22502

24225

4 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following : **10**

a) State the loads acting on steel structures as per IS 875-1987 part I to IV.

b) State the components of steel water tank.

c) Write the function of steel chimney.

d) State types and sketch any one bolted joint.

e) Define :

i) Nominal and

ii) Maximum shear stress in RCC.

f) State the functions of distribution steel in RCC slab.

g) State the necessity of lateral ties in RCC columns.

P.T.O.

Marks

2. Attempt any THREE of the following : **12**

a) Enlist any four components with their functions for Gantry Girder.

b) State various forms of shear reinforcements in beams and draw sketches any - 3.

c) Calculate shear resisted by two bent up bars of 20 mm dia. for Fe 415, $\alpha = 45°$.

d) Find development length of 16 mm dia. bar in tension and compression take τbd = 1.2 MPa, Fe 500.

3. Attempt any TWO of the following : **12**

a) i) Differentiate between balanced, over and under-reinforced section w.r. to Definition, strain, and depth of neutral axis.

ii) Draw stress block diagram for singly reinforced section.

b) Calculate values of X_{umax}, M_{umax} and limiting value of percentage of steel for beam, take M 25, Fe 415.

c) Find moment of resistance for 300 mm × 500 mm effective beam section. If 6 bars of 12 mm dia. used. M 20, Fe 500.

4. Attempt any TWO of the following : **12**

a) State any 3 advantages and disadvantages of –

i) Bolted Joints

ii) Welded Joints

b) Design lap joint for 2-plates of size 100 × 8 mm to transmit 100 KN factored load using single raw of 16 mm dia. 4.6 grade bolts and plates 410 grade.

c) Design suitable fillet weld for ISA. 80 × 50 × 8 mm with its longer leg connected to gusset plate of 8 mm thick. Take factored load = 300 KN. C_{xx} = 27.3 mm. Assume weld applied to all three edges and shop weld.

Marks

5. Attempt any TWO of the following : **12**

a) Design a one - way slab of 3.3 m effective span. Take MF = 1.2, M20, Fe415 Live load = 3 KN/m^2, FF = 1 KN/m^2.

b) Design cantilever slab for 1.2 m effective span, LL = 2 KN/m^2, FF = 1 KN/m^2, MF = 1.5, M20, Fe250.

c) Design two way slab for 3.0 × 4.5 m room simply supported by 230 mm thick walls on four sides. Use MF = 1.4, LL = 2 KN/m^2, FF = 0.5 KN/m^2, M20 Fe415 grades.

Ly / Lx = α	1.4	1.5
αx	0.99	0.104
αy	0.051	0.046

6. Attempt any TWO of the following : **12**

a) Design rectangular column for data :

Factored load = 3500 KN, unsupported length = L = 4.0 m, M20, Fe415, 1% steel.

b) i) Calculate load carrying capacity of 400 mm^2 square column using 1% steel for M20 and Fe415 grades.

ii) Enlist types of BCC footing and sketch any one.

c) Design RCC column footing with data :

Column size : 400 × 400 mm

Safe bearing capacity = 200 KN/m^2

Load on column = 1200 KN

M-20 Fe415 calculate depth of footing as using any one criteria.

No other checks required.