AR13

CODE 13CE2001 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT,TEKKALI

(Autonomous)

II B.Tech I Semester Supplementary Examination, March-2017

STRENGTH OF MATERIALS

(Civil Engineering)

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

Answer ALL questions from PART-A & ONE question from Each unit of PART-B

PART-A **1X10M=10M**

1 a. Mention different types of stresses?

b. What is meant by working stress?

c. Draw the bending moment diagram of cantilever beam with UDL?

d. Draw the bending moment diagram of cantilever beam with uniformly varying load?

e. Draw the shear stress diagram at support for a simply support rectangular beam ?

f. What is meant by "pure shear" conditions?

g. Define moment of inertia of a body?

h. What is meant by composite section?

i. Define the term, ultimate stress?

j. Define Flexural rigidity of a beam?

UNIT-I

2 a) The extension in a rectangular steel bar of length 600mm and thickness 20mm found 0.40mm. The bar tappers uniformly in width from 150mm to 100mm. If Young's modulus of steel (Es) $2x10^5$ N/mm^2 , find the axial load acting on the bar? (6M)

b) A steel rod 20mm diameter, 5m long is connected to two rigid grips and the rod maintained at 90^{o}C.Determine the stress and pull exerted when the temperature falls to 30^{o}C , if (i) the ends do not yield. (ii) the ends yield by 1.5mm. Assume Young"s modulus (E) for steel $2x10^5$ N/mm^2 and coefficient of thermal expansion of steel $12x10^{-6}$ / ^{o}C (6M)

(OR)

3 a)Define the terms Yield stress and Ultimate stress ? (4M)

b) A reinforced concrete column 250x250mm is reinforced with 8 steel bars of diameter 16mm . The column carries an axial load 180kN. If Young"s modulus of steel is 18 times of concrete (Es/Ec=18) then find out

(i) The stresses in concrete and steel. (4M)

(ii) The area of steel ,if the stress in the concrete limited to $4N/mm^2$ (4M)

UNIT-II

4. a) Derive a relation between the load (W),shear force (S) of a simply supported beam of span L mt and UDL of W / mt length? (4M)

b) A simply supported horizontal beam of span 8m is subjected to UDL load 4kN/m over the span. Find the position of the supports such that the bending moment in the beam is minimum. Also draw the Shear force and Bending moment diagrams in that position and locate the salient values? (8M)

(OR)

5 a) A simply supported horizontal beam of 12m span is subjected to UDL load 4kN/m applied over the span of 3mt from left end and UDL load 2kN/m applied over the span of 5mt from the right end. Draw the bending moment and shear force diagram and locate the maximum bending moment? (6M)

b) A Cantilever beam of span 8 m carries UDL of 3kN/m over the span and point loads 4kN and 8kN acting at 3m, 5m from left end respectively. Draw the bending moment, shear force diagram and find out shear ,bending moment at mid span? (6M)

UNIT-III

6 a)Define the Neutral axis of flexural members? (2M)

b) A simply supported beam of circular section 600mm diameter carries UDL 12kN/m over the span of 6m and point load 3kN at mid span. Find the maximum bending stress at mid span and 4m from right end? (10M)

(OR)

7 a)Draw the shear stress diagram of simply supported UDL load for I-section and write the relation between average and maximum and stresses? (4M)

b) A simply supported rectangular beam of 200x400mm depth is subjected to a UDL 3kN/m over the entire span of 5m. Find out the (i) maximum bending stress at 2m and 4m from left end. (8M)

UNIT-IV

8 a) T-beam section of flange width 150 mm , thickness 10mm and web length 300mm , thickness 8mm subjected to shear force 50kN. Draw shear stress distribution across the section and find out shear stress at 25mm above the neutral axis ? (5M)

b) A rectangular-beam section width 150 mm and depth 400mm is subjected to shear force 70kN. Find out the shear stress at 40mm and 80mm above neutral axis?(7M)

(OR)

9 a)T-beam section with flange width 250 mm and thickness 20mm and web length 400mm and thickness 12mm subjected to shear force 80kN. Draw shear stress distribution diagram with salient values and find out the maximum shear stress and it"s location? (9M)

b) Draw shear stress distribution for H- section simply supported beam carried UDL? (3M)

UNIT-V

10 a) A simply supported beam of span 8m , supported at the ends and carrying point loads 5kN and 8kN at 3m and 6m from left support. By using Macaulay"s method calculate the following. (9M)

(i) Deflection under 8kN load

(ii) Point at which maximum deflection occur?

