B.TECH. SEM -VI (CIVIL) 2014 COURSE (CBCS) : WINTER 2017

SUBJECT : STRUCTURAL DESIGN – II ★

Day : **Monday** Time : **10.00 AM TO 02.00 PM**

Date : **20/11/2017** **W-2017-2182** Max. Marks :60

N.B.

1) All questions are **COMPULSORY.**
2) Figures to the right indicate **FULL** marks.
3) Use of I.S. 456-2000 ,interaction charts, nonprogrammable electronic calculator is allowed.
4) Assume suitable data whenever necessary and mention it clearly.
5) Your answer will be valued as a whole.

Q.1 **a)** Elaborate with the help of a neat diagram how the load from the roof is transferred to further parts of a building till the underlying soil. **(04)**

b) How the semi probabilistic approach is used in limit state method of design? How it is accounted for in finding safety factors? **(06)**

OR

a) Define characteristics load and characteristics strength. **(05)**

b) How do you find out the yield stress of HYSD bars? What are the advantages and disadvantages in using high yield strength of deformed bars? **(05)**

Q.2 **a)** Find maximum load carrying capacity of simple beam 8 m long carrying uniformly distributed load . The beam is 230 mm wide and 450 mm deep. Effective cover 50 mm ,4 bars of 16 mm diameter of grade Fe 415 are used. Grade of concrete M 25. **(06)**

b) Show that limiting depth of neutral axis for a rectangular balanced section reinforced with Fe 250, Fe 415 of steel is given as 0.53d and 0.48 d respectively. **(04)**

OR

a) Derive the equation for Moment of Resistance of a singly reinforced rectangular beam with the help of a stress block. **(04)**

b) A singly reinforced rectangular beam is simply supported over a span of 4.5 m. The beam is of cross section 230 mm x 380 mm and is reinforced with 3 bars of 16 mm diameter. Determine the amount of uniformly distributed the load the beam can carry. Use M 20, Fe 415. **(06)**

Q.3 A reinforced concrete beam 380 mm wide and 750 mm deep carries a uniformly distributed load of 80 kN/m (excluding self weight) over a simply supported span of 6m . The beam is reinforced with 6 No. of 20 mm diameter of bars of grade Fe 415 on tension face. Design shear reinforcement, using vertical stirrups when all flexural reinforcement extends through out the span. Draw detailing of reinforcement in beam. **(10)**

P.T.O.

OR

a) A rectangular beam simply supported over a span of 3.8 m is 230 mm x 380 mm in cross section. It is reinforced with 3 bars of 20 mm diameter. The beam is loaded with a live load of 5 kN/m in addition to its self weight. Design the shear reinforcement for the beam. Use M 25, Fe 500. **(06)**

b) What is bond and development length? What are various types of bond? Mention the location at which the check for development length is given. **(04)**

Q.4 Design a floor slab of a residential building of size 3m x 5 m. The slab is discontinuous over two adjacent edges. Use M20, Fe 415. Show details of reinforcement. **(10)**

OR

Design a 3 span continuous floor slab of an office building where each span is of 3.1 m. Use M25 Fe 500. Show details of reinforcement. **(10)**

Q.5 A R.C. column of effective length 3.4 m is required to resist an axial ultimate load of 1700 kN. Design the column as a short column using M20 ,Fe 415. **(10)**

OR

Design a short R.C. column of rectangular section to carry an ultimate load of 620 kN and ultimate moment of 90 kNm acting about an axis bisecting the depth of the column. Width of supporting beam is 230 mm and effective length of column is 4.2 m. Use M 20 ,Fe 415 and provide equal steel on both tension and compression sides. **(10)**

Q.6 **a)** Draw soil pressure distribution diagram under footing on various types of soils. **(04)**

b) Decide the dimensions of an isolated rectangular footing for a column of size 230 mm x 525 mm to carry a factored load 1200 kN. Safe bearing capacity of soil is 210 kN/m^2. Use M25, Fe500. **(06)**

OR

Design an isolated footing for a column of size 375 mm x 375 mm to carry a factored load of 1000 kN. Safe bearing capacity of the soil is 230 kN/m^2. Use M20 ,Fe 415. **(10)**

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