7E7061

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B. Tech. VII - Sem. (Back) Exam., Feb.-March - 2021
Civil Engineering
7CE1A Water Resources Engineering - I

Time: 2 Hours   **Maximum Marks: 48**
                                                 Min. Passing Marks: 15

Instructions to Candidates:
  Attempt **three questions,** *selecting* **one question each** *from any three* **unit.** *All Questions carry* **equal** *marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.*
  Use of following supporting material is permitted during examination. (Mentioned in form No.205)

1. NIL _____   2. NIL _____

UNIT- I

Q.1 (a) Write short notes on the following -   [8]

  (i)   Consumptive use of water

  (ii) Water harvesting

  (iii) Contour farming

  (iv) Crop rotation

  (b) Define field capacity and permanent wilting point. The root zone of a crop in a certain soil has a field capacity of 40% and permanent wilting point of 12%. Determine the depth of moisture in the root zone per meter at the field capacity and at the wilting point. Also find the available depth of water if the root zone depth is 1.3 m. Take the dry unit weight of soil as 15 kN/m². [8]

OR

Q.1 (a) Describe various water losses in irrigation channels. [8]

(b) Determine the discharge of a distributary at the tail end from the following data - [8]

Gross commanded area = 20,000 ha

Culturable commanded area   = 70% of GCA

Losses beyond the tail end   = 1.0 cumecs

Kharif (rice) Intensity of irrigation = 15%

Kor depth   = 19 cm

Kor period   = 2.5 weeks

Rabi (wheat) Intensity of irrigation = 30%

Kor depth   = 13.5 cm

Kor period = 4.0 weeks

Sugarcane Intensity of irrigation   = 10%

Kor depth   = 16.5 cm

Kor period   = 4.0 weeks

UNIT- II

Q.2 (a) Compare Kennedy's and Lacey's theory for the design of the channel. What are the drawbacks of both theories? [8]

(b) Design an irrigation channel to carry a discharge of $50 m^3/s$ by Kennedy's theory. Assume m = 1.0, N = 0.025 and slope of channel as 1 in 5000. [8]

OR

Q.2 (a) Write short notes on the following - [8]

(i) Warabandi and Jamabandi

(ii) Silt control in channel

(iii) Estimation of channel losses

(iv) Role of Command Area Development

(b) Design an irrigation channel using Lacey's theory for a discharge of 22 cumecs and silt factor = 1.0. [8]

UNIT- III

Q.3 (a) Discuss various types of outlets. Also describe the criteria for selection of outlet capacity. [8]

(b) Describe various types of river training works. Draw neat sketches of Guide banks and spurs. [8]

OR

Q.3 (a) What do you understand by critical tractive force? Explain initial and final regime conditions of channels. [8]

(b) Describe the functions of a distributary head regulator and cross head regulator. [8]

UNIT- IV

Q.4 (a) Describe various types of tube wells. [6]

(b) For the strata shown in Fig 4 (b) design a tube well. The average level of the water table below the ground surface is 15 m in summer and 12 m in winter and the discharge required is 100 l.ps. The maximum depression head = 10.0m. Take the radius of influence as 400 m. [10]
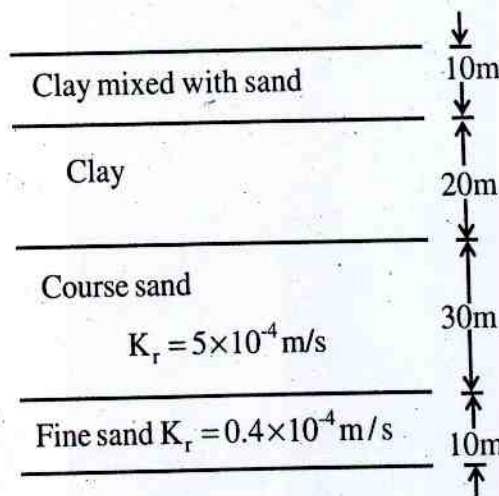

Clay mixed with sand	10m
Clay	20m
Course sand $K_r = 5 \times 10^{-4}$ m/s	30m
Fine sand $K_r = 0.4 \times 10^{-4}$ m/s	10m

Fig.4(b)

[7E7061]   **[1480]**

OR

Q.4 (a) Describe various types of channel lining. [8]

(b) Describe various measures for prevention of water logging. [8]

UNIT- V

Q.5 (a) Write a short note on Hydrologic cycle and factors affecting runoff. [8]

