.
2. What is an artifact ?
3. What is tachycardia ?
4. Define Propagation rate.
5. What is Angiography ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Explain the physiological system of the body.
7. What is a biopotential ? Name six types of biopotential sources.
8. Explain excitatory post synaptic and inhibitory post synaptic potential.
9. Explain Neuronal communication.
10. With neat sketch, explain Hematocrit measurement.
11. Explain X-ray image intensifier.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. (a) Explain the various class of electrodes used for Biomedical applications.

Or

(b) Explain the physiology of respiratory systems.

13. (a) Explain the electro-conduction system of heart.

Or

(b) Explain plethysmography and its types.

14. (a) Explain Nerve conduction and its velocity measurements.

Or

(b) Explain the principle of working of spirometer and pneumograph.

15. (a) Explain the principle of :

(i) Computed Tomography.

(ii) Ultrasonic Imaging System.

Or

(b) List and explain the main types of blood tests.

(4 × 10 = 40 marks)

C 5044 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2021

Electrical and Electronics Engineering

EE/PTEE 09 L04/IC 09 L02—ENTREPRENEURSHIP

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Explain about nascent entrepreneurs.
2. What is entrepreneurial context ? Explain.
3. Explain about angel investors.
4. What is sole proprietorship ? How it related to entrepreneurship.
5. Explain about ecological appraisal of projects.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Explain the planning function in scientific management.
7. List out and explain the procedural steps for preparing DPR.
8. Explain the importance of organizational culture.
9. Discuss the major market selection strategies.
10. Explain the organizational structures of small scale units.
11. Distinguish between cottage and house hold industries.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*

Each question carries 10 *marks.*

12. (a) Discuss the rewards and challenges of being an entrepreneur with examples.

Or

(b) Distinguish between entrepreneurship and intrapreneurship with examples.

13. (a) List out and explain the sampling techniques used in market survey.

Or

(b) Explain the procedural steps of technical appraisal of a project.

14. (a) Explain the process of starting a business.

Or

(b) Discuss the tools and techniques used for time management.

15. (a) Explain the important technology acquisition methodologies.

Or

(b) Explain about the major venture capital sources.

(4 × 10 = 40 marks)

C 5043 (Pages : 3) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) [2009 SCHEME] DEGREE EXAMINATION, APRIL 2021

Electrical and Electronics Engineering

EE/PTEE 09 L02—NUMERICAL ANALYSIS AND OPTIMIZATION TECHNIQUES

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. What are the different types of errors in Numerical Problems ?
2. State Stirling's formula.
3. State Milne's predictor corrector method, for solving differential equations.
4. Write the dual of primal problem :

$$Z_{max} = 5x_1 + 6x_2$$
$$\text{s.t.} \quad x_1 + x_2 = 5$$
$$-x_1 + 5x_2 \geq 3$$
$$4x_1 + 7x_2 \leq 8$$
$$x_1 \text{ : unrestricted, } x_2 \geq 0.$$

5. What is dynamic programming ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Explain the general steps to formulate LPP-Model.
7. Use Newton-Raphson method, find the roof of equation $x^3 - 2x - 5 = 0$.
8. Find l_n 301 :

x :	300	304	305	307
$l_n x$:	2.4771	2.4829	2.4843	2.4871

9. State Trapezoidal rule, finding total error.
10. Solve by relaxation method :

$$3x + 9y - 2z = 11$$
$$4x + 2y + 13z = 24$$
$$4x - 4y + 3z = -8.$$

Turn over

11. State the algorithm of Simplex method to solve an LP Problem.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. (a) Solve by R.K. Method :

$$\frac{d^2y}{dx^2} - x^2\frac{dy}{dx} - 2xy = 0$$

Given $y(0) = 1, y'(0) = 0,$ for $y(0.2)$.