(iii) Maximum deflection ?

b) Derive an expression for slope, deflection of cantilever beam length L carrying UDL=w. Assume suitable values of E & I (3M)

(OR)

11 a) A cantilever beam of span 12m, carries uniformly varying load of 25kN/m at fixed end and 40kN/m at fee end. If E =1.5x10^6 N/mm^2 and I =1.5x$10^8$$mm^4$ calculate slope and deflection at free end? (6M)

b) A simply supported of uniform cross section carries UDL 15kN/m over the span 14m. Find out the slope and deflection at 6 m from left end? Use moment area method.. Assume Young's modulus of elasticity E =2.x105 N/mm2 and I=1.20x106mm4 (6M)

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Code: 13ME2004 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

II B.Tech I Semester Supplementary Examination, March-2017

MECHANICS OF SOLIDS
(MECHANICAL ENGINEERING)

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

PART – A

Answer all questions **[10 x 1=10M]**

1. a) State Hooke's law.
   b) Define principal plane?
   c) Sketch the B.M. diagram for a cantilever of span 'L' subjected to a point load 'P' at the free end.
   d) When a couple is acted at a section of a beam, what happens in bending moment and shear force diagrams?
   e) Define neutral axis.
   f) What is the relation between maximum shear stress to average shear stress in a rectangular section of a beam?
   g) What is the equation used in double integration method for finding the deflections in beams?
   h) What is moment area method? Where it is used?
   i) What are the stresses induced in thin cylinder subjected to internal pressure?
   j) Sketch radial stress and hoop stress distribution in thick cylinders.

PART – B

Answer one question from each unit **[5 x 12=60M]**

UNIT – I

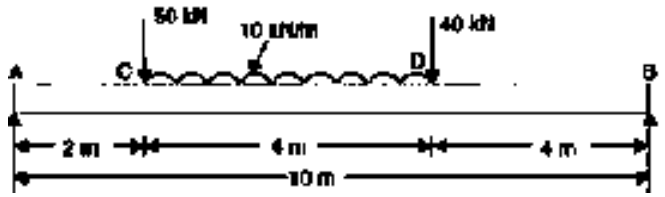
2. a) A 20 mm diameter brass rod was subjected to a tensile load of 40 kN. The extension of the rod was found to be 254 divisions in the 200 mm extensometer. If each division is equal to 0.001 mm, find the elastic modulus of brass. [5M]
   b) A steel rod of 15 m long is at a temperature of 15°C. Find the free expansion of the length when the temperature is raised to 65 °C. Also find the thermal stress produced when i) the expansion of the rod is prevented ii) the rod is permitted to expand by 6 mm. Take $\alpha = 12 \times 10^{-6}$ /°C and E = 200 GPa. [7M]

(OR)

3. At a point in a strained material, there are normal stresses of 60 Mpa (tensile) and 40 Mpa (compressive) at right angles to each other with a shear stress 20 Mpa (positive). Determine the principal stresses, maximum shear stress and the planes on which they act. [12M]

UNIT-II

4. A simply supported beam of length 10 m, carries uniformly distributed load and two point loads as shown in figure. Draw the S.F. and B.M. diagrams for the beam. Also calculate the maximum bending moment. [12M]



(OR)

5. A beam AB, 10 m long carries a uniformly distributed load of 20 kN/m over its entire length together with concentrated loads of 50 kN at the left end A and 80 kN at the right end B. The beam is supported on two intermediate supports, 6 m apart. The supports are so located that the reaction is the same at each support. Determine the positions of supports and draw the shear force and bending moment diagrams. [12M]

UNIT-III

6. Starting from the fundamentals, derive the following equation from the theory of simple bending. Also state assumptions made in deriving this equation. [12M]

$$\frac{M}{I} = \frac{\sigma}{y} = \frac{E}{R}$$

(OR)

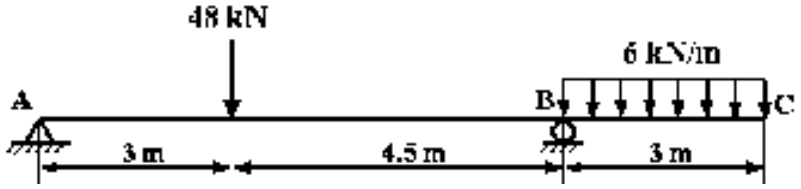
7. An I-section beam 350 mm x 150 mm has a web thickness of 10 mm and a flange thickness of 20 mm. If the shear force acting on the section is 40 kN, find the maximum shear stress developed in the I-section. Also sketch the shear stress distribution across the section. [12M]