(b) Describe various types of rain gauges for the measurement of rainfall with simple

sketches. [8]

OR

Q.5 (a) Describe the rational method for estimation of runoff. [8]

(b) Describe the theory of unit hydrograph. Explain the method of derivation of a unit

hydrograph from and isolated storm hydrograph. [8]

7E1712

7E1712

B. Tech. VII - Sem. (Main) Exam., Feb.- March - 2021
PCC Civil Engineering
7CE4 – 01 Transportation Engineering

Time: 2 Hours   [To be converted as per scheme]
Max. Marks: 82
Min. Marks: 29

Instructions to Candidates:

Attempt all ten questions from Part A, four questions out of seven questions from Part B and two questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

PART – A

(Answer should be given up to 25 words only)   [10×2=20]

All questions are compulsory

Q.1 Discuss the role of transportation in the economic and social activities of the country.   [2]

Q.2 Write about the role of transportation in rural development in India.   [2]

Q.3 Give names of steps involved in construction of a new Highway project.   [2]

Q.4 Write names of elements which include geometric design of Highways.   [2]

Q.5 Give basic difference between Rigid pavement and Flexible pavement.   [2]

Q.6 What is the role of filler in bituminous mix? Write the name of the material used as filler. [2]

Q.7 Give difference between Ports & Docks. [2]

Q.8 Give names of important components of an airport layout. [2]

Q.9 What are the basic functions of Ballast in Railway Construction? [2]

Q.10 Define Runway length in construction of Airport. [2]

PART – B

(Analytical/Problem solving questions)   [4×8=32]

Attempt any four questions

Q.1 Discuss different modes of transportation. Give features of each of them based on their utility. [8]

Q.2 Give classification of roads by Nagpur Road Plan. [8]

Q.3 Give sketches of typical cross section for different categories of Urban & Rural roads. [8]

Q.4 Give differences between Bitumen and Tar. [8]

Q.5 Calculate the safe stopping sight distance for a design speed of 50 kmph for - [8]

(a)   Two-way traffic on a two-lane road

(b)   Two-way traffic on a single lane road

Assume coefficient of friction as 0.37 and reaction time of driver as 2.5 seconds.

Q.6 Give the names of various tests carried out on road aggregate. Explain aggregate impact test with the help of a neat diagram. [8]

Q.7 Define permanent ways. Give ideal requirements of permanent way. Draw typical cross-section of a permanent way on Embankment. [8]

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions)   [2×15=30]

Attempt any two questions

Q.1 What are the desirable properties of a good bitumen? Write names of various tests carried out on bitumen. Explain Ductility test with the help of a diagram.   [15]

Q.2 (a) What are the basic requirements of Highway alignment? Explain the factors governing highway alignment.   [7]

(b) The design speed of highway is 80 kmph, there is a horizontal curve of radius 200m in a certain locality. Safe limit of transverse coefficient of friction is 0.15.   [8]

(i) Calculate the super elevation required to maintain this speed.

(ii) If the maximum super-elevation of 0.07 is not to be exceeded, calculate the maximum allowable speed on this horizontal curve as it is not possible to increase the radius.

Q.3 (a) Give differences between WBM Roads and WMM Roads.   [7]

(b) Explain various types of Road Rollers used for compaction during road construction.   [8]

Q.4 Explain CBR Test for evaluating the stability of flexible pavement with the help of a neat diagram. Also give limitation of CBR Test with respect to soil properties.   [15]

Q.5 (a) Define terminal area. Write about factors affecting site selection of Airport.   [7]

(b) Give advantages & disadvantages of various types of sleepers used in Railway construction.   [8]

7E7062

B. Tech. VII - Sem. (Back) Exam., Feb.-March - 2021
Civil Engineering
7CE2A Design of Steel Structures - I

Time: 2 Hours   [To be converted as per scheme]
Max. Marks: 48
Min. Marks: 15

Instructions to Candidates:

*Attempt **three questions**, selecting **one question each** from any three **unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.*

Use of following supporting material is permitted during examination. (Mentioned in form No.205)

