

CBCS Scheme

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15CV52

Fifth Semester B.E. Degree Examination, June/July 2018 Analysis of Indeterminate Structures

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

- 1 Analyze the continuous beam as shown in Fig.Q1 by slope deflection method and also determine its bending moment diagram and shear force diagram.

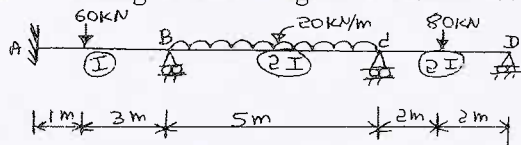


Fig.Q1 (16 Marks)

OR

- 2 Analyze the rigid jointed frame as shown in Fig.Q2 by slope deflection method and also determine its bending moment diagram.

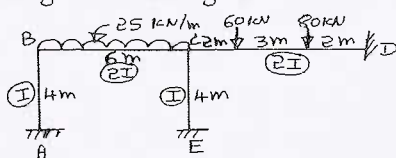


Fig.Q2 (16 Marks)

Module-2

- 3 Analyze the continuous beam as shown in Fig.Q3 by moment distribution method and also determine its bending moment diagram and shear force diagram.

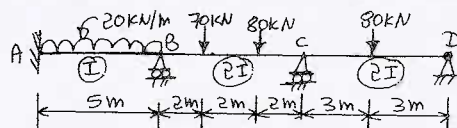


Fig.Q3 (16 Marks)

OR

- 4 Analyze the portal frame as shown in Fig.Q4 by moment distribution method and also determine its bending moment diagram.

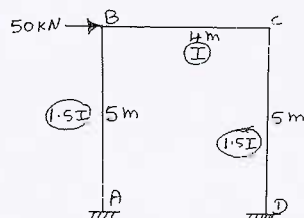


Fig.Q4 (16 Marks)

Module-3

- 5 Analyze the continuous beam as shown in Fig.Q5 by Kani's method and also determine its bending moment diagram and shear force diagram.

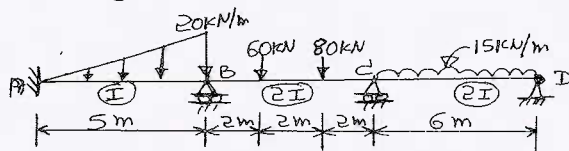


Fig.Q5 (16 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

OR

- 6 Analyze the portal frame as shown in Fig.Q6 by Kani's method by taking the advantage of symmetry and also determine its bending moment diagram.

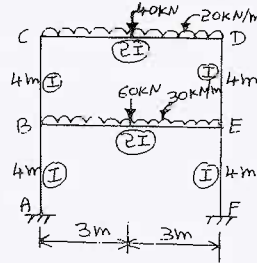


Fig.Q6

(16 Marks)

Module-4

- 7 Analyze the continuous beam as shown in Fig.Q7 by flexibility matrix method with system approach and also determine its bending moment diagram.

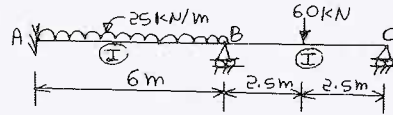


Fig.Q7

(16 Marks)

OR

- 8 Analyze the mill bent as shown in Fig.Q8 by flexibility matrix method with system approach and also determine its bending moment diagram.

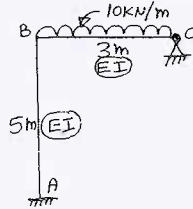


Fig.Q8

(16 Marks)

Module-5

- 9 Analyze the rigid jointed frame as shown in Fig.Q9 by stiffness matrix method with system approach and also determine its bending moment diagram.

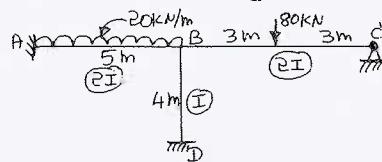


Fig.Q9

(16 Marks)

OR

- 10 Analyze the truss joint as shown in Fig.Q10 by stiffness matrix method with system approach and also tabulate the member forces. Cross section area of all members are 1000 mm^2 and $E = 2 \times 10^5 \text{ N/mm}^2$.

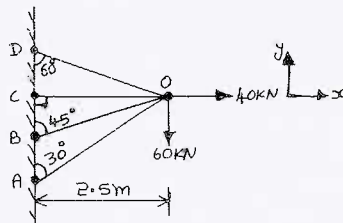


Fig.Q10

(16 Marks)

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15CV53

Fifth Semester B.E. Degree Examination, June/July 2018 Applied Geotechnical Engineering

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

- 1 a. What is subsurface exploration? What are objectives of soil exploration? (08 Marks)
b. What are Geophysical methods? Explain seismic refraction method with neat sketch. (08 Marks)

OR

- 2 a. List and explain different types of samplers used in soil sampling. (08 Marks)
b. What are the methods available for dewatering? Explain dewatering by well point system. (08 Marks)

Module-2

- 3 a. Derive the expressions for vertical stress and shear by using Boussinesq's theory. Also write expression for Westerguard's theory. (08 Marks)
b. What is Newmark's influence chart and also describe construction procedure for Newmark's influence chart. (08 Marks)

OR

- 4 a. What are the types of settlement? Explain them with equations. (08 Marks)
b. A soft, normally consolidated clay layer 18 m thick. The natural water content, saturated unit weights specific gravity and liquid limit are 45%, 18 kN/m³, 2.70 and 63% respectively. The vertical stress increment at centre of the layer due to the foundation load is 9 kN/m². The ground water level is at the surface of the clay layer. Determine the settlement of the foundation. (08 Marks)

Module-3

- 5 a. Define with neat sketch At rest, Active and Passive earth pressure. (06 Marks)
b. A retaining wall, 8 m high with a smooth vertical back, retains a clay backfill with $C' = 15 \text{ kN/m}^2$, $\phi' = 15^\circ$ and $\gamma = 18 \text{ kN/m}^3$. Calculate the total active thrust on the wall assuming that tension cracks may develop to the full theoretical depth. (10 Marks)

OR

- 6 a. Explain the causes for slope failure and also list the type of slope failures. (08 Marks)
b. A 7m deep canal has side slope of 1:1. The properties of soil are $C_u = 20 \text{ kN/m}^2$, $\phi_u = 15^\circ$, $e = 0.9$ and $G = 2.75$. If Taylor's stability number is 0.108, determine the factor of safety with respect to cohesion when canal runs full. Also find the factor of safety in case of sudden draw down, if the Taylor's stability number for this condition is 0.137. (08 Marks)

Module-4

- 7 a. Write a note on standard penetration test and its corrections. (08 Marks)
b. Define safe bearing capacity, safe bearing pressure and allowable bearing pressure and also write expressions for the same. (08 Marks)

OR

- 8 a. Discuss the effect of ground water table on bearing capacity of soil. (08 Marks)
- b. A square footing $2.5\text{m} \times 2.5\text{m}$ is built on homogenous bed of sand of density 19 kN/m^3 and having an angle of shearing resistance of 36° . The depth of foundation is 1.5m below ground surface. Calculate safe load that can be applied on the footing with factor of safety 3. Take bearing capacity factors as $N_c = 27$, $N_q = 30$ and $N_\gamma = 35$. (08 Marks)

Module-5

- 9 a. Explain the types of piles and also mention their uses. (08 Marks)
- b. 200 mm diameter, 8 m long piles are used as foundation for column in a uniform deposit of medium clay ($q_u = 100\text{ kN/m}^2$). The spacing between the piles is 500mm . There are 9 piles in the ground arranged in a square pattern. Calculate the ultimate pile load capacity of the group. Assume adhesion factor = 0.9 . (08 Marks)

OR

- 10 Write short notes on :
- a. Piles in granular soils (04 Marks)
- b. Settlement of pile group (04 Marks)
- c. Negative skin friction (04 Marks)
- d. Pile load tests. (04 Marks)

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10CV/CT52

Fifth Semester B.E. Degree Examination, June/July 2018
Design of RCC Structural Elements

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART – A

- 1 a. Enlist the reasons for adopting partial safety factors for loads and material strength. (05 Marks)
 b. Briefly explain singly and doubly reinforced RCC beam. Enlist the situations where doubly reinforced RCC beam adaptation required. (05 Marks)
 c. A singly RCC beam of dimensions 230×500 mm overall, simply supported over a span of 5 m (effective). The beam consists of 4 # 16mm diameter bars in tension zone use M₂₀ and Fe-415 grade. Calculate the UDL the beam can carry. Take clear cover 25 mm. (10 Marks)
- 2 a. Explain different limit states to be considered in the design of RCC beam and derive the expression for stress block parameter. (10 Marks)
 b. Determine the moment of resistance of the T-beam having following section properties:
 Effective width of flange = 1100 mm Thickness of flange = 110 mm
 Width of rib = 250 mm Effective depth = 450 mm
 Area of steel = 5 # 20 mm diameter.
 Use M-25 grade concrete and Fe-415 grade steel. (10 Marks)
- 3 a. Explain short term and long term deflections. (06 Marks)
 b. A simply supported RCC beam of size 300 × 600 mm carries a udl live load of 250 kN/m and superimposed dead load 12 kN/m over an effective span of 5 m. It is reinforced with 4#16 mm diameter bars. The effective cover is 50 mm. calculate the short term and long term deflection of beam $t_{cs} = 0.003$ and creep coefficient = 1.6. (14 Marks)
- 4 Design a RCC beam of section 230 × 600mm effective span of the beam is 6m, effective cover is 50mm. Imposed load is 30 kN/m. Use M-20 grade concrete and Fe-415 grade steel. Sketch the details of reinforcement.

Strain	Stress (N/mm ²)
0.00276	351.8
0.00280	360.9

(20 Marks)

PART – B

- 5 a. Explain briefly one way and two way slab. (04 Marks)
 b. Design a corner rectangular slab panel of size 4m × 5.5m. Assume that slab supports an imposed load of 3 kN/m² and floor finish 1 kN/m². The slab is subjected to moderate exposure condition and is made of M-25 grade concrete. Fe-415 grade steel. Wall support is 230 mm. (16 Marks)

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- 6 a. Enlist the functions of longitudinal and lateral reinforcement in columns. (05 Marks)
b. Design the reinforcement in a column of size 400mm × 500mm subjected to an axial load of 2000 kN. The column has unsupported length of 3.3m and is held in position at both the ends, restrained against rotation at one end. Use M-25 grade concrete and Fe-415 grade steel. (15 Marks)
- 7 Design a footing for a column of size 300mm × 300mm, carrying a load of 1200 kN. Take SBC of soil as 180 kN/m². Use M₂₀ grade concrete and Fe-415 grade steel. Sketch the reinforcement details. (20 Marks)
- 8 Design a waist slab type dog legged staircase for an office building given the following data:
Clear dimensions of room = 2.6 m × 4.75 m
Height of floor = 3.2 m
Rise = 160 mm, Tread = 250 mm
Width of flight = 1.25 m
Use M-20 grade concrete and Fe-415 grade steel. Landing slab spans in the same direction of the staircase. Assume wall thickness 230 mm. Take live load = 3 kN/m² and floor finish = 1 kN/m². (20 Marks)

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PART – B

- 5 Analyse the continuous beam shown in Fig.Q5 by Kani's method. Draw Bending Moment Diagram, Shear Force Diagram and Elastic Curve. (20 Marks)

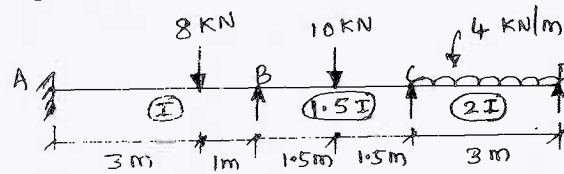


Fig.Q5

- 6 Analyse the continuous beam shown in Fig.Q6 by flexibility matrix method. Draw Bending Moment Diagram and elastic curve. (20 Marks)

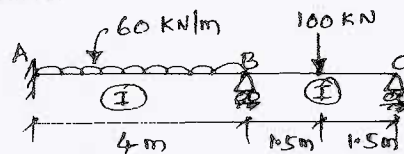


Fig.Q6

- 7 Using stiffness matrix method, analyse the frame shown in Fig.Q7. Draw bending moment diagram. Take EI constant throughout. (20 Marks)

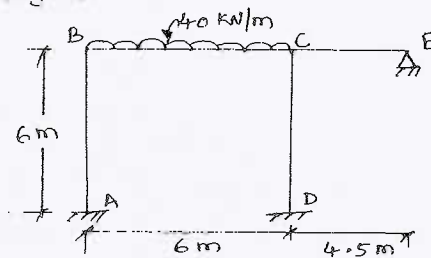


Fig.Q7

- 8 a. Explain :
 (i) Degree of freedom (ii) Free vibration (iii) Natural frequency
 (iii) Forced vibration (v) Damping. (10 Marks)
- b. Determine the natural frequency, cyclic frequency and period of oscillation for the spring mass system with mass 10 kg and stiffness 1000 N/m. If the system is given an initial displacement of 0.1m and an initial velocity of 0.2 m/s. Obtain the equation of motion. Also find displacement, velocity and acceleration after 0.2 sec. (10 Marks)

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10CV54

Fifth Semester B.E. Degree Examination, June/July 2018
Geotechnical Engineering – I

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer FIVE full questions, selecting at least TWO full questions from each part.
2. Assume missing data suitably, if any.

