**Code No: D-3520/CBCS**

# FACULTY OF ENGINEERING

**B.E (Civil) III - Semester (CBCS) (Backlog) Examination, March / April 2022**

**Subject: Fluid Mechanics - I**

**Time: 3 Hours** **Max marks: 70**

**(Missing data, if any may be suitably assumed)**

## PART – A

**Note**: **Answers all questions**. **(10 x 2 = 20 Marks)**

1 Calculate Specific gravity of a liquid having volume of $4m^3$ and weighing 3000 kgf.

2 Explain phenomenon of capillarity.

3 Contrast control volume analysis with system Analysis.

4 Differentiate between dynamic viscosity and kinematic viscosity and also give their units in the SI system.

5 What are the constraints on pressure measurement using a simple piezometer.

6 State concept of continuity.

7 Differentiate between Laminar and Turbulent flow.

8 By increasing the pressure of a liquid from 7950 $kN/m^2$ to 11470 $kN/m^2$ the volume of the liquid decreases by 1.5%. Determine the bult modulus of the liquid.

9 State applications of flow net.

10 Define Mach number and explain how it differs for sub sonic, sonic and supersonic flows.

## PART - B

**Note: Answers any five questions**. **(5 x 10 = 50 Marks)**

11. (a) What is the cause of Capillarity? Derive an expression for the pressure difference between the inside and outside of a liquid jet.
    (b) A tube of internal diameter 2 mm is dipped vertically into a vessel containing mercury. The lower end of the tube is 2 cm below the mercury surface. Estimate the pressure of air inside the tube required to blow a hemispherical bubble at the lower end. Surface tension of mercury is 0.4 N/m.

12. (a) Distinguish between i) laminar and turbulent flows ii) compressible and Incompressible flows.
    (b) Two-dimensional potential flow the velocity potential is given by $\phi = x(2y-1)$. Determine the velocity at a point p (4,5) and also determine the value of stream function $\psi$.

13. (a) Starting from the basics, derive the condition for irrotational flow in XY plane about Z axis
    (b) Prove that the streamlines and equipotential lines are orthogonal. Why should the stream lines meet the boundary at right angles?

14. The diameter of a pipe bend is 30 cm at inlet and 15 cm at outlet and the flow is turned through $120^o$ in a vertical plane. The axis at inlet is horizontal and the center of the outlet section is 1.5 m below the center of the inlet section. Total volume of water is the bend is 0.9 $m^3$ Calculate the magnitude and direction of the force exerted on the bend by water flowing through it at 120 liter/s and when the inlet pressure is 0.15 $N/mm^2$.

15. (a) Derive the expression for discharge through a triangular notch by assuming suitable nomenclature for relevant parameters.
    (b) Describe Bourdon gauge for measuring pressure.

16. (a) Derive the Bernoulli's equation for adiabatic process.
    (b) Air flows in a duct under isentropic conditions. At section 1, the velocity, pressure and temperature are 125 m/s, 200 KPa absolute and 300 K respectively. If at a downstream section the velocity is 220 m/s, calculate the Mach number, temperature and pressure at section 2. Also calculate the densities at sections 1 and 2.

17. (a) Describe in detail the measurement of discharge through Venturimeter.
    (b) Water flows through a right-angled weir first and then over rectangular weir of 1m wide. The $C_d$ value for V-notch and rectangular weir are 0.6, 0.7 respectively. The depth of water over triangular weir is 360 mm. Find the depth of water over rectangular weir.

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**Code No: D-3528/CBCS**

# FACULTY OF ENGINEERING

**B.E. (EEE/EIE) III - Semester (CBCS) (Backlog) Examination, March / April 2022**

**SUBJECT: Electromagnetic Fields**

**Time: 3 Hours** **Max marks: 70**

**(Missing data, if any may be suitably assumed)**

## PART – A

**Note**: **Answers all questions**. **(10 x 2 = 20 Marks)**

1. Define scalar and vector fields
2. List different types of charges.
3. Define dielectric strength
4. Define velocity and wave length
5. Define faradays laws of electromagnetism
6. Write Maxwell's equation for pharos form
7. What is skin depth?
8. State Biot - Savarts law
9. Define attenuation constant
10. Define uniform plane waves.

