



**M-8194**

Seat No. \_\_\_\_\_

**B. Arch. (Sem. VI) Examination**

**April / May - 2018**

**Structure - VI**

Time : 3 Hours]

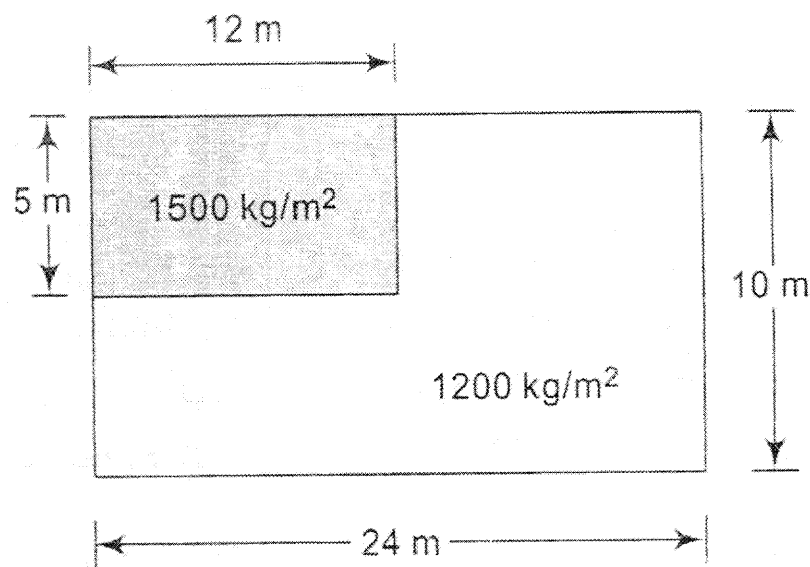
[Total Marks : 120

- Instructions :**
- (1) Attempt any six questions.
  - (2) Make suitable assumption wherever necessary.
  - (3) Figure to the right indicates full marks.
  - (4) IS 456 and IS SP-16 are permitted.

- 1 (a) Select the appropriate option from the below : **10**
- (1) Which one I.S. Code is for Earthquake load ?  
(A) IS 875 Part-III (B) IS 1893 Part-I  
(C) IS 800
  - (2) Lap length of Fe-415 TMT 12 mm Dia. Bar with C.C.M.-20 is  
(A) 564 mm (B) 465 mm  
(C) 705 mm
  - (3) Modulus of Elasticity of M-30 grade cement concrete is  
(A) 32360 N/mm<sup>2</sup> (B) 27386 N/mm<sup>2</sup>  
(C) 37386 N/mm<sup>2</sup>
  - (4) Weight of 12 meter long 16 mm dia. TMT bar is  
(A) 19.86 Kg (B) 18.96 Kg  
(C) 15.88 Kg
  - (5) Stripping time to beam span up to 6.0 mt. is  
(A) 7 Days (B) 14 Days  
(C) 21 Days
- (b) State whether it is true or false : **10**
- (1) IS 456 is code for Steel design and detailing.
  - (2) Bottom cover of 150 mm thick R. C. C. slab is 20 mm.
  - (3) Modulus of elasticity for M-20 concrete is 25000 N/mm<sup>2</sup>.
  - (4) Minimum grade of concrete for reinforced cement concrete is M-15.
  - (5) IS 1893 Part-I is for wind load.

- 2 (a) Explain with neat sketches : (any **two**) **10**
- (1) Combined Footing.
  - (2) Box Caisson.
  - (3) Inverted Arch Foundation.
- (b) Prepare ductile design and draw neat sketches **10**  
 showing structural detailing for size of footing  
 $1750\text{mm} \times 1750\text{mm}$ ,  $d=200\text{mm}$ ,  $D=550\text{mm}$ ,  
 reinforcement steel  $1250\text{mm}^2$  both the way. Size of  
 column  $300\text{mm} \times 300\text{mm}$  with TMT 4 bars of 16mm  
 dia. and ring 8mm dia., Concrete M-20, Steel Fe 415  
 for column and footing.
- 3 Write brief notes : (any **four**) **20**
- (1) Cover of concrete
  - (2) Ingredients of concrete
  - (3) Earthquake related Architectural Features
  - (4) Design loads for structural design
  - (5) Limit states method of structural design.
- 4 (a) Details of column is given below, prepare ductile **10**  
 designs and detailing for column as per IS 13920 and  
 IS 456 also give your comment for percentage of steel  
 provided and comment for slenderness of column. Draw  
 neat sketches showing structural detailing.  
 Rectangular column  $450\text{mm} \times 300\text{mm}$ , 6 bars TMT  
 $20\text{mm}$  dia and  $8\text{mm}$  dia. stirrups. Steel Fe 415, Grade  
 of Concrete M-25, height of column 3.75mt.
- (b) Calculate safe load carrying capacity of  $300\text{mm} \times 550\text{mm}$  **10**  
 rectangular column, with 6 bars 20 mm dia. Fe-415  
 and concrete M-25.  
 $P_u = 0.4 f_{ck} A_c + 0.67 f_y A_{st}$   
 Draw sketch for detailing of column cross section with  
 $8\text{mm}$  dia. Stirrups. Also mention details of side cover  
 also.

- 5 Design a simply supported slab for residential building having 20  
3.75 mt. Centre to centre span, Concrete M-20, reinforcement  
steel Fe 415 and thickness of slab is 130mm. Also draw  
bending moment and shear force diagrams.
- 6 (a) Draw a neat sketches for typical longitudinal and 10  
transverse reinforcement detailing is beam as per  
IS 13920:2016.
- (b) Design longitudinal main reinforcement for a simply 10  
supported beam of size 300mm × 550mm and effective  
span 5.60 mt. with U.D.L. of 22 KN/m (DL+LL) acting  
over its entire span. The effective cover to main  
reinforcement is 35 mm, concrete grade M-20 and steel  
grade is Fe 415.
- 7 (a) The plan of a simple one-story building is shown in 10  
figure. All the column and beams have same  
cross-section. Obtain its centre of stiffness.



- (b) A building having non-uniform distribution of mass is shown in figure. Locate its centre of mass. 10

