(REVISED COURSE)

(3 Hours)

KR–1242

Total Marks : 100

N. B. : (1) **Question No. 1 is compulsory.** Attempt any **four** questions out of remaining six questions.
(2) Illustrate your answers with neat component sketches/reinforcement layout wherever necessary to substantiate your design steps or comprehensive design.
(3) Use of any design aids including IS:456 is not permitted.
(4) Figures to the right indicate full marks assigned to the questions.

1. Attempt any four of the following :–
   (a) Explain the limit state method of design indicating its salient features along with merits. 5
   (b) What are the various assumptions made in the theory of bending of R.C. members at limit state of collapse ? 5
   (c) State the various limit states in the classified manner. Explain in brief. 5
   (d) What are the requirements governing good detailing ? Explain in brief. 5
   (e) Derive the expression for the ultimate moment of resistance in respect of the singly reinforced rectangular beam using Ultimate Load Method as prescribed by IS. 5
   (f) Justify the code specification for the limiting neutral axis depth in limit state method (LSM). 5
   (g) Discuss the influence of diagonal tension cracks on the tension steel stress in a flexural member. 5
   (h) Explain clearly the difference in the behaviour of one way slabs and two way slabs. 5

2 (a) A 5 m long simply supported beam carries a superimposed load of 20 kN/m. Design the mid-span section of the beam if its effective depth is kept constant at 500 mm using (i) Ultimate Load Theory and (ii) Limit State Theory. Neglect the self weight of the beam. Use M-20 concrete and HYSD steel of grade Fe 415. Comment on the results obtained using either theory. 10

(b) A R.C.C. beam reinforced on the tension side is 250 mm wide with an effective depth of 450 mm. It is reinforced with four bars of 18 mm diameter. Calculate the ultimate moment of resistance using Ultimate Load Method (IS Method). Take σ_{cu} = 20 N/mm^2 and σ_{sy} = 425 N/mm^2. 10

3 (a) A R.C.C. beam 250 mm × 450 mm (effective) is subjected to an ultimate moment of resistance of 224 kN-m. Find out the steel required Assume σ_{cu} = 20 N/mm^2 and σ_{sy} = 425 N/mm^2. Use Ultimate Load Method (IS Method). 10

(b) Determine ultimate moment of resistance of a singly reinforced rectangular beam of width 150 mm and overall depth 360 mm. The effective cover provided to the tensile reinforcement is 40 mm and the reinforcement comprises of 3 bars of 16 mm diameter. The materials are M-20 concrete and HYSD steel of grade Fe 415. 10

[–TURN OVER

4. (a) Using Limit State Method design a singly reinforced rectangular beam of span 4·5 m. It is subjected to a dead load of 14 kN/m and a superimposed load of 12 kN/m. Use M-20 concrete and HYSD steel of grade Fe 415. 10

(b) Find out ultimate moment of resistance of doubly reinforced rectangular section of size 250 mm × 550 mm (effective) having tensile reinforcement (3054 mm^2) and compressive reinforcement (982 mm^2). The materials are M-20 concrete and TOR steel. Refer Table 1 for the values of f_{sc} (in N/mm^2) for various d*/d ratios. 10

Table 1

d*/d	0·05	0·1	0·15	0·20
f_{sc}	355·1	351·9	342·4	329·2

5. (a) A Tee beam section having effective depth of 420 mm, flange width of 1250 mm, rib width of 320 mm, slab thickness of 110 mm comprises of 7 bars of 28 mm diameter. Assuming concrete of M-20 grade and HYSD steel of grade Fe 415. Calculate ultimate moment of resistance of the section. 10

(b) Design the shear reinforcement for the rectangular beam of dimensions 350 mm × 500 mm (effective) provided with the tensile reinforcement comprising 4-25 mm diameter. The beam is subjected to a maximum factored shear force of 400 kN. The materials are the concrete of grade M-20 and TOR steel. Refer Table 2 for the values of allowable shear stress (τ_c). 10