1. IS Handbook for Structural Engg.-Vol-I   2. IS 800 - 2007

UNIT- I

Q.1 (a) A prismatic continuous beam ABCD is fixed at A and simply supported at B, C and D. It is subjected to factored loads as shown in Fig.1. Find collapse mechanism.   [10]
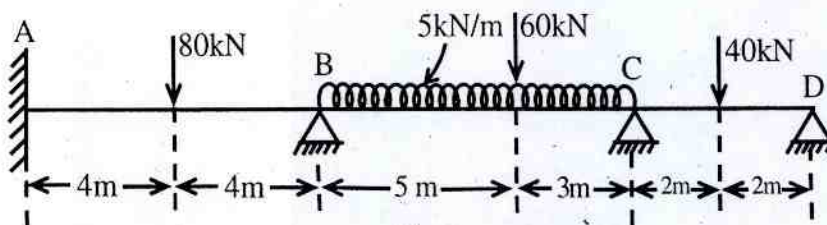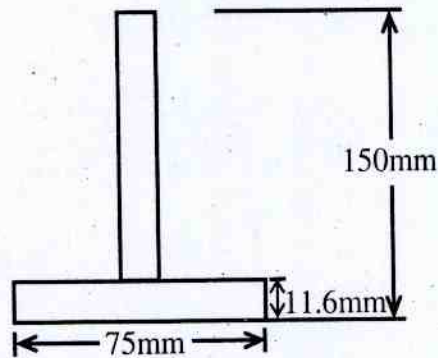

(Fig.1)

(b) Classify the following sections, where f_y = 250 N/mm² -   [6]

(i)   ISLB 300 @ 37.7 kg/m

(ii)   ISHB 400 @ 77.4 kg/m

(iii) ISHB 200 @ 37.3 kg/m

Q.1 (a) Classify the sections and compute effective area – [4]

ISA 100×100×6 and ISA 75×75×8

(b) Calculate shape factor for the section shown in Fig.2 [6]

(Fig.2)

(c) Determine collapse load W for continuous beam ABCDE loaded and supported as shown in Fig.3. For span AC, plastic moment of resistance is 50% more than that of CE. [6]
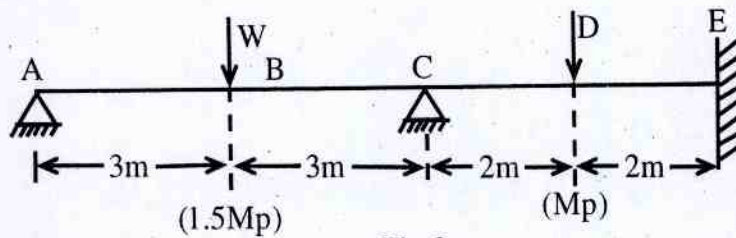

Fig.3

UNIT- II

Q.2 (a) Design a double angle (equal-angles) tie member of a roof truss subjected to a factored tensile force of 300kN. The two angles are to be connected by bolts back to back on either side of gusset 8mm thick. Take f_y=250 N/mm^2 , f_u=410 N/mm^2 for both the angle sections and bolts. Design bolted connections. Check the member for its design bearing strength and block shear strength as well in addition to yielding and rupture etc. [14]

(b) A 18 mm thick plate is joined to a 16 mm plate by 200 mm long (effective) butt weld. Determine the strength of joint, if a double V butt weld is used. [2]

Q.2 (a) A tie member of a roof truss consists of 2 ISA100×75×8mm. The angles are connected to either side of a 10mm gusset plates and the member is subjected to a factored full force of 450 kN. Design the welded connection. Assume connections are made in a workshop. [13]

(b) Calculate the strength of a 20 mm diameter bolt of grade 4.6 for 'lap joint'. The main plates to be joined are 10 mm thick. [3]

UNIT- III

Q.3 (a) Design double angle section back to back on each side of gusset 8mm thick for a continuous rafter (compression member) of a truss to carry factored load of 350 kN. Centre-to-center length of member between centroids of connections is 2.5m. [8]

(b) Determine the design axial load on the column section ISMB 500@ 1017.3 N/m, if the height of column is 3.0 metres and it is pin-ended. Also, $f_u=250$ N/mm^2, $f_u=410$ N/mm^2, $E=2\times10^5$ N/mm^2. [8]

OR

Q.3 (a) An ISHB 300 is to be used as a short column. Determine its (design strength) load carrying capacity if Fe 540 grade steel with $f_u=410$ N/mm^2. [4]

(b) Design a single angle strut carrying factored compressive load of 180 kN. Length of member is 2.30m. Assume number of bolts at each end to be more than 2. Design bolted connection also. [12]

UNIT- IV

Q.4 (a) Determine the design strength in bending of ISLB 350@ 486N/m considering beam to be laterally supported. The design shear force is less than 0.6 times the design shear strength. The unsupported length of the beam is 3.5m. Assume steel of Grade Fe410. [6]

