Code No: D-2025/O/AICTE

FACULTY OF ENGINEERING

BE (Civil) III - Semester (AICTE) (Main & Backlog) Examination, March/ April 2022

Subject: Solid Mechanics

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. Explain the terms Volumetric strain and Bulk modulus.
2. State Lame's equation used for finding stresses in a thick cylinder
3. Draw Mohr's circle for a state of stress, where two perpendicular direct stresses of 40N/mm^2 both tensile are acting.
4. Define Modulus of resilience.
5. Draw SFD and BMD for a simply supported beam of span 4m subjected to a UDL of 5kN/m acting on the entire span of the beam
6. Calculate the section modulus of a square section of side 90mm.
7. Sketch the shear stress distribution for an I-Section
8. Define core of a section. Sketch the core of a rectangular section box
9. A circular shaft of 100mm diameter is subjected to bending moment of 40kN-m and a twisting moment of 30kN-m Calculate principal stresses.
10. What is the structural difference between closely coiled and open coiled helical springs?

PART - B

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

11. A steel rod of 20mm diameter passes through a copper tube of 36mm external and 24mm internal diameter, the rod and the tube are screwed together at ends at a temperature of 50oC. Calculate the stresses in rod and tube when the temperature of the assembly is raised to 150^{o}C. E_s=200GPa, E_c = 100GPa, α_s = 12 x 10^{-6}/^{o}C & α_c = 18 x 10^{-6}/^{o}C.

12. A compound tube is composed of a tube 250mm internal diameter and 25mm thick shrunk on a tube of 250mm external diameter and 25mm thick. The radial pressure at the junction is 8N/mm^2. The compound tube is subjected to an internal fluid pressure of 84.5N/mm^2 Find the variation of the hoop stress over the wall of the compound tube

13. Two planes AB and BC which are at right angles carry shear stresses of intensity 22.5N/mm^2 while the plane AB carries also a tensile stress of 60N.mm^2. Find the normal and shear stresses on plane AC inclined at 25^o to the plane AB.

14. A horizontal beam AD, 10m long carries a uniformly distributed load of 160N/m together with a concentrated load of 400N at the left end A. The beam is supported at a point B which is 1m from A and at C which is on the right hand, half of the beam and 'X' meters from the end D. Determine the value of X, if the mid point is a point of contra flexure and for this arrangement draw SFD and BMD

15. Find the width and depth of the strongest beam that can be cut of a cylindrical log of wood whose diameter is 500mm.

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16. The T-shaped cross section of a beam in which flange is 200mm wide and 50mm thick and the web is 200mm deep and 10mm wide is subjected to vertical shear force of 100kN. Calculate the shear stress at the neutral axis at the junction of the web and the flange. Moment of inertia about the horizontal neutral axis is $1.134 \times 108 mm^4$.

17. A solid shaft is subjected to a torque of 15kN-m. Find the necessary diameter of the shaft if the allowable shearing stress is $60 N/mm^2$ and the allowable twist is I degree in a length of 20 diameters of the shaft. Take $C=8 \times 10^4 N/mm^2$.

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Code No: D-2028/O/AICTE

FACULTY OF ENGINEERING

B.E. (EEE/EIE) III - Semester (AICTE) (Main & 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 with examples.
2. Define Electric Flux Density and write the relation with Electric field Intensity.
3. Define Amperes Circuit law.
4. Explain Magnetic Boundary conditions.
5. Write the law of refraction for electric field.
6. Define MOM method.
7. Explain Faradays Law of Electromagnetic Induction.
8. Write Maxwell's Equation in Point form for time varying field.
9. Define Velocity and Wave length and also write the units.
10. What is skin depth and write its formula.

PART - B

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

11. a) Explain Gradient of Scalar and Curl of Vector with examples.
    b) Calculate E at point **P (1, 2, 3)** due to Charge Density of **12nC** at point **(2, 3, 4)**m.

12. a) Derive the relation between **E** and V and explain the relation.
    b) Derive the formula for energy stored in E field.

