Code: 7G651

III B.Tech. I Semester Supplementary Examinations December 2020

Design and Drawing of Reinforced Concrete Structures

(Civil Engineering)

Max. Marks: 70   Time: 3 Hours

PART-A
Answer *any One* questions (1 x 28 = 28 Marks)
******

1. Design a floor slab with restrained edges and discontinuous on two adjacent edges for a room 5.6 m X 3.4 m clear in size. The width of the beams on all edges is 230mm. Take the floor finishes as 1.5 kN/m². Assume the live load of 2.5 kN/m². Use M-20 grade concrete and Fe 415 grade. Detail the following to scale.

    (a) Draw the reinforcement of the slab in plan view

    (b) Draw cross sections of the slab in both directions showing reinforcement.

2. Design an isolated square footing to carry a column load of 1450 kN for a 380mm square tied column containing 25 mm bars as the longitudinal bars. Assume soil safe bearing capacity as 180 kN/m². Use M-25 grade concrete and Fe-500 grade steel. Assume unit weight of soil as 18 kN/m³.

    Draw to scale, showing reinforcement details

    (a) Plan view of the footing.
    (b) Sectional elevation of the footing.

PART-B
Answer *any Three* questions (3 x 14 = 42 Marks)

3   Design a doubly reinforced section for a rectangular beam at mid span having an effective span of 4m. The super imposed load of 40kN/m and size of beam is limited to 250mm X 400mm overall. Assume M20 concrete and Fe415 steel.

4   Calculate the amount of steel required in a T beam with the following dimensions to develop a moment of resistance of 300 kNm at working loads. Depth of slab=100mm, Breath of flange 750mm, Breath of web 200mm, total depth 570mm. Assume f_{ck}=20N/mm² and fy= 415N/mm² .

5   Design an axially loaded tied column 380mm X 380mm pinned at both ends with an unsupported length of 3.20m for carrying a factored load of 2000kN. Use M25 grade concrete and Fe 415 steel.

6   A 130mm thick roof slab is reinforced with 10mm bars @ 125mm center in each of the two directions. If clear size of the room is 4.5m × 5.5m and edges are simply supported and free to lift, determine the maximum superimposed load that can be placed on the slab safely.

7   A simply supported beam of rectangular section spanning over 6 m has a width of 300 mm and overall depth of 600 mm. the beam is reinforced with 4 bars of 25 mm diameter on the tension side at an effective depth of 550 mm spaced at 50mm centers. The beam is subjected to a working load moment of 160 kNm at the centre of span section. Using M-25 grade concrete and Fe 415 HYSD bars, check the beam for the serviceability limit state of cracking according to IS:456-2000 code method.

*****

III B.Tech. I Semester Supplementary Examinations December 2020
Environmental Engineering-I
(Civil Engineering)

Max. Marks: 70   Time: 3 Hours
Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)
****

UNIT–I

1. a) Explain the flow diagram of water supply system   6M

   b) Explain the types and variation in water demand   8M

OR

2. a) Explain the suitability of various sources of water for water supply system with reference to quantity and quality.   7M

   b) Estimate the population of a city for the year 2041, based on the following data using Arithmetic increase method and incremental increase method.

Census Year	1961	1971	1981	1991	2001	2011
Population in lakhs	1.8	2.2	2.7	3.8	4.6	6.1

7M

UNIT–II

3. a) Explain the river intake structure with neat sketch.   7M

   b) Determine the storage capacity of reservoir for a daily requirement of 2 lakhs liters. The pumping rate is 12 hrs (6 AM – 6 PM) constantly. The draw off is as follows.