## PART - B

**Note: Answers any five questions**. **(5 x 10 = 50 Marks)**

11. a) Explain briefly cylindrical and spherical systems.
    b) State and explain gauss law for E field.

12. a) Derive relation between E and V.
    b) Derive E for line charge.

13. a) State Biot-Savarts law and derive H
    b) Derive H and L for soleniod.

14. Explain Maxwell's equation for Static, time variant fields .in point integral form.

15. Derive Poynting theorem and explain P = E x H

16. Derive current densities for
    a) conduction current
    b) Convection current
    c) Displacement current

17. a) Explain coulombs law in detail.
    b) Derive uniqueness theorem.

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**Code No. 3546/CBCS**

# FACULTY OF ENGINEERING

**B.E. (CSE) III Semester (CBCS) (Backlog) Examination, March / April 2022**

**Subject: Logic & Switching Theory**

**Time: 3 hours** **Max. Marks: 70**

**(Missing data, if any, may be suitably assumed)**

## PART – A

**Note: Answer all questions** **(10 x 2 = 20 Marks)**

1 State and prove De Morgan's theorem.

2 Obtain the truth table of the following Boolean $F = (\bar{A} + \bar{B})(\bar{B} + C)$ Function.

3 Prove that dual of XOR is also its complement.

4 Construct a NOT gate using Exclusive OR gate.

5 Realize full subtractor using half subtractor.

6 Draw the Full Adder circuit using two half Adders and other logic gates.

7 Distinguish between latch and flip flop.

8 Design a D type flip – flop using JK flip flop.

9 Draw the 3-bit state diagram for mod-6 counter.

10 What is PROM?

## PART – B

**Note: Answer any five questions** **(5 x 10 = 50 Marks)**

11 a) Convert the given function into other canonical $F(x, y, z) = \pi(0, 7)$ form

b) Express the Boolean function as a product of $F = xy' + x'z$ maxterms.

12 Using Tabulation method, generate set of Prime Implicants and obtain minimal expression for the function F(W, X, Y, Z) = Σm(0, 1, 4, 5, 6, 7, 9, 11, 15)

13 Simplify the function using tabulation method
F (A,B,C,D,E) = Σm(4, 8, 10, 11, 12, 15) + Σd(9, 14)

14 Minimize using K-Maps
F (A,B,C,D,E)=Σm (0,2,3,4,5,6,7,11,15,16,18,19,23,27,31).

15 Tabulate the PLA programming table for Boolean function listed below and draw the PLA circuit to implement the functions. $F_1 = AB' + AC + A'BC'$
$F_2 = (AC + BC)'$

16 Design a B C D - to -7 Segment Decoder and Realize with a minimum number of gates

17 Write short notes on the following:
a) Ripple carry Adder
b) Equivalence function
c) Priority Encoder

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**Code No. D-3534/CBCS**

# FACULTY OF ENGINEERING

**B.E. (ECE) III - Semester (CBCS) (Backlog) Examination, March / April 2022**

**Subject: Switching Theory & Logic Design**

**Time: 3 Hours** **Max. Marks: 70**

**(Missing data, if any, may be suitably assumed)**

## PART – A

**Note: Answer all questions.** **(10 x 2 = 20 Marks)**

1 Represent $(43.75)_{10}$ into Binary and Octal Number System.
2 With an example explain the conversion of gray to binary code.
3 Design XOR gate using with minimum number of NAND gates.
4 What is an advantage of Tabular method?
5 Design a half adder using basic gates.
6 Define Hazard and mention different types of hazards.
7 Realize one bit comparator using gates.
8 Write JK-Flip Flop Truth table and it's Excitation table.
9 Differentiate between synchronous and asynchronous circuits.
10 Explain state diagram and state table with an example.

## PART – B

**Note: Answer any five questions.** **(5 x 10 = 50 Marks)**

11 (a) State and Prove Distributive and De Morgan's Law's.
(b) Simplify the following functions using Boolean theorems.
(i) $F = (A+B)(A+\overline{C})+\overline{A}B+\overline{A}\overline{C}$ (II) $F = \left[A\overline{B}C + B + B\overline{D} + AB\overline{D} + \overline{A}C\right]$.

