

Dr. Babasaheb Ambedkar Technological University, Lonere

Regular and Supplementary Winter Examination – 2023

Course: B. Tech.

Branch : Civil Engineering

Semester :V

Subject Code & Name: BTCVC502 Geotechnical Engineering

Max Marks: 60

Date: 03/01/2024

Duration: 3 Hr.

Instructions to the Students:

1. All the questions are compulsory.
2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

| | (Level/CO) | Mark |
|--|--------------------|-----------|
| Q. 1 Solve <u>any two</u> of the following. | | 12 |
| A) Explain the Following terms: | Understand/ CO1 | 6 |
| A.1) Voids Ratio A.2) Porosity A.3) Degree of saturation | | |
| A.4) Water Content A.5) Specific Gravity A.6) Air Content | | |
| B) Why soil is considered as three phase system? Explain with neat sketch? | Understand/ CO1 | 6 |
| C) State and explain the different types of soil structures? | Understand/ CO1 | 6 |
| Q.2 Solve <u>any two</u> of the following. | | 12 |
| A) Enlist the different soil classification systems that were developed by various organizations for their specific purpose. Explain in detail the by 'Indian Soil Classification system'. | CO2/ Apply | 6 |
| B) A soil sample of saturated clay has a diameter of 50 mm and the height of 100 mm. The mass of saturated sample is 220 g and its mass when oven dried is 150 g. Find: 1) Water content of the clay & 2) Void Ratio | Understand /CO1 | 6 |
| C) A soil sample has wet density 20 kN/m ³ and dry density of 18 kN/m ³ . If the specific gravity of soil is 2.67. Calculate the porosity, moisture content and degree of saturation. Assume unit weight of water = 10 kN/m ³ | Apply /CO2 | 6 |
| Q. 3 Solve <u>any two</u> of the following. | | 12 |
| A) What is mean by permeability of soil. Explain in detail the concept of Hydraulic gradient and Darcy Law? | Understand /CO2 | 6 |
| B) Determine the average coefficient of permeability in the horizontal and vertical directions for a deposit consisting of three layers of thickness 5 m, 1 m and 2.5 m and having the coefficients of permeability of 3×10^{-2} mm/sec, 3×10^{-5} mm/sec, and 4×10^{-2} mm/sec, respectively. Assume the layers are isotropic. | Apply /CO3 | 6 |
| C) In falling head permeability test, the head causing flow was initially 90 cm, and it drops 6 cm in 15 minutes. How much time is required for the head to fall to 45 cm. | Apply /CO3 | 6 |

Q.4 Solve any two of the following. 12

- A) Explain the fundamental equation of shear strength of soil given by Coulomb. Understand / CO2 **6**
- B) Explain the different types of shear test based on drainage conditions. Apply / CO3 **6**
- C) A vane 100 mm in diameter and 200 mm in heights was pressed into soft clay in a borehole. The torque was applied and gradually increased to 100 N-m when failure took place. Determine the undrain shear strength. Understand / CO2 **6**

Q. 5 Solve any two of the following. 12

- A) Explain in detail the major factors which affect the compaction? Understand/ CO2 **6**
- B) An earth embankment is compacted at a water content of 12 % to a bulk density of 25 kN/m³. If the specific gravity of the sand is 2.65, find the porosity, void ratio and the degree of saturation of the compacted embankment. Understand / CO2 **6**
- C) A gravity retaining wall retains 10 m of a backfill, $\gamma = 25 \text{ kN/m}^3$ $\phi = 20^\circ$ with a uniform horizontal surface. Determine the total active thrust per meter run of wall. Assume the wall interface to be vertical. Apply / CO3 **6**

*** End ***

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4. Assume suitable data wherever necessary and mention it clearly.

