D 93685 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2020

Printing Technology

PT 19 305—GRAPHIC DESIGN AND ELECTRONICS COMPOSITION

Time : Three Hours Maximum : 100 Marks

Part A

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

1. What is Colour Gamut ? Explain.
2. Why colour matching is required ? Explain.
3. What are perceived colours ?
4. Give the importance of line spacing.
5. What is copy fitting ?
6. Why centering a line of type is required ?
7. Explain the role and function of colour in design.
8. What are the elements of design ? Explain.
9. What are monograms ? Explain.
10. What is copy marking ?
11. Give the advantages of traditional copy fitting.
12. Why Inter character spacing is required ?
13. Give the advantages of Automatic Page Make-up.
14. Explain Text and graphics integration.
15. What is the need of Post Script ?

(10 × 5 = 50 marks)

Part B

Answer **one** *full section from each question.*
Each question carries 10 *marks.*

16. a) Explain additive and subtractive theory with sketch and applications.

Or

b) Explain the structure and functioning of human eye.

17. a) Why Casting up and Casting off is required ? Explain with example.

Or

b) Explain word and line spacing materials.

18. a) Explain with example, how design can influence ancillary operations.

Or

b) Explain how selection and specification of ink and paper will influence the design specification and production process.

19. a) With an example explain page-makeup of magazine and pamphlets.

Or

b) Why proofing is required ? Explain the proofing stages.

20 a) Explain with example about heavy duty and medium duty program.

Or

b) Give the applications of Page-maker and InDesign software.

(5 × 10 = 50 marks)

D 93684 **(Pages : 2)** **Name.....**

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2020

Printing Technology

PT 19 304—GRAPHICS ARTS TECHNIQUES

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **ten** *questions.*

Each question carries 5 *marks.*

1. Discuss highlight, middle tone and shadow areas.
2. Explain reciprocity failure and intermittence effect.
3. Explain the optical principle of process camera.
4. Compare soft and hard proofing.
5. What are the advantages, disadvantages and disadvantages of contact printing ?
6. Write notes on demands on the resolution.
7. What are the factors to be considered for paper substrate while planning a job ?
8. Discuss various materials used for planning.
9. Explain the steps involved in preparing 4 page and 8 page landscape half-sheetwork imposition.
10. Write notes on paper aluminium plates.
11. Explain 5 methods of graining planographic plates.
12. With diagram, explain the structure of a typical planographic plate.
13. Explain 3 factors influencing correct plate exposure.
14. Discuss the features and advantages of Pre-Sensitised plates.
15. What are the features and advantages of dry-offset plates ?

(10 × 5 = 50 marks)

Turn over

Part B

Answer **one** *full question from each section.*

Each question carries 10 *marks.*

16. (a) With neat diagram, explain different parts of a horizontal process camera.

Or

(b) Discuss various light sources used for films and plates.

17. (a) Discuss various special features of a digital camera.

Or

(b) Explain different types of scanners..

18. (a) Describe layout and with neat diagram, explain various steps involved in planning a layout.

Or

(b) Explain negative assembly to golden rod method of film planning.

19. (a) Discuss 10 factors to be considered for a good platemaking department.

Or

(b) Discuss various materials required for platemaking.

20. (a) Explain the characteristics and processing of wipe-on plates.

Or

(b) With neat diagram, explain the features and processing procedure of platemaking using Diffusion transfer method.

(5 × 10 = 50 marks)

D 93683 **(Pages : 2)** **Name.....**

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2020

Printing Technology

PT 19 303—PAPER AND INK

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Explain the manufacturing of refiner mechanical pulp with its advantages.
2. Explain dry indicator method and flotation method used to test paper water resistance.
3. Write notes on non-fibrous additives used in paper manufacture.
4. Write notes on the permanence and durability property of the paper.
5. Discuss various properties required by papers used for offset printing.
6. Write a note on Recycled paper.
7. Write notes on anti-settling agents.
8. Explain various forms of pigments.
9. Discuss the features of white pigments.
10. Write notes on easily dispersible pigments and hyper concentrated pigment dispersions.
11. Explain evaporation drying mechanism of printing inks.
12. Write notes on weight per gallon cups.
13. Discuss the features of Thermochromic inks
14. Write notes on anti-alteration security inks with examples.
15. Discuss twin horizontal mixer with diagram.

(10 × 5 = 50 marks)

Turn over

Part B

Answer **one** *full question from each section.*
Each question carries 10 *marks.*

16. a) Explain the paper manufacturing process with neat diagram.

Or

b) Discuss the four methods of paper coating with neat sketches.

17. a) Explain the features of various materials used in paper recycling process.

Or

b) Discuss various stages of paper de-inking process.

18. a) Discuss various types of black pigments and their features.

Or

b) Explain different types, properties and uses of dyes used in printing inks.

19. a) With the help of flow chart, explain the manufacturing of oleo-resinous varnish.

Or

b) With neat diagram, discuss the features, working, advantages and disadvantages of shot mill.

20. a) Discuss the following ink properties and their testing :

i) Viscosity ; ii) Tack ; ii) Length ; and iv) Pigment dispersion.

Or

b) Discuss the following mechanical properties of the paper :

i) Bursting strength ; ii) Folding endurance ; iii) Stiffness ; iv) Tearing resistance ; and v) Tensile strength.

(5 × 10 = 50 marks)

D 93682 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2020

Printing Technology

PT 19 302—COMPUTER PROGRAMMING IN C

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Draw a flowchart to compute the sum of digits in a given n-digit number.
2. Explain different language translators. Give an example for each.
3. Determine the value of each of the following expression, by mentioning all intermediate steps, if $a = 10$, $b = 4$ and $c = 2$.
   i) $a << b/c$.
   ii) $a == c \| a \% b >= a$.
4. Explain switch statement with an example.
5. Explain any *two* loop control structures in C.
6. Mention the difference between break and continue statements. Give suitable examples.
7. Write a program to find the sum of series $1! + 2! + 3! + \ldots\ldots n!$
8. How do you initialize single dimensional array ? Explain with examples.
9. Write a program to check whether entered string is palindrome or not.
10. Explain strcmp() and strcat() function with an example for each.
11. What is union in C language ? Explain how it differs from structure.
12. Write the general form of function definition, function call and function prototype with a C program as example.
13. Define recursive function. Write a C program to find sum of digits of a number using recursion.

Turn over

14. Write the difference between "reference" and "dereference" operators. Using these operators write a C program to swap two integer numbers.

15. List and explain any two functions used to handle files in C.

(10 × 5 = 50 marks)

Part B

Answer **one** *full question from each section.*
Each question carries 10 *marks.*

16. a) Explain any *four* types of Computer Networks.

Or

b) List and explain any *four* types of operating system.

17. a) Describe any four properties of an algorithm. Draw a flowchart to display the largest of given three numbers.

Or

b) Explain do-while statement. What are the differences between while and do-while statements.

18. a) What is a structure in C. Explain how we can create structure and initialize the members.

Or

b) What are 2D arrays ? Explain the different ways of initializing 2d arrays.

19. a) Write a C program to read a string and find the frequency of a given character in a string.

Or

b) Write a C program to find the sum of an array using recursive function.

20. a) Write a program using pointers to read in an array of integers and print its elements in reverse order

Or

b) Write a C program to create a file called emp.txt and store information about a person, such as his name, age and salary. Stored the data into the file emp.txt in text format with relevant messages.

(5 × 10 = 50 marks)

D 93681 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2020

Mechanical Engineering

ME 19 305—ELECTRICAL TECHNOLOGY

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Mention the applications of DC machines.
2. Differentiate between motor and generator.
3. Find the input power and efficiency of a DC generator supplying a load of 35 A at an output voltage of 200 V. The losses are as follows : friction 250 W, iron 125 W, field 200 W, armature copper losses 490 W, other stray losses 85 W.
4. Explain turn and transformation ratio of transformer.
5. Explain in detail on short circuit test on transformer.
6. An autotransformer is required set-up a voltage from 220 volts to 250 volts. The total number of coil turns on the transformer main winding is 2000. Determine the position of the primary tapping point, the primary and secondary currents when the output is rated at 10KVA and the economy of copper saved.
7. What is chording factor ? How it can be represented ? And mention its advantages.
8. Explain in brief on synchronous capacitor.
9. Explain in detail on DOL starter.
10. List the advantages and disadvantages of electrical drives.
11. Explain the parts of electric drives.
12. Explain the armature control method of DC motor.
13. Based on your general idea, draw the block diagram of gas turbine electric power generation.
14. What is skin effect and corona effect in electrical circuits ?
15. Draw the block diagram of online uninterruptable power supply.

(10 × 5 = 50 marks)

Turn over

Part B

Answer **all** *questions.*

Each question carries 10 *marks.*

16. Explain in detail on construction of DC machine.

Or

17. Derive the torque equation of DC motor.

18. Explain in detail on constructional features of single-phase transformer.

Or

19. Explain auto transformer with circuit diagram.

20. Discuss the losses and efficiency of an alternator

Or

21. Explain the torque slip characteristics of three phase induction motor.

22. Explain in detail on the components of load torque in electrical drives.

Or

23. Explain in detail on the ward leonard method or armature voltage control of electric motor.

24. Describe about electric equipments used in power plants.

Or

25. Explain in detail on Power MOSFET.

(5 × 10 = 50 marks)

D 93680 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2020

Mechanical Engineering

ME 19 304—METALLURGY AND MATERIAL SCIENCE

Time : Three Hours Maximum : 100 Marks

Part A

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

1 Classify engineering materials and list its important properties.

2 Show that the atomic packing factor for the FCC crystal structure is 0.74.

3 Explain the procedure to find Miller indices of crystal planes.

4 Explain Fick's first law of diffusion.

5 State Hume Rothery's rules for formation of substitutional solid solutions.

6 State and explain Gibb's phase rule.

7 Explain about annealing.

8 Write short notes on tool steels.

9 State the effects of following alloying elements on properties of steels :

(i) Chromium.

(ii) Silicon.

(iii) Nickel.

10 Distinguish between elastic an plastic deformation of metals.

11 Compare the deformation by slip and twinning.

12 Draw and explain the different stages of a creep curve.

13 Write the advantages and limitations of composites.

14 List the properties and applications of ceramics.

15 Write a short note on shape memory alloys.

(10 × 5 = 50 marks)

Turn over

Part B

Answer **all** *questions.*

Each question carries 10 *marks.*

16. What is meant by crystal imperfections ? Illustrate and discuss the different types of line defects in crystals.

Or

17. Discuss how X-ray diffraction technique is used to determine the crystallographic structure of a material.

18. Sketch and explain the Pb-Sn phase diagram for eutectic system.

Or

19. Draw Fe-Fe_3C phase diagram and discuss transformations that take place from melting point to room temperature at any percentage of carbon.

20. Sketch and explain about TTT diagram.

Or

21. Describe the composition, properties and typical applications of the following copper alloys :

(i) Gliding metal. (ii) Naval brass.

(iii) Phosphor bronze. (iv) Aluminium bronze.

(v) Cupronickel.

22. Explain the mechanism involved in solid solution strengthening.

Or

23. What is meant by ductile fracture ? Explain the mechanism of it.

24. Discuss the characteristics and applications of fibre reinforced composites.

Or

25. Explain the properties and typical applications of the following polymeric materials :

(i) PE. (ii) PP.

(iii) PVC. (iv) PEEK.

(5 × 10 = 50 marks)

D 93679 (Pages : 4) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2020

Mechanical Engineering

ME 19 303—MECHANICS OF SOLIDS

Time : Three Hours Maximum : 100 Marks

Part A

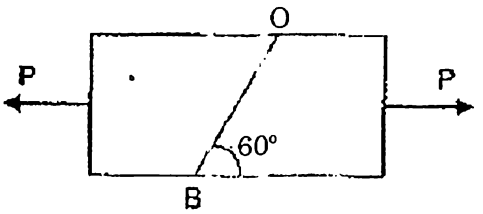
Answer any **ten** *questions.*
Each question carries 5 *marks.*

1. Draw the stress-strain curve for a ductile material and indicate the salient features.
2. A bar of 20 mm diameter is subjected to a pull of 50 kN. The measured extension on a gauge length of 250 mm is 0.12 mm and the change in diameter is 0.00375 mm. Calculate (i) Young's modulus ; (ii) Poisson's ratio ; and (iii) Bulk modulus.
3. Prove that the maximum stress induced in a body due to suddenly applied load is twice the stress induced when the same load is applied gradually.
4. The shearing stress of a solid shaft is not to exceed 40 N/mm^2 when the torque transmitted is 200000 N-m. Determine the minimum diameter of the shaft.
5. Explain the different types of loads acting on a beam.
6. Draw the shear force and bending moment diagrams for a cantilever of length L carrying a uniformly distributed load of w per unit length over its entire length.
7. What is theory of simple bending ? State the assumptions made in the same theory.
8. Explain about the beams uniform strength.
9. A copper wire of 2 mm diameter is required to be wound a drum. Find the minimum radius of the drum, if the stress in the wire is not to exceed 80 MPa. Take modulus of elasticity (E) for the copper as 100 GPa.
10. A wooden beam 140 mm wide and 240 mm deep has a span of 4 m. Determine the load, that can be placed at its centre to cause the beam a deflection of 10 mm. Take E as 6 GPa.
11. A cantilever of length 2.5 m carries a uniformly distributed load of 16.4 kN per metre length over the entire length. If the moment of inertia of the beam = 7.95×10^7 mm^4 and value of E = 2×10^5 N nm^2, determine the deflection at the free end.

Turn over

12. Find the slope and deflection of a simply supported beam carrying a point load at the centre using moment-area method.

13. A rectangular bar of cross-sectional area of 11000 mm^2 is subjected to a tensile load P as shown in Fig below. The permissible normal and shear stresses on the oblique plane BC are given as 7 N/mm^2 and 3.5 N/mm^2 respectively. Determine the safe value of P.



14. The stresses at a point of a machine component are 150 MPa and 50 MPa both tensile Find the intensities of normal, shear and resultant stresses on a plane inclined at an angle of 55° with the axis of major tensile stress. Also find the magnitude of the maximum shear stress in the component.

15. Explain the assumptions made in Euler's column theory. How far are the assumptions valid in practice?

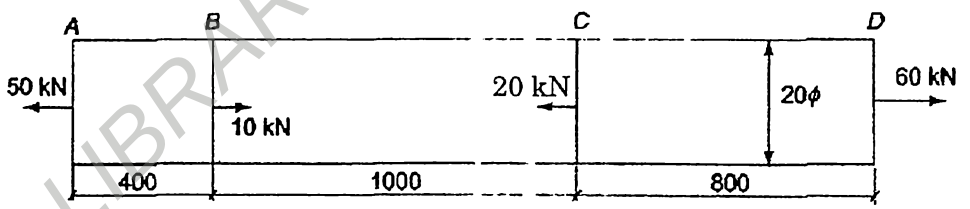
(10 × 5 = 50 marks)

Part B

Answer **all** *questions.*

16. A bar of uniform cross section 20 mm diameter is subjected to loads as shown in Fig. below. Find the total elongation of the bar and the maximum stress in the bar.

E = 200 GPa. (All lengths are in mm.)



Or

17. A steel rod of 3 cm diameter and 5 m long is connected to two grips and the rod is maintained at a temperature of 95°C. Determine the stress and pull exerted when the temperature falls to 30°C, if

    (i) The ends do not yield.

    (ii) The ends yield by 0.12 cm.

    Take $E = 2 \times 10^5$ N/mm^2 and $\alpha = 12 \times 10^{-6}$/°C.

18. Two shafts of the same material and of same lengths are subjected to the same torque, if the first shaft is of a solid circular section and the second shaft is of hollow circular section, whose internal diameter is 2/3 of the outside diameter shear and the maximum stress developed in each shaft is the same, compare the weights of the shafts.

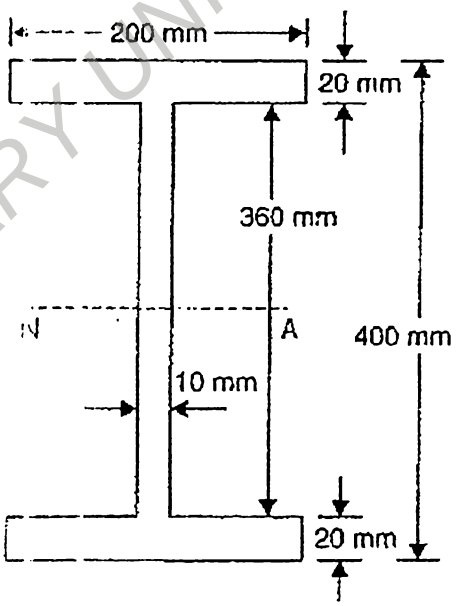
Or

19. A simply supported beam of length 6 m, carries point load of 3 kN and 6 kN at distances of 2 m and 4 m from the left end. Draw the shear force and bending moment diagrams for the beam.

20. A timber beam of rectangular section supports a load of 20 kN uniformly distributed over a span of 3.6 m. If depth of the beam section is twice the width and maximum stress is not to exceed 7 M Pa, find the dimensions of the beam section.

Or

21. A rolled steel joist of I section has the dimensions as shown in Fig. below. This (simply supported) beam of I section carries a uniformly distributed load of 40 kN/m run on a span of 10 m, calculate the maximum stress produced due to bending.



22. Determine : (i) Slope at the left support ; (ii) Deflection under the load ; and (iii) Maximum deflection of a simple supported beam of length 5 m, which is carrying a point load of 5 kN at a distance of 3 m from the left end.

Take $E = 2 \times 10^5$ N/mm^2 and $I = 1 \times 10^8$ mm^4.

Or

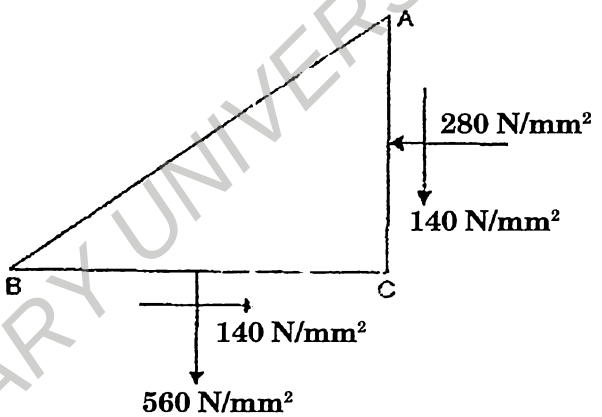
23. A beam of length 6 m is simply supported at its ends and carries two point loads of 48 kN and 40 kN at a distance of 1 m and 3 m respectively from the left support. Find using Macaulay's method : (i) Deflection under each load ; (ii) Maximum deflection ; and (iii) The point at which maximum deflection occurs.

Take $E = 2 \times 10^5$ N/mm^2 and $I = 85 \times 10^6$ mm^4.

24. At a point in a strained material, on plane BC there are normal and shear stress of 560 N/mm^2 and 140 N/mm^2 respectively. On plane AC, perpendicular to plane BC, there are normal and shear stresses of 280 N/mm^2 and 140 N/mm^2 respectively as shown in Fig. below. Determine the following :

(i) Principal stresses and location of the planes on which they act ; and

(ii) Maximum shear stress and the plane on which acts.



Or

25. Derive an expression for the Euler's crippling load for a long column when both ends of the column are hinged.

(5 × 10 = 50 marks)

D 93678 (Pages : 3) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2020

Mechanical Engineering

ME 19 302—FLUID MECHANICS

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Explain on different types of fluids with example.
2. Find the kinematic viscosity of an oil having density 981 kg/m^3. The shear stress at a point in oil is 0.2452 N/m^2 and velocity gradient at that point is 0.2 per second.
3. Define the following :

   (i) Absolute pressure ; (ii) Gauge pressure ; (iii) Vacuum pressure ; (iv) Vapor pressure and (v) Cavitation.
4. Brief on different types of fluid flow with an example.
5. The diameters of a pipe at the sections 1 and 2 are 10 cm. and 15 cm. respectively. Find the discharge through pipe if the velocity of water flowing through the pipe at section 1 is 5 m/s. Determine the velocity at section 2.
6. Differentiate free vortex flow and forced vortex flow.
7. Obtain bernoulli's equation! from euler's equation. Also list the assumptions involved in bernoulli's equation.
8. Differentiate between venturimeter and orificemeter.
9. Find the velocity of the flow of an oil through a pipe, when the difference of mercury level in a differential U tube manometer connected to the two tappings of the pitot tube is 100 mm. take co-efficient of pitot tube 0.98 and sp.gr of oil = 0.8.
10. Explain kinetic energy and momentum correction factors
11. Explain the major losses in pipes.
12. Brief on Reynolds experiment in fluid flow.

Turn over

13. Define displacement thickness, momentum thickness and energy thickness in boundary layer flow.

14. Brief on the concept of boundary layer.

15. What do you mean by separation of boundary layer ? What is the effect of pressure gradient on boundary layer separation ?

(10 × 5 = 50 marks)

Part B

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

16. The dynamic viscosity of an oil, used for lubrication between a shaft and a sleeve is 6 poise. The shaft is of diameter 0.4 m and rotates at 190 r.p.m. calculate the power lost in the bearing for a sleeve length of 90 mm. the thickness of the oil film is 1.5 mm.

Or

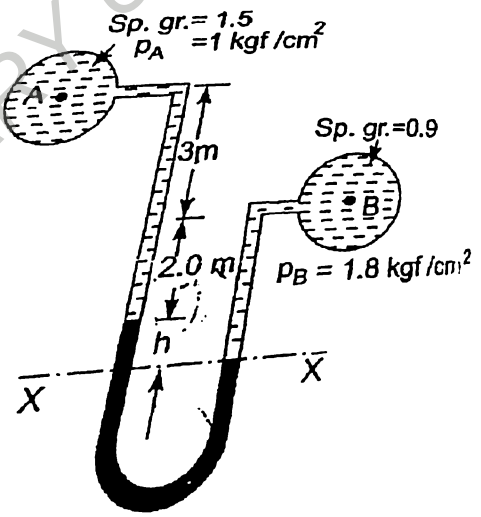
17. Derive the equation for pressure variation in a fluid at rest or static fluid.

18. Explain in detail the different types of fluid flow with suitable examples.

Or

19. Water flows through a pipe AB 1.2 m. diameter at 3 m/s and then passes through a pipe BC 1.5 m. diameter. At C, the pipe braches. Branch CD is 0.8 m. in diameter and carries one - third of the flow in AB. The flow velocity in branch CE is 2.5 m/s. Find the volume rate of flow in AB, the velocity in BC, the velocity in CD and the diameter of CE.

20. A Differential manometer is connected at two points A and B as shown in fig. the pipe A contains a liquid of sp.gr 1.5 while pipe B contains a liquid of sp.gr 0.9. the pressure at A and B are 1 kgf/cm^2 and 1.80 kgf/cm^2 respectively. Find the difference in mercury level in the differential manometer.



Or

21. Derive the Euler's equation of motion in dynamics of fluid flow.

22. The fluid of viscosity 0.7 Ns/m^2 and sp.gr 1.3 is flowing through a circular pipe of diameter 100 mm. the maximum shear stress at the pipe wail is given as 196.2 N/m^2, find : (i) The pressure gradient ; (ii) The average velocity ; and (iii) Reynolds number of the fluid flow.

Or

23. A pipe of diameter 20 cm. and length 10^4 m. is laid t a slope of 1 in 200. An oil of sp.gr 0.9 and viscosity 1.5 poise is pumped up at the rate of 20 liters per second. Find the head lost due to friction and also calculate the power required to pump the oil.

24. Find the displacement thickness, the momentum thickness and energy thickness for the velocity distribution in the boundary layer given by $u/U = y/\delta$, where u is the velocity at a distance from the plate and $u = U$ at $y = \delta$, where δ = boundary layer thickness.

Or

25. For the velocity profile $u/U = 2(y/\delta) - (y/\delta)^2$, fine the thickness of boundary layer at the end of the plate and the drag force on one side of a plate 1 m. long and 0.8 m. wide when placed in water flowing with a velocity of 150 mm. per second. Calculate the value of co-efficient of drag also. Take μ for water = 0.01 poise.

(5 × 10 = 50 marks)

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2020

Information Technology

IT 19 305—SWITCHING THEORY AND LOGIC DESIGN

Time : Three Hours Maximum : 100 Marks

Part A

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

1. i) Convert $(136)_8$ to base 2 and base 16.

   ii) Convert $(110101)_2$ to base 8 and 16.

2. i) Add the binary numbers 00111 and 10101 and show the equivalent decimal addition.

   ii) Subtract the binary number 00111 from 10101 and show the equivalent decimal subtraction.

3. i) Multiply $(10010)_2$ and $(11001)_2$.

   ii) Add $(110100111)_2$ and $(1110101)_2$.

4. i) Simplify the expression F = *x'yz + x'yz' + xz.*

   ii) Prove the expression *x'y'z' + x'yz' + xyz' = x'z' + yz'.*

5. i) Simplify the Boolean function $f1(x, y, z) = \sum m(2, 3, 5, 7)$.

   ii) Define fan in, fan out and propagation delay.

6. Simplify the Boolean expression using k-map

   F = A'C + A'B + AB'C + BC

7. How will you convert a 4-bit binary to gray code ?

8. Construct 16*1 multiplexer with two 8*1 and 2*1 multiplexer.

9. Implement the following Boolean function using 4 : 1 multiplexer, $F(A, B, C) = \sum m(1, 3, 5, 6)$.

Turn over

10. Construct a JK flip-flop using a D Flip-flop, a 2-to-1 line multiplexer and an inverter.

11. Design a sequential circuit with two D Flip-Flops, A and B, and one input x.

    When $x = 0$, then the state of the c ircuit remains the same. When $x = 1$, the circuit goes through the state transitions from 00 to 01 to 11 to 10 back to 00, and repeats

12. Explain the working procedure of serial-in serial-out shift register.

13. Explain in detail about RAM and its types.

14. Implement the following two Boolean functions with a PLA :

$$F1(A, B, C) = \sum (0, 1, 2, 4)$$
$$F2(A, B, C) = \sum (0, 5, 6, 7)$$

15. What is memory unit and memory deciding ?

(10 × 5 = 50 marks)

Part B

Answer **one** *full section from each question.*
Each question carriers 10 *marks.*

16. (a) Perform the following operations :

(i) Add $(4712)_8$ and $(1624)_8$. (2 marks)

(ii) Subtract $(232)_8$ from $(417)_8$. (2 marks)

(iii) Perform hexadecimal addition of $(B49C)_{16}$ and $(4E2F)_{16}$. (2 marks)

(iv) Perform hexadecimal subtraction of $(C92D)_{16}$ from $(7F9E)_{16}$. (2 marks)

(v) Convert the binary number 0.011_2 to its decimal equivalent. (2 marks)

Or

(b) Perform the following operations :

(i) Convert the binary number 110.011 to its decimal equivalent. (2 marks)

(ii) Convert the decimal fraction 0.432 to octal equivalent. (2 marks)

(iii) Convert $58.75 \div 23.5$ to binary form and then perform division operation. (2 marks)

(iv) Divide the following binary number $11001.11 \div 1101$. (2 marks)

(v) Add binary numbers $10011.1_2 + 11011.01_2$. (2 marks)

17. (a) Simplify the following expression to sum of product using Tabulation Method $f(a, b, c, d) = \sum (0, 1, 2, 3, 4, 6, 7, 11, 12, 15)$.

Or

(b) Simplify the Boolean expression using k-map F = A'C + A'B + AB'C + BC.

18. (a) Design a full subtractor and derive expression for difference and borrow. Realize using two half subtractor.

Or

(b) How to design a 2 bit magnitude comparator with 3 outputs A > B, A = B, A.

19. (a) A sequential circuit with two D Flip-Flops, A and B ; two inputs, x and y ; and one output, z, is specified by the following next-state and output equations :

$A(t+1) = x'y + xA$
$B(t+1) = x'B + xA$
$z = B$

(i) Draw the logic diagram of the circuit. (3 marks)

(ii) List the state table for the sequential circuit. (3 marks)

(iii) Draw the corresponding state diagram (4 marks)

Or

(b) Summarize the characteristic table and equation of JK flip flop.

20. (a) Implement the following two Boolean functions with a PAL.

$w(A, B, C, D) = \sum (2, 12, 13)$
$x(A, B, C, D) = \sum (7, 8, 9, 10, 11, 12, 13, 14, 15)$
$y(A, B, C, D) = \sum (0, 2, 3, 4, 5, 6, 7, 8, 10, 11, 15)$
$z(A, B, C, D) = \sum (1, 2, 8, 12, 13)$.

Or

(b) Design a combinational circuit using a ROM. The circuit should accept a 3-bit number and generate an output binary number equal to the square of the input number.

[5 × 10 = 50 marks]

D 93676 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2020

Information Technology

IT 19 304—COMPUTER ORGANIZATION AND DESIGN

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **ten** *questions.*
Each question carriers 5 *marks.*

1. Explain the functional units of a computer.
2. What is the purpose of Instruction Register (IR), Memory Address Register (MAR) and Memory Data Register (MDR) ?
3. Define a bus. Explain its types in brief.
4. (a) Perform the arithmetic operations (+42) + (–13) and (–42) – (–13) in binary using the signed-2's-complement representation for negative numbers.

   (b) Perform subtraction with the following unsigned decimal numbers by taking the 10's complement of the subtrahend.

   (i) 5250 – 1321 ; and (ii) 1753 – 8640.
5. Discuss the Instruction Set Architecture.
6. Explain the memory hierarchy in brief.
7. Differentiate static RAM and dynamic RAM.
8. Write short notes on (i) PROM ; and (ii) EPROM.
9. Explain the significance of floating-point representations.
10. Explain the concept of the virtual memory and its types.
11. Discuss the features and significance of magnetic disks.
12. Explain the arithmetic and logic unit with neat block diagram.
13. Define hazards and explain the types of hazards.

Turn over

14. Briefly explain the importance of a pipeline process.

15. Describe bus arbitration.

(10 × 5 = 50 marks)

Part B

Answer **one** *full section from each question.*
Each question carries 10 *marks.*

16. (a) What is Addressing Mode ? Explain in detail the different types of addressing modes.

Or

(b) Give examples for zero-address, one-address, two-address, and three-address instructions and illustrate the concept.

17. (a) With a neat diagram explain the booths algorithm.

Or

(b) (i) Differentiate between CISC scalar processor and RISC scalar processor. (5 marks)

(ii) Write short notes on cache memory organization. (5 marks)

18. (a) Give the structure of semiconductor RAM memories. Explain read and write operations in detail.

Or

(b) Compare paging and segmentation mechanism for implementing virtual memory.

19. (a) Explain in detail the basic types of shift registers.

Or

(b) What is Direct Memory Access (DMA) ? List the various DMA channels. Explain DMA controller with a neat sketch.

20. (a) Explain in detail about interrupt handling.

Or

(b) Write short notes on magnetic tape and optical drivers. Explain their functionalities.

(5 × 10 = 50 marks)

D 93675 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2020

Information Technology

IT 19 303—PROGRAMMING IN C

Time : Three Hours Maximum : 100 Marks

Part A

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

1. List and explain the types of header files in C.
2. What is the significance of an algorithm and a flowchart ?
3. Why C is called structured language ? Explain.
4. Write a C program to find the sum of two matrices of order 2*2.
5. List the applications of arrays.
6. What is a function ? Explain with an example.
7. Explain Bit Fields.
8. What is the difference between Union and Structure ?
9. How is a Union declared ? Show with an example.
10. Explain the use of the malloc() function.
11. When is the dereferencing operator used ? Give example.
12. What is the use of Dot (.) Operator ? Explain with an example program.
13. Discuss in brief dynamic memory allocation.
14. What is the use of realloc() ?
15. What is the purpose of free() ?

(10 × 5 = 50 marks)

Part B

Answer **one** *full section from each question.*
Each question carries 10 *marks.*

16. a) Write a C program with algorithm and flowchart for converting the temperature from Celsius to Fahrenheit.

Or

b) Write a C program to find the greatest among three numbers using if- else and if - else - if.

Turn over

17. a) Define jagged array. Write a program to implement jagged array.

Or

b) State the advantages of a function. How you will declare and call a function ? Show with an example.

18. a) Write a C program to pass structure as a arguments.

Or

b) Write a C program to define pointer to structure.

19. a) Explain pointer arithmetic with example program.

Or

b) Explain arrays of pointers with example program.

20. a) Explain the various operations for file handling.

Or

b) Write a simple C program to illustrate the modes in which a file can be opened.

(5 × 10 = 50 marks)

D 93673 (Pages : 3) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2020

Electrical and Electronics Engineering

EE 19 305—FLUID MECHANICS AND POWER PLANT ENGINEERING

Time : Three Hours Maximum : 100 Marks

Part A

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

I. 1. Define total pressure on a surface and centre of pressure of a surface.

2. Differentiate compressible and incompressible flow.

3. Distinguish between stream line and streak line.

4. Explain high head turbines. Give examples.

5. Discuss the role of draft tube in Kaplan turbine.

6. Why actual discharge be greater than theoretical discharge in a reciprocating pump ?

7. Summarize thermodynamic equilibrium.

8. Enlist the similarities between heat and work.

9. Define heat reservoir and source.

10. List out the assumptions made for the analysis of thermodynamic air cycles.

11. In an Otto cycle, pressure ratio during compression is 11. Calculate the air standard cycle efficiency.

12. Differentiate between refrigeration and air conditioning.

13. Define heat transfer. And write the different types.

14. What is meant by transient heat conduction ? Also give any *two* example.

15. Classify the dimensionless parameters used in forced and free convection heat transfer analysis.

(10 × 5 = 50 marks)

Turn over

Part B

Answer any **five** *questions.*
Each question carries 10 *marks.*

II. 1. State Bernoulli's theorem for steady flow of a incompressible fluid. Derive an expression for Bernoulli's equation from first principle and state the assumption made for such a derivation.

Or

2. A venturimeter of inlet diameter 300 mm and throat diameter 150 mm is inserted in vertical pipe carrying Water flowing in the upward direction. A differential mercury manometer connected to the inlet and throat gives a reading of 200 mm. Find the discharge if the coefficient of discharge of meter is 0.98.

3. Explain the constructional details of Pelton wheel with neat diagram.

Or

4. Explain the working of a double acting reciprocating pump with a neat sketch. Derive the expression for work done it.

5. (i) Derive the expression for the displacement work.

(ii) Determine the work transfer and heat transfer a system in which a perfect gas having molecular weight of 16Kg/mol is compressed from 101.3KPa. 20°C to a pressure of 600 KPa. following the law $PV^{1.3}$ = constant. Take specific heat at constant pressure of gas as 1.7 kJ/kg K.

Or

6. Draw the schematic diagram of Rankine cycle and explain its working with the help of h-s diagram. Also discuss Rankine cycle improvements.

7. An engine working on Otto cycle has a volume of $0.45m^3$, pressure 1 bar and temperature 30°C at the beginning of compression stroke. At the end of compression stroke, the pressure is 11 bar and 210KJ of heat is added at constant volume. Determine (i) Pressure, temperatures and volumes at salient points in the cycle ; (ii) Efficiency.

Or

8. A Freon-12 refrigerator producing a cooling effect of 20 kJ/s operates on a simple vapour compression cycle with pressure limits of 1.509 bar and 9.607 bar. The vapour leaves the evaporator dry saturated and there is no under cooling. Determine the power required by the machine.

9 A temperature rise of 50°C in a circular shaft of 50 mm diameter is caused by the amount of heat generated due to friction in the bearing mounted on the crankshaft. The thermal conductivity of shaft material is 55W/mK and heat transfer co efficient is 7 W/m^2K. Determine the amount of heat transferred through shaft assume that the shaft is a rod of infinite length.

Or

10 Two very large parallel plates are maintained at a uniform temperature of T1 = 1000 K and T2 = 800 K and have emissivity's of $\varepsilon 1 = \varepsilon 2 = 0.2$, respectively. It is desire to reduce the net rate of radiation heat transfer between the two plates to one-fifth by placing the thin aluminium sheets with an emissivity of 0.15 on both sides between the plates. Determine the number of sheets that need to be inserted.

(5 × 10 = 50 marks)

D 93671 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2020

Electrical and Electronics Engineering

EE 19 303—ELECTRONIC DEVICES AND CIRCUITS

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **ten** *questions.*

Each question carries 5 *marks.*

1. Show the importance of selecting the proper operating point.
2. Describe in detail about gain bandwidth product for voltage and current of BJT.
3. Analyze the bias condition of base emitter and collector base junction to operate a transistor in cut-off region.
4. Point out the advantages of MOSFET compared to JFET.
5. Recall the expression for the voltage gain of JFET common source amplifier.
6. Develop the high frequency equivalent circuit model for MOSFET.
7. Write about amplifiers and mention its applications.
8. Compare positive and negative feedback.
9. Explain stability in oscillators.
10. Compare the ideal and practical op-amp characteristics.
11. Draw and write the output voltage equation of Non-inverting amplifier.
12. Sketch the circuit of an op-amp employed as a non-inverting zero crossing detector, along with input and output waveforms.
13. What is sample and hold circuit ? Point out where it is used ? Why ?
14. Point out any two application of 555 Timer in Mono stable mode.
15. Enlist the important feature of 555 timer circuit.

(10 × 5 = 50 marks)

Turn over

Part B

Answer any **five** *questions.*

Each question carries 10 *marks.*

II. (1) Calculate the collector and emitter currents, as given the base current and current gain. Assume a CE current gain of $\beta = 150$ and a base current of $iB = \mu A$. Also assume that the transistor is biased in the forward active mode.

Or

(2) Describe hybrid parameters for all three configurations and relations between them.

(3) Build the construction and operation of *n*-channel JFET with neat diagrams.

Or

(4) Develop the high frequent equivalent circuit of a MOSFET from its geometry and derive the expression for short circuit current gain in the common source configuration.

(5) Discuss class A amplifier in detail using BJT.

Or

(6) (i) Explain the types of feedback connections.

(ii) Explain in detail about the phase shift oscillator with neat diagram.

(7) (i) Examine the functions of all the basic building blocks of an Op-Amp.

(ii) Explain the application of op-amp as adder and Subtractor.

Or

(8) Explain a triangle wave generator with neat diagram using op-amp.

(9) Design a second order butter worth low pass filter having upper cut-off frequency of 1 kHz

Or

(10) Explain the working of PLL using appropriate block diagram and analyze how it can be used as frequency translator.

(5 × 10 = 50 marks)

D 93670 (Pages : 3) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2020

Electrical and Electronics Engineering

EE 19 302—ELECTRICAL CIRCUIT ANALYSIS

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **ten** *questions.*

I. 1 Define active elements and passive elements.

2 Compare the properties of series and parallel resonant circuits.

3 An alternating current ii s given by i = 137.8 Sin314t. Find : (i) Maximum value of current ; (ii) Time Period ; (ii) Instantaneous value of current for t = 4ms.

4 State the two ways in which phases of a three phase supply .can be interconnected to reduce the number of conductors used compared with three single-phase systems.

5 Write the differences between balanced and unbalanced 3-phase systems.

6 Point out why Star connection three phase system is preferred at the point of power utilization.

7 Define : (i) Positive Sequence ; (ii) Negative Sequence.

8 List out the methods of power measurement in 3 Φ circuits.

9 Define shifting theorem.

10 What is meant by Time constant of Series RL Circuit ? And also express the formulae for RL Circuit with DC Excitation.

11 Point out the difference between Transient response and Steady state response of a circuit.

12 Justify the terms : (i) Zero input response ; (ii) Zero state response.

13 What is a positive real function ?

14 Write the condition for symmetry and reciprocity with reference to y and h parameters ?

15 Define symmetrical property in two port networks and write the same for h, z, y parameters.

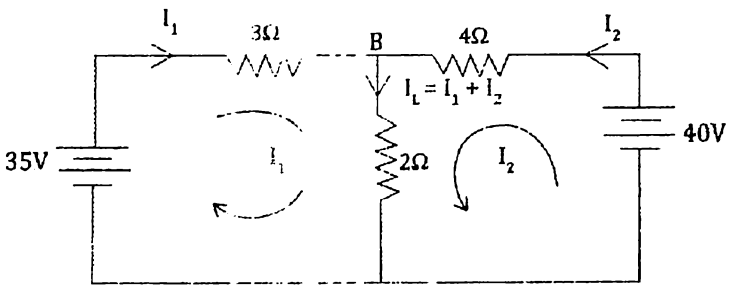
(10 × 5 = 50 marks)

Turn over

Part B

Answer any **five** *questions.*

II. 1 Calculate the value of : (i) Load Current and Current supplied by the Battery ; (ii) Voltage at the Load Current ; (iii) Power developed by the Load.



Or

2 A Series RLC Series Circuit has R = 10 Ω , L = 10 mH and C = 1MF has an applied voltage is 200V at resonant frequency. Find the : (i) Resonant Frequency ; (ii) Current in the circuit ; (iii) Voltage acrors the elements at resonance ; (iv) Quality factor ; (v) Bandwidth.

3 i) Explain the advantages of polyphase system over single phase system.

ii) A balanced 3-phase, 3-wire 50 Hz, 100 V supply is given to a load consisting of three impedances (1 + j1), (1 +j2), (3 + j4) ohms connected in star. Compute the line and phase voltages and also currents.

Or

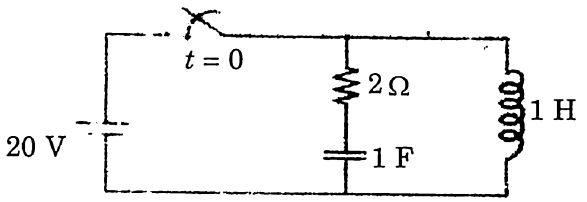
4 A balanced Star connected load of (4 + j3) Ohm/Phase is connected to a 3-Phase, 230 V, 50 Hz Supply. Find (i) Line Current ; (ii) Power Factor ; (iii) Reactive volt Amperes ; (iv) Power in VA.