13. a) State Biot Savarts Law and derive the formula for H.
    b) Find H at the origin due to current **element IdL=3π (ax-2ay+3az)** μ **Am** at point P (3, 4, 5) in free space.

14. a) Derive H and L for Solenoid.
    b) Write Maxwell's Equation in Point and Integral form for Static H and E field.

15. Derive Plane Wave equation in terms of propagation constant in Lossy Di-electrics

16. a) A uniform plane wave propagating in a medium has $E=2e^{-az}$ sin $(1010^8 t - \beta z)$ ay V/m. If medium is characterized by $\mu_r=20$, $\in_r=1$, $\sigma=3$mhos/m, find H, α, β.
    b) Write the formulas for dL, dS, dV for spherical system.

17. a) Derive Power and Poynting theorem.
    b) Derive Displacement current and Displacement current density.

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Code No. D-2038/O/AICTE

FACULTY OF ENGINEERING

B.E. (ECE/CSE/IT) III - Semester (AICTE) (Main & Backlog) Examination,
March / April 2022
Subject: Digital Electronics

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. Draw XOR gate symbol and write its truth table.
2. What is K-Map and mention its types?
3. State Commutative law of Boolean algebra.
4. What are encoders and decoders?
5. What is the difference between flip flop and latch?
6. Where is Programmable Logic Array used?
7. What is T flip flop and also draw its circuit?
8. What is CPLD used for?
9. What is Moore model?
10. What is Mealy state diagram?

PART – B

Note: Answer any five questions. **(5x10 = 50 Marks)**

11 Implement the following function using Quine McCluskey method
$F = \Sigma\, m(6,7,8,9) + d(10, 11, 12, 13, 14,15)$.

12 (a) Explain in detail about BCD to 7 segment display.
(b) Minimize the four variable logic function using K Map
$f(A,B,C,D) = \Sigma m(0,1,2,3,5,7,8,9,11,14)$.

13 (a) Explain about decoder and write a VDHL of a simple decoder.
(b) Explain the structure of CPLDs.

14 Explain in detail about Up/down counters.

15 Explain in detail about Full adder & Half adder.

16 (a) What are the limitations of FSM?
(b) Convert $(12570)_8$ to decimal, binary & Octal.

17 Explain in detail about PLA. & mention its advantages and disadvantages.

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Code No: D-2039/N/AICTE

FACULTY OF MANAGEMENT

BE (ECE/CSE/IT) III - Semester (AICTE) (Main & Backlog) (New) Examination, March / April 2022

Subject: Digital Electronics

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

Note: (i) First question is compulsory and answer any four questions from the remaining six questions. Each Questions carries 14 Marks.

(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.

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

1 (a) Explain about Design process

(b) Simplify the Boolean equation using K-Map $F(X,Y,Z)=\Sigma m(3,4,6,7)$

(c) Write VHDL code for AND gate

(d) State Demorgran's law

(e) What are the Prime implicants

(f) Explain about PLA

(g) Give the excitation table for T-Flip-flop

2 a) Simplify the Boolean function using k-map in POS form
$F(A,B,C,D) = \Pi M(0,1,2,3,4,5,6,7,9,11)$.

b) Simplify the Boolean function using k-map method
$F(A,B,C,D)= \Sigma m(0,1,3,7,15) + \Sigma d(2,11,12)$.

3 a) Simplify the Boolean functions using 5-variable using K-map.
$F(A,B,C,D,E) = \Sigma m(0,2,4,6,9,11,13,15,17,21,25,27,29,31)$

b) Write VHDL code for Decoder circuit.

4 a) Obtain the characteristics and excitation tables for SR,JK and D Flip-flips.

b) Design a 4-bit priority encoder circuit.

5 a) Design a mod-12 synchronous counter using JK flip-flop.

b) Design Half adder using NAND gates.

6 a) Define decoder ? Design a 3×8 line Decoder.

b) Explain about Demultiflexer.

7 a) With suitable example explain state reduction and state assignment.

b) With suitable design example, explain ASM Chart.

