

Con. 3214-08.

CO-3272

(REVISED COURSE)

(3 Hours)

[Total Marks : 100]

MASTER

- N.B. (1) Question No. 1 is compulsory.
 (2) Attempt any four questions from the remaining questions.
 (3) Assume suitable data if required and underline the same.

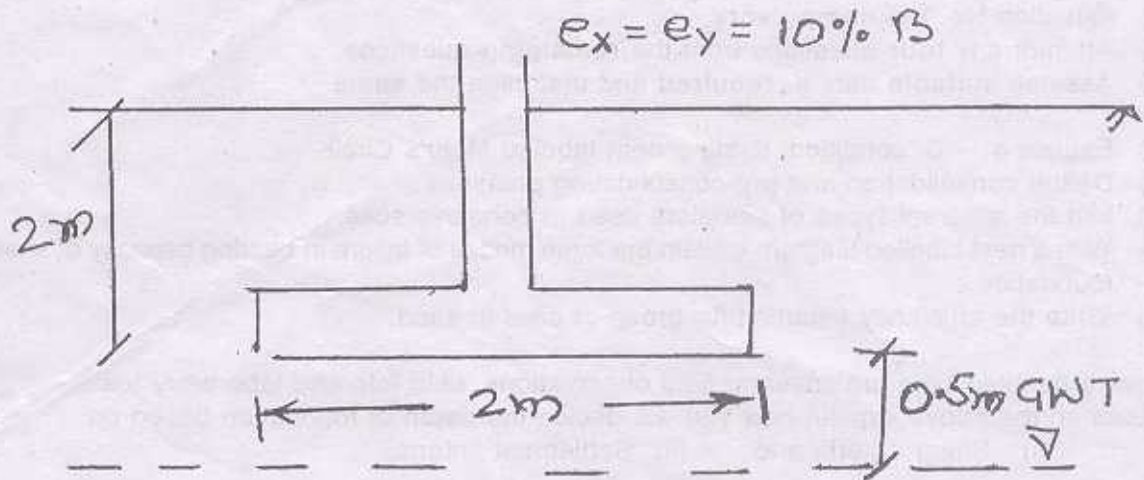
1. (a) Explain $\phi = 0$ condition, using a neat labeled Mohr's Circle. 4
 (b) Define consolidation and pre-consolidation pressure. 4
 (c) List the different types of samplers used in cohesive soils. 4
 (d) With a neat labelled diagram explain the three modes of failure in bearing capacity of shallow foundation. 4
 (e) Write the efficiency equation for group of piles in sand. 4
2. Draw a detailed bore log covering field observations, field tests and laboratory tests. 20
 Based on the above explain how you will decide the depth of foundation based on
 (i) Shear criteria and (ii) Settlement criteria.
3. (a) Direct shear test was carried out on samples of compacted sand. The shear box 10
 dimensions were 60 mm x 60 mm. The readings are as under :

Normal load (N)	Shear load at failure (N)	
	Peak	Ultimate
110	95	65
225	195	135
340	294	200

- Determine the angle of shearing resistance in dense and loose condition.
- (b) Write the Skempton's pore pressure equation and discuss the Parameters 'A' and 'B' in the pore pressure equation. 10
 4. (a) A line load of 100 kN/m run extends to a long distance. Determine the intensity of vertical stress at a point 2 m below the surface and (i) directly under the line load (ii) at a distance of 2 m perpendicular to the line. Use Boussinesq's theory. 10
 (b) Differentiate between Boussinesq's method and Westerguards method to evaluate stress distribution. 10

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5. (a) Explain how you will determine the bearing capacity of the soil based on plate load test 10
as proposed by IS Code.
(b) For the foundation given below, find the safe load, for the square footing. 10



$$r = 19.81 \text{ kN/m}^3$$

$$\phi = 30^\circ$$

$$C = 12 \text{ kPa}$$

$$\text{FoS} = 2.5$$

$$N_c = 37.2$$

$$N_q = 22.5$$

$$N_r = 19.7$$

6. (a) Explain what is negative skin friction. What is its effect on factor of safety? How will you reduce the negative skin friction? 10
(b) The following data refers to a cyclic pile load test carried out on a 300 mm diameter 10 m long pile. 10

Load on pile kN	Total settlement mm	Net settlement of pile top
150	1.45	0.40
200	2.25	0.65
250	2.75	0.80
300	3.60	1.00
400	5.75	1.70
500	10.75	5.25
600	30.00	20.80

Plot the load settlement curve and estimate the allowable load of the pile as per IS 2911 part 4.

