TED (21)5012
(Revision – 2021)

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Reg. No……………………
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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE, APRIL – 2024

DESIGN OF STEEL AND RCC STRUCTURES

[Maximum Marks: **75**] [Time: **3** Hours]

Instructions

- Use of IS456:2000, IS800:2007, SP16 and Steel Tables are permitted.
- Any suitable data for design questions can be assumed unless given.

PART-A

I. Answer '*all*' the following questions in one word or one sentence. Each question carries '*one*' mark.

(9 x 1 = 9 Marks)

		Module Outcome	Cognitive level
1.	Steel is an alloy of .... and.................	M1.01	R
2.	Define: Slenderness ratio.	M1.02	R
3.	Strut is a....................... member.	M1.03	R
4.	Define Plastic hinge.	M2.01	R
5.	Name the IS code used for the wind load calculation.	M2.04	R
6.	Define development Length of a Reinforcement bar.	M3.03	R
7.	Describe how we can identify a one way slab.	M3.04	R
8.	In RCC columns; the minimum diameter of longitudinal reinforcement bar used as per IS 456-2000 shall not be less than .... mm	M4.01	R
9.	Define: Raft foundation.	M4.03	R

PART-B

II. Answer any '*eight*' questions from the following. Each question carries '*three*' marks.

(8 x 3 = 24 Marks)

		Module Outcome	Cognitive level
1.	Sketch any two: Column with (i) Single laced system (ii) Double laced system. (iii) Battened system.	M1.04	U
2.	List out any four different types of steel trusses and draw any two of them.	M2.04	R
3.	Define Plastic Moment Carrying capacity (Mp) of a section.	M2.02	R
4.	Name and write a short note on the Classification of cross sections (i) Semi-compact (ii) Slender sections ; based on plastic analysis in the design of steel beams.	M2.01	U
5.	Differentiate between Laterally supported beam and Laterally unsupported beam.	M2.03	U
6.	Difference between Under reinforced and Over reinforced beams.	M3.02	U
7.	Compare: One way slab and Two way slab.	M3.03	U
8.	Describe the codal provisions to be considered- while designing the pitch of **lateral ties** in RCC columns.	M4.02	U
9.	Differentiate (i) Long column (ii) Short column	M4.01	R
10.	Sketch (i) isolated footing (ii) raft foundation.	M4.04	R

PART-C

Answer '*all*' questions from the following. Each question carries '*seven*' marks.

(6 x 7 = 42 Marks)

		Module Outcome	Cognitive level
III.	Determine the design strength due to yielding and rupture of an angle section ISA 100 x 100 x 10mm. One 100 mm legs is connected to the 12mm thick gusset plate. Given data: fy = 250 Mpa, fu = 410 Mpa, Weld length, Lc= 400 mm.	M1.01	A
	OR		
IV.	List out different Standard **Rolled steel sections** and **Built up sections** using as structural compression members. (draw figure).	M1.01	U
V.	Explain the step by step procedure for design of tension member.	M1.02	U
	OR		
VI.	Define (i) compression member (ii) Radius of gyration (iii) Slenderness ratio.	M1.03	U
VII.	Sketch the Plate girder and mark the components.	M2.04	U
	OR		
VIII.	Determine the Plastic section modulus (Zp) of ISMB 400@ 61.6 kg/m about z-z axis. Section properties: h= 400mm, b_f=140mm, t_f=16mm, t_w=8.9mm.	M2.01	U
IX.	a) State the circumstances under which doubly reinforced beams are needed. (3 Marks)	M2.03	U
	b) Draw and explain about 'Stress block diagram'. (4 Marks)	M3.04	U
	OR		
X.	Calculate the ultimate moment of resistance of a singly reinforced beam section (width =200mm, effective depth=400mm); reinforced with 3 bars of 20mm diameter. Concrete is of M20 grade and fy =415 N/mm^2.	M3.03	A
XI.	A simply supported rectangular beam of effective span 7m is subjected to Uniformly distributed load of 20kN/m inclusive of self weight of the beam. Determine the depth of the beam and area steel for limit state of collapse in flexure using M20 grade and Fe 415 grade steel. Assume breadth of beam as 250mm.	M3.04	U
	OR		
XII.	a) Distinguish between one way slab and two way slab (3 Marks)	M3.04	U
	b) Explain the step by step design procedure of two way slab. (4 Marks)	M3.04	U
XIII.	Find the ultimate axial load carrying capacity of a RCC square column of 600mm side having an effective length of 4m can carry. The column is reinforced with 8 numbers of 16mm longitudinal bars. The column carries lateral ties. M20 concrete and Fe 415 steel is used.	M4.02	A
	OR		
XIV.	Design a square footing for a short axially loaded column of size 300mm x 300mm carrying 500kN Load. Use M20 concrete and Fe415 steel. Soil Bearing Capacity of the soil is 250 kN/m^2.	M4.04	A

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