Or

(b) Obtain $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$, at $x = 1.2$ and estimate the errors :

x :	1	1.2	1.4	1.6	1.8	2	2.2
y :	2.7183	3.3201	4.0552	4.9530	6.0496	7.3891	9.0250

13. (a) Apply Lagranges formula inversely to obtain the root of $f(x) = 0$, given that $f(30) = -30$, $f(34) = -13$, $f(38) = 3$ and $f(42) = 18$.

Or

(b) Using Stirling formula, obtain $f'(90)$:

x :	60	75	90	105	120
$f(x)$:	28.2	38.2	43.2	40.9	37.7

Also find the maximum value of the function from the data.

14. (a) Solve by Simplex method :

Maximize $Z = 30x_1 + 40x_2$

s.t. $60x_1 + 120x_2 \leq 12000$

$8x_1 + 5x_2 \leq 600$

$2x_1 + 4x_2 \leq 300$

$x_1, x_2 \geq 0.$

Or

(b) Solve, use Gauss :

$$\begin{aligned} 2x + y + z &= 10 \\ 3x + 2y + 3z &= 18 \\ x + 4y + 9z &= 16. \end{aligned}$$

15. (a) Define the following terms of LPP :

(i) Objective function.

(ii) Constants.

(iii) Feasible solution.

(iv) Surplus and Artificial variables.

Or

(b) Define a transportation problem. Explain the concept of solve by VAM method.

(4 × 10 = 40 marks)

C 5042 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2009 SCHEME) EXAMINATION, APRIL 2021

Electrical and Electronics Engineering

EE/PTEE 09 605—ELECTRICAL ENGINEERING DRAWING

Time : Three Hours Maximum : 70 Marks

1. Design and draw a developed winding diagram of a double layer lap winding for a three phase, 6 poles, 18 slots machine. Assume that the winding is full pitched.

Or

2. Design and draw the winding diagram for a 4 pole, 13 slots double layer, wave winding with 13 commutator segments.

(15 marks)

3. Draw the plan in full section of a 3 phase 315 kVA, 11 kV/400V transformer. The detailed dimensions of the parts are as follows. Other missing data can be assumed.

Maximum width of core	–	1080mm
Maximum height of the core	–	1000
Cross section of the core	–	Three stepped core
Diameter of the circum circle	–	240 mm
Distance between the core centres	–	425 mm
Width of the first core	–	216 mm
Width of the second core	–	168 mm
Width of the third core	–	100 mm
Height of the limb	–	500 mm
Overall height of the core and yoke	–	1000 mm
Outside diameter of LT coil	–	283 mm
Inside diameter of LT coil	–	250 mm
Number of turns/phase	–	12
Outside diameter of HT coil	–	415 mm
Inside diameter of HT coil	–	343 mm
Number of turns per phase	–	572

Or

4. Draw the single line layout of a generating station with 220kV/11kV substation yard.

(20 marks)

Turn over

5. Draw the side view and upper half sectional elevation of the armature of a d.c. machine with the main dimension given below :

Outside diameter	–	100 cm
Inside diameter	–	58 cm.
Length of armature core	–	28 cm
Length of armature spider	–	54 cm
Number of slot	–	56
Size of slot	–	3.5 ×1.5cm
Diameter of the shaft	–	14cm.

Or

6. Draw the half sectional end view of a three phase 415V, 5HP squirrel cage induction motor with the following dimensions :

Outside diameter of the stator stamping	–	230
Inside diameter of the stator stamping	–	164
Stator core length	–	120
Thickness of stator frame	–	25 Slots
(a) Type	–	open.
(b) Number	–	36.
(c) Size	–	15 × 8
Air gap	–	2
Outside diameter of the rotor stamping	–	160
Inside diameter of the rotor stamping	–	35

Shaft diameter : at centre : 35

At bearings : 30

The rotor has totally closed type slots and contains bare conductors which are short circuited at both ends. Other data may be assumed. All dimensions are in mm.

