# P P SAVANI UNIVERSITY

**Sixth Semester of B. Tech. Examination**

**May 2022**

**SECV3062 Structural Design I**

**17.05.2022, Tuesday** **Time: 09:00 A.M. To 11:30 A.M.** **Maximum Marks: 60**

***Instructions:***

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

## SECTION – I

**Q-1** Draw the stress diagram for Singly R C Beam also state the condition for ORS, URS and Balanced condition and what it signify. **4**

**Q-2** Design a singly RCC beam to resist the factored moment of 80 kN*m. Grade of material is M25 and Fe415. **7**

**Q-3** An RCC beam 250*500 mm in section is reinforced with 4no-18mm dia bar. Is subjected to a working shear force of 250 kN. Use M25 conceret and Fe415 steel design shear reinforcement. **7**

**Q-4** Design a rectangular beam having ratio and effective span of 4m. Superimposed load acting on beam is 40kN/m. Use M25 and Fe415 grade of material. **7**

## SECTION – II

**Q-1** Design a one-way slab for a room having clear dimension of 3m*6.5m, slab is rested on 250mm thick wall. assume necessary data and perform check. **10**

**Or**

Design a two-way slab (corner held down condition) for a cabin having in to in dimension of 5m*6m, support width is 230mm. assume necessary data and perform check.

**Q-2** Design a square column to carry axial load of 1500kN. Also determine pitch distance and dia of lateral ties. assume necessary data. **07**

**Q-3** Design a footing for above column if the soil exploration result showed the soil is of loose gravel type. carryout one way shear check. **10**

| *Type of Rock/soil* | *IS : 1904–1978* | |
|---|---|---|
| | $t/m^2$ | $kN/m^2$ |
| **I. Rocks** | | |
| 1. Hard Sound Rock | 330 | 3240 |
| 2. Laminated rock | 165 | 1620 |
| 3. Residual Deposits of Shattered and Broken Rocks | 90 | 880 |
| 4. Soft Rock | 45 | 440 |
| **II. Non-Cohesive Soils**** | | |
| 1. Compact gravel, sand and gravel | 45 | 440 |
| 2. Compact and dry coarse sand | 45 | 440 |
| 3. Compact and dry medium sand | 25 | 245 |
| 4. Fine sand, silt | 15 | 150 |
| 5. Loose gravel or sand | 25 | 245 |
| 6. Loose and dy fine sand | 10 | 100 |

**Q-4** A straight staircase is made of structurally independent tread slabs, cantilevered from a reinforced concrete wall. Given that the riser is 150 mm, tread is 300 mm, and width of **8**

flight is 1.2 m, design a typical tread slab. Apply the live loads specified in the IS Loading Code for stairs liable to be overcrowded. Use M 25 concrete and Fe 250 steel.

Or

The plan of a floor slab system, covering an area 8.0 m × 14.5 m (clear spans). The slab rests on a 230 mm thick masonry wall all around. For economy, the span of the slab is reduced by providing three (equally spaced) intermediate beams along the 8.0 m direction, as shown. The specified floor loading consists of a live load of 5 kN/m2, and a dead load (due to floor finish, partitions etc.) of 1 kN/m2 in addition to the self-weight. Assuming Fe 415 steel, design and detail the floor slab. **No check required.**