12 Simplify function F=using K-Map method and implement using NAND gates only.

13 Realize 4 bit Look ahead carry adder and with the help of design circuit justify it is faster compare to the ripple carry adder.

14 Design Excess-3 to BCD code convertor circuit using basic gates.

15 Design a Synchronous counter which counts 0,2,5,3,4,1,2,…etc. using Flop.

16 (a) Express the function F= $B\overline{C} + AB\overline{D}$ in Canonical SOP.
(b) Implement Full adder using 74138.

17 (a) Draw mod-6 Asynchronous counter and explain it.
(b) Convert JK Flip Flop into T Flip Flop.

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**Code No. D-3538/CBCS**

# FACULTY OF ENGINEERING

**B.E. (MECH/PROD) III - Semester (CBCS) (Backlog) Examination,**
**March / April 2022**

**Subject: Fluid Mechanics**

**Time: 3 Hours** **Max. Marks: 70**

**(Missing data, if any may be suitably assumed)**

**PART – A**

**Note: Answer all questions.** **(10 x 2 = 20 Marks)**

1 Differentiate Newtonian and Non Newtonian fluids.
2 Differentiate Laminar flow and Turbulent flow.
3 State Continuity Equation.
4 What do you understand by Magnus effect?
5 Define Mach number and State its significance.
6 State how Moody's chart is useful in Fluid Mechanics.
7 What do you understand by stagnation pressure?
8 Define boundary layer and boundary layer thickness.
9 Differentiate between friction drag and pressure drag.
10 What is the difference between orifice and mouthpiece?

**PART – B**

**Note: Answer any five questions.** **(5 x 10 = 50 Marks)**

11 Derive Darcy's Equation for friction factor and state various assumptions made.

12 Explain about (a) Hot wire Anemometer (b) Types of manometers.

13 A horizontal venturimeter with inlet dia 20cm and throat dia 10cm is used to measure the flow of oil of specific gravity 0.8 discharge is 60 lit/sec. Find oil mercury differential manometer reading. Take Cd=0.8.

14 Water is flowing through a pipe of dia 200mm & 100mm at section 1&2 resppectively. The rate of flow through the pipe is 35lit/sec. Section 1 is 6m, section 2 is 4m above datum line. If he Pressure at section 1 is 4000kN/$m^2$. Find Pressure at section 2.

15 Derive Bernoulli's equation from Euler's equation of Motion.

16 A vertical gap 2.2cm wide of infinite extent contains a fluid of viscosity 2 NS/$m^2$ and specific gravity 0.9. A metallic plate 1.2mX1.2mX0.2cm is to be lifted up with a constant velocity of 0.15m/sec, through the gap. If the plate is in the middle of the gap, find the force required. The wright of the plate is 40 N.

17 What do you mean by boundary layer separation? What is the product of pressure gradient on the boundary layer separation?

18 (a) Derive the continuity equation for one dimensional compressible flow in differential form.
(b) What do you mean by compressibility correction factor? Find an expression for compressibility factor