(35 marks)

C 5041 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2009 SCHEME) EXAMINATION, APRIL 2021

Electrical and Electronics Engineering

EE/PTEE 09 604—ELECTRIC DRIVES

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. How do you classify drives ?
2. Give the expression for armature voltage of a single-phase full wave converter.
3. What is chopper fed DC drives ?
4. What is indirect vector control ?
5. What is stepper motor ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Why DC drives are extensively used for traction applications ? Explain.
7. What is two quadrant drive ? Explain with diagrams.
8. What is the principle of closed loop control of DC drives ? Explain.
9. What are the important features of switched reluctance motor drives ?
10. Explain the principle of vector control.
11. What is AC traction drives ? Illustarte.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. Explain the various modes of operation of DC motor drives with appropriate diagrams.

Or

13. Why phase locked loop control is used for precision control applications ? Illustrate about such a system with appropriate sketches.

Turn over

14. Explain the working of four quadrant operation of an electric drive system.

Or

15. Derive an expression for the average armature voltage of a single-phase full converter drive. Assume suitable data.

16. Explain about the logic behind the voltage, current and frequency control with suitable diagrams.

Or

17. Illustrate the working of a CSI controlled induction motor drive with appropriate diagrams.

18. With a neat diagram, explain the control scheme of stepper motor drive.

Or

19. Briefly discuss about the motor drive systems used for railway traction in india. Justify your answer in each case.

(4 × 10 = 40 marks)

C 5040 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2021

Electrical and Electronics Engineering

EE/PTEE 09 603—MODERN CONTROL THEORY

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

1. What is the advantage of diagonal representation of a system over other forms of state space representations ?
2. What do you mean by a non linear system ?
3. What is meant by limit cycle ?
4. Define positive definiteness.
5. Define Observability.

(5 × 2 =10 marks)

Part B

Answer any **four** *questions.*

6. Explain concept of state space and explain its advantage over transfer function approach.
7. The state representation of a separately excited DC servo motor dynamics is given as :

$$\begin{bmatrix} \dot{\omega} \\ \dot{i}_a \end{bmatrix} = \begin{bmatrix} -1 & 1 \\ -1 & -10 \end{bmatrix} \begin{bmatrix} \omega \\ i_a \end{bmatrix} + \begin{bmatrix} 0 \\ 10 \end{bmatrix} u,$$ where ω is the speed of motor, i_a is the armature current and u is the armature voltage. Find transfer function $\frac{\omega(s)}{U(s)}$.

8. Explain the different non linearities commonly exhibited by a system.
9. State and explain Lyapunov stability criteria.
10. How do you test for controllability of a system ?
11. Explain the typical performance measures used in optimal control.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*

12. (a) Determine the diagonal state model of a system whose transfer function is :

$$T(s) = \frac{2(s+5)}{(s+2)(s+3)(s+4)}.$$

Or

(b) For a system $\begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = A\begin{bmatrix} x_1(t) \\ x_2(t) \end{bmatrix}$, the response $\begin{bmatrix} x_1(t) \\ x_2(t) \end{bmatrix} = \begin{bmatrix} e^{-2t} \\ -2e^{-2t} \end{bmatrix}$, when :

$\begin{bmatrix} x_1(0) \\ x_2(0) \end{bmatrix} = \begin{bmatrix} 1 \\ -2 \end{bmatrix}$ and $\begin{bmatrix} x_1(t) \\ x_2(t) \end{bmatrix} = \begin{bmatrix} e^{-t} \\ -e^{-t} \end{bmatrix}$ when $\begin{bmatrix} x_1(0) \\ x_2(0) \end{bmatrix} = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$. Determine matrix A.

13. (a) Use isocline method to plot the phase plane trajectory for system represented by :

$\frac{d^2x}{dt^2} + 0.3\frac{dx}{dt} + x = 0$ for initial conditions (2, 0).

Or

(b) Obtain the describing function of a relay with hysterisis non linearity.

14. (a) Consider a non linear system :

$$\dot{x}_1 = x_2 - x_1\left(x_1^2 + x_2^2\right)$$

$$\dot{x}_2 = -x_1 - x_2\left(x_1^2 + x_2^2\right).$$

Determine stability using Lyapunov criterion.

