Form A : Paper-setting Blank

Ref. No. *Ex/CE/5/T/206/2017*

........*B.C.E.(Evening) 2nd Year 2nd Semester*...... EXAMINATION, *2017*

SUBJECT ....*Theory of Structures - I*..........

Full Marks 100
(50 marks for each part)

Time: **Three hours**

Use a separate Answer-Script for each part

No. of Questions	PART I	Marks
	Answer ANY TWO questions	
1.	a) Derive the expression to find the deflection at any location along the span and the expression of bending stress at any point on the cross-section of a beam subjected to unsymmetrical bending. b) State 'theorem of three moments' and prove it.	[15+10 = 25]
2.	A cantilever beam over a span of 1m is carrying a concentrated load of magnitude 5N acting vertically downward at the free-end of the beam. The **Z-shaped cross-section** of the beam (shown in fig Q2) has the following dimensions: width = 75mm., depth = 150mm., thickness of flange and web = 10mm. Calculate a) the angle of inclination of principal axes and principal moments of inertia, b) the net vertical and horizontal deflections at free end of the beam if E = 2×10^5 N/mm2 and c) the stress developed at points P1 and P2 as shown in Fig.Q2 near the fixed end.	[25]

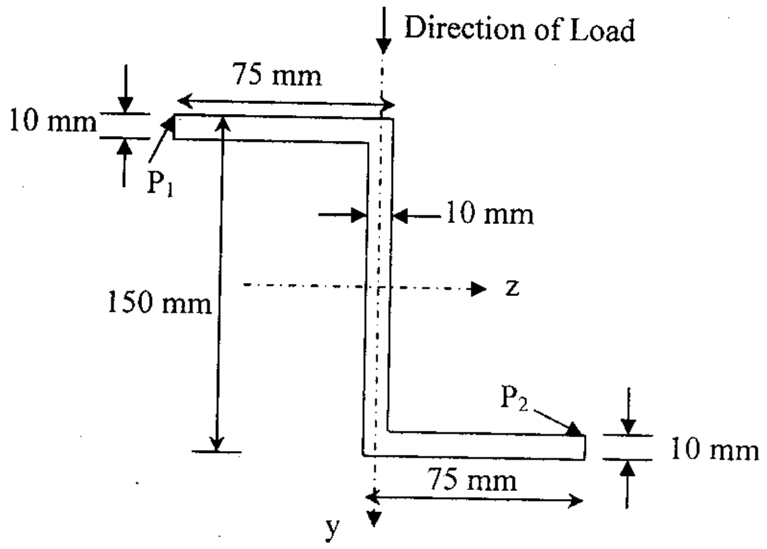

Fig. Q2

(Contd. to page 2)

........*B.C.E.(Evening) 2nd Year 2nd Semester*...... EXAMINATION, *2017*

SUBJECT ....*Theory of Structures - I*..........

Time: **Three hours**

Full Marks
(50 marks for each p

Use a separate Answer-Script for each part

No. of Questions	PART I	Ma
	(Contd. from page 1)	
3.	Analyse the continuous beam ABCD as shown in Fig.Q3 by using '**Three Moment Theorem**' and calculate the support reactions. Also draw the bending moment diagram and shear force diagram for this beam.	[2

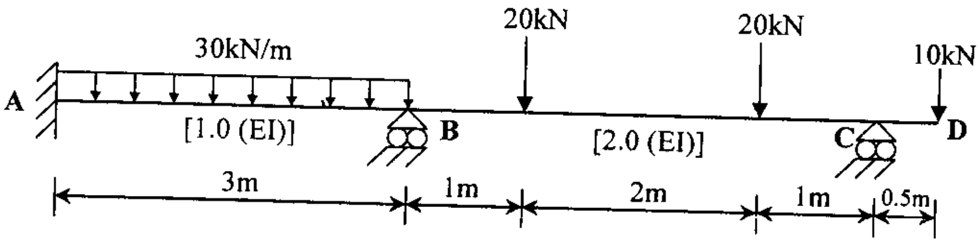

Fig.Q3

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Ref. No.: EX/CE/5/T/206/2017

Examination: B.E. CIVIL ENGINEERING (Part Time) 2nd Year, 2nd Semester, 2017

Subject: Theory of Structures – I **Time: Three (3) Hours** **Full Marks: 100**

Part II

Use separate answerscript for each part **Answer Any Two (2)**

1 (a) Using Beam – Column theory obtain the expression for calculation of critical buckling load for a simply supported column. (15)

(b) A timber column 150 mm x 100 mm in section is 3 m long and hinged at both ends. Determine (a) The safe axial compressive load the column can carry. (b) If deflection is prevented at mid section in the direction of smaller side in the cross-section of the column, how will the safe load change? Take E = 1×10^{10} N/m^2. (10)

2. (a) Obtain the expression for critical buckling load for a column with both ends fixed using the moment equilibrium equation. (15)

(b) Plot the notional ILD using Muller – Breslau's principle for the given functions shown in figure 1. (10)

3. (a) State Muller – Breslau's principle for obtaining the ILD for a function of a beam. Prove the principle using 'Principle of Virtual work'. (5)

(b) Obtain the maximum bending moment at point 'C' on the beam as shown in figure 2 for the train of rolling load. (10)

(c) Calculate the absolute maximum bending moment for the beam due to the train of rolling load shown in figure 3 and identify the position of the load train on the beam. (10)

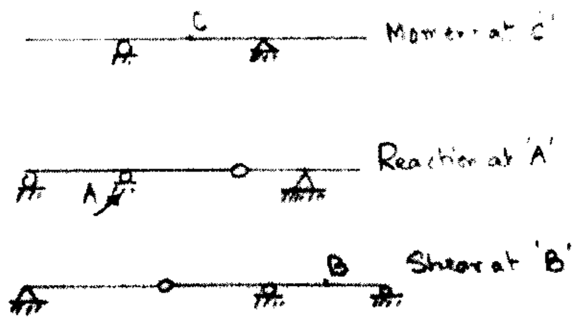

Figure 1

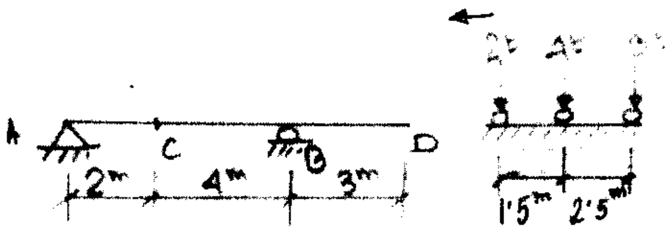

Figure 2

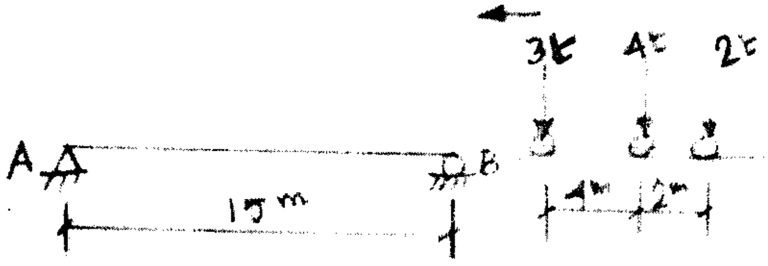

Figure 3