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**Code No. D-3543/CBCS**

# FACULTY OF ENGINEERING

**B.E. (A.E) III - Semester ((CBCS) Backlog) Examination, March / April 2022**

**Subject: Automotive Engineering Drawing**

**Time: 3 Hours** **Max. Marks: 70**

**(Missing data, if any, may be suitably assumed)**

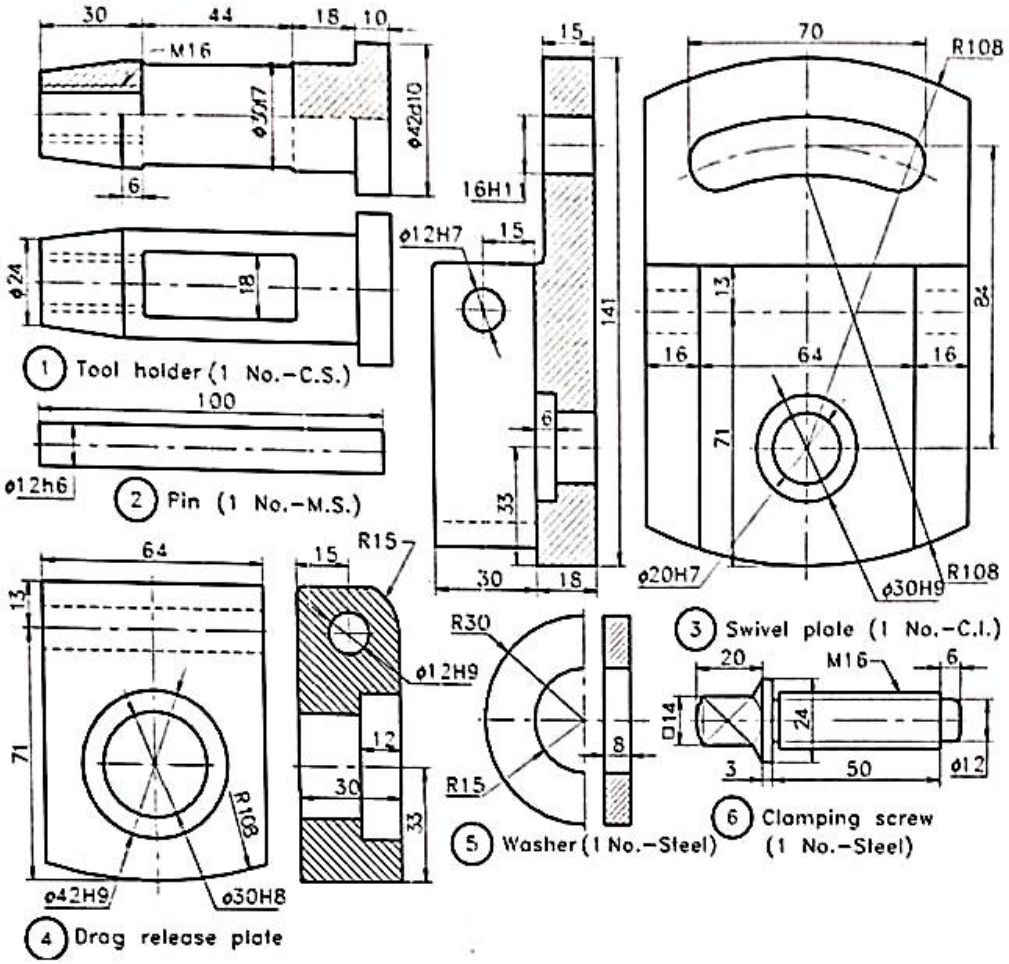
**Note: Answer any four questions from Part-A and Part-B is compulsory.**

## PART – A (20 Marks)

1. What so you understand by first and third angle projections?
2. Draw any two types of bolted joints taking t=15mm.
3. Draw any four set screws taking d=10mm.
4. Draw an eye foundation bolt taking D=20mm
5. What are the different types of keys used in machines?
6. What are the advantages of using a cotter joint?
7. Draw a double rivetted butt joint taking t=15mm.

## PART – B (50 Marks)

8. Draw the assembly of the figure given below.

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**Code No: D-3011/NON-CBCS**

# FACULTY OF ENGINEERING

**B.E II / IV (Civil) I - Semester (NON-CBCS) (Backlog) Examination, March / April 2022**

**Subject: Building Planning and Drawing**

**Time: 3 Hours** **Max. Marks: 75**

**(Missing data, if any, may be suitably assumed)**

## PART – A

**Note: Answer all questions.** **(25 Marks)**

1 Draw plan of Window.
2 Draw the conventional sign for Concrete and Steel.
3 Sketch the elevation of standard paneled door.
4 Draw the plan of 1½ brick English bond for two layers.
5 Draw the cross section of walls of ashlar masonry.
6 List various types of roofs.
7 Why a section is considered in drawing.
8 Differentiate between RC staircase and Steel staircase.
9 List different forms of Stairs.
10 Draw the isometric view of a Brick.

## PART – B

**Note: Answer any five questions.** **(5 x 10 = 50 Marks)**

11. Draw the isometric view of 1½ brick English bond, minimum number of layers is 5

12. Draw the plan and elevation of a fully paneled door to a scale of 1:50, for 1.2m x 2.1 m.

13. Draw the plan, elevation and sectional elevation of a glazed window of size 1.0 m x 1.2m.

14. Draw the sectional elevation of a RCC slab in both directions of span 4 m x 5 m and has a thickness of 160 mm. sketch the reinforcement details.