Or

(b) Explain the Krasovskii's method for construction of Lyapunov function.

15. (a) Check for the Controllability and Observability of a system with system matrices,

$$A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix}, B = \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix} \text{ and } C = [10 \quad 5 \quad 1].$$

Or

(b) Find the variation of the functional $J = \int_0^1 \left[x^2(t) + 2x(t)\right].dt$.

(4 × 10 = 40 marks)

C 5039 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2009 SCHEME) EXAMINATION, APRIL 2021

Civil Engineering

CE/PTCE 09 L05—FUNCTIONAL DESIGN OF BUILDINGS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *the questions.*

Each question carries 2 *marks.*

1. What is meant by reflection co-efficient ?
2. Discuss about lux meter.
3. List out the factors determining thermal comfort.
4. Describe climate graph.
5. Define low energy cooling.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

Each question carries 5 *marks.*

6. What is meant by reverberation control ?
7. Discuss Glare in artificial lighting.
8. Describe Lumen method.
9. Explain ET nomograms.
10. What do you mean by thermal gradients ?
11. Discuss the various shading devices.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*

Each question carries 10 *marks.*

12. (a) Discuss about various acoustic materials and its properties.

Or

(b) Explain about the airborne and structure borne propagation.

13. (a) State the principles of day lighting. Explain day light factor.

Or

(b) What are the illumination requirements for various building ? Explain in detail.

14. (a) Discuss about Climate on a global scale.

Or

(b) Explain the climate analysis with Corrected Effective Temperature (CET) in detail.

15. (a) Write short note on :

(i) Low energy cooling.

(ii) Internal blinds and curtains.

Or

(b) Explain active solar building energy.

(4 × 10 = 40 marks)

C 5038 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2009 SCHEME) EXAMINATION, APRIL 2021

Civil Engineering

CE/PTCE 09 L02—TRAFFIC ENGINEERING

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

Each question carries 2 *marks.*

1. List the scope of traffic engineering.
2. What is meant by v/c ratio ?
3. What is a design vehicle ?
4. Define Spot Speed.
5. What is meant by object markings ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

Each question carries 5 *marks.*

6. List out the objectives of traffic engineering.
7. What are the limits of vision of a driver ?
8. Explain the uses of O and D survey.
9. How parking turn over computed ?
10. Explain the warrants for traffic signals.
11. Define signal.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*

Each question carries 10 *marks.*

12. (a) Discuss the various vehicular characteristics that influence design of road.

Or

(b) Describe the traffic stream characteristics.

13. (a) Explain how the speed and delay studies are carried out. What are the various uses of speed and delay studies ?

Or

(b) Give the various objectives of the accident studies. Also explain the causes of accidents.

14. (a) Discuss the different types of grade intersection with sketches.

Or

(b) Explain the factors affecting the traffic signal co-ordination.

15. (a) Describe the various informatory signs.

Or

(b) Explain the traffic control devices.

(4 × 10 = 40 marks)

C 5037 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2021

Electronics and Communication Engineering

EC/PTEC 09 L05—SATELLITE COMMUNICATION

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Define apogee and perigee ?
2. Define Sun transit outage.
3. Define Polar Mount Antenna.
4. What is inter modulation noise ?
5. What do you mean by multiple access techniques ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. What are look angles? Derive the expression for azimuth.
7. Discuss about Satellite Transponder.
8. An antenna has a noise temperature of 35 K and is matched into a receiver which has a noise temperature of 100 K. Calculate the noise is power density and the noise power for a bandwidth of 36 MHz.
9. Explain DBS.
10. A satellite downlink at 12 GHz operates with a transmit power of 6 W antenna diameter of 3 m and efficiency 0.55. Calculate the EIRP in dBW.
11. (a) Explain Kepler's laws.

    (b) List out frequency bands used for satellite communication.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. A) Explain any one orbit perturbation.