PART – A

- 1 a. Derive the following with usual notation.

$$\gamma_{sat} = \frac{\gamma_w (G + e)}{1 + e} \quad (06 \text{ Marks})$$

- b. Define: i) Void ratio ii) Porosity iii) Water content iv) Specific gravity. (04 Marks)
 c. A moist soil sample has a weight of 6.33 N and volume of $3 \times 10^5 \text{ mm}^3$ at a water content of 11%. Taking specific gravity as 2.68. Find void ratio, air content (n_a) degree of saturation. Also determine water content at which soil gets saturated. What will be the unit weight at saturation? (10 Marks)

- 2 a. What is consistency of soil? List and define various consistency limits. (06 Marks)
 b. List the different methods to determine water content of soil and explain any one method. (06 Marks)
 c. The results obtained from a liquid limit test on a day sample is as follows. The plastic limit is 13% and natural water content of the soil is 45%.

Number of blows	38	34	20	12
Water content, percent	16	17	20	22

Plot the flow curve and determine:

- i) Liquid limit
 ii) Flow index plasticity index
 iii) Toughness index
 iv) Liquidity index. (08 Marks)

- 3 a. Mention three different clay minerals commonly present in soils. Explain their structure with neat sketches. (06 Marks)
 b. Explain BIS classification of soil system. (06 Marks)
 c. An oven dried sample of 50g passing through 75 micron sieve is taken for hydrometer analysis. The corrected hydrometer reading in 1000ml soil suspension at 2 mins elapse time interval is 25. The effective depth corresponding to $R_h = 25$ is $U_c = 121 \text{ mm}$. Taking $G = 2.7$ and viscosity as 0.01 poise calculate the diameter and percent finer. (08 Marks)

- 4 a. Briefly explain variable head permeameter test and derive the expression to determine coefficient of permeability. (06 Marks)
 b. List and explain the factors effecting the permeability. (06 Marks)
 c. On a falling head permeameter the soil sample is having a length of 180mm and $22 \times 10^{-4} \text{ m}^2$. Calculate the time required for a head drop of 250 to 100mm if the cross sectional area of the stand pipe is $2 \times 10^{-1} \text{ m}^2$. The soil sample is heterogeneous having coefficient of permeabilities $30 \times 10^{-7} \text{ m/s}$ for first 60mm, $4 \times 10^{-6} \text{ m/s}$ in second 60mm and $6 \times 10^{-6} \text{ m/s}$ for last 60mm thickness. Assume flow taking place perpendicular to the bedding plane. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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PART – B

- 5 a. Explain Mohr-Coulomb's failure theory of soils. (06 Marks)
 b. List and explain various shear tests based on drainage conditions. (06 Marks)
 c. A direct shear test conducted on a soil sample and following results are obtained. The size of the shear box is 60mm × 60mm.

	1	2	3
Normal load, (N)	360	720	1080
Shear load, (N)	268	432	576

- Determine shear parameters of soil. Mark failure plane for any one of failure point on a Mohr's circle and obtain principal stress and planes. (08 Marks)
- 6 a. List and explain the factors affecting the compaction of soils. (06 Marks)
 b. Differentiate between light and heavy compaction tests. (06 Marks)
 c. A standar proctor test is carried out and results are as follows:
- | | | | | | | | |
|-------------------------------------|----|----|------|------|----|------|------|
| Bulk unit weight, kN/m ³ | 18 | 19 | 19.9 | 20.8 | 21 | 20.5 | 20.1 |
| Water content, percent | 9 | 11 | 13 | 15 | 16 | 17 | 18 |
- i) Plot the compaction and determine maximum dry density and optimum moisture content.
 ii) Also plot zero air void line and 10% air void line if the specific gravity of soil solids is 2.60. (08 Marks)
- 7 a. Explain theory of consolidation with spring analogy concept. (06 Marks)
 b. Explain different types of deposits based on consolidation theory. (06 Marks)
 c. Define the following terms:
 i) Coefficient of compressibility.
 ii) Coefficient of volume change.
 iii) Coefficient of compression index. (08 Marks)
- 8 a. Explain tri axial shear test with a neat sketch. (06 Marks)
 b. List and explain the advantages and limitations of direct shear tests. (06 Marks)
 c. A footing 3.6m × 3.6m for a watch tower carries a load of 90kN and rests on dense sand of 9.0 m thickness overlaying a clay layer of 3.0 m depth. The depth of foundation is 1.5m. The clay layer overlies hard rock. The liquid limit of clay is 54percent, void ratio as 1-08. The saturated unit weights of sand and clay are 18.5 kN/m³ and 17.5 kN/m³ respectively. Assume the load distribution as 2V to 1H. Also the site is flooded. Determine the ultimate settlement of clay layer due consolidation. (08 Marks)

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10CV55

Fifth Semester B.E. Degree Examination, June/July 2018
Hydrology and Irrigation Engineering

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART - A

- 1
 - a. Explain the different methods of determining the average rainfall over a catchment due to storm. Discuss with merits and demerits of the methods. (10 Marks)
 - b. The normal annual rainfall at rain gauge stations A, B, C and D in a basin are 80.97, 67.59, 76.28 and 92.01 cm respectively. In the year 1985 the station D was in operative and the stations A, B and C recorded annual precipitation of 91.11, 72.23, 79.89cm respectively. Estimate the rainfall at station 'D' in that year. (05 Marks)
 - c. List out the applications of Hydrology in Engineering. (05 Marks)
- 2
 - a. Discuss the factors that affect the evaporation from a water body. (06 Marks)
 - b. Describe ISI standard evaporation pan, with a neat sketch. (08 Marks)
 - c. The total observed runoff volume during a 6 hour storm with a uniform intensity of 1.5cm/hour is $21.6 \times 10^6 \text{ m}^3$. If the area of the basin is 300km^2 . Find the average infiltration rate of the basin. (06 Marks)
- 3
 - a. Define Hydrograph and Unit Hydrograph and describe the step by step procedure of the derivation of a unit hydrograph from an isolated storm. (10 Marks)
 - b. Given the ordinates of a 4-h unit hydrograph as below derive the ordinates of a 12-h unit Hydrograph for the catchment. (10 Marks)

Time (h)	0	4	8	12	16	20	24	28	32	36	40	44
UHG -4h	0	20	80	130	150	130	90	52	27	15	5	0

- 4
 - a. What are the methods of estimating design flood? What are their limitations? (08 Marks)
 - b. Define Flood Routing. What are the uses of flood routing? (06 Marks)
 - c. A culvert is proposed across a stream drainage an area of 185 hectares. The catchment as a slope of 0.004 and the length of travel for water is 1150m, estimate the 25 year flood of the rainfall is given by

$$I = \frac{1000T_r^{0.2}}{(t + 20)^{0.7}}$$

Where I is in mm/hour, T_r is in years and 't' is in minutes. Assume runoff co-efficient of 0.35. (06 Marks)

PART - B

- 5
 - a. What is the necessity of Irrigation? Discuss in brief the merits and demerits of Irrigation. (10 Marks)
 - b. Compare Surface and Subsurface irrigation. (05 Marks)
 - c. Write a note on Border strip method of irrigation, with neat sketch. (05 Marks)
- 6
 - a. Write a note on the following : i) Saturation capacity ii) Field capacity iii) Wilting point iv) Ready available moisture v) Frequency of irrigation. (10 Marks)

1 of 2

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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- b. A loam soil as field capacity of 22% and wilting co-efficient of 10%. The dry unit weight of soil is 1.5gm/cc. If the root zone depth is 70cm, determine the storage capacity of the soil. Irrigation water is applied when moisture content falls to 14%. If the water application efficiency is 75%, determine the water depth required to be applied in the field. (10 Marks)
- 7 a. Explain the terms 'Duty', 'Delta' and Base period of a crop and derive an relationship between them. (06 Marks)
b. What are the methods of assessment of irrigation water and why it is essential? (06 Marks)
c. A water course as C.C.A of 2600 hectares out of which the intensities of irrigation for perennial sugarcane and rice crops are 20% and 40% respectively. The duty for these crops at the head of water course are 750 hectares/cumec and 1800 hectares/cumec. Find the discharge required at the head of water course if the peak demand is 20% of the average requirement. (08 Marks)
- 8 a. Define Canal and explain various types of canals classified. (10 Marks)
b. Explain how would you design the channel using Kennedy's theory for a channel of given discharge (Q), Rugosity(N) , CVR (m) and bed width – depth ratio (B/D). (10 Marks)

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15CV61

Sixth Semester B.E. Degree Examination, June/July 2018 Construction Management and Entrepreneurship

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

- 1 a. Define Construction management. Explain the objectives of construction management. (08 Marks)
b. What are the functions of management? Explain any two of them. (08 Marks)

OR

- 2 a. What is construction planning? List the objectives of construction planning. (06 Marks)
b. Explain Bar chart or Gantt chart. Write its limitations. (04 Marks)
c. Draw the network for the project based on the following data of events:
Find Early start time, Early finish time, Late finish time, and determine the least number of days required to complete the work. Draw the critical path.

Event	Duration (Days)	Preceders
A	2	-
B	4	-
C	1	A
D	6	B
E	7	C, D

(06 Marks)

Module-2

- 3 a. Explain the importance of resource management in the construction of a project. (08 Marks)
b. Explain (i) Minimum wages act 1948 (ii) Labour production rate of productivity. (08 Marks)

OR

- 4 a. Explain the advantages of utilization of construction equipments in construction field. List the various classifications of equipments. (08 Marks)
b. Describe material management and objectives of material management. (08 Marks)

Module-3

- 5 a. Define quality. Describe quality control and quality assurance. (08 Marks)
b. Explain the importance of safety in construction. Explain the safety measures during (i) Excavation (ii) Drilling and blasting (08 Marks)

OR

- 6 a. Describe the safety insurance. Explain constructors all risk insurance. (08 Marks)
b. Differentiate between morals and values. (04 Marks)
c. List the professional rights. (04 Marks)

Module-4

- 7 a. What is economics? List the goals of economics. (08 Marks)
b. Differentiate between Microeconomics and Macroeconomics. (08 Marks)

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OR

- 8 a. Explain : (i) Time value of money (ii) Simple interest (iii) Compound interest. (10 Marks)
b. Mr. X is planning to build his own house. He plans to deposit Rs. 40,000/- every year for next 10 years in a bank. The bank gives 12% interest rate compound annually. Find the maturity value of his account after 10 year. (06 Marks)

Module-5

- 9 a. Explain in brief the role of entrepreneurship in economic development. (08 Marks)
b. What do you mean by small-scale industry? List the characteristics of small scale industries. (08 Marks)

OR

- 10 a. What is business plan? Explain the importance of business plan. (08 Marks)
b. Explain in detail the contents of a good project report. (08 Marks)

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15CV62

Sixth Semester B.E. Degree Examination, June/July 2018 Design of Steel Structural Elements

Time: 3 hrs.

