MECHANICS OF SOLIDS AND THEORY OF STRUCTURES

Course Code	Course Title	No. of Periods per Week	Total No. of Periods	Marks for Formative Assessment	Marks for Summative Assessment
C-302	MECHANICS OF SOLIDS AND THEORY OF STRUCTURES	05	75	20	80

Model Paper for Unit Test-I

State Board of Technical Education and Training,

A.P.Diploma in Civil Engineering (DCE)

Third Semester:C-302 MECHANICS OF SOLIDS & THEORY OF STRUCTURES

Time: 90 Minutes **Unit Test –I** **Maximum Marks : 40**

PART- A **16 Marks**

Instructions: **(i)** ***Answer all questions***

(ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1. (a) A triangular beam of depth 300 mm is subjected to a max comp stress of 40N/mm^2 at the top. The tensile stress at the bottom of the beam is_____ (CO1)

   (b) The formula for section modulus of rectangular beam of dimensions bxd is___(CO1)

   (c) The maximum deflection of a cantilever beam of length 'L' subjected to u.d.l w kN/m acting throughout the length of the beam is_____ (CO2)

   (d) The ratio between effective length of the column to its least radius of gyration is called as_____ (CO3)

2. Find the moment of resistance of rectangular beam of breadth 240mm depth 400mm.If thebending stress is not to exceed 12 N/mm$^{2.}$ (CO1)

3. Draw the shear stress distribution for a rectangular cross section. (CO1)

4. A cantilever beam of span 3m carries a point load of 10kN at free end. Find the slope and deflection at the free end using Moment area method. Take E = 210 kN/mm^2 and I = 42 X 10^{6}mm^4. (CO2)

5. Define (i) Critical load (ii) Safe load (iii) Slenderness ratio (CO3)

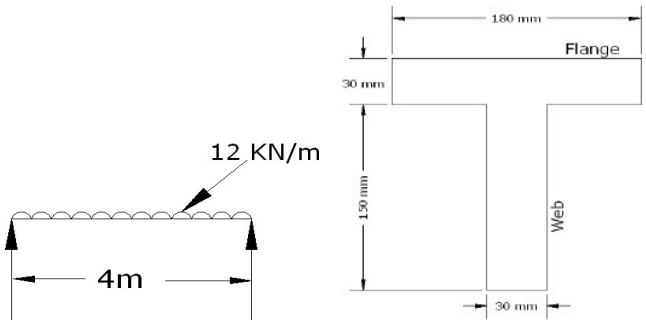
PART- B **3 x 8 = 24 Marks**

Instructions : **(i)Answer all questions**

(ii) Each question carries EIGHT marks

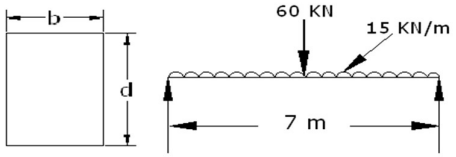
(iii) Answer should be comprehensive and the criterion for valuation is the contentbut not the length of the answer.

6. (A) A T-Section shown in fig. is used as a beam over a span of 4m. Calculate the bending stressin the beam if it carries a UDL of 12 kN/m. (CO1)



(OR)

(B) A simply supported beam having a span of 8m carries a uniformly distributed loadof 18kN/m over its entire span and a point load of 60kN at its centre. Design a suitable rectangular beam if b/d ratio is 0.45, the bending stress is not to exceed 18N/mm^2. (CO1)



7. (A) A beam 6m long is Simply supported at its ends and carries a load of 20kN at a distance of 1m from each end. Calculate the values of Maximum slope and Maximum deflection occurring in the beam using Moment area method. Take EI = 42000 kNm^2. (CO2)

(OR)

(B) A beam of length 5m is fixed at one end and free at the other end, subjected to uniformly distributed load of 2 kN/m over a length of 3 m from the fixed end. Determine the maximum deflection at the free end. Take EI=1X10^{13} Nmm^2. (CO2

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8. (A) An I-Section Joist of top & bottom flanges 200x20mm and web 20x360mm is 6m long, used as a column with both ends fixed. Calculate Euler's crippling load for the column? Assume E = 2x 10^5 N/mm^2. (CO3)

(OR)

(B) A hollow cast iron column of external diameter 200mm, thickness of 20mm and 4.5mlong, fixed at both ends. Calculate the safe load by Rankine's formula using a factor of safety

4. Also determine ratio of Euler and Rankine's critical load. Given E = 100 kN/mm^2, f_c = 550N/mm^2, a = 1/1600. (CO3)

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Model Paper for Unit Test-II:

State Board of Technical Education and Training,

A.P.Diploma in Civil Engineering (DCE)

Third Semester:C-302 MECHANICS OF SOLIDS & THEORY OF STRUCTURES

Time: 90 Minutes **Unit Test –II** **Maximum Marks: 40**

PART- A **16 Marks**

Instructions :

(i) Answer all questions

(ii) First question carries FOUR marks, each question of remaining carries THREE marks.