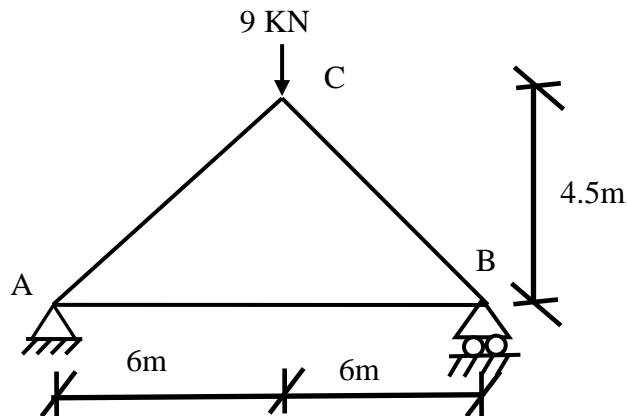
(Level/CO) Marks

Q. 1 Solve Any Two of the following.

12

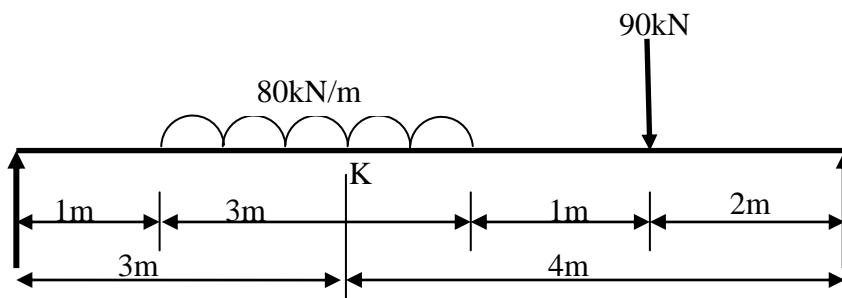
- A) Determine the vertical and horizontal displacement of the joint C of the pin jointed frame as shown in fig. The cross sectional area of AB is 150 mm² and of AC and BC is 200 mm². Assume E = 200 kN/mm².**

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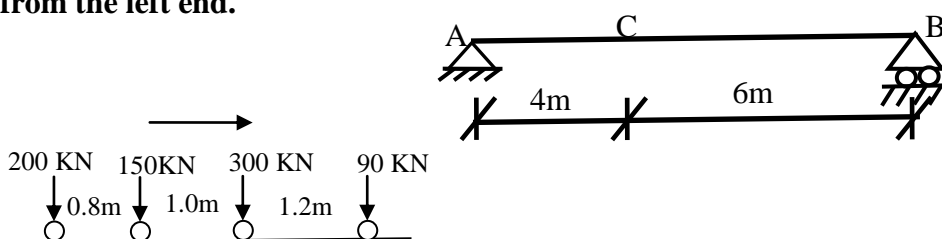
- B) Find the shear force at the section K for the Loaded girder as shown in fig.**

6



- C) The Wheel Loads shown in fig. roll over along a beam of span 10 m. Find the maximum bending moment which can occur at a section 4 m from the left end.**

6



Q.2 Solve Any Two of the following.

12

A) A suspension bridge of 100m span has two hinged stiffening girders supported by two cables, having a central dip of 10m. The road way is 6 meters. The dead load on the bridge is 5kN per Sq. meter and the live load is 10kN per Sq. meter, which covers the left of the span. Determine the shear force and bending moment for the girder at 25 m from the left end. Find also the maximum tension in the cable for this position of the live load.

6

B) A three hinged parabolic arch ABC of span 20m and rise 4m carries uniformly load of 20 KN per meter run on the left half of the span. Find the maximum bending moment for Arch.

6

C) A two hinged parabolic arch has span of 20m and a rise of 5m and carries a uniformly distributed load of 20kN/m for a distance of 5m from the left end. Determine bending moment, normal thrust and radial shear at a section of the arch 5m from the left end.

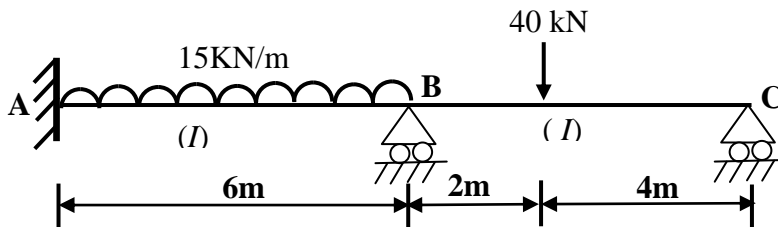
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Q. 3 Solve Any Two of the following.