7. Draw c/s and plan of stone column for ground improvement. Show clearly triangular pattern, 20 spacing of column. How do you determine load carrying capacity of stone column.

Traffic Planning & Design

WS April 08 498

Con. 2755-08.

(REVISED COURSE)

CO-3302

(3 Hours)

[Total Marks : 100

MASHER

- N.B. :** (1) Question No. 1 is **compulsory**.
 (2) Attempt any **four** questions out of remaining **six** questions.
 (3) **All** questions carry **equal** marks.
 (4) Assume any **data** if **required** and state them **clearly**.

1. (a) Explain step by step method to design the fixed signal also state IRC warrants for signal installation. 8
- (b) Explain 'level of service concept'. Explain various levels of services with respect to highway capacity. 8
- (c) Explain briefly various methods of economic evaluation for highway projects. 4
2. (a) Explain various guidelines for design of a Rotary intersection. 7
- (b) Explain various methods of conducting 'Origin and Destination' survey. 7
- (c) Discuss various TSM schemes. 6
3. (a) Differentiate with typical sketches between 'collision diagram' and 'condition diagram', with respect to accident studies. 8
- (b) The relationship between the hourly traffic volume as percentage of AADT and number of hours in a year when the traffic exceeds is given below for a road. Determine design traffic volume :- 8

Number of Hours Exceeding	1	5	10	20	30	60
% AADT	24	20	14	16	14	12

- (c) Give various design guidelines for the design of a Rotary intersection. 4
4. Write short notes on (any **four**) :- 20
 - (a) Peripheral Parking schemes.
 - (b) Transportation Planning Process.
 - (c) Moving observer method.
 - (d) Presentation of traffic data.
 - (e) Traffic Signs.
5. (a) Explain the significance of statistical distributions in traffic engineering and how they are used. 7
- (b) What do you mean by 'Channelisation' ? Explain various uses of channelising islands with neat sketches. 7
- (c) Discuss various methods of Traffic Assignment. 6
6. (a) Explain various road user and vehicle characteristics in brief. 6
- (b) Differentiate between 'at grade' and 'grade separated' intersections with examples. 8
- (c) Explain various environmental considerations for highway planning. 6
7. (a) Explain with the help of flow chart the transportation planning process. What are the steps involved in transportation planning ? Explain each one of them briefly. 10
- (b) State and compare the different types of urban mass transit modes available. Explain their suitability for different travel demands and also for different population sizes. 10

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WS March 08 254

Con. 3426-08.

K.E. (CIVIL) VI (REV)

Construction Engg.

(REVISED COURSE)

(3 Hours)

9/6/08

CO-3277

[Total Marks : 100

MASRAN

- N.B. : (1) Question No. 1 is **compulsory**.
(2) Attempt any **four** out of remaining **six** questions.

1. (a) A 1km long tunnel with 40 sq.m c/s area is required for a highway. Explain the 'heading and benching' method of tunnelling, discussing the process of excavation, equipments needed and the procedure of much removal. 12
(b) Discuss different methods of under water concreting. 8
2. (a) Suggest suitable machinery for the following works. Justify the use of each equipment. 12
(i) 5 km long cement concrete road construction.
(ii) Construction of a 500m span flyover bridge using precast girders.
(iii) Concreting for a high rise building-30 storeyed.
(b) What is meant by lining of a tunnel ? Discuss different methods of lining. 8
3. (a) Determine the probable cost of owning and operating an equipment purchased for Rs. 50 lakhs. It has a useful life of 15000 hrs. Salvage value is estimated at 10% of the purchase cost. The equipment is powered by a 150 bhp diesel engine. The equipment works for 1500 hrs in a year. The operating factor is 0.75. The maintenance and repairs cost is estimated at 80% of depreciation. The operators salary is Rs. 12000/- per month. 12
(b) Discuss different excavating equipment, with their suitability. 8
4. (a) What is a cofferdam ? Discuss different types of cofferdams. 10
(b) What is vacuum concrete ? Explain step by step method of vacuum concreting. 10
5. (a) Discuss cast in situ pile construction by auger boring. 10
(b) Draw neat sketches for : 10
(i) Sand drains
(ii) Diphragm wall construction.
6. (a) Discuss different cost compacting equipment, stating operations and suitability. 10
(b) Explain liner plate method of tunneling in soft soils. 10
7. Write short notes on : (any four) 20
(a) Grouting and its applications
(b) Tunnel boring machine
(c) Cranes
(d) Selection of construction equipment
(e) Depreciation.

