[This question paper contains 03 printed pages]

Roll Number: _____

HPAS (Main) Examination-2018

CIVIL ENGINEERING-I

Time: 3 Hours Maximum Marks: 100

Note:

1. This question paper contains eight questions. Attempt total five questions including question No.1 which is compulsory.

2. Each question carries equal marks. Marks are divided and indicated against each part of the question.

3. Write legibly. Each part of the question must be answered in sequence in the same continuation.

4. If questions are attempted in excess of the prescribed number only questions attempted first up to the prescribed number shall be valued and the remaining answers will be ignored.

5. Use of I.S. Codes of Practice and Steel Section Handbook is permitted.

6. Assume suitable missing Data, if any.

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1 (a) What is meant by the Seasoning and Preservation of Timber. Name the various Methods of applying Preservatives to timber. Give a brief account of one method. (10)

(b) Calculate the quantities of Cement, Sand and Course Aggregate required to produce one cubic meter of concrete for Mix Proportions of 1:1:40:2.80 (by Volume) with Water cement Ratio of 0.48 (by Mass). Bulk densities of Cement, Sand and Course Aggregates are 14.7, 16.66 and 15.68 KN/m^3 respectively. Percentage of Entrained Air is 2.0. Specific Gravity of cement, sand and course aggregate are 3.15, 2.6 and 2.5 respectively. (10)

2 (a) An 1 Beam with flanges of size 200x20 mm with a web of 600x12 mm is subjected at a section to a bending moment of $45x10^5$ Kg-cm and a shear force of 40,000 Kg. Determine the magnitudes of the bending stress and shear stress at a point 20 cm above the neutral Axis and also the Principal Stresses at that point. (10)

(b) In a Tensile Test, a Test piece of 25 mm diameter is tested over a gauge length of 125 mm. The elongation over this length is 0.0875 mm under a pull of 68,725 N. In a Torsion Test, a test piece was made of the same material and of same diameter and it twisted 0.025 Rad. Over a length of 250 mm at a torque of 0.3068 KNm. Find the Poisson's ratio and three Elastic Modulii of the test piece material. (10)

3. Using Muller Breslau principle, draw the influence line for B.M. and S.F. at mid span 'E' at point B respectively of beam as shown in Fig.I. Also plot the influence line ordinates for span AB at suitable interval. (20)

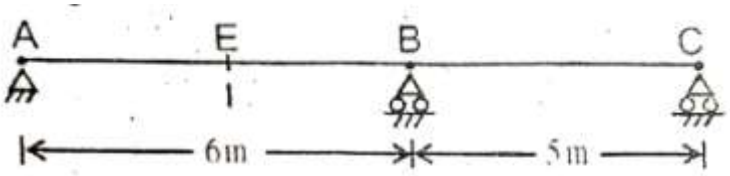

Fig.1

4. Design a suitable Rectangular Flat Section for a Tension Member carrying a load of 10,000 Kg. The Member is to be connected to a Gusset Plate by Lap Joint. The Tensile allowable stress of Steel Flat Plates = 1500 Kg/cm^2. The Allowable Shear stress of River = 945 Kg/cm^2 and the Allowable Bearing Stress of Rivet=2125 Kg/cm^2. Use 16mm diameter of Rivets. Draw a Sketch of the Lap Joint. (20)

5. Design a Suitable Reinforced Concrete Footing for a masonry Wall 30 cm thick carrying load of 15,000 Kg per meter length. The bearing capacity of soil is 10 tonnes/m^2. Given: m=18. Permissible Stresses in bending for concrete and steel are 50 Kg/cm^2 and 1400 Kg/cm^2 respectively. Permissible Bond stress = 10 Kg/cm^2 and permissible shear stress = 5 Kg/cm^2. (20)

6 (a) A Rectangular Prestressed Concrete Beam 200 mm wide and 300 mm deep is prestressed by 10 wires of 7 mm diameter initially prestressed to a stress of 12000 Kg/cm^2. The wires are

located at a depth of 20 cm from the top of the beam. Assuming all losses to be 15% of the initial prestress. Calculate the stresses developed in the mid span of the beam if the beam carries a uniformly distributed Live load of 2 tonnes per meter over a simply supported span of 4 m. (10)

(b) Name the various types of doors used in a building & also describe briefly the different types of door movements. (10)

7. The network for certain project shown in Fig.II. Determine the following:- (20)

(a) Earliest event time and latest event time.
(b) Earliest and latest start and finish times of each activity.
(c) Total and free floats for each activity.
(d) Critical path for the network.

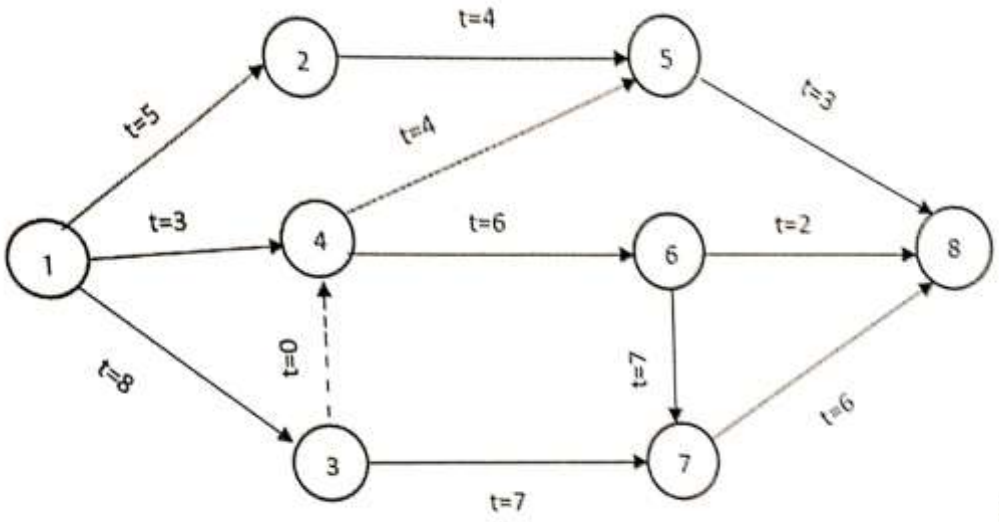

Fig. II

8. (a) Give the physical interpretation of principle of effective stress and its importance in soil Engineering. (10)

(b) A wall with smooth vertical back 8 m high supports a backfill having bulk unit weight = 1.8 g/cm^3 and having effective shear strength parameters as C′ = 0.5 Kg/cm^2 and ϕ = 15 degrees. Draw a sketch showing the active earth pressure intensity at the back of the wall and also discuss the likely depth of tension cracks in the backfill. (10)