5 A three-phase, three-wire, ABC system, with line voltage VBC = 311.1 < 00 V has line currents 1A = 61.5 < 116.60 A, IB = 61.2 < –480 A and 1C = 16.1 < 2180 Amp. Find the readings of watt meters in lines : i) A and B, ii) B and C, and iii) A and C

Or

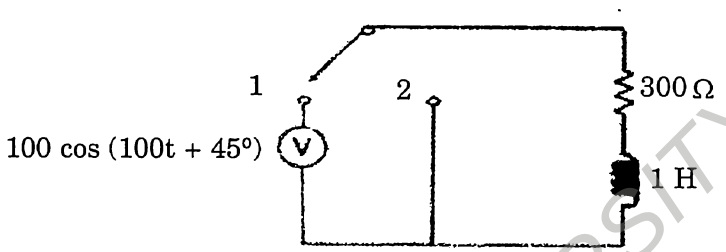
6 Explain the following methods for the Three Phase Power Measurement Methods (i) Three Watt meter Method (ii) Two Wattmeter Method.

7 For the circuit shown in Fig, determine the current delivered by the source when the switch is closed at $t = 0$, using Laplace transformation. Assume there is no initial charge on the capacitor and no initial current though the inductor.

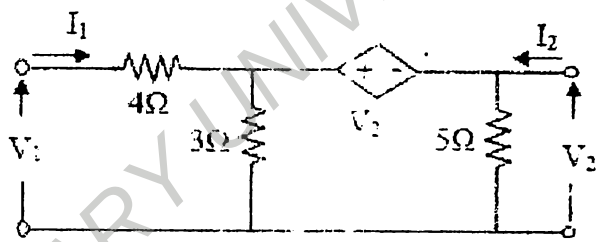


Or

8 For RL circuit shown in Fig. is operating in the sinusoidal steady state with the switch in position 1. The switch is moved to position 2. When the voltage source is $v = 100 \cos(100t + 45°)$. Obtain the expression for current.



9 Find Y and Z parameters of the network shown.



Or

10 Currents I_1 and I_2 entering at port 1 and port 2 respectively of a two-port network are given by $I_1 = 0.5V1 - 0.2\ V2$; $I_2 = -2V1 + V2$

Find Y, Z and ABCD parameters. From Y parameters, check whether the network is reciprocal and symmetrical.

(5 × 10 = 50 marks)

D 93669 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2020

Electronics and Communication Engineering

EC 19 305—ELECTRONIC DEVICES

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Draw and explain the energy band diagram of an N type semiconductor at 0°K and at room temperature.
2. Draw and explain the variation of majority carrier concentration with temperature in extrinsic semiconductor.
3. A Ge sample is doped with 10^{17} Boron atoms per cm^3. Determine the carrier concentration and Fermi level position at room temperature, n_i for Ge = 2.5×10^{13} cm^{-3} at room temperature.
4. Differentiate between Zener and avalanche breakdown.
5. What are tunnel diodes ? Explain their V-I characteristics.
6. What are varactor diodes ?
7. Explain base width modulation.
8. Explain Kirk effect.
9. Define a) Injection efficiency ; and b) Base transport factor. What is the relation between α and β ?
10. Compare BJT and FET.
11. Define a) Pinch off voltage ; and b) Drain resistance.
12. Explain the small signal model of an enhancement MOSFET.
13. What are power MOSFETs ? Explain with suitable diagram.
14. What are Photodiodes ? Explain their V-I characteristics.
15. List the advantages of LED.

(10 × 5 = 50 marks)

Turn over

Part B

Answer any **five** *questions from each section.*
Each question carries 10 *marks.*

16 a) What is Mobility ? Explain the variation of mobility with temperature and doping.

Or

b) State and derive Einstein relations.

17 a) Derive the ideal diode equation.

Or

b) Explain the working of metal semiconductor junction with V-I characteristics.

18 a) Draw and explain the hybrid π model of common emitter BJT.

Or

b) Explain the main regions of operation and minority carrier distribution in a BJT.

19 a) Draw the structure of an *n*-channel JFET. Briefly explain the principle of operation. Draw and explain the drain characteristics.

Or

b) Draw the structure and explain the operation of an *n*-channel enhancement MOSFET. Also explain the transfer characteristics.

20 a) Explain the working principle of LED. Explain the V-I characteristics.

Or

b) What are IGBTs ? Draw the structure and explain the operation of IGBT using equivalent circuit.

(5 × 10 = 50 marks)

D 93668 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2020

Electronics and Communication Engineering

EC 19 304—DIGITAL ELECTRONICS

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Using Boolean logic, Prove

   $A(\bar{A}+B)=AB.$

2. Realize the following using logic gates

   $F = AB + CD + \bar{A}B + BC$

3. Draw the logic diagram for a single bit full adder
4. Multiply the following binary numbers

   1001 and 1101

5. Give the BCD representation of 832.17.
6. Explain the operation of a 1 to 4 demultiplexer.
7. With a truth table, explain the function of JK Flip Flop.
8. What are registers ? Draw the schematic of a 4-bit register.
9. What are the properties of a 4bit Universal Shift register ?
10. Explain the basic rules for the design of a sequence detector.
11. Differentiate between combination circuit and sequential circuit.
12. How do you implement a sequential circuit using ROMs and PLAs ?
13. Draw the transfer characteristics of a TTL NAND gate.
14. What is refreshing ? In which type of memory IC it is used.
15. Explain the role of FPGA in Digital System Design.

(10 × 5 = 50 marks)

Turn over

Part B

Answer **one** *full question from each section.*
Each question carries 10 *marks.*

16. (a) Simplify the Boolean expression

$$ABCD + \bar{A}\bar{B}CD + A\bar{B}\bar{C}D + AB\bar{C}\bar{D}$$

Or

(b) Simplify the function using K-map

F (A, B, C, D) = (0, 1, 3, 4, 15, 16)

17. (a) What is ASCII code ? Provide ASCII code for A, C, E, F.

Or

(b) How do you design a full adder using multiplexers ? Explain.

18. (a) Explain the design Process of a 4-bit asynchronous counters.

Or

(b) Draw the block schematic of an up/down counter.

19. (a) Explain the basic rules involved in the design of State Machine Chart with an example.

Or

(b) What are synchronous sequential circuits ? Draw the timing diagram of 3-bit synchronous counters.

20. (a) Draw the circuit diagram of a CMOS inverter and explain its working.

Or

(b) Write a short note on the applications of PLAs.

(5 × 10 = 50 marks)

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2020

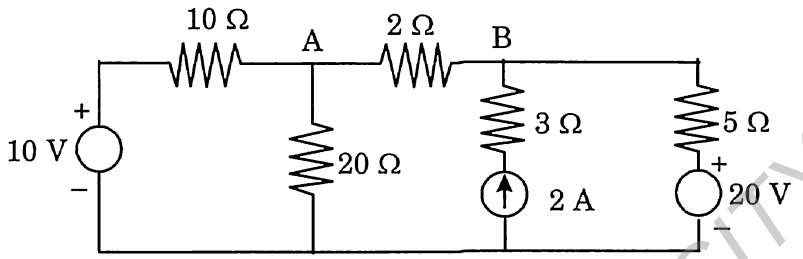
Electronics and Communication Engineering

EC 19 303—NETWORK THEORY

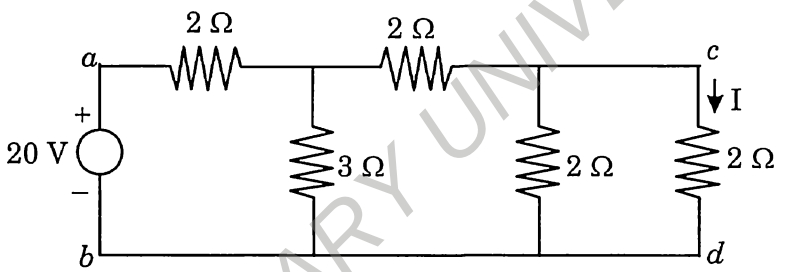
Time : Three Hours Maximum : 100 Marks

Part A

Answer any 10 *questions.*
Each question carries 5 *marks.*

1. 

Find the voltage across 2Ω resistor using Superposition Theorem.

2. 

Verify reciprocity theorem for the network shown above.

3. Define tree, co-tree, twig, link, and incidence matrix taking a suitable example.

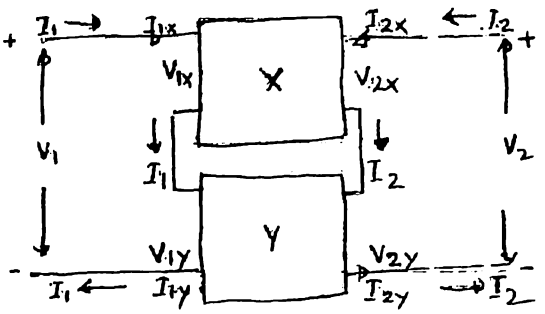
4. Derive the step response of a RC circuit.

5. State and explain Initial Value theorem. Illustrate with an example.

6. Determine the inverse Laplace transform of the function, $F(s) = \frac{s-3}{s^2+4s+13}$.

7. List the properties of Driving Point Functions.

8. Draw the pole-zero diagram for the function $I(s) = \frac{3s}{(s+1)(s+3)}$.

9. 

Derive the describing equations of the following interconnection in terms of the Z-parameters of the component 2-port networks.

10. With relevant diagrams, give the classification of filters based on frequency response.

11. Design a low-pass filter (both p and T-sections) having a cut-off frequency of 2 kHz to operate with a terminated load resistance of 500 Ω.

12. Design a T-pad attenuator to give an attenuation of 60 dB and to work in a line of 500 Ω impedance.

13. List the properties of LC Admittance Functions.

14. Show that the polynomial $P(s) = s^4 + s^3 + 6s^2 + 3s + 4$ is Hurwitz.

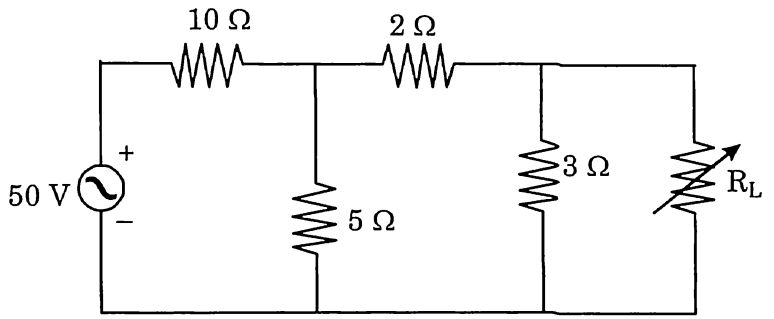
15. List the properties of a Hurwitz polynomial.

(10 × 5 = 50 marks)

Part E

Answer **one** *full question from each Section.*
Each question carries 10 *marks.*

16. a)



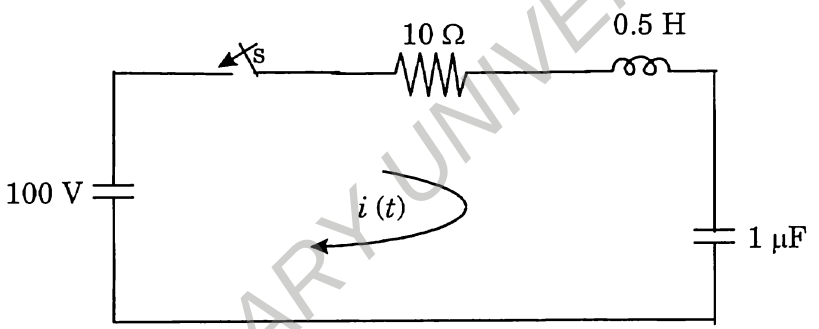
Obtain Thevenin's equivalent circuit for the network shown. Find R_L for maximum power transfer from the source and compute maximum power that can be transferred, i.e. P_{max}.

Or

b) i) State and explain Millman's theorem with an example. (5 marks)

ii) What are the different types of sources ? Give the circuit symbol for each. (5 marks)

17. (a)



Obtain the expression for the current using time domain analysis. Assume that the circuit is relaxed initially.

Or

b) Derive the Laplace Transform for the following signals :

(i) $f(t) = u(t)$.

(ii) $f(t) = e^{-at}$.

(iii) $f(t) = \cos(\omega t)$.

(iv) $f(t) = t^n$.

18. a) The impedance parameters of a two-port network are $Z_{11} = 6\ \Omega$; $Z_{22} = 4\ \Omega$; $Z_{12} = Z_{21} = 3\ \Omega$. Compute the Y-parameters and ABCD- parameters and write the describing equations.

Or

b) For the given network function, draw the pole zero diagram and hence, obtain the time-domain response $i(t)$.

$$I(s) = \frac{5s}{(s+1)(s^2+4s+8)}.$$

19. a) Design a m-derived low-pass filter having cut-off frequency of 1 kHz, design impedance of 400 V, and the resonant frequency of 1100 Hz.

Or

b) With proper examples, explain what is Frequency Transformation.

20. a) With proper examples explain about the following :

i) Causality of a system ; and

ii) Stability of a system.

Or

b) Realise the network function $Y(s) = \frac{s^2+1}{2s(s^2+4)}$.

(5 × 10 = 50 marks)

D 93666 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2020

Electronics and Communication Engineering

EC 19 302—ELECTRONIC CIRCUITS

Time : Three Hours Maximum : 100 Marks

Part A

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

1. List the benefits of h-parameter.
2. Differentiate between linear and switching regulator.
3. Draw the circuit of zener shunt regulator and explain.
4. Draw the circuit of universal FET amplifier.
5. Obtain the expression for input resistance of CG amplifier.
6. Compare the performance of CS and CD amplifier.
7. How low pass RC circuit be used as an integrator ?
8. Discuss on the classification of multivibrators.
9. List the uses of Schmitt trigger.
10. Discuss the effect of bandwidth on feedback.
11. Compare RC Wien bridge and RC phase shift oscillator.
12. Draw the electrical equivalent circuit of piezoelectric crystal.
13. Draw complementary Darlington transistor and explain.
14. What is class D amplifier ? Explain.
15. Briefly explain why dominant pole high frequency compensation method used in amplifiers.

(10 × 5 = 50 marks)

Part B

Answer **one** *question from each module.*
Each question carries 10 *marks.*

MODULE I

16. a) Draw the circuit of series voltage regulator and explain. Derive an expression for voltage regulation factor.

Or

b) Draw the *h* parameter equivalent circuit of BJT in CB configuration.

MODULE II

17. a) Analyse a CS amplifier and obtain an expression for voltage gain.

Or

b) Draw the FET amplifier circuit and discuss the functions of each components.

MODULE III

18. a) Design collector coupled astable multivibrator for a period of oscillation of 1ms. Assume Vcc = 5V.

Or

b) With relevant waveform, explain the working of a Schmitt trigger.

MODULE IV

19. a) Discuss the effect of negative feedback on the performance of an amplifier.

Or

b) Draw the circuit of BJT Wien bridge oscillator and derive the expression for its frequency of oscillation.

MODULE V

20. a) For a class B pushpull amplifier, derive an expression for conversion efficiency and figure of merit.

Or

b) What is neutralization ? Why neutralization is done ? How it is provided ?

(5 × 10 = 50 marks)

D 93665-A (Pages : 3) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2020

EN 19 302—DISCRETE COMPUTATIONAL STRUCTURE

Time : Three Hours Maximum : 100 Marks

Part A

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

1. State the properties of Binary Operations.
2. How many rows are needed in the truth table of given statement :

   a) $p \urcorner p$; and b) $\left(p \wedge \urcorner r\right)$.

3. Prove $\left[(A \to B) \wedge A\right] \to B\left[(A \to B) \wedge A\right] \to B$ is a tautology.
4. Explain Quantifiers and its types
5. Show $(Z+,/)$ is a POSET.
6. Write an order of an element. Give example.
7. Prove that $\left(\urcorner p \wedge p\right) \wedge q$ is a contradiction.
8. Obtain PCNF of $P \to \left(P \wedge (Q \to P)\right)$.
9. $1.2^0 + 2.2^1 + 3.2^2 + \ldots\ldots\ldots\ldots n.2^{n-1} = (n-1)\,2^n + 1$ for all positive integers.
10. Every cyclic group is Abelian. Explain.
11. Prove that every element of Sn $(n > 1)$ can be written as a product of elements of the form $(1k)$.
12. Any right cosets of H in G are eithe disjoint or identical. Justify.
13. Show that monoid homomorphism preserves the property of invertability.

14 Define Subgroup. Give Example.

15 Explain the ring with zero and without zero divisor.

(10 × 5 = 50 marks)

Part B

Answer **one** *full section from each question.*
Each question carries 10 *marks.*

16. a) i) Using Indirect method, prove that $P \to R, Q \to S, P \vee Q \Rightarrow S \vee R$.

ii) What is the direct proof of the above ? Illustrate.

Or

b) $(\neg p \to R) \wedge (Q \leftrightarrow P)$. Obtain PCNF and PDNF. Show by using Laws of Propositions.

17. a) Let be given finite set and P (A) its power set. Let $\leq$ be the inclusion relation on the elements of $P(A)$. Draw hasse diagram of $(P(A), \leq)$ for :

(a) $A = \{a\}$; (b) $A = \{a\}$; and (c) $A = \{a, b, c\}$.

Or

b) Draw Hasse diagram for $(D\,12, /)$.

18. a) State and explain Lagrange's Theorem.

Or

b) i) Let $G = (1, -1, i, -i)$ is a group under multiplication and $H = (1, -1)$ is a subgroup of G. Give left coset. (5 marks)

ii) If G is a finite group of order n, then $a^n = e$ for any a £ G. (5 marks)

19. a) What is necessary and sufficient conditions of subgroup ?

Or

b) Let (G, A) and (G', 0) be two groups. Let $f : G \to G'$ be a homomorphism of groups with kernel K. Then G/K is isomorphic to $f(G) \leq G'$.

20. a) Prove that the set $Z_4 = (0, 1, 2, 3, 4)$ is a commutative ring with respect to the binary operation t_4 and X_4.

Or

b) i) The Kernels of Homomorphism from a group of $(G, *)$ to $(G', *)$ is a subgroup of G. Justify. (5 marks)

ii) State Cayley's Theorem. (5 marks)

[5 × 10 = 50 marks]

D 93665 (Pages : 3) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

EN 19 301—ENGINEERING MATHEMATICS – III

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Let $H = \{(a+3b, a-b, 2a-b, 4b)^T : a,b \in R\}$. Show that H is a subspace of R^4.

2. Prove that $(1,3,4,2), (3,-5,2,2)$ and $(2,-1,3,2)$ in R^4 are linearly dependent over R.

3. Find the orthogonal complement of the plane spanned by the vectors $(1,1,2)$ and $(1,2,3)$.

4. Find the Fourier transform of :

$$f(x) = \begin{cases} e^{2ix}, -1 < x < 1 \\ 0 \quad , \text{otherwise.} \end{cases}$$

5. Find the Fourier cosine transform of :

$$f(x) = \begin{cases} \sin x \text{ in } 0 < x < \pi \\ 0 \qquad \text{otherwise.} \end{cases}$$

6. Find the Fourier sine transform of :

$$f(x) = \begin{cases} x^2 \quad \text{if } 0 < x < 1 \\ 0 \qquad \text{if } x > 1. \end{cases}$$

7. Find the Laplace transform of $te^{-t}\cos 2t$.

8. Find the inverse Laplace transform of $\dfrac{2}{s^2 + \dfrac{s}{3}}$.

9. Find $L^{-1}\left(\log\left(\dfrac{s+a}{s-b}\right)\right)$.

10. Prove that $J_{-n}(x) = (-1)^n J_n(x)$ where n is a positive integer.

11. Prove that $xJ_n' - nJ_n + xJ_{n-1}$.

12. Show that $\frac{d}{dx}\left(x^{-n}J_n(x)\right) = -x^{-n}J_{n+1}(x)$.

13. Solve $z^2\left(p^2+q^2+1\right) = c^2$.

14. Solve the pde $p^2y\left(1+x^2\right) = qx^2$.

15. Solve the pde $x^2(y-z)p + y^2(z-x)q = z^2(x-y)$.

(10 × 5 = 50 marks)

Part B

Answer **one** *full section of each questions.*
Each question carries 10 *marks.*

16. (a) Show that $\mathcal{B}_1 = \{(1,1,1),(0,2,3),(0,2,-1)\}$ and $\mathcal{B}_2 = \{(1,1,0),(1,-1,0),(0,0,1)\}$ are two bases of R^3. Find the co-ordinate vector of $v = (3,5,-2)$ relative to $\mathcal{B}_1$ and $\mathcal{B}_2$.

Or

(b) Find an orthonormal basis for R^3 from $(1,0,1),(1,0,0),(2,1,0)$ by Gram–Schmidt process.

17. (a) Find the Fourier sine and cosine integral representation of $f(x) = \begin{cases} 1-x^2, 0 < x < 1 \\ 0 \quad , \quad x > 1. \end{cases}$

Or

(b) Using Fourier integral representation show that :

$$\int_0^\infty \frac{\cos wx + w\sin wx}{1+w^2}\,dw = \begin{cases} 0 & \text{if } x < 0 \\ \frac{\pi}{2} & \text{if } x = 0 \\ \pi e^{-x} & \text{if } x > 0. \end{cases}$$

18. (a) Solve $y'' - 3y' + 2y = 4t - 8, y(0) = 2, y'(0) = 7$.

Or

(b) Find Laplace transform of :

(i) $\frac{\cos 2t - \cos 3t}{t}$.

(ii) $t^2 \cos(3t - 5)$.

19. (a) Solve in series the equation $\frac{d^2y}{dx^2} + x^2 y = 0$ by Frobenius method.

Or

(b) Solve in series the equation :

$$2x^2 \frac{d^2y}{dx^2} + \left(2x^2 - x\right)\frac{dy}{dx} + y = 0.$$

20. (a) Derive the one dimensional heat equation.

Or

(b) Solve the one dimensional wave equation by the method of separation of variables.

(5 × 10 = 50 marks)

D 92082 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Printing Technology

PT 14 306—NON-IMPACT PRINTING

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions out of ten.*
Each question carries 5 *marks.*

1. What are the features of commercial Digital Printing Systems ? Explain.
2. Write the merits and demerits of physical storage systems and cloud storage systems.
3. Explain the difference between Visualization and Prototyping.
4. Write about the advanced features available in digital colour press- Indigo E-print.
5. Explain the evolution from photo type setting to Direct Imaging Technology.
6. Explain the working and evaluate the merits and demerits of Automatic plate changing equipment.
7. Explain the importance of paperless publishing.
8. What are the latest techniques of selling through electronic media ? Explain.
9. Discuss the features of inks utilized in Thermography.
10. What are the merits and demerits of Dot Matrix Printer ? Explain.

(8 × 5 = 40 marks)

Part B

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

11. With example, discuss in detail the difference impact and non-impact printing process.

Or

12. What is the technical differences in digital and conventional printing process ? Explain.
13. Write about Electrophotography- advantages, Technology and design.

Or

14. Explain the different types of paper utilized for high quality inkjet printing.

15. How is CTF different from CTP explain in detail ?

Or

16. Explain the basic imaging principle of Image carriers in Digital Printing.

17. Explain the cultural and social impact of electronic publishing.

Or

18. With a neat diagram, explain the direct imaging of offset plate using LASER technology.

(4 × 15 = 60 marks)

D 92081 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Printing Technology

PT 14 305—PRINTING INK AND COLOR THEORY

Time : Three Hours Maximum : 100 Mar

Part A

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

1. Discuss the ways in which electromagnetic radiation can interact with matter.
2. Write notes on human color vision.
3. What are the factors to be considered while selecting a colorant ?
4. Discuss the features of waxes used as additive in printing ink.
5. Compare wetting agents and stiffening agents.
6. Write notes on water-based inks.
7. Discuss possible causes and remedies for hickeys and picking in printing.
8. Compare UV and EB curing inks.
9. Discuss five features of security printing inks.
10. Describe working properties of an ink with examples.

(8 × 5 = 40 mark

Part B

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

11. Write notes on the following :

    i) Sensation of color. ii) Color temperature.

    iii) Color attributes.

Or

12. A) With neat diagram, explain the function and structure of a human eye. (10 mark

    B) Explain color triangles and color circles. (5 mark

Turn ov

13. Discuss the features and applications of various inorganic pigments used in printing inks.

Or

14. Discuss the features and applications of various resins and solvents used in printing inks.

15. A) With neat diagram, explain the working of bead mill. (8 marks)

B) Explain the mechanism of absorption drying. (7 marks)

Or

16. With the help of a flow chart, explain the process of manufacturing paste ink.

17. Describe, explain the significance and testing procedure for the following printing ink properties ;

i) Wet ink film thickness. ii) Flash point.

iii) Light fastness.

Or

18. A) Discuss various printing problems that can occur due to improper pigment grinding in each printing process.

(10 marks)

B) Explain the working of Duke tester used to evaluate the emulsification of an offset ink.

(5 marks)

[4 × 15 = 60 marks]

D 92080 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Printing Technology

PT 14 304—PRINTING SUBSTRATES

Time : Three Hours Maximum : 100 Marks

Part A

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

1. What are the features required by fibres to be used for paper manufacturing ?
2. Discuss different ways and levels of sizing.
3. What are the various purposes of paper coating ?
4. What is the importance of paper recycling ?
5. Give an account of bleaching agents used for paper recycling process.
6. Explain the significance and testing procedure for dimensional stability of a paper.
7. Explain the purpose and working of compression testers.
8. With neat diagram, explain the process of wet lamination.
9. Discuss various properties of glass.
10. Write notes on black plate.

(8 × 5 = 40 marks)

Part B

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

11. A) Discuss the 4 types of non-woody fibres used for paper manufacturing. (5 marks)

    B) Discuss the features, advantages and disadvantages of fillers. (5 marks)

    C) With neat diagram, explain blade coating method of paper. (5 marks)

Or

12. Explain various stages of pulping.

Turn over

13. Explain the process of paper recycling with neat diagram.

Or

14. With neat diagrams, explain the 4 methods of fibre preparation.

15. Define, explain the significance and testing procedures for the following paper properties ;

    i) Brightness.

    ii) Color.

    iii) Gloss.

Or

16. Define, explain the significance and testing procedures for the following paper properties ;

    i) Tearing strength.

    ii) Tensile strength.

    iii) Folding endurance.

17. Discuss the properties and applications of various plastic substrates used for printing.

Or

18. Discuss the properties and applications of various metallic substrates used for printing.

[4 × 15 = 60 marks]

D 92079 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Printing Technology

PT 14 303—GRAPHIC REPRODUCTION

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Describe the types of originals used in graphic reproduction with examples.
2. Describe the type of cameras used for graphic arts.
3. What are positive and negative films ? How are they produced ? Explain.
4. Explain the cross section of the aluminum and plastic plate.
5. Explain the principle of relief and recess printing.
6. What do you mean by multimetal plate ? Brief.
7. Describe focal length of lens and lens aberration.
8. Explain the selection of metals for image and non-image areas using contact angle test.
9. Explain the process of Aluminum anodizing.
10. What are the materials used for litho plates ? Explain.

(8 × 5 = 40 marks)

Part B

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

11. Describe with a flow block diagram the structure of a medium size printing industry. Explain the responsibility and functions of each department.

Or

12. Explain the process of offset lithography and screen printing process with neat diagrams. List the advantage and disadvantages of each process.

13. With a neat diagram explain the working of a vertical gallery camera. Describe the functions of each part. Explain the process of making a magnified film negative using the vertical gallery camera.

Or

14. Explain the physical structure of a light sensitive film. Describe the principle of working of manual and automatic film processing with neat diagrams.

15. Define layout. Explain the factors to be considered when preparing the layout.

Or

16. Explain the three types of light sensitive coatings used in plate making.

17. Explain the procedure for preparing additive PS plates, subtractive PS plates and Diographic plates.

Or

18. What is graining ? What are the different methods of graining the litho plates ? Explain each of them.

(4 × 15 = 60 marks)

D 92077 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Biomedical Engineering

BM 14 306—ANALOG ELECTRONICS

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Draw and explain the *h*-parameter model of a BJT.
2. Describe the general characteristics of amplifiers.
3. Explain FET biasing.
4. What is a negative feedback ? State its advantages.
5. Write short notes on oscillators.
6. State the characteristics of an ideal operational amplifier.
7. Write a note on MOSFET.
8. Explain about BJT.
9. Write short notes on CMRR.
10. What is Linear wave shaping ?

(8 × 5 = 40 marks)

Part B

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

11. (i) State the advantages and disadvantages of various transistor biasing methods. (8 marks)

    (ii) Draw the emitter follower circuit and explain its operation. (7 marks)

Or

12. (i) For a common-source amplifier, obtain a small signal model and derive its current gain, voltage gain, input impedance, and output impedance. (8 marks)

    (ii) Explain the concept of load line of a diode circuit. Explain the procedure for drawing the load line. (7 marks)

Turn over

13. (i) Stating the Bark hausen's criterion, explain the working of an oscillator. How a transistor amplifier can be converted as oscillator. (8 marks)

(ii) With a circuit diagram and wave form explain the operation of an op-amp integrator. What is the condition to be satisfied to get satisfactory integrator operation. (7 marks)

Or

14. (i) Explain the principles of feedback in amplifiers.

(ii) Explain two practical circuits in which feedback is employed.

(iii) Compare the affect of positive feedback on the characteristics of a circuit.

(5 + 5 + 5 = 15 marks)

15. (i) Explain the operation and characteristics of *n*-channel MOSFET. (8 marks)

(ii) Explain the difference between MOSFET and JFET. (7 marks)

Or

16. Write in detail about Thyristors and its characteristics and SCR characteristics.

17. Explain the basic operation of bistable, monostable and astable multivibrators.

Or

18. Explain in detail the followings :

(i) The operation of Schmitt trigger circuit.

(ii) Transistor as a switch-application logic inverter.

[4 × 15 = 60 marks]

D 92076 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Biomedical Engineering

BM 14 303—ELECTRICAL TECHNOLOGY

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Derive the E.M.F. equation of a D.C. generator.
2. Describe the construction of armature field and commutator of a D.C. machine.
3. Explain the effect of variation in load on the magnitude of flux in the core of single-phase transformer.
4. List out the advantage of V/*f* control as applied to a synchronous motor.
5. A three-phase 250 kVA, 3300 V, star connected alternator has a stator resistance of 0.05 ohm per phase and a synchronous reactance of 10 ohms per phase. Find the regulation at full-load at 0.8 p.f. lagging.
6. Explain the principle of transformer. Discuss its construction and working.
7. What is phasor diagram ? Explain with its significance.
8. Explain the advantages of RF transformer.
9. Explain the methods of breaking used in induction motor.
10. Explain the construction and operation of stepper motor.

(8 × 5 = 40 marks)

Part B

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

11. Explain the shunt, series and compound motors.

Or

12. Explain the different types and applications of D.C. motors.

Turn over

13. Explain in detail about alternators, construction and classification.

Or

14. Explain the principle of operation, starting of synchronous motor with applications.

15. Explain different types and applications of transformers.

Or

16. Write a note on (i) Auto transformer ; and (ii) Audio transformer.

17. Explain the double field revolving theory for operation of single-phase induction motor.

Or

18. Explain the types and applications of single-phase induction motors.

(4 × 15 = 60 marks)

D 92075 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Civil Engineering

CE 14 306—ENGINEERING GEOLOGY

Time : Three Hours Maximum : 100 Marks

Part A

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

1 Explain the causative factors of landslides.

2 State the characteristics of strong ground motion in earthquake.

3 What are the measures for the protection of life and property ?

4 Give the mega scopic characteristics of mica.

5 Discuss on rocks as construction materials.

6 Classify folds and state its significance.

7 With a neat sk[redacted] any two aquifers.

8 State the [redacted]

9 Give the role of remote sensing in civil engineering.

10 Discuss stand-up-time in tunnelling.

(8 × 5 = 40 marks)

Part B

II. Answer *all* questions :

11 Explain internal composition of the Earth with emphasis on upper mantle.

Or

12 Describe in detail about the weathering of rocks.

13 What is coalification ? Describe the types of coal and its properties.

Or

14 How are rocks classified ? Describe the distinguishing properties of major rock types.

Turn over

15 Describe joint sand unconformities in geological structures.

Or

16 Describe the gravimetric method of investigation for ground water exploration.

17 Using case study give a detailed account on the applications of remote sensing in civil engineering.

Or

18 Explain the various structural constraints to be taken into account during the construction of multi-storied building.

(4 × 15 = 60 marks)

D 92074 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Civil Engineering

CE 14 305—SURVEYING–I

Time : Three Hours Maximum : 100 Marks

Part A

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

1 What is a well conditioned triangle ? Why is it necessary to use well-conditioned triangles ?

2 Draw and explain the working of the following : optical square and cross staff.

3 Differentiate dip and declination with the significance of each.

4 Define the following: level surface, benchmark, bubbie line, reduced line, back sight.

5 Discuss the methods of contouring with its applications.

6 Summarize the uses of planimeter in area calculation.

7 Demonstrate the adjustments of hand level.

8 Describe about the instrumental error in theodolite work.

9 Illustrate the following elements of simple curve : (a) Length of curve ; (b) Mid ordinate.

10 What is meant by shift of a curve ? Derive the expression for the same.

(8 × 5 = 40 marks)

Part B

II. Answer *all* questions :

11 What are the factors should be considered in deciding the stations of a chain survey ? Differentiate between a gunter's chain and an engineer's chain. State relative advantages of each.

Or

12 Describe the adjustments made in prismatic compass and surveyor's compass.

13 Explain how the procedure of reciprocal levelling eliminates the effect of atmospheric refraction and earth's curvature as well as the effect of in adjustment of the line of collimation.

Or

14 Describe the following methods of plane table surveying: radiation, intersection, traversing and resection with the help of neat sketch.

15 Demonstrate the following methods of calculating areas : average ordinate rule, trapezoidal rule, and simpons's rule of. Also calculate the area enclosed between the survey line, the irregular boundary line and the first and last offsets, using the above methods. The following perpendicular offsets were taken at 10 m intervals from a survey line to an irregular boundary line : 3.25, 5.60, 4.20, 6.65, 8.75, 6.20, 3.25, 4.20, 5.65.

Or

16 Illustrate the four general cases of omitted measurements with the help of neat sketch.

17 Explain the step by step procedure of setting out of compound curve.

Or

18 Illustrate the various methods for determining the length of a transition curve with the help of neat sketch.

(4 × 15 = 60 marks)

D 92073 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Civil Engineering

CE 14 304—BUILDING TECHNOLOGY–I

Time : Three Hours Maximum : 100 Marks

Part A

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

1 Discuss the properties of lime in detail.

2 State the significance of steel used in construction industry.

3 Draw the flowchart to explain the clay brick manufacturing process.

4 Discuss briefly the following : (a) segregation ; (b) bleeding.

5 Describe the stress strain behaviour of concrete with the help of graph.

6 Enumerate the limitations of masonry construction.

7 State the significance of scaffoldings during construction process.

8 Differentiate painting and pointing.

9 Discuss the functional requirements of buildings.

10 Demonstrate the NBC rules for structural elements in public buildings.

(8 × 5 = 40 marks)

Part B

II. Answer *all* questions :

11 Describe the mortar types with its properties and applications in detail.

Or

12 Explain the following quality tests conducted in Stones : a) crushing strength ; b) water absorption.

13 With the help of neat sketch discuss the following tests on workability of concrete : a) Vee-bee consistometer ; b) Compacting factor.

Or

14 Demonstrate how alkali aggregate reaction occurs in the concrete structures with the help of neat sketch. Also write the step by step procedure of concrete mix design as per IS 10262 : 2019.

Turn over

15 Explain the shallow and deep foundation in detail with the help of neat sketch.

Or

16 Explain the constructional details of stairs such as types, layout and planning and illustrate the significance of distempering.

17 How buildings are classified based on occupancy as per National building code ? Explain in detail.

Or

18 Demonstrate with the help of neat sketch the process of circulation and ventilation residential buildings.

(4 × 15 = 60 marks)

D 92072 (Pages : 3) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Civil Engineering

CE 14 303—MECHANICS OF SOLIDS

Time : Three Hours Maximum : 100 Marks

Part A

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

1 Describe the stress-strain curve for mild-steel.

2 Calculate the force required for punching a hole of 10 mm diameter through a mild-steel plate 4 mm thick. Take maximum shear strength of mild-steel as 320 N/mm^2. Also find the compressive stress on the punch.

3 A metal bar 40 mm × 40 mm section is subjected to an axial compressive load of 480 Kn. The contraction of a 200 mm gauge length is found to be 0.4 mm and the increase in thickness of 0.04 mm. Find the value of Young's modulus and Poisson's ratio.

4 Draw the bending moment and shear force diagram of a cantilever beam AB 4 m long having its fixed end at A and loaded with a uniformly disturbed load of 1 kN/m up to 2 m from B with a concentrated load of 2 kN at 1 metre from A.

5 Enumerate the different types of loading with the help of neat sketch.

6 A floor has to carry a load f 5000 N/sq.m. It is supported by joists 15 cm × 30 cm over a span of 5 m. How far apart may the joists be placed so that the bending stress does not exceed 8 N/mm^2 ?

7 A hollow shaft of diameter ratio 3/5 is required to transmit 590 kW at 110 r.p.m., the maximum torque being 20% greater than the mean. The shear stress is not exceeding 63 MPa and the twist in a length of 3m is not exceeding 1.4°. Calculate the minimum external diameter satisfying these conditions.

8 A close-coiled helical spring is to have a stiffness of 1 kN/m of compression under a maximum load of 45 N and a maximum shearing stress 126 MPa. The solid length of the spring is to be 4.5 cm. Find the diameter of the wire, the mean diameter of the coil required, modulus of rigidity G = 42 GPa.

9 State the limitations of Euler's formula with an example.

10 A rectangular column of 240 mm × 150 mm is subjected to a vertical load of 10 kN placed at an eccentricity of 60 mm in a plane bisecting 150 mm side. Determine stress intensities in the section.

(8 × 5 = 40 marks)

Turn over

Part B

II. Answer *all* questions :

11. (i) A steel tube of 4.5 cm external diameter and 3 mm thickness encloses centrally a solid copper bar of 3 cm diameter. The bar and the tube are rigidly connected together at the ends at a temperature of 30°C. Find the stress in each metal when heated to 180°C. Also find the increase in length if the original length of the assembly is 30 cm. Take $\alpha_s = 1.08 \times 10^{-5}/°C$, $\alpha_c = 1.7 \times 10^{-5}/°C$, $E_s = 210$ GPa, $E_c = 110$ GPa. (10 marks)

(ii) A short timber post of rectangular section has one side of the section twice the other. When the post is loaded with 150 kN, it contracts by 0.012 mm per unit (mm) length of the post. If E for timber is 1.4×10^4 N/mm^2, calculate the sectional dimensions of the post.

(5 marks)

Or

12. A steel bar is placed between two copper bars each having the same area and length as the steel bar at 15°C. At this stage they are rigidly connected together at both the ends. When the temperature is raised to 315°C, the length of the bars increases by 0.15 cm. Determine the original length and the final stresses in the bars. Take Es = 210 GPa, Ec = 100 GPa, $\alpha_s = 12 \times 10^{-6}/°C$, $\alpha_c = 17.2 \times 10^{-6}/°C$.

13. A cantilever beam 5 m long carries concentrated loads of 30, 30 and 30 kN at distances of 1.5, 3 and 4.5 metres from the fixed end. In addition to this the beam carries a uniformly distributed load of 10 kN/m over the entire length of the beam. Draw the shear force and bending moment diagrams.

Or

14. (i) A beam 10 m long and simply supported at each end has a uniformly disturbed load of 20 kN/m extending from the left end to a point 4 m away. There is also a clockwise couple of 40 kN.m applied at the centre of the beam. Draw the shear force and bending moment diagrams for the beam and determine the value of maximum bending moment. Neglect the weight of the beam. (7.5 marks)

(ii) A cast iron T-beam has the following dimensions: overall depth = 160 mm, width of flange =150 mm, flange thickness = 40 mm, web thickness = 50 mm. The beam is simply supported over a span of 2.5 m placed in the inverted T-position (i.e. flange at the bottom). If the maximum allowable tensile stress in the flange and compressive stress in the web are limited to 20 N/mm^2 and 75 N/mm^2 respectively. Find the maximum central load that the beam can safely carry. (7.5 marks)

15. A solid shaft is to transmit 295 kW at 100 r.p.m. If the shear stress is not to exceed 80 MPa, find the diameter of the shaft. What percentage saving in weight would be obtained if this shaft is replaced by a hollow one whose internal diameter equals 0.6 of the external diameter, the length, material and maximum shear stress being the same.

Or

16. In an open coiled spring of 10 coils the stresses due to the bending and twisting are 100 MPa and 110 MPa respectively when the spring is loaded axially. Assuming the mean diameter of the coils to be eight times the wire diameter. Find the maximum permissible axial load and the wire diameter for a maximum extension of 1.8 cm. Take E = 200 GPa and G = 80 GPa.

17. A hollow circular column of length 5m, external diameter of 20 cm and internal diameter of 14 cm is fixed at both ends. It carries a load of 200 kN at an eccentricity of 1.5 cm from the axis of the column. Find the maximum stress developed. What should be the limiting eccentricity if tension is not to develop ? Take E = 95 GPa.

