Code No. 2890/AICTE/S

FACULTY OF ENGINEERING

B. E. (Civil) (AICTE) III – Semester (Suppl) Examination, December 2020

Subject: Solid Mechanics

Time: 2 hours **Max. Marks: 70**

Note: (Missing data if, any can be assumed suitable).

PART – A

Answer any five questions. **(5 x 2 = 10 Marks)**

1. A uniformly tapering circular bar 1m long has end diameters of 100mm and 60mm and it is subjected to an axial load of 80 KN. Calculate the elongation of bar. E = 200KN/mm^2.
2. The Young's modulus and Shear modulus for a material are 200GPa and 100GPA respectively. Calculate its Bulk modulus.
3. Define Proof resilience and Modulus of resilience.
4. Draw shear force diagram for a cantilever beam of span 4m subjected to two point loads of each 10KN acting at free end and mid span.
5. A beam of rectangular section 150mm wide and 300mm deep is subjected to a shear force of 80 KN at a section. Calculate the maximum shear stress across the section.
6. Sketch the core of a rectangular and circular section.
7. State any two assumptions in the theory of bending.
8. A closely coiled helical spring has mean coil diameter equal to 8 times of wire diameter. If the permissible shear stress under a load of 200 N is 60N/mm^2, calculate the wire diameter.
9. Calculate the section modulus of a circular section of diameter 60mm.
10. State middle third rule for a column section.

PART – B

Answer any four questions. **(4 x 15 = 60 Marks)**

11. A circular bar of 12mm diameter and 1m long is subjected to an axial load of 20KN. The change in diameter is 0.003 mm. Calculate the elongation of bar, Poisson's ratio and Bulk modulus. E = 200 GPa.
12. Draw shear force and bending moment diagrams for the simply supported beam shown in fig.1.

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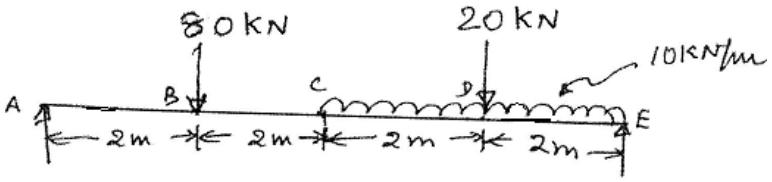

13. A point in a strained material is subjected to principal stresses of 100N/mm^2 (tensile) and 40 N/mm^2 (comp). Find the normal and tangential stress on a plane making 30^0 with the axis of compressive stress. Also, check the result graphically by Mohr's circle.

14. A boiler 800mm in diameter and 2m long is subjected to an internal pressure so that the maximum tensile stress in the boiler is 20N/mm^2. Calculate the increase in volume of the cylinder. E = 200GPa, v = 0.3.

15. Find the minimum thickness for a cylindrical shell of internal diameter 160mm to withstand an internal pressure of 8 N/mm^2. The maximum hoop stress in the section is not to exceed 35 N/mm^2.

16. A hollow circular shaft is to transmit 200KW at 150 RPM. The maximum shear stress in the shaft is 70 N/mm^2 and the maximum torque in each revolution exceeds the mean by 25%. Calculate the internal and external diameters of the shaft if diameter ratio is 3/5. Also, find the angle of twist in a length of 2.4m. C = 100 GN/m^2.

17. Sketch the shear stress distribution across the T-section whose flange is 120mm x 10mm, depth of web is 180mm and thickness 10mm, subjected to a shear force of 150KN.

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Code No.2894/AICTE/S

FACULTY OF ENGINEERING

B. E. (EEE/Inst.) (AICTE) III – Semester (Suppl.) Examination,

December 2020

Subject: Electromagnetic Fields

Time: 2 hours **Max. Marks: 70**

Note: (Missing data if, any can be assumed suitable).

PART – A

Answer any five questions. **(5 x 2 = 10 Marks)**

1. State divergence theorem.
2. State and give Mathematical expressions for electric potential.
3. Give the relationship between potential gradient and electric field intensity.
4. A moving charge is subjected to both electric and magnetic fields, what force act on the charge.
5. Explain Faraday's law of induction.
6. State and explain Poynting theorm.
7. A dielectric material with electric suseptability of 0.5, subjected to electric field of 5V/m. Compute the polarization.
8. Determine Volume charge density of P(1, 2, -5) due to a potential functions $V=6xy^2z+8$.
9. Write the significance of del operator and write the mathematical expression for del operator in cylindrical and spherical coordinates.
10. Two coils of self inductance of 0.5H and 0.8H are connected in series. There is mutual inductance of 0.2H, find the effective inductance of the contamination.

PART – B

Answer any four questions. **(4 x 15 = 60 Marks)**

11. (a) Deduce the electro magnetic wave equation from Maxwell's equation.