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N. B. : (1) Question No. 1 is compulsory.
(2) Attempt any four questions out of remaining six questions.

1. (a) Answer any five :- 15
 - i) Explain the significance of pH in alum coagulation.
 - ii) Why velocity needs to be controlled in grit chamber?
 - iii) Why iron and manganese need to be removed from water?
 - iv) What is population equivalent?
 - v) What is the principle of tube settler?
 - vi) What is sludge volume index? What is its significance?

- (b) Draw a flow sheet for conventional sewage treatment plant with trickling filter. 5

2. (a) Following is data for activated sludge process:- 12
 - i) Flow --- 3 MLD
 - ii) BOD₅ of raw sewage – 250 mg/l
 - iii) Dimensions of aeration tank - 25m long x 8m wide x 4m liquid depth.
 - iv) MLSS to be maintained – 2250 mg/l
 - v) S.V.I. – 100 ml/l

Compute F/M, Hydraulic retention time and BOD loading
- (b) Compare lime soda with ion exchange. 8

3. (a) Write the assumptions for ideal sedimentation tank and prove with suitable derivation that the efficiency of sedimentation tank is independent of the depth of the tank. 10
- (b) i) Design a circular sedimentation tank to treat 10000 m³ / d of flocculated water. Check the design for surface loading and weir loading. 5
- ii) Design a septic tank for housing colony of 200 people water supply rate is 150 lpcd and the tank is to be cleared once in two years. 5

4. (a) Explain the following terms related to activated sludge process 10
 - (i) F/M (Food to micro-organism ratio.)
 - (ii) S.V.I.
 - (iii) MLSS
 - (iv) Hydraulic retention time
 - (v) Aeration

- (b) Explain the potential filter troubles which may be encountered in the operation of rapid sand filters. Distinguish between rapid sand filter and slow sand filter with reference to 10
 - (i) Rate of filtration
 - (ii) Loss of head
 - (iii) Size of filter media
 - (iv) Filter media of sand.

Con. 3043-CO-3286-08.

B. E (C) VI Rev

Env. Engg-II 21/5/08

5. (a) The 5 day 20°C BOD of waste water is 210 mg/lit. What will the ultimate BOD? What will be the 10 day demand? If the bottle has been incubated for 30°C , What will be 5 day BOD? At 20°C take $K = 0.1$ per day 10
- (b) What is digestion of sludge? Explain the mechanism of anaerobic digestion. How liquid, solid and gaseous products are disposed off? 10
6. (a) Give a brief description of several disinfectants used in water treatment stating the relative merits and situations where they are most suited. 10
- (b) (i) Explain oxygen sag curve 5
(ii) Explain water borne diseases and how do you control it 5
7. Write a short note on any four : 20
- Self purification of streams
 - Operational problems in trickling filters
 - short circuiting
 - Under drainage system of rapid sand filter
 - Ion exchange process
 - Tube settlers

(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 where **necessary**. State them **clearly**.

1. (a) Enlist the methods of irrigation and explain any three in detail. 10
 (b) The base period, intensity of irrigation and duty of various crops under a canal system are given in the following table. Find the reservoir capacity, if the canal losses are 20% and reservoir losses are 12%. 10

CROP	BASE PERIOD (DAYS)	DUTY AT FIELD (hect/cumec)	AREA UNDER CROP (hect)
Wheat	120	1800	4800
Sugarcane	360	800	5600
Cotton	200	1400	2400
Rice	120	900	3200
Vegetable	120	700	1400

2. (a) What are the different types of precipitations ? Explain any two. 6
 (b) Write a short note on Symon's Rain Gauge. 4
 (c) The hourly ordinates of two hour unit hydro graph are as given below. Derive a 6 hour unit hydrograph for the same catchment. 10

Time (Hrs)	0	1	2	3	4	5	6	7	8	9	10
Discharge (Cumec)	0.0	1.8	4.5	5	7.5	8	6	4.2	2.5	1.3	0.0