(b) A simply supported beam which is laterally supported, of span 4.5m is subjected to a factored load of 380 kN at its centre through a plate of 150mm length, Check its adequacy in strength, web buckling, web crippling and deflection if the section used is ISMB 400. [10]

Q.4 (a) Compute the moment carrying capacity of a laterally unrestrained ISMB 450 member of length 3.5m. [10]

(b) An ISLB 600@ 976.1 N/m has been used as a simply supported beam over 6.50m span. Determine the safe uniformly distributed load that the beam can carry in addition to its own weight. Assume Fe 410 grade steel and the compression flange to be restrained. [6]

UNIT- V

Q.5 A non sway column in a building frame with flexible joints is 3.8m high and subjected to factored axial load of 520 kN and factored moment at top of column = 25 kNm and at bottom of column as 40 kNm. Design a suitable member assuming effective length of the compression member as 0.85L along both the axes and $f_y = 250 N/mm^2$. [16]

OR

Q.5 Design a slab base for a column ISHB 300 subjected to an axial factored load of 950 kN and a factored bending moment about major axis of 25 kNm. The base plate rests on a concrete pedestal of M30 Grade and the bearing capacity of soil is 400 kN/m². [16]

7E1714

B. Tech. VII - Sem. (Main) Exam., Feb.- March - 2021
OE - I Open Elective-I Civil Engineering
7CE6 – 60.2 Disaster Management

Time: 2 Hours

[To be converted as per scheme]
Max. Marks: 82
Min. Marks: 29

Instructions to Candidates:

Attempt all ten questions from Part A, four questions out of seven questions from Part B and two questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL   2. NIL

PART – A

(Answer should be given up to 25 words only)   [10×2=20]

All questions are compulsory

Q.1 What are the consequences of disaster on a society?

Q.2 What are the major man-made causes of floods?

Q.3 Who are the National Disaster Risk Reduction Stakeholders?

Q.4 Is there a national disaster management policy, act or related legislation?

Q.5 What is response time?

Q.6 What is radiological and nuclear disaster?

Q.7 Describe cyclones.

Q.8 What is industrial disaster?

Q.9 What are natural hazards?

Q.10 What is disaster management cycle?

PART – B

(Analytical/Problem solving questions)   [4×8=32]

Attempt any four questions

Q.1 What are coping strategies with disaster?

Q.2 Explain dimensions of vulnerability factors for earthquake hazards.

Q.3 Explain disaster management cycle.

Q.4 What are industrial safety plans, safety norms and survival kits?

Q.5 Write about legislative support at the state and national level for disaster management.

Q.6 Explain disaster phenomena.

Q.7 Write about disaster resources and their utility in disaster management.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions)   [2×15=30]

Attempt any two questions

Q.1 Explain Disaster Management Act and Policy in India.

Q.2 What are the different types of disaster management?

Q.3 What are the objectives of disaster management?

Q.4 Explain steps for formulating a disaster risk reduction plan.

Q.5 What are vulnerabilities to flood and earthquake hazards?

7E1713

B. Tech. VII - Sem. (Main) Exam., Feb.- March - 2021
OE -I Open Elective - I Civil Engineering
7CE6 – 60.1 Environmental Impact Analysis

Time: 2 Hours

[To be converted as per scheme]
Max. Marks: 82
Min. Marks: 29

Instructions to Candidates:

Attempt all ten questions from Part A, four questions out of seven questions from Part B and two questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

PART – A

(Answer should be given up to 25 words only)   [10×2=20]

All questions are compulsory

Q.1	What do you mean by EIS?	[2]
Q.2	What are the effects of human activity on environment?	[2]
Q.3	What are the guidelines of MoEF?	[2]
Q.4	Describe E. M. P.	[2]
Q.5	What is the industrial policy of the Govt. of India on EIA?	[2]
Q.6	What is the prediction on socio-economic environment?	[2]
Q.7	What are the water quality criteria?	[2]
Q.8	What is fauna and flora?	[2]
Q.9	Explain CPCB guidelines.	[2]
Q.10	What are Noise Barriers?	[2]

PART – B

(Analytical/Problem solving questions) [4×8=32]

Attempt any four questions

Q.1 Explain scope of the course. [8]

Q.2 Explain the concept of ecosystem imbalance. [8]

Q.3 Write notes on - [8]

    (a) Stockholm and Basal convention

    (b) Rio-Earth summit

Q.4 Explain the prediction and assessment of impacts on water. [8]