UNIT-IV

8. A beam of length 10 m is supported at its ends and carries two point loads of 100 kN and 60 kN at a distance of 2 m and 5 m respectively from the left support. Calculate the deflections under each load. Find also the maximum deflection. Take I = 1.8 x 10^9 mm^4 and E = 2 x 10^5 N/mm^2. [12M]

(OR)

9. An overhanging beam ABC supported at A and B and it overhangs from B to C and is loaded as shown in Fig. Determine i) Deflection at the free end C and ii) Maximum deflection between A and B. Take E = 200 GPa and I = 1.5x10^9 mm^4. [12M]



UNIT-V

10. a) Derive the expression for the change in volume of a thin cylindrical shell subjected to internal fluid pressure. [6M]
    b) A cylindrical shell 90 cm long, 20 cm internal diameter and 8 mm thickness is filled with a fluid at atmospheric pressure. If an additional fluid of 20 cm^3 is pumped into the cylinder, find i) the pressure exerted by the fluid on the cylinder and ii) the hoop stress induced. Take E = 2 x 10^5 N/mm^2 and ν = 0.3. [6M]

(OR)

11. a) Briefly explain compound cylinders. [4M]
    b) A thick cylinder with internal diameter of 250 mm and external diameter of 500 mm is subjected to an internal fluid pressure of 50 MPa. Draw the variation of radial and hoop stresses across the section. [8M]

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Code: 13EC2003 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examination, March-2017
SWITCHING THEORY AND LOGIC DESIGN
(Common to ECE & EEE)

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

PART-A

Answer all questions **[1 x 10=10M]**

1. a) What does the radix or base of a number system indicate?
   b) What is an XS-3 code?
   c) What is the use of De Morgan's theorem?
   d) Why NAND-NAND and NOR-NOR realizations are preferred over other forms?
   e) How many cells an '*n*' variable K-map can have?
   f) What is an essential prime implicant?
   g) What is the type of display used in calculators?
   h) Why a Demultiplexer called distributor?
   i) What are the applications of Flip-Flop?
   j) What do you mean by resetting the counter?

PART - B

Answer one question from each unit **[5 x 12 = 60M]**

UNIT-I

2. a. Convert the following [6M]
   I. $(2598.7675)_{10} = (\ )_{16}$ II. $(4433)_5 = (\ )_{10}$ III. $(378)_{10} = (\ )_8$
   b. Perform the following operations by using Two's complement [6M]
   I. $(-15)_{10} + (-22)_{10}$ II. $(22)_{10} - (15)_{10}$

(OR)

3. a. Convert the following into the Gray number. [6M]
   (I) $3\ A\ 7_{16}$ (II) $5\ 2\ 7_8$ (III) $6\ 5\ 2_{10}$
   b. Given the 8-bit data word 01011011, generate the 12-but composite word for the Hamming code that corrects and detects single errors. [6M]

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Code: 13EC2003 **SET-2**

UNIT-II

4. a Expand $A+B\overline{C}+AB\overline{D}+ABCD$ to minterms and maxterms. [8M]

   b. Simplify the expression $F=A\overline{B}+ABD+AB\overline{D}+\overline{A}\overline{C}\overline{D}+\overline{A}B\overline{C}$ and implement with NAND gate circuits. [4M]

(OR)

5. a. Draw the logic diagram using only two input NAND gates to implement the following expression $F=\left(AB+\overline{A}\overline{B}\right)\left(C\overline{D}+\overline{C}D\right)$ [6M]

   b. Prove that (i) $\overline{\overline{ABC}+\overline{A}\overline{B}.+BC}=\overline{A}\overline{B}$ and

   (ii) $\mathrm{AB}+\mathrm{A}\left(\mathrm{B}+\mathrm{C}\right)+\mathrm{B}\left(\mathrm{B}+\mathrm{C}\right)=\mathrm{B}+\mathrm{AC}$ [6M]

UNIT-III

6. Simplify the logic function $F\left(A,B,C,D\right)=\sum m\left(0,1,2,5,6,8\right)+d\left(3,4,7,14\right)$ using K-map in SOP and POS forms [12M]

(OR)

7. Simplify the function $F=\sum\left(0,1,2,3,5,9,11\right)+d\left(4,7,15\right)$ using Quine Mclusky method and verify the result by Karnaugh map. [12M]

UNIT-IV

8. a. Design a Half Subtractor with minimum number of NOR gates. [4M]

   b. With the help of logic diagram and truth table, explain a 16:4 encoder? [8M]

(OR)

9. a. Design an Odd Parity bit generator for a 4-bit input? [8M]

   b. Draw the logic diagram of a 1-bit magnitude comparator? [4M]