Or

B) Explain (i) Mean anomaly ; (ii) True anomaly ; (iii) Inclination ; (iv) Nodes ; and (v) Sub-satellite points.

13. A) Explain the attitude control of satellite with necessary diagram.

Or

B) Write brief note on TTC and M subsystem.

14. A) Derive the link power budget equation.

Or

B) Discuss the effect of rain on uplink and downlink of a satellite system.

15. A) Explain TDMA frame structure of satellite system with necessary diagrams.

Or

B) Write short note on (i) GPS ; and (ii) CDMA.

(4 × 10 = 40 marks)

C 5035 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) [2009 SCHEME] DEGREE EXAMINATION, APRIL 2021

Electronics and Communication Engineering

EC/PTEC 09 L02—NUMERICAL METHODS FOR ENGINEERS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 marks.

1. Find a positive root of $x = \cos x$ by bisection method (2 iterations only).
2. Prove $\left(\frac{\Delta^2}{E}\right)u_x \neq \frac{\Delta^2 u_x}{E u_x}$.
3. By Gauss two points formula, evaluate $\int_{-1}^{1} \frac{dx}{1+x^2}$.
4. What are the orders of the errors in Trapezoidal rule and Simpson's $\frac{1}{3}$ rule ?
5. Solve : $u_{x+2} - 4u_x = 0$.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 marks.

6. Find the root of $4x - e^x = 0$ that lies between 2 and 3 by Newton's method (2 iterations).
7. Find the missing value of the table below :

x	0	1	2	3	4
y	1	2	4	—	16

Explain why $y(x = 3)$ is not $2^3 = 8$ in your answer.

8. Using Lagrange's formula of interpolation find $y(9.5)$ given the table below :

x	7	8	9	10
y	3	1	1	9

9. Compute the value of $\int_1^2 \frac{dx}{x}$ using Trapezoidal rule and Simpson's 1/3 rule by proper selection of h.

Turn over

10. Using Euler's method solve $\frac{dy}{dx} = x + y, y(0) = 1$ for $x = 0.2$ and 0.4.

11. Solve $y'' - xy = 0$ given $y(0) = -1, y(1) = 2$ by finite difference method taking $n = 2$. (Assume $x \in (0, 1)$).

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. (a) Find the roots of $x^3 - 4x^2 + 5x = 2$ by Graeffe's method. (4 squarrings).

Or

(b) Find the positive root of $x^3 = 2x + 5$ by False position method (upto 4 digits and 4 iterations).

13. (a) By Crout's method, solve :

$3x + y - z = -3, x + y + z = 3, 2x - y + 3z = 16.$

Or

(b) Fom the table below, find $f(x)$ and $f(6)$ using Newton's interpolation formula :

x	:	1	2	7	8
$y = f(x)$	:	1	5	5	4

14. (a) The table below gives the velocity v of a moving particle at time t seconds. Find the distance covered by the particle in 12 seconds and also the acceleration at $t = 2$ seconds :

t	:	0	2	4	6	8	10	12
v	:	4	6	16	34	60	94	136

Or

(b) Apply Runge-Kutta method of 4th order to find $y(0.2)$ given $\frac{dy}{dx} = x + y, y(0) = 1$ taking $h = 0.2$.

15. (a) Solve $u_{xx} + u_{yy} = 0$ over the square mesh of side 4 units, satisfying the conditions :

(i) $u(0, y) = 0$ for $0 \le y \le 4$. (ii) $u(4, y) = 12 + y$ for $0 \le y \le 4$.

(iii) $u(x, 0) = 3x$ for $0 \le x \le 4$. (iv) $u(x, 4) = x^2$ for $0 \le x \le 4$.

Or

(b) Solve $u_t = u_{xx}$ subject to $u(0, t) = 0, u(1, t) = 0$ and $u(x, 0) = \sin \pi x$ for $0 < x < 1$. Select h and k properly to use Bender-Schmidt method. Select $h = 0.2$.