Q.5 Discuss the EIA on thermal power plant. [8]

Q.6 Explain the Land pollution due to contraction activities. [8]

Q.7 Explain the Air quality impact of industry transport system. [8]

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) [2×15=30]

Attempt any two questions

Q.1 Explain the objectives and outcome of the course. [15]

Q.2 What is EIA? Explain the methodology of EIA. [15]

Q.3 Explain the water quality standards and describe the impact on water quality of development projects. [15]

Q.4 Write notes on - [15]

    (a) Biota

    (b) Air quality criteria

    (c) Effects of noise on people

Q.5 Explain the EIA of Nuclear power plant. [15]

7E7063

B. Tech. VII - Sem. (Back) Exam., Feb.-March - 2021
Civil Engineering
7CE3A Design of Concrete Structures - II

Time: 2 Hours

[To be converted as per scheme]

Max. Marks: 48

Min. Marks: 15

Instructions to Candidates:

Attempt **three questions**, selecting **one question each** from any three **unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No.205)

1. IS 1343 : 1980   2. IS 456 – 2000   3. IS 3370 (Part-II & IV)   4. IRC 6 & 21 : 2000

UNIT- I

Q.1 (a) What is the basic principle of pre-stressed concrete? [6]

(b) A rectangular concrete beam of cross section 300 mm deep and 200 mm wide is pre-stressed by means of 10 wires of 8 mm diameter located 65 mm from the bottom of the beam and 5 wires of diameter of 8 mm, 25 mm from the top. Assuming the pre-stress in the steel as $1000N/mm^2$, calculate the stresses at the extreme fibres of the mid-span section when the beam is supporting its own weight over a span of 8m. If a uniformly distributed live load of 6kN/m is imposed, evaluate the maximum working stress in concrete. The density of concrete is $24kN/m^3$. [10]

Q.1 A pre-stressed concrete beam, 200 mm wide and 300 mm deep, is pre-stressed with wires (area = 400mm^2) located at a constant eccentricity of 60 mm and carrying an initial stress of 1200N/mm^2. The span of the beam is 10m. Calculate the percentage loss of stress in wires if (a) the beam is pre-tensioned, and (b) the beam is post-tensioned, using the following data; [16]

E$_s$ = 210 kN/mm^2 and E$_c$ = 32 kN/mm^2, Relaxation of steel stress = 5 percent of the initial stress. Shrinkage of concrete = 300*10^{-6} for pre-tensioning and 200*10^{-6} for post-tensioning, Creep coefficient = 1.6, Slip at anchorage = 1 mm, Frictional coefficient for wave effect = 0.0015 per m

UNIT- II

Q.2 A rectangular concrete beam 400 mm wide and 600 mm deep is subjected to the following at a section (i) Factored bending moment of 70 kN-m (ii) Factored shear force of 50 kN and (iii) Factored torsional moment of 30 kN-m. Design the section for torsion. Use M20 grade of concrete and Fe 415 grade of steel. [16]

OR

Q.2 (a) A curved beam is in a form of a full continuous circle in plan with a radius of 8 m and it is supported continuously on 4 supports, the beam carries an UDL of 8 kN/m including its self-weight. Determine the bending moment, shear force and torsional moment at salient location and plot bending moment, shear force and torsion moment diagram. [12]

(b) Explain the concept of redistribution of moment. [4]

UNIT- III

Q.3 Design a spherical dome over a circular room, for the following data: (i) Inside diameter of room = 14 m, (ii) Rise of dome = 6 m, (iii) Live load due to wind ice, snow etc, = 1.5 kN/m². The dome has opening of 1.8 m diameter at its crown. A lantern is provided at its top, which causes a dead load of 25 kN acting along the circumferences of the opening. Use M20 concrete and Fe 415 steel. [16]

OR

Q.3 (a) Differentiate between circular water tank and rectangular water tank. [4]

(b) Design a circular tank of capacity of 210000 liters. The depth of the tank is limited to 3 m from inside. Keep the joint between the wall and base slab as flexible. The base slab rests on the ground. Use M20 grade of concrete. [12]

UNIT- IV

Q.4 Design a T shaped cantilever retaining wall to retain earth embankment 4 m height above ground level, the unit weight of earth is 18 kN/m³ and its angle of repose is 30°. The embankment is horizontal at its top. The safe bearing capacity of soil be taken as 130 kN/m² and the coefficient of friction between soil and concrete as 0.5. Use M20 mix and Fe 415 bars. [16]

