D 10651 (Pages : 2) Name.....

Reg. No.....

SEVENTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION DECEMBER 2010

CE 04 705-B—ADVANCED STRUCTURAL DESIGN—I

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*
Assume any missing data suitably.
Use of IS 456, IS 801, IS 1893 and SP 16 permitted.

Part A

1. (a) Sketch the detailing of steel in a deep beam.
   (b) Explain the structural behaviour of flat slabs.
   (c) Explain the substitute frame method of frame analysis for gravity loads.
   (d) Explain the design procedure of flexural members using light gauge steel members.
   (e) Explain the term flat-width ratio.
   (f) Explain the procedure to analyse a frame by response spectrum method.
   (g) Explain the following terms : (i) fundamental period ; (ii) mode shapes and (iii) ductility.
   (h) An industrial building is to be designed in Madras. Compute the basic wind speed and pressure.

(8 × 5 = 40 marks)

Part B

2. (a) Design a simply supported deep beam as shown in Fig. 1. Consider concrete of M 25 and steel of grade Fe 415.

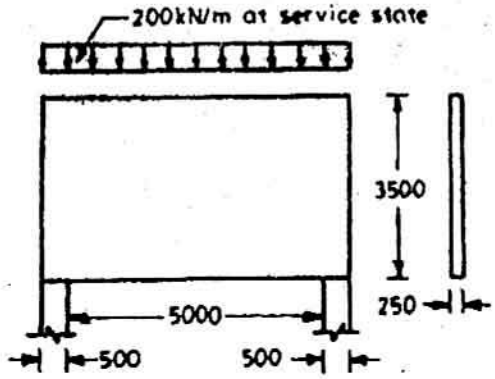

Fig. 1

(20 marks)

Or

(b) Design and sketch the reinforcement details of an interior panel of a flat slab 7 m × 5 m, if the column size be 400 mm × 400 mm. It is subjected to a live load of 5 kN/m^2 and surface finish of 1 kN/m^2, respectively. Use M 20 concrete and Fe 415 steel.

(20 marks)

Turn over

3. (a) The substitute frame of a multi storeyed building having 3 bays has a continuous beam ABCD with AB = 4 m ; BC = 2.5 m and CD = 4 m. The beams are spaced at 3 m intervals. Thickness of floor slab is 120 mm. Live load = 4 kN/m^2. Floor finish = 0.64 kN/m^2. Size of beams = 250 mm × 400 mm. Size of columns = 250 mm × 400 mm. Height between floors = 3 m. Analyse the substitute frame and estimate the maximum design moments in the beams and columns.

(20 marks)

Or

(b) Distinguish between stiffened, unstiffened and multiple stiffened compression elements in light gauge section.

(5 marks)

(c) Design a light gauge beam of span 4 m carrying a load of 5.5 kN/m. (15 marks)

4. (a) A small shed is having the following data : span of roof truss = 12 m (fink type truss) ; rise of truss = 3 m ; eave above GL = 7 m ; spacing of truss = 5 m ; spacing of purlins = 1.4 m. The shed is situated in industrial zone of Bombay, on plain land. The basic wind speed in Bombay is 44 m/s. Determine the following :

(i) Design wind speed.

(ii) Design wind pressure on the building.

(iii) Wind load on one span of purlin when wind is parallel to ridge and normal to ridge.

(5 + 5 +10 = 20 marks)

Or

(b) Distinguish between intensity and magnitude of an earthquake. (5 marks)

(c) A four-storey reinforced concrete framed building as shown in Fig. 2, is situated at Bhopal. The height between the floors is 3 m and total height of building is 12 m. The dead load and normal live load is lumped at respective floor. The soil below the foundation is assumed to be hard rock. Assume building is intended to be used as a hospital. Determine the total base shear as per IS 1893. Distribute the base shear along the height of the building.

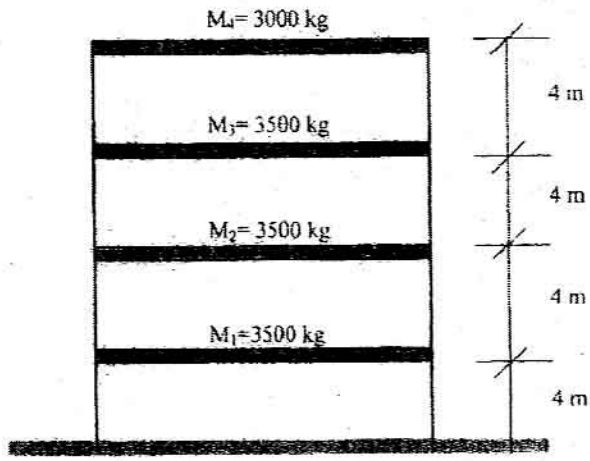

Fig. 2

(15 marks)