12

A) Analyse the continuous beam as shown in fig. by flexibility approach. If support B sinks by 20mm. Take $EI=3800kN\cdot m^2$

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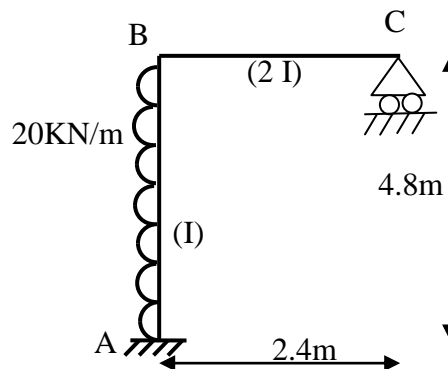


B) What is the Relation Between the Stiffness matrix and Flexibility Matrix.

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C) Analyse the portal frame as shown in fig. by flexibility approach.

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Q.4 Solve Any Two of the following.

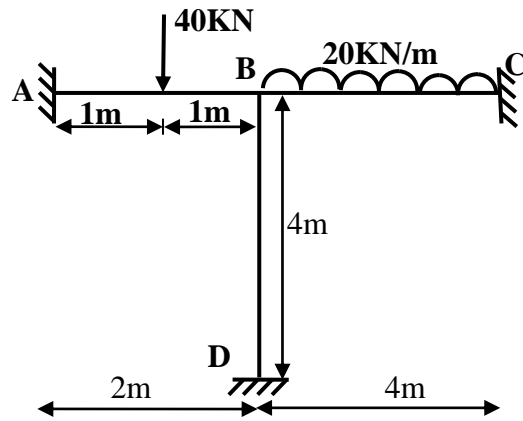
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A) Differentiate between the force method and displacement method.

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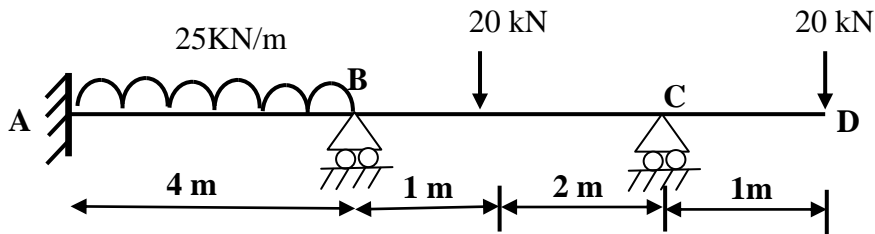
B) Analyse the frame by stiffness method . Draw BMD.EI constnt.

6



C) Analyse the beam as shown in fig. by stiffness matrix method and draw B.M.D.

6



Q. 5 Solve Any Two of the following.

12

A) Write general steps of FEM.

6

B) Explain:

6

(i) Triangular Element

(ii) Rectangular element

(iii) Quadrilateral element

C) Write a note on Pascal's Triangle.

6

*** End ***

b) Explain Duff Abraham's Law in detail.

CO 1 6

OR

B) Design a concrete mix for M45 grade using following data:

CO 3 12

- a) Grade designation : M45
- b) Type of cement : OPC 43 Grade (Specific Gravity=3.15)
- c) Maximum nominal size of aggregate : 20mm (Specific Gravity=2.80)
- d) Minimum cement content : 320 kg/m³
- e) Maximum water-cement ratio : 0.45
- f) Workability : 125 mm slump
- g) Exposure condition : Severe (RCC)
- h) Method of concrete placing : Pumping
- i) Volume of C.A. (20 mm) & for F.A. Zone II= 0.62 (W/C=0.50)
- j) Type of Aggregate: Crushed Angular Aggregates
- k) Super Plasticizer will be used.
- l) Fine aggregates: Confirming to Zone II (Specific Gravity=2.70)

Table 2 Assumed Standard Deviation
(Clause 4.2.1.3)

| Sl No. | Grade of Concrete | Assumed Standard Deviation N/mm ² |
|--------|-------------------|--|
| (1) | (2) | (3) |
| i) | M10 | 3.5 |
| | M15 | |
| ii) | M20 | 4.0 |
| | M25 | |
| iii) | M30 | 5.0 |
| | M35 | |
| | M40 | |
| | M45 | |
| | M50 | |
| | M55 | |
| iv) | M60 | 6.0 |
| | M65 | |
| | M70 | |
| | M75 | |
| | M80 | |