OR

Q.4 (a) Differentiate between counterfort retaining wall and buttress type retaining wall. [6]

(b) Write characteristic features of yield line theory. Also derive an expression for ultimate load of simply supported square slab. [10]

UNIT- V

Q.5 Design a solid slab bridge for class – A loading for the following data: clear span = 5 m, clear width of road ways = 7.5 m, average thickness of wearing coat = 75 mm, use M20 grade of concrete, take unit weight of concrete 24000 N/m^3. [16]

OR

Q.5 Design a box culvert having inside dimension 3.5 m * 3.5 m. The box culvert is subjected to a superimposed dead load of 12000 N/m^3 and a live load of 45000 N/m^3 from the top. Assume unit weight of soil as 18000 N/m^3 and angle of repose of 30°. Use M 20 grade of concrete and Fe 415 grade of steel. [16]

7E7064

B. Tech. VII - Sem. (Back) Exam., Feb.-March - 2021
Civil Engineering
7CE4A Transportation Engineering - II

Time: 2 Hours

Maximum Marks: 48
Min. Passing Marks: 15

Instructions to Candidates:

Attempt **three questions**, selecting **one question each** from any three **unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No.205)

1. NIL _____   2. NIL _____

UNIT- I

Q.1 (a) Describe the functions and requirements of sleepers to be used for railways. Also enumerate the classification of sleepers according to the materials used.   [8]

(b) Explain the various types of rail failures with the help of neat diagrams.   [8]

OR

Q.1 (a) Enlist the different materials used as ballast. Also explain the functions and requirements of good quality ballast to be used for railways.   [8]

(b) Explain the various factors considered in selection of alignment.   [8]

UNIT- II

Q.2 (a) What do you understand by crossings? Explain different types of crossings with the help of neat sketches.   [8]

(b) Draw a neat sketch of a point and explain its various components.   [8]

OR

Q.2 (a) Explain "elevated railway systems". What are the merits and demerits of elevated railway systems over underground railway systems? [8]

(b) Explain in detail the recent developments in railway networking. [8]

UNIT- III

Q.3 (a) Explain the different types of Gradients and write the permissible values adopted in Indian Railways. [8]

(b) Determine the length of transition curve and draw the offset at every 15m. Given that the design speed of the train on curve is 90 kmph on a Board Gauge track. [8]

OR

Q.3 (a) Describe in detail the advantages of 'Widening of gauges'. [8]

(b) What do you understand by the term "cant deficiency"? Explain in detail. [8]

UNIT- IV

Q.4 (a) Explain in detail the various requirements of Airport planning. [8]

(b) Describe in detail the factors involved in airport site selection. [8]

OR

Q.4 (a) Describe various types of runway patterns with the help of neat sketch. [8]

(b) Write a short note on the following -

(i) Hanger [4]

(ii) Apron [4]

UNIT- V

Q.5 (a) Describe Load Classification Number (LCN) method of rigid and flexible pavement design for runway. [8]

(b) Enlist the causes of failure of rigid pavements. [8]

OR

Q.5 (a) Discuss the various factors to be considered in determining the airport pavement thickness. [8]

(b) Discuss the Westergaard's method for design of airfield rigid pavement. [8]

7E7065

B. Tech. VII - Sem. (Back) Exam., Feb.-March - 2021
Civil Engineering
7CE5A Application of Numerical Methods in Civil Engg.

Time: 2 Hours   [To be converted as per scheme]

Max. Marks: 48

Min. Marks: 15

Instructions to Candidates:

Attempt **three questions**, selecting **one question each** from any three **unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No.205)

1. NIL _____   2. NIL ' _____

UNIT- I

Q.1 (a) Explain the various types of errors with suitable examples.   [8]

(b) If $u = 4 x^2 y^3 / z^4$ and errors in x, y, z be 0.001, compute the relative maximum error in u when $x = y = z = 1$.   [8]

OR

Q.1 (a) Explain the following terms with examples -

    (i) Decimal & Binary Number system   [4]

    (ii) Propagation of errors   [4]

(b) Round off the number 47.5689 to four significant figures and compute the absolute and relative errors that occur.   [8]

UNIT- II

Q.2 (a) Find the real root of the equation $x^3 - 2x - 5 = 0$ by the method of false-position correct to three decimal places. [8]

(b) Using Newton-Raphson method, find the real root of the equation $3x = \cos x + 1$. [8]

