

GUJARAT TECHNOLOGICAL UNIVERSITY
Diploma Engineering - SEMESTER – V • EXAMINATION – WINTER 2012

Subject code: 350601**Date: 30/12/2012****Subject Name: Design of Concrete Structures****Time: 10.30 am - 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt any five questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. English version is considered to be Authentic.
5. Use of I.S. 456-2000, Design aid (SP-16) and I.S. 875-1987-Part-1 & Part-2 are permitted.

Q.1 (a) Give your answer with IS code para No . **08**

- (i) Find effective span for a simply supported slab span having clear span of 3m & effective depth of 140 mm which is rested on 250mm thick brick wall.
- (ii) A simply supported slab having effective depth of 130 mm is reinforced with 8 mm - $\phi 150$ mm c/c as main steel. And 6 mm - $\phi 150$ mm c/c as distribution steel. Check the slab for cracking.
- (iii) Calculate minimum tension steel area required for 230 X 450 mm effective depth of beam. use Fe 415 steel Grade.
- (iv) Find minimum longitudinal steel area required for 450 X 450 mm column.

(b) A Singly reinforced beam 250 mm X 500mm is reinforced with 3 Nos. 20 mm dia. Bars at an effective cover of 30 mm. Effective span of the beam is 4 m. Find allowable superimposed load on the beam. **06**

Q.2 (a) A Simply supported 5m clear span beam, having 300 mm wide support carrying service load of 36.0 KN/m on entire span. Design beam as singly reinforced rectangular section. **08**

(b) A.R.C. beam 250 X 500 mm effective is reinforced with 4 Nos-20 mm ϕ of Fe 415. The beam carries factored S.F. of 200 KN. Find spacing of 8mm dia-2 legged- Fe 250 stirrups. Use M20. **06**

OR

(b) Design tensile and compressive reinforcement for a R.C.C. beam 250 mm wide and 500 mm deep beam to resist factored moment of 250 KN.-M. Take Effective cover of 50 mm on both side. Draw sketch of cross- section of beam. **06**

Q.3 (a) A R.C.C. Tee- beam section reinforced for tension has the following data: **08**

- (i) Flange Width = 2000 m.m.

- (ii) Thickness of Flange = 130 m.m
- (iii) Effective depth = 800 m.m.
- (iv) Breadth of rib = 400 m.m.

Determine the limiting moment of resistance of the section. Take $f_y = 415 \text{ N/mm}^2$ and $f_{ck} = 20 \text{ N / mm}^2$.

- (b) Draw the detailed dimensional sketch for cantilever beam with the following data: 06

- (i) Effective span – 2.5 meter
- (ii) Tensile steel – 4 No. 22 mm dia. Fe-415
- (iii) Anchor bar – 2 No. 12 mm dia. Fe-415
- (iv) Width of beam – 230 mm
- (v) Overall depth of beam = 440 mm
- (vi) Clear cover – 40 mm
- (vii) Vertical stirrups 6 mm diameter at 140 mm c/c throughout the beam.

OR

- Q.3** (a) Design a simply supported slab for following data. 08
- (i) Clear Room size : 4m X 10m
 - (ii) Width of support wall : 300mm
 - (iii) Imposed load & floor finish load intensity : 3.5 & 1.0 KN/m² Respectively. Check your Design For Cracking & Deflection Control.
- (b) Sketch the reinforcement details across a typical cross – section of a waist slab along with the landing slab of single flight stair simply supported at both the ends, from the following data: 06
- (i) Riser – 150 mm, and thread – 250 mm.
 - (ii) Waist slab – 160 mm
 - (iii) Main reinforcement 12 mm dia. At 140 mm c/c
 - (iv) Distribution steel 8 mm diameter at 190 mm c/c
 - (v) Going 2.5 mm and landing 1.0 meter.
 - (vi) Assume all other required data.