UNIT-V

10. a. Draw the logic diagram of JK Master Slave flip flop using NAND gates and explain its operation? [6M]

    b. What is a Register? What are the types of shift registers? With a neat diagram explain the operation of Parallel In – Parallel Out shift register? [6M]

(OR)

11. a. Draw the circuit of clocked S-R flip flop using NAND gates and explain its operation? [6M]

    b. Design a Mod-6 Asynchronous counter using T flip flops? [6M]

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CODE: 13CS2003 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

II B.Tech I Semester Supplementary Examination, March-2017

MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE
(Common to CSE and IT)

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

PART-A

ANSWER ALL QUESTIONS **[1 x 10 = 10 M]**

1. a) Show that the truth value of the formula $\left(\left(P \wedge \left(P \rightarrow Q\right)\right) \rightarrow Q\right)$ is independent of its components
   b) Using the statements R: Mark is Rich H: Mark is Happy
   Write the following statements in symbolic form "Mark is poor but happy"
   c) State Fermat's theorem
   d) State division algorithm for integers.
   e) Define spanning tree
   f) Is there a graph with degree sequence (3, 3, 3, 4, 4)? Give reasons.
   g) Define semi group
   h) Define a poset
   i) Give the recurrence relation corresponding to towers of Hanoi problem
   j) Find the coefficient of X^9 in $\left(1+X^3+X^8\right)^{10}$

PART-B

Answer one question from each unit **[5x12=60M]**

UNIT-I

2. **a** Obtain the PDNF of : P→((P→Q) ∧¬ (¬ Q ∨ P)) **6M**
   b Show that (¬ P ∧ (¬ Q ∧ R)) ∨ (Q ∧ R) ∨ (P ∧ R) ⇔ R. **6M**

(OR)

3. **a** Show that $S \vee R$ logically follows from $P \vee Q,\ P \rightarrow R,\ Q \rightarrow S$ **6M**
   b Show that the following premises are inconsistent $P \rightarrow Q,\ P \rightarrow R,\ Q \rightarrow \neg R,\ P$ **6M**

UNIT-II

4. **a** Using Fermat's theorem compute 3^{302} (mod 7) **6M**
   b Show that $n < 2^n$ where $n \geq 0$ using mathematical induction **6M**

(OR)

5. **a** Show that $n^3 + 2n$ is divisible by 3 for all non negative integers n **6M**
   b Find d= gcd (216,80) and find integers m and n such that d=m(216)+n(80) **6M**

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CODE: 13CS2003 **SET-1**

UNIT-III

6. **a** Are the following pair of graphs isomorphic. Justify your answer. **6M**

b Explain DFS algorithm with an example. **6M**

(OR)

7. a If G= (V, E) is a connected plane graph, show that | V | - | E | + | R | = 2. **6M**

b A complete bipartite graph $K_{m,n}$ is planar iff $m \le 2$ *or* $n \le 2$ **6M**

UNIT-IV

8. a Show that a non-empty subset S of a group G under multiplication is a subgroup of G if $ab^{-1} \in S$,for every $a, b \in S$. **6M**

b Show that if every element of a group is its own inverse, then the group must be abelian **6M**

(OR)

9. **a** Let A be a given finite set and P(A) its power set. Let $\subseteq$ be the inclusion relation on the elements of P(A). Draw a Hasse diagram of <P(A), $\subseteq$ > for A = {a, b, c} **6M**

b Define a lattice. Prove that in a lattice $(L, \le)$, $a \le b$ if and only if $a \wedge b = a$. **6M**

UNIT-V

10. a Find the coefficient of X^{15} in **6M**

$A(X) = (X^2 + X^3 + X^4 + X^5)(X^1 + X^2 + X^3 + X^4 + X^5 + X^6 + X^7)(1 + X + ... + X^{15})$

b Solve using generating functions the recurrence relation **6M**

$a_n - 7a_{n-1} + 10a_{n-2} = 0$ *for* $n \ge 2$, $a_0 = 10$ *and* $a_1 = 41$

(OR)

11. a Find a generating function for a_r = the number of nonnegative integral solutions of **6M**

$e_1 + e_2 + e_3 + e_4 + e_5 = r$ *where* $0 \le e_1 \le 3$, $0 \le e_2 \le 3$, $2 \le e_3 \le 6$, $2 \le e_4 \le 6$, e_5 *is odd*, *and* $1 \le e_5 \le 9$

b Find a recurrence relation for the number of ways to climb n steps, where at each step either one can step onto the next or skip the next and step onto the immediate to next step, and solve it. **6M**

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