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Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2018

Fourth Semester

Branch : Civil Engineering

CE 010 403—MECHANICS OF SOLIDS—II [CE]

(New Scheme—2010 Admission onwards)

[Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.

Each question carries 3 marks.

1. Define slope and deflection.
2. State Betti's theorem.
3. Discuss the effect of moving load on bridges.
4. Explain theoretical arch.
5. Define product of inertia.

(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. Explain Macaulay's method of analysis.
7. Discuss Maxwell's reciprocal theorem.
8. Explain influence line for bending moment.
9. Explain anchor cables.
10. Discuss Mohr's theory.

(5 × 5 = 25 marks)

Turn over

Part C

Answer all questions.

Each question carries 12 marks.

11. A beam of uniform cross-section and of length ' l ' carries a uniformly distributed load ' w ' per unit length. It is simply supported at the left hand end and at a point $1/3$ inside the right hand end.

Show that the deflection of overhanging end is $\frac{Wl^4}{684EI}$.

Or

12. A beam of uniform moment of inertia is simply supported at its end over a span of L meters. It carries a point load W at a point whose distance is ' a ' from one end and ' b ' from the other. Find the strain energy stored by the beam. Hence find the deflection under the load.

13. Find the forces in members marked 1, 2, 3 and 4 of the truss shown in fig. (I)

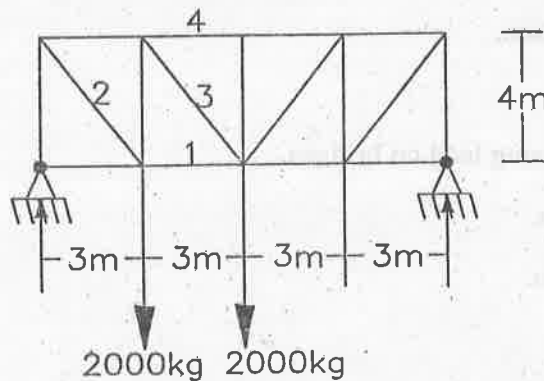


fig. (I)

Or

14. For the beam shown in fig. (II) find the maximum safe value of W if working stresses are not to exceed 5000 N/cm^2 in compression and 3000 N/cm^2 in tension.

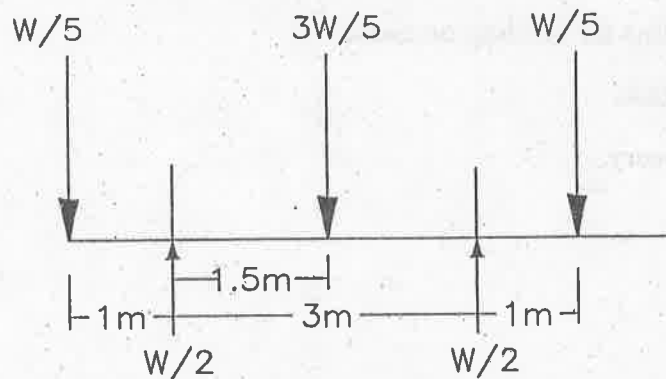


fig. (II)

15. Two-point loads of 60 kN. and 30 kN. space 4 m. apart cross a girder of 10 m. span from left to right, with smaller load leading. Construct the max. S.F. and B.M. diagrams. Find the position and amount of absolute maximum bending moment.

Or

16. A Warren girder having a span of 24 m. consists of 4 equal panels as shown in fig. (III). Draw influence line for force in $U_2 U_4$ and $U_4 L_3$ and hence find the maximum force in the members due to train of loads shown in the figure. (Diagonals are inclined at 60°).

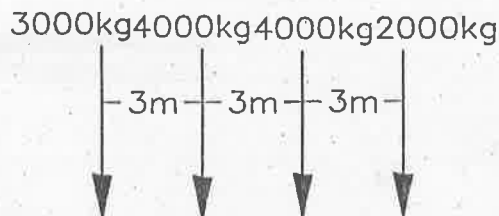
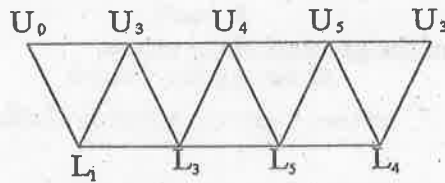


fig. (III)

17. A flexible cable weighing 10 N/m hangs between two supports 40 m horizontally apart. The right hand support is 8 m below left support. The cable also supports a point load of 300 kN at a point 12 m horizontally and 2.5 m below the right support. Assuming the weight of the cable is uniformly distributed over the horizontal span, find the maximum, tension of the cable and its location.

