

SCHOOL OF PLANNING AND ARCHITECTURE, VIJAYAWADA
B. ARCH II YEAR - IV SEMESTER EXAMINATION, (REGULAR), MAY 2015

THEORY OF STRUCTURES (TS-4)

Maximum Marks – 100

Time – 3.00 Hours

- a) Answer any Five Questions*
b) Question No.8 is Compulsory.
c) IS 456 and SP:16 code books are allowed into Exam Hall
d) Any missing data can be suitably assumed and stated

- Q1. a) State the assumptions in working stress method. (05)
- b) A R. C beam of rectangular section having a width of 400mm and overall depth of 850mm is reinforced with 4 bars of 25mm diameter Fe 415 HYSD bars at an effective depth of 800mm. The self weight of the beam together with the dead load is 6KN/m. Calculate the maximum permissible live load on the beam. Assume M-20 grade concrete. (15)
- Q2. a) Explain the terms 'balanced', 'over reinforced', 'under reinforced' sections in bending. (05)
- b) A reinforced concrete beam is to be designed over an effective span of 5m to support a design service load of 8KN/m. Adopt M-20 grade concrete and Fe-415 HYSD bars and design the beam to satisfy the limit status of collapse and serviceability. (15)
- Q3. Design a reinforced concrete beam of rectangular section using the following data. (20)
- Effective span=5m;
Width of the beam =250mm;
Overall depth=500mm;
Service dead and live loads including self weight=40 KN/M;
Effective cover=50mm;
M-20 grade concrete;
Fe 415 steel;
Sketch the details of reinforcement.
- Q4. a) How do you differentiate 'one-way' and 'two way' slab. (05)
- b) A simply supported slab has a clear span of 2.1m and is supported on walls of 400mm thick along the edges. If the live load on the slab is 4KN/m^2 and floor finish weighs 0.6KN/m^2 , design the slab using M-20 grade concrete and Fe-415 HYSD Bars. (15)
- Q5. Design two-way slab for a residential roof to suit the following data. (20)
- Size of the roof=4.5m x 6m.
Edge conditions: Simply supported on all the sides with corners prevented from lifting to support a live load of 5KN/m^2
Materials: M20 grade concrete and Fe 415 HYSD steel.

- Q6. a) Write a note on the modes of failure of axially loaded columns. (05)
b) Design the longitudinal and lateral reinforcements in a rectangular concrete column of size 300mm by 600mm to support a factored axial load of 1400KN. The column has a unsupported length of 3m and is braced against side sway in both directions. (15)

- Q7. a) What are the assumptions in limit state of design? (05)
b) Derive the expression for moment of resistance of rectangular sections without compression reinforcements. (15)

Q8. Write short notes of *any four* of the following 4 x 5=20

- a) What are the merits of working stress method?
- b) Distinguish between the structural action of one way and two way slabs with sketches.
- c) Classify the prestressing based on the level and axis of application of prestress.
- d) Write a note on losses in prestress.
- e) What is unbonded post-tensioning. List its advantages?
- f) What is Modular ratio? Determine the modular ratio for M20 grade concrete?