Table 2

$(A_s/bd) \times 100$	0·25	0·5	0·75	1·0	1·25	1·5	1·75	2	2·25
τ_c (N/mm^2)	0·36	0·48	0·56	0·62	0·67	0·72	0·75	0·79	0·81

6. (a) Design a simply supported slab to cover a room of internal dimensions 4 m × 5·75 m and 23 cms thick brick wall around. Assuming a superimposed load of 3·5 kN/m^2 and a floor finish of 1 kN/m^2, design the slab. Use M-20 concrete and HYSD steel of grade Fe 415. Assume that the slab corners are prevented from lifting. Draw the neat sketches of the reinforcement layout. Refer Table 3 for bending moment coefficients. 15

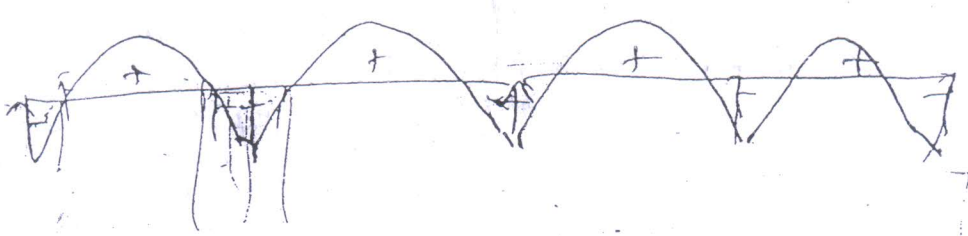
Table 3

l_y/l_x	1·0	1·1	1·2	1·3	1·4	1·5	1·75
α_x	0·062	0·074	0·084	0·093	0·099	0·104	0·113
α_y	0·062	0·061	0·059	0·055	0·051	0·046	0·037

(b) Explain the doubly reinforced beam. State the conditions warranting the necessity of such beams.

7. (a) Design a short column, square in cross-section, to carry an axial load of 2000 kN using M-20 concrete mix and HYSD steel of grade Fe 415.

(b) A rectangular column of dimensions 275 mm × 450 mm is subjected to an ultimate axial load of 900 kN. Design the footing for the column assuming safe bearing capacity of the soil to be 210 kN/m^2. Use M-25 concrete mix and TOR steel.



CIVIL / VII 26/11

EC - DAU

VT-S II Exam Nov.-12- 137

Con. 9420–12. (REVISED COURSE) KR–1002

Dec. 2012

(3 Hours) [Total Marks : 100

N.B. : (1) Question No. 1 is compulsory.
(2) Attempt any four questions out of remaining six questions.
(3) Assume any suitable data wherever required.
(4) Figures to the right indicates full marks.

1. Answer any four :– 20
(a) Why sewers are designed to run partially full ?
(b) What is sludge volume index ? What is it's significance ?
(c) Why velocity needs to be controlled in grit chamber ?
(d) A 3% solution of a sewage sample is incubated for 5 days at 20°C. The depletion of oxygen was found to be 4·5 ppm. Determine the B.O.D. of the sewage.
(e) Write down classification of air pollutants.

(a) Explain any two major episodes of Air pollution. Also explain Ozone Depletion. 10
(b) Define Sound Intensity, Sound Power and Noise. Explain various methods of noise control. 10

(a) Calculate the diameter and discharge of a circular sewer laid at a slope of 1 in 300 when it is running half full and with a velocity of 1·9 m/sec. (n in Manning's formula = 0·012). Also write down necessity of pumping sewage. 10
(b) Draw a flow sheet of conventional sewage treatment plant employing A.S.P. Explain the working of Activated Sludge Process. 10

(a) Explain the necessity and process mechanism of anaerobic digestion of sludge. How the solid, liquid and gaseous products of digestion are disposed off ? 10
(b) Write down construction details of Imhoff cone. And Disposal of the effluent from Septic Tanks. 10

a) A single stage filter is to treat a flow of 4 MLD of raw sewage with BOD of 240 mg/lit. It is to be designed for a loading of 12000 kg of BOD in raw sewage per hectare meter, and the recirculation ratio is to be 1. What will be the strength of the effluent ? 10
) Explain self purification of stream and zones of poliution in a River-Stream. 10

) Explain with diagram systems of plumbing. 10
) Write short note on Intercepting Traps and why antisiphonage pipe is attached to traps ? 10

ite short notes on (any four) :– 20
(a) Water Meter
(b) Food to Micro Organism Ratio and Sludge Age
(c) Sewage Disposal Methods
d) Sludge Thickening
e) Aerated Lagoons
(f) Drop Manhole.