3. (a) Define : 6
 (i) Storage Coefficient
 (ii) Coefficient of permeability
 (iii) Coefficient of Transmissibility.
 (b) Write a Short note on Recuperation Test. 4
 (c) A well penetrates fully, a 10 m thick water bearing stratum of medium sand having coefficient of permeability of 0.005 m/sec. The well radius is 10 cm and is to be worked under a drawdown of 4 m at the wall face. Calculate the discharge from the well. What will be the % increase in discharge if the radius of the well is doubled ? Take radius of drawdown as 300 m in each case. 10
4. (a) Enlist different types of Spillways and explain any two in detail. 10
 (b) Explain the methods to compute average rainfall. 10
5. (a) Compare Kennedy's and Lacey's theories. 10
 (b) Design an irrigation channel in alluvial soil according to Lacey's silt theory from the following : 10

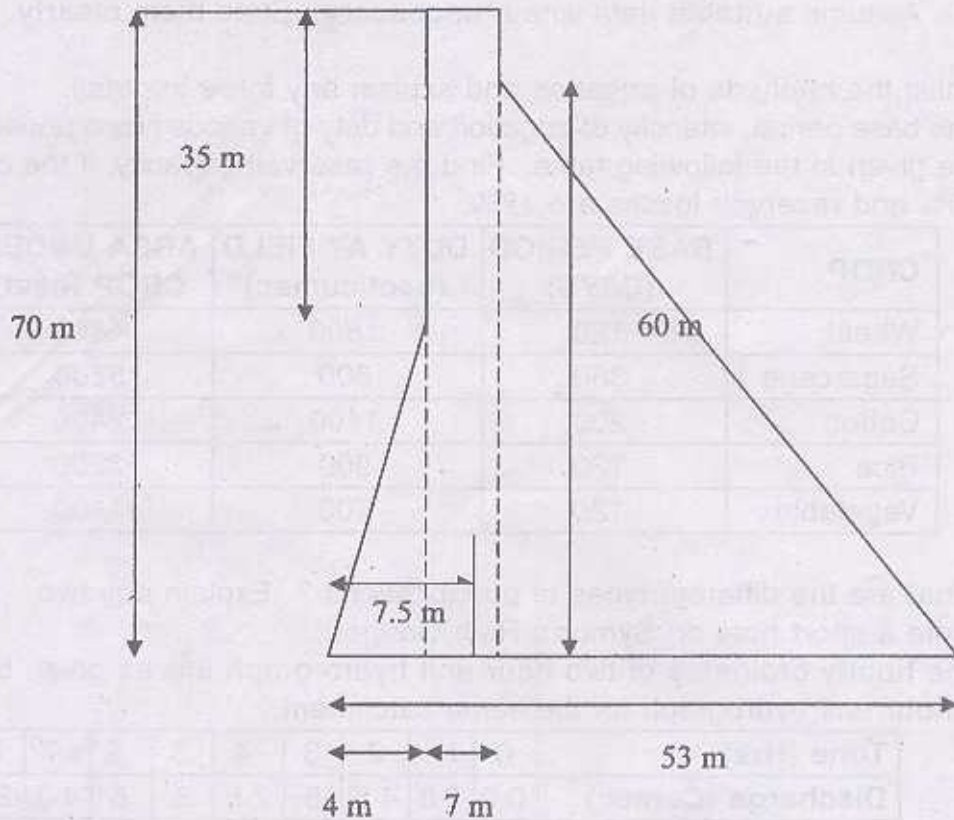
Full supply discharge = 15 cu.m/sec.

Lacey's Silt factor = 1.0

Channel side slope = 0.5 : 1.

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6. (a) Write a short note on causes of failures of earthen dams. 10
 (b) Check the stability of the dam section shown for reservoir full condition with uplift. 10
 Also find principle stresses at the toe and heel.
 Take $\gamma_{con} = 24 \text{ kN/m}^3$ and $\gamma_w = 10 \text{ kN/m}^3$.



7. (a) What are the effects of water logging ? 5
 (b) What are the different types of canal linings ? 5
 (c) Write a short note on Sarda type fall. 5
 (d) Write a short note on Bligh's Theory.

Theory of Reinforced & Prestressed Concrete.

Con. 2784-08.

(REVISED COURSE)
(3 Hours)

CO-3256

[Total Marks 100]

- N.B.**(1) Question No. 1 and question No. 7 are **compulsory**. Solve any **three** from remaining questions.
 (2) IS 456-2000 is not **permitted**.
 (3) Assume **suitable** data if **required** and justify the **same**.
 (4) Illustrate your answers and design with sketches where **required**.
 (5) Answers should be **grouped** and written **together**.