Or

18 A horizontal strut 3 m long, having pin joints at its ends, is of rectangular cross-section, 4 cm wide and 10 cm deep and carries an axial thrust of 100 kN together with a vertical load of 10 kN uniformly distributed. Estimate the maximum stress induced and find the percentage error if the additional bending moment caused by the eccentricity of the thrust were neglected. E = 210 GPa.

[4 × 15 = 60 marks]

D 92071 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Electrical and Electronics Engineering

EE 14 306—MECHANICAL ENGINEERING

Time : Three Hours Maximum : 100 Marks

Part I

Answer any **eight** *questions out of ten.*
Each question carries 5 *marks.*

1. Differentiate : a) Steady vs unsteady flow ; b) Compressible vs incompressible flow.
2. What is meant by capillarity ? Explain one engineering use of capillarity.
3. Explain the working of a draft tube.
4. Explain any two selection criteria of centrifugal pumps.
5. Describe any three boiler mountings with neat sketches.
6. Explain the assumptions of fuel air cycles.
7. Define : a) Specific heat ; b) Latent heat ; c) Thermal conductivity ; d) Radiation.
8. Derive an expression for the efficiency of Carnot cycle.
9. Differentiate between adiabatic, isothermal and hyperbolic processes.
10. Explain the Zeroth law of thermodynamics.

(8 × 5 = 40 marks)

Part II

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

I. a) A manometer is used to measure the pressure drop of flow of water through a pipe. The difference in level was found as 20 cm. If the manometer fluid is of density 1360 Kg/m^3 find the pressure drop. If the manometeric fluid is changed to another fluid of specific gravity 15.6, what will be the difference in the level ?

Or

b) A container of 0.1 m^3 of gas at a temperature of 20° C and a pressure of 1.5 bar is compressed to a pressure of 7.5 bar and acquires a volume of 0.04 m^3. Find the final temperature of the gas.

Turn over

D 92070 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Electrical and Electronics Engineering

EE 14 305—ANALOG ELECTRONICS

Time : Three Hours Maximum : 100 Marks

Part A

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

I. a) Derive the expressions for Idc, Vdc of HWR.

b) What is ripple factor ? Show that the ripple factor of a full-wave rectifier is 0.48.

c) A multistage amplifier employs 3 stages each of which has a power gain of 30. What is the total gain of the amplifier in dB ?

d) Draw and explain common source transfer curve for n-channel FET.

e) An amplifier has a gain of 2×10^5 without feedback. Determine the gain if negative voltage feedback is applied. Given : $\beta = 0.02$.

f) Explain the operation of transformer coupled class A amplifier with a circuit diagram.

g) State the characteristics of an ideal op-amp. In an inverting amplifier let RF = 100 KΩ, R_1 = 10 KΩ and V_1 = 1V calculate : i) Input current ii) Output Voltage iii) Closed loop gain.

h) It is desired to get an output using op-amp, given by the equation $Vo = 5(V_1 - V_2) + 3V_3$ design and draw the designed circuit.

i) What is meant by a PLL ? Define its capture range.

j) Draw the frequency response of a band pass filter and explain.

(8 × 5 = 40 marks)

Part B

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

II. (a) (i) A Zener diode has a breakdown voltage of 10 V. It is supplied from a voltage source varying between 20-40 V in series with a resistance of 820 Ω. Using an ideal Zener model, obtain the minimum and maximum Zener currents.

(10 marks)

(ii) Explain the terms line regulation and load regulation with respect to voltage regulator.

(5 marks)

Or

Turn over

(b) (i) Draw hybrid small signal model for a transistor in CE configuration. Define in words and also as a partial derivative (a) h_{ie} (b) h_{fe} (c) h_{re} (d) h_{oe}.

(10 marks)

(ii) Explain with neat sketches the working of a negative clamper. (5 marks)

III. (a) With neat diagram, explain the characteristics of an enhancement type MOSFET.

Or

(b) List the advantages of negative feedback in an amplifier. Explain the voltage series feedback amplifier. Show that the gain bandwidth product for a feedback amplifier is constant.

IV. (a) Explain how Op-Amp can be used as : i) Integrator ; ii) Inverting Summer ; and iii) Voltage Follower.

Or

(b) Draw the circuit and derive the expression for frequency of oscillations for RC phase shift Oscillator.

V. (a) Draw the neat circuit of first order Butterworth high pass filter and explain its design procedure.

Or

(b) (i) Draw and explain the functional block diagram of 555 timer. List its applications.

(10 marks)

(ii) Draw the circuit of Astable multivibrator using 555. (5 marks)

[4 × 15 = 60 marks]

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THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Electrical and Electronics Engineering

EE 14 306—MECHANICAL ENGINEERING

Time : Three Hours Maximum : 100 Marks

Part I

Answer any **eight** *questions out of ten.*
Each question carries 5 *marks.*

1. Differentiate : a) Steady vs unsteady flow ; b) Compressible vs incompressible flow.
2. What is meant by capillarity ? Explain one engineering use of capillarity.
3. Explain the working of a draft tube.
4. Explain any two selection criteria of centrifugal pumps.
5. Describe any three boiler mountings with neat sketches.
6. Explain the assumptions of fuel air cycles.
7. Define : a) Specific heat ; b) Latent heat ; c) Thermal conductivity ; d) Radiation.
8. Derive an expression for the efficiency of Carnot cycle.
9. Differentiate between adiabatic, isothermal and hyperbolic processes.
10. Explain the Zeroth law of thermodynamics.

(8 × 5 = 40 marks)

Part II

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

I. a) A manometer is used to measure the pressure drop of flow of water through a pipe. The difference in level was found as 20 cm. If the manometer fluid is of density 1360 Kg/m^3 find the pressure drop. If the manometeric fluid is changed to another fluid of specific gravity 15.6, what will be the difference in the level ?

Or

b) A container of 0.1 m^3 of gas at a temperature of 20° C and a pressure of 1.5 bar is compressed to a pressure of 7.5 bar and acquires a volume of 0.04 m^3. Find the final temperature of the gas.

Turn over

II. a) A Pelton wheel runs under a head of 480 m develops 120 KW. The runner speed is 1200 r.p.m. Calculate the specific speed. If the speed is changed to 1000 r.p.m. and the head is changed to 420 m, what is the power developed ?

Or

b) With a neat sketch explain the working of a centrifugal pump and describe the parts of the centrifugal pump

III. a) 0.1 m^3 of air at a pressure of 1.5 bar is expanded isothermally to 0.5 m^3. Calculate the final pressure of the gas and heat supplied during the process.

Or

b) With a sketch, explain the working of a Diesel engine.

IV. a) A heat insulation brick wall is made up of two layer heat insulation. Total thickness of the wall is 225 mm. The inner layer of fire brick has a heat transfer co-efficient k = 0.8 W/m°C and there is an outer insulation with a heat transfer coefficient k = 0.3 W/m°C. The inside and ambient temperatures are 1000°C and 25°C respectively. Calculate the thickness of the two layers. What is the heat loss if the insulating material has a maximum temperature of 800°C ?

Or

b) A vertical plate is of 1.5 m height and is exposed to atmospheric air at 55°C. The plat has a temperature of 135°C. Determine the value of mean heat transfer coefficient and the rate of heat transfer per unit width of the plate.

(4 × 15 = 60 marks)

D 92069 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Electrical and Electronics Engineering

EE 14 304—ELECTRICAL MEASUREMENTS AND INSTRUMENTATION SYSTEMS

Time : Three Hours Maximum : 100 Marks

Part A

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

I. a) What is the need for damping in measuring instruments ? Explain.

b) Explain the operating principle of moving coil attraction type instruments.

c) Give the operating principle of current transformer. What is its application ?

d) Give the working principle of wattmeter.

e) Give the torque equation of single phase watt meter. Explain its significance in power measurement.

f) Explain direct deflection method of resistance measurement.

g) State and explain the general equation for bridge at balance.

h) Explain the standardization process of potentiometers.

i) Give the principle operation of Hall effect Gauss meter.

j) What is meant by PDP ? Explain.

(8 × 5 = 40 marks)

Part B

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

II. (a) (i) Discuss the working principle of operation of electrodynamometer type of instruments with its constructional diagram.

(7 marks)

(ii) A PMMC ammeter gives reading of 40mA when connected across two opposite corners of a bridge rectifier, the other two corners of which are connected in series with a capacitor to 100 k, 50 Hz supply. Compose the value for capacitance.

(8 marks)

Or

(b) (i) Explain the methods of turns compensation used in current transformers to reduce ratio error.

(7 marks)

(ii) Explain the term "loading" in voltmeter and give the method to remove the adverse effect of the same.

(8 marks)

III. (a) Explain the construction and operation of single phase induction type energy meter.

Or

(b) Explain the construction and theory of operation of dynamometer wattmeter.

IV. (a) (i) With the help of Schering bridge, explain how loss angle of a dielectric can be determined.

(8 marks)

(ii) Explain the measurements of frequency by Wien's bridge.

(7 marks)

Or

(b) (i) Explain the theory and working principle of Hay's Bridge. Derive the relation for finding unknown resistance and inductance.

(8 marks)

(ii) Obtain an expression for measurement of inductance using Anderson's bridge with a neat circuit diagram.

(7 marks)

V. (a) (i) Develop a neat block diagram of X-Y recorder and describe its working.

(7 marks)

(ii) Explain the principle and working of CRT display with a neat diagram.

(8 marks)

Or

(b) Explain in brief about the construction and operation of flux meter.

[4 × 15 = 60 marks]

D 92068 (Pages : 4) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Electrical and Electronics Engineering

EE 14 303—ELECTRIC CIRCUIT THEORY

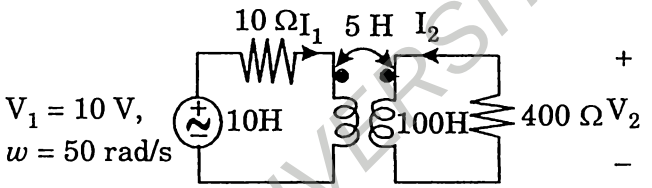
Time : Three Hours Maximum : 100 Marks

Part A

Answer **eight** *questions.*

Each question carries 5 *marks.*

1. State and prove Thevenins theorem.
2. Explain the terms Bandwidth and quality factor with suitable expression.
3. For the coupled circuit, find the ratio of output voltage to the source voltage.



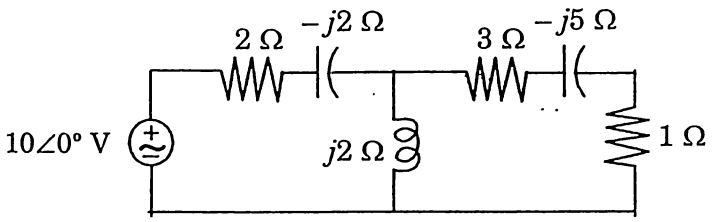
4. Write short note on circulating currents in unbalanced A connected sources.
5. Derive the step response of RL circuit.
6. Discuss about two wattmeter method of power measurement.
7. State the final value theorem for Laplace transform.
8. Using the relation $Y = Z^{-1}$, show that $|Z| = ½ \{(Z_{22}/Y_{11}) + (Z_{11}/Y_{22})\}$.
9. The Z parameters of a two port network are $Z_{11} = 20\ \Omega$, $Z_{22} = 30\ \Omega$, $Z_{12} = Z_{21} = 10\ \Omega$. Find Y and ABCD parameters.
10. List any 5 properties of transfer immitance functions.

(8 × 5 = 40 marks)

Part B

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

11. (a) (i) For the circuit shown in the figure. Determine the KVL equations, find the loop current I_1 and I_2, find the power supplied by the source and the power dissipated in each resistor.



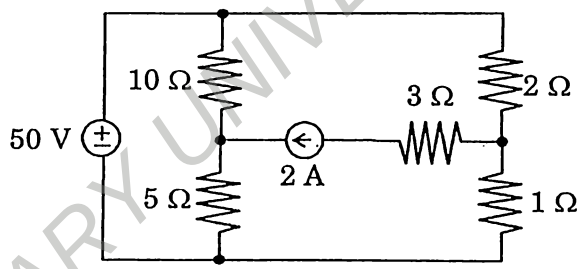
(10 marks)

(ii) A parallel resonant circuit comprising a coil of 150 nH with Q of 20 in parallel with a capacitor. What is the value of capacitor ? Find also the resistance of the coil and the circuit impedance at resonance. Take f_0 = 1 MHz.

(5 marks)

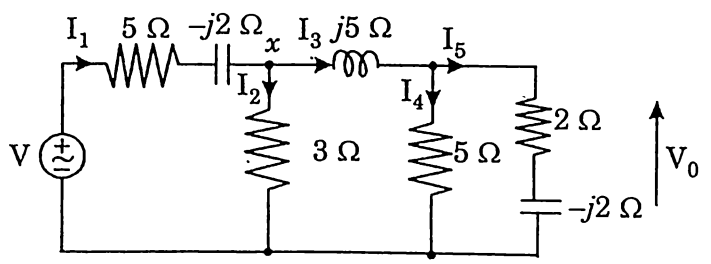
Or

(b) (i) Find the current through the 5Q resistor in the figure using mesh analysis.



(7 marks)

(ii) For the network shown find the value of the voltage V which results in the output voltage $V_0 = 5v_x$.

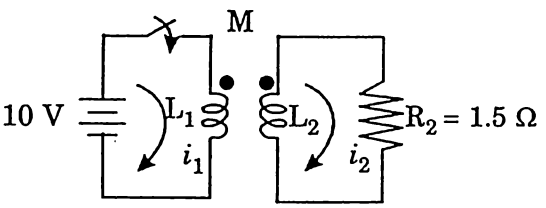


(8 marks)

12. (a) Explain in detail 3-phase circuits with balanced sources and unbalanced loads.

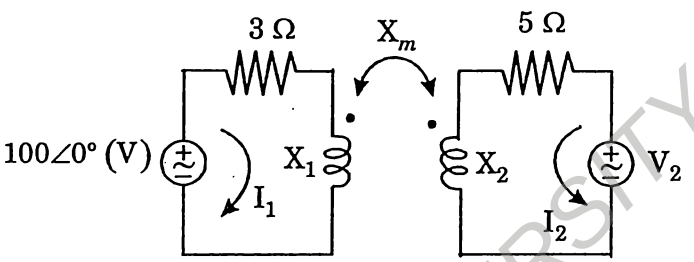
Or

(b) (i) Find the voltage V (t) across 1.5 Ω resistance in the network shown in the figure when a 10 V source is switched on. The primary and secondary self-inductances are $L_1 = L_2 = 1$ H and M = 0.5 H



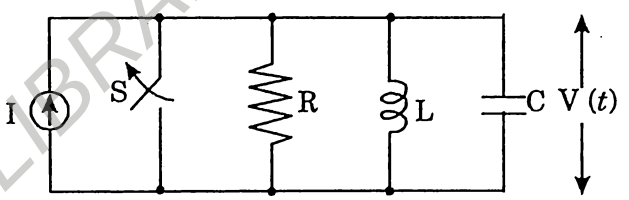
(7 marks)

(ii) In the circuit shown below, calculate the current I_2 for which I_1 will be zero. Also calculate the value of V_2 for this condition. Assume $X_1 = X_2 = 15\Omega$ and $X_m = 100$.



(8 marks)

13. (a) The figure shows a parallel RLC circuit fed from a DC current source through a switch. The circuit elements are R = 400 Ω, L = 25 mH, C = 25 nF. The source current is 24 mA. The switch which has been in closed position for a long time is opened at $t = 0$. (i) What is the initial value of current I_L ? (ii) What is the initial value of voltage across L at $t = 0$; (iii) What is the expression for current through inductance, capacitance and resistance ? (iv) What is the final value of I_L. (v) What happens to I_L t (if R is increased from 400 to 625 Ω ? Assume the initial energy is zero.



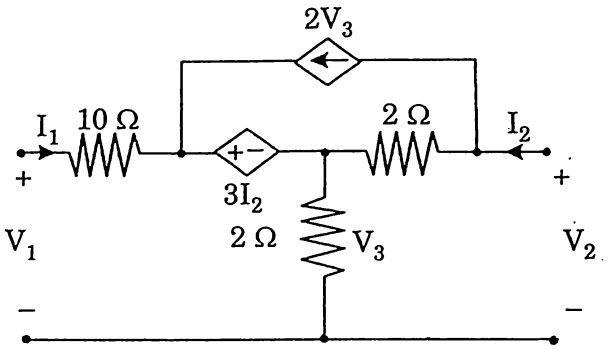
Or

(b) Find the initial and final value of the functions :

(i) $F(s) = 4(s + 1) / (s^2 + 4s + 6)$.

(ii) $G(s) = 5s^3 - 1{,}600 / (s(s^3 + 18s^2 + 90s + 800))$.

14. (a) (i) Find the Z and Y parameters for the network shown in the figure.



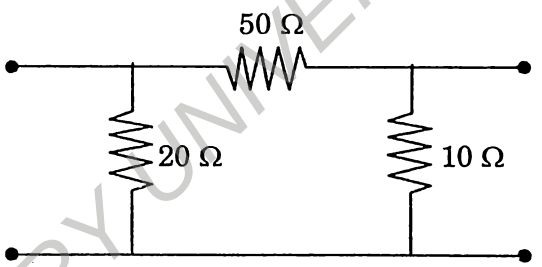
(7 marks)

(ii) Derive the interrelationship between the transmission and hybrid two port network parameters.

(8 marks)

Or

(b) (i) Find the Y parameters for the network shown in the figure. (6 marks)



(ii) Currents I_1 and I_2 entering at port 1 and port 2 respectively of a two port network are given by the following equations : $I_1 = 0.5\ V_1 - 0.2\ V_2$; $I_2 = -0.2\ V_1 + V_2$. Find Y, Z and ABCD parameters for the network.

(9 marks)

[4 × 15 = 60 marks]

D 92067 (Pages : 3) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Applied Electronics and Instrumentation Engineering

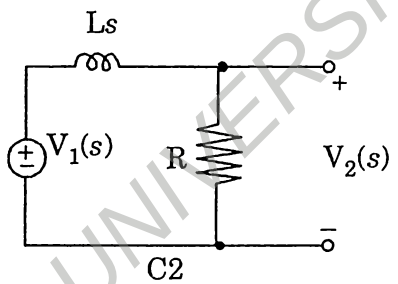
AI 14 306—ELECTRIC CIRCUITS AND NETWORK THEORY

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Find the Laplace transform of $f(t) = e^{-\alpha t}$.
2. Find the poles and zeros of $f(t) = [4 - 3 \cos 500t]\ u(t)$.
3. Find the transfer function of the circuit and find the driving-point impedances seen by the input sources :



4. Describe the significance of impulse response.
5. Describe Forward Transfer impedance with output port open.
6. Explain the term Admittance matrix.
7. Write the significance of input admittance with the output port shorted.
8. Express the high-pass filter in the form of transfer function.
9. Enlist the important points in terms of asymptotes for high-pass filter design.
10. Discuss the design requirements for a second-order low-pass and high-pass filter design by different methods.

(8 × 5 = 40 marks)

Turn over

Part B

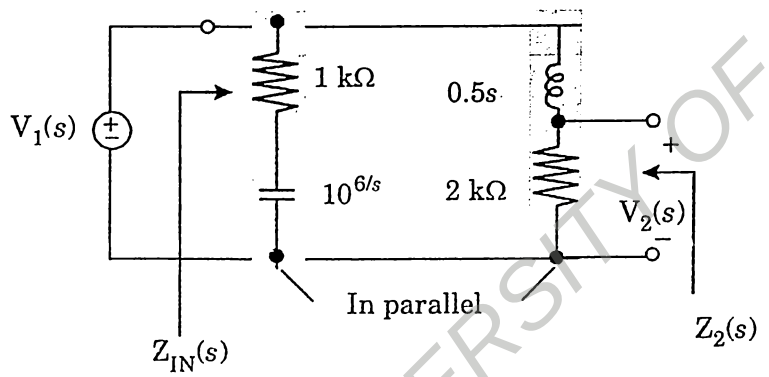
Answer Sections (a) **or** *(b) questions.*

Each question carries 15 *marks.*

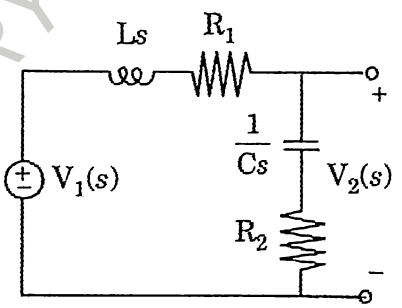
11. Describe the series equivalence in the *s*-domain.

Or

12. Consider the S- domain circuit and find the input impedance, ratio of the output to the input, poles and zeros of input impedance.



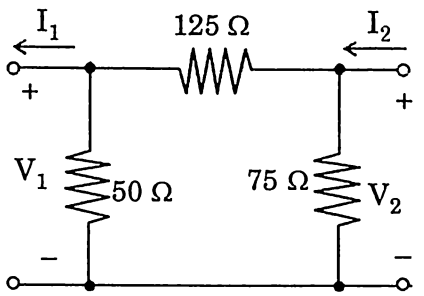
13. Find the voltage transfer function, driving point impedance and locate the poles and zeros of the transfer function when $R_1 = R_2 = 1$ KΩ, L = 10 mH and C = 0.1 μF.



Or

14. Describe and differentiate the Block diagram of an impulse response in t and s domain.

15. Find the impedance parameters of a resistive circuit.



$$z_{21} = \left.\frac{V_2}{I_1}\right|_{I_1=0} = \frac{0.2I_1 \times 75}{I_1} = 15\ \Omega.$$

Or

16. The h-parameters of a two-port network are h_{11} = 2 KΩ, h_{12} = - 2, h_{21} = 10 and h_{22} = 500 μS. A 10 – V voltage source is connected at the input port. Find the Norton equivalent circuit at the output port.

17. Construct a second-order bandstop transfer function with a notch frequency of 50 rad/sec, a notch bandwidth of 10 rad/s and passband gains of 5.

Or

18. Construct a first-order cascade transfer function that meets the following requirements : T_{MAX} = OdB, T_{MIN} = – 30 dB, w_c = 200 rad/s and w_{MIN} = 1 K rad/s.

(4 × 15 = 60 marks)

D 92066 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Applied Electronics and Instrumentation Engineering

AI 14 305—DIGITAL SYSTEMS

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*

1. Convert $(1011)_2$ in to its equivalent gray code.
2. By writing the parity code (even) and three-fold repetition code for all possible four-bit straight binary numbers, prove that the Hamming distance in the two cases is at least 2 in the case of the parity code and 3 in the case of the repetition code.
3. Starting with the Boolean expression for a two-input OR gate, apply Boolean laws and theorems to modify it in such a way as to facilitate the implementation of a two-input OR gate by using two-input NAND gates only.
4. Draw and describe the schematic of half-subtractor.
5. We have an eight-line to three-line priority encoder circuit with D_0, D_1, D_2, D_3, D_4, D_5, D_6 and D_7 as the data input lines. The output bits are A (MSB), B and C (LSB). Higher-order data bits have been assigned a higher priority, with D_7 having the highest priority. If the data inputs and Outputs are active when LOW, determine the logic status of output bits for the following logic status of data inputs :
   (a) All inputs are in logic '0' state.
   (b) D_1 to D_4 are in logic '1' state and D_5 to D_7 are in logic '0' state.
   (c) D_7 is in logic '0' state. The logic status of the other inputs is not known.
6. Explain, how to implement Boolean function with decoders ?
7. Describe the operational basics of Binary ripple counter.
8. Determine the number of flip-flops required to construct (a) a MOD-10 ring counter ; and (b) a MOD-10 Johnson counter. Also, write the count sequence in the two cases.
9. Explain the partitioning method of state reduction.
10. Draw the schematic of state diagram of combination detector.

(8 × 5 = 40 marks)

Turn over

Part B

Answer section (a) **or** *(b) questions.*

11. Describe the codes available for error detection and correction.

Or

12. A logic system has three inputs A,B, and C and two outputs Y_1 and Y_2. The output functions Y_1 and Y_2 are expressed by $Y_1 = \bar{A}.B.C + B.\bar{C} + \bar{A}.\bar{C} + A.\bar{B}.C + A.B.C$; $Y_2 = \bar{A}.B + A.\bar{C} + A.B.C$.

Determine the minimized output logic functions using the Quine-McCluskey tabular method.

13. Design a four-line to two-line priority encoder with active HIGH inputs and outputs, with priority assigned to the higher-order data input line.

Or

14. Implement a full adder circuit using a 3-to-8 line decoder.

15. Describe the functions of Serial-in parallel-out shift register.

Or

16. Draw and describe the working basics and waveforms of four-bit binary ripple counter.

17. Explain the block diagrams for Moore machine and Mealy machine.

Or

18. Describe the sequential circuit to be implemented with JK flip-flops and its state table and diagram.

(4 × 15 = 60 marks)

D 92065 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Applied Electronics and Instrumentation Engineering

AI 14 304—ELECTRICAL ENGINEERING

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Enlist the parts of a D.C. Generator.
2. Elaborate how coil-span of a D.C. Generator is measured.
3. Describe back pitch.
4. Describe voltage transformation ratio of a Transformer.
5. Express the total voltage drop of a transformer.
6. Describe the structure of two types of armature windings used for 3-phase Alternator.
7. Enlist the effects of different types of excitation in a synchronous motor.
8. Classify the Induction motor.
9. Derive an expression for General 4-arm Bridge configuration.
10. Describe the creeping errors in Energy meter.

(8 × 5 = 40 marks)

Part B

Answer section (a) **or** (b) *questions.*
Each question carries 15 *marks.*

11. Describe the procedure to draw open circuit characteristics at different speeds.

Or

12. Derive a suitable expression for Voltage Equation of a D.C. Motor.

Turn over

13. Derive a suitable expression for Exact voltage drop of a transformer with lagging and leading power factor.

Or

14. Draw and describe the equivalent circuit for leakage reactance of the transformer.

15. Derive an expression for induced E.M.F. for Alternator.

Or

16. Draw and describe the torque-speed curve of Induction motor.

17. Describe the operation of single-phase Energy meter.

Or

18. Describe how to find the unknown inductance using Maxwell's bridge.

(4 × 15 = 60 marks)

D 92063 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Electronics and Communication Engineering

EC 14 306—ELECTRICAL ENGINEERING

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Draw the equivalent circuit of a two winding transformer and derive the phasor diagram.
2. With a neat diagram, explain the principle of moving coil instrument.
3. Explain the working principle of an induction type instrument.
4. Draw and explain the performance characteristics of a shunt motor.
5. Explain the procedure of finding the efficiency of a d.c. motor.
6. Enumerate various applications of a d.c. motor.
7. Define voltage regulation. How the regulation of an alternator is maintained in the accepted level.
8. What is meant by rotating magnetic field ? Explain.
9. Why centrifugal switches provided on many single-phase induction motors ? Explain.
10. List the advantages and disadvantages of induction motors.

(8 × 5 = 40 marks)

Part B

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

11. (i) From first principles, derive the e.m.f. equation of a transformer. Also show that the voltage induced per turn is the same, whether it is primary or secondary.

(10 marks)

(ii) What are the losses in a transformer ? Explain. (5 marks)

Or

Turn over

12. (i) Explain the principle of operation of a single- phase transformer and its behavior on loaded condition with phasor diagram.

(5 marks)

(ii) Explain the O.C. and S.C. tests done on a single- phase transformer. (10 marks)

13. (i) Explain the principal of operation of d.c. motor. (10 marks)

(ii) Derive the torque equation of a d.c. motor.

(5 marks)

Or

14. (i) Derive the e.m.f. equation of d.c. machine, how can its direction be obtained ? (8 marks)

(ii) Explain the various types of core losses. (7 marks)

15. Explain the method of finding voltage regulation of an alternator by EMF and MMF method.

Or

16. (i) Explain methods for starting a synchronous motor. (9 marks)

(ii) Enumerate applications of synchronous motors. (6 marks)

17. Draw the structure and explain the characteristics of 3 phase induction motor.

Or

18. Explain in detail about : (i) Star-delta starter ; (ii) Auto transformer starter ; and (iii) DOL starter.

[4 × 15 = 60 marks]

D 92062 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Electronics and Communication Engineering

EC 14 305—ELECTRONIC CIRCUITS—I

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Explain the specification and construction details of different type's capacitors.
2. What is meant by AF choke ? Draw the symbol.
3. Define TUF. Derive the expression for TUF in HWR.
4. Draw the circuit of series pass voltage regulator and explain its working.
5. Explain short circuit protection in rectifiers.
6. Draw load line regulation for a Zener voltage regulator.
7. Differentiate hybrid and T model of transistors.
8. Define Bias stabilization and derive the same for CE configuration.
9. Discuss the LF response of a JFET.
10. Draw any two biasing circuits of MOSFET.

(8 × 5 = 40 marks)

Part B

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

11. Derive the rectifier specifications PIV, DC output voltage, ripple factor, efficiency and TUF for Center tap rectifier. Compare these with that of half wave rectifier.

Or

12. Analysis and Design of L and C Filters with rectifier circuits.

13. Explain in detail Diode circuit models.

Or

14. Analysis of series pass voltage regulator. Draw the load and line regulation.

15. Analysis and design of Common collector configuration.

Or

16. Design the small signal equivalent circuit model of Common base configuration.

17. Analysis of Low frequency and high frequency response of common source amplifier.

Or

18. Analysis of Low frequency and high frequency response of common drain amplifier.

(4 × 15 = 60 marks)

D 92061 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Electronics and Communication Engineering

EC 14 304—SOLID STATE DEVICES

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Define drift current. Give an expression.
2. Determine the density of free electrons in silicon if the fermi level is 0.2ev below Ec at 300K.
3. Explain the principle of a varactor diode.
4. What is meant by Avalanche break down ? Explain.
5. Derive the ideal diode equation.
6. Explain base width modulation with neat diagrams.
7. What is meant by coupled diode model ? Explain.
8. What is channel length modulation ? Explain.
9. Draw the transfer characteristics curve for JFET and explain its operation.
10. What is a TRIAC ? Give the symbol and structure of TRIAC.

(8 × 5 = 40 marks)

Part B

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

11. a) Derive an expression for drift current density. (7 marks)

    b) Explain the effect of temperature on mobility. (3 marks)

    c) An electric field is applied to a sample of Ge that is doped with 10^15 cm^-3 of boron. The field has intensity of 100V/cm. Calculate velocity of electron and hole, and the conductivity of the sample.

(5 marks)

Or

Turn over

12. a) Derive the expression for electron, hole and intrinsic concentrations at equilibrium in terms of effective density of states. Formulate the relation between these concentration at equilibrium

(10 marks)

b) A sample of silicon is doped with 10^15 cm^–3 of phosphorus and 5 × 10^15 cm^–3 of boron. Determine the density and mobility of holes and electrons.

(5 marks)

13. a) Draw the energy band diagram of a metal n type semiconductor with $\varphi m > \varphi s$ when it is : i) under equilibrium and ii) when it is biased. Is the contact rectifying or ohmic ? Justify your answer.

(9 marks)

b) Differentiate between ohmic and rectifying contacts. (6 marks)

Or

14. a) Derive the expression for depletion and diffusion capacitance of a PN junction. (7 marks)

b) With the help of necessary diagrams, explain the working of a tunnel diode. (8 marks)

15. a) Illustrate the minority carrier distribution in a PNP transistor in the active mode of operation. Given values of minority carrier concentrations in the three regions.

(7 marks)

b) Write short notes on: Kirk effect, frequency limitations of transistors and Avalanche breakdown.

(8 marks)

Or

16. a) Derive an expression for emitter injection efficiency of a transistor. (10 marks)

b) Explain early effect. (5 marks)

17. a) With the help of necessary band diagrams, explain equilibrium, accumulation, depletion and Inversion stages of MOS capacitor.

(12 marks)

b) What is the effect of real surfaces of a MOS capacitor. (3 marks)

Or

18. a) With necessary diagrams, explain the operation of UJT. (8 marks)

b) Draw the structure of IGBT and explain. (7 marks)

[4 × 15 = 60 marks]

D 92060 (Pages : 4) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Electronics and Communication Engineering

EC 14 303—NETWORK ANALYSIS AND SYNTHESIS

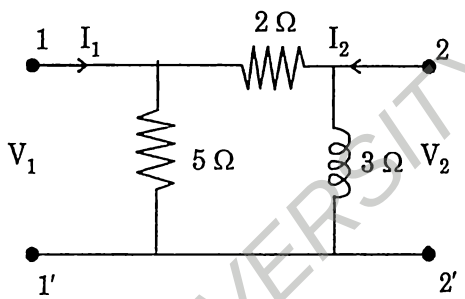
Time : Three Hours Maximum : 100 Marks

Part A

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

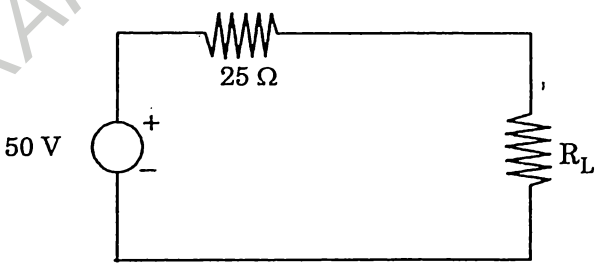
1. What are independent and dependent sources ? State superposition and Norton's Theorems.

2. Find the mutual impedance for the following circuit :



Define the significance of co-efficient of coupling.

3. (a) In the following circuit, find the value of load resistance when the load resistance draws maximum power. Also find the value of the maximum power :



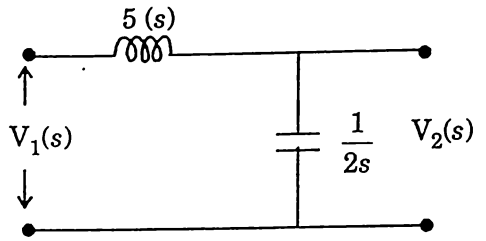
(3 marks)

(b) Define Laplace transform. (2 marks)

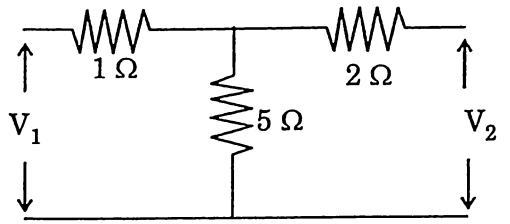
Turn over

4. State the necessary conditions for transfer functions of a circuit.

5. For the network shown below, find the transfer functions $G_{21}(s)$ and $Z_{21}(s)$ and the driving point admittance $Y_{11}(s)$.



6. Find the transmission circuit parameters for the following circuit :



7. Design a T-pad a attenuator to give an attenuation of 60 dB and to work in a line of 500 Ω impedance.

8. Compare the butterworth and Chebyshev filter characteristics.

9. Test whether the polynomial $p(s) = s^5 + 3s^3 + 2s$ is Hurwitz.

10. Define causality and stability. Give an example each for causal, non-causal, stable and unstable systems.

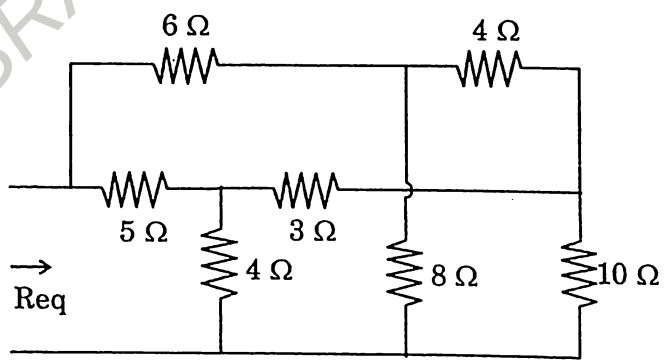
(8 × 5 = 40 marks)

Part B

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

11. (a) Discuss the significance of pulse and impulse responses of a system. (5 marks)

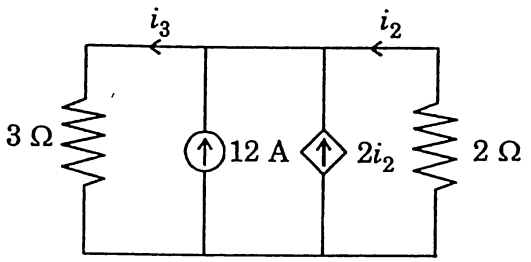
(b) In the following circuit, find the equivalent resistance by using star-delta transformation :



(10 marks)

Or

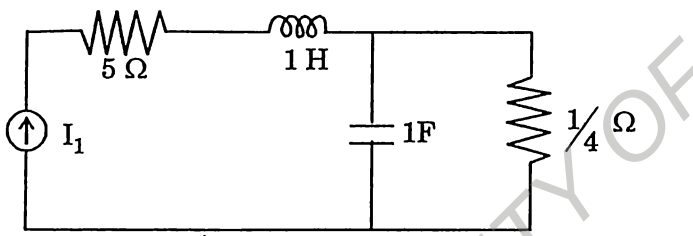
12. (a) For the following circuit, find the power absorbed by each element :



(7 marks)

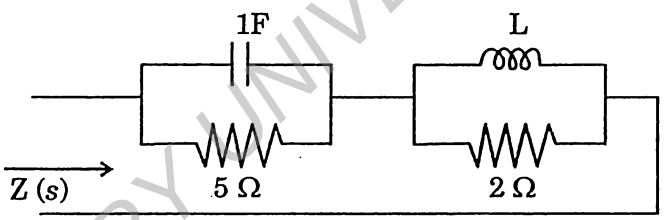
(b) Discuss any four properties of Laplace transform. (8 marks)

13. (a) Find the pole-zero plots of the driving point and transfer impedances of the following network :



(9 marks)

(b) What should be the value of L such that Z (*s*) = 1 in the following network :



(6 marks)

Or

14. (a) Express *h* parameters of a two port network interms of *z*-parameters.

(8 marks)

(b) The *z*-parameters of a circuit are given by $\begin{bmatrix} 4 & 1 \\ 3 & 3 \end{bmatrix}$. Obtain the transmission parameters.

(7 marks)

15. (a) Design a second order Butterworth low-pass filter with cut-off frequency of 1 kHz.

(7 marks)

(b) Explain on the method of obtaining transfer function of high-pass filter by transformation of frequency variable in the transfer function of low-pass filter.

(8 marks)

Or

16. Derive the design equations of T and Bridged T attenuators.

17. (a) Find the first and second foster forms of $Z(s) = \frac{(s+1)(s+3)}{s(s+2)}$.

(b) Find the first Caver form of :

$$Z(s) = \frac{(s+3)(s+7)}{(s+2)(s+4)}.$$

Or

18. Discuss the frequency response of reactive one port networks.

[4 × 15 = 60 marks]

D 92058 (Pages : 3) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Automobile Engineering

AM 14 305—THERMODYNAMICS

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions out of ten.*
Each question carries 5 *marks.*

1. What is a quasi-equilibrium process ? What is its importance in engineering ?
2. A gas in a piston-cylinder device is compressed, and as a result its temperature rises. Is this a heat or work interaction ? Justify it.
3. A piston-cylinder device contains 0.05 m3 of a gas initially at 200 kPa. At this state, a linear spring that has a spring constant of 150 kN/m is touching the piston but exerting no force on it. Now heat is transferred to the gas, causing the piston to rise and to compress the spring until the volume inside the cylinder doubles. If the cross-sectional area of the piston is 0.25 m2, determine the final pressure inside the cylinder and the fraction of this work done against the spring to compress it.
4. Show that the Kelvin-Planck and the Clausius expressions of the second law are equivalent.
5. A Carnot heat engine receives 650 kJ of heat from a source of unknown temperature and rejects 250 kJ of it to a sink at 24°C. Determine : (a) the temperature of the source and (b) the thermal efficiency of the heat engine.
6. A system undergoes a process between two fixed states first in a reversible manner and then in an irreversible manner. For which case is the entropy change greater ? Why ?
7. Complete this table for water :

T (°C)	P (kPa)	h (kJ/kg)	Quality (x)	Phase description
140		1800		
	950		0	
80	500			
	800	3162.2		

8. Describe the significance of Clausius - Clapeyron eqution.

9. What is adiabatic flame temperature ? Describe the significance.

10. Air at 37 °C, 44 percent relative humidity, is cooled to 23°C by spraying water at 13°C into it. The mixture pressure remains constant at 101.3 kPa. Assuming that all of the water evaporates and that the mixing occurs in an insulated duct, calculate the mass of water added per kilogram of air.

(8 × 5 = 40 marks)

Part B

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

11. a) A well insulated rigid tank contains 5 kg of a saturated liquid-vapor mixture of water at 100 kPa. Initially, three quarters of the mass is in the liquid phase. An electric resistor placed in the tank is connected to a 110 V source, and a current of 8 Amps flows through the resistor when the switch is turned on. Determine how long it will take to vaporize all the liquid in the tank. Also, show the process on a T-v diagram with respect to saturation lines.

(7.5 marks)

b) Steam enters a turbine operating at steady state with a mass flow rate of 4600 kg/h. the turbine develops a power output of 1000 kW. At the inlet, the pressure is 60 bar, the temperature is 400°C, and the velocity is 10m/s. At the exit, the pressure is 0.1 bar, the quality is 0.9 (90%), and the velocity is 50 m/s. Calculate the rate of heat transfer between the turbine and surroundings, in kW.

(7.5 marks)

Or

12. An insulated tank is divided into two parts by a partition. One part of the tank contains 4 kg of compressed liquid water at 80°C and 600 kPa while the other part is evacuated. The partition is now removed, and the water expands to fill the entire tank. Determine the final temperature of the water and the volume of the tank for a final pressure of 100 kPa.

