SEAL

30-5-14 01:00 AM

FOR EVALUATOR'S USE ONLY

Sub. Code : 53

Optional Paper

Civil Engineering : Paper-I

Time : 3 Hours / Maximum Marks : 200 / Total Pages : 32

Evaluation Table (For Evaluator's Use Only)

PART-A				PART-B				PART-C			
QN	E-1	E-2	AC	QN	E-1	E-2	AC	QN	E-1	E-2	AC
1				21				33			
2				22				34			
3				23				35			
4				24				36			
5				25				37			
6				26				38			
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Grand Total	
PART-A	
PART-B	
PART-C	
Total	
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Final Total	

Marks in Words

Remarks of Evaluator/Chief Evaluator

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PART – A

Marks : 40

Note : Attempt all the **twenty** questions. Each question carries **2** marks. Answer should not exceed **15** words.

1 Give the interrelationship between modulus of elasticity (E), modulus of rigidity (C) and bulk modulus of solids (K).

2 A cantilever 2 m long carries a gradually varying load over the whole span, from zero at free end and increment of load 25 kN/m towards the fixed end. Determine the value of shear force at the fixed end.

3 Write the value of bending stress at extreme fibre of a rectangular cross-section 150 × 300 mm, if it is subjected to a bending moment of 100 kN-m.

4 Explain "Point of Contraflexure".

5 If the values of D_{60}, D_{30} and D_{10} for a soil are 0.71, 0.34 and 0.18 respectively. Determine the values of coefficient of uniformity and coefficient of curvature.

6 Write the different types of earth pressure for design of retaining structures.

7 State, "Quick Sand condition" is a type of soil or it is typical stress condition in the soil.

8 Define coefficient of compressibility of soil.

9 If final expected settlement under a foundation is 300 mm. If the settlement under the foundation after 2 years is 180 mm, what is the degree of consolidation at this stage ?

10 Define "Static Indeterminancy" for plane truss.

11 A fixed beam of 6 m span carries a downward point load of 60 kN at midspan, draw B.M.D.

12 What is principle of virtual work ?

13 Enumerate factors (any four) responsible for losses of prestress.

14 Write the Euler's Column formula for the following conditions :
(i) both ends are fixed (ii) one end is fixed and other end is free.

15 What is doubly reinforced section ? Write two situations in which it is preferred.

16 Write importance of providing "Distribution Reinforcement", in reinforced concrete structures.

17 If f_{bt} and f_c are the coexistent bending tensile stress and shear stress in a member, what will be the equivalent stress f_e ?

18 Why intermediate/vertical stiffeners are used in plate girders ?

19 Write two situations in which "Grillage Foundation" is provided.

20 Define Poisson's ratio of materials.

PART – B

Marks : 60

Note : Attempt all the **twelve** questions. Each question carries **5** marks. Answer should not exceed **50** words.

21 Show that in a general biaxial state of stress, the maximum shear stress is given by half the algebraic difference of the principal stresses.

22 Draw the stress-strain curve for mild steel and show the salient points.

23 A 24 mm thick clay sample tested in a laboratory reached 50% consolidation in 30 minutes. How much time it will take for layer of clay in the field, from which the sample was collected, if :

(i) thickness of layer is 4.8 m and it is sandwiched between two sand layers.

(ii) thickness of layer is 3.6 m, which is underlain by rocky strata and overlain by sand layer.

24 Find the torque which a shaft of 150 mm diameter can transmit safely, if the shear stress is not to exceed 110 N/mm^2.

25 A continuous beam A, B, C fixed at A and C, has equal spans AB and BC of 5 m each. For AB, the moment of inertia is twice that of the value for span BC. Write the moment distribution factors for spans "BA", "BC" meeting at joint "B".

26 Write five merits of prestressed concrete over RCC.

27 Write partial safety factors for :

(i) Concrete and steel

(ii) Dead load, live load and wind loads for design with dead load, live load and wind load combination.

as per the specifications of IS 456.

28 A structure is to be constructed, where basic wind pressure is 44 m/sec; risk factor = 1, terrain and size factor is 0.98, topographic factor is 1.0. Determine the design wind pressure.

29 Two plates 120 mm × 10 mm are overlapped and connected together by transverse fillet weld to transmit a pull. Design a welded connection and determine the maximum pull which can be transmitted by the plate, if the allowable stress in the weld is 110 N/mm^2.

30 A uniformly distributed load of 10 kN/m, 8 m long crosses a girder of 18 m span. Determine the ordinates of maximum negative and positive shear force diagrams at a section of 3 m from left hand support.

31 Calculate the factor of safety with respect to cohesion, of a clay slope laid at 1 in 2 to a height of 8 m, if the internal angle of friction is 20°. C = 22 kN/m^2 and unit weight of soil 19 kN/m^3 and the value of Taylor's stability number is 0.0625.

32 Write following in respect of Standard Penetration test :

(i) height of hammer (ii) fall of hammer (iii) penetration of sampler for which 'N' is counted (iv) Expression for overburden correction (v) SPT number for refusal.

PART – C

Marks : 100

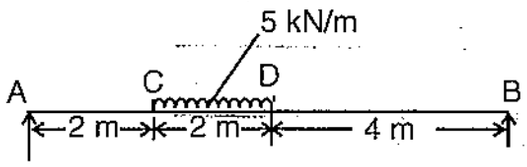
Note : Attempt any **5** questions. Each question carries **20** marks. Answer should not exceed **200** words.

33 An unsymmetrical I section is used to support a superimposed load of 2 kN/m over a span of 8 m. The sectional details are : Top flange 300 mm wide, 60 mm thick, bottom flange : 100 mm wide, 60 mm thick, thickness of web 80 mm. Overall depth of beam 400 mm. At the centre of the beam, the effective prestressing force of 100 kN is located at 50 mm from soffit of beam. Determine the stresses at the central section of the beam due to prestress, self weight and the superimposed load. Assume concrete weighs 24 kN/m^2.

34 A column section having both width and depth equal to 250 mm, C 85.6 carries an axial load of 600 kN. Design slab base for column. The allowable bearing pressure on concrete is 4 N/mm^2. The allowable bending stress in the slab base is 185 N/mm^2 (MPa).

35 Discuss the different types of well foundations with the help of neat sketches. Describe the components of a well foundation. What are the corrective measures adopted to keep tilts and shifts within permissible limits, while well sinking ?

36 A beam A B C D is simply supported at ends 'A' and 'B' is loaded as shown in figure. Taking E = 2×10^5 N/mm^2 and I = 8000 cm^4; Determine : (i) Deflection at midspan (ii) Maximum Deflection.



37 A continuous beam 'ABCD' consists of three spans, AB = 6 m, BC = 5 m and CD = 5 m. AB is loaded with uniformly distributed load of 3 kN/m. Two concentrated loads of 10 kN each, acts at mid points of the spans 'BC' and 'CD'. Supports A and D are fixed. Determine the bending moments at supports by slope-deflection method.

38 Apply Muller-Breasleau's principle to draw the influence lines for the bending moment at fixed supports for a propped cantilever beam of span 10 m. Calculate the ordinates at 1.25 m interval.

39 A prismatic bar of circular cross section is loaded by a direct tensile force of 80 kN. The bar has length equal to 3 m and diameter as 40 mm. It is made of metal with modulus of elasticity, E = 70 GPa and Poisson's ratio $\nu = 1/3$. Calculate the elongation, the decrease in diameter and change in volume of the bar.

SPACE FOR ROUGH WORK

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