    (b) Find the velocity of the wave in lossless medium having relative permittivity 4 and relative permeability of 1.2.

12. (a) Given a particular field of F=(x+2y+ak)+(bx-2y-z)az + (4x+cy+2z)az. If the field is Irrotational find the constant a, b, c.

    (b) Calculate $\nabla X \nabla(\nabla.G)$, if $G=2x^2yzax-20yay + (x^2-z^2)az$.

13. (a) Evaluate both the sides of the stokes theorem for the field $G=10 \sin\theta\, a\phi$. The surface is r=3 $0 \le \theta \le 90$; $0 \le \phi \le' 90$.

    (b) State and explain Ampere circuital Law and deduce the expression in the point form.

14. (a) Given the flux density Vector $D = \frac{1+\cos 2\phi}{r^3} a_\phi$. Find the flux crossing the surface defined by r=2 $0 \le \theta \le \pi$ $0 \le \phi \le 2\pi$.

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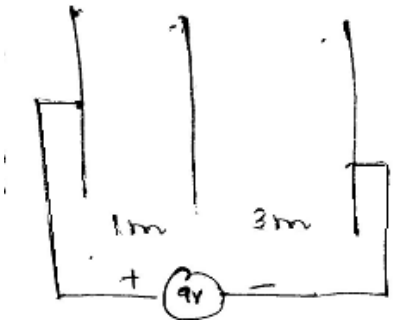
(b) A parallel plate capacitor has layers of dielectrics with permittivites $\in_1$:360 and $\in_2$: $2\in_0$ as shown if the potential given is 9V determine the potential drop in the two dielectrics.



15. (a) Two narrow Coils A and B having a common axis and are placed 15cm apart, Coil A has 15 turns of radius 5 cm with a current of 2A paring through it. Coil B has a single turn of radius 7.5 cm. If the magnetic field at the centre coil A is zero, what amount of current should be passed and it directions.

(b) Derive the expression $\nabla \vee - \epsilon$.

16. (a) In a system of charges, there are 2 points charges and 2 line charges, their dispositions are as follows:

Q_1 = 5nC of P_1(2, 3, 4); $Q_2 = -5n C_1^1$ of P_2(3, 6, 8)

Line charge λL_1 = 5n C/m lying along X axis

Line charge $\lambda L_2 = -5$nC/m lying inclined to Z axis at Y = 4; Z = 3. Compute the electric field intensity at origin (0, 0, 0).

(b) Explain and deduce the boundary conditions between two perfect dielectrics.

17. (a) Given the potential functions $V = x^2y + 10z + 2\log(x^2 + y^2)$, find the flux density and volume charge density at P(1, 2, 3).

(b) Explain what is displacement current and deduce the expression for it.

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Code No: 2903/AICTE/S

FACULTY OF ENGINEERING

B.E. (AICTE) (ECE/CSE/IT) III-Semester (Suppl) Examination, December 2020

Subject : Digital Electronics

Time: 2 Hours **Max. Marks: 70**

Note: (Missing data if, any can be assumed suitable).

PART – A

Answer any five questions. **(5 x 2 = 10 Marks)**

1. State and prove De Morgan's laws and show their implementation using fundamental gates.
2. Prove that the dual of XOR is XNOR.
3. Design half subtractor using only NAND gates.
4. What are the applications of multiplexer?
5. Write the comparison between a PLA and PAL?
6. What is acronym for VHDL?
7. Distinguish between Combinational and Sequential circuits.
8. Compare and contrast between synchronous and asynchronous counters?
9. Distinguish between Moore and Mealy FSMs
10. Explain notation of an ASM chart?

PART – B

Answer any four questions. **(4 x 15 = 60 Marks)**

11. a) Expand X ($\overline{Y} + X$) Y to maxterms and minterms.
    b) Reduce the following functions using a K-Map method
    f(a, b, c, d) = Σm(4,5,7,12,14,15) + Σdc(3,8,10)

12. a) Implement full adder using 3x8 decoder and suitable gates
    b) What is Priority Encoder? Design 4x2 Priority Encoder with appropriate gates?

13. a) Draw the block diagram and explain architecture of a PLA.
    b) Explain architecture of FPGA with a neat circuit diagram.

14. a) Design Mod-6 synchronous counter using JK Flip-Flops and explain its operation with a timing diagram.
    b) Convert D – Flip Flop to J-K Filp Flop

15. a) Draw and explain Circuit of master slave J-K Flip - Flop
    b) Explain the operation of positive edge triggered T Flip-Flop with active low preset and clear inputs through its truth table.

16. Simplify the following function using Tabulation method,
    f(a, b, c, d) =Σm (1,3,5,8,9,11,15).

17. a) Write Verilog code for a JK Flip-Flop using case statement.
    b) Draw ASM chart for a 1010 sequence.

