



**SURYA POLYTECHNIC COLLEGE, VIKIRAVANDI-605 602.**

**DEPARTMENT OF CIVIL ENGINEERING**

**Model Question Paper - I**

**Subject Name : STRUCTURAL ENGINEERING**

**Q.P. Code : 510**

**Time : 3 Hours**

**Subject Code : 4010510**

**Max. Marks : 100**

*[ N.B:- (1) Answer all 10 Questions in PART – A and each Question carries 3 Marks.*

*(2) Answer division (a) or division (b) of each Question in PART – B and each Question carries 14 Marks.]*

**PART –A**

**10 x3=30Mark**

1. Define modular ratio.
2. When a R.C beam is called as singly reinforced beam?
3. What mean by T-beam section?
4. When the lintels are provided?
5. Classify the types of slab?
6. What is meant by two way slab?
7. What are the different types of footing?
8. What is meant by axially loaded column?
9. What is meant by unsupported length of the column?.
10. What is meant by net effective area of a steel tension member?

**PART-B**

**(5x14=70 Mark)**

11. A). A Singly reinforced rectangular beam 350mm wide has a span of 6.25m and carry an UDL of 30KN/m. Find the effective depth and the area of tensile reinforcement. Use  $M_{20}$  concrete and  $Fe_{415}$  steel by limit state method.

**(OR)**

B) A R.C rectangular section of overall size 305mm x 610mm is subjected to a characteristic B.M of 250KNm about its major axis. Determine the areas of steel required at the tension and compression zones of the section if the concrete is  $M_{20}$  grade  $Fe_{415}$  grade. Provide an effective cover of 40mm to the reinforcement.

12. A) The floor slab of a college building, 120mm thick, is supported by T-beams at 3.6m meter interval (center to center). The slab carries an UDL of  $8\text{KN/m}^2$  including its self weight and floor finish. The effective span of beams may be taken as 7.2 meters. The breadth of rib of beams

shall not exceed 300mm. Design the mid span section of a beam use concrete is  $M_{20}$  grade  $Fe_{415}$  grade steel. Assume its ends are simply supported.

(OR)

B) A T-beam with 1150mm x 110 mm size flange and 230mm x 450mm size web , has to resist a maximum factored bending moment of 240KNm.  $M_{20}$  grade and  $Fe_{500}$  steels to be used. Effective cover to reinforcement shall be 40mm. Determine the area of tension reinforcement for the critical section of the beam by limit state method.

13.A) Design a simply supported two slab for the roof of a room of clear dimension 3m x 3.5m using  $M_{20}$  grade and  $Fe_{415}$  grade steel. The corner of the slab are not prevented from lifting. Width of support is 230mm. Imposed load is  $1.5\text{KN/m}^2$  and weathering course weight is  $1.75\text{KN/m}^2$ .

(OR)

B) Design one of the flight slab of a dog legged staircase using  $M_{20}$  grade  $Fe_{415}$  grade steel. The flight slab is simply supported on 230mm wide brick wall at its ends and consist of 9 steps of 250mm tread and 150mm rise. The clear width of landing at top and bottom is 1m each. unit weight of step may be taken as  $20\text{KN/m}^3$  The stair will be subjected to imposed load of  $3\text{KN/m}^2$  of plan area including finishes.

14.A) Design a circular R.C column with lateral ties, using  $M_{25}$  grade concrete and  $Fe_{415}$  grade steel to carry an axial load of 1300KN. The unsupported length of column is 4.5m and both of its ends are fixed. Assume percentage of longitudinal reinforcement as 1%

(OR)

B) Design a short square column using  $M_{15}$  concrete and  $Fe_{415}$  grade steel to carry an axial load of 1000KN by limit state method.

15.A) Two channel sections ISMC 300 @  $358\text{N/m}$  are placed to back to back at a clear distance of 100mm, at a clear distance of 100mm, if the effective length of the member is 4m.  $f_y$  of steel is assumed as 250Mpa. Determine the design compressive strength of the column assuming the gross area of built-up section as the net area.

(OR)

B) A Laterally supported simple steel beam has to be provided to carry an UDL of  $36\text{KN/m}$  over an effective span of 5.4m . The yield strength of steel used 300Mpa. Select I-section for the beam and Check the stiffness requirements.

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