Printed Pages:02 **Sub Code:RCE601**

Paper Id: 100260 **Roll No.** | | | | | | | | | | |

B.TECH.
(SEM VI) THEORY EXAMINATION 2018-19
DESIGN OF STRUCTURE-II

Time: 3 Hours ***Total Marks: 70***

Note: 1. Attempt all Sections. If you require any missing data, choose suitably.
2. Use of IS 456; 2000 is permitted.

SECTION A

1. Attempt *all* questions in brief. 2 x 7 = 14

a. Find the depth of neutral axis and lever arm for a balanced section of a singly reinforced beam using M20 and Plain steel by WSM.
b. Draw the strain diagram of a singly reinforced beam for LSM.
c. Give two examples of structures subjected to torsional moments.
d. Why helical reinforcement better than lateral ties in circular column?
e. What is the difference between Main bars and distribution bars in slab?
f. Draw the diagram of Counterfort retaining wall.
g. What are the uses of shear key in retaining wall?

SECTION B

2. Attempt any *three* of the following: 7 x 3 = 21

a. Find the moment of resistance of an R.C.C. cantilever beam of 300mm width and 500 mm effective depth, reinforced with 2 bars of 16 mm diameter. Use M20 concrete and Fe415 steel. Also find the safe load , including its self weight , if the span of the beam is 2 m. Use Working Stress Method and design.
b. Write the steps for design of shear reinforcement for a beam.
c. Find the reinforcement for a lintel for a window opening of 2.1 m wide . The window is centrally located in a 300mm thick brick wall , the height of the masonry above the lintel 3m. Use M20 concrete and Fe415 steel . Unit weight of masonry =19 kN/m^3 .
d. Write the functions of Longitudinal reinforcement and transverse reinforcement for column.
e. A brick masonry wall 230 mm thick carries a load of 370 kN/m inclusive of its own weight., The bearing capacity of soil is 151 kN/m^2 at 1 m depth . Design the footing of the wall. Use M20 concrete and Fe415 steel.

SECTION C

3. Attempt any *one* part of the following: 7 x 1 = 7

(a) Write design steps of Doubly reinforced beam by WSM. The Span of the beam is *l*, size of beam (b x d), loading on the beam and grade of concrete and steel are known.
(b) A rectangular reinforced concrete beam is simply supported on two masonry wall 230 mm thick and 6 m span center to center. The beam is carrying an imposed load of 15 kN/m . Design the beam and check only for deflection. Use M25 concrete and Fe415 steel. Take effective cover 50 mm.

4. Attempt any *one* part of the following: 7 x 1 = 7

(a) A rectangular simply supported beam 300mm x 500 mm spanning over 5 m is

subjected to a maximum moment of 150 kNm at the mid span . The beam is reinforced with four bars of 25 mm diameter, on the tension side at an effective depth of 450 mm . The bars are spaced at 50 mm centre to centre . Check the beam for serviceability limit state of cracking . If M20 and Fe415 steel is used.

(b) Design a cantilever slab for chajja of an overhang 1.1 m . The imposed load on slab is 1 kN/m^2 and weight of finishing is $0.8KN/m^2$. Use M20 concrete and Fe415 steel. Also check for shear.

5. Attempt any *one* part of the following: 7 x 1 = 7

(a) Design a column of size 450mm x 600mm and having 3 m unsupported length. The column is subjected to a ultimate load of 3000kN and is effectively held in position but not restrained against rotation. Use M20 concrete and Fe415 steel. Draw the sketch also.

(b) Write the design steps for Isolated square footing of a column.

6. Attempt any *one* part of the following: 7 x 1 = 7

(a) Draw the structural behavior of a combined footing with L-section , Plan and section at column.

(b) Design a combined footing for two columns 500mm x500mm each , 5 m apart center to center of column carrying a load of 1600 kN each. The width restriction is 2.4 m. The safe bearing capacity is 200 kN/m^2 . Use M25 concrete and Fe415 steel. Check depth for B.M. Criteria, and one way shear criteria.

7. Attempt any *one* part of the following: 7 x 1 = 7

(a) Draw the diagram of cantilever retaining wall and show the forces acting on the wall. Also draw reinforcement details in Stem, Heel Slab, and Toe Slab.

(b) Design a Cantilever retaining wall to retain earth embankment 4.2 m high above G.L. The density of earth is $18KN/m^2$ and angle of repose is 30^0. The embankment is horizontal at its top. The safe bearing capacity of the soil is $190KN/m^2$ and the coefficient of friction between soil and concrete is 0.5. Adopt M20 grade concrete and Fe415 grade steel.