13. A reversible heat engine operates between two reservoirs of temperatures of 800°C and 30°C. The engine drives the reversible heat pump which operates between reservoirs at temperatures of 30°C and -10°C. The heat transfer to the engine is 2000 kJ and the net work output of the combined plant is 250 kJ : (i) Evaluate the heat transfer to the refrigerant and the net heat transfer to the reservoir at 30°C ; (ii) Also find the heat transfer to the refrigerant and the net heat transfer to the reservoir at 30°C if the efficiency and COP are 40% of the ideal values.

Or

14. Two reversible heat engines A and B are arranged in series. A rejects heat directly to B. Engine A receives 200 kJ at a temperature of 421°C from the hot source while Engine B is in communication with cold sink at a temperature of 5°C. If the work output of A is twice that of B, find : (i) intermediate temperature between A and B ; (ii) efficiency of each engine ; (iii) heat rejected to the sink.

15. Derive the van der Waals equation for the ideal gas.

Or

16. Derive the Maxwell's equation using Gibbs energy equation and Helmholtz and Gibbs functions.

17. Compute the Adiabatic 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 volume.

Or

18. 800 m^3/min of re-circulated air at 22°C (DBT) and 10°C dew point temperature is to mixed with 300 m^3/min of fresh air at 30°C (DBT) and 50% RH. Determine the enthalpy, specific volume, humidity ratio and dew point temp of the resultant mixture.

[4 × 15 = 60 marks]

D 92056 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Automobile Engineering

AM 14 303—MECHANICS OF SOLIDS

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*

Each question carries 5 *marks.*

1. What is meant by Poisson's ratio ? Which material has the higher value of Poisson's ratio ?
2. Derive an expression for strain energy stored in a parameter has subjected in an axial load.
3. How do you relate intensity of loading, shearing force and bending moment ?
4. A beam 2 m long, simply supported at its ends, is carrying a point load at its centre. If the slope at the ends is 1 degree, find the deflection at the mid span of the beam.
5. How bending moment, shear force and intensity of loadings are released ?
6. What are the advantage of Macaulay's method over double integration method for beam deflection analysis ?
7. A cantilever of span 1.5 m is carrying a point load at the free end. Find the deflection at the free end, if the slope at the free end is 1 degree.
8. Determine the strain energy stored in a solid circular shaft of diameter 100 mm and length 1 m when it is subjected to a torque of 20 kNm. Take the shear modulus as 80 Gpa.
9. What is the value of normal stress on the plane of maximum shear stress in an element of a strained body in two dimensional state of stress ?
10. What are principal planes ?

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*

Each question carries 15 *marks.*

11. (a) A steel bar 300 mm long, 40 mm wide and 25 mm thick is subjected to a pull of 180 kN. Determine the change in volume of the bar. Take E = 2 × 10^6 N/mm^2 and 1/m = 0.3.

Or

Turn over

(b) An cylindrical shell 1 m diameter and 3 m length is subjected to an internal pressure of 2 Mpa, Calculate the minimum thickness if the stress should not exceed 50 Mpa. Find the change in diameter and volume of the shell. Poisson's ration = 0.3 and E = 200 kN/mm^2.

12. (a) Draw SFD and BMD for the cantilever with single concentrated load a free end.

Or

(b) Derive the equation for maximum slope and deflection of a simply supported beam (SSB) with central point load.

13. (a) A 10 m long beam ABC is simply supported at B and C over a span of 8 m with end A being free. It carries point loads of 8 kN and 4 kN at distances 3 m and 5 m from C. The beam also has two uniformly distributed loads of intensity 4 kN/m for a distance of 4 m starting from C and 6 kN/m on AB. Draw shearing force and bending moment diagrams indicating all principal values.

Or

(b) A beam AB of span 7 m is simply supported at its ends A and B. It carries a point load of 10 kN at a distance of 3 m from the end A and a uniformly distributed load of 6 kN/m over the right half span length. Determine : i) the maximum deflection in the beam and ii) slope at the ends. Take EI = 10000 kN/m^2.

14 . (a) At a point in the web of grinder the bending stress is 60 N/mm^2 tensile and the shearing stress at the same point is 30 N/mm^2. Determine : i) principal stresses and principal planes ; ii) maximum shear stress and its orientations.

Or

(b) The stresses on two mutually perpendicular planes through a point on a body are 30 Mpa and 20 Mpa both tensile, along with a shear stress of 25MPa. Find,

i) The position of principal planes and stresses across them.

ii) The planes of maximum shear stress.

iii) The normal and tangential stress on the plane of maximum shear stress.

(4 × 15 = 60 marks)

D 92055 (Pages : 3) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Production Engineering

PE 14 307—PRODUCTION ENGINEERING DRAWING

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **two** *from the following.*

Each question carries 15 *marks.*

1. Draw the three views of a hexagonal headed bolt of size M24. The length of the bolt is 80 mm. and the thread length is 54 mm.

2. A M16 stud bolt with hexagonal nut, lock nut and washer is used to fix an M.S. plate of thickness 16 mm on to a C.I. block. If the metal end length of stud is 20 mm, the nut end length is 38 mm. and the total length of stud is 78 mm, draw the joint showing full sectional elevation.

3. Sketch the following types of keys in two views, as fitted in position between a shaft and the mounting. Choose the shaft diameter as 24 mm. and the hub diameter of the mounting as 40 mm.

   (a) Hollow saddle key.

   (b) Flat saddle key.

4. Draw the three views of the cotter and gib with curved ends and flat sides suitable to use on joints with rod diameter 30 mm.

(2 × 15 = 30 marks)

Part B

Answer any **one** *question.*
The question carries 70 marks.

5. Part drawing of a plummer block is shown in Fig. 1. Draw the following assembled views to a suitable scale and also include bill of materials:

   (i) Front view left half in section.

   (ii) Top view left half in section.

   (iii) Full sectional side view from left.

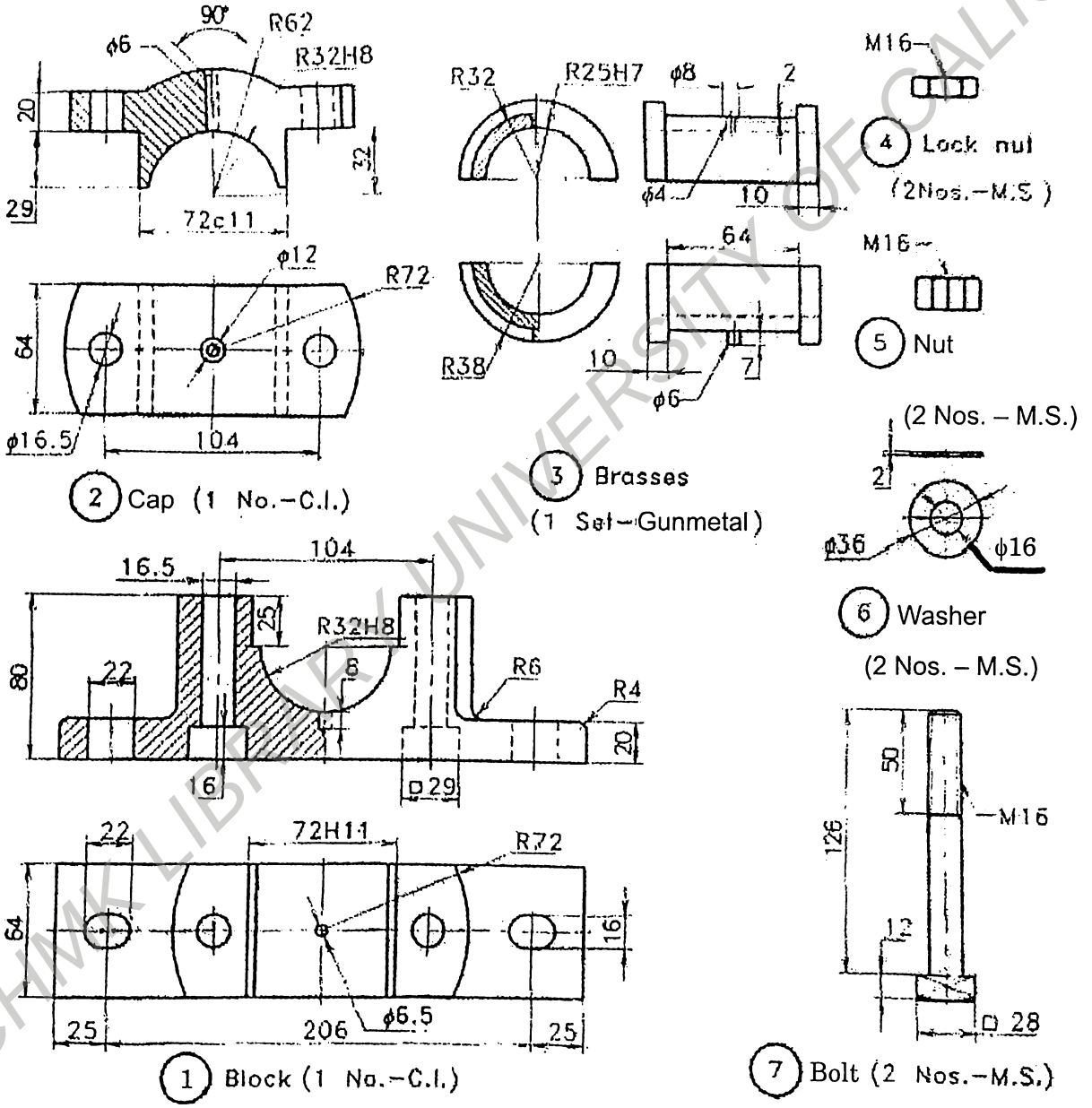


Fig.1

6. Part drawing of a single point lathe tool post is shown in Fig. 2. Draw the following assembled views to a suitable scale and also include bill of materials :

   (i) Front view left half in section.

   (ii) Side view from left.

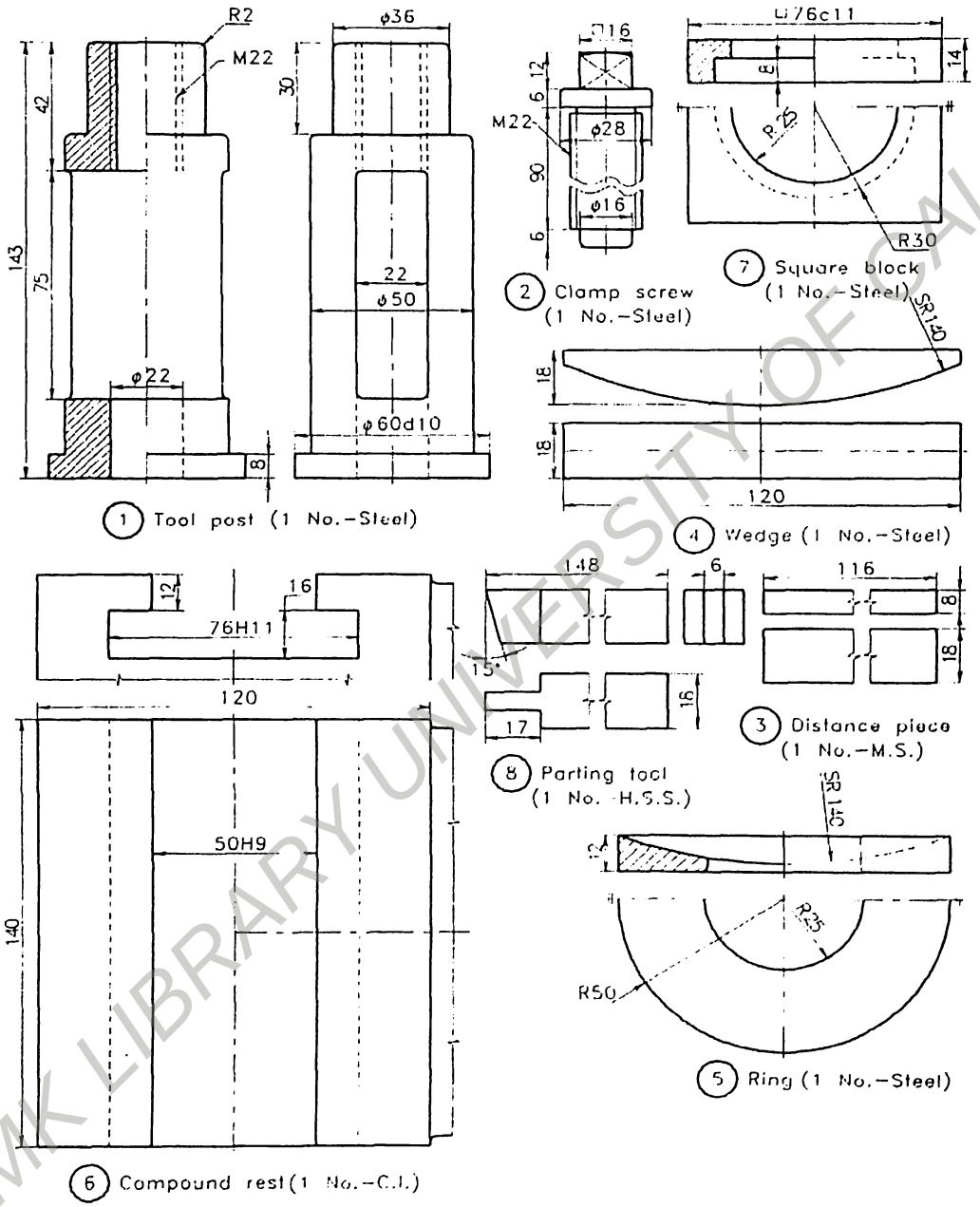


Fig. 2

(1 × 70 = 70 marks)

D 92054 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Production Engineering

PE 14 306—MACHINE TOOL TECHNOLOGY

Time : Three Hours Maximum : 100 Marks

Part A

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

1. What are the needs and advantages of automatic lathes ? Explain.
2. What are the limitations of centre lathe ?
3. Discuss any *two* operations that can be performed on a lathe.
4. What are the advantages of honing process ? Explain.
5. Discuss any *two* abrasives used in grinding wheel.
6. How do you specify a grinding wheel ? Explain.
7. Sketch a twist drill and label.
8. Enumerate with neat sketch, gear cutting on a gear shaper using a rotary gear shaper.
9. Sketch and indicate various elements of a pall broach.
10. State the difference between a vertical shaper and a slotter.

(8 × 5 = 40 marks)

Part B

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

11. (a) Describe the constructional features of a bed of an engine lathe. (5 marks)

    (b) What are the various methods available for supporting long components and fragile components in a lathe ? Explain with sketches. (10 marks)

Or

12. Describe any *five* methods of holding work in a capstan lathe.

Turn over

13. (a) Explain with neat sketches the four different types of surface grinding operations.

(10 marks)

(b) Mention the four important factors that influence the selection of grinding wheel.

(5 marks)

Or

14. (a) How does a wheel dressing differ from wheel truing ? (5 marks)

(b) Enumerate the advantages and disadvantages of centreless grinding. (10 marks)

15. (a) Compare plain and Universal Milling Machine. (8 marks)

(b) Enumerate with a neat sketch gear shaping. (7 marks)

Or

16. (a) Discuss with neat sketches gear grinding and gear lapping methods. (10 marks)

(b) What is gear hopping ? Why it is done ? (5 marks)

17. (a) Discuss with neat sketch vertical Broaching machine. (8 marks)

(b) Sketch and indicate various elements of a pull broach. (7 marks)

Or

18. With the aid of sketches, describe any *three* clamping devices used in planning machine to hold the work pieces.

[4 × 15 = 60 marks]

D 92052 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Production Engineering

PE 14 304—MECHANICS OF SOLIDS

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Derive $K = E/3(1-2\gamma)$ from fundamentals for an isotrophic material.
2. Define stress and strain.
3. Write a note on Torsion of thin hollow sections.
4. Sketch stress-strain diagrams for ductile and brittle materials and compare it.
5. Write a note on sign conventions for bending moment and shear force.
6. A hollow shaft has greater strength and stiffness than solid shaft of equal weight'—Justify.
7. Write a note on inelastic bending.
8. Discuss the moment area method for deflection, stating the relevant theorems.
9. Write a note on strain rosettes.
10. Explain principal stresses.

(8 × 5 = 40 marks)

Part B

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

11. A short concrete 300 × 300 mm. is reinforced with four steel bars of 16 mm. diameter, one in each corner. When an axial load of 2.2 MN is applied in the column, calculate the stresses induced in concrete and steel. Assume E_c = 14 GPa and E_s = 210 GPa.

Or

12. A bar of 30 mm diameter is subjected to pull of 60 kN. The measured extension on a gauge length of 200 mm is 0.09 mm and change in diameter is 0.0039 mm. Calculate the Poisson's ratio and values of three moduli.

13. A solid circular shaft is to transmit 400 kW at 150 r.p.m.

    (i) Find the diameter of the shaft if the shear stress is not to exceed 60 N/mm^2.

    (ii) What percent saving in weight would be obtained if this shaft is replaced by a hollow shaft whose internal diameter equal to $2/3^{rd}$ of its external diameter, the length, the material and maximum shear stress being the same ?

Or

14. (a) A composite shaft ABC of length L, has two portions AB and AC of different diameters, lengths and rigidity moduli. Ends A and C are fixed. A torque T is applied at the junction B. Find the twisting couple exerted at the fixed points A and C. (10 marks)

    (b) Write short notes on 'Elastic Curve'. (5 marks)

15. (a) Explain the two reasons because of which unsymmetrical bending may take place with examples. (7 marks)

    (b) Find the shear deflection, bending deflection and total deflection for an edge loaded cantilever of rectangular cross-section. (8 marks)

Or

16. A beam with a span of 6 m carries a point load of 40 kN at 4 m from the left support. If for the section $I_{xx} = 73.3 \times 10^{-6}\ m^4$ and 200 GN/m^2. Find the deflection of slope under the load and position and amount of maximum deflection.

17. Derive an expression for critical stress developed in a long column hinged at both ends.

Or

18. (a) Write a short note on : End conditions and effective length factors in columns.

    (b) Derive the formula for validity limit of Euler's formula in terms of yield stress and L/r ratio.

[4 × 15 = 60 marks]

D 92051 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Production Engineering

PE 14 303—ELECTRICAL DRIVES AND AUTOMATION

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Derive an expression for the e.m.f. generated in a d.c. machines.
2. Derive the e.m.f. equation of a single-phase transformer.
3. What are the losses produced in a transformer and drive the condition for maximum efficiency ?
4. Explain the principle of operation of a 3-phase induction motor.
5. Differentiate between squirrel cage and slip ring induction motor.
6. Explain the methods of starting synchronous motor.
7. Explain about microprocessor applications.
8. Write short notes on memory mapping.
9. List the factors affecting the selection of electric drives.
10. Explain the advantages of PLC systems.

(8 × 5 = 40 marks)

Part B

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

11. Explain the construction and working principle of a single phase transformer.

Or

12. Explain with speed torque characteristics of D.C. series motor under dynamic braking.

13. Explain the typical control circuits in starters for the three-phase slip ring induction motors.

Or

14. (a) Explain the speed-torque curve of single-phase induction motors in detail. (10 marks)

(b) Explain the constructional details of single-phase induction motor. (5 marks)

15. Write in detail about memory mapping concepts and memory decoding.

Or

16. Briefly explain microprocessor based temperature control and speed control.

17. Write a note on synchronous motor drives and induction motor drives with industrial applications.

Or

18. Explain about :

(a) Electric drives and control schemes ; and

(b) Ladder logic programming concepts.

(10 + 5 = 15 marks)

[4 × 15 = 60 marks]

D 92049 (Pages : 4) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Mechanical Engineering

ME 14 307 P/D—COMPUTER ASSISTED MACHINE DRAWING

Time : Three Hours Maximum : 100 Marks

Part A

1. Draw double riveted butt joint of 9 mm thick plates using snap headed rivets with double cover and chain riveting. Show at least three rivets in the plan view and add a sectional elevation. Mark the dimensions in terms of the rivet diameter.

Or

2. Details of a universal coupling are shown in Fig. 1, draw the front view and sectional top view of the assembly.

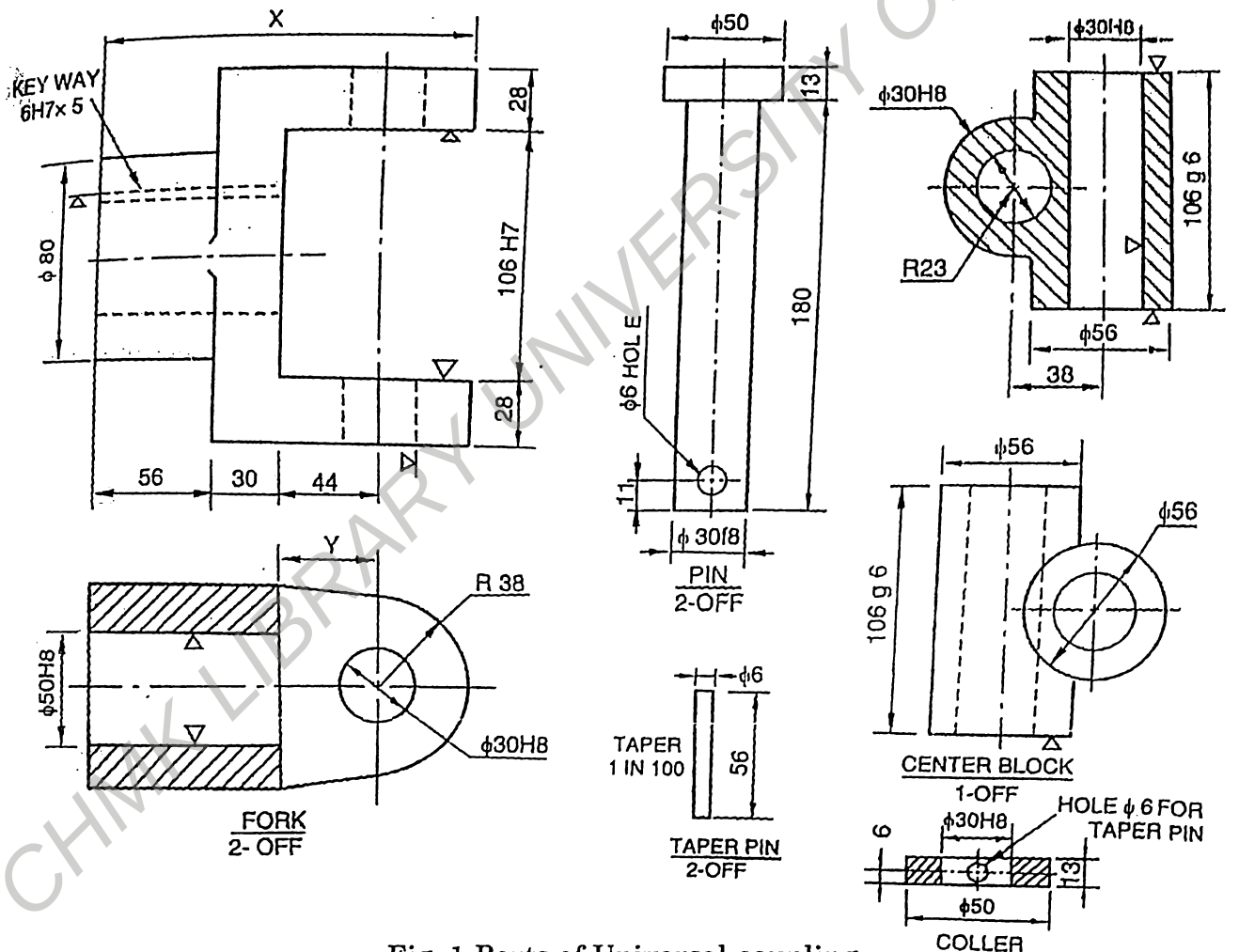


Fig. 1 Parts of Universal coupling

(1 × 25 = 25 marks)

Turn over

Part B

3. (a) Calculate the dimensions of the shaft and bearing bore using hole basis system and show the limit dimensions on a schematic diagram. Basic size of shaft = 70 mm, tolerance for both shaft and bearing is 0.075 mm and the required allowance is 0.10 mm.

(15 marks)

(b) Interpret the five geometrical tolerances shown on drawing of a flange in Fig. 2.

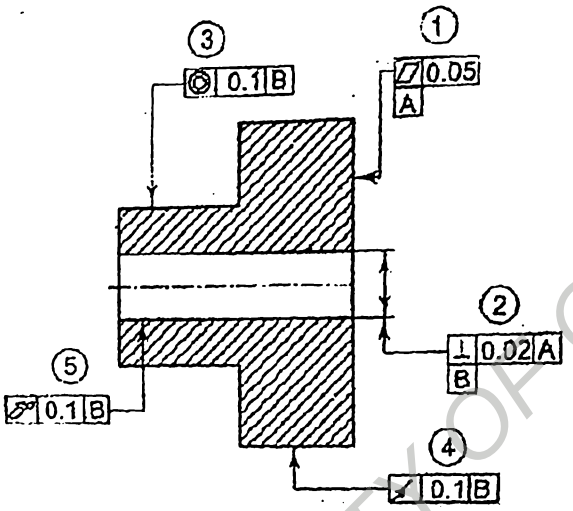


Fig.2 Flange

Or

(15 marks)

4. Isometric view of a bushed bearing is shown in Fig. 3. Draw the following views :
   (a) Front view, right half in section.
   (b) Right side view, left half in section.
   (c) Top view.

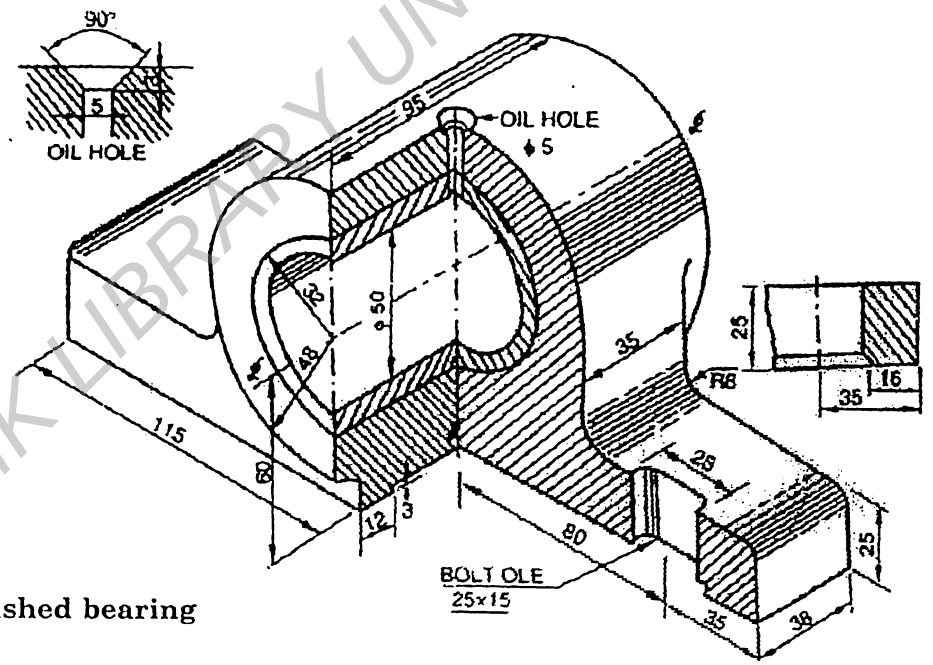


Fig. 3 Bushed bearing

[1 × 30 = 30 marks]

Part C

5. Parts of a simple eccentric are given in Fig. 5. Draw the following assembled views to a suitable scale and also include the bill of materials :
   (a) Elevation top half in section.
   (b) End view from right.

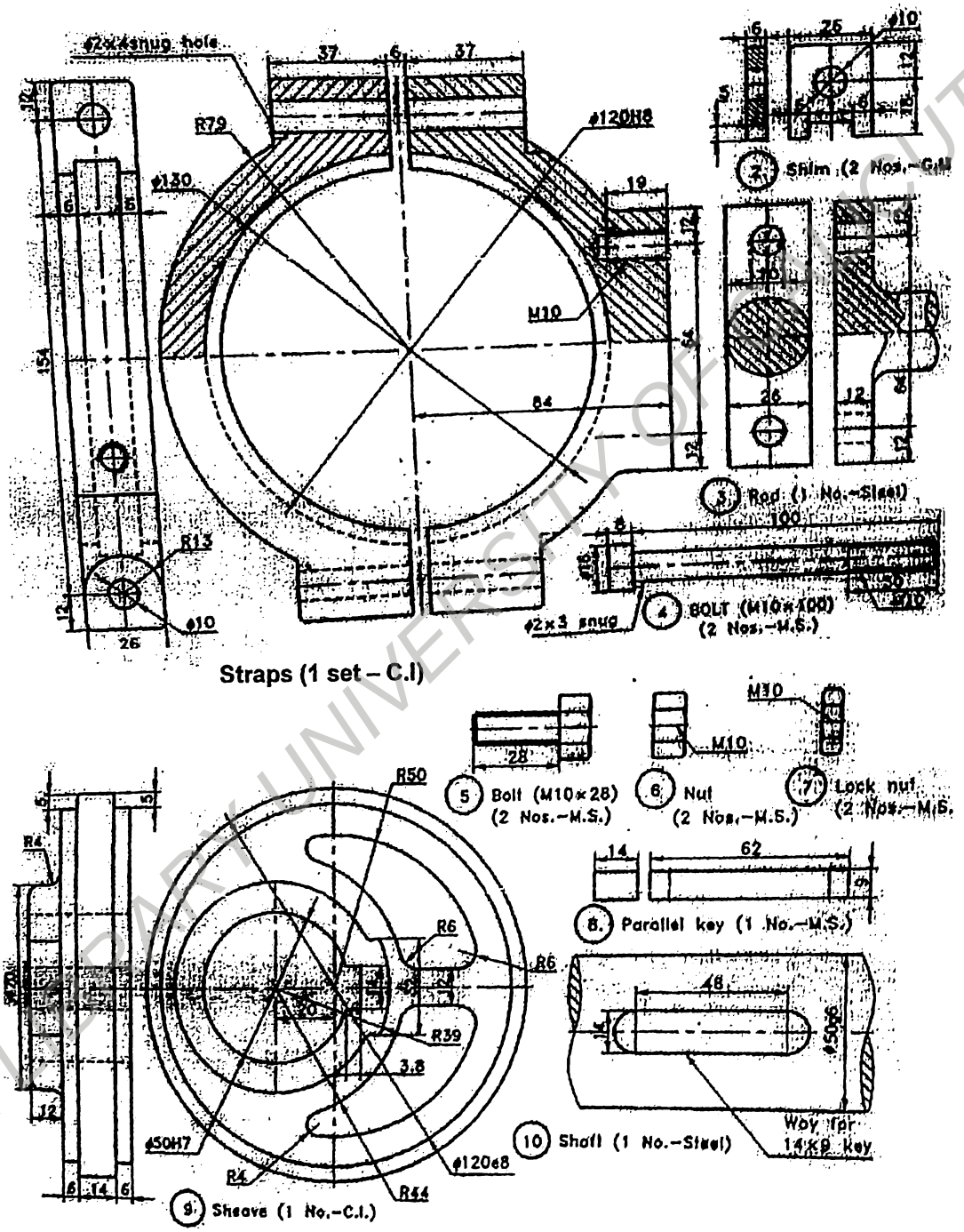


Fig.5 Eccentric parts

Or

6. Part drawings of a blow-off cock are given in Fig. 3. Draw the following assembled views to a suitable scale and also include bill of materials :

   (a) Sectional front view.

   (b) Top view.

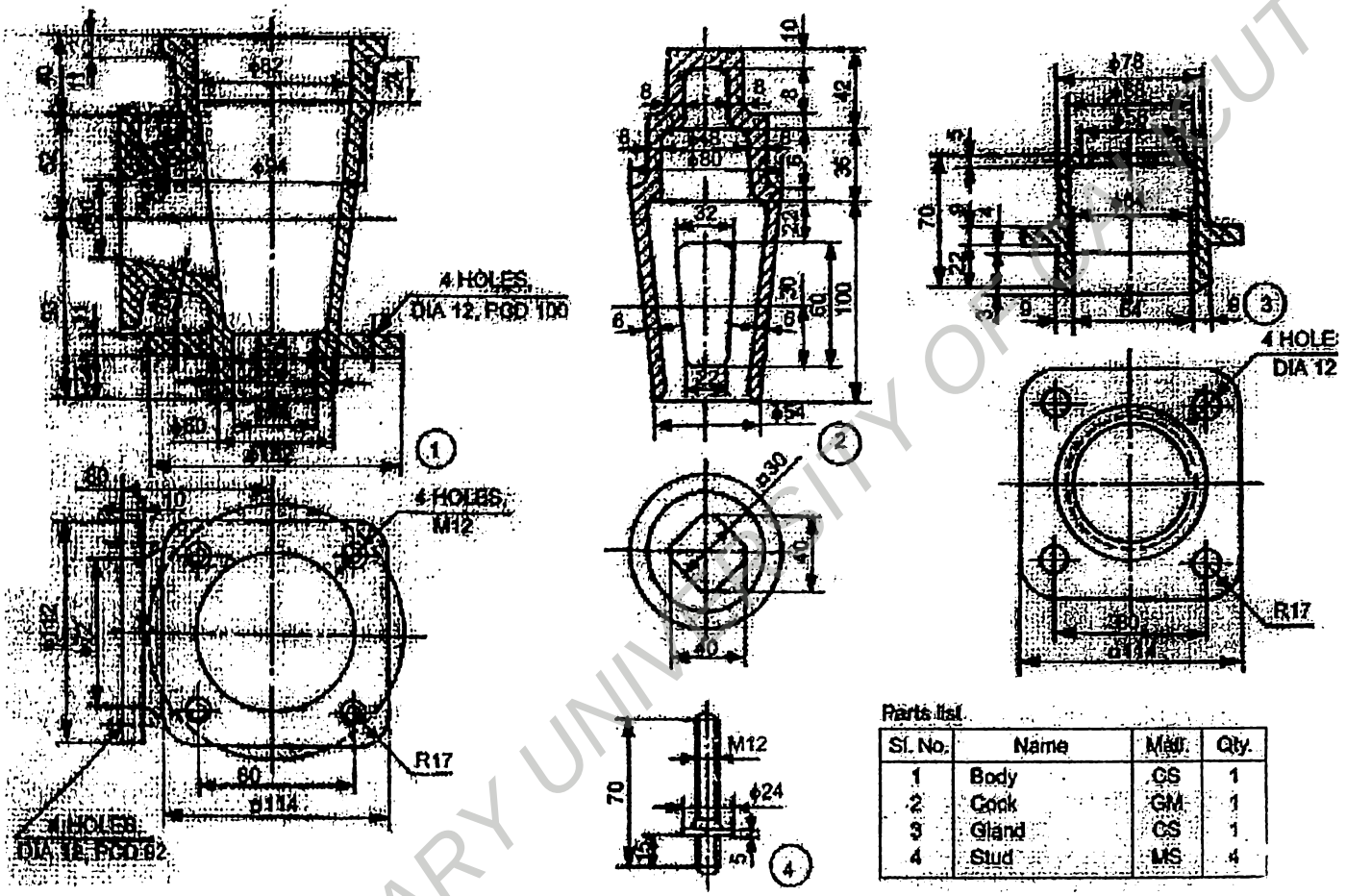


Fig. 5 Eccentric Parts

(1 × 45 = 45 marks)

D 92048 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Mechanical Engineering

ME 14 305—METALLURGY AND MATERIAL SCIENCE

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Explain the specimen preparation technique for microstructural examination of materials.
2. Show that the atomic packing factor for the FCC crystal structure is 0.74.
3. State Hume Rothery's rules for formation of substitutional solid solutions.
4. Explain about annealing.
5. What is meant by hardenability ? What are the factors affecting it ?
6. Compare the deformation by slip and twinning.
7. Draw and explain the different stages of a creep curve.
8. State the effects of following alloying elements in steel : (i) Mn ; (ii) Ni ; (iii) Ti.
9. List the properties and applications of malleable cast iron.
10. Write a short note on composites.

(8 × 5 = 40 marks)

Part B

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

11. (a) Explain with neat sketches the construction and working principle of a scanning electron microscope (SEM). State its applications.

Or

(b) What is meant by crystal imperfections ? Illustrate and discuss the different types of line defects in crystals.

Turn over

12. (a) Sketch and explain the phase diagram for an isomorphous system.

Or

(b) Draw the equilibrium diagram of Iron-Carbon system and discuss transformations that take place from melting point to room temperature at any percentage of carbon.

13. (a) (i) Derive an expression for critical resolved shear stress in a material subjected to uniaxial tensile loading.

(8 marks)

(ii) Write short notes on work hardening.

(7 marks)

Or

(b) What is meant by ductile fracture ? Explain the mechanism of it.

14. (a) Explain the composition, properties and typical applications of aluminium alloys.

Or

(b) Discuss the composition, properties and applications of low, medium and high carbon steels.

[4 × 15 = 60 marks]

D 92047 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Mechanical Engineering

ME 14 306/MT 14 305—ELECTRICAL TECHNOLOGY

Time : Three Hours Maximum : 100 Marks

Part A

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

1 Briefly discuss the operation of a three-phase transformer.

2 A 200 kVA single-phase transformer is in circuit continuously. For 8 hrs in a day, the load is 160 kW at 0.8 p.f. For 6 hrs, the load is 80 kW at unity p.f. and for the remaining period of 24 hrs, it runs on no-load. Full-load copper losses are 3.02 kW and iron losses are 1.6 kW. Find all day efficiency.

3 Write notes on the role of damping torque in a measuring instrument.

4 Enumerate the advantages of an electric drive.

5 Discuss the static characteristics of a silicon controlled rectifier.

6 A shunt generator delivers 195 A at a terminal of 250 V. The Armature resistance and shunt field resistance are 0.02 ohms and 50 ohms respectively. The Iron and friction losses equal to 950 W. Find : E.m.f. generated, Cu losses, output of prime mover in kW, commercial-mechanical-electrical efficiencies.

7 With a diagram, explain the operation of a three point starter.

8 Briefly describe the distribution factor and chording factor with respect to the alternator.

9 Explain the working of a star-delta starter. What are its advantages and limitations ?

10 Discuss the power flow diagram of a three-phase induction motor.

(8 × 5 = 40 marks)

Part B

II. Answer *all* questions :

11 a) A 50 KVA,4400/220 V transformer has R_1 = 3.45 ohms, R_2 = 0.009 ohms. The value of reactance are X_1 = 5.2 ohms and X_2 = 0.015 ohms. Calculate for the transformer (a) equivalent resistance as referred to primary ; (b) equivalent resistance as referred to secondary ; (c) equivalent reactance as referred to both primary and secondary ; (d) equivalent impedance as referred to both primary and secondary ; (e) total Cu loss, first using individual resistances of the two windings and secondly, using equivalent resistances as referred to each side.

(7½ marks)

Turn over

b) Write notes on open circuit test on a transformer.

(7½ marks)

Or

12 a) With a neat constructional diagram, explain the working principle of an induction type energy meter.

(7½ marks)

b) What are the types of moving iron instruments ? Explain any one type briefly.

(7½ marks)

13 Draw the circuit diagram of a single-phase AC voltage controller with R load and explain how the output voltage can be varied. Derive the expression for r.m.s. value of the output voltage.

Or

14 a) Describe the components of load torque of an electric drive.

(7½ marks)

b) What type of a power electronic converter can be used to control the speed of a d.c. motor, if the input source available is also d.c.

(7½ marks)

15 Explain with neat graphs, the characteristics of a d.c. motor.

Or

16 a) Discuss the method of speed control of a d.c. motor.

(7½ marks)

b) Derive the e.m.f. equation of an alternator.

(7½ marks)

17 a) Derive the torque equation of a 3-phase induction motor.

(7½ marks)

b) Write notes on three-phase induction motor drives.

(7½ marks)

Or

18 a) What is a no-load test ? Describe.

(7½ marks)

b) With a block diagram explain the concept of slip and rotor frequency.

(7½ marks)

[4 × 15 = 60 marks]

D 92046 (Pages : 5) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Mechanical Engineering

ME 14 304—MECHANICS OF SOLIDS

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Define the following :

   (i) Poisson's ratio ;

   (ii) Proportional limit ;

   (iii) Elastic limit.

2. A railway line is laid so that there is no stress in the rails at 15°C. Calculate the stress in rails at 60°C, if :

   (i) There is no expansion allowance ;

   (ii) There is an expansion allowance of 10 mm/rail.

   Length of rail = 30 m, $E = 2 \times 10^5$ N/mm^2 and $\alpha = 12 \times 10^{-6}$/°C

3. A specimen of steel 50 mm in diameter and 1000 mm long is subjected to an axial tension of 200 kN. Change length was recorded as 0.509 mm and change in diameter as 0.0076 mm. Calculate : (i) Young's modulus, (ii) Poisson's ratio, and (iii) Bulk modulus.

4. A hollow shaft of external diameter 120 mm transmits 300 kW power at 200 r.p.m. Determine the maximum internal diameter if the maximum stress in the shaft is not to exceed 60 N/mm^2.

5. A cantilever of length 2 m carries a uniformly distributed load of 1.5 kN/m run over the whole length and a point load of 2 kN at a distance of 0.5 m from the free end. Draw the shear force and bending moment diagrams for the cantilever.

6 What do you mean by 'simple bending' ? What are the assumptions made in the theory of simple bending ?

7 A beam 3 m long, simply supported at its ends, is carrying a point load W at the centre. If the slope at the ends of the beam should not exceed 1°, find the deflection at the centre of the beam.

Turn over

8 A rectangular bar of cross-sectional area of 11000 mm^2 is subjected to a tensile load P as shown in Fig. 1. The permissible normal and shear stresses on the oblique plane BC are given as 7 N/mm^2 and 3.5 N/mm^2 respectively. Determine the safe value of P.