OR

Q.2 (a) Using Bisection method, find a root of the equation $x^3 - 4x - 9 = 0$ [8]

(b) Find the real root of the equation $x^3 - 5x + 1 = 0$ by Secant method. [8]

UNIT- III

Q.3 (a) Find the rank of the matrix - [8]

$$\begin{bmatrix} 0 & 1 & -3 & -1 \\ 1 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & -2 & 0 \end{bmatrix}$$

(b) Explain Gauss – Jordan method with suitable example. [8]

OR

Q.3 (a) Solve the following equations by Cramer's rule - [8]

$$3x + y + 2z = 3$$

$$2x - 3y - z = -3$$

$$x + 2y + z = 4$$

(b) Solve the following equations by Gauss elimination method - [8]

$$2x_1 + 4x_2 + x_3 = 3$$

$$3x_1 + 2x_2 - 2x_3 = -2$$

$$x_1 - x_2 + x_3 = 6$$

UNIT- IV

Q.4 (a) Solve the following equations - [8]

$20x + y - 2z = 17, 3x + 20y - z = -18$

$2x - 3y + 20z = 25$

by Jacobi iteration method

(b) Explain LU decomposition method with example. [8]

OR

Q.4 (a) Solve the following equations by matrix inversion method - [8]

$x_1 + x_2 + 2x_3 = 4, 2x_1 + 5x_2 - 2x_3 = 3$ and $x_1 + 7x_2 - 7x_3 = 5$

(b) Solve the equations $27x + 6y - z = 85, 6x + 15y + 2z = 72, x + y + 54z = 110$ by

Gauss- Seidel method. [8]

UNIT- V

Q.5 From the following table - [16]

x	10°	20°	30°	40°	50°	60°	70°	80°
y	0.9848	0.9397	0.866	0.766	0.6428	0.500	0.3420	0.1737

Evaluate- (i) $y(25°)$ (ii) $y(32°)$ (iii) $y(73°)$

Q.5 (a) Using the Lagrange's Interpolation formula, find the value of y(x = 10) from the

following table - [8]

x	:	5	6	9	11
y	:	12	13	14	16

(b) Using Newton's divided difference formula evaluate f (9), given - [8]

x	:	5	7	11	13	17
f(x)	:	150	392	1452	2366	5202

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B. Tech. VII - Sem. (Back) Exam., Feb.-March - 2021
Civil Engineering
7CE6.1A Advance Transportation Engineering

Time: 2 Hours

[To be converted as per scheme]
Max. Marks: 48
Min. Marks: 15

Instructions to Candidates:

*Attempt **three questions,** selecting **one** question **each** from any three **unit.**
All Questions carry **equal** marks. Schematic diagrams must be shown wherever
necessary. Any data you feel missing suitably be assumed and stated clearly. Units
of quantities used/ calculated must be stated clearly.*

*Use of following supporting material is permitted during examination.
(Mentioned in form No.205)*

1. Normal Distribution Table _____   2. NIL _____

UNIT- I

Q.1 (a) Describe any six applications of Origin and Destination (O & D) study. Discuss
the method of "Road side interview method" used for O & D study.   [3+5=8]

(b) Discuss any six uses of speed and delay study. Describe the method "Floating Car
or Riding Check method" used for the speed and delay study.   [3+5=8]

OR

Q.1 (a) Enumerate and discuss in detail about any eight factors responsible for road
accidents.   [8]

(b) What are merits and demerits of on-street and off-street parking, discuss? Draw
the layout plan of various types of on-street parking with the help of sketches and
also write the formula to calculate number of parking spaces (N) in a kerb length
of L.   [3+5=8]

UNIT- II

Q.2 The occupancy of parking spaces in a parking lot consisting of 50 spaces is shown below. The count was taken as 15 minute intervals during 4 hours duration between 10.00 AM to 2:00 PM on 6 week days (Monday to Saturday). Find by inspection whether the number of vacant spaces during any count follow a Poisson distribution- [16]

Occupancy of Parking Spaces	50	49	48	47	46	45	44	43	42	41	40 and less
Frequency	6	15	21	20	15	10	5	2	1	1	0

OR

Q.2 (a) Spot speed data at a particular location are normally distributed with a mean of 51.7 kmph and a standard deviation of 8.3 kmph- [3×4=12]

(i) What is the probability that the speed exceeds 65 kmph?

(ii) What is the probability that the speed lies between 40 and 70 kmph?

(iii) Calculate 85th percentile speed.