Civil - VII

Irrigation Engineering

IL Dec 12

Dec · 2012

V-A4-II-HI-Ex-12-D-54

Con. 8361–12. KR-1119

(3 Hours) [Total Marks : 100

N.B. : (1) Question No. 1 is compulsory.
(2) Answer any four questions from remaining six questions.
(3) Assume suitable data wherever necessary and state it clearly.

1 (a) Enlist various techniques of Irrigation in India. Describe any one. 4

(b) Table below gives the necessary data about crop, duty and the area under each crop commanded by a canal taking off from storage tank. Taking time factor $\frac{12}{20}$ calculate the discahrge required at the head of the canal. 4

Crop	Base period in Days	Area in hectares	Duty at the head of the canal hectares/cumec	—
Sugarcane	320	800	600	
Overlap for sugarcane in Hot weather	90	120	580	—
Wheat (Rabi)	120	650	1700	
Bajri (monsoon)	120	550	2500.	
Vegatables	120	400	600	

(c) Derive the relationship between Duty, Delta and Base period. 4

(d) Write the importance of irrigation in India. 4

(e) Describe Sarda type of fall. 4

2 (a) Describe with neat diagram Symon's raingauge. 6

(b) What are the methods of computing average rainfall over the basin and describe any one. 4

(c) The ordinates of 3 hour unit hydrograph are given below :— 10

Time in hour	0	3	6	9	12	15	18	21	24	27	30	—
Ordinates in m^3/sec	0	20	35	30	26	22	18	16	15	13	0	—

Find the ordinates of 6 hour unit hydrograph for the same basin analytically Plot the graph.

3 (a) Define :— 6

(i) Specific yield (ii) Specific retension (iii) Storage coefficient.

(b) During a Recuperation test, the water level in an open well was depressed by pumping by 2·5 m and recuperated by an amount 1·6 m in 60 minutes. Determine the yield from a well of 2m diameter under a depression head of 3 m. Also determine the diameter of the well to yield 20 lit/sec under depression head of 2·5 m. 10

(c) Distinguish between :— 4

(i) Unconfined aquifer and confined aquifer.

(ii) Shallow open well and deep open well.

[TURN OVER

4 (a) (i) Describe various methods of reservoir sediment control. 6

(ii) What are the factors on which the selection of site of the reservoir depends ? 4

(b) (i) What do you understand by gravity dam ? Explain various forces that act on a gravity dam. 6

(ii) Distinguish between elementry and practical profile of a gravity dam. 4

5 (a) (i) Describe various types of gallaries in gravity dam. 4

(ii) Explain various types of joints in gravity dam. 4

(b) (i) What are the different types of earth dams usually adopted ? Explain various causes of failure of earthen dam. 8

(ii) What is meant by energy dissipater ? Write its necessity and state various types of energy dissipaters. 4

6 (a) (i) Describe with neat diagram Ogee-shape spillway.

(ii) Design a practical profile of a gravity dam of stone masonry, given the following data :—

R.L. of the base of dam = 1450 m

R.L. of HFL = 1480·5 m

Specific gravity of masonry = 2·8 ; safe compressive stress for masonry = 150 t/m^2 and height of wave = 1·2 m.

(b) (i) The culturable command area of water course is 1500 hectares. Intensity of Irrigation for sugarcane and wheat crops are 20% and 40% respectively. The duties for the crops at the head of watercourse are 730 hectares/cumec and 1800 hectares/cumec respectively. Find the (1) Discharge required at the head of the course (2) Determine the design discharge at the outlet assume time factor 0·8.