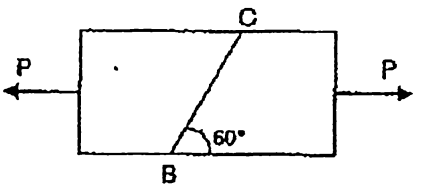


Fig. 1

9. An offset link subjected to a force of 25 kN is shown in Fig. 2. It is made of grey cast iron FG300 (ultimate strength = 400 N/mm^2) and the factor of safety is 3. Determine the dimensions of the cross-section of the link.

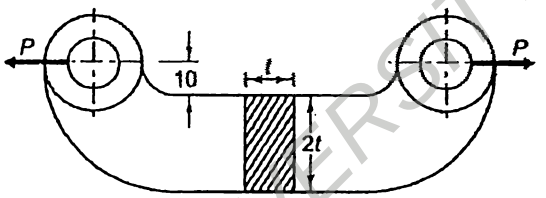


Fig. 2

10. Explain the assumptions made in the Euler's column theory. How far the assumptions valid in practice?

(8 × 5 = 40 marks)

Part B

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

11. (a) A member ABCD is subjected to point loads P_1, P_2, P_3 and P_4 as shown in the Fig. 3. Calculate the force P_2 necessary for equilibrium if P_1 = 45 kN, P_3 = 450 kN and P_4 = 130 kN. Determine the total elongation of the member, assuming the modulus of elasticity to be 2.1×10^5 N/mm^2.

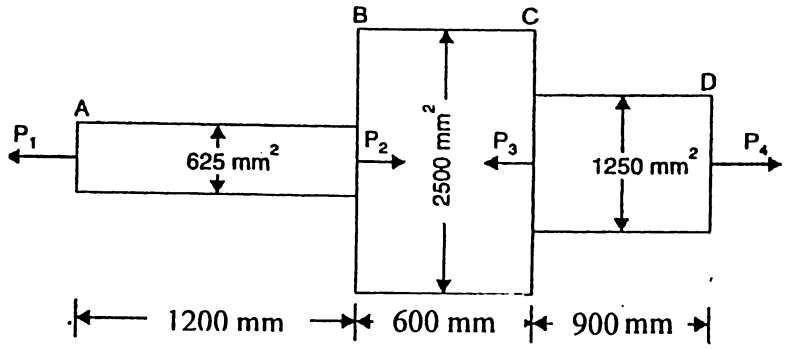


Fig. 3

Or

(b) A rigid horizontal beam hinged at A and supported by two steel bars at B and C carries a load of 160 kN in the position shown in Fig.4. Neglecting the self weight of the beam, determine the reaction in each bar and also at the hinge.

Take E = 210 kN/mm^2.

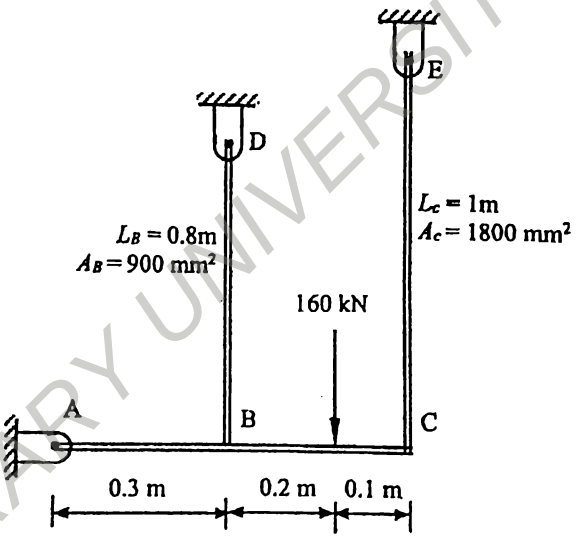


Fig. 4

12. (a) A solid circular shaft is to transmit 300 kW at 100 r.p.m.

(i) If the shear stress is not to exceed 80 N/mm^2, find its diameter.

(ii) What percentage saving in weight would be obtained if this shaft is replaced by a hollow one whose internal diameter equals 0.6 of the external diameter, the length, the material and maximum shear stress being the same ?

Or

(b) Draw the shear force and bending moment diagrams for the overhanging beam carrying uniformly distributed load of 2 kN/m over the entire length as shown in Fig. 5. Also locate the point of contraflexure.

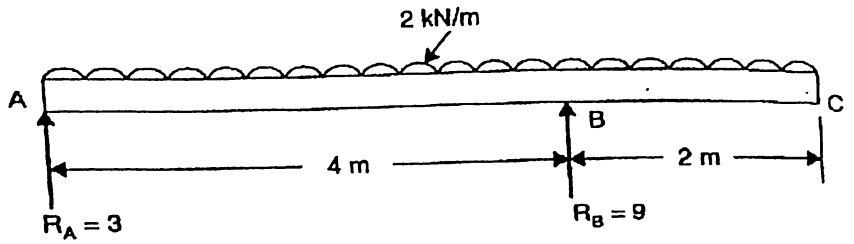


Fig. 5

13. (a) A cast iron beam is of T- section as shown in Fig.6. The beam is simply supported on a span of 8 m. The beam carries a uniformly distributed load of 1.5 kN/m on the entire span. Determine the maximum tensile and maximum compressive stresses.

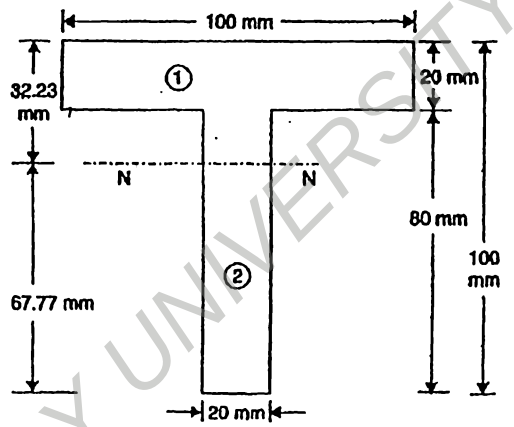


Fig.6

Or

(b) A beam of length 6 m is simply supported at its ends and carries two point loads of 48 kN and 40 kN at a distance of 1 m and 3 m respectively from the left support. Calculate the deflection under each load. Use Macaulay's method.

Take $E = 2 \times 10^5$ N/mm^2 and $I = 85 \times 10^6$ mm^4.

14. (a) Derive an expression for the Euler's crippling load for a long column when both ends of the column are hinged.

Or

(b) At a point in a strained material, on plane BC there are normal and shear stresses of 560 N/mm^2 and 140 N/mm^2 respectively. On plane AC, perpendicular to plane BC, there are normal and shear stresses of 280 N/mm^2 and 140 N/mm^2 respectively as shown in Fig.7. Determine the following :

(i) Principal stresses and location of the planes on which they act,

(ii) Maximum shear stress and the plane on which it acts.

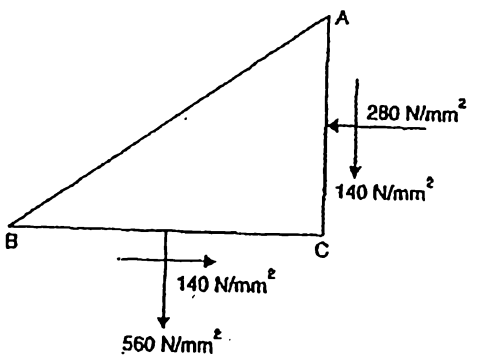


Fig.7

(4 × 15 = 60 marks)

D 92045 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Mechanical Engineering

ME 14 303—FLUID MECHANICS

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Calculate the density, specific weight and weight of one litre of petrol of specific gravity = 0.7.
2. State and prove the Pascal's law.
3. A stone weighs 392.4 N in air and 196.2 N in water. Compute the volume of stone and its specific gravity.
4. A pipe of diameter 400 mm carries water at a velocity of 25 m/s. The pressures at the points A and B are given as 29.43 N/cm^2 and 22.56 N/cm^2 respectively while the datum head at A and B are 28 m and 30 m. Find the loss of head between A and B.
5. The head of water over an orifice of diameter 100 mm is 12 m. The water coming out from the orifice is collected in a rectangular tank 2 m × 0.9 m. The rise of water level in this tank is 1.2 m in 30 seconds. Find the co-efficient of discharge.
6. Differentiate between: (i) Uniform and non-uniform flow (ii) Compressible and Incompressible flow.
7. A crude oil of kinematic viscosity 0.4 stoke is flowing through a pipe of diameter 300 mm at the rate of 300 litres per sec. Find the head lost due to friction for a length of 50 m of the pipe.
8. A 150 mm diameter pipe reduces in diameter abruptly to 100 mm diameter. If the pipe carries water at 30 litres/s, calculate the pressure loss across the contraction. Take the coefficient of contraction as 0.6.
9. A smooth plate 2 m wide and 2.5 m long is towed in oil (sp.gr. = 0.8) at a velocity of 1.5 m/s along its length. Find the thickness of boundary layer and shear stress at the trailing edge of the plate. Take kinematic viscosity of oil as 10^{-4} m^2/s.
10. Define the following : (i) Momentum thickness (ii) Energy thickness.

(8 × 5 = 40 marks)

Turn over

Part B

Answer **all** *questions.*

Each question carries 15 *marks.*

11 (a) A 15 cm diameter vertical cylinder rotates concentrically inside another cylinder of diameter 15.10 cm. Both cylinders are 25 cm high. The space between the cylinders is filled with a liquid whose viscosity is unknown. If a torque of 12 Nm is required to rotate the inner cylinder at 100 rpm, determine the viscosity of the fluid.

Or

(b) Determine the total pressure and centre of pressure on an isosceles triangular plate of base 4 m and altitude 4 m when it is immersed vertically in an oil of specific gravity 0.9. The base of the plate coincides with the free surface of oil.

12 (a) 250 litres/s of water is flowing in a pipe having a diameter of 300 mm. If the pipe is bent by 135° (that is change from initial to final direction is 135°), find the magnitude and direction of the resultant force on the bend. The pressure of water flowing is 39.24 N/cm^2.

Or

(b) An oil of sp.gr. 0.8 is flowing through a venturimeter having inlet diameter 20 cm and throat diameter 10 cm. The oil-mercury differential manometer shows a reading of 25 cm. Calculate the discharge of oil through the horizontal venturimeter. Take $C_d = 0.98$.

13 (a) If for a two-dimensional potential flow, the velocity potential is given by $\Phi = x(2y - 1)$, determine the velocity at the point P (4,5). Determine also the value of stream function Ψ at the point P.

Or

(b) Derive Hagen-Poiseuille equation for laminar flow and state the assumptions made.

14 (a) A thin plate is moving in still atmospheric air at a velocity of 5 m/s. The length of the plate is 0.6 m and width 0.5 m. Calculate : (i) the thickness of the boundary layer at the end of the plate, and (ii) drag force on one side of the plate. Take density of air as 1.24 kg/m^3 and kinematic viscosity as 0.15 stokes.

Or

(b) Water is flowing over a thin smooth plate of length 4 m and width 2 m at a velocity of 1.0 m/s. If the boundary layer flow changes from laminar to turbulent at a Renold number 5×10^5, find (i) the distance from leading edge upto which boundary layer is laminar, and (ii) the drag force on one side of the plate. Take viscosity of water as 9.81×10^{-4} Ns/m^2.

(4 × 15 = 60 marks)

D 92044 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Computer Science and Information Technology Engineering

IT/CS 14 306—SWITCHING THEORY AND LOGIC DESIGN

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*

Each question carries 5 *marks.*

1. Perform the following conversions :

   (i) $(225.225)_{10} = ()_2$. (ii) $(10001.101)_2 = ( )_{10}$.

   (iii) $(0.365)_8 = ( )_{10}$. (iv) $(0.513)_{10} = ( )_8$.

2. What is meant by Dont' care Conditions? Justify how are they useful in simplifying boolean expressions.

3. Compare between K-map and Quine -Mc Cluskey Methods for simplifying boolean expressions.

4. Design & Implement a full adder using : (i) Basic gates ; and (ii) Two half adders.

5. Why do we call NAND and NOR gates as Universal Gates ? Give justification with necessary gate realizations using NAND .

6. Explain the working principle of carry propagate adder with diagram.

7. Differentiate between Johnson and Ring counter with diagrams.

8. What is shift Register ? Discuss the different types of shift registers in brief.

9. Describe static hazard with an example.

10. What is meant by hazard free switching circuit? Discuss it with an example.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*

Each question carries 15 *marks.*

11. (a) Explain different methods used to represent signed numbers in binary system.

    (b) Write the following numbers in different methods using 8 bit representation.

        (i) + 23.

        (ii) – 57.

        (iii) + 85

Or

12. Simplify the Boolean function F (A, B, C, D) = Σm (1, 3 ,5, 7 , 8, 9, 11) using K-Map.

13. Explain the operation of 4 bit Carry Look Ahead Adder and compare its performance with Carry Propagate Adder.

Or

14. Design a magnitude comparator Circuit to compare two 2-bit numbers and explain its working.

15. (a) Draw the NAND only logic diagram of JK flip flop and explain its operation.

    (b) Design a 4 bit Ring counter using D flip-flops and explain its operation with the help of initial bit pattern 0001.

Or

16. Design a synchronous decade counter using JK flip-flops.

17. Describe the fault detection using path sensitizing method with suitable example.

Or

18. Describe in detail the fault classes and models with suitable examples.

(4 × 15 = 60 marks)

D 92043 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Computer Science and Information Technology Engineering

IT/CS 14 305—ELECTRONIC CIRCUITS

Time : Three Hours Maximum : 100 Marks

Part A

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

I. 1 Write short notes on Schmitt trigger.

2 Explain the operation on transistor.

3 Explain about clipping and clamping circuits.

4 What is digital switching ? Explain.

5 Bring out the characteristics of E-MOSFET.

6 Differentiate CMOS from NMOS technologies.

7 Explain the concepts of MSI.

8 Explain the features of VLSI technology.

9 Explain the significance of timing circuits in ADC.

10 Discuss the principle of CD-ROM with a neat diagram.

(8 × 5 = 40 marks)

Part B

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

II. a) Draw a neat circuit diagram of astable multivibrator and explain its principle of operation.

Or

b) With a neat circuit diagram, explain the principle of operation of a bistable multivibrator.

III. a) Explain the dual gate D-MOSFET's with neat diagrams.

Or

b) Draw an op-amp comparator with non-zero reference and explain in detail.

Turn over

IV. a) Draw the circuit diagram of ECL. Explain its principle of operation.

Or

b) Compare and contrast logic families.

V. a) Explain the basic concepts of ROM with neat diagrams in detail.

Or

b) Explain in detail about working of A/D and D/A convertors.

(4 × 15 = 60 marks)

D 92042 (Pages : 3) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Computer Science and Information Technology Engineering

IT/CS 14 304—DISCRETE COMPUTATIONAL STRUCTURES

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*

1. Show that $((P \vee Q) \wedge \neg(\neg P \wedge (\neg Q \vee R))) \vee (\neg P \wedge \neg Q) \vee (\neg P \wedge \neg R)$ is a tautology.

2. Let F (x, y) be the statement "x can fool y", where the domain consists of all people in the world. Use quantifiers to express the statements :

   (a) Everybody can fool somebody.

   (b) There is no one who can fool everybody.

3. Define maximal and minimal elements of a poset. Are they same as the greatest and least members of a poset ?

4. If S = [1, 2, 3, 4, 5] and if the functions $f, g, h : S \to S$ are given by :

$$f = \{(1,2),(2,1),(3,4),(4,5),(5,3)\}$$
$$g = \{(1,3),(2,5),(3,1),(4,2),(5,4)\}$$
$$h = \{(1,2),(2,2),(3,4),(4,3),(5,1)\}$$

   (a) Verify whether $f \circ g = g \circ f$.

   (b) Explain why f and g have inverses but h does not.

5. Give examples for relations defined on set A = [1, 2, 3, 4] that are :

   (i) reflexive, antisymmetric but not transitive.

   (ii) symmetric and transitive but not reflexive.

6. Prove that $(a * b)^{-1} = b^{-1} * a^{-1}$ for $a, b \in (G, *)$.

7. Define left cosets and right cosets of a group. When will they be same ?

8. Show that the inverse of an element a in a group is unique.

9. Solve the recurrence relation $a_n = 2a_{n-1} + 2^n$; $a_0 = 2$.

10. How will you use the notion of generating function to solve a recurrence relation ?

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*

11. (a) Prove that 'b' can be derived from the premises $a \to b, c \to b, d \to (a \vee c), d$ by the indirect method.

(b) Show that the premises "If you help me , then I will do my homework" ,"If you do not help me , then I will go to sleep early", and "If I go to bed early, the teacher will punish me " imply the conclusion. "If I do not do my homework, my teacher will punish me".

Or

12. (a) Show that $\exists x(P(x) \vee Q(x)) \Leftrightarrow \exists x P(x) \vee \exists x Q(x)$ is a logically valid statement.

(b) Prove that the premises $a \to (b \to c), d \to (b \wedge \neg c)$ and $(a \wedge d)$ are consistent.

13. (a) If R is the relation on the set of ordered pairs of positive integers such that $(a,b),(c,d) \in R$ if and only if $ad = bc$, prove that R is an equivalence relation.

(b) Draw the Hasse diagram representing the partial ordering relation $p = \{(a,b) / a \text{ is a divisor of } b\}$ on {3, 5, 9, 15, 24, 45}. Also find the minimal and maximal elements, the greatest and least elements, the upper bounds and LUB of {3, 5) and the lower bounds and GLB of {15, 45}.

Or

14. (a) If R is the relation on set A = {1,2,4,6,8} defined by aRb if and only if $\frac{b}{a}$ is an integer, show that R is a partial order on A.

(b) If $f : Z \to N$ is defined by $f(x) = 2x - 1$ if $x > 0$, $f(x) = -2x$ if $x \leq 0$, Prove that f is one — to one and onto.

15. (a) Explain group homomorphism. Discuss two properties of group homomorphism.

(b) If G is the set of all ordered pairs (a, b) where $a \neq 0$ and b are real and the binary operation $*$ on G is defined by $(a, b) * (c, d) = (ac, bc + d)$, show that $(G, *)$ is a non-abelian group.

Or

16. (a) Prove that the necessary and sufficient condition for a non-empty subset H of a group $(G, *)$ to be a subgroup is $a, b \in H \Rightarrow a * b^{-1} \in H.$.

(b) How will you use the generator matrix to get the code words corresponding to the given message words ?

17. Solve the recurrence relation $a_n = 4a_{n-1} - 4a_{n-2} + (n+1)2^n$.

Or

18. Use the method of generating function to solve the recurrence relation $a_{n+2} - 4a_n = 9n^2$; $n \geq 0$.

(4 × 15 = 60 marks)

D 92041 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Computer Science and Information Technology Engineering

IT/CS 14 303—COMPUTER ORGANIZATION AND DESIGN

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*
Draw suitable diagrams wherever necessary.

I. 1 Explain computer system bus.

2 Explain single bus structure of a computer system.

3 Explain adder/substractor logic unit with a diagram.

4 What is meant by fast-adder ? Explain.

5 Explain the components of ALU.

6 What is meant by data path in a computer system ?

7 Explain microprogramming.

8 Explain memory hierarchy.

9 Why cache memory is needed in a computer system ?

10 What is meant by virtual memory ?

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*
Draw suitable diagrams wherever necessary.

II. (a) Explain various addressing modes of a computer system.

Or

(b) Explain various representations of instructions and instruction sequencing.

III. (a) Explain binary multiplication of positive numbers with examples.

Or

(b) Explain the representation of floating point numbers with necessary diagrams.

Turn over

IV. (a) Explain about building data path in a processor in detail.

Or

(b) Explain in detail about the execution of a complete instruction.

V. (a) Explain the organization of cache memory in a computer system.

Or

(b) Explain virtual memory organization in a computer system.

(4 × 15 = 60 marks)

D 92040 (Pages : 2) Name..... .....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

EN 14 302—COMPUTER PROGRAMMING IN C

Time : Three Hours Maximum : 100 Marks

Part A

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

1 Explain various input output devices.

2 Write short notes on Wi-Fi.

3 Draw the flowchart for computing the roots of the quadratic equation.

4 Write a program to accept a character and print whether the given character is a "Vowel" or "Consonant".

5 Enunciate about various string functions.

6 Write a program to add the given matrices.

7 Write a recursive function to find the factorial of a given number.

8 State the difference between pointer to an array and array of pointers with an example.

9 Create a structure called "Patient" with member's patientid, name, doctor_id and diagnosis. Print all patients treated by doctor with id "444".

10 Write a program to read the contents of input file character by character and count the number of characters.

(8 × 5 = 40 marks)

Part B

II. Answer *all* questions :

11 Write short notes on computer networks.

Or

12 Explain in detail the components of a computer.

13 Ram's basic salary is input through the keyboard. His dearness allowance is 40% of basic pay and house rent allowance is 20% of basic pay. Write a program to calculate his gross salary.

Or

Turn over

14 Write a C program to find a peculiar two digit number which is three times the sum of digit.

15 Create a function perimeter() to find the perimeter of the rectangle.

Or

16 Write a program to find the sum of squares of the diagonal elements of the given matrix.

17 Create structure for storing the details of postal address (Eg. Doorno, Street, City, State and Pincode). Create a structure for student which consists of name, roll no and address. Use the structure definitions to store the details of 10 students and print all the student details from a particular state.

Or

18 Write a program to read the contents of a file and copy only the numerals to another file.

(4 × 15 = 60 marks)

D 92039 (Pages : 4) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

EN 14 301—ENGINEERING MATHEMATICS—III

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions from Part A.*
Each question carries 5 *marks.*

I. (a) Check whether the function $f(z)=z^3$ is analytic ? If so find the derivative.

(b) Determine the analytic function $u+iv$, whose real part is $x^3-3xy^2+3x^2-3y^2+1$.

(c) Under the transformation $w=\frac{1}{z}$, find the image of $|z-2i|=2$.

(d) Evaluate $\int_0^{1+i}\left(x^2-iy\right)dz$ along the path $y=x^2$.

(e) Evaluate $\int_{|z+1|=1}\frac{z^2+1}{z^2-1}dz$.

(f) Expand $\cos z$ about $z=\pi/2$.

(g) Prove that the vectors $(1,1,-2),(2,1,0)$ and $(2,-2,1)$ are linearly independent of each other and express $(3,-4,0)$ as a linear combination of the above set of vectors.

(h) Find a basis, the dimension of the sub-space W of R^4 generated by $(1,-4,-2,1),(1,-3,-1,2)$ and $(3,-8,-2,7)$.

(i) Using the Fourier integral representation, show that $\int_0^\infty \frac{w\sin x\,w}{1+w^2}\,dw = \frac{\pi}{2}e^{-x}, (\ x>0.$

(j) Find the Fourier cosine transform of the function $f(t)$ defined by

$$f(t)=\begin{cases} t, & 0<t<1 \\ 2-t, & 1<t<2. \\ 0, & t\geq 2 \end{cases}$$

(8 × 5 = 40 marks)

Part B

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

MODULE I

II. (a) Prove that $f(z)=x^3\frac{(1+i)-y^3(1-i)}{x^2+y^2}, z\neq 0$ and $f(0)=0$ is continuous and satisfies CR equations at the origin, but $f'(0)$ does not exist. (8 marks)

(b) Show that $u=e^{-x}(y\cos y+y\sin y)$ is harmonic and find the analytic function whose real part is u. (7 marks)

Or

III. (a) Prove that $w=\frac{z}{1-z}$ maps the upper half plane into the upper half plane. What is the image of $|z|=1$? (8 marks)

(b) Find the bilinear transformation which maps $(2, i, -2)$ into the points $(1, i, -1)$. (7 marks)

MODULE II

IV. (a) Evaluate $\int_C \frac{3z^2+2}{(z-1)(z^2+9)}dz$ where C is $|z-2|=2$, by Cauchy's residue theorem.

(7 marks)

(b) Expand $\frac{1}{z^2-7z+12}$ in (i) $|z|<3$; (ii) $3<|z|<4$; (iii) $|z|>4$; and (iv) $0<|z-3|<1$.

(8 marks)

Or

V. (a) Show that $\int_0^{2\pi} \frac{d\theta}{\sqrt{2}-\cos\theta} = 2\pi$. (8 marks)

(b) Evaluate $\int_{-\infty}^{\infty} \frac{dx}{(1+x^2)^2}$. (7 marks)

MODULE III

VI. (a) Show that the vector $(3,9,-4,2)$ is not a linear combination of the vectors $(1,-2,0,3)$ and $(2,-2,2,1)$. (6 marks)

(b) Using Gram-Schmidt process find an orthonormal basis for the subspace of R^3 spanned by $(1,1,0),(1,0,1),(1,-1,2)$. (9 marks)

Or

VII. (a) If x and y are any *two* vectors in an Euclidean space V prove that $2\left(\|x\|^2+\|y\|^2\right)=\|x+y\|^2+\|x-y\|^2$. (5 marks)

(b) Find the co-ordinates of the vectors $(1,1,1),(0,4,0),(2,-2,-4)$ in R^3 relative to the basis $\{(2,-1,1),(2,0,3),(1,1,-2)\}$. (10 marks)

Turn over

MODULE IV

VIII. (a) Find the Fourier transform of $f(t)=\begin{cases}1-t^2, & |t|<1\\ 0, & |t|>1\end{cases}$. Hence evaluate $\int_0^\infty \frac{x\cos x-\sin x}{x^3}\,dx$.

(8 marks)

(b) Find the inverse Fourier transform of $\frac{1}{2w^2+3iw+5}$. (4 marks)

(c) If $F\{f(t)\}=F(w)$ prove that $F\{f(t-t_0)\}=e^{-iwt}F(w)$. (3 marks)

Or

IX. (a) Using Fourier integral representation prove that :

(i) $\int_0^\infty \frac{\lambda \sin x\lambda}{1+\lambda^2}\,d\lambda=\frac{\pi}{2}e^{-x}$ for $x\geq 0$.

(ii) $\int_0^\infty \frac{\cos x\lambda}{1+\lambda^2}\,d\lambda=\frac{\pi}{2}e^{-x}$ for $x\geq 0$.

(10 marks)

(b) Find the Fourier transform of $f(t)=\begin{cases}1-t, & |t|\leq 1\\ 0, & |t|>1\end{cases}$. (5 marks)

[4 × 15 = 60 marks]

D 92038 (Pages : 3) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Mechatronics Engineering

MT 09 305—ELECTRICAL TECHNOLOGY

Time : Three Hours Maximum : 70 Marks

Part A

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

1. Define Kirchhoff's laws.
2. Three equal resistances connected in star across a three-phase balanced supply consume 1000 W. If the resistors were connected in delta across the same supply, determine the power consumed.
3. A DC motor takes 40 A at 220 V and runs at 800 r.p.m. If the armature and field resistances are 0.2 ohms and 0.1 ohms respectively, find the torque developed in the armature.
4. A 12 pole 3-phase alternator driven at a speed of 500 r.p.m. supplies power to an 8 pole 3-phase induction motor. If the slip of the motor at full-load is 3%, calculate the full-load speed of the motor.
5. Consider a 50 Hz, four pole three-phase induction motor. Initially the rotor is stationary, calculate the relative speed.

(5 × 2 = 10 marks)

Part B

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

6. Find I_1, I_2, I_3 in the network shown using loop current method as shown in Figure. 1 against resistances indicate their values in ohms.

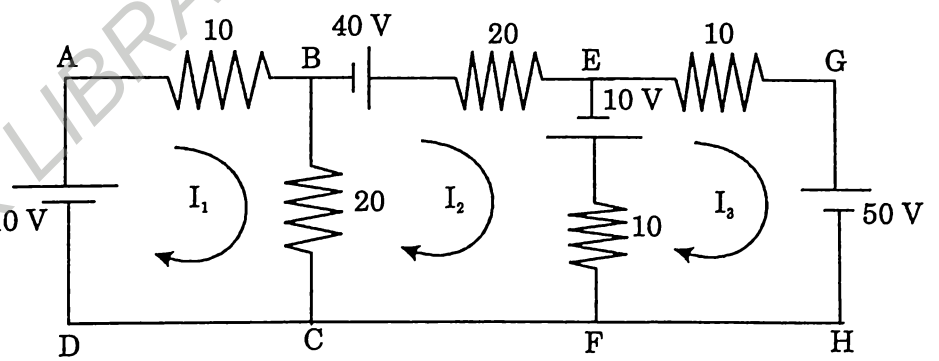


Figure. 1

Turn over

7. Discuss the 3 wattmeter method of measuring power.

8. A 250 V, DC shunt motor takes 4A rated voltage on no-load. Armature and field resistances are 0.5 ohms and 250 ohms respectively. Calculate the efficiency of the motor for a load current of 40 A.

9. Write notes on the working principle of a transformer.

10. A 6-pole, 3-phase induction motor develops 30 horse power (22.38 kW) including mechanical losses totalling 2 HP at a speed of 950 rpm on 550 volts, 50 Hz mains. The p.f. is 0.88. Neglect core losses. Calculate for this load the following : (i) the slip ; (ii) rotor copper loss ; (iii) total input if the stator losses are 2000 watts ; (iv) the line current.

11. Describe the working and application of a universal motor.

(4 × 5 = 20 marks)

Part C

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

12. In the network shown in Figure.2 (a) Find resistance RL connected between terminals *a* and *b* so that maximum power is developed across R_L. What is the maximum power ?

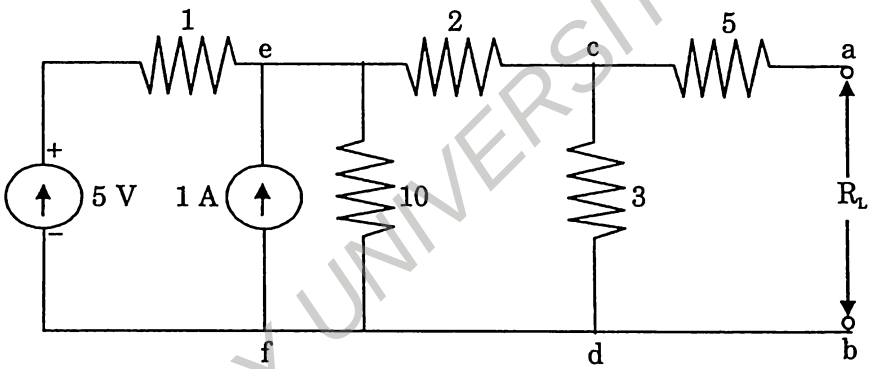


Figure. 2

Or

13. Find RN, IN, the current flowing through and Load Voltage across the load resistor in Figure. 3 by using Norton's Theorem.

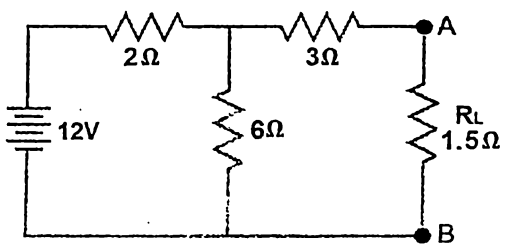


Figure.3

14. A coil of resistance 20 ohms and an inductance of 60 mH is connected in series with a 13 μF capacitor across a 230 V 50 Hz supply. Calculate :

    (i) The impedance.

    (ii) The power factor of the circuit.

    (iii) The current flowing in it.

    (iv) The voltage across the coil.

    (v) The voltage across the capacitor.

Or

15. Three similar coils each of resistance 10 ohms and an inductance of 505 H are connected : (i) in star ; (ii) in delta to the three-phase 400 V, 50 Hz symmetrical system. Find the phase current, line currents, total phase power and total line power.

16. A 20 kW, 200 kV DC shunt generator has armature and field resistance of 0.5 ohms and 150 ohms, respectively. Determine the total armature power developed : (i) when working as a generator delivering 20 kW output and (ii) when working with a motor taking 20 kW.

Or

17. Derive the expressions for the back emf, torque and power developed in a d.c. motor.

18. Discuss the parameters used for the selection of a motor for a specific application. Also justify what type of motors is suitable for a mixie and machine tools application.

Or

19. a) Write notes on the torque slip characteristics of an induction motor. (5 marks)

    b) Describe the techniques used to start a three-phase induction motor. (5 marks)

[4 × 10 = 40 marks]

D 92037 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Mechatronics Engineering

MT 09 303—THERMODYNAMICS AND HEAT TRANSFER

Time : Three Hours Maximum : 70 Marks

Part A

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

1. What are point and path functions ?
2. Define Enthalpy.
3. Define specific fuel consumption.
4. List some merits of multi stage turbines.
5. What is overall heat transfer co-efficient ?

(5 × 2 = 10 marks)

Part B

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

6. Calculate ΔU and ΔH in kJ for 1 kmol of water, as it is vaporized at the constant temperature of 373 K and constant pressure of 101.3 kPa. The specific volume of liquid and vapour at these conditions are 1.04×10^{-3} and 1.675 m^3/kmol respectively ; 1030 kJ of heat is added to water for this change.
7. With a short notes, brief on reversible and irreversible process for thermodynamic system.
8. Differentiate between S.I. and C.I. engine.
9. Explain briefly the principle of open cycle gas turbine with diagram.
10. Explain briefly on laws of radiation in heat transfer.
11. Derive one dimensional steady state heat conduction in a hollow cylinder.

(4 × 5 = 20 marks)

Turn over

Part C

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

12. Using Clausius inequality show that the change in entropy in a process is related to the heat interaction as $dS \geq \frac{dQ}{T}$ where the greater than sign refers to an irreversible process and equal to sign refers to a reversible process.

Or

13. Derive the relationship for heat capacity at constant pressure and constant volume process for an ideal gas.

14. With a neat sketch, explain the working principle of a four-stroke I.C. engine.

Or

15. In an air - standard Carnot cycle, the following quantities are specified : minimum cycle temperature = 350 K, maximum cycle temperature = 1500 K, minimum cycle pressure = 101.325 kPa, Heat added to cycle = 300 kJ/kg. Determine : a) Cycle thermal efficiency ; b) the isentropic compression ratio ; c) the pressure ratio ; d) the maximum cycle pressure ; and e) the mep.

16. A closed cycle ideal gas turbine plant operates between temperature limits of 800°C and 30°C and produces a power of 100 kW. The plant is designed such that there is no need for regenerator. A fuel of calorific 45000 Kj/kg is used. Calculate the mass flow rate of air through the plant and rate of fuel consumption.

Or

17. In a gas turbine plant working on Brayton cycle, the air at inlet is 27°C, 0.1 MPa. the pressure ratio is 6.25 and the maximum temperature is 800°C. The turbine and compressor efficiencies are each 80%. Find compressor work, turbine work, heat supplied, cycle efficiency and turbine exhaust temperature. Mass of air may be considered as 1 kg. Draw T-s diagram.

18. Explain in detail the three modes of heat transfer with examples with an application.

Or

19. A metal plate of 4 mm thickness (k = 95.5W/m°C) is exposed to vapour at 100°C on the one side and cooling water at 25°C on the other side. The heat transfer coefficients on the vapour side and water side are 14500 W/m^2°C and 2250 W/m^2°C respectively. Determine : i) the rate of heat transfer ; and ii) the overall heat transfer co-efficient.

(4 × 10 = 40 marks)

D 92036 (Pages : 3) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Automobile Engineering

AM 09 305—THERMODYNAMICS

Time : Three Hours Maximum : 70 Marks

Part A

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

1. What is a quasi-static process ? What is its characteristic feature ?
2. Define Enthalpy. Why does the enthalpy of an ideal gas depend only temperature ?
3. How did Rudolf Clausius summarize the first and second laws of thermodynamics ?
4. What do you understand by triple point ?
5. What is foldback temperature ?

(5 × 2 = 10 marks)

Part B

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

6. If it is desired to melt aluminium with solid state specific heat 0.9kJ/kgK, latent heat 39. kJ/kg ; atomic weight 27, density in molten state 2400 kg/m^3 and final temperature 7000 C, find out how much metal can be melted per hour with the above kW rating. Other data are as in the above example. Also, find the mass of aluminium that the above furnace will hold. The melting point of aluminum is 6600 C.
7. A in a steam power station, steam flows steadily through a 0.2 m diameter pipeline from the boiler to the turbine. At the boiler end, the steam conditions are found to be : p = 4 MPa, t = 4000 C, h = 3213.6 kJ/kg, and v = 0.073 m^3/kg. At the turbine end, the conditions are found to be : p = 3.5 MPa, t = 3920 C, h = 3202.6 kJ/kg, and + 0.084 m^3/ kg. There is a heat loss of 8.5 kJ/kg from the pipeline. Calculate the steam flow rate.

Turn over

8. Calculate the decrease in available energy when 25 kg of water at 950 C mix with 35 kg of water at 350 C, the pressure being taken as constant and the temperature of the surroundings being 150 C (cp of water = 4.2 kJ/kg K)

9. Find the enthalpy, entrophy, and volume of steam at 104 MPa, 3800 C.

10. The specific heats of a gas are given by Cp = a + kT and Cv = b + kT, where a, b, and k are constants and T is in K. Show that for an isentropic expansion of this gas :

    Tb va-b ekT = constant.

11. Briefly explain Joule-Kelvin effect. What is inversion temperature ?

(4 × 5 = 20 marks)

Part C

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

12. A fluid is confined in a cylinder by a spiring-loaded, frictionless piston so that the pressure in the fluid is a linear function of the volume (p = a + bV). The internal energy of the fluid is given by the following equation :

$$U = 34 + 3.15\ pV$$

Where U is in kJ, p in kPa, 0.03 m^3 to a final state of 400 KPa, 0.06 m^3, with no work other than that done on the piston, find the direction and magnitude of the work and heat transfer.

Or

13. In a reciprocating engine, the mass of gas occupying the clearance volume is m_c kg at state p_1, u_1, v_1 and h_1. By opening the inlet valve, m_f kg of gas is taken into the cylinder, and at the conclusion of the intake process the state of the gas is give by p_2, u_2, v_2, h_2. The state of the gas in the supply pipe is constant is given by p_p, u_p,v_p, h_p, V_p. How much heat is transferred between the gas and the cylinder walls during the intake process ?

14. The following data were obtained with a separating and throttling calorimeter :

Pressure in pipeline	–	1.5 MPa
Condition after throttling	–	0.1 MPa, 110°C
During 5 min moisture collected in the separator	–	0.150 litre at 70°C
Steam condensed after throttling during 5 min	–	3.24 kg

Find the quality of steam in the pipeline.

Or

15. In a steam boiler, hot gases from a fire transfer heat to water which vaporizes at constant temperature. In a certain case, the gases are cooled from 11000 C to 5500 C while the water evaporates at 2200 C. The specific heat of gases is 1.005 kJ/kgK, and the latent heat of water 2200 C, is 1858.5 kJ/kg. All the heat transferred from the gases goes to the water. How much does the total entropy of the combined system of gas and water increase as result of the irreversible heat transfer ? Obtain the result on the basis of 1 kg of water evaporated. If the temperature of the surroundings is 300 C, find the increase in unavailable energy due to irreversible heat transfer.

16. A steam turbine receives 600 kg/h of steam at 25 bar, 3500C. At a certain stage of the turbine, steam at the rate of 150 kg/h is extracted at 3 bar, 2000C. The remaining steam leaves the turbine at 0.2 bar, 0.92 dry. During the expansion process, there is heat transfer from the turbine to the surroundings at the rate of 10 kJ/s. Evaluate per kg of steam entering the turbine (a) The availability of steam entering and leaving the turbine ; (b) The maximum work ; and (c) The irreversibility. The atmosphere is at 300C.

Or

17. A mixture of ideal gases consists of 3 kg of nitrogen and 5 kg of carbon dioxide at a pressure of 300 kPa and a temperature of 200 C. Find the (a) The mole fraction of each constituent ; (b) The equivalent molecular weight of the mixture ; (c) The equivalent molecular weight of the mixture ; (d) The equivalent gas constant of the mixture ; (e) The partial pressures and the partial volumes ; (f) The volume and density of the mixture ; and (g) The Cp and Cv of the mixture. If the mixture is heated at constant volume to 400 C, find the changes in internal energy, enthalpy and entropy of the mixture. Find the changes in internal energy, enthalpy and entropy of the mixture if the heating is done at constant pressure. Take γ for CO_2 and N_2 to be 1.286 and 1.4 respectively.

18. Water at 300 C flow into a cooling tower at the rate of 1.15 kg per kg of air. Air enters the tower at a dbt of 200 C and a relative humidity of 60% and leaves it at a dbt of 280 C and 90 % relative humidity. Make-up water is supplied at 200 C. Determine : (i) The temperature of water leaving the tower ; (ii) The fraction of water evaporated ; and (iii) The approach and range of the cooling tower.

Or

19. Water from a cooling system is itself to be cooled in a cooling tower at a rate of 2.78 kg/s. The water enters the tower at 650 C and leaves a collecting tank at the base at 380 C. Air flows through the tower, entering the base at 150 C, 0.1 MPa, 55% RH, and leaving the top at 350 C, 0.1 MPa, saturated. Make-up water enters the collecting tank at 140 C. Determine the air flow rate into tower in m^3/s and the make-up water flow rate in kg/s.

(4 × 10 = 40 marks)

D 92034 (Pages : 3) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Biomedical Engineering

BM 09 306—ANALOG ELECTRONICS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

Each question carries 2 *marks.*

1. Compare amplifier classes based on operating cycle and power efficiency.
2. State the conditions to be met to get sustained oscillations in oscillators.
3. Draw the circuit conditions and waveform for the OFF state of SCR.
4. What are the characteristics of ideal op-amp ?
5. List some applications of monostable multivibrator.