Available data: $\phi\,(1.00) = 0.8413$; $\phi\,(1.05) = 0.8531$; $\phi\,(1.6) = 0.9425$; $\phi\,(1.4) = 0.9192$; $\phi\,(2.20) = 0.9861$

(b) Define "Sampling theory and Significance of testing". [4]

UNIT- III

Q.3 (a) Define Macroscopic and Microscopic parameters related to traffic stream. Describe all the three macroscopic parameters such as volume, speed, density and discuss relation between them. [8]

(b) Discuss Human & Vehicular road user characteristics. [8]

OR

Q.3 (a) Describe principles of road junction design. Draw the labeled diagram of Rotary

Intersection. [5+3=8]

(b) Write short notes on the followings - [4×2=8]

(i) Bus stops

(ii) Parking lots

(iii) Webster method of signal design

(iv) Design of rotary intersection

UNIT- IV

Q.4 (a) Discuss general features & specifications (size, background color, border color,

letter size etc.) of warning signs, regulatory signs and informatory signs. Draw four

sketches of all three categories along with their significance/use. [6+6=12]

(b) List out various regulations and ordinances for drivers. [4]

OR

Q.4 (a) Discuss specifications and applications of Divisional, Channelizing, Pedestrian

loading and Rotary islands. Also draw neat sketches of each type. [6+2=8]

(b) Write short notes on any four of the followings– [4×2=8]

(i) Road markings

(ii) Mixed traffic in India

(iii) Traffic Laws

(iv) Street Lighting

(v) Access control on highways

UNIT- V

Q.5 (a) What are ill effects of major air pollutants caused by traffic, discuss? Describe measures for controlling air pollution generated due to traffic. [8]

(b) Discuss about detrimental effects caused by noise pollution on human health. Discuss the methods/techniques used to reduce the noise pollution. [8]

OR

Q.5 (a) Describe about equipment and accessories used on the roads to enhance the safety of road users. [8]

(b) How the road safety audit plays and important role for identification of problem, causation and prevention? Discuss the importance of road safety audits conducted on existing roads and on new roads during construction & after construction. [8]

B. Tech. VII - Sem. (Back) Exam., Feb.-March - 2021
Civil Engineering
7CE6.3A Rural Water Supply & Sanitation

Time: 2 Hours   **Maximum Marks: 48**
           Min. Passing Marks: 15

Instructions to Candidates:
     Attempt **three questions**, selecting **one question each** from any three **unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.
     Use of following supporting material is permitted during examination. (Mentioned in form No.205)

1. NIL _____   2. NIL _____

UNIT- I

Q.1 (a) Describe with a neat sketch the construction of sanitary well.   [8]

     (b) Discuss the traditional sources of water in rural areas. Explain their significances in present scenario.   [8]

OR

Q.1 (a) What is the importance of village communities in Indian society?   [8]

     (b) Discuss the condition of Indian villages with regard to economic, health and social aspects.   [8]

UNIT- II

Q.2 What do you understand by communicable disease? How can these be transferred and controlled?   [16]

OR

Q.2 What is 'Guinea worm disease'? What are the symptoms of this disease? What is the life cycle of this worm? Give cause, prevention and treatment of this disease.   [16]

UNIT- III

Q.3 (a) Differentiate between flow sand filters and horizontal roughing filters. Give neat sketch of both the filters. What are the advantages of horizontal roughing filter? [8]

(b) What do you understand by treatment of water? Why it is necessary? Describe in brief the various types of de-fluoridation methods that are available. [8]

OR

Q.3 (a) Explain the importance of disinfection and the common methods used for it in rural areas. [8]

(b) What is significance of fluoride in drinking water? What do you mean by de-fluoridation? What types of de-fluoridation methods are available? [8]

UNIT- IV

Q.4 Describe in brief the various tests used to control the quality of milk and dairy products. [16]

OR

Q.4 (a) Give a sketch of life cycle of mosquitoes. What are the remedial measures to control the mosquito nuisance? [8]

(b) What do you understand by food poisoning? Explain the term Botulism and discuss its ill effects. [8]

UNIT- V

Q.5 (a) What is Bio-Gas? Explain the working of a biogas plant. What are the reasons of failure of biogas plant? [8]

(b) Draw a flow diagram for the planning procedure adopted in community water supply and sanitation projects. [8]

OR

Q.5 Write short notes on –

(a) Septic tank [4]

(b) Small bore sewer system [4]

(c) Soak pit [4]

(d) Composting [4]