Max. Marks: 80

- Note: 1. Answer any FIVE full questions, choosing one full question from each module.
2. Use of IS:800-2007, SP(6)-I or Steel table is permitted.*

Module-1

- What are the advantages and disadvantages of steel structures? (08 Marks)
 - What are rolled steel sections? Mention any six shapes used as structural elements with sketches. (08 Marks)

OR

- Identify plastic hinge distance 'X' is $0.414l$ from the simple support of a propped cantilever beam supporting a UDL of w kN/m over the entire span. (08 Marks)
 - Analyse the continuous beam ABC subjected to working loads shown in Fig.Q2(b) and determine the maximum plastic moment. Take load factor of 1.85. (08 Marks)

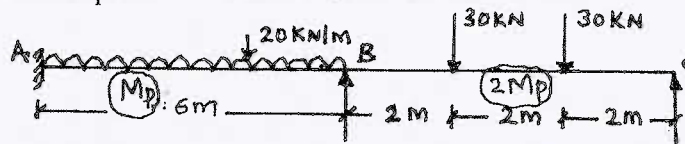


Fig.Q2(b)

Module-2

- What are HSFG bolts? What are the advantages of HSFG bolts? (06 Marks)
 - Design a bolted connection for a lap joint of plate thickness 10 mm and 12 mm to carry a factored load of 150 kN. Use M_{16} and 4.6 grade bolt. Assume the bolts as fully threaded. (10 Marks)

OR

- What are the advantages and disadvantages of welded connections? (08 Marks)
 - 18 mm thick plate is joined to a 16 mm thick plate by 200 mm (Effective) butt weld. Determine the strength of joint if, (i) A double V-butt weld is used (ii) A single V-butt weld is used. Take $f_u = 410 \text{ N/mm}^2$ and $\gamma_{mw} = 1.25$. (08 Marks)

Module-3

- Explain Laced and Battened columns with sketches. (06 Marks)
 - Determine the design strength of a column section ISHB 350@67 kg/m. The column is 3m height with one end fixed and other end hinged. Take $f_y = 250 \text{ N/mm}^2$. (10 Marks)

OR

- Design a compression member using double channel section (2ISLC300@33.1 kg/m) face to face to carry a factored load of 1600 kN. The length of the column is 5 m with one end fixed and one end hinged. Assume M_{18} bolts and $f_{cd} = 200 \text{ N/mm}^2$. Also design single lacing system. (16 Marks)

Module-4

- 7 a. What is lug angle? Explain briefly with sketch. (04 Marks)
b. A single unequal angle ISA 100×75×6 mm is connected to 10 mm thick gusset plate with six 16 mm ϕ bolts to transfer tension. Determine design tensile strength if longer legs are connected to gusset. Assume pitch and edge distance of 40 mm each. (12 Marks)

OR

- 8 a. Briefly explain types of column bases. (04 Marks)
b. Design a slab base for a column ISHB 300@58.8 kg/m subjected to a service load of 1500 kN. The grade of concrete for pedestal is M₂₀ and SBC of soil is 180 kN/m². Design slab base and concrete base with welded connection. (12 Marks)

Module-5

- 9 A floor of hall measuring 9m × 21m is of 150 mm thick R.C. slab supported on steel beams [I section] spaced at 3.5 m c/c. The finishing load of floor is 1.5 kN/m² and live load is 3 kN/m². Design the steel beam and apply the necessary checks. Assume self weight of beam = 1 kN/m and thickness of wall = 0.3 m. (16 Marks)

OR

- 10 Simply supported beam ISMB 350@52.4 kg/m is used over a span of 5 m. The beam carries an Udl live load of 20 kN/m and dead load 15 kN/m. The beam is laterally supported throughout check the safety of the beam. (16 Marks)

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CBCS Scheme

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15CV63

Sixth Semester B.E. Degree Examination, June/July 2018 Highway Engineering

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

- 1 a. Explain the various characteristics of road transport. (08 Marks)
- b. What are the significant recommendations of Jayakar committee report? Explain how it is implemented in the road development of a country. (08 Marks)

OR

- 2 a. Briefly explain about planning surveys for a highway project. (08 Marks)
- b. The area of a district is 13400 sq km and there are 12 towns as per 1981 census. Determine the length of different categories of roads to be provided in the district by the year 2001. Assume over all density of road length is 82 km per 100 sq km area. (08 Marks)

Module-2

- 3 a. Explain with sketches the various factors controlling the alignment of a road. (08 Marks)
- b. What are the objectives of preliminary survey for highway alignment? Enumerate the details to be collected and the various steps to be followed in the conventional method. (08 Marks)

OR

- 4 a. Derive an expression for finding the extra widening required on horizontal curve. (08 Marks)
- b. The speeds of overtaking and over taken vehicles are 70 kmph and 40 kmph respectively on a two way traffic road. The average acceleration during overtaking may be assumed as 0.99 m/sec^2 . Calculate safe overtaking sight distance and show the details of overtaking zone with sketch. (08 Marks)

Module-3

- 5 a. What are the desirable properties of sub grade soil? Enumerate the identification and classification tests of soils. (08 Marks)
- b. Design a flexible pavement for a two lane undivided carriage way using the following data: Design CBR value of subgrade 5.0% initial traffic on completion of construction is 300 C.V/day. Average growth rate is 6.0% per year. Design life is 10 years VDF value is 2.5. Lane distribution factor is 0.75. (08 Marks)

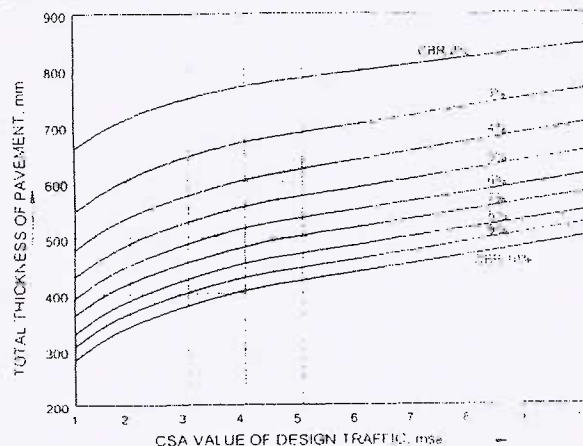


Fig.5(b) CBR design chart for determination of total pavement thickness for traffic with CSA of 1.0 to 10 msa.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

OR

- 6 a. What are the desirable properties of road aggregates? What tests are conducted for judging the desirable properties? Mention the significance of each test. (08 Marks)
- b. A plate load test was conducted on a soaked sub grade during monsoon using a plate diameter of 30cm. The load values corresponding to the mean settlement dial readings are given below. Determine the modulus of sub grade reaction for the standard plate. (08 Marks)

Mean settlement values, mm	0.0	0.24	0.52	0.76	1.02	1.23	1.53	1.76
Load values kg	0.0	460	900	1180	1360	1480	1590	1640

Module-4

- 7 a. What are the desirable properties of Bituminous mixes? Discuss briefly. (08 Marks)
- b. What are the essential requirements of soil properties suitable for the construction of highway sub grade? Explain the method of construction of highway sub grade. (08 Marks)

OR

- 8 a. Explain the method of construction of water Bound Macadam base. (08 Marks)
- b. What are the functions of granular material sub base? Explain the construction method of granular sub base. (08 Marks)

Module-5

- 9 a. Discuss the importance of highway drainage. (08 Marks)
- b. The maximum quantity of water expected in longitudinal drains on clayey soil is $0.9 \text{ m}^3/\text{sec}$. Design the cross section and longitudinal slope of trapezoidal drain assuming the bottom width of the trapezoidal section to be 1.0m and cross slope to be 1.0 vertical to 1.5 horizontal. The allowable velocity of flow in the drain is 1.2 m/sec and Manning's roughness coefficient is 0.02. (08 Marks)

OR

- 10 a. Discuss the various components of quantifiable and non-quantifiable benefits to the road users due to highway development project. (08 Marks)
- b. Calculate the annual cost of a stretch of highway from the following particulars:

Item	Total cost lakhs	Estimated life years	Rate of interest
Land	35.0	100	6%
Earthwork	40.0	40	8%
Bridges, culverts, drainage	50.0	60	8%
Pavement	100.0	15	10%
Traffic signs and road appurtenance	15.0	5	10%

The average cost of maintenance of the road is Rs.1.5 lakhs per year.

(08 Marks)

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CBCS Scheme

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15CV64

Sixth Semester B.E. Degree Examination, June/July 2018 Water Supply and Treatment Engineering

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Enumerate points to be considered for water supply scheme. (08 Marks)
b. What is fire demand? Compute fire demand for a city having population 1,40,000 by various formula. (08 Marks)

OR

- 2 a. What is peaking factor? Explain the factor governing design period. (08 Marks)
b. The population of 5 decades from 1970 to 2010 are given in the table. Find the population after one, two and three decades beyond the last known decade by : i) geometric increase method ii) incremental increase method.

Year	1970	1980	1990	2000	2010
Population	25000	28000	34000	42000	47000

(08 Marks)

Module-2

- 3 a. What is the purpose of analysis of water point out significant of each unit in water treatment? (08 Marks)
b. What is sampling? Explain the steps involved in collection of river water sample. (08 Marks)

OR

- 4 a. Enumerate the necessity of microbiological examination of water. Explain membrane filter technique for bacteriological examination of water. (08 Marks)
b. Write the permissible limits and effects of following water quality parameter according (IS10500 – 1991) i) Turbidity ii) pH iii) Chloride iv) Lead. (08 Marks)

Module-3

- 5 a. Briefly explain mechanism of filtration. (08 Marks)
b. A rectangular settling tank without mechanical equipment is to treat 1.8 million liters per day of raw water. The sedimentation period is to be 4 hours, the velocity of flow 8cm/min and the depth of water and sediment 4.2m. If an allowance of 1.2m for sediments is made. Design the dimension of the tank. (08 Marks)

OR

- 6 a. Briefly explain design elements of a rectangular sedimentation tank. (08 Marks)
b. What are the characteristics of good coagulant? (04 Marks)
c. Explain the causes for Fouling of membrane and how it can be controlled. (04 Marks)

Module-4

- 7 a. What is permanent hardness? With the help of chemical formula explain zeolite process of removing hardness. (08 Marks)
b. Discuss the importance of nano filtration and explain different forms of chlorination. (08 Marks)

OR

- 8 a. Discuss the characteristics of ideal disinfectants and explain the mechanism of disinfection. (08 Marks)
b. Explain reverse osmosis principle with the help of neat sketch. (04 Marks)
c. Enumerate importance of defluoridation. Mention the methods of defluoridation. (04 Marks)

Module-5

- 9 a. Briefly explain economical diameter of raising main. (04 Marks)
b. Mention the points to be considered for selection of a site for intake structure. (04 Marks)
c. A city has a population of 1,50,000 water is to be supplied at the rate of 160 liters per head per day. If the static lift of the pump is 40 meters. Calculate the B.H.P of motor. The raising main is 300m long and its diameter is 50cm. Assume that motor efficiency is 85%. Pump efficiency is 60% $f = 0.04$ and peak hour demand is 1.5 times of average demand. (08 Marks)

OR

- 10 Briefly explain the following :
a. Sluice valve
b. Reflux valve
c. Post fire hydrant
d. Air valve. (16 Marks)

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CBCS SCHEME

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15CV651

Sixth Semester B.E. Degree Examination, June/July 2018 Solid Waste Management

Time: 3 hrs.

Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing one full question from each module.
2. Missing data if any, may be suitably assumed.

Module-1

- 1 a. Briefly explain physical and chemical characteristics of solid waste. (10 Marks)
 b. From the following data estimate the waste generation rate per day for a residential area consisting of 1200 houses. The observation location is a local transfer station that receives all the waste collected for disposal. The observation period is for one week. Assume 5 persons in each house. (06 Marks)

Vehicle type	No. of loads	Vol. of vehicle (m ³)	Sp. Wt. of solid waste (kg/m ³)
Compactor truck	10	15.30	296.50
Flat bed load	08	1.53	133.40
Private cars/trucks	25	0.23	88.90

OR

- 2 a. With a neat sketch, explain the operational sequence of Hauled Container System. (08 Marks)
 b. Estimate the moisture content, bulk density and energy content of 1000kg sample of solid waste with the following composition. Also estimate energy content on dry weight basis and on ash free dry basis. Take ash content as 7 percent. (08 Marks)

Component	Food waste	Paper	Cardboard	Plastics	Wood
% by mass	45	5	15	15	20
Moisture %	70	6	5	2	20
Bulk density kg/m ³	290	85	50	65	240
Energy content kJ/kg	4650	16750	16300	32600	18600

Module-2

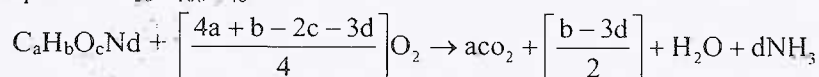
- 3 a. Explain with a neat sketch, working of a municipal incinerator. (08 Marks)
 b. Explain briefly the following processing technique :
 i) Mechanical volume reduction ii) Mechanical size reduction. (08 Marks)

OR

- 4 a. Explain briefly the following component separation techniques :
 i) Magnetic separation ii) Air separation. (08 Marks)
 b. Write a short note on following :
 i) Garbage chutes ii) Bailing and Compaction. (08 Marks)

Module-3

- 5 a. Explain the factors that governs the selection of site for sanitary land filling. (08 Marks)
 b. Determine the amount of air required to oxidize one tone of waste having the chemical equation C₅₀H₁₀₀O₄₀N. (08 Marks)



1 of 2

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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OR

- 6 a. Explain with neat sketch, Indore process and Bangalore process of composting of municipal solid waste. (08 Marks)
- b. Determine the landfill area required for municipality with population 50,000. given that,
- i) Solid waste generation rate = 450 gm/person/day. (08 Marks)
 - ii) Compacted density of landfill = 504 kg/m^3 .
 - iii) Avg. depth of compacted solid work = 5mt.