15. Draw the sectional elevation of a wooden stair case for a suitable plan and scale

16. (a) Give and draw the standard dimensions for the following rooms of a residential building:
(i) Veranda (ii) Bed room (iii) Kitchen
(b) Give sectional elevation of Footing.

17. For the given line diagram in Figure 1 develop the Plan of a residential building. Take the thickness of all walls as 300 mm. Provide the doors and windows at appropriate locations

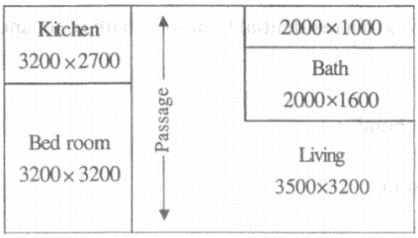


Figure 1

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**Code No.D-3016/NON-CBCS**

# FACULTY OF ENGINEERING

**B.E. II/IV (EEE/EIE) I - Semester (NON-CBCS) (Backlog) Examination, March / April 2021**

**Subject: Electronic Engineering – I**

**Time: 3 hours** **Max. Marks: 75**

**(Missing data, if any, may be suitably assumed)**

## PART – A

**Note: Answer all questions.** **(25 Marks)**

1 Define Diffusion and Transition Capacitance.
2 The threshold voltage of a silicon diode is 0.7 V at 25$^{o}$C. What will be the value of threshold voltage if the junction temperature rises to 100$^{o}$C?
3 Define Peek Inverse Voltage.
4 Draw the symbol of Varactor Diode, LED and Photo Diode.
5 Define Thermal runaway.
6 State the general steps to follow in designing of bias circuits.
7 Draw the h-parameter equivalent circuit for Common Emitter Configuration.
8 State any four applications of charge Coupled Devices.
9 Define Pinch off voltage.
10 Explain how FET acts as an amplifier.

## PART – B

**Note: Answer any five questions.** **(5 x 10 = 50 Marks)**

11 Drive the Diode Current equation under Forward and Reverse bias conditions.

12 (a) Draw and explain the working principle of Bridge Wave Rectifier and also derive Efficiency of it.
(b) Compare the features of Half Wave Rectifier with Full Wave Rectifier.

13 (a) Explain the BJT characteristics in Common Base Configuration.
(b) Define Base Width Modulation.

14 (a) Draw the construction of SCR and also explain the working principle of it.
(b) Draw the T equivalent circuit of Common Base Configuration.

15 Construct the E-MOSFETs and also obtain drain and transfer characteristics of it.

16 (a) The reverse saturation current at 300K of a germanium diode is 5 $\mu$A. Determine the voltage to be applied to obtain a forward current of 50$\mu$A.
(b) Explain CLC section filter and also derive the ripple factor of it.

17 (a) Explain about self-bias and derive stability factor of it.
(b) Compare TRAIC and DIAC.

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**Code No. D-3024/NON-CBCS**

# FACULTY OF ENGINEERING

## B.E. II/IV (ECE) I – Semester (Backlog) Examination, March / April 2022

**Subject: Electro Magnetic Theory**

**Time: 3 Hours** **Max. Marks: 75**

**(Missing data, if any, may be suitably assumed)**

**PART – A**

**Note: Answer all questions.** **(25 Marks)**

1 Given the scalar function $t = x^2y + 2xz - 4$, obtain the unit vector norma to the surface at the point (2, -2, 3).
2 State Gauss law in both differential and integral forms.
3 What is electric susceptibility? What is its unit?
4 State uniqueness theorem.
5 Define magnetic vector potential. Mention its unit.
6 State Ampere's circuital law. Write its integral and differential forms.
7 Differentiate between conduction and displacement currents.
8 Define loss tangent.
9 The electric field intensity of a uniform plane wave in a perfect dielectric medium is given by $E = E_o \cos[(\pi x 10^2)t + 1.62]$. If the relative permeability of the medium is unity, find its relative permittivity.
10 Distinguish between left and right circular polarization of waves.