(ii) Define alignment of canal and describe in brief methods of alignment of canal.

7 (a) (i) Write a short note on Bandhara Irrigation.

(ii) Describe causes and effects of water logging.

(b) (i) Distinguish between syphon aqueduct and canal syphon with neat sketch.

(ii) Describe the advantages of canal lining.

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L S MRCS

Dec 2011

Con.6615-11. (REVISED COURSE) MP-5470

(3 Hours) [Total Marks : 100

N.B.: (1) Question No. 1 is compulsory.
(2) Attempt any four questions from the remaining six questions.
(3) Assume suitable additional data if necessary and state the same clearly in your answer.

1. (a) Define limit state. State the different limit states considered in design giving reasons for their consideration. 6
(b) Determine Lever Arm, N.A. and MR constant from first principle. 6
(c) What are the functions served by longitudinal and transverse reinforcement in column ? 4
(d) Explain in brief Whitney's theory. 4

2. (a) A single reinforced beam of concrete grade M20 has to resist an ultimate moment of 120 kNm. Design the section using 0·9% steel of grade fe415. Assume the width of beam equal to 230mN. 10
(b) A R.C. beam of rectangular section is 230 mm x 530 mm deep. It is provided with tension steel of 1570 mm^2 and comp. steel of 1005 mm^2 at an effective cover of 55 mm for both steel. Calculate the ultimate moment of resistance. Use M20/Fe415. 10

3. (a) A rectangular beam 230 mm x 550 mm depth is subjected to a sagging BM of F40 kNm, shear force of 30kN and twisting moment of 12 kNm at a given section. Design the reinforcement at given section. Use M20/Fe415. Assume effective cover 50 mm. 10
(b) Calculate the ultimate MR of 'T' beam for the following data— 10
Width of flange = 1200 mm,
Depth of slab = 110 mm
Effective depth = 600 mm
Width of web = 300 mm
Area of tension steel provided is 25 mm dia. 6 No. Use M20/Fe500.

4. (a) Calculate the load carrying capacity of shoot axially loaded circular column 400 mm dia. reinforced with 6 Nos. of 20 mm dia basis of grade Fe415. The helical-reinforcement consist of 8 mm dia spaced at 75 mm c/c. Assume clear cover to main steel equal to 40 mm. Use M20/Fe415. 10
(b) A RCC column 300 mm x 500 mm is reinforced equally on two short sides by 3000 mm^2 of steel on each side. Calculate ultimate load and ultimate moment the column can resist if it is just on the verge of cracking ($K_u = 1$). 10
Use M20/Fe415. Take effective cover is 50 mm.
fsi – stress in the reinforcement in the i^{th} row is 355 N/mm^2.
fsi – comp. stress in conc. at the level of i^{th} row of reinforcement is 8·92 N/mm^2.

5. Design a combined footing connecting two columns A and B 4m center to centre carrying an ultimate axial load of 1200 kN and 1400 kN resp. the boundary line of the property is 400 mm from the outerface of the column A. Column A is 300 mm x 300 mm and column B is 400 mm x 400 mm. The SBC of soil is 150 kNm^2. Use M20/Fe415. 20

6. (a) Design a footing for a column carrying an ultimate load of 300 kN and ultimate of moment of 180 kNm about an axis bisecting the depth of column at its base. Size of column is 300 mm x 600 mm. SBC of soil is 400 kN/m^2. Use of M20/Fe415. 12
(b) Determine ultimate moment of resistance for a beam having size 230 mm x 450 mm (effective) steel on tension side 2000 mm^2 and steel on comp. side 1200 mm^2 Use M20/Fe415. (By Whitney's method). 8

7. (a) Explain how the variation in loads and meterial strength have been accounted for in the limit state method. 4
(b) Design a R.C. slab for a room measuring 4m x 5m. The slab carries super imposed load of 3 kN/m^2. Use M20/Fe415. 16
$\alpha x = 0{\cdot}072$
$\alpha x = 0{\cdot}056$
Draw the sketch showing reinforcement details.