Module-4

- 7 a. Define Hazardous waste. Explain briefly about collection and disposal of hazardous waste. (08 Marks)
- b. Explain the characteristics of Bio – medical waste and its disposal method. (08 Marks)

OR

- 8 a. Briefly explain about E – Waste and its environmental significance. (08 Marks)
- b. Explain briefly about reuse of construction and demolition waste in Construction Industry. (08 Marks)

Module-5

- 9 a. What are 3Ts of incineration process? Explain briefly. (08 Marks)
- b. Define Pyrolysis. Briefly explain about process of Pyrolysis. (08 Marks)

OR

- 10 a. Explain with a flow diagram, energy recovery system from solid waste. (08 Marks)
- b. Define Incineration. Explain briefly about air pollution control methods adopted in an incineration process. (08 Marks)

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CBCS SCHEME

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15CV653

Sixth Semester B.E. Degree Examination, June/July 2018 Alternative Building Materials

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

- 1 a. Explain the concept of energy embodied in building materials. (08 Marks)
b. Explain the role of construction industry in global warming. (08 Marks)

OR

- 2 a. List out the various environmental friendly and cost effective building technologies. Explain any one in brief. (08 Marks)
b. What are the advantages of LEED? List out the five main credit categories in LEED rating system. (08 Marks)

Module-2

- 3 a. Write a note on : (i) Fal-G blocks (ii) Laterite blocks. (08 Marks)
b. List and explain the properties of Good mortar. (08 Marks)

OR

- 4 a. Explain the method of manufacturing stabilized mud blocks. (08 Marks)
b. A brick masonry prism is made up of 6 bricks joined by mortar of thickness 2 cms. The brick is 8 cm is thickness. The prism is subjected to a uniform vertical stress of 5 MPa. The brick has a modulus of 800 MPa and the mortar has a modulus of 9000 MPa. Determine the horizontal lateral stress in brick and mortar. Assume the Poisson's ratio of brick and mortar = 0.1 (08 Marks)

Module-3

- 5 a. Write the properties and uses of lime Pozzolana cement. (08 Marks)
b. List out the different methods employed in manufacturing of FRP and explain any one in brief. (08 Marks)

OR

- 6 a. List out the different agro and industrial wastes. Explain their use as a building material. (08 Marks)
b. Explain the applications of FRP composites. (08 Marks)

Module-4

- 7 a. List out the advantages and disadvantages of Mivan Construction Techniques. (08 Marks)
b. Explain the process of constructing masonry domes and vaults. (08 Marks)

OR

- 8 a. What are the materials used in ferro cement? Explain its construction methods in brief. (08 Marks)
b. What are the primary functions of a roof? Explain briefly the various roofing alternatives. (08 Marks)

Module-5

- 9 a. What are the advantages and disadvantages of manufacturing concrete from RMC plants?
(08 Marks)
- b. What is the meaning of precast elements? What are the advantages of precast concrete?
(08 Marks)

OR

- 10 a. Write a note on :
(i) Types of concrete mixer
(ii) Cost concept in building. (08 Marks)
- b. What are the equipments used for producing stabilized blocks? Explain them in brief.
(08 Marks)

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CBCS SCHEME

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15CV661

Sixth Semester B.E. Degree Examination, June/July 2018 Water Resources Management

Time: 3 hrs.

Max. Marks: 80

Note: Answer FIVE full questions, choosing one full question from each module.

Module-1

- 1 a. With a sketch, explain hydrologic cycle. (08 Marks)
b. Give a summary on global water resources and Indian water resources. (08 Marks)

OR

- 2 a. With a sketch, explain confined and un-confined aquifer. (08 Marks)
b. What is water scarcity? Summarize the contributing factors of water scarcity. (08 Marks)

Module-2

- 3 a. Explain the necessity of water resources planning and management. (08 Marks)
b. Explain the spatial and temporal scales of planning and management. (08 Marks)

OR

- 4 a. With a typical analytical frame work for water resources management studies, explain inception, development and selection phases. (08 Marks)
b. Summarize the questions addressed in adaptive integrated policy an activities of water resources planning and management. (08 Marks)

Module-3

- 5 a. With a sketch showing the components, explain the principles of integrated water resources management (IWRM). (08 Marks)
b. Explain the guiding principles : Dublin statement and Rio declaration of integrated water resources management. (08 Marks)

OR

- 6 a. With a figure of three pillars: Economic efficiency, equity and environmental sustainability, explain the implementation process of IWRM. (08 Marks)
b. Summarize the sectors benefited by IWRM. (08 Marks)

Module-4

- 7 a. Explain the existing legal framework and constitutional provisions for water in India. (08 Marks)
b. Explain the various deficiencies in the existing legal framework of water resources development in India. (08 Marks)

OR

- 8 a. Summarize the salient features of Indian National Water Policy 2012. (08 Marks)
b. Summarize the scope of Water User's Association (WUA) and list it's functions. (08 Marks)

Module-5

- 9 a. What is rainwater harvesting? Explain the needs for rainwater harvesting. (08 Marks)
b. Explain the different types of lining done to control seepage in Ponds. (08 Marks)

OR

- 10 a. What is Percolation tank? Describe the general guidelines to be followed in proposing a percolation tank. (08 Marks)
b. Briefly explain the various techniques of rain water harvesting in urban area. (08 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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10AL61

14

Sixth Semester B.E. Degree Examination, June/July 2018
Management and Entrepreneurship

Time: 3 hrs.

Max. Marks:100

*Note: Answer FIVE full questions, selecting
atleast TWO questions from each part.*

PART – A

- 1 a. Define management. Explain the characteristics and functional areas of management. (10 Marks)
- b. List the differences between administration and management. (06 Marks)
- c. Discuss the roles of management. (04 Marks)
- 2 a. Define planning. Explain the importance of planning. (05 Marks)
- b. Differentiate between strategic and tactical planning. (05 Marks)
- c. Define decision making? With neat diagram explain the steps involved in decision making. (10 Marks)
- 3 a. What are the types of organization? With a neat diagram explain line and staff organization along with its merits and demerits. (09 Marks)
- b. Briefly explain the types of committees. (04 Marks)
- c. Explain the nature and importance of staffing. (07 Marks)
- 4 a. What is leadership? List the types of leadership styles and briefly explain. (06 Marks)
- b. Discuss the characteristics of motivation. (06 Marks)
- c. Define co-ordination. What are its characteristics? (08 Marks)

PART – B

- 5 a. Explain the characteristics of an entrepreneur. (06 Marks)
- b. Differentiate between intrapreneur and entrepreneur. (06 Marks)
- c. Explain the functions of women entrepreneur. (08 Marks)
- 6 a. Define Small Scale Industry (SSI) and discuss the characteristics and objectives of SSIs. (10 Marks)
- b. Explain the role of SSI in economic development. (05 Marks)
- c. Explain the steps to start a SSI. (05 Marks)
- 7 a. List the central government institutions which support SSI. Explain the functions of National Small Industries Corporation (NSIC). (08 Marks)
- b. Write short notes on :
 - i) DIC[Direct Industries Centre]
 - ii) SISI[Small Industries Development Institutes]
 - iii) SIDO[Small Industries Development Organization]
 - iv) SIDBI[Small Industries Development Bank of India] (12 Marks)
- 8 a. What is the meaning of project? Briefly explain the contents of project report. (10 Marks)
- b. What is network analysis? Explain its importance. (05 Marks)
- c. Write a note on :
 - i) Market feasibility study
 - ii) Technical feasibility study. (05 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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10CV62

Sixth Semester B.E. Degree Examination, June/July 2018
Design and Drawing of RCC Structures

Time: 4 hrs.

Max. Marks:100

Note: 1. Answer any TWO full questions form Part – A
ONE full question from Part –B.
2. Use of IS : 456 – 2000 and SP – 16 is permitted.

PART – A

- 1 A square RCC column and footing has the following details :
 Column size = 300 × 300 mm
 Size of footing = 1.5 M × 1.5 M, thickness of footing 450mm near column face and tapered to 200mm near the edges
 Depth of foundation below ground level = 1M
 Height of column to be shown above ground level = 1M
 Column reinforcement = 8 numbers of 16mm ϕ as main bars with 8mm ϕ @ 150mm c/c lateral ties
 Footing reinforcement = 12 mm ϕ @ 150mm c/c on both ways
 Draw to a suitable scale, the following :
 a. Sectional plan of column and footing
 b. Sectional elevation of column and footing. (20 Marks)

- 2 A rectangular beam of size 230mm × 500mm is continuous over number of columns spaced at 4.5 M c/c. The width of column is 300 mm main reinforcement:
 @ mid span of +ve steel → 4 # 20
 @ support of -ve steel → 4 # 20
 Shear reinforcement : 2L 8 mm ϕ vertical stirrups @ 140mm c/c
 Draw to a suitable scale, the following :
 a. Longitudinal sectional elevation of beam
 b. Cross section of beam @ mid span and end section. (20 Marks)

- 3 A RCC doglegged staircase has the following details :
 Staircase bars size (clear) = 5m × 2.5m
 Floor to floor height = 3.15m
 Rise = 150mm
 Tread = 250mm
 Waist slab thickness = 150mm
 Width of staircase = 1.2m
 Bearing = 230mm
 Main steel = 12mm ϕ @ 150 mm c/c
 Dist. Steel = 10 mm ϕ @ 180 mm c/c
 Two landing beams of size 230mm × 250mm are provided with 2# 12mm ϕ steel @ top and bottom, stirrups : 8mm ϕ @ 200mm c/c.
 Draw to a suitable scale, the following :
 a. Plan
 b. Sectional elevation of two flights. (20 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

PART – B

- 4 Design a RCC cantilever retaining wall to retain the levelled earth embankment 5m high above the ground level. The unit weight of earth is 16 kN/m^3 and its angle of repose is 30° . The S.B.C of soil is 145 kN/m^2 . The co-efficient of friction between soil and concrete is 0.55. Use M20 grade of concrete and steel grade Fe415. (40 Marks)
Draw the following to a suitable scale :
- Sectional elevation of retaining wall showing the details of steel in stem, and base slab. (10 Marks)
 - Longitudinal section for 2m showing reinforcement of stem and base slab. (06 Marks)
 - Plan of base slab through center showing all reinforcements. (04 Marks)
- 5 Design combined footing for two RCC columns A and B, separated by a distance of 4m c/c column A is $500\text{mm} \times 500\text{mm}$ and carries a load of 1250 kN and column B is $600\text{mm} \times 600\text{mm}$ and carrier a load of 1600 kN. Take S.B.C of soil as 200 kN/m^2 . Use M20 grade concrete and Fe415 steel. (40 Marks)
Draw the following to a suitable scale :
- Sectional elevation (10 Marks)
 - Plan of bottom and top reinforcement (05 Marks)
 - c/s at two different places to show the maximum details of reinforcement. (05 Marks)

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10CV63

Sixth Semester B.E. Degree Examination, June/July 2018
Transportation Engineering - II

Time: 3 hrs.

Max. Marks:100

- Note:1. Answer any FIVE full questions, selecting atleast TWO questions from each part.**
2. Draw neat sketches wherever required.
3. Assume any missing data suitably.