**PART – B**

**Note: Answer any five questions.** **(5 x 10 = 50 Marks)**

11 a) State and explain Coulomb's law. Mention their applications.
b) A spherical region of radius 'a' contains a volume change density in spherical coordinates given by $\rho = \rho_o\left(1-\frac{r^2}{a^2}\right)$; $r \le a$

$= 0$; $r > a$.

Calculate (a) the total charge and (b) electric field inside and outside the distribution of charges.

12 a) Derive the general continuity equation.
b) Given that, $\vec{J} = \frac{1}{r^3}(2\cos\theta\, a_r + \sin a_\theta)\frac{A}{M^2}$. Obtain the current passing through a hemispherical shell of radius 20 cm; $0 < \theta < \pi/2$, $0 < \varphi < 2\pi$.

13 a) State and derive magnetic boundary conditions.
b) $\vec{B} = \frac{2}{r}a_\varphi$ Tesla. Determine the magnetic flux crossing the plane surface described by $0.5 \le r \le 2.5$m and $0 \le z \le 20$m. Use cylindrical coordinates.

14 a) List the Maxwell's equations for harmonically varying fields.

b) The phase constant of as UPW travelling in a perfect dielectric medium is 10 rad/m.
Calculate the phase velocity, wave frequency and intrinsic impedance of the field. The relative permittivity and permeability of the medium are 4.8 and 1.0 respectively.

15 a) State and prove Poynting's theorem. How do you interpret Poyntying's vector?

b) The electric field intensity in a lossless medium is given by $E(t) = E_{x_o}$ cos (wt- $\beta z$) $u_x$ where, $E_{x_o}$ = $150\frac{V}{m}$, $\omega = 2\pi x10^8\ rad/s$ *and* $\beta = \frac{4\pi}{3} rad/m$. Find the (i) instantaneous Poynting vector (ii) Complex Poynting vector using phasor forms of the field intensities and (iii) power flow through an area S = $5u_z$ $M^2$.

16 a) Show that, intrinsic impedance of free space is 377 Ohms.

b) The conductivity, relative permittivity and relative permeability of sea water are 4 S/m, 80 and 1.0 respectively. Find the frequency below which sea water can be considered as a good conductor. Also determine the skin depth of sea water at 0.5 MHz.

17 Write short notes on:
a) Laplace's Equation
b) Surface Impedance.

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**Code No: D-3028/NON-CBCS**

# FACULTY OF ENGINEERING

**BE II/IV (MECH/PROD/AE) I - Semester (NON-CBCS) (Backlog) Examination, March / April 2022**

**Subject: Mechanics of Materials**

**Time: 3 Hours** **Max. Marks: 75**

**(Missing data, if any, may be suitably assumed)**

## PART – A

**Note: Answer all questions.** **(25 Marks)**

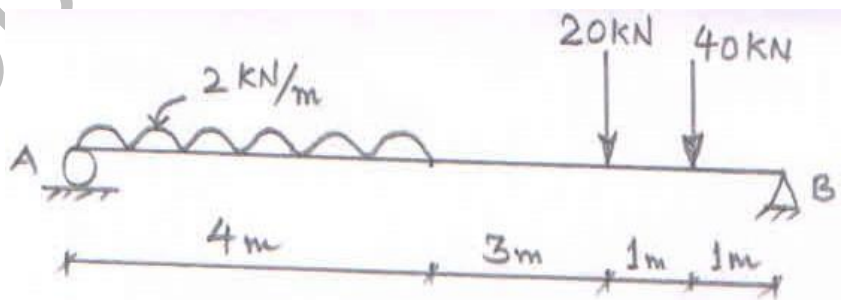
1 Define Poisson's ratio and Modular ratio?
2 Explain Hoop stress due to temperature?
3 What is the section modulus of a circular section of diameter 500mm?
4 Find max BM of a simply supported beam subjected to UDL of 20kN/m through the span l=5m?
5 Write the limitations of double integration method used for finding out slope and deflection?
6 A solid shaft of 150mm diameter is used to transmit torque. Find the maximum torque transmitted by the shaft if the maximum shear stress induced to the shaft is 45 $N/mm^2$?
7 A circular beam of 100mm diameter is subjected to a shear of 5kN. Calculate average shear stress and maximum shear stress?
8 Explain equivalent bending moment & equivalent torque?
9 Write three applications of compound cylinders?
10 What are the limitations of Euler's column theory?