   6 AM – 8 AM   -   35 % of daily supply
   8 AM – 5 PM   -   35 % of daily supply
   5 PM – 8 PM   -   30 % of daily supply   7M

OR

4. a) Explain the following characteristics of water

   i) Turbidity ii) pH iii) Hardness and iv) E-coli   8M

   b) Explain the standards of drinking water as per WHO   6M

UNIT–III

5. a) Explain the methods of aeration in water purification   7M

   b) Explain about the Jar test for determining optimum dosage of coagulant   7M

OR

6. a) Design with suitable assumptions, a set of rapid sand filters to treat 2 MLD of water.   7M

   b) Explain the different methods of disinfection.   7M

UNIT–IV

7. a) Explain the following terms i) Sewage ii) sewer iii) sewerage iv) sullage   8M

   b) Determine the Maximum drainage of a town based on the following data:
   Area of a town   : 50 hectares,   Population   : 30000
   runoff of coefficient   : 0.5   time of concentration   : 30 minutes   6M

OR

8. a) Explain the sewer materials with their merits and demerits   7M

   b) What are the various sewer appurtenances? Explain any one with neat sketch.   7M

UNIT–V

9. a) Explain the cycles of aerobic and anaerobic decomposition.   7M

   b) Determine the 5 day BOD of a sample at 20^0C, if its 2 day BOD at 20^0C is 20 mg/lit, K_D at 20^0 C is 0.1/day. Also determine ultimate BOD   7M

OR

10. a) Explain the working principle of activated sludge process   6M

    b) Write a note on i) Oxidation pond ii) Septic tank   8M

****

Code: 7G652

III B.Tech. I Semester Supplementary Examinations December 2020
Engineering Geology
(Civil Engineering)

Max. Marks: 70   Time: 3 Hours
Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)
****

UNIT–I

1. Describe briefly Importance of physical geology, petrology and structural geology?   14M

OR

2. Give brief note on weathering how its impacts the dams, reservoirs and tunnels?   14M

UNIT–II

3. Explain briefly physical properties of Kyanite, Garnet, Talc, Calcite and explain its importance?   14M

OR

4. Describe briefly Different methods of minerals study – Advantages of study of minerals   14M

UNIT–III

5. Explain briefly different types of Fault with neat sketches?   14M

OR

6. Explain briefly different types of joints with neat sketches?   14M

UNIT–IV

7. Give brief note on causes of Earthquake and explain briefly their impacts, control techniques?   14M

OR

8. Describe briefly Geological controls of groundwater movement and Hydrological properties of rocks?   14M

UNIT–V

9. Explain briefly how Geological Factors contributing to the success of a reservoir?   14M

OR

10. Describe briefly Geological Factors role in the success of tunnels?   14M

*****

R-17

Code: 7G655

III B.Tech. I Semester Supplementary Examinations December 2020
Structural Analysis-II
(Civil Engineering)

Max. Marks: 70   Time: 3 Hours

*Answer all five units by choosing one question from each unit (5 x 14 = 70 Marks)*

****

UNIT–I

1. a) State and prove Eddy's Theorem.   6M

    b) A three-hinged circular arch consists of a portion AC of radius 3m and rise of
        the hinge C with respect to the left abutment is 3m. The right hand portion CB
        is of radius 8m and the horizontal distance BC is 7m. If a concentrated load of
        10KN acts at 6m from the left hand end, determine the reactions at the hinges
        and maximum bending moment on the arch?   8M

OR

2. a) Explain the effect of temperature on two- hinged arches.   6M

    b) A two- hinged parabolic arch of span 40m and rise 8m carries a point load of
        80KN at a distance of 10m from the left support. Find the horizontal thrust at
   each support? Find also the maximum bending moment and its location?   8M

UNIT–II

3. Analyse the portal frame shown in figure below by using slope- deflation
    method. Also draw the shear force and bending moment diagrams. The frame
    is of uniform section throughout.

                                                                               14M
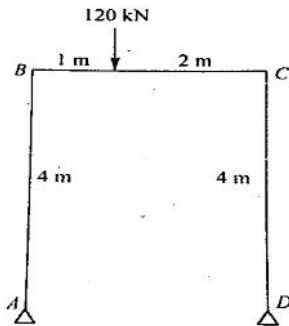
OR
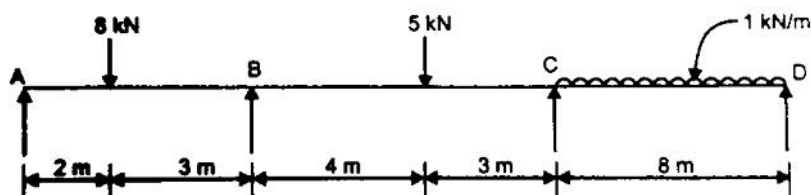
4. Analyse the portal frame shown in figure below by using moment distribution
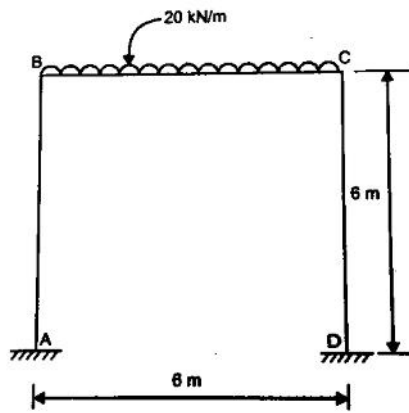   method. Also draw the bending moment diagram.