PART - A

- 1
 - a. Discuss the factors governing the choice of gauge for a railway track. (06 Marks)
 - b. List the requirements of an ideal rail joint. (06 Marks)
 - c. Draw the cross section of double line BG track in cutting (straight stretch). (08 Marks)

- 2
 - a. Explain the functions of sleepers. (06 Marks)
 - b. List the requirements of a good ballast. (06 Marks)
 - c. Calculate the maximum train load that a BG locomotive with 4 pairs of driving wheels with axle load of 20 tonnes each, can haul along a straight level track at a speed of 80 kmph. Calculate the reduction in speed on an upgradient of 1 in 50. What would be the further reduction in speed along of 3° curve on the upgradient. (08 Marks)

- 3
 - a. Discuss the classification of gradients on Indian Railways indicating the adopted values. (06 Marks)
 - b. Calculate the maximum permissible speed on a 3° BG track if the length of transition curve is 60m and super elevation is 7cm. The maximum values of cant deficiency and speed likely to be sanctioned are 6cm and 70 kmph respectively. (06 Marks)
 - c. On a BG track, a 6° curve diverges in an opposite direction from a 3° main curve. Calculate the allowable speed on the branch line, if the permissible speed on the main line is 65 kmph. (08 Marks)

- 4
 - a. Draw a neat line diagram of a left hand turnout showing all the components. (06 Marks)
 - b. Calculate the elements of a BG turnout of heel divergence is 11.43 cm. Number of crossing is 16 and angle of switch is 1°8' 0". Straight arm distance is 0.9m. (06 Marks)
 - c. Explain the working procedure of automatic block system of controlling the movement of train. (08 Marks)

PART - B

- 5
 - a. List the factors to be considered for an airport site selection. What is a preferential runway? (06 Marks)
 - b. Discuss the functions of the components of an airport. (06 Marks)
 - c. Determine the best direction for orienting the runway for the wind data given. If the permitted deviation of wind from the direction of landing and take - off is 33°.75. Determine the percentage of time in a year during which the runway can be used. (08 Marks)

Wind direction	Duration percent	Wind direction	Duration percent	Wind direction	Duration percent	Wind direction	Duration percent
N	7.3	E	5.7	S	7.4	W	3.9
NNE	8.9	ESE	1.7	SSW	5.9	WNW	1.7
NE	14.6	SE	0.6	SW	10.5	NW	1.2
ENE	10.3	SSE	0.4	WSW	8.3	NNW	0.5

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

- 6 a. List the assumed conditions under which basic runway length is determined. Sketch and explain the normal take – off case of determining the basic runway length. (06 Marks)
- b. An airport is planned at an elevation of 380m above MSL. The monthly mean of average and maximum daily temperature for the hottest month of the year are 28⁰C and 40⁰C respectively. The effective gradient is 0.178 percent. Determine the length of runway required if the basic runway length is 1900m. (06 Marks)
- c. Explain the flight procedure in an I LS with the help of a schematic diagram. (08 Marks)
- 7 a. List the advantages of tunnels over open cuts (06 Marks)
- b. Discuss the features and suitability of the different shapes adopted for tunnel cross - section. (06 Marks)
- c. Discuss the three methods of mechanical ventilation. (08 Marks)
- 8 a. Tabulate the comparisons between mound type and wall type breakwater. (06 Marks)
- b. Enumerate the forces acting on a graving dock. (06 Marks)
- c. Draw a neat layout of an artificial harbor and list the functions of the components. (08 Marks)

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10CV64

Sixth Semester B.E. Degree Examination, June/July 2018
Geo – Technical Engineering - II

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART – A

- 1
 - a. Define Representative and Undisturbed samples. Also explain area ratio with its recommended values. (06 Marks)
 - b. What are the objectives of soil exploration? List and explain any one indirect method of soil exploration. (08 Marks)
 - c. Estimate the position of ground water table from the following data obtained from the field. Depth upto which water is boiled out is 10.67m. Rise in water levels :
On first day 64cm , Second day 57.9cm and Third day 51.8cm. (06 Marks)
- 2
 - a. Write a note on : i) Isobar ii) Contact pressure iii) Newmark's chart. (09 Marks)
 - b. Differentiate between Boussinesq's and Westergards theory of stresses in soils. (04 Marks)
 - c. Plot the vertical pressure at a point center 1m, 2m 4m horizontally away from the axis of loading at a depth of 3m, for a point load of 25kN. Use Boussinesq's equation. (07 Marks)
- 3
 - a. What is Flownet? List the characteristics and use of flownets. (06 Marks)
 - b. For a homogeneous earthen dam 52m height and 2m free board. The flownet has 22 potential lines and 5 flow channels. Calculate discharge per meter length of dam. The coefficient of permeability in X and Y directions are 8×10^{-5} m/s and 3.6×10^{-5} m/s respectively for earthen embankment. (04 Marks)
 - c. An earthen dam has the following details. Top width 8m upstream slope 2.75H:1V and downstream slope 2.5 H:1V. Total height of dam 60m. The height of water stored 57.5m. Downstream filter 120m long. K for dam material 4×10^{-7} m/sec. Draw the phonic line and calculate the discharge through the dam. (10 Marks)
- 4
 - a. List the assumptions made in Rankine's earth pressure theory and explain active earth pressure and passive earth pressure. (06 Marks)
 - b. Explain Cullman's graphical method of finding out the active earth pressure. (06 Marks)
 - c. For retaining wall 8m height supports sandy back fill with $e = 0.6$, $G = 2.65$, $\phi = 30^{\circ}$. Water table is at a depth of 2m from ground surface. Draw active earth pressure diagram and find magnitude and point of application of total earth pressure. Assume soil above water table has a degree of saturation of 50%. (08 Marks)

PART – B

- 5
 - a. Define Finite Slope. What are the causes for failure of slopes? List various types of failure of slopes with sketches. (06 Marks)
 - b. Explain the method of slice to determine the factor of safety against failure of finite slope. (08 Marks)
 - c. An embankment is to be constructed with $C = 20\text{kN/m}^2$, $\phi = 20^{\circ}$, $\gamma = 18\text{kN/m}^3$, $F_s = 1.25$ and $H = 10\text{m}$. Estimate side slope required. Taylor's stability numbers are as follows for the slope number. (06 Marks)

Slope angle	60°	45°	30°	20°
Sn	0.097	0.062	0.025	0.005

Also determine factor of safety if side slope changes to IV : 2H.

1 of 2

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

- 6 a. Write a note on : i) General shear failure ii) Local shear failure iii) Effect of water table on bearing capacity. (09 Marks)
- b. What are the assumptions made on Terzaghi's theory? Write the expressions for ultimate bearing capacity of strip footing, square and circular footing. (05 Marks)
- c. Compute the safe bearing capacity of a square footing $1.5\text{m} \times 1.5\text{m}$ located at a depth of 1m below the ground level in a sandy soil of average density 20kN/m^3 , $\phi = 20^\circ$, $N_c = 17.7$, $N_q = 7.4$, $\gamma = 5$. Take factor of safety = 3 and that the water table is very deep. Also compute the reduction in safe bearing capacity of the footing if the water table rise to the ground level. (06 Marks)
- 7 a. What is the importance of settlement analysis? List remedial measures to be taken against harmful settlement. (06 Marks)
- b. Estimate the immediate settlement of a footing of size $2 \times 3\text{m}$ resting at a depth of 1.5m in a sandy soil whose compression modulus is 10N/mm^2 . Footing transmits a pressure of 200kN/m^2 . Take $\mu = 0.3$ and influence factor as 1.06. (06 Marks)
- c. A soft normally consolidated clay layer is 18m thick. The natural water content is 45%. The saturated unit weight is 18kN/m^3 ; The grain specific gravity is 2.70 and liquid limit is 63%. The vertical stress increment at the centre of the layer due to the foundation load is 9kN/m^2 . The ground water level is at the surface of the clay layer. Determine the settlement of the foundation. (08 Marks)
- 8 a. What are the different types of foundation? And list the factors influencing the choice of foundation. (08 Marks)
- b. Enumerate the factors influencing the selection of depth of foundation. (06 Marks)
- c. With a neat sketch, explain the types of piles classified based on its function. (06 Marks)

CBCS Scheme

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15CV/CT51

Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018

Design of RC Structural Elements

Time: 3 hrs.

Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing one full question from each module.

2. Use of code IS456:2000 and SP-16 is permitted.

Module-1

- 1 a. Explain: (i) Characteristic load; (ii) Characteristic strength; (iii) Partial safety factor. (06 Marks)
- b. What is stress block? Derive from the fundamentals the expressions for the area of stress block $0.36 f_{ck} b x_u$ and depth of centre of compressive force from the extreme fibre in compression $0.42 x_u$. (10 Marks)

OR

- 2 a. Explain: (i) Developmental length of bars; (ii) Short term deflection; (iii) Long term deflection (06 Marks)
- b. A rectangular simply supported beam of span 5 m is 300×650 mm in cross section and is reinforced with 3 bars of 20 mm on tension side at an effective cover of 50 mm. Determine the short deflection due to an imposed working load of 20 kN/m excluding self weight. Assume grade of concrete M20 and steel as Fe415. (10 Marks)

Module-2

- 3 a. Differentiate between under reinforced, over reinforced and balanced section. (06 Marks)
- b. A RCC beam of section $300 \text{ mm} \times 500 \text{ mm}$ is reinforced with 4 bars of 16 mm diameter with an effective cover of 50 mm. The beam is simply supported over a span of 5 m. Find the maximum permissible udl on the beam. Use M20 grade concrete and Fe 500 steel. (10 Marks)

OR

- 4 a. A RCC beam 250 mm wide and 450 mm deep is reinforced with 3 numbers of 20 mm dia bars of grade Fe415, on the tension side with an effective cover of 50 mm. If the shear reinforcement of 2-legged-8 mm dia stirrups at a spacing of 160 mm c/c is provided at a section, determine the design ultimate strength of the section. Assume M20 concrete. (07 Marks)
- b. A T-beam RC floor system consists of 120 mm thick slab supported by beams at 3m c/c. The effective width and depth of web is 300×580 mm as shown in Fig.Q4(b). Main reinforcement consists of 8 bars of 20 mm dia. The grade of concrete and steel used are M20 and Fe415 respectively. Determine the moment of resistance of T-beam, if it is used as simply supported beam of span 3.6 m.

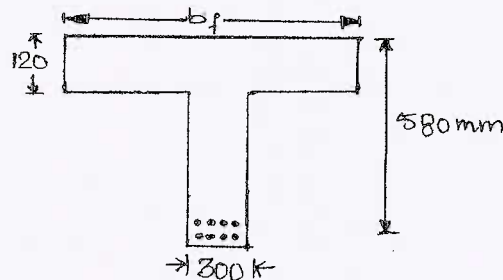


Fig.Q4(b)

(09 Marks)

Module-3

- 5 A rectangular beam is to be simply supported on supports of 230 mm width. The clear span of the beam is 6m. The beam is to have width of 300 mm. The super imposed load is 12 kN/m. Using M20 concrete and Fe415 steel. Design the beam. Apply check for deflection. (16 Marks)

OR

- 6 Design a rectangular beam of section 230 mm × 600 mm of effective span 6m. Effective cover of reinforcement should be kept as 50 mm. Imposed load on the beam is 40 kN/m. Use M20 concrete and Fe 415 steel. (16 Marks)

Module-4

- 7 Design a continuous RC slab for a class room 7m wide and 14 m long. The roof is to be supported on RCC beams spaced at 3.5 m intervals. The width of beam should be kept 230 mm. The super imposed load is 3 kN/m² and finishing load expected is 1 kN/m². Use M20 concrete and Fe415 steel. (16 Marks)

OR

- 8 Design a dog legged stairs for an office building in a room measuring 2.8m * 5.8 m clear. Vertical distance between the floor is 3.6m. Width of flight is to be 1.25 m. Allow a live load of 3 kN/m². Sketch the details of reinforcement. Use M20 concrete and Fe 415 steel. Assume the stairs are supported on 230 mm walls at the end of outer edges of landing slabs. (16 Marks)

Module-5

- 9 A corner column 400 * 400 mm, is subjected to the factored loads $P_u = 1300$ kN, $M_{ux} = 190$ kN-m and $M_{uy} = 110$ kN-m. Design the reinforcement in the column, assuming M25 concrete and Fe 415 steel and effective cover of 60 mm. Assume it as short column. (16 Marks)

OR

- 10 Design a square footing for a short axially loaded column of size 300 mm * 300 mm carrying 600 kN load. Use M20 concrete and Fe415 steel. SBC of soil is 180 kN/m². Sketch the details of reinforcement. (16 Marks)

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10CV52

Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018

Design of RCC Structural Elements

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer FIVE full questions, selecting at least TWO questions from each part.
2. IS: 456 -2000 and SP – 16 is permitted.