(4 × 10 = 40 marks)

C 5034 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, APRIL 2021

Electronics and Communication Engineering

EC/PTEC 09 603—RADIATION AND PROPAGATION

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. What is resonant antenna ?
2. What factors govern the selection of the feed point of a dipole antenna ?
3. Why is Yagi-Uda array called a super gain antenna ?
4. What is uniform linear array ?
5. Write short note on "Super-refraction".

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. The mean radius of a small circular loop of constant current is $\lambda/10$. Find the ratio of its maximum effective aperture and physical area of the loop.
7. A transmitting antenna with an effective height of 10 metres has a 50 A current at the base. The frequency of operation is 600 KHz. Calculate the radiated power.
8. Define the antenna temperature and equivalent noise temperature of antenna.
9. Explain the principle of operation of a binomial array.
10. Derive the relationship between MUF and skip distance for flat earth.
11. What is a slot antenna ? Why does it often used an array of slots ?

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*

Each question carries 10 *marks.*

12. (a) What is a half wave dipole ? Assuming a sinusoidal current distribution over the dipole length, derive an expression for the vector potential A at a large distance from the dipole. Clearly mention the approximations made in the derivation.

Or

(b) (i) Give the statement and proof of reciprocity theorem.

(ii) Explain the terms Directivity and radiation resistance as applied to an antenna.

(5 + 5 = 10 marks)

13. (a) Sketch the radiation pattern of 8 antenna elements with $d = \lambda/2$ and fed in phase.

Or

(b) Derive expression for array factor in the case of uniform End-fire arrays.

14. (a) Write a review on the different types of antenna used at LF, MF, HF and VHF. Discuss why the practical antenna used in the different frequency ranges are different.

Or

(b) What is YAGI antenna ? Explain its construction and properties with special reference to directivity and beam width.

15. (a) (i) What is Secant law ?

(ii) Write notes on ionospheric characteristics and propagation of electromagnetic waves.

(2 + 8 = 10 marks)

Or

(b) (i) Discuss in detail the space-wave propagation.

(ii) What is a ground wave ? Explain. (5 + 5 = 10 marks)

[4 × 10 = 40 marks]

C 5030 (Pages : 3) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2009 SCHEME) EXAMINATION, APRIL 2021

Chemical Engineering

CH/PTCH 09 604—ECONOMICS AND MANAGEMENT OF CHEMICAL INDUSTRIES

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

1. Define Hoskold's formula.
2. What is a detailed estimate ?
3. How do you find variable cost in economics ?
4. What is the formula for cost of production ?
5. What is a trial balance and what are its purposes ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

6. List the factors affecting depreciation expense.
7. Explain project cost estimation with the factors contribute to uncertainty in project cost estimation.
8. Brief the economic significance of capacity utilization.
9. What is the Discounted Cash Flow DCF Formula and analyse its components ?
10. What are the purposes of creating balance sheet ?
11. List the major types of financial institutions. Explain any one in detail.

(4 × 5 = 20 marks)

Part C

12. (a) Explain in detail about the methods of depreciation with simple examples and also list its factors.

Or

(b) A fixed asset is purchased on 1st January 2011.

Information relating to the asset is as follows :

Cost of acquisition	–	$ 110,000
Residual Value estimated at the time of acquisition	–	$ 10,000
Residual Value revised estimate on 1st January 2012	–	Nil
Useful Life estimated at the time of acquisition	–	10 years
Useful Life revised estimate on 3rd January 2013	–	8 years

Calculate depreciation expense for the years ended 31st December 2011, 2012, 2013 and 2014.

13. (a) Consider that you plan to start up a chemical industry. Suggest your cost estimation plan after final process-design stage is being completed. Also list the calculation methods for calculating capital investment.