                                                                               14M
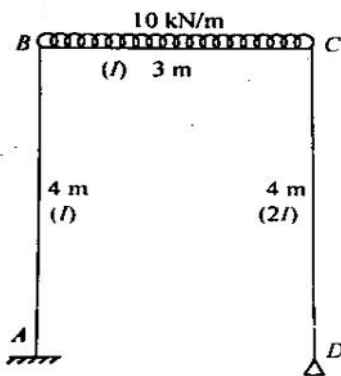
UNIT–III

5. Analyse the continuous beam shown in figure below by Kani's method, If the
    support B sinks by 10mm. Take $E = 2.1 \times 10^5 N/mm^2$ and $I = 85 \times 10^5 mm^4$. Sketch
    the B.M.D.

                                                                               14M
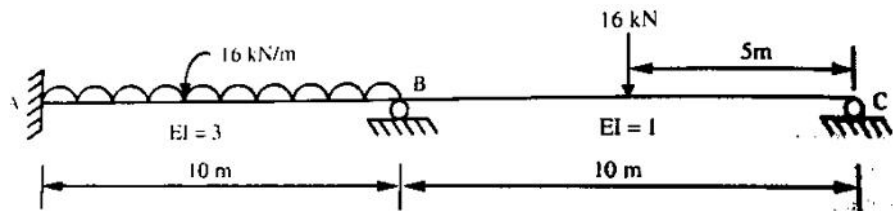
OR

6. Analyse the frame shown in figure below using Kani's method. Also draw the B.M.D.
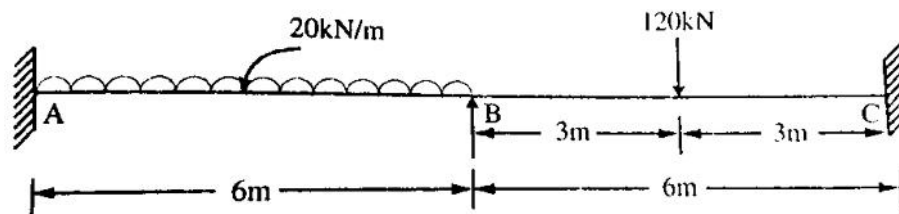

14M

UNIT–IV

7. Analyse the continuous beam shown in figure below by flexibility method and draw the B.M.D.

14M

OR

8. Analyse the continuous beam shown in figure below by stiffness method. Draw the B.M.D.

14M

UNIT–V

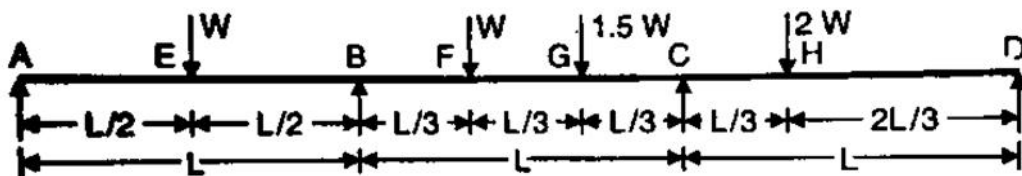9. Calculate the shape factors for the following sections.

   a) Rectangular section of breadth 'b' and depth 'd'
   b) Triangular section of base 'b' and height 'h'
   c) Solid circular section of diameter 'd'?   14M

OR

10. a) What is lower bound theorem and explain briefly?   5M

    b) Determine the value of 'W' at collapse for a three span continuous beam of constant M_p, loaded as shown in figure below?