- Q.4** (a) Design & draw a simply supported slab for following data. 08
- (i) Clear room size : 3m X 4m
 - (ii) width of support wall : 250 mm
 - (iii) Imposed load & floor finish load intensity : 2.5 & 0.75 KN/m² respectively.
 - (iv) Corners are not held down.
 - (v) No check is required for design.
- (b) Design and detail longitudinal and transverse steel for a square R.C.C. Column section to carry axial factored load of 900 KN. 06

OR

- Q. 4** (a) Design a square isolated sloped footing for a column of size. 500mm X 500 mm carrying service load of 2000 KN. Safe bearing capacity of soil is 250 KN/m² . use M 20 concrete and Fe 415. Check for shear and bearing pressure is not required Draw neat sketch. (any one view) Take $\gamma_f=1.5$ 08
- (b) Answer the following: 06
- (i) Explain the necessity of steel reinforcement in RCC structures.
 - (ii) What is the minimum eccentricity of column ? Also write the minimum & maximum % of Longitudinal steel & minimum numbers of bars in rectangular & circular

column as per IS?

- (iii) What is the minimum % of steel and the minimum shear reinforcement requirement in beam as per IS? Also explain IS provision for effective span for continuous beam or slab.

Q.5

- (a) Design and draw continuous one way slab having three equal effective span of 3.4m each to resist imposed load of $3\text{KN}/\text{m}^2$ and floor finish load of $1\text{ KN}/\text{m}^2$. No check is required. **08**
- (b) State & discuss methods of improving ductility. **06**

OR

- Q.5** (a) Design a simply supported slab having clear spans 3.0 m X 3.0 m. it is rested over 230 mm th.Brick wall. Assume L.L. = 2.5 kN.m^2 , F.F= $1\text{KN}/\text{m}^2$. Assume that corners are held down. Use M20, Fe415. No check is required. **08**
- (b) Detail at least two sketches for special confining reinforcements for ductile detailing. **06**

A rectangular slab with a central longitudinal reinforcement bar (Fe 415) running across its width. There are four corner columns. The slab has a width of 140 mm and a thickness of 3 mm.

The slab has a width of 140 mm and a thickness of 3 mm.

The slab has a width of 250 mm and a thickness of 3 mm.

The slab has a width of 130 mm and a thickness of 8 mm.

The slab has a width of 150 mm and a thickness of 6 mm.

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A rectangular slab with a central longitudinal reinforcement bar (Fe 415) running across its width. There are four corner columns. The slab has a width of 300 mm and a thickness of 5 mm.

The slab has a width of 300 mm and a thickness of 5 mm.

□ 300 mm
□ 3
□ 6.0 kN/m
□
□

- Fe 415 □ 4-20 mm □ 250mm x 500mm **06**

□
□ 200kN
□ 8
mm □ Fe 250
□ M 20 □
□

- 250 mm □ 500 mm è R.C.C. **06**

□
□ 250 kN/m
□
□ 50mm □
□

□
□

- R.C.C **08**

□
□
□ = 2000 mm
□ = 130 mm
□ è = 800 mm
□ = 400 mm.

□
□ $f_y = 415 \text{ N/mm}^2$ and $f_{ck} = 20 \text{ N / mm}^2$ □

- **06**

□
□ -2.5 m
□ 4 No. 22 mm dia.Fe -415
□ 2No. 12 mm dia fe-415.
□ 230mm
□ è 440 mm
□ 40 mm
□ 6 mm □ 140 mm
□
□

□

□
□

- **08**

□
□
□ -4m x 10m
□ 300 mm
□

- 3.5 & 1.0 KN/m²
 150mm 250 mm
 160 mm
 12 mm 140mm
 8 mm 190
 mm 2.5 1
 3m x 4m
 200 mm
 2.5 & 0.75 KN/m²
 900 R.C.C.
- 500mm X 500 mm
 200
 0
 250 KN/m²
 M:20 Fe 415
- 06**
08
06

- 07

- $\gamma_f = 1.5$
06
- R.C.C

 IS

 IS

 IS
-
- 3.4m
 3KN/m²
 1KN/m²
- 08**
-
- 3.0 m x 3.0m

 230 mm
 L.L=2.5KN/m²
 ,F.F=1KN/m²
 M 20
 , Fe 415
- 06**
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