(5 × 2 = 10 marks)

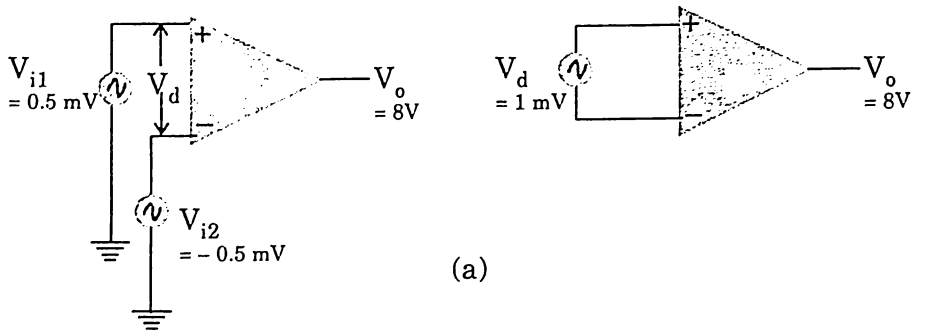
Part B

Answer any **four** *questions.*

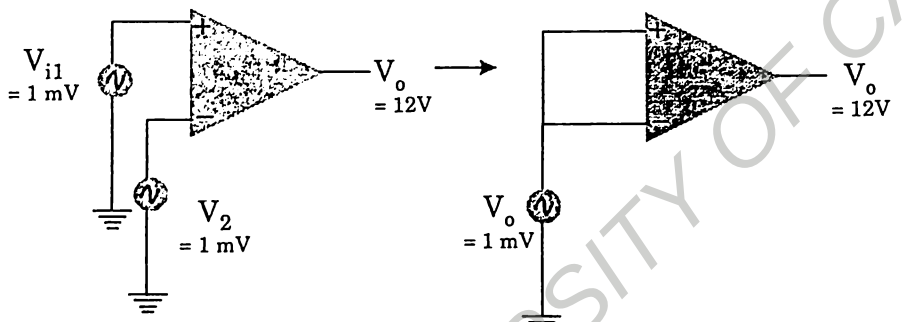
Each question carries 5 *marks.*

6. Derive the hybrid parameters of a transistor in CE configuration.
7. Give the block schematic of amplifier. Derive the amplifier input and output resistance.
8. Deduce the Barkausen criterion for the generation of sustained oscillations. How are the oscillations initiated ?
9. With neat sketch, brief about voltage divider biasing arrangement for enhancement-type MOSFET.

10. Calculate CMRR for the circuit measurements shown :



(a)



(b)

Differential and common-mode operation : (a) Differential - mode : (b) Common-mode

11. Write a note on current repeaters.

(4 × 5 = 20 marks)

Part C

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

12. (a) How to convert *h*-parameters in CB configuration to CE configuration ? Give the equivalent circuit.

Or

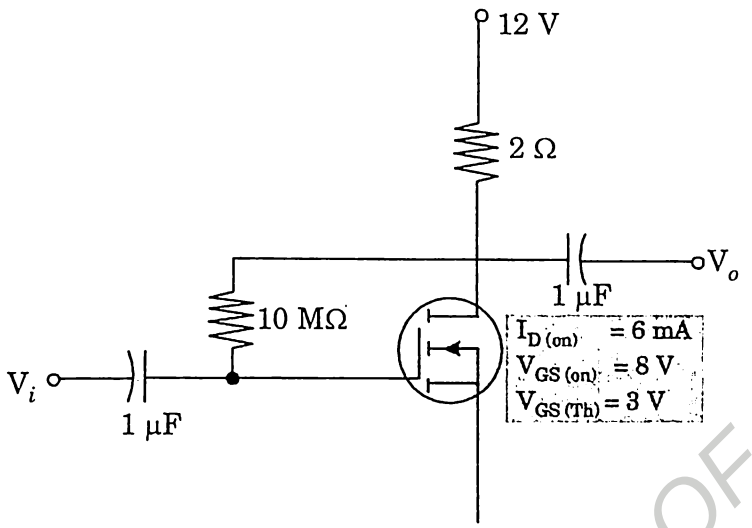
(b) Obtain the expression for maximum collector efficiency of class B push-pull amplifier.

13. (a) Draw the circuit and explain the principle of operation of R.C. phase-shift oscillator circuit. What is the frequency range of generation of oscillators ? Derive the expression for the frequency of oscillations.

Or

(b) Derive the expression for the output resistance with feedback in the case of : (i) Voltage series feedback ; and (ii) Current shunt feedback.

14. (a) Determine I_{DQ} and V_{DSQ} for the enhancement type MOSFET shown



Or

(b) Give the structure and symbol of SCR. Elaborate the characteristics of SCR.

15. (a) What is a differential amplifier ? Explain the operation of a basic differential amplifier.

Or

(b) Give the basic block diagram of monostable multivibrator. Construct a monostable multivibrator circuit using op-amp and explain the operation.

(4 × 10 = 40 marks)

D 92033 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Biomedical Engineering

BM 09 305—DIGITAL PRINCIPLES AND DESIGN

Time : Three Hours Maximum : 70 Marks

Part A

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

1. Given the two binary numbers X = 1010100 and Y = 1000011, Perform the subtraction using a) X-Y and Y-X using 2's complement.
2. Distinguish between combinational circuit and sequential circuit.
3. What is a Decoder ?
4. Define modulus counters.
5. Draw the moore machine with and without output decoder.

(5 × 2 = 10 marks)

Part B

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

6. List the various postulates and theorems of Boolean algebra.
7. Design a full adder circuit and draw its logic diagram.
8. What are the general steps to be followed to construct a mod-N counter ?
9. Describe the characteristics of ECL family.
10. Brief about the general sequential circuit.
11. Give the procedure for obtaining transition table from circuit diagram for an asynchronous sequential circuit.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*

Each question carries 10 *marks.*

12. (a) (i) State and prove DeMorgan's theorem. (4 marks)

(ii) Express the Boolean function $F = A + B' C$ as a sum of minterms. (6 marks)

Or

(b) Implement the following boolean function F using the two-level forms of logic (i) NAND-AND ; (ii) AND-NOR ; (iii) OR-NAND ; and (iv) NOR-OR.

$F(A, B, C, D) = \sum(0, 4, 8, 9, 10, 11, 12, 14)$.

13. (a) Design a BCD to excess-3 code converter with a reduced logic expression and logic diagram.

Or

(b) What is a clocked S-R flip-flop ? Explain the NOR based and NAND based clocked S-R flip-flop. Also give the characteristic table.

14. (a) Construct a shift-right register using a JK and D flip-flop and explain its operation using a timing waveform.

Or

(b) Construct a mod-10 counter using T-flip-flop. Give its state diagram, state table and logic diagram.

15. (a) Design a clocked sequential circuit whose state diagram is given below.

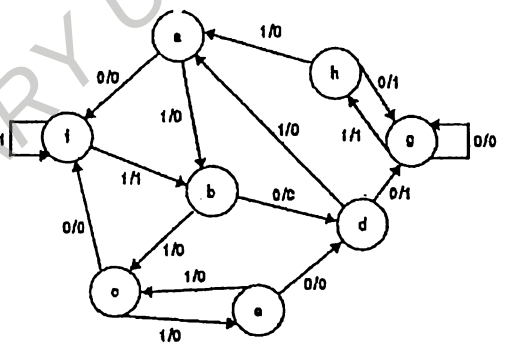


Figure 7.91 State diagram.

Or

(b) What is structural description ? Draw a majority voter circuit and write a VHDL structural description.

(4 × 10 = 40 marks)

D 92032 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Biomedical Engineering

BM 09 304—ELECTRICAL TECHNOLOGY

Time : Three Hours Maximum : 70 Marks

Part A

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

1. What is the principle of DC generator ?
2. A 25 kVA, single-phase transformer has 250 turns on the primary and 40 turns on the secondary winding. The primary is connected to 1500-volt, 50-Hz mains. Calculate (i) Primary and Secondary currents on full-load ; (ii) Secondary e.m.f. ; and (iii) Maximum flux in the core.
3. What is the difference between a d.c. generator and an alternator ?
4. Define synchronous speed. Give its expression.
5. State the conditions for satisfying balance condition in an a.c. bridge.

(5 × 2 = 10 marks)

Part B

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

6. Mention and explain the various causes for the failure of the generator to build up.
7. How does change in frequency affect the operation of a given transformer ?
8. What are the losses occurs in a transformer ? Explain.
9. A 3-phase, 16 pole, star connected alternator has 144 slots on the armature periphery. Each slot contains 10 conductors. It is driven at 375 r.p.m. the line value of e.m.f. available across the terminals is observed to be 2.657 kV. Find the frequency of induced e.m.f. and flux per pole.
10. A synchronous motor develops torque only at synchronous speeds whereas an induction motor develops torque at all speeds except the synchronous speeds. Mention the reasons.
11. Write a note on D.C. potentiometer.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*

Each question carries 10 *marks.*

12. (a) Draw and explain the no-load and load characteristics of DC shunt, series and compound generators.

Or

(b) (i) A 4-pole d.c. motor runs at 600 r.p.m. on full-load taking 25 A at 450 V. The armature is lap wound with 500 conductors and flux per pole is expressed by the relation.

$$\varphi = \left(1.7 \times 10^{-2} \times I^{0.5}\right) \text{weber.}$$

Where I is the motor current. If supply voltage and torque are both halved, calculate the speed at which the motor will run. Ignore stray losses. (5 marks)

(ii) A 6-pole, 500-V wave-connected shunt motor has 1200 armature conductors and useful flux/pole of 20 mWb. The armature and field resistance are 0.5 Ω and 250 Ω respectively. What will be the speed and torque developed by the motor when it draws 20 A from the supply mains ? Neglect armature reaction. If magnetic and mechanical losses amount to 900 W, find (i) Useful torque ; (ii) output in kW ; and (iii) efficiency at this load.

(5 marks)

13. (a) With neat diagram, explain the construction and working of a transformer. Also explain its types.

Or

(b) How the performance of a transformer can be tested ? Discuss in detail.

14. (a) With neat diagram, explain the constructional features of alternator.

Or

(b) Explain in detail the torque speed characteristics of three phase induction motor.

15. (a) Explain the construction and working of Moving Iron Instrument. Also Derive its torque equation.

Or

(b) Explain how determination of unknown frequency is performed using Wien's bridge.

(4 × 10 = 40 marks)

D 92031 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Printing Technology Engineering

PT 09 305—ELECTRICAL MACHINES AND MEASUREMENTS

Time : Three Hours Maximum : 70 Marks

Part A

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

1. Write the output equation of a d.c. machine.
2. What is the function of compensating winding in a d.c. machine ?
3. What are the different starting methods available to start the 3-phase induction motor ?
4. What is Scott connection ?
5. Name two methods of providing damping torque in indicating instruments.

(5 × 2 = 10 marks)

Part B

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

6. Draw the load characteristics of a D.C. series generator and show how it can serve as a booster.
7. The armature current of a d.c. series motor is 60 Amperes when on full-load. If the load is adjusted so that this current decreases to 40 Amperes, find the new torque expressed as a percentage of the full-load torque. The flux for a current of 40 amperes is 70% of that when the current is 60 Amperes.
8. Explain how a synchronous motor can be used as a synchronous condenser.
9. Why is it necessary to maintain transformer primary voltage constant while finding the regulation ?
10. Derive the condition for maximum torque of a 3-phase induction motor under running conditions.
11. Explain the working of an electrodynamometer type instrument.

(4 × 5 = 20 marks)

Turn over

Part C

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

12. a) A shunt generator has a total of 50 Ω Resistance in the shunt field circuit. Its no-load terminal voltage is 25 V. When driven at 500 r.p.m. : 100 V at 775 r.p.m. : 200 V at 1000 r.p.m. and 250 V at 1100 r.p.m. Determine the no-load terminal voltage at 1000 r.p.m. if the field circuit resistance is increased to 60 Ω.

Or

b) Derive an expression for the torque developed in a D.C. motor. Explain the speed-torque characteristics of d.c. shunt motor.

13. a) Define the voltage regulation of a transformer. Derive an expression for voltage regulation of a transformer using its approximate equivalent circuit and obtain the condition for zero voltage regulation.

Or

b) What is auto-transformer ? Derive an expression for the saving in copper by using an auto-transformer instead of a two-winding transformer.

14. a) i) Explain the principle of operation of synchronous motor and hence develop its phasor diagram.

ii) Derive an expression for the power developed in a synchronous motor.

Or

b) i) Explain the principle of working of a 3-phase Induction motor. State how the direction of rotation of the motor can be reviewed.

ii) What is the effect of changing rotor resistance on torque-slip characteristic of a 3-phase Induction motor ?

15. a) Develop an approximate equivalent circuit for a 3-phase Induction motor.

Or

b) Describe the constructional details of an attraction type moving iron instrument with the help of a neat diagram. Derive the equation for deflection if spring control is used and comment upon the shape of scale.

(4 × 10 = 40 marks)

D 92029 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Production Engineering

PE 09 306—MACHINE TOOL TECHNOLOGY

Time : Three Hours Maximum : 70 Marks

Part A

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

1. What is automatic lathe ?
2. What is gear finishing ?
3. What are the principal types of broaching machines ?
4. Why is milling a versatile machining process ?
5. Write a note on Slotter.

(5 × 2 = 10 marks)

Part B

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

6. Write the specifications of typical lathe.
7. What are the types of abrasives ? Explain.
8. Briefly explain boring machine.
9. Explain gear hopping with examples.
10. Write short notes on shaper.
11. Sketch and indicate various elements of a bull broach.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*

Each question carries 10 *marks.*

12. a) Describe various types of multi spindle automats.

Or

b) What are the various methods available for supporting long components and fragile components in a lathe ? Explain with sketches.

13. a) The performance of grinding wheel depends upon type of abrasive, grain size, grade, structure and bonding material. Discuss the effect of each.

Or

b) Explain with neat sketches the four different types of surface grinding operations.

14. a) Describe any *two* methods of gear generation that suits mass production in brief.

Or

b) Discuss with neat sketches gear grinding and gear lapping methods.

15. a) Describe with neat sketch the quick return mechanism used in shaper.

Or

b) Describe various types of broaching machines used in industry.

(4 × 10 = 40 marks)

D 92027 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Production Engineering

PE 09 303—ELECTRICAL DRIVES AND AUTOMATION

Time : Three Hours Maximum : 70 Marks

Part A

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

1. A 4 pole wave wound DC generator has 50 slots and 24 conductors/slot. The flux/pole is 10 mWb. Determine the induced e.m.f. in the armature if it is rotating at a speed of 600 r.p.m.
2. What is chording factor ?
3. Draw the NAND gate and write its truth table.
4. Define assembly language programming.
5. List the applications of an electric drive.

(5 × 2 = 10 marks)

Part B

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

6. Write notes on the working principle of a transformer.
7. Derive the expressions for the back e.m.f. of a d.c. motor.
8. A 6 pole, 3 phase induction motor develops 30 horse power (22.38 kW) including mechanical losses totaling 2 HP at a speed of 950 r.p.m. on 550 volts, 50 Hz mains. The p.f. is 0.88. Neglect core losses. Calculate for this load the following : (i) the slip ; (ii) rotor copper loss ; (iii) total input if the stator losses are 2000 watts ; and (iv) the line current.
9. Write a program to sort given 10 numbers from memory location 2200 H in the ascending order.
10. Implement various Logic Gates AND, OR, NOT, NOR, NAND in PLC using Ladder Diagram programming language.
11. Discuss the different types of electric drives.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*

Each question carries 10 *marks.*

12. Explain in detail the open circuit and short circuit test performed on a transformer.

Or

13. Draw and explain various load characteristics of DC Shunt Motor.

14. a) Derive the torque equation of a 3-phase induction motor. (5 marks)

    b) Explain the construction and working of a synchronous motor. (5 marks)

Or

15. Why is a single-phase induction motor not self starting ? What are the strategies used to start the motor ? Explain.

16. Draw the architecture of an 8085 microprocessor and explain the functions of each block in detail.

Or

17. Draw the circuit of a half adder and full adder, draw its truth table and explain.

18. Explain with neat sketches about the DC Shunt Motor speed control by using single phase fully controlled bridge converter.

Or

19. Discuss in detail how motors are selected for applications in rolling mill and coal mines.

[4 × 10 = 40 marks]

D 92026 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Applied Electronics and Instrumentation Engineering

AI 09 306—ELECTRONIC CIRCUITS AND NETWORK THEORY

Time : Three Hours Maximum : 70 Marks

Part A

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

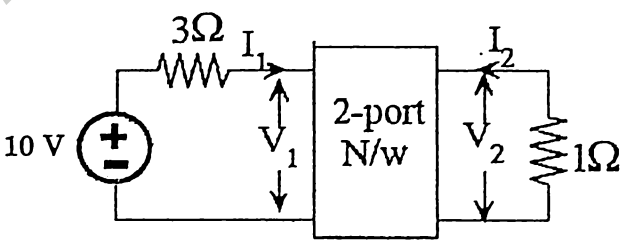
1. Write the property of Laplace transform of Unit impulse.
2. What is driving point ?
3. Name the different two-port parameters for a two-port network.
4. What is series two port network ?
5. State the necessity of low-pass filter.

(5 × 2 = 10 marks)

Part B

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

6. The current through a 4F capacitance is given by the following s-domain equation $I(s)=\frac{24(s+2)}{(s+1)(s+3)}$. Find voltage across the capacitance $v(t)$.
7. Discuss the concept of complex frequency.
8. If $[z]=\begin{bmatrix}3 & 2\\ 2 & 3\end{bmatrix}$ for the two port network in the following figure, calculate the average power delivered to $1\,\Omega$ resistor.



Turn over

9. Explain the transformation of band elimination in detail.

10. Discuss the concept of Butterworth filter.

11. Test whether the following represents LC driving point admittance function :

$$F(s) = \frac{3(s^2+1)(s^2+9)}{s(s^2+3)}.$$

(4 × 5 = 20 marks)

Part C

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

12. How can you give solution for differential equation ? Explain it.

Or

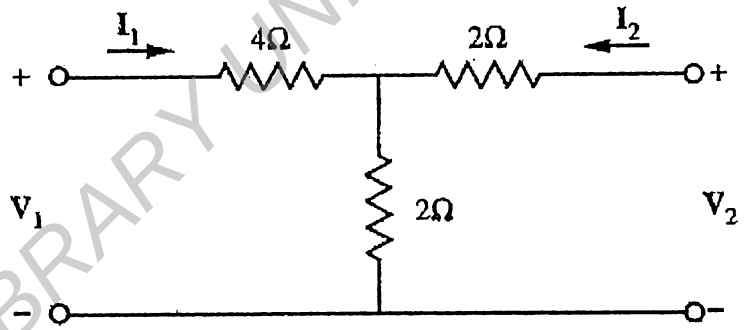
13. An RC series circuits is excited by sinusoidal voltage $V(t) = V_m \sin(\omega t + \phi)$. Derive an expression for the current in the circuit. Discuss the factors which govern the maximum value and rate of decay of transient component of current.

14. What is Network function ? Define the terms "Driving point impedance" and "Driving point Admittance" of two-port network.

Or

15. Explain the various types of Interconnections of the Two port networks in detail.

16. Determine the admittance parameters of the T network shown in below figure.



Or

17. Derive the characteristics of impedance parameters in two port networks.

18. Explain Quadrature mirror filtering.

Or

19. Write a note on the frequency transformation technique of converting a normalised low-pass filter into desired one.

(4 × 10 = 40 marks)

D 92025 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Applied Electronics and Instrumentation Engineering

AI 09 305—DIGITAL SYSTEMS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

Each question carries 2 *marks.*

1. Draw a 3 variable K-map and show the product terms in each cell.
2. Define combinational circuits.
3. What is synchronous counter ?
4. State transition equation.
5. Define minterm.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

Each question carries 5 *marks.*

6. What is don't care condition ? Explain it with suitable example.
7. State the differences between combinational and sequential circuits.
8. Write a note on Synchronous counters.
9. Briefly explain structure of clocked synchronous sequential circuits.
10. Explain the minimisation technique of asynchronous sequential circuits.
11. Explain mod-N counter with its diagram and truth table.

(4 × 5 = 20 marks)

Part C

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

12. Simplify the given Boolean function using 3 variable K-map

$f(A, B, C, D) = \Sigma m\ (0, 1, 3, 5, 6, 11, 13) + d\ (4, 7)$.

Or

13. Simplify the given Boolean function using Quine McClusky method

$f(A, B, C, D) = \Sigma m\ (7, 9, 12, 13, 14, 15) + d\ (4, 11)$.

14. Discuss the function of astable multivibrators with suitable diagram.

Or

15. Explain the term ROM and organization in memory.

16. Discuss 4-bit asynchronous counter with block diagram, truth table and timing diagram.

Or

17. With necessary diagram, explain the characteristics and implementation of the following digital logic families.

(a) CMOS.

(b) ECL.

(c) TTL.

18. Explain working principle of serial binary adder and sequence recognizer with suitable example.

Or

19. Discuss the races and race free state assignment in analysis of asynchronous sequential circuits.

(4 × 10 = 40 marks)

D 92024 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Applied Electronics and Instrumentation Engineering

AI 09 304—ELECTRICAL ENGINEERING

Time : Three Hours Maximum : 70 Marks

Part A

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

1. What is reactance voltage ?
2. What is meant by hysteresis loop ?
3. Draw the vector diagram of the three-phase induction motor.
4. Mention the starting methods of the induction motor.
5. Classify the electrical measuring instruments.

(5 × 2 = 10 marks)

Part B

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

6. Explain the open circuit and load characteristics of series-wound and separately excited generator.
7. Draw the equivalent circuit of a transformer.
8. Calculate the voltage regulation from the short-circuit test of a transformer.
9. You have been asked to design a cheap fan to fit in a refrigerator. Which motor would you select ? Justify your choice.
10. Calculate the efficiency of the synchronous motor.
11. Write short notes on moving iron type instruments.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*

Each question carries 10 *marks.*

12. (a) Construct a DC generator and explain its working principle. (10 marks)

Or

(b) (i) A four-pole armature 50 cm in diameter has 1000 conductors, each of active length 25 cm. the pole span is two-thirds of pole pitch, and the average flux density in the gap is 6000 lines per sq.cm. Calculate the torque lb.in. when each conductor carries 10A. (4 marks)

(ii) Write short notes on motor starter. (6 marks)

13. (a) Derive the e.m.f. equation of a transformer. (10 marks)

Or

(b) The following results were obtained on a 50 kVA transformer. Open circuit test -primary voltage, 3300 V ; secondary voltage, 400 V ; primary power, 430 W.

Short-circuit test - primary voltage, 124 V ; primary current, 15.3 A ; primary power, 525 W ; secondary current, full-load value.

Calculate :

(i) The efficiencies at full-load and at half load for 0.7 power factor ;

(ii) The voltage regulations for power factor 0.7, (A) lagging, (B) leading ;

(iii) The secondary terminal voltages corresponding to (A) and (B).

(10 marks)

14. (a) (i) Derive the e.m.f. equation of an alternator. (6 marks)

(ii) How the rotating field is produced in the alternator ? Explain. (4 marks)

Or

(b) Explain the starting and speed control of squirrel cage induction motor. (10 marks)

15. (a) Explain how to measure the power in three-phase circuit using two wattmeter method.

(10 marks)

Or

(b) (i) How to extend the range of voltmeter and ammeter. (5 marks)

(ii) Explain the working of Kelvin's double bridge. (5 marks)

[4 × 10 = 40 marks]

D 92023 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Applied Electronics and Instrumentation Engineering

AI 09 303—ELECTRONIC CIRCUITS–I

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

Each question carries 2 *marks.*

1. Write the application of Zener diode.
2. State the different types of clamper.
3. Mention the stability factor.
4. Give the different types of couplings.
5. What are application of rectifier circuits ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

Each question carries 5 *marks.*

6. Draw the output characteristics of CE configuration and mark its region of operation.
7. Explain the function of LC filter with neat diagram.
8. Discuss the function of series voltage regulator.
9. Differentiate JFET with MOSFET.
10. Derive the advantages of *h* parameter model.
11. Compare LC and π filter.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*

Each question carries 10 *marks.*

12. Explain the operation of two types of clipping circuits with necessary diagram.

Or

13. Discuss the construction and operation of MOSFET.

Turn over

14. With neat diagrams explain the operation of bridge rectifier (with and without filter).

Or

15. Discuss the operation of C and pi filter and draw its waveform.

16. Derive the function of Darlington circuits.

Or

17. Explain the operation of transistor as an amplifier.

18. With necessary equation, analyse the function of MOSFET amplifier.

Or

19. Discuss the function of single stage IC MOS amplifiers with the necessary diagram.

(4 × 10 = 40 marks)

D 92022 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Computer Science and Engineering

IT/CS 09 306/PT CS 09 305—SWITCHING THEORY AND LOGIC DESIGN

Time : Three Hours Maximum : 70 Marks

Part A

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

1. Show truth tables for De'Morgan's theorem.
2. How can AND-OR circuit can be converted to NAND Logic ?
3. How can a decoder be used as demultiplexer ?
4. What is path sensitisation ?
5. What is the difference between synchronous and asynchronous counter ?

(5 × 2 = 10 marks)

Part B

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

6. What is ASCII code ? Discuss it briefly.
7. Using only NAND gates, draw logic circuit to generate $F = AB + \bar{A}\,\bar{B} + \bar{B}\,C$.
8. Explain 8 to 1 multiplexer with the help of logic diagram.
9. Draw the block diagram of built-in logic block observer and explain.
10. Draw the logic diagram of mod - 6 counter and explain.
11. Show how an SR flip-flop can be converted into J.K. and D flip-flop.

(4 × 5 = 20 marks)

Part C

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

12. a) (i) Find the minimum - cost SOP and POS forms for the logic function :

$Y(A, B, C) = \Sigma m\ (1, 2, 3, 5)$.

(7 marks)

(ii) Differentiate between two level logic and hybrid logic. Give examples. (3 marks)

Or

Turn over

b) Using Quine Mc Cluskey method minimize the following function :

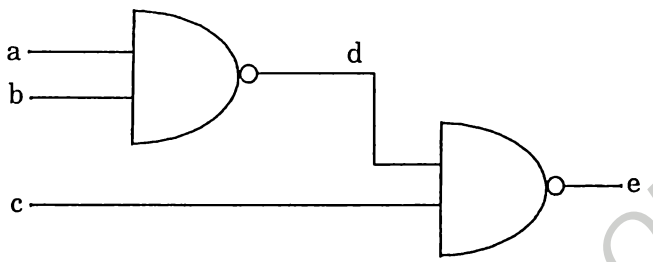
F (A, B, C, D) = Σm (0, 5, 7, 8, 9, 10, 11, 14, 15).

13. a) Draw the logic diagram of a look - ahead carry generator and explain.

Or

b) Design a combinational circuit that accepts a 3 bit number and generates an output binary equal to the square of the input number.

14. a) (i) For the following circuit, derive a table to show the coverage of the various stuck-at-0 and stuck-at-1 faults by the eight possible tests. Find a minimal test set for this circuit.



(6 marks)

(ii) Briefly explain about PLA minimization. (4 marks)

Or

b) With an example, explain any one method for fault diagnosis and testing.

15. a) Draw the logic diagram of 4-bit shift register and explain all 4 mode of operation.

Or

b) Design a sequential logic circuit using JK Flip-flop to count the following random sequence :

7, 4, 3, 1, 5, 0, 7, 4,.....

[4 × 10 = 40 marks]

D 92021 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Computer Science and Engineering

IT/CS 09 305/PTCS 09 304—ELECTRONIC CIRCUITS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *the questions.*

Each question carries 2 *marks.*

1. Enumerate the characteristics of LED.
2. Mention the potential applications of Schmitt trigger.
3. What are the advantages of Digital Switching.
4. What are the advantages of CMOS Logic ?
5. Enumerate the features of PROMs.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

Each question carries 5 *marks.*

6. Explain the drain characteristics of E-MOSFET.
7. What is Varistor ? Explain draw its equivalent circuit.
8. Explain the working of a Window Comparator with a neat diagram.
9. Explain the concept of SSI and MSI.
10. Differentiate SRAM from DRAM.
11. Define and explain the parameters of ADC and DAC.

(4 × 5 = 20 marks)

Part C

Answer **either** (a) **or** (b).

Each question carries 10 *marks.*

12. (a) Explain the construction and principle of operation of tunnel diode with neat energy band diagrams.

Or

(b) Write technical notes on :

(i) Step recovery diode.

(ii) Backward diode.

(iii) Optocoupler.

(iv) Schottky diode.

(4 × 2½ = 10 marks)

13. (a) Explain the principle of Dual Gate D-MOSFET with a neat schematic diagram.

Or

(b) Explain the principle of wave form conversion with op-amp with a neat diagram.

14. (a) Compare and contrast the parameters of all logic families.

Or

(b) Draw a neat diagram of MOS Flip-Flop and explain its working principle in detail.

15. (a) Write a technical note on 'Magnetic Bubble Memories'.

Or

(b) Draw a diagram of dual slope ADC and explain its working principle in detail.

[4 × 10 = 40 marks]

D 92020 (Pages : 3) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Computer Science and Engineering

IT/CS 09 304/PTCS 09 303—DISCRETE COMPUTATIONAL STRUCTURES

Time : Three Hours Maximum : 70 Marks

Part A

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

1. Determine the truth value of the following statements :

   a) If $3 * 4 = 7$, then $3 * 2 = 5$.

   b) If $3 * 3 = 9$, then $3 * 4 = 10$.

2. Define equivalence relation ? Give an example of a relation that is not an equivalence relation ?

3. Define cyclic group ? Give an example of cyclic group ?

4. Consider the recurrence relation $b_1 = 4, b_n = b_{n-1} + 5n$. Then what is the value of b_{64} ?

5. Define partial order relation ?

(5 × 2 = 10 marks)

Part B

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

6. Without using truth tables, prove that $(\neg P \vee Q) \wedge (P \wedge (P \wedge Q)) \equiv P \wedge Q$

7. Draw the Hasse diagram for the divisibility relation on the set $A = \{1, 2, 3, 6, 9, 18\}$.

8. Consider the set Q of rational numbers and let * be the operation on Q defined by $a * b = a + b - ab$. Is $(Q, *)$ a semi group ?

Turn over

9. Solve the recurrence relation $a_n = 5a_{n-1} + 6a_{n-2}, a_0 = 1, a_1 = 3$.

10. Write the converse, inverse and contrapositive of the following implication also determine the truth values of all four implication.

    $0 + 0 = 0$, then $1 + 1 = 1$

11. Consider f, g and h are functions on integers $f(n) = n^2, g(n) = n + 1, h(n) = n - 1$.

    Determine

    i. *fofoh* ; and

    ii. *gofoh.*

(4 × 5 = 20 marks)

Part C

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

12. a) Prove that $(P \wedge Q) \rightarrow (P \leftarrow\rightarrow Q)$ is a tautology.

Or

b) Prove that $((\exists x) P(x) \wedge Q(x)) \rightarrow (\exists x) P(x) \wedge (\exists x) Q(x)$.

13. a) If $A = \{1, 2, 3, 4\}$ give an example of a relation R on A that is

    I. Ant symmetric.

    II. Reflexive and symmetric, but not transitive.

    III. Reflexive and transitive, but not symmetric.

    IV. Symmetric and transitive, but not reflexive.

    V. Reflexive, symmetric and transitive.

Or

b) Let $A = \{1, 2, 3, 4, 5\} \times \{1, 2, 3, 4, 5\}$ and define R on A by $(x_1, y_1) R (x_2, y_2)$ if $x_1 + y_1 = x_2 + y_2$. Verify that R is an equivalence relation on A and also determine the equivalence classes $[(1, 3)], [(2, 4)]$ and $[(1, 1)]$.

14. a) If H is a subgroup of the finite group G, then for all $a, b \in G$, prove that :

(i) $|aH| = |H|$; and

(ii) either $aH = bH$ or $aH \cap bH = \varnothing$.

Or

b) Show that any group G is abelian iff $(ab)^2 = a^2 b^2$, for all $a, b \in G$.

15. a) If $a_0 = 0, a_1 = 1, a_2 = 4$ and $a_3 = 37$ satisfy the recurrence relation $a_{n+2} + ba_{n+1} + ca_n = 0$, where $n \geq 0$ and b, c are constants, determine b, c and solve for a_n.

Or

b) Determine the co-efficient of x^{15} in $f(x) = \left[\left(x^2 + x^3 + x^4 + \ldots\right)\right]^4$.

(4 × 10 = 40 marks)

D 92019 (Pages : 3) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Computer Science and Engineering

IT/CS 09 303/PTCS 09 302—DATA STRUCTURES

Time : Three Hours Maximum : 70 Marks

Part A

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

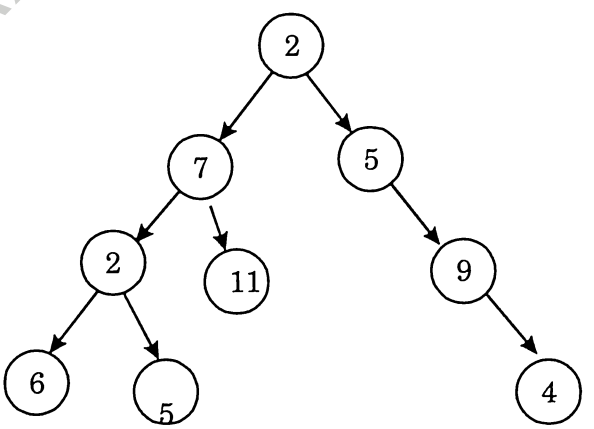
1. Differentiate the types of data structures based on relationship among the elements.
2. How is an Array different from Linked List ?
3. List the different ways of representing graph with an example.
4. Draw the expression tree for the expression (A + B * (C/D) – E).
5. Write an algorithm for bubble sort.

(5 × 2 = 10 marks)

Part B

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

1. Write an algorithm to search an element in a list using sequential search. Analyze its complexity.
2. Write the algorithms to perform insertion and deletion to implement circular queue using Circular Singly Linked List.
3. Write the Recursive algorithms for in-order, pre-order and post-order traversal of a binary tree. What will be the in-order, pre-order and post-order of the following binary tree ?



4. Write an algorithm to print the values of nodes in a binary search tree in ascending order.

5. Write the algorithm for insertion sort. Trace it for the given elements :

   12, 6, 9, 23, 45, 1, 90.

(4 × 5 = 20 marks)

Part C

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

1. Develop iterative and recursive algorithms for finding factorial of a number. Find time complexity of your algorithms.

Or

2. What do you mean by Array ? Describe the storage structure of array. Also explain sparse matrix representation using array in detail.

3. Devise an algorithm to add two polynomials (P_1 and P_2) and trace the same for the given polynomials.

   $P_1 : 8X^4 + 4X^3 + 6X^2 - 2.$

   $P_2 : 2X^4 + 3X^2 + 7.$

Or

4. Write an algorithm to convert an infix expression to postfix expression. Trace the algorithm for the expression : $a + b*(c - d)/(e*f)$.

5. Develop an algorithm to insert an element in a Binary search Tree. Trace the algorithm to construct a Binary Search tree for the following sequence of elements in the order given :

   25, 20, 30, 18, 22, 26, 35, 28, 16

Or

6. Define B Tree. Insert the following keys in a B tree of order 4 show each step clearly :

   10, 4, 3, 2, 1, 16, 9, 8, 11 and 7.

7. What is Collision in Hashing ? How linear probing is used when there is a collision in a hash table ?

   Consider a hash table with 10 slots. Given the following input keys 332, 342, 481, 689, 999, 181, 183, 199,335 inserted into an initially empty hash table using open addressing with hash function $h(k) = k \bmod 10$ and linear probing. What is the resultant table ?

Or

8. Write an algorithm for sorting list of elements using heap sort. Trace the algorithm with the following list of elements :

   25, 13, 17, 5, 8, 3, 12.

(4 × 10 = 40 marks)

D 92017 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Electronics and Communication Engineering

EC 09 305/PTEC 09 304—DIGITAL ELECTRONICS

Time : Three Hours Maximum : 70 Marks

Part A

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

1. Define Min term and Max term.
2. Give the truth table for a Exclusive - OR and Exclusive - NOR function.
3. Reduce the following function using Boolean algebraic theorems :

   $f(A,B,C) = \Sigma m(0,1,5,7) + \Sigma d(2,3)$.

4. What are the triggering methods available for sequential circuits ?
5. What are the basic building blocks of an ASM chart ?

(5 × 2 = 10 marks)

Part B

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

6. Reduce the following expression using Quine Mc Cluskey Method :

   $f(x,y,z) = \Sigma m(0,1,3,5,7)$.

7. Explain the working of an ECL gate.
8. Convert the following :
   (i) $(ABCD)_{16}$ to Binary number.
   (ii) $(375)_8$ to Hexadecimal number.
9. Explain the working of a SR - Latch.
10. Design a 4 - bit Ring Counter.
11. Describe the difference between Mealy and Moore state machines.

(4 × 5 = 20 marks)

Turn over

Part C

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

12. (a) Reduce the following using Karnaugh Map :

$$f(A,B,C,D) = \Sigma m(0,1,2,3,6,7,9) + \Sigma d(5,10,12).$$

Or

(b) Implement the full adder using only : (i) NAND and (ii) NOR gates.

13. (a) Explain fixed point and floating point representations with suitable examples.

Or

(b) Design a 8 × 1 :

(i) Multiplexer. (5 marks)

(ii) De Multiplexer. (5 marks)

14. (a) What is a race - around condition in JK flip-flop ? How it is avoided in Master - Slave JK flip-flop ? Explain with suitable logic diagrams.

Or

(b) (i) Design a Modulo - 10 counter. (5 marks)

(ii) Design a 3 - bit universal shift register. (5 marks)

15. (a) Explain state minimization rules with suitable examples.

Or

(b) (i) Design a sequence detector to detect the sequence 101. (6 marks)

(ii) Draw the ASM chart for a MOD - 5 counter. (4 marks)

[4 × 10 = 40 marks]

D 92016 (Pages : 3) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Electronics and Communication Engineering

EC 09 304/PTEC 09 303—SIGNALS AND SYSTEMS

Time : Three Hours Maximum : 70 Marks

Part A

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

1. State the difference between a random and deterministic signal.
2. What is a power signal ?
3. State Sampling theorem.
4. State the multiplication property of DTFT.
5. Determine the transfer function of the system described by $y(n) = a\, y(n-1) + x(n)$.

(5 × 2 = 10 marks)

Part B

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

6. Check whether the following signal is periodic. If yes find fundamental period :

$$\sum_{k=-\infty}^{\infty} (-1)^k \delta(t-2k).$$

7. Sketch the even and odd parts of the following signal :

$$x(t) = \begin{cases} t & 0 \le t \le 1 \\ 2-t & 1 \le t \le 2 \end{cases}.$$

8. Explain power spectral density and energy spectral density.

Turn over

9. Explain the conditions for distortionless transmission.

10. How to obtain the Laplace transform of the impulse response of a system ?

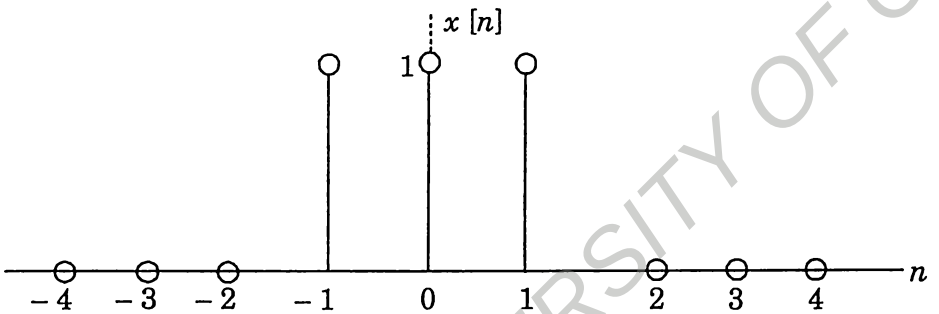
11. Find the z-transform of $x[n] = u[n-2] * (2/3)^n u[n]$.

(4 × 5 = 20 marks)

Part C

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

12. (a) What is an energy signal ? Determine the total energy of the discrete time signal shown in figure.



Or

(b) Consider the continuous-time system described by the input-output relation

$$y(t) = x(t)\,x(t-1).$$

Check whether the system is linear or non-linear.

13. (a) Determine the Fourier series representation of the signal

$$x(t) = 3\cos(\pi t/2 + \pi/4).$$

Or

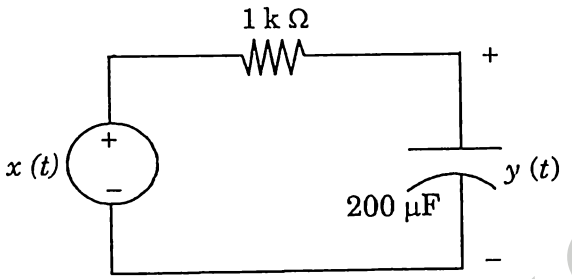
(b) Explain transform function. Find the transfer function of a Butterworth filter with cut-off frequency w_c = 1 and filter order (i) k = 1 ; and (ii) k = 2.

14. (a) What is an anticausal signal ? Determine the Laplace transform and ROC for the anticausal signal

$y(t) = -e^{at}\, u(-t)$.

Or

(b) Find the Laplace transform of the output of the RC circuit shown in figure for the input $x(t) = t\, e^{2t}\, u(t)$.



15. (a) Explain the properties of z-transform.

Or

(b) Find the inverse z-transform of

$$x(z) = \frac{2 + z^{-1}}{1 - \frac{1}{2} z^{-1}} \text{ with ROC } |z| > \frac{1}{2}$$

using power series expansion.