## PART – B

**Note: Answer any five questions.** **(5 x 10 = 50 Marks)**

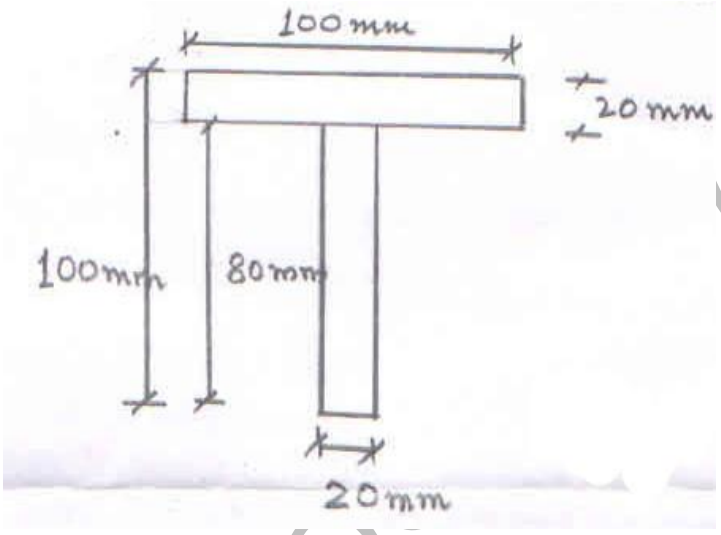
11 Derive a relation between the Elastic constants K,C, and E from the fundamentals.

12 Draw SFD and BMD for the beam as shown in fig.1. Locate the point of contraflexure, if any.




13 Derive pure torsion equation for circular shaft.

14 The shear force acting on a section of a beam is 50kN. The section of the beam is of T-shaped of dimensions 100mm x 100mm x 20mm as shown in fig.2. Calculate the shear stress at the neutral axis and at the junction of the web and the flange.




15 A cylindrical vessel whose ends are closed by means of rigid flange plates, is made of steel plate 4mm thick. The length and the internal diameter of the vessel are 100cm and 30cm respectively. Determine the longitudinal and hoop stresses in the cylindrical shell due to an internal fluid pressure of 2 $N/mm^2$. Also calculate the increase in length, diameter and volume of the vessel. Take $E=2x10^5$ $N/mm^2$ and $\mu=0.3$.

16 A simply supported beam AB of span 6m is carrying a point load of 40kN. At a distance 4.75m from left end A. calculate deflection under the load and maximum deflection. Take $EI= 26x10^{12}$ $N\text{-}mm^2$.

17 A steel tube of 30mm external diameter and 20mm internal diameter encloses a copper rod of 15mm diameter which is rigidly connected to the tube at ends. If the composite bar is free of stresses at $50^0C$, calculate the stresses in the rod and tube when the temperature is raised to $150^0C$. Take $E_s=2x10^5$ $N/mm^2$, $E_c=1x10^5$ $N/mm^2$ , $\alpha_s= 12x10^{-6}$ / $^0C$ and $\alpha_c= 18x10^{-6}$ / $^0C$.

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Code No.D-3035/NON-CBCS

# FACULTY OF ENGINEERING

**B.E. II/IV (CSE) I - Semester (NON-CBCS) (Backlog) Examination, March / April 2022**

**Subject: Data Structures Using C++**

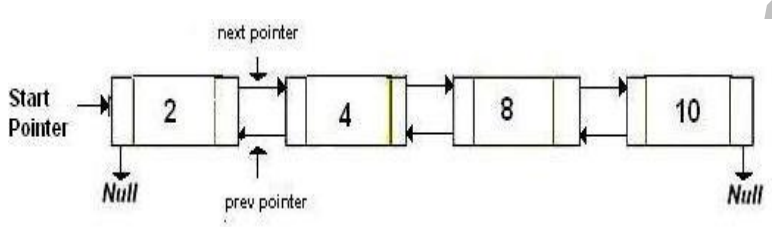
**Time: 3 Hours** **Max. Marks: 75**

**(Missing data, if any, may be suitably assumed)**

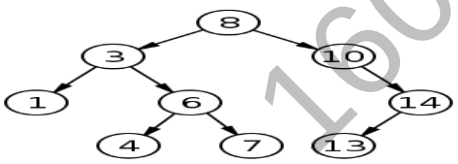
## PART – A

**Note: Answer all questions.** **(25 Marks)**

1. Explain the different Time complexity notations.
2. Declare an array as an Abstract Data Type in C++.
3. Evaluate the postfix expression 8 2 / 3 – 4 2 * + using Stacks.
4. Define Mazing Problem.
5. Identify the data structure shown below. Design the pseudo code when a new node is inserted at the beginning of this list.