Or

(b) Explain the following :

(I) Lang factor method with formula. (2 marks)

(II) Relate total, average and marginal cost of the product. (4 marks)

(III) Specify items which are generally classified as direct materials. (4 marks)

14. (a) Calculate profitability ratios for the following as shown in Table 1 :

Table 1

Particulars	*Amount* Rs.
Shareholder Equity :	
Equity Shares, 2346 share outstanding. Par value 0.05	118
Paid in Capital	5,858
Retained Earning	13,826
Total Shareholder Equity	19,802
Total Assets	30,011
Current Liability	8,035
Total Sales'	53,553
Gross Profit :	16,147
Net Operating Profit	3,028.65
Net Profit	3,044

Or

(b) XYZ Company is looking to invest in some new machinery to replace its current malfunctioning one. The new machine, which costs $ 420,000, would increase annual revenue by $ 200,000 and annual expenses by $ 50,000. The machine is estimated to have a useful life of 12 years and zero salvage value.

15. (a) (i) How do you calculate financial ratios from balance sheet and income statement ? Explain in detail.

(5 marks)

(ii) Compare Balance Sheet with Profit and Loss account. (5 marks)

Or

(b) Explain in detail about the causes and effects of inflation and deflation.

[4 × 10 = 40 marks]

C 5029 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2009 SCHEME) EXAMINATION, APRIL 2021

Chemical Engineering

CH/PTCH 09 601—CHEMICAL PROCESS INDUSTRIES

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

1. Write a short note on natural trona ore.
2. Discuss the advantages of mercury cell process over diaphragm cell process.
3. What is DDT ? Briefly explain.
4. Distinguish edible and non-edible oils.
5. Define starch and list out its derivatives.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

6. Explain the phosphate rock beneficiation process with neat sketch.
7. Explain the properties and uses of different types of Portland cements.
8. Write a detailed note on Ceramics manufacturing processes.
9. Write a detailed note on soda-lime glass and Lead glass.
10. Give an account of nature and occurrence of coal.
11. Write a detailed note on role of unit operations in food product industries.

(4 × 5 = 20 marks)

Part C

Answer **all** *Questions.*

12. (a) Draw a neat sketch and describe the manufacture of soda ash by Solvay process.

Or

(b) Describe the manufacturing process of triple super phosphate with engineering flow sheet.

Turn over

13. (a) Describe the manufacture of ammonium nitrate and nitro lime with neat sketch.

Or

(b) Define paints and pigments. Explain the titanium dioxide manufacturing process with engineering flow sheet.

14. (a) Draw a neat sketch and describe the continuous process for fatty acids, soap and glycerin.

Or

(b) What are the non-fibrous raw materials used in paper industry ? Explain the paper manufacturing process with schematic diagram.

15. (a) Explain in detail the production of white crystalline sugar from sugar cane with flow chart.

Or

(b) Draw a neat sketch and describe the method of extraction of vegetable oil from seed.

(4 × 10 = 40 marks)

C 1208 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) [09 SCHEME] DEGREE EXAMINATION, APRIL 2016

PT 09 L05 – MANAGEMENT INFORMATION SYSTEM

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

1. Briefly explain about evolution of MIS.
2. How data reduction in done in MIS?
3. Give the structure of MIS.
4. How MIS will help for strategic planning?
5. Explain Information System Audit.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

6. Give the mathematical definition of information.
7. Explain Integrated system *vs*. Total system.
8. Explain how codification and classification can be done by MIS.
9. How MIS will help for product introduction and pricing?
10. Explain decision analysis approach used in MIS.
11. Explain audit for system security.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*

12. (a) Explain about the types of system in MIS.

Or

(b) Basic model of manual information processing system.

13. (a) Explain the conceptual and physical extent of integration and extent of man/machine interaction.

Or

(b) Explain methodology of system design.

14. (a) Explain how MIS will support production function.

Or

(b) How MIS will support far personnel function?

15. (a) Explain about the techniques and technology for MIS.

Or

(b) Discuss about future trends in MIS.