Or

18. A three-hinged parabolic arch of span 20 meter and rise 4 meter carries a uniformly distributed load of 20 kN/m run of the left half of the span. calculate the maximum bending moment for the arch.

Turn over

19. (a) Discuss the computation of bending stress at a given point in the section due to a given bending moment, using the concept of product of inertia.
- (b) Write short notes on : Maximum Principal strain theory.

Or

20. A rectangular block of material is subjected to a tensile stress of 100 N/mm^2 on one plane and a tensile stress of 50 N/mm^2 on a plane at right angles, together with shear stresses of 60 N/mm^2 on the same planes. Find :
- (a) The direction of the principal planes ;
- (b) The magnitude of the principal stresses ; and
- (c) The magnitude of the greatest shear stress.

(5 × 12 = 60 marks)

C

B.TECH. DEGREE EXAMINATION, MAY 2018**Fourth Semester**

Branch : Civil Engineering

CE 010 404—OPEN CHANNEL FLOW AND HYDRAULIC MACHINES [CE]

(New Scheme—2010 Admission onwards)

[Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A*Answer all questions.**Each question carries 3 marks.*

1. Define specific energy.
2. Define prismatic channel.
3. Define hydraulic jump.
4. Explain velocity triangle for Pelton turbine.
5. Define slip and co-efficient of discharge for reciprocating pumps.

(5 × 3 = 15 marks)

Part B*Answer all questions.**Each question carries 5 marks.*

6. State the characteristics of uniform flow.
7. State and explain dynamic equation for gradually varied flow.
8. Derive non dimensional equation for hydraulic jump.
9. Explain the functions of draft tube.
10. Explain the working of multistage pumps.

(5 × 5 = 25 marks)

Turn over

Part C

Answer all questions.

Each question carries 12 marks.

11. A trapezoidal channel with side slopes of 1 to 1 has been designed to convey 12 cum/sec at a velocity of 2 m/sec so that the amount of concrete lining for the bed and sides of the channel is minimum. Calculate the area of lining required for one meter length of the channel.

Or

12. Find the bed slope of a trapezoidal channel of bed width 5m depth of water 2.5m and side slope 3H to 4V, When discharge through the channel is 20 cum/sec. Give Chezy's constant $C = 60$.
13. Determine the length of the back water curve caused by an afflux of 1.6m in a rectangular channel of width 50m and depth 2m. The slope of the bed of the channel is 1 in 12000 and Manning's $N = 0.03$.

Or

14. Find the slope of the free water surface in a rectangular channel of width 20m having a depth of flow 5m. The discharge through the channel is 50cum/sec. Bed slope of the channel 1 in 4000. Give Chezy's constant $C = 60$.
15. The specific energy for a 5m wide rectangular channel is to be 4 kg-m/kg. If the rate of flow of water through the channel is 20 cum/sec, determine the alternate depths of flow.

Or

16. The depth of flow of water, at a certain section of a rectangular channel of 2m wide, is 0.3m. The discharge through the channel is 1.5 cum/sec. Determine whether a hydraulic jump will occur, and if so, find its height and loss of energy per Kg of water.
17. A jet of water of diameter 75mm moves with a velocity of 25m/sec strikes a fixed plate in such a way that the angle between the jet and the plate is 60° . Find the force exerted by the jet on the plate in the direction normal to the plate.

Or

18. A turbine develops 9000 kW when running at a speed of 140 rpm and under a head of 30m. Determine the specific speed of the turbine.
19. The diameter of an impeller of a centrifugal pump at inlet and outlet are 300mm and 600mm respectively. Determine the minimum starting speed of the pump if it works against a head of 30m.

Or

20. A single acting reciprocating pump running at 30 rpm delivers 720 litres per minute of water. The diameter of the piston is 250mm and stroke length 500mm. Determine the theoretical discharge of the pump, co-efficient of discharge, slip and percentage of slip.

(5 × 12 = 60 marks)