PART – A

- 1 Explain the following :
 - a. Partial safety factors for loads and materials. (04 Marks)
 - b. Explain the principles of limit state design. (06 Marks)
 - c. Show that $x_u \text{ limit} = 0.53d$, for Fe250 grade of steel. (04 Marks)
 - d. Explain under reinforces section, over-reinforced section, balance section with a neat sketches. (06 Marks)

- 2 A R.C.C beam of rectangular section $300 \times 600 \text{mm}$ is reinforced with 4 bars of 20mm dia with an effective cover 50mm, effective span of the beam is 6m. Assuming M20 concrete and Fe250 steel. Determine the central concentrated P, that can be carried by the beam in addition to its self weight. (20 Marks)

- 3
 - a. Distinguish between short term and long term deflection in case of R.C structures. Mention the main factors affecting these deflections. (06 Marks)
 - b. A rectangular simply supported beam of span 5m is $300 \text{mm} \times 650 \text{mm}$ in cross section and is reinforced with 3 bars of 20mm on tension side at an effective cover of 50mm. Determine the shaft term defection due to an imposed working load of 20kN/m (excluding self wt). Assume grade of concrete M20 and grade of steel Fe415. (14 Marks)

- 4 A T-Beam slab floor has 125mm thick slab forming part of T – beam which are of 8m clear span. The end bearing are 450mm thick. Spacing of T-beams is 3.5m. The live load on the floor is 3kN/m^2 . Design one of the intermediate beams. Use M20 concrete and Fe415 steel. (20 Marks)

PART – B

- 5 Design a slab for a room of clear dimensions $3 \text{m} \times 5 \text{m}$ supported on wall of 300mm thickness with corners held down. Two adjacent sides of the slab are continuous and other discontinuous. LL on slab is 3kN/m^2 . Assume floor finish of 1kN/m^2 . Use M20 concrete and Fe415 steel. Sketch the details of reinforcement. (20 Marks)

- 6 a. Design the reinforcement for a axially loaded square column of size 450mm \times 450mm to support a load of 1500 kN. Use M20 concrete and Fe415 steel. (10 Marks)
- b. A column size of 300 \times 400mm has effective length of 3.6m and is subjected to $P_u = 1100$ kN, and $M_u = 150$ kN-m, about the major axes. Assume the bars on two side, design the column using M25 concrete and Fe415 steel. (10 Marks)
- 7 Design on Isolated rectangular Footing of uniform depth for the column size of 230mm \times 300mm supporting an axial service load of 850kN. The safe bearing capacity of soil is 150kN/m². Adopt M20 grade concrete and Fe415 grade steel. Sketch the reinforcement details. (20 Marks)
- 8 Design a dog-legged stairs for an building in a room measuring 3.6 \times 5.2m clear. The vertical distance between the Floors is 3.2m. Consider LL 3kN/m². Use M20 concrete and Fe415 grade of steel. Assume stairs are supported on 300mm wall at the outer edges of landing slabs. Consider Rise = 160mm, and Tread = 300mm. (20 Marks)

CBCS Scheme

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15CV52

Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018

Analysis of Indeterminate Structures

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

- 1 Analyze the continuous beam shown in Fig.Q1 by slope deflection method. Draw BMD and EC.

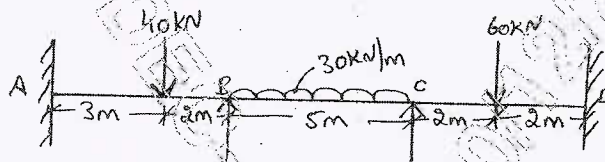


Fig.Q1

(16 Marks)

OR

- 2 Analyze the portal frame shown in Fig.Q2 by slope deflection method. Draw BMD.

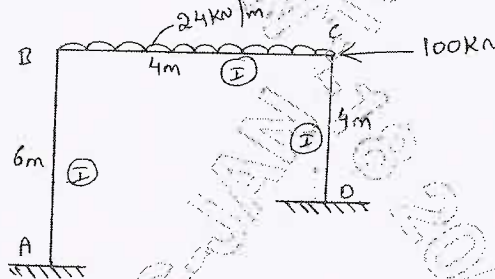


Fig.Q2

(16 Marks)

Module-2

- 3 Analyze the continuous beam by moment distribution method shown in Fig.Q3. The support 'B' sinks by 10 mm. Take $EI = 4000 \text{ kN-m}^2$. Draw BMD and EC.

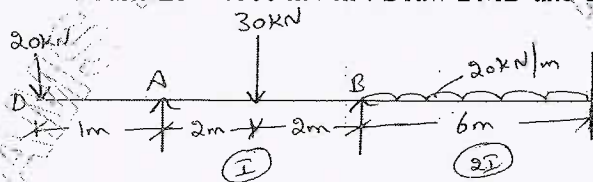


Fig.Q3

(16 Marks)

OR

- 4 Analyze the frame shown in Fig.Q4 by moment distribution method. Draw BMD.

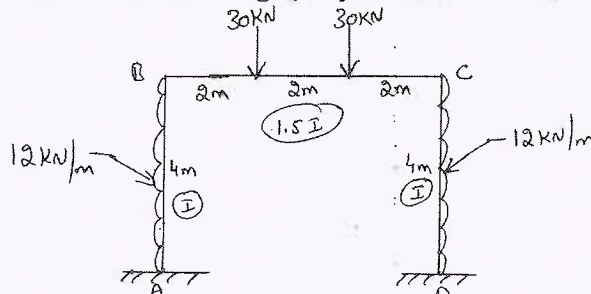


Fig.Q4

(16 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

Module-3

5 Analyze the continuous beam by Kani's method. Shown in Fig.Q5. Draw BMD.

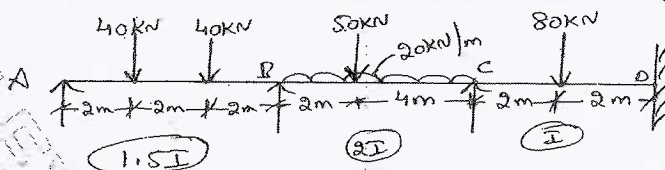


Fig.Q5

(16 Marks)

OR

6 Analyze the frame shown in Fig.Q6 by Kani's method. Draw BMD.

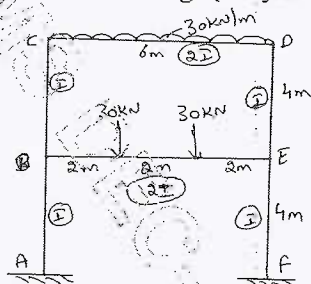


Fig.Q6

(16 Marks)

Module-4

7 Analyze the beam shown by flexibility matrix method. Draw BMD.



Fig.Q7

(16 Marks)

OR

8 Analyze the beam shown in Fig.Q8 by flexibility matrix method. Draw BMD.

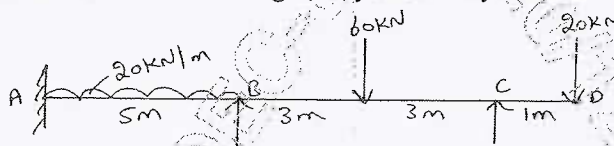


Fig.Q8

(16 Marks)

Module-5

9 Analyze the continuous beam shown in Fig.Q9 by stiffness matrix method. Draw BMD.

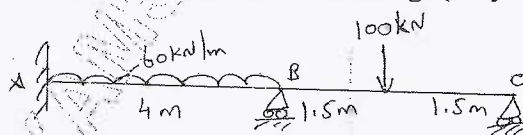


Fig.Q9

(16 Marks)

OR

10 Analyze the portal frame shown in Fig.Q10 by stiffness matrix method. Draw BMD.

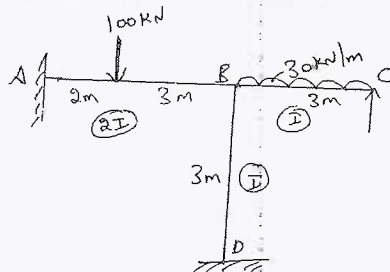


Fig.Q10

(16 Marks)

CBCS Scheme

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15CV53

Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018

Applied Geotechnical Engineering

Time: 3 hrs.

Max. Marks: 80

Note: Answer FIVE full questions, choosing one full question from each module.

Module-1

- 1 a. Describe with neat sketch wash boring technique to explore soil. (08 Marks)
b. The following sizes of sampling tubes are available in market.

Sample No.	I	II	III
Outer Diameter (mm)	75	110	50
Inner Diameter	72	107	35
Length (mm)	600	600	600

Out of these which one would you select for obtaining undistributed Soil sample from a base hole, Apply appropriate technique to get best undisturbed sample. (08 Marks)

OR

- 2 a. Explain with neat sketch. electrical resistivity method of soil exploration. (06 Marks)
b. Predict the Ground water table given the following data: Depth upto which water is boiled out 18 m, Water rise in I day = 0.95 m, II day = 0.86 m and III day = 0.78 m. use the Hvorslev's method for predicting ground water table. (10 Marks)

Module-2

- 3 a. Compare Boussinesq's theory with Westergaard's theory with a logical graph analysis. (08 Marks)
b. Find intensity of vertical pressure at a point 3 m directly below 25 kN point load acting on a horizontal ground surface. What will be the vertical pressure at a point 2 m horizontally away from the axis of loading and at same depth of 3 m? Use Boussinesq's equation. (08 Marks)

OR

- 4 a. Explain components of settlements. (12 Marks)
b. A reinforced concrete foundation of dimensions 1.8m × 3.6m exerts a uniform pressure of 180 kN/m² on a soil mass. with E-value 45MN/m². Determine the value of Immediate settlement under the foundation. Take $\mu = 0.3$ and $I_f = 1.0$ (04 Marks)

Module-3

- 5 a. Compare Coulomb's Earth pressure theory over Rankin's Earth pressure theory. (06 Marks)
b. Determine the active earth pressure using Rebhann's graphical method. (10 Marks)

OR

- 6 a. Explain the procedure for determination of factor of safety using method of slices for C- ϕ soil. (12 Marks)
b. An Embankment is inclined at an angle 35° and its height is 15 m. The angle of shearing resistance is 15° and the cohesion intercept is 40 kN/m². The unit weight of soil is 18 kN/m³. Examine the factor of safety with respect to cohesion. Consider Taylor's stability number = 0.06. (04 Marks)

Module-4

- 7 a. Determine the bearing capacity of the soil by using plate load test as per IS : 1888 guidelines. (08 Marks)
- b. A square footing located at a depth of 1.3 m below ground has to carry a safe load of 800 kN. Predict the size of footing which is safe against applied load. If the desired factor of safety is 3.0. Assume $e = 0.55$, Degree of Saturation = 50%, $G = 2.67$, $C = 8 \text{ kN/m}^2$. Use Terzaghi's analysis for general shear failure. Assume $\phi = 30^\circ$, $N_c = 37.2$, $N_q = 22.5$ and $N_r = 19.7$ (08 Marks)

OR

- 8 a. Generalize the assumptions made by Terzaghi's bearing capacity theory for development of bearing capacity equation. (08 Marks)
- b. Determine the bearing capacity of the soil by using standard penetration test as per IS : 2131 guidelines. (08 Marks)

Module-5

- 9 a. Classify the various type of Piles based on material and function. (10 Marks)
- b. Explain negative skin friction in pile foundation. (06 Marks)

OR

- 10 a. Explain with a neat sketch the construction and working of under reamed pile. (10 Marks)
- b. Justify with a neat sketch, how static formula summarize the load transfer mechanism in pile foundations. (06 Marks)

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10CV53

Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Structural Analysis - II

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer FIVE full questions, selecting at least TWO questions from each part.
 2. Missing data may be assumed suitably.