9M

******

Code: 7G654

R-17

III B.Tech. I Semester Supplementary Examinations December 2020

Water Resource Engineering-I

(Civil Engineering)

Max. Marks: 70   Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

****

UNIT–I

1. a) Explain the different methods of determining the average rainfall over a catchment.   6M

   b) Explain the following in brief.

      (i) rainfall mass curve   (ii) hyetograph   (iii) measurement of rainfall

      (iv) IDF curves.   8M

OR

2. a) Describe the principle of working of a tipping bucket type recording rain gauge with a neat sketch. What are its advantages and disadvantages?   6M

   b) Outline the procedure for estimating the missing rainfall data of a station. During a month a rain guage went out of order while the other three gauges in the basin reported rainfalls of 107, 89 and 120 mm. if the normal annual rainfall for these three gauges are 1120, 935 and 1200 mm respectively and normal annual rainfall of the broken gauge is 978 mm, estimate the missing monthly rainfall at the broken gauge.   8M

UNIT–II

3. a) Illustrate ISI evaporation pan.   6M

   b) From the data of a recording rain gauge installed in a watershed of 30 km^2 area, the following mass curve was obtained for a storm having duration of 7 hours.

Time (hrs)	0	1	2	3	4	15	16	17
Accumulated rainfall (cm)	0	1.0	3.0	5.5	7.7	8.0	9.0	10.0

   Sketch the effective rainfall hyetograph and the volume of effective rainfall, if the loss of rainwater due to infiltration was at the rate of 0.65 cm/hr.   8M

OR

4. a) What is evapotranspiration? Explain the factors affecting evapotranspiration.   7M

   Discuss the following

   i. Infiltration
   ii. Horton-Infiltration Curve
   iii.   -index
   iv. W-index

   b) Explain the factors affecting runoff. Enumerate the empirical equations used to estimate runoff.   7M

5. a) Discuss baseflow. Explain various methods of separation of baseflow. 7M

   b) Given the ordinates of a 4-h unit hydrograph as below, derive the ordinates of a 12-h unit hydrograph for the same catchment.

Time:	0	4	8	12	16	20	24	28	32	36	40	44
Ordinates of 4-h UH:	0	20	80	130	150	130	90	52	27	15	5	0

7M

OR

6. a) What is IUH? What are its characteristics? 6M

   b) The ordinates of a 6-h unit hydrograph are given below:

Time:	0	6	12	18	24	30	36	42	48	54	60	66
6-h UHO	0	20	60	150	120	90	66	50	32	20	10	0

   If two storms, each of 1 cm rainfall excess and 6-h duration occur in succession, calculate the resulting hydrograph of flow. Assume a constant baseflow of $10 m^3/s$. 8M

UNIT–IV

7. a) Explain the following
      i) aquifer   ii) aquiclude   iii) aquitard   iv) aquifuge
      v) confined aquifer   vi) perched groundwater. 6M

   b) Derive an expression for a steady radial flow to an unconfined auiqifer. 8M

OR

8. a) Give the comparison between Kennedy's theory and Lacey's theory and draw typical cross section of the Lacey's regime channel. 7M

   b) A channel section is to be designed for the following data: Discharge $Q=10 m^3/s$, silt factor $f = 1.0$, side slope = ½(H): 1(V). Also determine the bed-slope of the channel 7M

UNIT–V

9. a) Classify the irrigation canals. What are the factors to be considered in the alignment of canal? 7M

   b) Explain the following
      i. Duty and Delta.
      ii. Cultivable commanded Area and Intensity of irrigation.
      iii. Water conveyance efficiency and water application efficiency.
      iv. Consumptive Irrigation Requirement and Net Irrigation Requirement. 7M

OR

10. a) What is consumptive use of water? Describe any two methods for determining the consumptive use of water. 7M

    b) The gross command area for an irrigation canal is 20,000 hectares out of which 75% is culturable command area. The intensity of irrigation is 40% for rabi and 10% for rice. If kor period is 4 weeks for rabi and 2.5 weeks for rice, determine the outlet discharge. Outlet factor for rabi and rice may be assumed as 1800hectares/cumec and 775 hectares/cumec 7M

****