(4 × 10 = 40 marks)

C 1206 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) [09 SCHEME] DEGREE EXAMINATION, APRIL 2016

PT 09 L02 – COMPUTER GRAPHICS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

1. Write the matrix formulation of the following transformations :
   (a) Translation.
   (b) Rotation.
2. List the basic elements of CRT.
3. What is aperture?
4. Write and define the terms used in illumination equation.
5. What is temporal aliasing?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

6. Explain mid-point sub-division with a suitable example.
7. List and explain the *three* categories of computer techniques used to generate pictures.
8. Explain Modelling and Realism.
9. Explain texture mapping from pixel to the surface to the texture map with a neat diagram.
10. Write and explain the basic rules of Animation.
11. How to determine whether a point on an object is in shadow?

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*

Each question carries 10 *marks.*

12. (a) Explain any *two* display devices with inherent image storage capacity.

Or

(b) Write and explain the line clipping algorithm.

13. (a) Explain the following :

(i) Stereoscopic views.

(ii) Kinetic depth effect.

(iii) Hidden line elimination.

Or

(b) A model of a molecular structure can be viewed as a graph structure in which each node has an (x, y, z) location and n successors (n is often 1). Show how the topological information could be compactly recorded for such a structure.

14. (a) Explain the following illumination modes :

(i) Ambient light.

(ii) Diffuse reflection.

Or

(b) Explain the following models for polygons :

(i) Gouraud shading.

(ii) Phong shading.

15. (a) Explain the steps involved in rendering pipeline for radiosity and Gouraud shading.

Or

(b) Explain the following methods for controlling animation :

(i) Full explicity control.

(ii) Procedural control.

(iii) Physically based animation.

(4 × 10 = 40 marks)

C 1187 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) [09 SCHEME] DEGREE EXAMINATION, APRIL 2016

BM 09 L01 – POWER ELECTRONICS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

1. What is second breakdown in a Power Transistor?
2. Distinguish between natural and forced commutation.
3. Why is the power factor of a semiconverter better than that of full converter?
4. State the advantages of using IGBT instead of SCR in a DC chopper.
5. State the various schemes for induction motor speed control by voltage source inverter.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

1. Discuss forward and reverse safe operating areas of IGBT.
2. Explain the circuit arrangements that are necessary for proper operation of series connected thyristors.
3. Compare the merits and demerits of on-off and phase-angle a.c. voltage controllers.
4. Explain the operation of step down thyristorised chopper with RL Load.
5. Discuss the advantages and disadvantages of current source thyristorised inverters over voltage source thyristorised inverters.
6. Draw the scheme for speed control of a d.c. motor using a d.c. chopper and explain its operation in Motoring Mode.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*

1. (a) Discuss the following terms in brief for diodes :
   (i) Cut-in voltage.
   (ii) Reverse recovery current and
   (iii) Punch through.
   (b) Draw and explain the V–I characteristics of MCT.

(7 + 3 = 10 marks)

Or

2. (a) Explain briefly the various methods of turn on of SCR.

   (b) What are the precautions needed to prevent false turn-or of the SCRs?

(7 + 3 = 10 marks)

3. Explain the operation of single-phase fully controlled converter, feeding a highly inductive load, with free wheeling diode present across the output. Also derive the expression for the output d.c. voltage.

Or

4. Explain the operation of single phase a.c. voltage controller supplying RL load. Draw the relevant voltage wave forms when (a) Firing angle (α) > load power factor angle (ϕ) and (ii) $\alpha \leq \phi$.

5. Explain the operation of the back converter and illustrate the operation with the inductor current and the switch waveforms.

Or

6. Describe briefly the construction and working of McMurray Inverter and discuss the various modes involved in the commutation process. Draw the load voltage and current waveforms also.

7. Discuss the various speed control schemes for 3-phase squirrel cage Induction motor using power semiconductor device based circuitries.

Or

8. Draw and explain the power circuit of semiconductor feeding a separately excited d.c.motor. Explain with typical voltage and current wave forms, the operation in both continuous armature current and discontinuous armature current modes.

[4 × 10 = 40 marks]