(4 × 10 = 40 marks)

D 92015 (Pages : 3) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Electronics and Communication Engineering

EC 09 303/PTEC 09 302—NETWORK ANALYSES AND SYNTHESIS

Time : Three Hours Maximum : 70 Marks

Part A

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

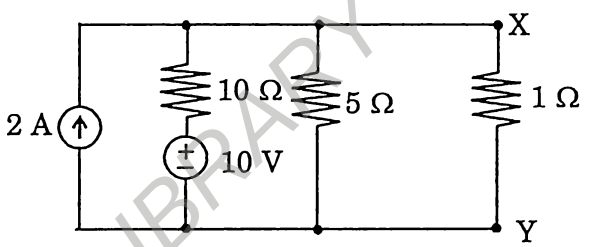
1. State Kirchhoff's Voltage Law.
2. State Maximum Power Transfer Theorem.
3. A transfer function is given by $Y(s) = \frac{50}{s^2 + 2s + 2}$. Find the poles.
4. State any *two* disadvantages of constant *k* filters.
5. State the three properties of Hurwitz Polynomial.

(5 × 2 = 10 marks)

Part B

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

6. In the circuit shown in figure, find the power loss in the 1 Ω resistor by Thevenin's Theorem.



7. Derive the r.m.s. and instantaneous current expressions of a series RC circuit for a sinusoidal input $v = V_m \sin w_m t$.

Turn over

8. Check, if the driving point impedance $z(s)$, given by $z(s)=\dfrac{s^4+s^2+1}{s^3+2s^2-2s+10}$ can represent a passive one port network.

9. Explain T-section and π-section networks.

10. Design a second order Butterworth low-pass filter cut-off frequency of 1 kHz.

11. Determine whether the polynomial $(s+2)\left(s^2+4s+6\right)\left(s^2+3s+2\right)$ is Hurwitz or not.

(4 × 5 = 20 marks)

Part C

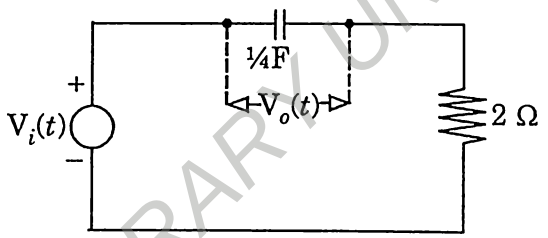
Answer **all** *questions.*
Each question carries 10 *marks.*

12. (a) State Superposition theorem. Explain the superposition theorem with suitable example.

Or

(b) Explain the operation of RC Integrator and differentiator.

13. (a) Find the system function of the network show in the figure. Hence obtain the expression of $V_o(t)$ if the input voltage applied is $\cos t$.



Or

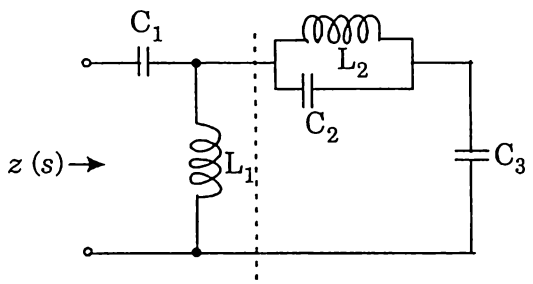
(b) Distinguish between symmetrical network and asymmetrical network. For symmetrical network define and explain characteristic impedance and propagation constant.

14. (a) Derive an m-derived low-pass filter having cut-off frequency of 1.5 kHz with a nominal impedance of 500 Ω and resonant frequency is 1600 Hz. Obtain the T and π-section.

Or

(b) Design a constant-k low pass T-section filter to be terminated in 600 Ω having cut-off frequency of 3 kHz. Determine the frequency at which the filter attenuation is 17.372 dB.

15. (a) The driving point impedance function is given as $z(s) = \dfrac{6s^4 + 42s^2 + 48}{s^5 + 18s^3 + 48\,s}$. Synthesize $z(s)$ in the network form shown in the figure.



Or

(b) Explain the difference between Cauer form and Foster form of realizations with suitable example.

(4 × 10 = 40 marks)

D 92014 (Pages : 3) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Electrical and Electronics Engineering

EE 09 306/PTEE 09 305—MECHANICAL ENGINEERING

Time : Three Hours Maximum : 70 Marks

Usage of Steam table is permitted.

Part A

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

1. Does wet steam obey laws of perfect gases ?
2. Define the term Thermal resistance.
3. State Stefan-Boltzman law.
4. State Pascal's law.
5. What is slip of a reciprocating pump ?

(5 × 2 = 10 marks)

Part B

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

6. Explain the following terms relating to steam formation : (i) Sensible heat of water ; (ii) Dryness fraction of steam ; and (iii) Superheated steam.
7. Explain with the help of neat diagram a regenerative cycle.
8. Describe heat conduction through a composite cylinder.
9. What is Capillarity ? Derive an expression for height of capillary rise.
10. Explain briefly how flow through a circular pipe can be measured using an Orifice meter.
11. Compare impulse and reaction turbines.

(4 × 5 = 20 marks)

Turn over

Part C

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

12. (a) In a steam turbine, steam at 20 bar, 360°C is expanded to 0.08 bar. It then enters a condenser, where it is condensed to saturated liquid water. The pump feeds back the water into the boiler. Assume ideal processes, find per kg of steam the network and the cycle efficiency.

Or

(b) A steam power plant operates on a theoretical reheat cycle. Steam at boiler at 150 bar, 550°C expands through the high pressure turbine. It is reheated at a constant pressure of 40 bar to 550°C and expands through the low pressure turbine to a condenser at 0.1 bar. Draw T-s and h-s diagrams. Find : (i) Quality of steam at turbine exhaust ; (ii) Cycle efficiency ; and (iii) Steam rate in kg/kWh.

13. (a) The interior of a refrigerator having inside dimensions of 0.5 m × 0.5 m base area and 1 m height is to be maintained at 6°C. The walls of the refrigerator are constructed of two mild steel sheets 3 mm thick (k = 46.5 W/m °C) with 50 mm of glass wool insulation (k = 0.046 W/m °C) between them. If the average heat transfer coefficients at the inner and outer surfaces are 11.6 W/ m^2 °C and 14.5 W/ m^2 °C respectively, calculate : (i) The rate at which heat must be removed from the interior to maintain the specified temperature in the kitchen at 25°C ; and (ii) The temperature on the outer surface of the metal sheet.

Or

(b) In a counter-flow double pipe heat exchanger, water is heated from 25°C to 65°C by an oil with a specific heat of 1.45 kJ/kg K and mass flow rate of 0.9 kg/s. The oil is cooled from 230°C to 160°C. If the overall heat transfer coefficient is 420 W/ m^2 °C, calculate the following : (i) The rate of heat transfer, (ii)The mass flow rate of water, and (iii) The surface area of the heat exchanger.

14. (a) Two large fixed parallel planes are 12 mm apart. The space between the surfaces is filled with oil of viscosity 0.972 Ns/m^2. A flat thin plate 0.25 m^2 area moves through the oil at a velocity of 0.3 m/s. Calculate the drag force : (i) When the plate is equidistant from both the planes ; and (ii) When the thin plate is at a distance of 4 mm from one of the plane surfaces.

Or

(b) Derive Euler's equation of motion.

15. (a) The impeller of a centrifugal pump has an external diameter of 450 mm and internal diameter of 200 mm and it runs at 1440 r.p.m. Assuming a constant radial flow through the impeller at 2.5 m/s and that the vanes at exit are set back at an angle of 25°, determine : (i) Inlet vane angle ; (ii) The angle, absolute velocity of water at exit makes with the tangent ; and (iii) The work done per N of water.

Or

(b) With the help of a neat diagram explain the construction and working of Pelton wheel turbine.

(4 × 10 = 40 marks)

D 92013 (Pages : 3) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Electrical and Electronics Engineering

EE 09 305/PTEE 09 304—ANALOG ELECTRONICS

Time : Three Hours Maximum : 70 Marks

Part A

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

1. Define Rectifier efficiency.
2. Compare Class A and Class B amplifiers.
3. What is the significance of feedback ?
4. Define slew rate of an operational amplifier.
5. What happens when the order of the filter is increased ?

(5 × 2 = 10 marks)

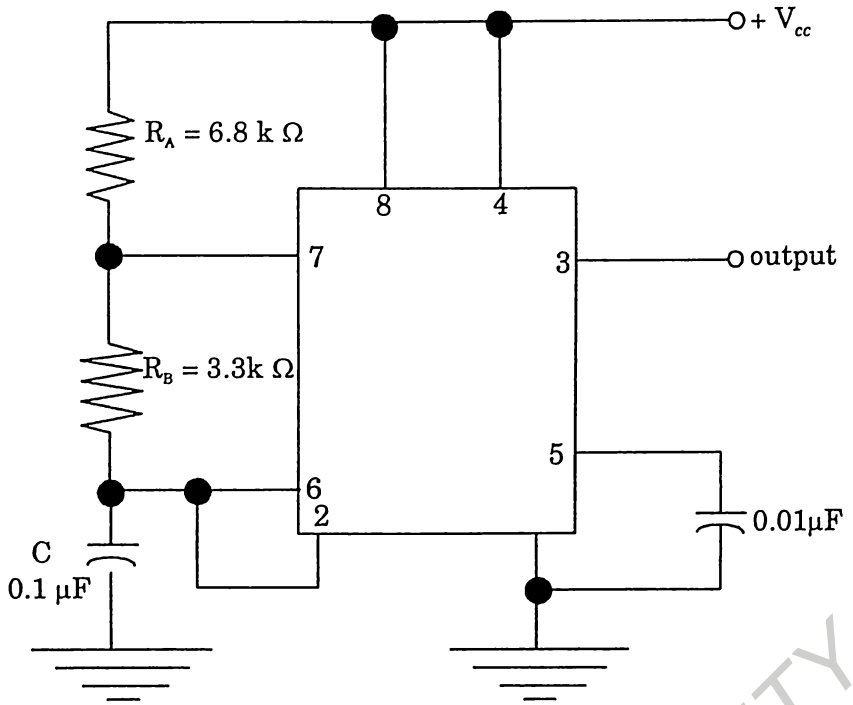
Part B

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

6. Explain the AC equivalent circuit of a common emitter amplifier.
7. Explain any *one* practical feedback circuit.
8. Explain the operation of a precision rectifier.
9. Explain the operation of a phase-shift oscillator.
10. Design a wideband pass filter having f_l = 400 Hz, f_h = 2 kHz and pass band gain of 4. Find the value of Q of the filter.

Turn over

11.



Identify the circuit. Calculate its t_{High} and t_{Low} values and duty cycle.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*

Each question carries 10 *marks.*

12. (a) Explain the operation of a full wave rectifier and bridge rectifier.

Or

(b) Explain the operation of a common source and common drain amplifiers.

13. (a) Derive the high frequency response of a BJT.

Or

(b) Derive the high frequency response of a FET.

14. (a) Explain the working of an op-amp based :

(i) Summing amplifier.

(ii) Subtractor.

Or

(b) Explain the operation of a :

(i) Phase-shift oscillator.

(ii) Wien bridge oscillator.

15. (a) Explain the working principle of regenerative comparator circuit.

Or

(b) Explain working of a phase Locked Loop. Calculate the output frequency f_o, lock range Δf_L and capture range Δf_c of a 565 PLL, if R_T = 10 kΩ, C_T = 0.01 μF and C = 10 μF.

(4 × 10 = 40 marks)

D 92012 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. DEGREE (2009 SCHEME) EXAMINATION NOVEMBER 2020

Electrical and Electronics Engineering

EE 09 304 / PT EE 09 303—ELECTRO MAGNETIC FIELD THEORY

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

I. 1. Describe line, surface and volume charge density.

2. Mention the two sources of electromagnetic fields.

3. Outline the concept of permeability and its unit.

4. Discuss phase velocity with expression.

5. Examine the significance of intrinsic impedance.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

II. 1. Express the value of differential volume in rectangular and cylindrical Co-ordinate systems.

2. How do you find the equivalent capacitance of two capacitors C1 and C2 connected in series?

3. Explain Biot's Savart law in vector form.

4. Explain the Maxwell's Equation derived from Faradays Law.

5. Derive boundary conditions of at the interface between two magnetic materials of different permeabilities.

6. Explain the Wave propagation in Lossless medium.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*

III. 1. Transform the vector field W = 10 ax – 8ay + 6az to cylindrical coordinate system at point P (10, –8, 6).

Or

2. Derive the boundary conditions of the normal and tangential components of electric field at the interface of two media with different dielectrics.

Turn over

3. Derive an expression for the magnetic field intensity at a point 'P' in a medium of permeability 'μ' due to an infinitely long current carrying conductor at a distance 'r' meters from the point.

Or

4. Discuss about the force on a straight and long current carrying conductor placed in the uniform magnetic field.

5. In a given lossy dielectric medium, conduction current density Jc = 0.02 sin109t (A/m^2). Find the displacement current density if ó =103 S/m and år = 6.5.

Or

6. Illustrate the integral and point form of Maxwell's equations for static fields.

7. Derive the one dimensional general wave equation and find the solution for wave equation.

Or

8. Obtain the expression for the reflection co-efficient and transmission coefficient for a wave normally incident on the surface of the dielectric.

(4 × 10 = 40 marks)

D 92011 (Pages : 5) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Electrical and Electronics Engineering

EE 09 303/PTEE 09 302—ELECTRIC CIRCUIT THEORY

Time : Three Hours Maximum : 70 Marks

Part A

I. Answer *all* the questions :

1 Find the Thevenin equivalent circuit for the circuit shown in the Figure 1 to the left of the terminals *a*-*b*. Then find the current through $R_L = 6$.

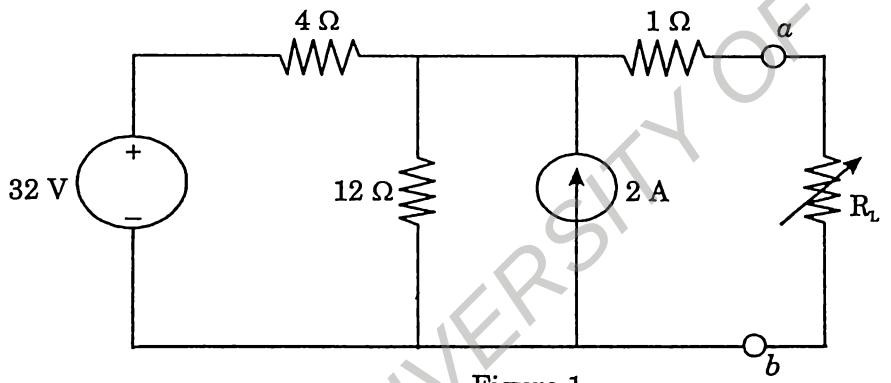


Figure 1

2 A constant voltage of frequency, 1 MHz is applied to a lossy inductor (R series with L), in series with a variable capacitor, C as shown in the Figure 2. The current drawn is maximum, when C = 400 pF while current is reduced to $(1/\sqrt{2})$ of the above value, when C = 450 pF. Find the values of R and L. Calculate the quality factor of the coil and bandwidth.

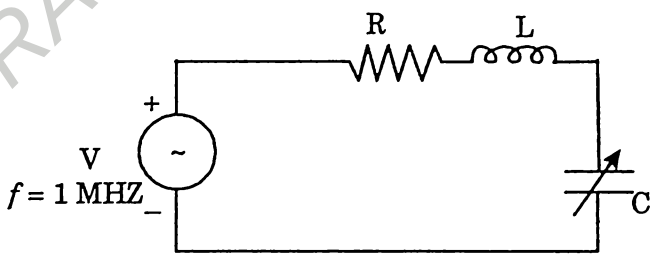


Figure 2

Turn over

3 A series RL circuit with R = 30 Ω and L = 15 H has a constant voltage V = 60 V applied at $t = 0$ as shown in the Figure 3. Determine the current i, the voltage across resistor and the voltage across the inductor.

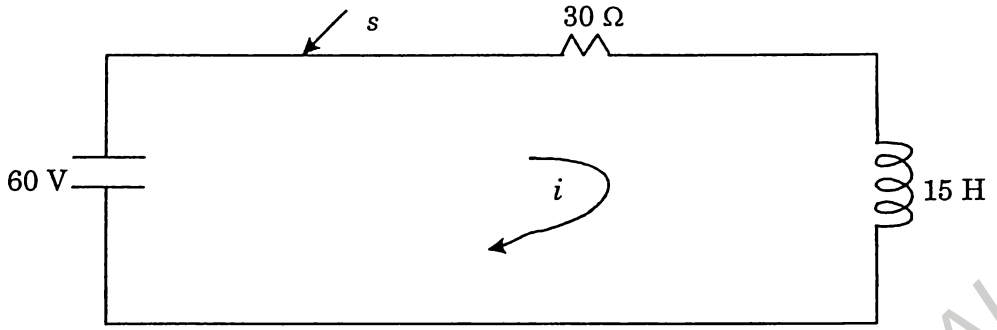


Figure 3

4 Define Image Impedance.

5 Define Mesh analysis.

(5 × 2 = 10 marks)

Part B

II. Answer any *four* questions :

6 Calculate the phasor current I_1 and I_2 in the given circuit as shown in the Figure 4.

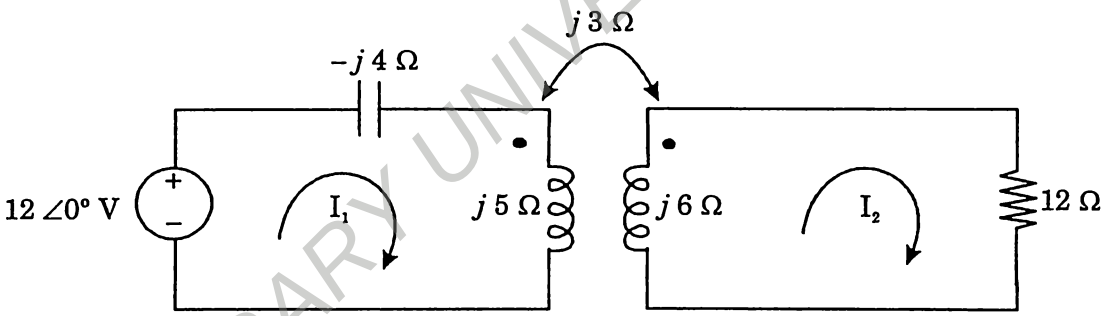


Figure 4

7 Find the Y Parameters for the network shown in the Figure 5.

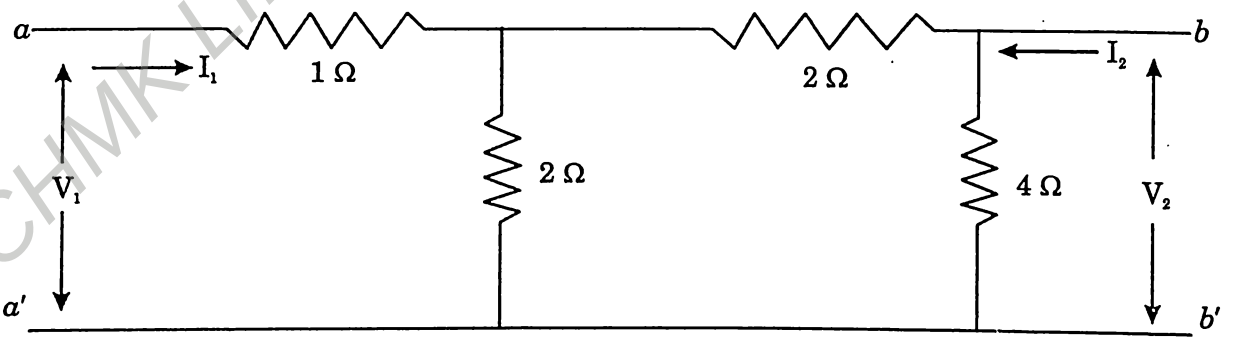
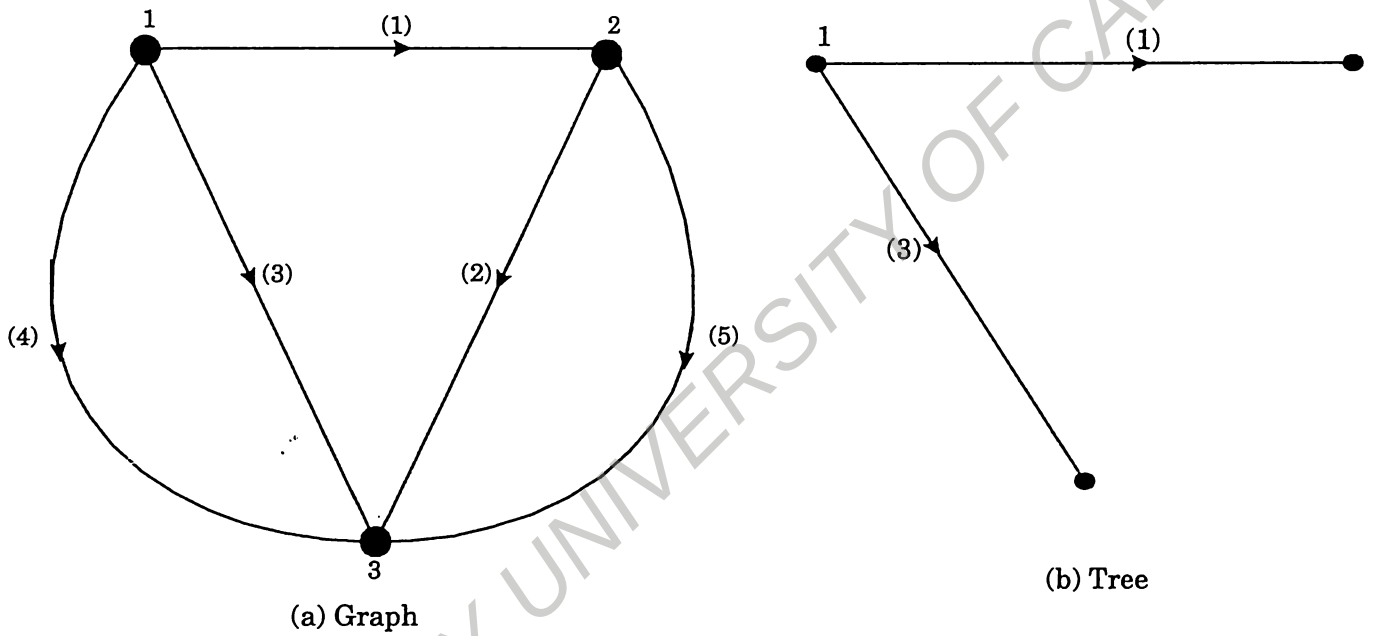


Figure 5

8 Write short notes on Low Pass Filter, High Pass Filter, Band Pass Filter and Stop band filter.

9 The driving point impedance of an LC network is given by $Z(s) = \frac{\left(s^2 + 4s^2 + 3\right)}{\left(s^3 + 2s\right)}$. Determine the second Cauer form of the network.

10 For the graph and the corresponding tree of the graph shown in the Figure 6, find the fundamental tie-set matrix.



(a) Graph (b) Tree

Figure 6

11 A three-phase balanced delta-connected load of $(4 + j8)\,\Omega$ is connected across a 400 V, 3-Phase balanced supply. Determine the phase currents and line currents. Assume the Phase sequence to be RYB. Also calculate the power drawn by the load.

(4 × 5 = 20 marks)

Part C

III. Answer *all* questions :

12 Determine the equivalent resistance between A-B of the given circuit shown in the Figure 7 by using star-delta or delta-start transformation.

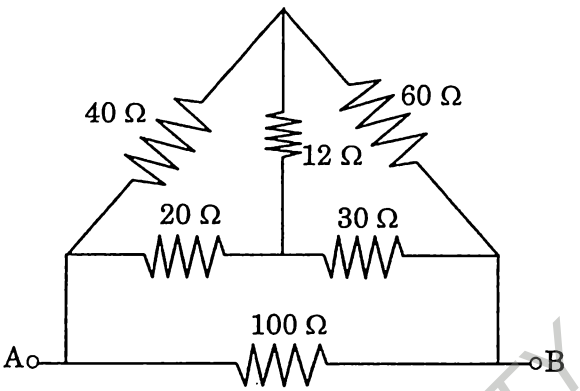


Figure 7

Or

13 Determine the mesh current I_1 in the circuit shown in Figure 8.

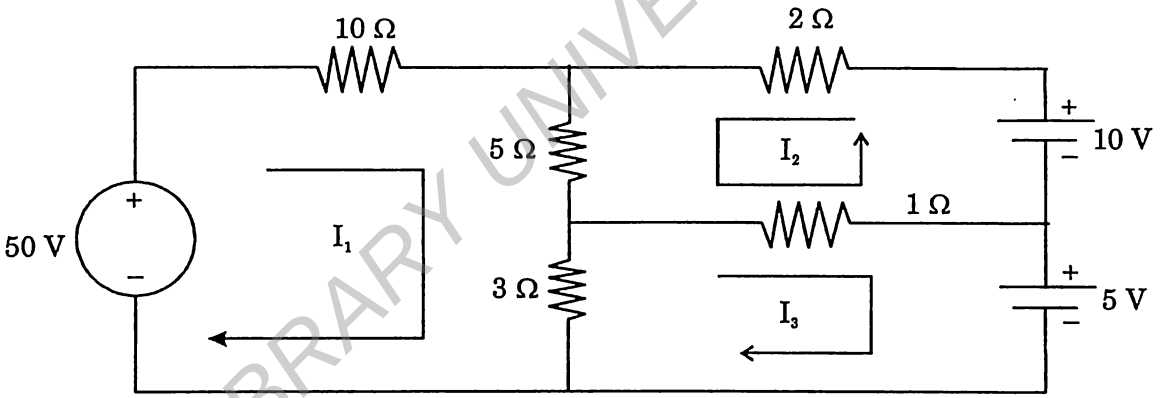


Figure 8

14 For the circuit shown in Figure 9, find the ratio of output voltage to the source voltage.

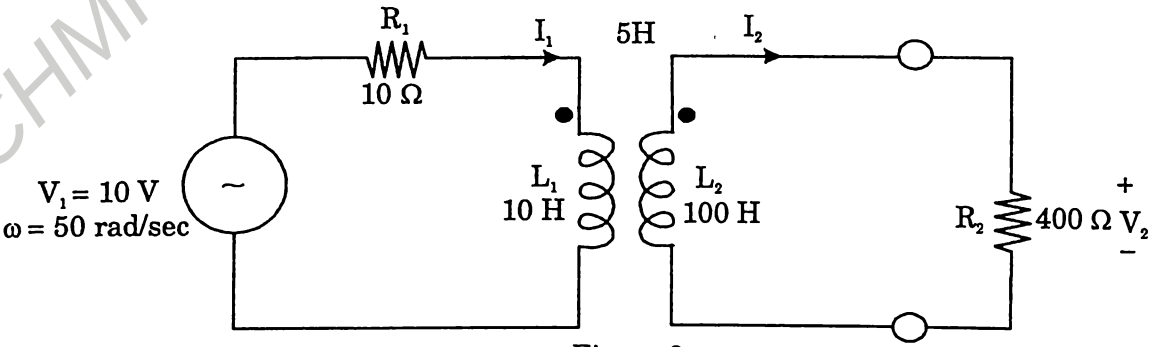


Figure 9

Or

15 Determine the complete solution for the current when switch is closed at $t = 0$ for the circuit given in the Figure 10. Applied voltage to the circuit is given as $V(t) = 400 \cos\left(500\,t + \frac{\pi}{4}\right)$.

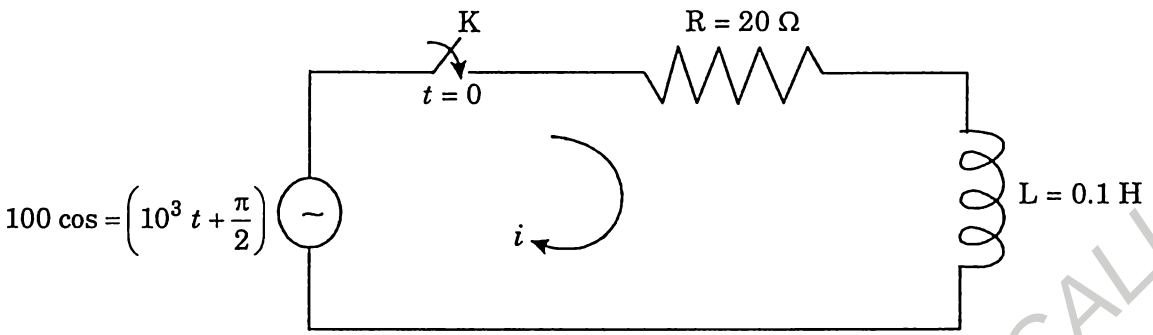


Figure 10

16 Design a low pass filter (both π and T sections) having a cut-off frequency of 2 kHz to operate with a terminated load resistance of 500 Ω .

Or

17 Design a *m*-derived T-section filter (high pass) with a cut-off frequency 10 kHz, design impedance of 200 Ω and $m = 0.4$.

18 The driving point impedance of a one-port reactive network is $Z(s) = 5\frac{(s^2+4)(s^2+25)}{s(s^2+16)}$.

Obtain the first and second Foster networks.

Or

19 Determine the incidence matrix and cutset matrices for the network shown in the Figure 11.

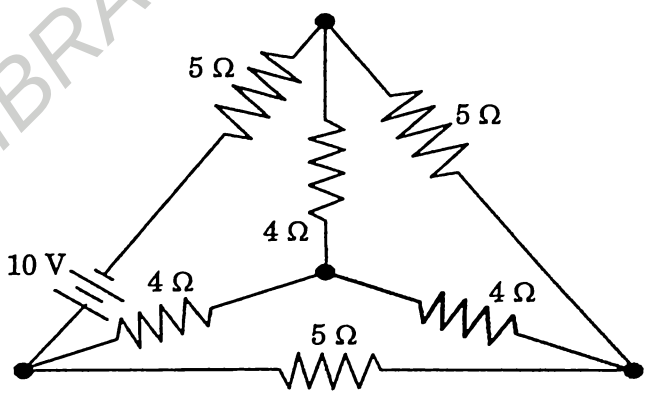


Figure 11

(4 × 10 = 40 marks)

D 92010 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Mechanical Engineering

AN/ME/AM/MT 09 306/PTME 09 305—METALLURGY AND MATERIAL SCIENCE

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *the questions.*

Each question carries 2 *marks.*

1. What is meant by Allotropy ?
2. Calculate the volume of a BCC unit cell in terms of the atomic radius R.
3. What is meant by Frankel defect ?
4. Define Hardenability.
5. Write the limitations of ferrous alloys.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

Each question carries 5 *marks.*

6. Show that the atomic packing factor for the FCC crystal structure is 0.74.
7. Discuss how crystal structure is determined by X-ray diffraction.
8. Derive an expression for the critical resolved shear stress.
9. Differentiate between ductile and brittle fracture.
10. Explain annealing technique for heat treatment of steels.
11. Explain the properties and applications of super alloys.

(4 × 5 = 20 marks)

Part C

Answer **all** *the questions.*

Each question carries 10 *marks.*

12. (a) Represent the following Miller indices for planes in a cubic cell :

(i) (2 2 1). (ii) (6 3 2).

(iii) (1 1 0). (iv) (1 0 1).

Or

(b) Enumerate the various types of bonds occurring in crystals and describe briefly the characteristics of the metallic bond.

13. (a) Give brief accounts of the following :

(i) Solid solution hardening. (5 marks)

(ii) Line defects. (5 marks)

Or

(b) Explain the following :

(i) Creep curve. (5 marks)

(ii) Work hardening. (5 marks)

14. (a) Draw the equilibrium diagram of Iron-Carbon system and discuss transformations that take place from melting point to room temperature at any percentage of carbon.

Or

(b) Draw and explain Cu-Ni phase diagram.

15. (a) Describe composition, properties and applications of any *five* copper alloys.

Or

(b) Write short notes on the following :

(i) Stainless steels. (5 marks)

(ii) Nanomaterials and bio-materials. (5 marks)

[4 × 10 = 40 marks]

D 92009 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Mechanical Engineering

AN/ME 09 305/PTME 09 304—ELECTRICAL TECHNOLOGY

Time : Three Hours Maximum : 70 Marks

Part A

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

1. Does the transformer draw any current when secondary is open. Why ?
2. List the function of 3 point starter.
3. Why aluminium disc is used in induction type energy meter ?
4. How do you calculate EMF ?
5. Define load equalization.

(5 × 2 = 10 marks)

Part B

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

6. Enumerate the effects of armature reaction. Explain any one in detail.
7. What is meant by power factor in AC circuits ? What is its significance in AC circuits ?
8. Draw the phasor diagram of sinusoidal waveform and explain it in brief.
9. Which of the method is more accurate for determine the voltage regulation of an alternator ?
10. List the difference between star delta starter and DOL starter.
11. List the different types of load torque on an electric motor. Explain any one in detail.

(4 × 5 = 20 marks)

Turn over

Part C

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

12. (a) Explain in detail about the characteristics of DC generator with its types.

Or

(b) Explain the construction and working of four-point starter with its circuit diagram.

13. (a) Explain in detail about the losses and efficiency of the transformer. Also illustrate how to determine the All-day efficiency of a transformer.

Or

(b) Explain the construction and working of induction type energy meter.

14. (a) Derive the equation for distribution factor of alternator. Also determine formula for *n*th harmonic factor.

Or

(b) Explain the torque slip characteristics of three-phase induction motor. Also illustrate the effect of rotor resistance on the torque slip characteristics.

15. (a) Explain in detail about the classification of load torque on electric drives with different load characteristics.

Or

(b) Explain the SCR with circuit diagram, working and characteristics.

(4 × 10 = 40 marks)

D 92008 (Pages : 4) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Mechanical Engineering

AN/ME/AM/MT 09 304/PT ME 09 303—COMPUTER ASSISTED MACHINE DRAWING

Time : Three Hours Maximum : 70 Marks

Part A

1. Draw front and top views of a hexagonal bolt and nut of size M 20.

Or

2. Part details of a flanged coupling of unprotected type is shown in Fig.1. Assemble them and draw (1) Front view top half in section ; and (2) Top view of the assembly.

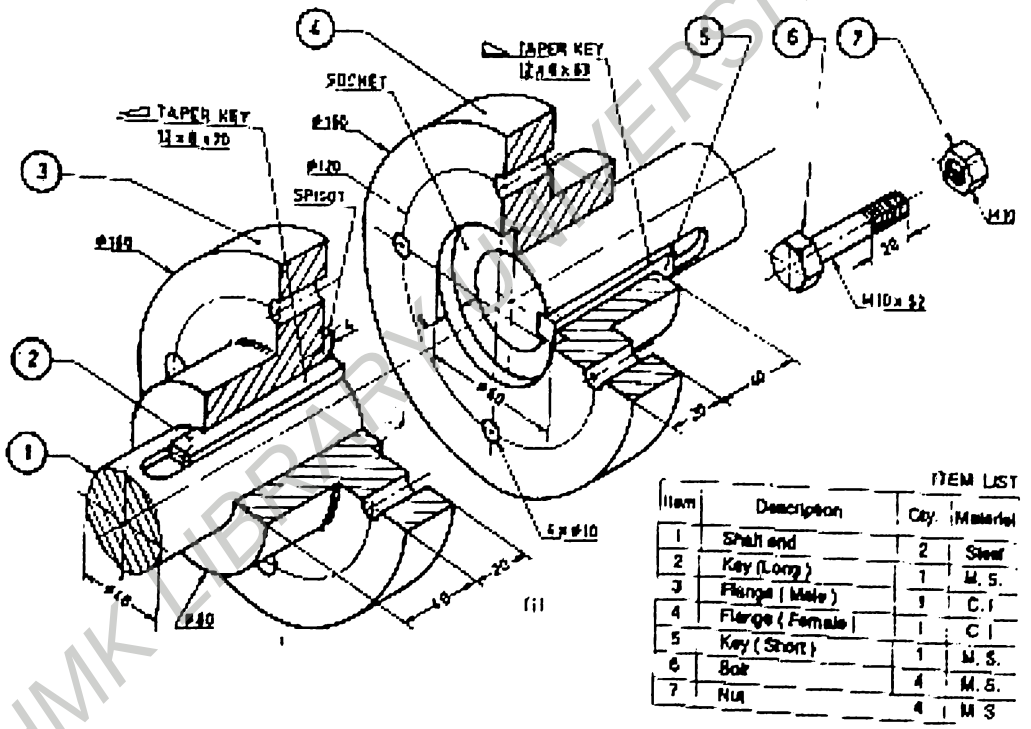


Fig. 1

(1 × 15 = 15 marks)

Turn over

Part B

3. (a) With neat sketches illustrate various type of fits.

   (b) Explain with neat sketches unilateral and bilateral tolerance system.

Or

4. Assemble the parts of the Plummer block as shown in Fig. 2 and draw the following views.

   (a) Elevation left half in section.

   (b) Top view.

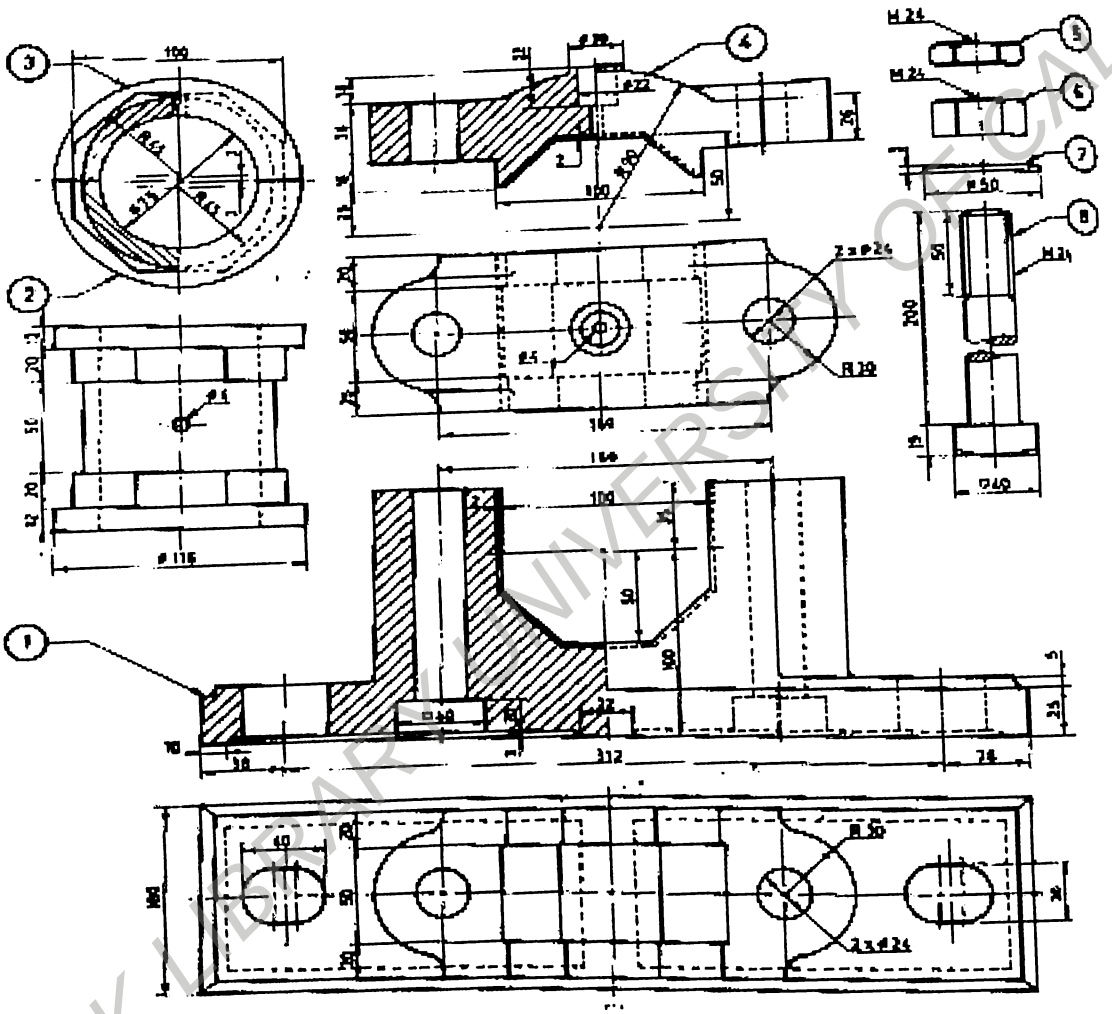


Fig. 2

(1 ×•20 = 20 marks)

Part C

5. Parts of a stuffing box are given in Fig. 3. Draw the following assembled views to a suitable scale.

   (a) Elevation right half in section.

   (b) Plan.