6. Design the pseudo code to perform insertion at the end of a circular linked list.
7. What is a AVL tree?
8. Write the Preorder traversal for the following binary search tree.




9. Define spanning tree.
10. Explain internal sorting.

## PART – B

**Note: Answer any five questions.** **(5 x 10 = 50 Marks)**

11(a) What is the matrix which has more number of zero entries? Develop a C++ program to perform store and retrieve operations on such matrix efficiently.

(b) Design the ADT for a String. Given a sentence with only words, commas and spaces in between. Design a C++ function to count the number of words with a given input length in the sentence. For example, if the given input sentence is “Education is not the learning of facts, but the training of mind to think” and input length is 5 then Output is 2 (2 words -- facts and think : with length 5).

12 (a) Explain the power of templates in C++ with a suitable example.
(b) Design an algorithm for converting an infix expression to postfix expression. Given an infix expression (P+Q)-(R+S*T+U) / Y. Show step by step representation of the stack content and output expression after each character is read.

13 (a) Write the C++ functions to perform insert and deletion operation at a particular position in a linked list.
(b) How is a node represented in a doubly linked list? What are the advantages of doubly linked list? Explain with an example.

14 (a) Explain Red- Black Tree with suitable example.
(b) Write C++ functions to traverse through the binary tree in preorder, postorder and inorder.

15 (a) Explain Heap sort by considering the following numbers.
23, 4, 7,5 ,21,9,17, 22
(b) Differentiate between Depth first search and Breadth first search in a graph.

16 (a) Define Sparse matrix? Describe the efficient way to store the elements of a Sparse Matrix.
(b) Write the ADT for Queue data structure. Design C++ functions to perform insertion and deletion on queues using arrays.

17 (a) List the applications of Stack. Write the C++ program to implement Stack data structure using Linked list.
(b) Differentiate between Tree and a graph with the help of an example.

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**Code No. D-3040/NON-CBCS**

# FACULTY OF ENGINEERING

**B.E. II/IV (I.T) I – Semester (NON-CBCS) (Backlog) Examination,**
**March / April 2022**
**Subject: Micro Electronics**

**Time: 3 Hours** **Max. Marks: 75**

**(Missing data, if any, may be suitably assumed)**

## PART – A

**Note: Answer all questions.** **(25 Marks)**

1 Draw the energy band diagrams of conductor, semiconductor and insulator.
2 What is a clamper? Explain the operation of a positive clamper.
3 Derive the relation between $\alpha$ and $\beta$.
4 Sketch the Drain characteristics of a MOSFET and indicate the three regions of operation
5 State the advantages of negative feedback.
6 Which type of feedback is used in oscillators? State the condition for oscillation.
7 Implement Op-amp as a current controlled voltage source (CCVS).
8 Explain virtual ground concept w.r.t. an op-amp.
9 What are the advantages of CMOS logic?
10 Define Delay power product.

## PART – B

**Note: Answer any five questions.** **(5 x 10 = 50 Marks)**

11 a) Explain how zenerdiode can be used as a voltage regulator.
b) Explain about varactor diode.

12 a) Discuss the operation of BJT as a switch.
b) Draw the hybrid $\pi$ and T models of a BJT.

13 a) Explain the operation of a class B power amplifier and derive its efficiency.
b) State the principle used in crystal oscillators and also mention the advantages of a crystal oscillator.

14 Explain the operation of a monostable multivibrator.

15 a) Derive the gain of as inverting op-amp.
b) What are characteristics of an ideal op-amp?

16 a) Implement 2-input NOR gate and 2-input NAND gate using CMOS logic.
b) Discuss about the VTC of an inverter.

17 Write notes on the following:
a) Clipping circuits
b) Analog multipliers.

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