PART - A

- 1 a. What is an influence line? Explain its importance in structural analysis. (04 Marks)
- b. The load system shown in Fig. Q1 (b) move from left to right on a girder of span 10 m. Find the absolute maximum B.M. for the girder. Also find the maximum +ve and -ve S.F. anywhere on the beam. (16 Marks)

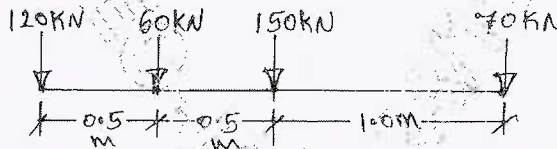


Fig. Q1 (b)

- 2 Analyse the continuous beam shown in Fig. Q2 by slope deflection method and draw B.M. diagram. Support B sinks by 1.0 mm and C rises up by 0.5 mm relative to support A. Take $EI = 30000 \text{ kN-m}^2$. (20 Marks)

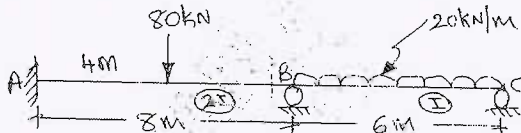


Fig. Q2

- 3 Analyse the given frame shown in Fig. Q3 by moment distribution method and draw BMD and SFD. (20 Marks)

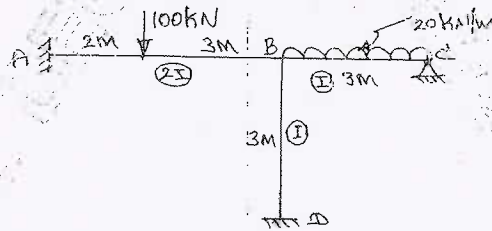


Fig. Q3

- 4 Find the total force P to be applied at C to prevent sway shown in Fig. Q4. Use slope deflection method. (20 Marks)

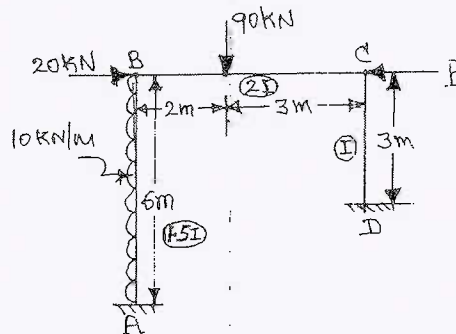


Fig. Q4

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

PART - B

- 5 Analyse the multistorey building frame shown in Fig. Q5 by Kani's method and draw BMD. Use principle of symmetry only. (20 Marks)

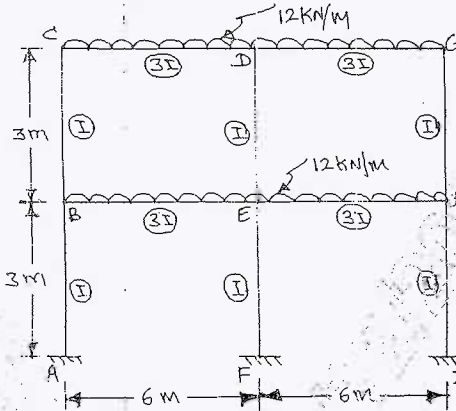


Fig. Q5

- 6 Analyse the frame shown in Fig. Q6 by flexibility matrix method. Draw BMD. (20 Marks)

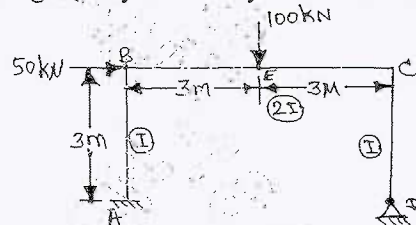


Fig. Q6

- 7 Analyse the portal frame shown in Fig. Q7 by stiffness matrix method. Draw BMD EI constant. (20 Marks)

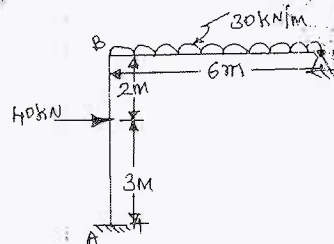


Fig. Q7

- 8 a. Define natural frequency and period of vibration. (04 Marks)
 b. Determine the natural frequency of the systems shown in Fig. Q8 (b). (10 Marks)

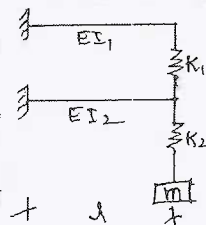


Fig. Q8 (b)

- c. Set up the differential equation of motions for the free vibration of a spring mass system. (06 Marks)

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10CV54

Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Geotechnical Engineering - I

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART - A

- 1 a. Explain three phase system of soil, with a sketch. Differentiate between void ratio and percentage voids. (06 Marks)
- b. With usual notation show that
- $$e = \frac{Gw}{Sr} \quad (06 \text{ Marks})$$
- c. Soil sample in its natural state is fully saturated with a water content of 30%. Determine the void ratio, dry unit weight and wet unit weight. Also calculate total weight of water required to fully saturate a soil mass of volume 50m³. Take G = 2.60. (08 Marks)

- 2 a. Determine the moisture content of soil sample by Pycnometer method. At what situation this method is preferred? (07 Marks)
- b. Discuss advantages and limitations of sedimentation analysis. Explain the corrections to be applied to Hydrometer readings. (07 Marks)
- c. A dry sample of weight 50gms is mixed with distilled water to prepare a suspension of 1000 ml for hydrometer analysis. The reading of the hydrometer taken after 5 minutes is 25 and the depth of the centre of the bulb below the water surface when the hydrometer was in the jar was 150mm. The volume of the hydrometer 62ml and cross section area of Jar 55 cm². Assuming G = 2.68 and $\eta = 1.0 \times 10^{-5}$ g-sec/cm². Determine the co-ordinates of the point corresponding to above observation. (06 Marks)

- 3 a. With a neat sketch, explain plasticity chart and describe its use in classifying fine grained soil. (06 Marks)
- b. Explain with neat sketches, the structure of the following minerals :
 i) Kaolinite ii) Montmorillonite. (06 Marks)
- c. Following are the results obtained from the tests conducted on two soils A and B. Classify them as per IS classification system. Show the salient steps involved. (08 Marks)

Soil	LL	PL	% Retained on IS 75 μ m Sieve	% Retained on IS 4.75 mm Sieve	Cu	Cc
A	110	50	40	Zero	-	-
B	-	-	97	05	7	2

- 4 a. State Darcy's Law. With a neat sketch, derive an expression for the co-efficient of permeability of a soil in a falling head permeability test. (08 Marks)
- b. Explain the factors affecting the permeability of soil. (06 Marks)
- c. A sample of soil for constant head permeability test yielded the following data :
 i) Diameter of sample = 7.6cm.
 ii) Length of sample = 20cm.
 iii) Head causing the flow = 15cm.
 iv) Quantity of water collected in 10min = 150 CC.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

Assume $G = 2.65$, $\gamma_d = 18 \text{ kN/m}^3$.

Determine : i) Co-efficient of Permeability ii) Discharge velocity iii) Seepage Velocity. (06 Marks)

PART – B

- 5 a. Explain Mohr – Coulomb failure theory of soils. Sketch Coulomb failure envelope for pure sand and pure clay. (06 Marks)
- b. Explain the following terms : i) Sensitivity and Thixotropy of clay. ii) Total, neutral and effective stresses in soils. (06 Marks)
- c. Two identical specimens 4cm diameter and 8cm height of partly saturated compacted soil are tested in a triaxial cell under undrained conditions. The first specimen failed at deviator load of 720N under a cell pressure of 100 kN/m^2 . Second specimen failed at deviator load of 915N under a cell pressure of 200 kN/m^2 . The increase in the volume of first specimen at failure is 1.2 ml and shortens by 0.6cm. The increase in the volume of second specimen at failure is 1.6 ml and shortens by 0.8cm. Determine apparent cohesion and angle of shearing resistance by analytical method. (08 Marks)
- 6 a. Obtain the value of compactive energy imported to the soil during Light compaction and Heavy compaction test. (04 Marks)
- b. What are the objectives of Compaction? Discuss the factors affecting compaction. (06 Marks)
- c. Following are the results obtained from a standard compaction test :
- | | | | | | |
|---|------|------|------|----|------|
| Water content, W(%) | 13.5 | 20.2 | 25 | 35 | 45 |
| Bulk unit weight, $\gamma_b \text{ kN/m}^3$ | 16.3 | 19.4 | 18.8 | 18 | 17.2 |
- Plot compaction curve and obtain maximum dry unit weight and OMC. Also plot 100% saturation line. Show specimen calculation. $G = 2.65$. (10 Marks)
- 7 a. Define the following terms : i) Compression index ii) Co-efficient of compressibility iii) Co-efficient of volume compressibility. (06 Marks)
- b. Explain with a neat sketch, Casagrande's method of obtaining Pre – consolidation pressure. (06 Marks)
- c. A saturated soil stratum 5m thick lies above an impervious stratum. It has a compression index of 0.25 and co-efficient of Permeability $3.2 \times 10^{-3} \text{ mm/sec}$. If void ratio is 1.90 at a normal stress of 0.15 N/mm^2 . Compute i) void ratio due to increase in stress to 0.2 N/mm^2 ii) settlement of soil stratum due to above increase in stress. (08 Marks)
- 8 a. List the merits and demerits of Triaxial shear test over Direct shear test. (06 Marks)
- b. Explain the determination of co-efficient of consolidation by square root of time fitting method. (06 Marks)
- c. In a direct shear test on a specimen of clean dry sand a normal stress of 200 kN/m^2 was applied and failure occurred at a shear stress of 140 kN/m^2 . Determine i) Angle of shearing resistance ii) Principal stresses during failure iii) Direction of principal planes with respect to plane to shearing. Draw a neat sketch of Mohr circle showing the directions of Major and Minor principal planes with reference to shearing. (08 Marks)

CBCS Scheme

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15CV563

Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018

Remote Sensing & GIS

Time: 3 hrs.

Max. Marks: 80

Note: Answer FIVE full questions, choosing one full question from each module.

Module-1

- 1 a. Define Remote Sensing, with a neat sketch and explain the process of remote sensing system. (08 Marks)
b. With a neat sketch and explain the electromagnetic spectrum. (08 Marks)

OR

- 2 a. Explain the energy interactions in the atmosphere. (08 Marks)
b. Explain the elements of visual interpretation techniques. (08 Marks)

Module-2

- 3 a. Explain the different types of platforms used in remote sensing. (06 Marks)
b. What is resolution of a sensor? Describe all sensor resolutions. (10 Marks)

OR

- 4 a. Explain digital image processing. (06 Marks)
b. Write a note on IRS, Landsat, IKonos and Cartosat. (10 Marks)

Module-3

- 5 a. Define GIS. Describe the key components of GIS. (08 Marks)
b. Explain the different steps involved in GIS operations. (08 Marks)

OR

- 6 a. What is a map projections? Explain the types of map projections. (08 Marks)
b. Write a note on Geospatial data and projected coordinate system. (08 Marks)

Module-4

- 7 a. What is vector data model? How to represent the simple spatial features in vector data model. (08 Marks)
b. Write a note on topology and coverage. Mention their importance. (08 Marks)

OR

- 8 a. Explain the different raster data structures. (08 Marks)
b. What is raster data model? Explain the different types of raster data used in GIS. (08 Marks)

Module-5

- 9 a. What is land use land cover? Explain the applications of remote sensing in land use land cover analysis. (08 Marks)
b. How remote sensing and GIS are used in change detection study? (08 Marks)

OR

- 10 a. Explain the applications of RS and GIS in natural resource management. (08 Marks)
b. Explain the following: Urban palnning, Traffic management (08 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

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10CV55

Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018

Hydrology and Irrigation Engineering

Time: 3 hrs.

Max. Marks:100

- Note:** 1. Answer any FIVE full questions, selecting atleast TWO questions from each part.
2. Assume any suitable missing data.