1. (a) For no tension to occur at the base of the dam, the resultant force acting in the dam c/sshould pass within the middle third points (TRUE/FALSE) (CO3)

   (b) If angle of repose of soil mass is 30^o, the ratio between Co-efficient of passive earth pressure to Co-efficient of active earth pressure is_____ (CO3)

   (c) Degree of statical indeterminacy of propped cantilever is_____ (CO4)

   (d) The frame is said to be perfect, when it satisfies the condition: n=2j-3 (TRUE/FALSE) (CO5)

2. Draw the stress distribution diagrams at the base of dam for three possible cases. (CO3)

3. Define (i) Critical load (ii) Safe load (iii) Slenderness ratio (CO3)

4. A propped cantilever beam of span 3.5m subjected to u.d.l of 20 kN/m acting throughout thelength of the beam. If prop is provided at free end, find the prop reaction. (CO4)

5. What are the assumptions made in the analysis of truss. (CO5)

PART- B **3 x 8 = 24 Marks**

Instructions : **(i) Answer all questions**

(ii) Each question carries EIGHT marks

(iii) Answer should be comprehensive and the criterion for valuation is the contentbut not the length of the answer.

6. (A) A trapezoidal concrete dam has its water face vertical with 2.5m top width, stores water to a depth of 14 m with a free board of 2.0m. Take density of concrete as 24 kN/m^3. Calculate the minimum base width required. (CO3)

(OR)

(B) Calculate the stresses at the base of a masonry retaining wall of trapezoidal section given top width 1.0m, bottom width 3.0m, height 8m and the earth face vertical.It is retaining earth level with its top. $\emptyset = 45^0$, $\gamma = 18\ kN/m^3$, unit weight of masonry ρ= 24 kN/m3. (CO3) (CO3

7. (A) Plot SFD and BMD of a propped cantilever beam of span 4m subjected to u.d.l of 20 kN/m acting throughout length of the beam. (CO4)

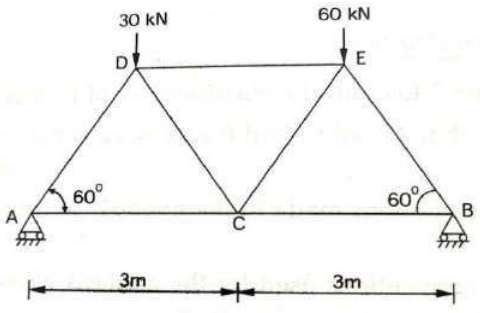
(OR)

(B) A propped cantilever beam of span 3.0m subjected to two-point loads 25 kN and 30 kN at1m and 2m respectively from fixed end. If prop is provided at the free end, find the prop reaction and also plot SFD and BMD. (CO4)

8. (A) Explain the procedure of finding the forces in the members of a pin jointed truss by using method of joints (CO5)

(OR)

(B) Determine the forces in the frame shown below by method of joints. (CO5)



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Model Paper for End Examination:

MODEL PAPER - DIPLOMA EXAMINATION, (C–23)

DCE—THIRD SEMESTER EXAMINATION

MECHANICS OF SOLIDS AND THEORY OF STRUCTURES (C-302)

Time : 3 hours] [*Total Marks* : 80

PART—A 3×10=30marks

Instructions **: (1) Answer all questions.**

(2) Each question carries three marks.

(3) **Answers should be brief and straight to the point and shall not exceed *five* simple sentences.**

1. State any three assumptions made in the theory of simple bending. (CO1)
2. Define (i) Neutral Axis (ii) Flexural rigidity. (CO1)
3. Distinguish between strength and stiffness of a beam. (CO2)
4. State Mohr's theorem and its limitations. (CO2)
5. Write any two differences between long columns and short columns. (CO3)
6. State the stability conditions for the Dams. (CO3)
7. Define the following terms:
   (a) Active earth pressure*(b)* Passive earth pressure. (CO3)
8. What is meant by degree of static indeterminacy? (CO4)
9. State the advantages of continuous beams. (CO4)
10. Name three different methods used to find the stresses in the members of a frame. (CO5)

PART – B **5 x 10 = 50 marks**

Instructions:

i) Answer any FIVE questions

ii) Each question carries TEN marks.

iii) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11) Calculate maximum shear force and bending moment for a cantilever beam of span 3 m and carries an u.d.l. of 2 kN/m over a length of 1 m from free end and a point load of 10 kN is acting at a distance of 1 m from fixed end. (CO1)

12) A beam of I—section, 150 mm deep and 80 mm wide has flanges 6·8 mm thick and web 4·8 mm thick is Simply Supported and carries a u.d.l of 20 kN/m over its entire span. Find the maximum permissible span without exceeding the shear stress of 60 N/mm2. Take I_{xx} = 688.2 x10^4 mm^4 and A = 1808 mm^2. (CO1)

13) A Simply supported beam of span 5m carries a point load of 50kN acting at 3m from Left hand support. Find the maximum deflection using Macaulay's method. Assume EI = 4500 kN-m^2.(CO2)

14) Two concentrated loads of 60 kN and 100 kN are placed on a simply supported beam of span 6 m at distances of 2 m and 3 m respectively from the left end. Determine the deflections under the two point loads, taking *EI* = 3000 kN/m^2. (CO2

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15) A circular column of diameter 200mm and 4 m long is fixed at both ends. Calculate the safe load by Rankine's formula using a factor of safety 5. Also determine ratio of Euler and Rankine's critical load. Given E = 100 kN/mm^2, f_c = 500 N/mm^2, a = 1/1500.

(CO3)

16) A masonry dam 10 m high, 2 m at top and 6 m wide at bottom retains water to a depth of 7.5m, water face of dam is vertical. Find maximum and minimum stresses at base. Weight of masonry 23 kN/m^3 and specific weight of water 10 kN/m^3. (CO3)

17) A propped cantilever beam of span 3.0m subjected to two-point loads 25 kN and 30 kN at1m and 2m respectively from fixed end. If prop is provided at the free end, find the prop reaction and also plot SFD and BMD. (CO4)

18) Find the magnitude and nature of forces in all members of the truss shown below: (CO5)

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