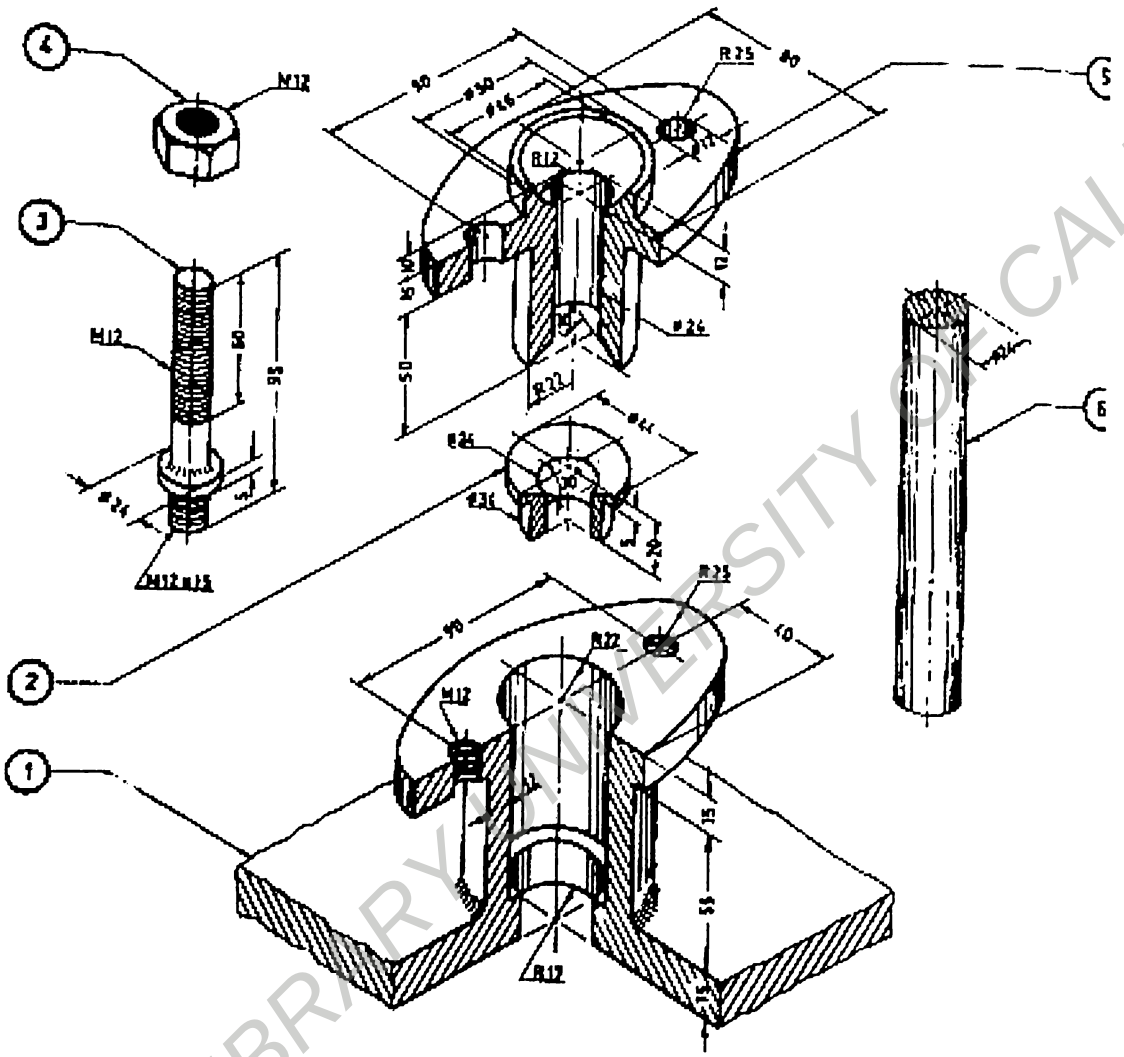


Fig. 3

Or

6. Part drawing of a Rams Bottom Safety valve are given in Fig. 4. Draw the assembled view right half in section to a suitable scale.

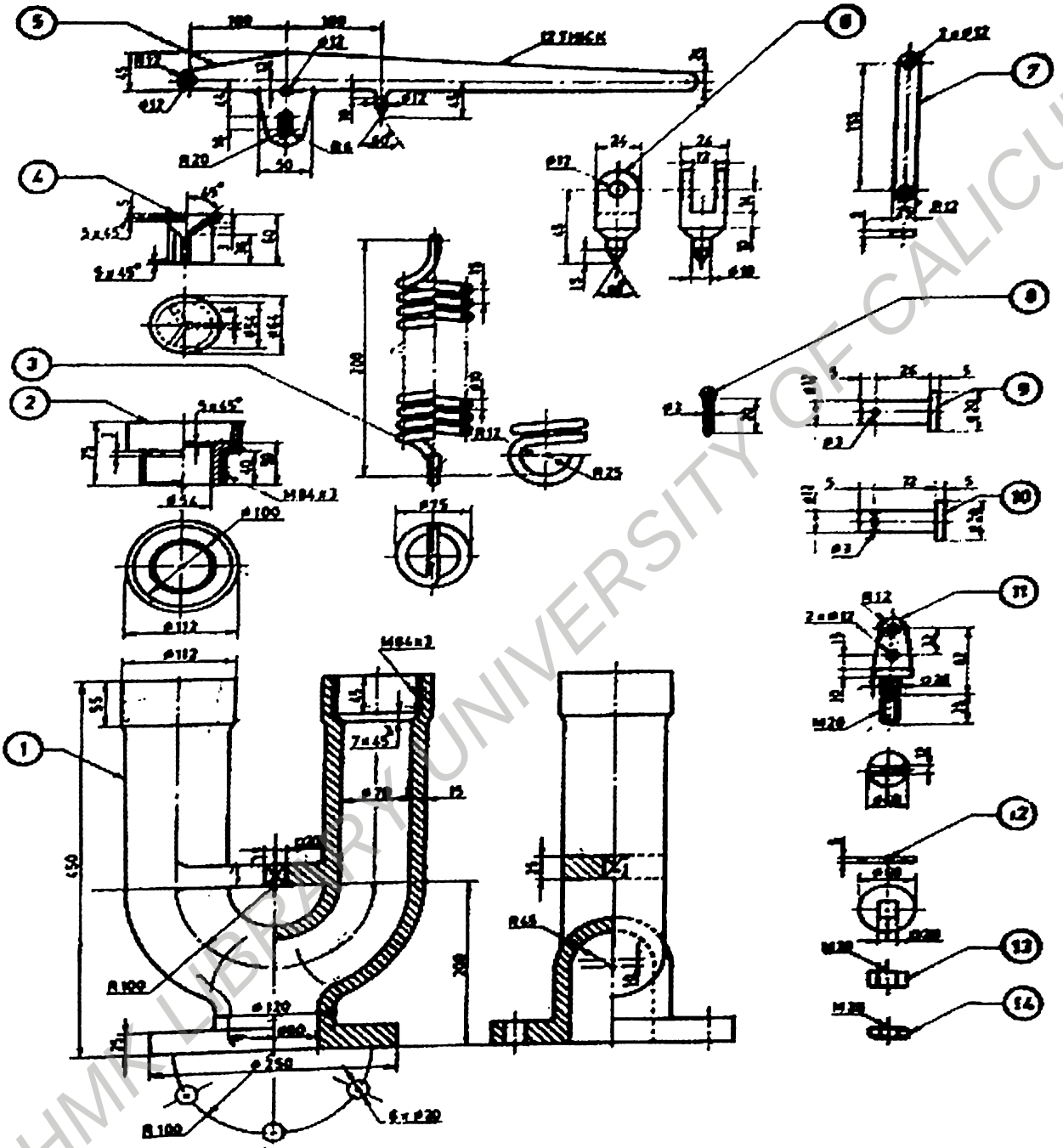


Fig. 4

(1 × 35 = 35 marks)

D 92007 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Mechanical Engineering

ME 09 303—FLUID MECHANICS

Time : Three Hours Maximum : 70 Marks

Part A

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

1. Define the compressibility of a fluid.
2. Define the term metacentre and metacentric height.
3. What is the significance of Reynolds number ?
4. Distinguish between laminar and turbulent flow.
5. Discuss the effect of skin friction.

(5 × 2 = 10 marks)

Part B

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

6. Prove that the pressure is same in all directions at a point in a static fluid.
7. Explain momentum and energy correction factors.
8. What are velocity potential and stream functions ?
9. What do you mean by a streamlined body ?
10. Derive the equations for streamlines and equipotential lines for the flow from a plane source.
11. Draw a neat diagram of boundary layer developed along thin plate and name all the details of the layer. Explain the concept of boundary layer development.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*

Each question carries 10 *marks.*

12. Explain the phenomenon of capillarity. Derive an expression for the capillary rise of a liquid. The pressure inside a soap bubble of 50 mm diameter is 2.5 N/m^2 above atmosphere. Estimate the surface tension.

Or

13. What is meant by stability of a floating body ? Explain the stability of a floating body with reference to metacentric height. Give neat sketches.

14. Obtain the continuity equation for three dimensional flow. Explain momentum and energy correction factor.

Or

15. What are the advantages of triangular notch over rectangular notch ? Water flows over a rectangular weir 1m wide and a depth of 200 mm and afterwards passes through a triangular right angle weir. Taking Cd for the rectangular and triangular weir as 0.63 and 0.58, find the depth over the triangular weir.

16. Explain Langrarian and Eulerian methods of describing fluid flow.

If for two dimensional potential flow, the velocity potential is given by

$\phi = x(2y - 1)$, determine the velocity at the point P(4,5). Determine also the value of stream function ψ at the point P.

Or

17. Derive Darcy-Weisbach equation for the loss of head in a pipe due to friction.

18. Explain the term displacement thickness and momentum thickness.

Define boundary layer and explain the causes of its existence and explain various methods of controlling boundary layer.

Or

19. The wing of an aeroplane is designed to develop a lift of 5×10^4 N. If the span is 10.5 m and the mean chord length is 1.8 m. Calculate the total drag at a speed of 500 km/hr. Assume elliptical lift distribution. Density of air is 1.207 kg/m^3 and the profile drag coefficient is 0.012.

($4 \times 10 = 40$ marks)

D 92006 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Civil Engineering

CE 09 306/PTCE 09 305—ENGINEERING GEOLOGY

Time : Three Hours Maximum : 70 Marks

Part A

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

1. Define Weathering.
2. Differentiate between Cleavage and fracture.
3. How will you differentiate between igneous rock and sedimentary rock ?
4. List out the effects of Joints.
5. Define the term GIS.

(5 × 2 = 10 marks)

Part B

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

6. What are the Causes of Earthquakes ?
7. Write short notes on Landslides and its causes.
8. Explain the Engineering Properties of Rocks.
9. Discuss about Seismic method of Geological Investigation.
10. Explain how folds affect the Choice of location for Tunnels ?
11. Write short notes on Geological factors consideration of Tunnels.

(4 × 5 = 20 marks)

Turn over

Part C

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

12. (a) Describe in detail, the process of Chemical Weathering of rocks.

Or

(b) Write in detail about Tectonic plates and their role in generation of Earthquakes.

13. (a) Write short notes on :

(i) Basalt. (5 marks)

(ii) Lime stone. (5 marks)

Or

(b) Write detailed notes on the Mineral Composition, Texture, Origin and Engineering properties and uses of (a) Sandstone ; and (b) Marble.

14. (a) Write in detail about the types of faults and their influence on Tunnel projects.

Or

(b) Write short notes on :

(i) Saline Water intrusion in Coastal Aquifers. (5 marks)

(ii) Artificial Recharge of Ground water. (5 marks)

15. (a) Comment on the various geological factors to be considered for the Construction of Roads.

Or

(b) Write in detailed about various interpretation techniques in remote sensing.

[4 × 10 = 40 marks]

D 92005 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Civil Engineering

CE 09 305/PTCE 09 304—SURVEYING—I

Time : Three Hours Maximum : 70 Marks

Part A

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

1. Classify Surveying based on instruments used.
2. What do you mean by a well-conditioned triangle ?
3. Define the term Traversing.
4. What is a horizontal curve ?
5. Define Pantagraph.

(5 × 2 = 10 marks)

Part B

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

6. Distinguish between a check line and a tie line.
7. What is a Whole circle Bearing ?
8. What is fly leveling and check leveling ?
9. Define the term Theodolite and list the uses of it.
10. What are back sights and foresights ?
11. List out the permanent adjustments of theodolite.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*

Each question carries 10 *marks.*

12. a) Write a note on :

    i) Principles of surveying.

    ii) What are the steps involved in the survey ?

    Or

    b) Mention the list instruments used for chaining and explain any three in detail.

13. a) What are the two types of compass ? Explain them.

    Or

    b) The following bearings were observed with a compass. Calculate the interior angles :

Line	Fore Bearing
AB	60° 30'
BC	122° 0'
CD	46° 0'
DE	205° 30'
EA	300° 0'

14. a) The following observations were made in a levelling work : 0.335, 0.550, 0.86, 1.65, 1.785, 1.995, 1.750, 0.815, 0.655 and 1.535. the positions of instrument were changed after third and eighth readings. Open a field level book and enter the readings.

    Compute the R. Ls of all the points by rise and fall method. The first reading was taken on a Bench mark of R.L. 105.00. Apply Arithmetic check.

    Or

    b) Write a short note on :

    i) Characteristics of contour.

    ii) Contour Interval.

15. a) Describe the adjustment of a theodolite.

    Or

    b) How do you find the height of an object using a clinometer ? Discuss it.

(4 × 10 = 40 marks)

D 92004 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Civil Engineering

CE 09 304/PTCE 09 303—BUILDING TECHNOLOGY—I

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

Each question carries 2 *marks.*

1. Name the laboratory tests to be conducted on stones.
2. List out the factors affecting workability of concrete.
3. Define white cement and where is it used.
4. Mention the purpose of adding admixture in concrete.
5. What is meant by Public Buildings ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

Each question carries 5 *marks.*

6. Write the short note on production of concrete/concrete operations.
7. Write short notes on super plasticizers.
8. What do you understand by split tensile and flexural test ?
9. Explain the functions and requirements of foundations.
10. Discuss the classification of buildings and its uses.
11. List out the few points in Alkali-Silica Reaction.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*

Each question carries 10 *marks.*

12. (a) Explain any *two* tests carried out in coarse aggregate.

Or

(b) Describe about the manufacturing process of cement.

13. (a) Explain any *two* test to measure workability of concrete.

Or

(b) Write a short notes on :

(i) Water permeability of concrete. (5 marks)

(ii) Sulphate attack of concrete. (5 marks)

14. (a) Enumerate how damp proof course can be achieved using various methods.

Or

(b) Explain the classification types of stairs.

15. (a) Explain in general about the principles of planning for building.

Or

(b) Write a note on :

(i) Circulation in building.

(ii) Ventilation in building.

[4 × 10 = 40 marks]

D 92003 (Pages : 3) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Civil Engineering

CE 09 303/PTCE 09 302—MECHANICS OF SOLIDS

Time : Three Hours Maximum : 70 Marks

Part A

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

1) State Hooke's law.

2) Define point of contra flexure.

3) What is a conjugate beam ?

4) Write down the expression for power transmitted by a shaft.

5) Differentiate between hoop stress and longitudinal stress.

(5 × 2 = 10 marks)

Part B

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

1) Determine the Poisson's ratio and bulk modulus of a material, for which Young's modulus is 1.2×10^5 N/mm^2 and modulus of rigidity is 4.8×10^4 N/mm^2.

2) Write the assumptions in the theory of simple bending.

3) Draw the shear force and bending moment diagrams for a cantilever with a uniformly distributed load '*w*' throughout its span L.

4) Explain the method of successive integration.

5) Compare thick cylinder and thin cylinder based on the stresses induced.

6) Derive the Euler's formula for a column fixed at both ends.

(4 × 5 = 20 marks)

Turn over

Part C

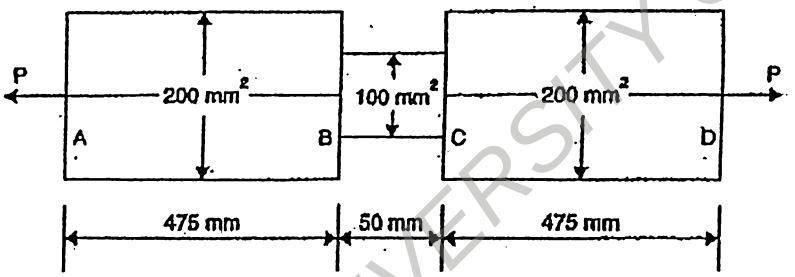
Answer **all** *questions.*
Each question carries 10 *marks.*

MODULE 1

1) A mild steel rod of 20 mm diameter and 300 mm long is enclosed centrally inside a hollow copper tube of external diameter 30 mm and internal diameter 25 mm. The ends of the tube and rods are brazed together and the composite bar is subjected to an axial pull of 40 kN. Find the stresses developed in the tube and the rods, given E for copper and steel are 100 GN/m^2 and 200 GN/m^2 respectively. Also find the extension of the rod.

Or

2) The maximum stress produced by a pull in a bar of length 1 m is 150 N/mm^2. The area of cross-section and length are as shown in figure. Calculate the strain energy stored in the bar if E = 200 GPa.

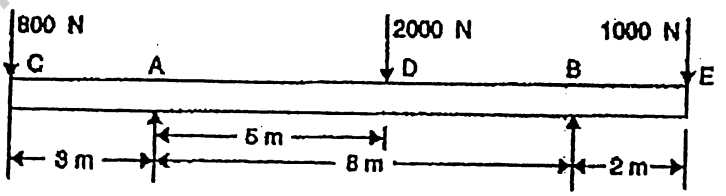


MODULE 2

3) A circular beam of 100 mm diameter is subjected to a shear force of 5 kN. Calculate the average shear stress, maximum shear stress and the shear stress at a distance of 40 mm from the neutral axis.

Or

4) Draw the shear force and bending moment diagrams for the given beam and mark all salient points.



MODULE 3

5) A cantilever of 3 m length carries two point loads of 2 kN at the free end and 4 kN at a distance of 1 m from the free end. Find the deflection at the free end. Take $E = 2 \times 10^5$ N/mm^2 and $I = 10^8$ mm^4.

Or

6) A beam of span 8 m and of uniform flexural rigidity 40 MNm^2, is simply supported at its ends and carries a u.d.l. of 15 kN/m run over the entire span. It is also subjected to a clockwise moment of 160 kNm at a distance of 3 m from the left support. Calculate the slope of the beam at the point of application of the moment.

MODULE 4

7) A close coil helical spring of 10 cm mean diameter is made up of 1 cm diameter rod and has 20 turns. The spring carries an axial load of 200 N. determine the shearing stress, deflection when carrying the load, the stiffness of the spring and the frequency of free vibration for a mass hanging from it. Take modulus of rigidity as 8.4×10^4 N/mm^2.

Or

8) A 1.5 m long column has a circular cross-section of 5cm diameter. One end of the column is fixed and the other end is free. Calculate the safe load by Rankine's formula and Euler's formula. Take factor of safety of 3. Yield stress, σ_c = 560 N/mm^2, α = 1/1600 for pinned ends and $E = 1.2 \times 10^5$ N/mm^2.

(4 × 10 = 40 marks)

D 92002 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Chemical Engineering

CH 09 304/PTCH 09 303—ORGANIC CHEMISTRY

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

Each question carries 2 *marks.*

1. Write the chemical equation for the preparation of acetoacetic ester.
2. Write the equation for the reaction of glucose on osazone.
3. Write the chemical structures of malachite green and rosaniline.
4. Give the mechanism of nitration of benzene.
5. How is piperidine obtained from pyridine ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

Each question carries 5 *marks.*

6. Explain the mechanism of Pinacol-Pinacolone rearrangement and Hofman's rearrangement.
7. Explain recemisation and keto-enol tautomerism with suitable examples.
8. Write a note on the isolation of amino acids from natural sources.
9. Give the pyranose and furanose structure of *d*-glucose. How is the structure of α and β-glucose confirmed ?
10. How is aniline prepared in the laboratory ? How does it undergo acylation and diazotisation reactions.
11. Explain the synthesis and uses of vanillin.

(4 × 5 = 20 marks)

Turn over

Part C

Answer section (a) **or** *section* (b) *of each question.*
Each question carries 10 *marks.*

12. (a) What are 'nucleophilic' substitution reactions ? Explain the terms S_N1 and S_N2 in connection with the mechanism of the hydrolysis of primary, secondary and tertiary alkyl halides.

Or

(b) Give an descriptive account on :

(i) Asymmetric synthesis ; and (ii) Preparation and uses of antipyrene.

13. (a) Give an account on the properties and reactions of glycine and alanine. What is Sorensen's formal titration ?

Or

(b) Discuss the preparation and properties of starch and cellulose.

14. (a) (i) Write any *three* reactions of phenol.

(ii) Give a descriptive account on the dyes malachite green and rosaniline.

Or

(b) Write a note on :

(i) Riemer-Tieman reaction.

(ii) Kolbe reaction.

(iii) Coupling reaction.

15. (a) Elucidate the structure of nicotine.

Or

(b) Write a note on :

(i) Mechanism of enzyme action.

(ii) Synthesis of saccharin and aspirin.

(iii) Classification of vitamins.

(4 × 10 = 40 marks)

D 92001 (Pages : 3) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Chemical Engineering

CH 09 303/PTCH 09 302—CHEMICAL PROCESS PRINCIPLES

Time : Three Hours Maximum : 70 Marks

Part A

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

1. What is the role of chemical engineer in the manufacturing industry ?
2. Write the SI unit for energy with dimension.
3. What is the importance of bypass operation ?
4. Define the term heat capacity and illustrate its SI unit.
5. State the Raoult's law

(5 × 2 = 10 marks)

Part B

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

6. Distinguish between unit operations and unit processes.
7. Determine the mole fraction of CH_3OH and H_2O in a solution prepared by dissolving 5.5 g of alcohol in 40 g of H_2O. Molecular weight of H_2O is 18 and Molecular weight of CH_3OH is 32.
8. Write the overall material and solute crystals balance for crystallization with neat diagram.
9. Illustrate the overall material balance and component balance for a binary system of distillation operation.
10. Discuss briefly on latent heat fusion and latent heat of vaporization.
11. Explain briefly about the proximate and ultimate analysis.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*

Each question carries 10 *marks.*

12. (a) Illustrate the SI unit and dimensional formula for density, force, power, pressure and work.

Or

(b) Explain the terms briefly on molarity, normality, conversion and yield.

13. (a) (i) A single effect evaporator is fed with 10,000 kg./h. of weak liquor containing 15 % caustic by weight and is concentrated to get thick liquor containing 40 % by weight caustic (NaOH). Calculate : (a) kg./h of water evaporated and (b) kg./h of thick liquor obtained.

(ii) A binary mixture consists of 35 % benzene and 65 % toluene are continuously fed to the distillation column at a rate of 1000 kg./hr. Whereas, the distillate flow rate was 10 % from the feed flow rate. The distillate (top product) contains 85 % benzene. Calculate quantity and compositions of the bottom stream.

Or

(b) (i) Explain and illustrate the overall material balance and component balance for an absorption operation carried out in counter current flow.

(ii) Explain briefly on batch and continuous operations with neat diagrams.

14. (a) (i) Explain briefly about the energy balance equation for with phase change in shell and tube heat exchanger with neat sketch.

(ii) Describe briefly about the energy balance equation for without phase change in shell and tube heat exchanger with neat sketch.

Or

(b) (i) 100 Kg./hr. of methanol liquid at a temperature of 303 K is to be obtained by removing heat from saturated methanol vapour. Find out the amount of heat to be removed in this case.

Boiling point of methanol : 337.8 K.

Latent heat of condensation of methanol = 1101.7 kJ./kg.

Specific heat of methanol = 2.7235 kJ./kg.

(ii) An oil flowing at 2 kg./s is cooled from 420 K to 380 K by a water supply of 1.0 kg./s at 300 k counter currently. Determine the outlet temperature of cold water. Take specific heat of oil and water as 2330 J/kg. K and 4174 J/kg K.

15. (a) Describe briefly about humidity, saturation humidity, relative humidity, humid heat and dew point.

Or

(b) (i) Write briefly about the Clausius Clapeyron equation and Antoine equation.

(ii) The Antoine constants for n-heptane are A = 13.8587, B = 2911.32, and C = 56.56. Ps is in kPa and T is in K. Calculate.

(a) The vapour pressure of *n*-heptane at 325 K.

(b) The normal boiling point of n-heptane

(4 × 10 = 40 marks)

D 92000 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

EN 09 302—HUMANITIES AND COMMUNICATION SKILLS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions each in one* **or** *two sentences.*

Each question carries 2 *marks.*

1. Importance of humanities to education.
2. Role of electronic media in communication.
3. Explain body language.
4. Describe Moral Autonomy.
5. Face-to-face discussion.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

Each question carries 5 *marks.*

6. The contributions of India in the field of space technology.
7. What are the different levels of communication ?
8. Explain the methods of writing paragraph.
9. Write a note on the importance of humanities of technology.
10. Moral dilemmas and the methods adopted to resolve it.
11. What are the causes of industrial revolution ?

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*

Each question carries 10 *marks.*

12. (a) Prepare a curriculum vitae (C. V.) for a job appropriate to your educational qualifications.

Or

(b) Write a paragraph in about 200 words on the topic "Conservation of Water".

13. (a) Describe the contributions of ancient Egypt to World Civilization.

Or

(b) Discuss the formalities to be followed in convening and conducting group discussion.

14. (a) Discuss the various moral issues involved in Engineering Profession. Citing suitable examples.

Or

(b) Explain the ethical principles to the followed by an Engineer.

15. (a) Describe the salient features of Indus Valley Civilization.

Or

(b) Compare and contrast between consensus and controversies.

(4 × 10 = 40 marks)

D 91999 (Pages : 3) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

EN 09 301—ENGINEERING MATHEMATICS – III

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

1. Show that the function $f(z)e^z$ is analytic.

2. Find the image of $x = \pi/2$ under the transformation $w = \sin z$.

3. Evaluate $\int_C \frac{\cos \pi z}{z-1} dz$ where C is the circle $|z| = 3$.

4. If $F_s(s)$ is the Fourier sine transform of $f(x)$, then S.T. $F_s\{f(ax)\} = \frac{1}{a} F_s\left(\frac{s}{a}\right)$.

5. Let V = R^3. Show that $w = \{(a,b,c) : a \geq 0\}$ is not a subspace of V.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

6. Show that under the transformation $w = \frac{1}{z}$, the image of the hyperbola $x^2 - y^2 = 1$ is the lemniscate $\rho^2 = \cos 2\phi$.

7. Evaluate $\int_{1-i}^{2+3i} (z^2 + z)\, dz$ along the line joining the points $(1,-1)$ and $(2,3)$.

8. Find the function if its sine transform is $\frac{e^{-s}}{s}$.

9. Find the Fourier transform of $e^{-x^2/2}, -\infty < x < \infty$.

10. Let V be the vector space of functions from R into R. Show that $f,g,h \in V$ are independent where $f(t)=e^{2t}, g(t)=t^2, h(t)=t$.

11. Expand the vector $u=(9,-2,4)$ in terms of the orthogonal basis $e_1=(2,1,3), e_2=(1,-2,0)$, $e_3=(6,3,-5)$.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions as per choice given.*

12. (a) Prove that the function $f(z)$ defined by $f(z)=\dfrac{x^3(1+i)-y^3(1-i)}{x^2+y^2}(z\neq 0), f(0)=0$ is continuous and the C–R equations are satisfied at the origin yet $f'(0)$ does not exist.

Or

(b) Show that the transformation $w=\dfrac{iz+2}{4z+i}$ transforms the real axis in the z-plane into circle in the w-plane. Find the center and radius of this circle.

13. (a) If $F(\xi)=\int_C \dfrac{4z^2+z+5}{z-\xi}dz$ where C is the ellipse $\left(\frac{x}{2}\right)^2+\left(\frac{y}{3}\right)^2=1$, find the value of $F(3.5), F(i)$, $F'(-1)$ and $F''(-i)$.

Or

(b) Show that $\int_0^{\pi} \dfrac{ad\,\theta}{a^2+\sin^2\theta}=\dfrac{\pi}{\sqrt{1+a^2}}$.

14. (a) Let $u_1=(0,1,1), u_2=(1,1,1)$ and $u_3=(3,2,2)$. Find $\dim[\text{span}\{u_1,u_2,u_3\}]$.

Or

(b) Find an orthonormal basis for the subspace spanned by $(2,0,1)(1,1,1)$ and $(-2,0,3)$ of $\mathbb{R}^3$.

15. (a) Find the Fourier cosine transform of :

$$f(x)=\begin{cases}x, & 0<x<1\\ 2-x, & 1<x<2\\ 0, & x>2.\end{cases}$$

Or

(b) Solve for $f(x)$ the integral equation :

$$\int_0^\infty f(x)\sin xt\,dx=\begin{cases}1, & 0\le t<1\\ 2, & 1\le t<2\\ 0, & t\ge 2.\end{cases}$$

(4 × 10 = 40 marks)

D 71052 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) [2009 SCHEME] DEGREE EXAMINATION, NOVEMBER 2019

Instrumentation and Control Engineering

IC 09 305—ANALOG DEVICES AND CIRCUITS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *the questions.*

Each question carries 2 *marks.*

I. (a) Write the function of positive diode clamping circuits.

(b) Define the current gain of BJT.

(c) List the advantages of Hartley oscillator.

(d) State the features of CMOS transistor.

(e) Draw the circuit of CD configuration.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

Each question carries 5 *marks.*

II. (f) Explain the working principle of negative clipper with necessary circuit diagram.

(g) Compare CE, CB and CC configuration of transistor.

(h) Explain series voltage feedback configuration.

(i) Differentiate between Enhancement and Depletion MOSFET.

(j) Draw and explain the operation of crystal oscillator.

(k) Compare MOSFET with BJT.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*

Each question carries 10 *marks.*

III. (a) (i) Derive and explain the full bridge rectifier without and with filer circuit.

Or

(ii) Explain the working of zener diode regulator with necessary diagram.

(b) (i) Discuss the low frequency response of BJT amplifier and give expression for lower cutoff frequency due to CC, CE and CS.

Or

(ii) Draw and describe any *two* types of topology for feedback of an amplifier.

(c) (i) With a neat diagram explain about RC phase shift oscillator and derive the expression for frequency of oscillation and condition of oscillation.

Or

(ii) Derive the expression for AF and Zif for a practical series current feedback circuit.

(d) (i) With Equivalent circuit obtain the expression for Zo and Av for JFET Self bias with unbypassed Rs.

Or

(ii) With necessary diagram explain the construction and characteristics of enhancement MOSFET.

(4 × 10 = 40 marks)

D 71048 (Pages : 4) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) [2009 SCHEME] DEGREE EXAMINATION, NOVEMBER 2019

Production Engineering

PE 09 304—MECHANICS OF SOLIDS

Time : Three Hours Maximum : 70 Marks

Part A

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

1. Give the relation between Young's modulus and shear modulus.
2. Give the differential relations between load, shear force.
3. Give the diagrammatic conventions for a uniformly distributed load and uniformly varying load.
4. What are the assumptions in the theory of pure bending ?
5. Give any *two* assumptions made in the Euler's column theory for long columns.

(5 × 2 = 10 marks)

Part B

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

6. The extension in a rectangular steel bar of length 400 mm. and thickness 10 mm. is found to be 0.21 mm. The bar tapers uniformly in width from 100 mm. to 50 mm. If E for the bar is 2×10^5 N/mm^2, determine the axial load on the bar.
7. A solid steel shaft has to transmit 75 kW at 200 r.p.m. Taking allowable shear stress as 70 N/mm^2, find suitable diameter for the shaft, if the maximum torque transmitted at each revolution exceeds the mean torque by 30 %.
8. A cantilever beam of length 2 m. carries the point load as shown in figure 1. Draw the shear force and Bending Moment diagrams for the cantilever beam.

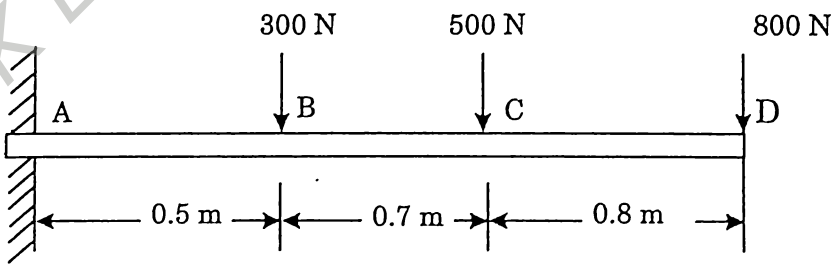


Figure 1

Turn over

9. A rectangular beam 200 mm. deep and 300 mm. wide is simply supported over a span of 8 m. What uniformly distributed load per metre the beam may carry, if the bending stress is not to exceed 120 N/mm^2.

10. A hollow cylindrical cast iron column is 4 m. long with both ends fixed. Determine the minimum diameter of the column if it has to carry a safe load of 250 kN with a factor of safety of 5. Take the internal diameter as 0.8 times the external diameter. Take crushing stress, σ_c = 550 N/mm^2 and Rankine's constant, α = 1/1600 in Rankine's formula.

11. At a point within a body subjected to two mutually perpendicular directions, the stresses are 80 N/mm^2 tensile and 40 N/mm^2 tensile. Each of the above stresses is accompanied by a shear stress of 60 N/mm^2. Determine the normal stress, shear stress and resultant stress on an oblique plane inclined at an angle of 45° with the axis of minor tensile stress.

(4 × 5 = 20 marks)

Part C

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

12. A member ABCD is subjected to point loads p_1, p_2, p_3 and p_4 as shown in figure 2 below. Calculate the force P_2 necessary for equilibrium, if P_1 = 45 kN, P_3 = 450 kN and P_4 = 130 kN. Determine the total elongation of the member, assuming the modules of elasticity to be 2.1 × 10^5 N/mm^2.

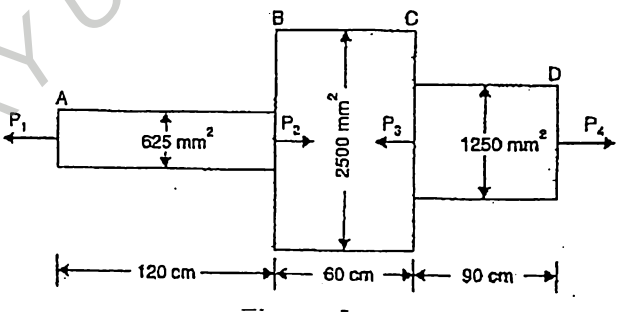


Figure 2

Or

13. An unknown weight falls through a height of 10 mm. on a collar rigidly attached to the lower end of a vertical bar 500 cm. long and 600 mm^2 in section. If the maximum extension of the rod is to be 2 mm., what is the corresponding stress and magnitude of the unknown weight ?

    Take $E = 2 \times 10^5$ N/mm^2.

14. Two shafts are connected end to end by means of a flanged coupling, in which there are 12 bolts, the pitch circle diameter being 25 cm. The maximum shear stress is limited to 55 N/mm^2 in the shafts and. 20 N/mm^2 in the bolts. If one shaft is solid of 5 cm. diameter and the other is hollow of 10 cm external diameter, calculate the internal diameter of the hollow shaft and the bolt diameter so that both shafts and the coupling are equally in torsion.

Or

15. A horizontal beam AB of length 8 m. is hinged at A and placed on rollers at B. The beam carries three inclined point loads as shown in figure 3. Draw the S. F, B. M. and axial force diagram of the-beam,

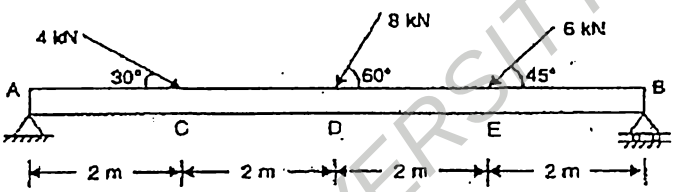


Figure 3

16. A timber beam of rectangular section is to support a load of 20 kN uniformly distributed over a span of 3.6 m. when beam is simply supported. If the depth of section is to be twice the breadth, and the stress in the timber is not to exceed 7 N/mm^2, find the dimensions of the cross-section. How would you modify the cross-section of the beam, if it carries a concentrated load of 20 kN placed at the centre with the same ratio of breadth to depth ?

Or

17. A beam of length 6 m is simply supported at its ends and carries two point loads of 48 kN and 40 kN at a distance of 1 m. and 3 m. respectively from the left support. Find : (i) Deflection under each load, (ii) Maximum deflection ; and (iii) The point at which maximum deflection occurs. Given $E = 2 \times 10^5$ N/mm^2 and $I = 85 \times 10^6$ mm^4.

18. Derive the Euler's relation for crippling load of a column with both ends hinged.

Or

19. A 1.5 m. long column has a circular cross-section of 5 cm. diameter. One of the ends of the column is fixed in direction and position while the other end is free. Taking factor of safety as 3, calculate the safe load using

(a) Rankine's formula, take yield stress, $\sigma_c = 560$ N/mm^2 and Rankine's constant, $a = 1/1600$.

(b) Euler's formula, Young's modulus for C.I. = 1.2×10^5 N/mm^2.

(4 × 10 = 40 marks)

D 71022 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) [2009 SCHEME] DEGREE EXAMINATION, NOVEMBER 2019

Chemical Engineering

CH 09 305/PTCH 09 304—CHEMICAL ENGINEERING THERMODYNAMICS—I

Time : Three Hours Maximum : 70 Marks

Part A

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

1. What are intensive and extensive properties ?
2. State Kelvin Planck Statement of Second law of thermodynamics.
3. List Maxwell's equations.
4. Define COP of a refrigerator.
5. List the properties of a real gas.

(5 × 2 = 10 marks)

Part B

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

6. One Kilo mole of a gas for which PV = nRT, where R = 8.314 kJ/K mol K is originally at 300 K and 1 bar. It is then heated at constant pressure to a temperature of 400 K and compressed isothermally to a volume equal to its initial volume. Assume that C_P = 30 kJ/K mol K. Find ΔU, ΔH Q and W.
7. Explain the principle of Corresponding States.
8. Explain how the Hess's law of constant heat Summation is useful in thermochemical calculations.
9. Explain any *three* methods for estimating the fugacity of a pure gas.
10. Explain the effect of pressure and temperature on activity.
11. Explain the advantages of multi-stage compression.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*

12. (a) (i) Determine the van dar Waals Constants and the molar volume of ethane at the critical point, given that the critical temperature and pressure are 305.2 K and 49.4 bar respectively.

(5 marks)

(ii) Explain about closed, open and isolated system. (5 marks)

Or

(b) An ideal gas under goes the following reversible processes :

(i) From an initial state of 343 K and 1 bar, it is compressed adiabatically to 423 K.

(ii) It is then cooled to 343 K at constant pressure.

(iii) It is then expanded to its original state isothermally.

Calculate ΔU, ΔH, W and Q for each step and entire cycle. Assume $C_V = \frac{3}{2} R$.

13. (a) Give a statistical explanation for entropy.

Or

(b) Derive the mathematical statement of second law of thermodynamics.

14. (a) Explain the effect of pressure and volume on C_P and C_V.

Or

(b) Show that for a gas obeying van der Waals equation of state,

$$C_P - C_V = \frac{R}{1 - 2a\,(V - b)^2 / \left(RTV^3\right)}$$

where a and b are van dar Waals constants.

15. (a) Derive the work of compression for adiabatic and isothermal processes.

Or

(b) Explain the basic components of an open cycle gas turbine power plant.

(4 × 10 = 40 marks)

D 50241 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2018

Printing Technology Engineering

PT 09 306—THERMAL ENGINEERING

Time : Three Hours Maximum : 70 Marks

Part A

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

1. What is perfect gas ? Under what conditions does a real gas behave as a perfect gas ?
2. What do you understand by NTP and STP ? What are their values ?
3. Define efficiency ratio in thermodynamic vapour cycles.
4. What is boiler efficiency ? Explain.
5. What are the different components found in reaction turbine ?

(5 × 2 = 10 marks)

Part B

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

6. Derive the equation for the steady flow energy.
7. Explain the conditions of reversibility and irreversibility of thermodynamic process.
8. Explain (i) swept volume ; (ii) mean effective pressure.
9. List the factors that determine the selection type and size of a steam boiler.
10. Draw the sketch of schematic representation of boiler accessories.
11. Compare impulse turbine and reaction turbine.

(4 × 5 = 20 marks)

Part C

Answer section (a) **or** *section (b) of each question.*
Each question carries 10 *marks.*

12. (a) (i) Define intensive and extensive properties.

(ii) A cold storage is to be maintained at – 5° C. while the surroundings are at 35° C. the heat leakage from the surroundings into the cold storage is estimated to be 29 kW. The actual COP of refrigeration plant is 1/3rd of an ideal plant working between the same temperatures. Find the power required to drive the plant.

(2 + 8 = 10 marks)

Or

Turn over

(b) A vessel of 2.5 m^3 capacity contains one kg-mole of nitrogen at 100° C. Evaluate the specific volume and pressure. If the gas is cooled to 30° C., calculate final pressure, change in specific internal energy and specific enthalpy.

13. (a) (i) What is isothermal process, describe this process under thermodynamic process of vapours ?

(ii) A steam at pressure of 10 bar and 0.9 dry expands to atmospheric pressure hyperbolically. Find : (1) work done ; (2) change in enthalpy ; (3) change in internal energy and (4) heat absorbed. When C_p = 2 kJ/kg.K.

(2 + 8 = 10 marks)

Or

(b) Steam at 50 bar, 400° C. expands in Rankine cycle to 0.34 bar. For a mass flow rate of 150 kg/s of steam, determine (i) power developed ; (ii) Thermal efficiency ; and (iii) Specific steam consumption.

14. (a) Classify the different types of steam boilers and explain.

Or

(b) Briefly explain the important parts of steam engine.

15. (a) A Parson's reaction turbine, while running at 400 r.p.m. consumes 30 tonnes of steam per hour. The steam at certain stage is at 1.6 bar with dryness fraction of 0.9 and the stage develops 10 kW.

The axial velocity of flow is constant and equal to 0.75 of the blade velocity. Find the mean diameter of the drum and the volume of steam flowing per second. Take blade top angles at inlet and exit as 35° and 20° respectively.

Or

(b) A rotary air compressor receives air at a pressure of 1 bar and at 17° C. and delivers it at a pressure of 6 bar. Determine, per kg. of air delivered, work done by the compressor and heat exchanged with the jacket water when the compression is isothermal, isentropic and by the relation $pv^{1.6} = e$.

[4 × 10 = 40 marks]