PART - A

- 1 a. Explain different types of precipitation. (08 Marks)
b. Analysis of a storm yielded the following information regarding isohyets. Calculate average depth of rainfall. (06 Marks)

Isohyetal interval (mm)	70 - 80	80 - 90	90 - 100	100 - 110	110 - 120	120 - 130
Area (km ²)	20	96	125	80	100	89

- c. The average annual rainfall at five existing rain gauge stations in a watershed are 1000mm, 995mm, 800mm, 825mm and 750mm. If the average depth of rainfall should be estimated within 6% error, determine the optimal number of rain gauges for the water shed. (06 Marks)
- 2 a. Differentiate between : i) Evaporation and Evapotranspiration ii) W - index and ϕ - index iii) AET and PET iv) Infiltrometer and Lysimeter. (08 Marks)
b. What are the measures taken to reduce the evaporation? (06 Marks)
c. A twelve hour storm rainfall with the following depths in cm occurred over a basin :
2, 2.5, 7.6, 3.8, 10.6, 5, 7, 10, 6.4, 3.8, 1.4 and 1.4.
The surface runoff resulting from the above storm is equivalent to 25.5cm of depth over the basin. Estimate the average infiltration index. (06 Marks)

- 3 a. Define Flood hydrograph and explain the different components of flood hydrograph. (06 Marks)
b. What is a Master depletion curve? What is its use? (04 Marks)
c. The ordinates of a storm hydrograph due to 6h isolated storm is given. Obtain the ordinates of 6h unit hydrograph for the catchment, if its area is 423km². (10 Marks)

Time (hr)	0	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90
Discharge (m ³ /s)	10	32	88	116	102	85	71	59	47	39	32	26	22	18	15	10

- 4 a. Define Flood. List the factors influencing flood. (05 Marks)
b. Explain the rational formula of estimation of flood. (05 Marks)
c. The values for K and x for a river reach were found to be 12h and 0.2 respectively. Route the following flood through the reach. Inflow values at 6h interval are (in m³/s) :
10, 20, 50, 60, 55, 45, 35, 27, 20, 15 and 13. (10 Marks)

PART - B

- 5 a. Define Irrigation. What is the necessity for irrigation? (06 Marks)
b. Explain briefly : i) Systems of Irrigation ii) Environmental impacts of irrigation. (14 Marks)

- 6 a. Give the classification of Indian soils. (06 Marks)
 b. Define Irrigation efficiencies. (06 Marks)
 c. What are the different methods of maintaining soil fertility? (08 Marks)
- 7 a. Define Duty. What are the factors affecting duty of water? Explain. (10 Marks)
 b. Table gives the necessary data about the crop, their duty and area under each crop, commanded by a canal taking off from a storage tank. Taking time factor for the canal $13/20$, calculate the discharge required at the head to the canal. If the capacity factor is 0.8, determine the design discharge. (10 Marks)

Crop	Base period (days)	Area (ha)	Duty (ha/cumec)
Sugarcane	320	850	580
Overlap for sugarcane in summer	90	120	580
Wheat (Rabi)	120	600	1600
Bajri (Monsoon)	120	500	2000
Veg (Hot weather)	120	360	600

- 8 a. What are the consideration for alignment of canals? (10 Marks)
 b. Design the canal for the discharge of 30 cumec with silt factor 1.0. Side slope – 0.5H : 1V. (10 Marks)

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10CV56

26

Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Transportation Engineering – I

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer any FIVE full questions, selecting atleast TWO questions from each part.
2. Use of IRC : 37 – 2001 is permitted.

PART – A

- 1 a. Discuss briefly the role of transportation in the economic social activities of the country. (06 Marks)
- b. Explain the following :
 - i) Jayakar committee's recommendations
 - ii) IRC
 - iii) CRF. (06 Marks)
- c. The area of state is 3,08,000 sq. km. The number of towns as per 1981 census was 276. The number of villages were 41,833. Calculate the length of various categories of roads as per 3rd 20 year road plan formulae. (08 Marks)
- 2 a. Briefly describe highway planning surveys. (06 Marks)
- b. List the salient features of: i) PMGSY ii) KSHIP projects. (06 Marks)
- c. Four new roads A, B, C and D are to be constructed in a district during a five year plan period. Suggest the order of priority for phasing the development programme based on maximum utility approach. Assume utility units of 0.5, 1, 2 and 4 for population ranges and 1 and 10 for 1000 t of agricultural and industrial products.

Road	Length km	Number of villages with population range				Productivity, t	
		<500	500 -1000	1000-2000	>2000	Agricultural	Industrial
A	65	40	12	14	8	5000	1000
B	55	22	9	6	4	8000	1200
C	45	32	8	9	6	6000	800
D	72	36	6	3	3	9000	2000

(08 Marks)

- 3 a. Briefly explain the factors controlling highway alignment. (06 Marks)
- b. Explain with neat sketch the width of carriage way and mention the IRC standards. (06 Marks)
- c. Two vehicles A and B are moving in the same direction with speeds of 100 kmph and breaking efficiency of 70% and 50% respectively. An object is seen by both the drivers on the road approximately at a distance of 250m. Find :
 - i) Which vehicle will meet with an accident
 - ii) If the accident is to be avoided, what is the breaking efficiency required? (08 Marks)
- 4 a. Explain briefly the attainment of designed super elevation in practice. (06 Marks)
- b. A NH passing through a plain terrain has a horizontal curve of radius equal to the ruling minimum radius. If the design speed is 100 kmph. Calculate the : i) design super elevation ii) Extra widening iii) Length of transition curve. Make suitable assumptions. (08 Marks)
- c. An ascending gradient of 1 in 50 meets with a descending gradient of 1 in 80. Calculate the length of the summit curve for SSD of 120m and OSD of 470m. (06 Marks)

1 of 2

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

PART – B

- 5 a. Briefly explain the desirable properties of sub grade soil. (06 Marks)
 b. Explain the desirable properties of road aggregates. Indicate the test conducted to determine these properties. (06 Marks)
 c. The following test data pertains to a soil sub-grade specimen. Plot the data and determine the CBR value :

Penetration (mm)	0	0.5	1.0	1.50	2.0	2.5	3.0	4.0	5.0	7.5	10.0	12.5
Load (kg)	0	5	16.2	28.1	40	48.5	56.5	67.5	75.2	89.0	99.5	106.5

(08 Marks)

- 6 a. Briefly explain the design factors to be considered in pavement design. (06 Marks)
 b. Explain the following terms :
 i) Modulus of subgrade reaction
 ii) Radius of relative stiffness
 iii) Equivalent radius of resisting section. (06 Marks)
 c. Design the flexible pavement for construction of a new highway (NH/ Two lane /Single carriageway) with the following data as per IRC : 37–2001 :
 i) Number of commercial vehicles as per last count = 1000 CVPD
 ii) Period of construction = 3 years
 iii) Design life = 15 years
 Annual growth rate = 8% . Design CBR of sub-grade soil = 6% (08 Marks)

- 7 a. Explain the construction step for cement concrete roads. (10 Marks)
 b. Explain the methods of sub-surface drainage to control the seepage flow, capillary rise and water table. (10 Marks)
- 8 a. Explain the various benefits that a road user gets by the improvement of road. (06 Marks)
 b. Briefly explain the factors to be considered for evaluating the motor vehicle operating cost. (06 Marks)
 c. Determine the relative economics of two type of flexible pavements by annual cost method from the following data :

Details	Pavement type A	Pavement type B
Total cost per km, Rs. lakhs	3.30	6.20
Design life, years	5.00	12.00
Annual rate of interest, %	10.00	9.00
Salvage value after design life, Rs. Lakhs	2.10	3.00
Average annual maintenance cost per km, Rs. lakhs	0.40	0.20

(08 Marks)

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CBCS Scheme

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15CV/CT551

Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018

Air Pollution and Control

Time: 3 hrs.

Max. Marks: 80

Note: Answer FIVE full questions, choosing one full question from each module.

Module-1

- 1 a. Define Air Pollution. Explain Primary and Secondary air pollutants. (08 Marks)
b. With respect to Air pollution, explain air borne contaminants. (08 Marks)

OR

- 2 a. Enumerate the effects of Air pollution on Human Health and Vegetation. (08 Marks)
b. Define Inversion. Briefly explain the different types of inversion with the aid of neat sketches. (08 Marks)

Module-2

- 3 a. Explain the structure and the composition of atmosphere. (08 Marks)
b. Define Lapse rate. Explain the different types of lapse rate. (08 Marks)

OR

- 4 a. What are the assumptions and limitations of the Gaussian Plume dispersion model? (08 Marks)
b. A Thermal power plant releases SO_2 at a rate of 138.8 g/s. The stack height is 120m. While the temperature of the stack gas is 150°C and the ambient air temperature is 35°C . The wind velocity at the stack height is 8.5m/s. While the stack gas velocity is 10m/s. The stack diameter is 3.5m. The atmospheric pressure is 1.005 bar. Estimate the effective stack height. (08 Marks)

Module-3

- 5 a. What is meant by Air sampling? Explain briefly sampling train. (08 Marks)
b. With the help of the neat sketch, explain the measurement of SPM in ambient air. (08 Marks)

OR

- 6 a. With the help of neat sketch, explain high volume air sampler for measurement of particulate matter. (08 Marks)
b. Briefly explain any one method of measuring SO_2 in the stack. (08 Marks)

Module-4

- 7 a. Explain the factors affecting the selection of the particulate air control devices. (08 Marks)
b. Briefly explain the particulate matter removal by gravity Sattler, with the help of neat sketch. (08 Marks)

OR

- 8 a. With the help of neat sketch, explain the working principle of Electro Static Precipitation. (08 Marks)
b. A cement plant was emitting flue gas at the rate of $20,000 \text{ m}^3/\text{h}$. Assuming inlet gas velocities of 2m/s. Design a tubular ESP with 0.20m diameter with 7 cylinders to achieve the efficiency of 90% and 95%. (08 Marks)

Module-5

- 9 a. Explain briefly the emission of the gasoline driven vehicles and diesel driven vehicles. (08 Marks)
b. Define Noise Pollution. Explain the sources and control methods of Noise - Pollution. (08 Marks)

OR

- 10 Write short notes on any Four of the following :
- a. Acid rain and its effects.
 - b. Bhopal gas tragedy.
 - c. Air quality standards.
 - d. Noise Pollution standards.
 - e. Environmental policy.
 - f. Kyoto protocol.

(16 Marks)

CBCS Scheme

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15CV561

Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018 Traffic Engineering

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing
ONE full question from each module.

Module-1

- 1 a. List the different road users characteristics and explain the concept of PIEV theory. (08 Marks)
- b. Discuss various urban traffic problem that India is facing. List some remedial measures also. (08 Marks)

OR

- 2 a. What are the different vehicular characteristics which affect road design? Explain. (08 Marks)
- b. Write short notes on :
 - i) Fundamentals of traffic flow
 - ii) Integrated planning of town. (08 Marks)

Module-2

- 3 a. Mention various applications of "O and D" study. Explain road side interview method of collecting "O and D" data. (08 Marks)
- b. Spot speed studies were carried out at a certain stretch of a road highway and the consolidated data collected are given below :

Speed range (km ph)	Number of vehicles observed	Speed arrange (km ph)	Number of vehicles observed
0 to 10	12	50 to 60	255
10 to 20	18	60 to 70	119
20 to 30	68	70 to 80	43
30 to 40	89	80 to 90	33
40 to 50	204	90 to 100	09

Determine :

- i) Upper and lower values of speed limit for regulation
- ii) Design speed for checking the geometric design element of the highway. (08 Marks)

OR

- 4 a. Explain the following terms :
 - i) Time headway
 - ii) Space headway
 - iii) Traffic volume
 - iv) Level of service. (08 Marks)
- b. Define the term "spot speed study". With neat sketch explain enoscope method of measuring spot speed study. (08 Marks)

Module-3

- 5 a. What are the advantages and disadvantages of rotary intersection? (08 Marks)
- b. i) Define briefly signal "cycle" and "Interval"
- ii) The average normal flow of traffic on cross roads A and B during design period are 400 and 250 PCU per hour; the saturation flow values on these roads are estimated as 1250 and 1000 PCU per hour respectively. The all red time required for pedestrian crossing is 12 secs. Design two phase traffic signal by Webster's method. Sketch phase diagram also. (08 Marks)

OR

- 6 a. Mention various classifications of traffic signs. Explain any two of them with neat sketches. (08 Marks)
- b. Write short notes on :
- i) Road markings
- ii) Channelized intersections
- iii) Unchannelized intersections. (08 Marks)

Module-4

- 7 a. i) What are the major sources of traffic related noise pollution? Explain.
- ii) Explain controlling methods of noise pollution by traffic. (08 Marks)
- b. What are the major air pollutants due to road traffic? Explain consequences of each. (08 Marks)

OR

- 8 a. i) Write various objective of road accidents studies (04 Marks)
- ii) Explain in detail the causes for road accidents. (04 Marks)
- b. Write short notes on :
- i) Promotion of non – motorized transport
- ii) Measures to decrease accidents. (08 Marks)

Module-5

- 9 a. Define traffic congestion. Explain different method of traffic restrain (reduction). (08 Marks)
- b. Explain Intelligent transport system for traffic management. (08 Marks)

OR

- 10 a. Suggest some traffic regulatory measures suitable for urban areas. (08 Marks)
- b. Write short notes on :
- i) Requirement of good pricing system
- ii) Travel demand management
- iii) Area traffic control
- iv) Traffic system management. (08 Marks)

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