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Code No.2906/AICTE/S

FACULTY OF ENGINEERING

B. E. (M/P) (AICTE) III – Semester (Suppl) Examination, December 2020

Subject: Metallurgy and Material Science

Time: 2 hours **Max. Marks: 70**

Note: (Missing data if, any can be assumed suitable).

PART – A

Answer any five questions. **(5 x 2 = 10 Marks)**

1. Define the terms (a) Space lattice (b) Unit cell.
2. Define modulus of elasticity and mention its significance.
3. Why ductile fracture is preferred over brittle fracture?
4. What is fatigue failure? Where do fatigue failures originate on a metal section?
5. Distinguish between hypo eutectoid and hyper eutectoid steels.
6. Differentiate substitutional and interstitial solid solution.
7. Why hardening of steel is followed by tempering?
8. State the effect of nickel on steel.
9. What is polymerization?
10. What are the general properties of glass?

PART – B

Answer any four questions. **(4 x 15 = 60 Marks)**

11. (a) Discuss recovery, recrystallization and growth and its effect on mechanical properties.

    (b) Explain about various crystal imperfections.

12. (a) Sketch and explain the mechanism of fatigue failure.

    (b) Define creep. Explain various stages in creep curve.

13. (a) A 1.2% hyper eutectoid plain carbon steel is slowly cooled from 850^0C to a temperature just above 723^0C. Calculate the wt% of proeutectoid cementite and austentite present at that temperature in the steel.

    (b) Differentiate the production process of malleable cast iron and nodular cast iron.

14. (a) Sketch and explain how I-T diagram for eutectoid steel is constructed? Indicate the various transformation phases.

    (b) What is stainless steel? How stainless steels are classified?

15. (a) Explain the various steps in Age hardening treatment.

    (b) Differentiate between thermoplastics and thermosetting plastics.

16. (a) Differentiate between ductile and brittle fracture.

    (b) Explain how alloy steels are classified.

17. Write short notes on (a) Strain hardening (b) Equilibrium diagrams (c) Ceramics

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Code No: 2908/AICTE/S

FACULTY OF ENGINEERING

BE III Semester (AICTE) (A.E.) (Suppl) Examination, December 2020

Subject: Fluid Mechanics &Machinery

Time: 2 Hours **Max. Marks: 70**

Note: (Missing data if, any can be assumed suitable).

PART – A

Answer any five questions. **(5 x 2 = 10 Marks)**

1. Define the Newton's law of viscosity.
2. Write short notes on Piezometer.
3. Differentiate Uniform and Non-Uniform flow.
4. What are the applications of Bernoulli's equation?
5. State Navier stoke's equation.
6. Define the fallowing
   a) Drag force b) Lift forces c) Total energy line
7. What are Hydraulic machines.
8. Differentiate between radial and axial flow turbines
9. Define Percentage of Slip and Negative slip in Reciprocating Pump.
10. What is Cavitation in Pumps? and what are its effects?

PART – B

Answer any four questions. **(4 x 15 = 60 Marks)**

11. a) Two horizontal plates are placed 1.25cm apart, the space between them filled with oil of viscosity 14 poises. Calculate the shear stress in oil if upper plate is moved with a velocity of 2.5m/s.
    b) Explain the phenomenon of Capillarity, and derive an expression for capillary rise of a liquid.
12. a) An Orifice meter with diameter 15 cm is inserted in a pipe of 30cm diameter. The pressure difference measured by a mercury oil differential manometer on the two sides of the orifice meter gives a reading of 50cm of mercury. find the rate of flow of oil specific gravity 0.9 when the co-efficient of discharge of orifice meter is 0.64.
    b) What is the significance of Pitot tube? And how it is determined?
13. a) An oil of specific gravity and viscosity 0.06poise is flowing through a pipe of diameter 200mm at the rate of 60liter/s. find the head lost due to friction for a 500m length of pipe. Find the power required to maintain this flow.
    b) What is mean by boundary layer separation?
14. a) Determine the power given by the jet of water to the runner of a Pelton wheel which is having tangential velocity as 20m/s. The net head on the turbine is 50m and discharge through the jet water is $0.03m^3/s$. The side clearance angle is 15^o and take C_V=0.975.
    b) Define specific speed of turbine and give its significance
15. A Centrifugal Pump delivers water against a net head 14.5m and a design speed of 1000rpm. The vanes are curved back to an angle of 30^o with the periphery. The Impeller diameter is 300 mm and out let width is 50mm. Determine the discharge of Pump if Manometric efficiency is 95%.

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16. Derive Euler's equation of motion and how will you obtain Bernoulli's equation from it?

17. a) What is absolute pressure, gauge pressure, vacuum pressure? and give their relationship.
    b) Explain Pipes in series and parallel.
    c) What are the types of Draft tubes?

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