1. (a) What do you mean by under reinforced, balanced and over reinforced section? 5
- (b) Develop the equation $\frac{X_{u\max}}{d} = 0.48$ w.r.t. LSM, when Fe 415 is used. 5
- (c) What is advantage of helical reinforcement in place of circular links in column? Explain conditions in which it is applicable. 5
- (d) Discuss Hoyer's method of pre-tensioning. 5
2. (a) The C/s of a singly reinforced beam is 300 mm x 450 mm effective 4 bars of 16 mm ϕ are used at tension face of beam. Determine MR of the section. Also determine actual stresses acting in steel and concrete. Use M20 and Fe 415. Adopt WSM. 10
- (b) Dimensions of a 6 m simply supported beam are restricted to 300 mm x 700 mm over all. Imposed udl is 55 kN/m. effective cover is 50 mm. Check suitability of dimensions and design the beam. Use M 20 and FE 415. Adopt WSM. 10
3. (a) Under what situations a beam will be subjected to torsional moment? How longitudinal and transverse reinforcement is designed to resist it? 10
- (b) Determine UMR and Ast for Tee beam with following specifications. Adopt LSM. 10
 Grade of concrete — M 25 : Grade of steel — Fe 415.
 bf = 1400 mm; Df = 100 mm; d = 500 mm; bw = 300 mm.
4. (a) A 5 m simply supported beam of 300 mm x 500 mm effective is reinforced with 4 bars of 22 mm ϕ The beam is carrying 230 mm thick wall of 4 m height on it, in addition to it's self weight. 2 bars are cranked up near support at 45°. Find spacing of 6 mm ϕ stirrups. Use M 20 concrete, Fe 415 for longitudinal steel and Fe 250 for Transverse steel. Adopt LSM. 10

$P_t(\%)$	0.25	0.5	1.0
$\tau(\text{MPa})$	0.36	0.48	0.56

- (b) Design a one way slab on clear span 4 m. Bearing at each end is 230 mm thick walls. 10
 The slab is subjected to
 LL = 4 kN/m² and FF = 0.5 kN/m². Use M 20 and Fe 415 Adopt LSM.

[TURN OVER

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5. (a) A concrete column 300 mm \times 300 mm is reinforced with 4 \times 25 mm ϕ at an effective cover of 50 mm. Find how far from the centre, the line of thrust pass through yy-axis without causing tension in the concrete. Will it be safe column? Check it's adequacy. Take load acting on column as 700 kN. Use M 25 and Fe 415. Adopt WSM. 10
- (b) Explain Whitney's theory to simplify the curved stress distribution for flexural behaviour of an R.C. beam. Also develop equation for UMR of singly reinforced balanced section. Use ULM. 8
- (c) What are load factors for dead and line load in case ULM. 2
6. (a) What is development length? Develop relevent equation. 5
- (b) What are factors affect on selection of a cable profile. Explain in reference to load balancing concept in prestress. 5
- (c) A pre-tension prestressed concrete beam 200 mm wide and 300 mm deep is prestressed with wires of area 320 mm². Located at constant eccentricity of 50 mm and carrying an initial stress of 1000 N/mm². The span of beam is 10 m. Calculate loss of stress and strain. 10
- Take $E_s = 210 \text{ kN/mm}^2$; $E_c = 35 \text{ kN/mm}^2$; Shrinkage strain = 300×10^{-6} ;
Creep co-efficient = 1.6; Relaxation of steel 5%.
7. (a) Compute and draw the location of pressure line for a rectangular beam 30 mm \times 400 mm deep. It is prestressed with a force of 600 kN at a constant eccentricity of 80 mm. It carries a total udl of 20 kN/m over a span of 6 m. 5
- (b) An unsymmetric-I section of overall depth 450 mm has C/s area and second moment of area as $48.1 \times 10^3 \text{ mm}^2$ and $800.7 \times 10^6 \text{ mm}^4$ respectively. The position of centroid of section is 246.5 mm from soffit of beam. Determine stresses at mid span, quarter span and support section at service stage. It is a 6 m simply supported beam carries a udl of 15 kN/m inclusive of it's self weight. A cable with initial $P_f = 250 \text{ kN}$ is provided concentric at supports and 80 mm from soffit at mid span. Cable is parabolic. Assume 20% loss at service. 15