Table 4 Water Content per Cubic Metre of Concrete For Nominal Maximum Size of Aggregate
(Clause 5.3)

| Sl No. | Nominal Maximum Size of Aggregate mm | Water Content ¹⁾ kg |
|--------|--------------------------------------|--------------------------------|
| (1) | (2) | (3) |
| i) | 10 | 208 |
| ii) | 20 | 186 |
| iii) | 40 | 165 |

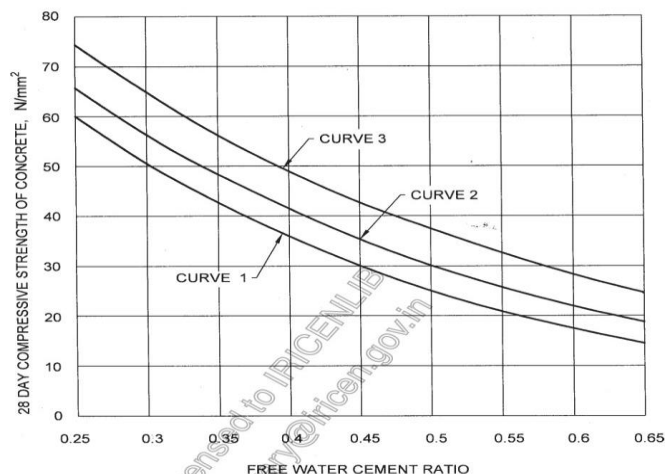
¹⁾ Water content corresponding to saturated surface dry aggregate.

NOTES

1 These quantities of mixing water are for use in computing cement/cementitious materials content for trial batches.

2 On account of long distances over which concrete needs to be carried from batching plant/RMC plant, the concrete mix is generally designed for a higher slump initially than the slump required at the time of placing. The initial slump value shall depend on the distance of transport and loss of slump with time.

IS 10262 : 2019



Curve 1 : for expected 28 days compressive strength of 33 and < 43 N/mm².
Curve 2 : for expected 28 days compressive strength of 43 and < 53 N/mm².
Curve 3 : for expected 28 days compressive strength of 53 N/mm² and above.

*** END ***

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular/Supplementary Winter Examination – 2023

Course: B. Tech.

Branch: Civil Engineering

Semester: V

Subject Code & Name: BTHM505 & Project Management

Max Marks: 60

Date: 10/01/2024

Duration: 3 Hr.

Instructions to the Students:

