

QP CODE : F4-4014-A  
REVISION : 2015

Reg. No.....  
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**MALABAR POLYTECHNIC CAMPUS CHERPULASSERY**

FIRST SERIES EXAMINATION - AUGUST 2021

FOURTH SEMESTER DIPLOMA IN CIVIL ENGINEERING

PROGRAM : Diploma In Civil Engineering  
COURSE CODE : 4014  
COURSE TITLE : Theory Of structures II

Semester:S4  
Duration:90Minutes  
Max Mark:50

**PART A**

I Answer the following questions in one or two sentences. Each question carries 2 marks

- |   |   |   |        |
|---|---|---|--------|
| 1 | Define slenderness ratio                  | 2 | [COI]  |
| 2 | Define equivalent length/effective length | 2 | [COI]  |
| 3 | Define core/kernel of a section           | 2 | [COI]  |
| 4 | Define Active earth pressure              | 2 | [COII] |

4x2 = 8

**PART B**

II Answer any TWO question. Each question carries 6 marks

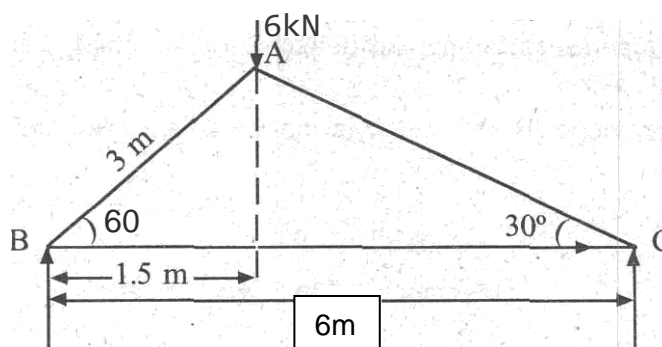
- |   |   |   |        |
|---|---|---|--------|
| 1 | A short column 150mmx150mm is subjected to an eccentric load of 70KN at an eccentricity of 40mm in the plane bisecting the two opposite faces. Find the maximum and minimum intensities of stress at the base section | 6 | [COII] |
| 2 | State the conditions for the stability of a dam   | 6 | [COII] |
| 3 | A beam of 6m span has its ends built in and carries a uniformly distribute load of 3KN/m. Find the maximum bending moment and deflection  | 6 | [CO V] |

**PART C**

Answer one full question from each unit. Each full question carries 15 marks.

UNIT - 1

- III a) Compute the magnitude and nature of forces in the members of the truss shown in figure by method of joints



7 [COIII]

- b) Compute the Euler's crippling load for a hollow cylindrical steel

column 38 mm external diameter and 2.5mm thick. The length of the column is 2.3m and hinged at its both ends. Take  $E = 205\text{GPa}$ . Also determine the crippling load by Rankine's Formula using constants  $\sigma_c = 335\text{N/mm}^2$  and  $\alpha = \frac{1}{7500}$

8 [COI]

OR

- IV a) illustrate the effective length of columns based on end conditions 6 [COI]  
 b) A built up column consisting of 150mm x 100 mm RSJ with 120mm x 12mm plate rivetted to each flange. Calculate the safe load, the column can carry, if it is 4m long having one end fixed and other end hinged with a factor of safety 3.5. Take the properties of the built up column as Area= 5047mm<sup>2</sup>, I<sub>xx</sub>= 27.32 x 10<sup>6</sup>mm<sup>4</sup> and I<sub>yy</sub> = 4.404 x 10<sup>6</sup> mm<sup>4</sup>. Assume crushing strength of the column 315 MPa and Rankine's constant (a) =  $\frac{1}{7500}$  9 [COI]

#### UNIT - II

- a) A concrete dam of trapezoidal section having vertical water face is 25 m height. The width of the dam is 12m at the base and 5m at the top. Compute (i)the resultant pressure on the base per metre length (ii) The point where the resultant pressure cuts the base (iii)Eccentricity of the resultant. The height of the free surface of water above the base is 20m and specific weight of concrete is 25kN/m<sup>3</sup> and that of water is 10kN/m<sup>3</sup> 9 [COII]  
 b) A rectangular column 25cm wide and 20cm deep is carrying a vertical load of 1000kN at an eccentricity of 5cm in a plane bisecting the depth. Determine the maximum and minimum intensities of stress in section 6 [COII]

OR

- VI a) Compare determinate and indeterminate structures 7 [CO V]  
 b) A retaining wall of rectangular section has 5m height and 2m width. The wall retains soil for full height. Find and plot the distribution of stresses at the base of masonry. The unit weight of soil is 17kN/m<sup>3</sup> and that of masonry is 22kN/m<sup>3</sup>. Angle of repose of soil retained is 30°. 8 [COII]

Prepared By

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