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Code No. D-2042/O/AICTE

FACULTY OF ENGINEERING

B.E. (MECH/PROD) III – Semester (AICTE) (Main & Backlog) Examination,
March / April 2022
Subject: Metallurgy and Material Science

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 Define the term Strain hardening.
2 Distinguish between Screw dislocation and Edge dislocation.
3 State the modes of fracture.
4 What do you understand by fatigue strength?
5 Differentiate between Eutectic and Eutectoid reaction.
6 Write the properties and applications of High Speed Steel.
7 Define Annealing.
8 Mention the applications of case hardening.
9 State the properties and applications of Gun metal.
10 Write the significance of composite materials.

PART – B

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

11 (a) Explain slip and twinning as mechanism of plastic deformation.
(b) Discuss the phenomena of recovery, recrystallization of hot worked metal.

12 (a) Discuss the Griffith theory of brittle fracture.
(b) Explain about ductile to brittle transition temperature in metals.

13 (a) Describe the construction of thermal equilibrium diagram in binary alloy.
(b) Give a detailed classification of Cast Irons. Mention their properties and applications.

14 (a) What is Normalizing? Discuss the objectives of Normalizing.
(b) Discuss the construction and interpretation of TTT Curve.

15 (a) Distinguish clearly between carburizing and Nitriding.
(b) Write the composition, properties and applications of Duralumin.

16 (a) Explain why metals are mostly ductile and ceramics are brittle at room temperature.
(b) Discuss the common methods of producing Fiber Reinforced Composites.

17 Write short note on any two of the following:
(a) Hall-Petch equation.
(b) Classification of Steels on the basis of Carbon content.
(c) Metal Matrix Composites.

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Code No. D-2044/O/AICTE

FACULTY OF ENGINEERING

B.E. (AE) III - Semester (AICTE) (Main & Backlog) Examination, March / April 2022

Subject: Fluid Mechanics and Machinery

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 Define terms specific volume and specific gravity.
2 What do you mean by Vacuum Pressure?
3 Define the Equation of Continuity.
4 What is the difference between momentum equation and impulse momentum equation?
5 Define term Kinetic energy correction factor.
6 What are the minor energy losses in the pipe?
7 Difference between inward and outward flow reaction turbine.
8 Write important relations for Francis Turbine.
9 Differentiate Kaplan and Propeller Turbine.
10 Explain the term Static suction head and static discharge head.

PART – B

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

11 A simple U tube manometer containing mercury is connected to a pipe in which an oil of specific gravity 0.9 is flowing. The pressure in the pipe is vacuum. The other end of the manometer is open to the atmosphere. Find the vacuum pressure in the pipe. If the difference of mercury level in the two limbs is 30cm and height of oil in the left limb from the center of the pipe is 20cm below.

12 What is Venturi meter? Derive the expression for rate of flow of fluid through venture meter with neat sketch.

13 (a) Obtain the expression for velocity distribution for turbulent flow in smooth pipes.
(b) An oil of specific gravity 0.7 is flowing through a pipe of diameter 300mm at the rate of 500lit/s. Find the head lost due to friction and power required to maintain the flow for a length of 1000m. Take v=0.29 strokes.

14 Design a Pelton wheel for a head of 80meter and speed 300rpm. The Pelton wheel develops 103 KW shaft power. Take C_v=0.98, speed ration 0.45 and overall efficiency 0.8.

15 What is negative slip in reciprocating pumps? Explain with neat sketch the function of air vessels in reciprocating pumps.

16 A centrifugal pump having outer diameter equal to 3 times the inner dia and running at 1200 rpm works against a head of 50m. The velocity of flow through the impeller is const. and equal to 2.5m/s. The vanes are set back at an angle of 45˚ at outlet. If the outer dia of impeller is 500mm and width at outlet is 50mm determine (i) Work done by impeller on water per sec (ii) Manometric Efficiency.

17 (a) What is Draft tube? Why is it used in Reaction turbine?
(b) What do you mean by equivalent pipe? Obtain the expression for equivalent pipe.

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