1. All the questions are compulsory.
2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

| | (Level /CO) | Marks | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|------------------------|-------------------|-----------------------|------------------------|-------------------|-----------------------|------------------|-----|---|------|---|-------|-----|---|------|---|------|-----|---|------|---|------|-----|---|------|---|-------|
| Q.1 Solve Any Two of the following. | | 12 | | | | | | | | | | | | | | | | | | | | | | | | | |
| A) Explain in detail project, project management and components of project management. | CO1 | 6 | | | | | | | | | | | | | | | | | | | | | | | | | |
| B) Explain the uses, advantages, and limitations of break-even analysis | CO5 | 6 | | | | | | | | | | | | | | | | | | | | | | | | | |
| C) Discuss the importance of quality control in Project Management | CO5 | 6 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Q.2 Solve Any Two of the following. | | 12 | | | | | | | | | | | | | | | | | | | | | | | | | |
| A) Explain Resource Allocation | CO2 | 6 | | | | | | | | | | | | | | | | | | | | | | | | | |
| B) The following table gives the data for the duration and costs of each activity of project network. The indirect cost of the project 2000Rs/Week. | CO2 | 6 | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1" style="width: 100%; border-collapse: collapse;"><thead><tr><th>Activity</th><th>Normal Duration (Week)</th><th>Normal Cost (Rs.)</th><th>Crash Duration (Week)</th><th>Crash Cost (Rs.)</th></tr></thead><tbody><tr><td>1-2</td><td style="text-align: center;">4</td><td style="text-align: center;">4000</td><td style="text-align: center;">2</td><td style="text-align: center;">12000</td></tr><tr><td>2-3</td><td style="text-align: center;">5</td><td style="text-align: center;">3000</td><td style="text-align: center;">2</td><td style="text-align: center;">7500</td></tr><tr><td>2-4</td><td style="text-align: center;">7</td><td style="text-align: center;">3600</td><td style="text-align: center;">5</td><td style="text-align: center;">6000</td></tr><tr><td>3-4</td><td style="text-align: center;">4</td><td style="text-align: center;">5000</td><td style="text-align: center;">2</td><td style="text-align: center;">10000</td></tr></tbody></table> | | | Activity | Normal Duration (Week) | Normal Cost (Rs.) | Crash Duration (Week) | Crash Cost (Rs.) | 1-2 | 4 | 4000 | 2 | 12000 | 2-3 | 5 | 3000 | 2 | 7500 | 2-4 | 7 | 3600 | 5 | 6000 | 3-4 | 4 | 5000 | 2 | 10000 |
| Activity | Normal Duration (Week) | Normal Cost (Rs.) | Crash Duration (Week) | Crash Cost (Rs.) | | | | | | | | | | | | | | | | | | | | | | | |
| 1-2 | 4 | 4000 | 2 | 12000 | | | | | | | | | | | | | | | | | | | | | | | |
| 2-3 | 5 | 3000 | 2 | 7500 | | | | | | | | | | | | | | | | | | | | | | | |
| 2-4 | 7 | 3600 | 5 | 6000 | | | | | | | | | | | | | | | | | | | | | | | |
| 3-4 | 4 | 5000 | 2 | 10000 | | | | | | | | | | | | | | | | | | | | | | | |
| Draw network. Find project duration and show critical path based on normal duration and corresponding total project cost. Calculate cost slope for each activity. | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C) Determine the optimum duration of project and the corresponding minimum cost associated with the project in Q.no.2 (B) | CO2 | 6 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Q.3 Solve Any Two of the following. | | 12 | | | | | | | | | | | | | | | | | | | | | | | | | |
| A) Define and explain Optimistic time, Pessimistic time, and Most likely time. | CO3 | 6 | | | | | | | | | | | | | | | | | | | | | | | | | |

B) Draw the network and find the project duration & Critical path for the following CO3 6

| Activity (i-j) | t_o (Optimistic Time) | t_L (Most likely Time) | t_p (Pessimistic Time) |
|----------------|----------------------------|-----------------------------|-----------------------------|
| 1-2 | 2 | 5 | 8 |
| 2-3 | 8 | 11 | 20 |
| 3-4 | 0 | 0 | 0 |
| 2-4 | 4 | 7 | 16 |
| 2-5 | 4 | 9 | 20 |
| 4-6 | 7 | 10 | 13 |
| 5-6 | 3 | 7 | 17 |
| 3-7 | 3 | 5 | 13 |
| 6-7 | 2 | 3 | 10 |
| 7-8 | 2 | 4 | 6 |

C) Find Standard Deviation and Z value if the project mentioned in Q. no 3 (B) has the completed in 40 Days. CO3 6

Q.4 Solve Any Two of the following. 12

- A) Explain Demand and Supply CO4 6
 B) Explain Inflation and Cause of Inflation. CO4 6
 C) Explain Time value of money. CO4 6

Q.5 Solve Any Two of the following. 12

A) Draw the network and calculate TE & TL for all activities for the following. CO1 6

| Activity (i-j) | 1-2 | 1-3 | 1-4 | 2-5 | 2-7 | 3-4 | 3-6 | 4-5 | 5-6 | 5-7 | 6-7 | 7-8 |
|-----------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Duration (t^{ij}) Weeks | 6 | 7 | 8 | 7 | 8 | 4 | 4 | 9 | 5 | 6 | 6 | 9 |

- B) Prepare table and calculate EST, EFT, LST, LFT, and Total Float associated with the project in Q.no.5(A), Find critical path & project Duration CO1 6
 C) Explain break even analysis. CO5 6

*** End ***

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular & Supplementary Winter Examination-2023

Course: B. Tech. Branch: Civil & Allied Engineering Semester: V
Subject Code & Name: BTCVPE506G/BTCIPE506G & Material, Testing and Evaluation

Max Marks: 60

Date:12/01/2024

Duration: 3 Hr.

Instructions to the Students:

- 1. All the questions are compulsory.*
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| | (Level/CO) | Marks |
|--|-------------|-----------|
| Q. 1 Solve Any Two of the following. | | 12 |
| A) Classify and Explain 'Physical Properties' of Polymers. | CO 2 | 6 |
| B) Compare Hard and Soft wood with minimum 10 properties. | CO 4 | 6 |
| C) Explain with Figure the Variability of Materials. | CO 2 | 6 |
| Q.2 Solve Any Two of the following. | | 12 |
| A) Describe in detail 'Aerated Autoclaved Block'. | CO 2 | 6 |
| B) Write minimum Yield stress and applications for following: a) Fe E 220 b) Fe 410 c) Fe 330 | CO 2 | 6 |
| C) Write note on Engineered wood products. | CO 2 | 6 |
| Q. 3 Solve Any Two of the following. | | 12 |
| A) Discuss the properties of Fiber Reinforced Concrete. | CO 2 | 6 |
| B) Describe in detail the environmental and health impact of typical composite material. | CO 2 | 6 |
| C) Explain the factors responsible for determining the Choice of Proper Material in construction. | CO 2 | 6 |
| Q.4 Solve Any Two of the following. | | 12 |
| A) Describe Photo catalytic admixture in detail. | CO 2 | 6 |
| B) Report Advantages and Disadvantages of bacterial concrete. | CO 2 | 6 |
| C) Discuss 'Hempcrete' as material in construction industry. | CO 2 | 6 |
| Q. 5 Solve Any Two of the following. | | 12 |
| A) Enlist and Explain material factors that affect visual testing. | CO 2 | 6 |
| B) Classify Destructive testing and explain any one. | CO 2 | 6 |
| C) Enlist with minimum six points the necessity of material testing. | CO 2 | 6 |

***** End *****

| DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE Regular & Supplementary Winter Examination-2023 Course: B. Tech. Branch : Civil & Allied Engineering Semester:V Subject Code & Name: BTCVPE506F/BTCIPE506F Town and Urban Planning Max Marks: 60 Date: 12-01-24 Duration: 3 Hr. | | | |
|--|--|------------|-----------|
| Instructions to the Students: 1. All the questions are compulsory. 2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question. 3. Use of non-programmable scientific calculators is allowed. 4. Assume suitable data wherever necessary and mention it clearly. | | | |
| | | (Level/CO) | Marks |
| Q. 1 | Solve Any Two of the following. | | 12 |
| A) | Explain necessity of Town planning | CO1 | 6 |
| B) | Explain the Nandyavarta planning in ancient period with sketch | CO1 | 6 |
| C) | Write short notes on: Garden city theory and sector theory | CO1 | 6 |
| Q.2 | Solve Any Two of the following. | | 12 |
| A) | Explain contribution of Sir Patrick Geddes | CO2 | 6 |
| B) | Enlist various skills of the town planner | CO2 | 6 |
| C) | Explain various types of settlements in India | CO2 | 6 |
| Q. 3 | Solve Any Two of the following. | | 12 |
| A) | Explain various principles of Neighbourhood planning | CO2 | 6 |
| B) | Explain Cul-de-sac with its advantages and neat sketch | CO2 | 6 |
| C) | Differentiate between Horizontal and Vertical growth of a town | CO2 | 6 |
| Q.4 | Solve Any Two of the following. | | 12 |
| A) | Explain various zones of a town as per land use zoning | CO3 | 6 |
| B) | Explain objectives and types of urban road | CO3 | 6 |
| C) | State and explain procedure of land acquisition as per MRTP | CO3 | 6 |
| Q. 5 | Solve Any Two of the following. | | 12 |
| A) | Explain objectives of village planning. Also explain multilevel planning | CO3 | 6 |
| B) | Explain various planning methodologies | CO3 | 6 |
| C) | Write a short note on need for Rural development in India | CO3 | 6 |
| *** End *** | | | |

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