B.L.D.E.A's V.P.Dr.P.G.HALAKATTI COLLEGE OF ENGINERING AND TECHNOLOGY VIJYAPUR 586103

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18CV32

Third Semester B.E. Degree Examination, June/July 2023
Strength of Materials

Time: 3 hrs.

Max. Marks: 100

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

Module-1

1 a. Draw a typical stress-strain curve for behavior of a mild steel rod during tension test. Show salient points on the graph and briefly explain them. **(06 Marks)**

   b. Derive an expression for deformation of a circular tapered bar, subjected to axial tensile force 'P'. **(06 Marks)**

   c. A composite section made up of steel with 100mm internal diameter and 120mm external diameter is fitted inside a bruss tube of 140mm internal diameter and 160mm external diameter, under a compressive load of 500kN. Determine stress in both materials. $E_s = 200 \times 10^3 \text{N/mm}^2$, $E_b = 100 \times 10^3 \text{ N/mm}^2$. Also determine deformation if length of bar is 1500mm. **(08 Marks)**

OR

2 a. Determine the net deformation of a stepped circular bar with different forces as shown in Fig.Q.2(a). Take Young's modulus $E = 210 \text{kN/mm}^2$.
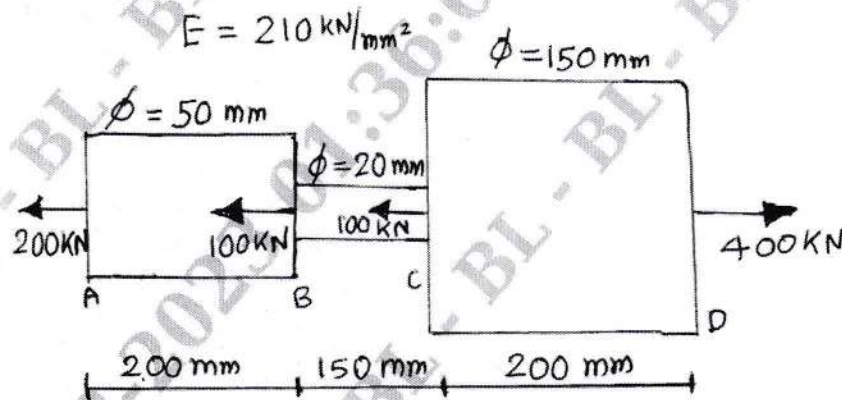
Fig.Q.2(a)

(08 Marks)

   b. Establish a relation between modulus of elasticity (E), modulus of rigidity (G) and Poisson's ratio (μ). **(06 Marks)**

   c. A steel rod of 20m length is at 20°C. Find the expansion of the rod if the temperature rises to 65°C. Also find temperature stresses for following:
   i) When expansion is fully prevented?
   ii) An expansion of 5.8mm is allowed.
   If the temperature stress in the rod is 35N/mm², what is permitted expansion in the rod? Assume E = 200GPa and $\alpha = 12 \times 10^{-6}/°C$. **(06 Marks)**

3

c. Define following:
   i) Section modulus
   ii) Moment of resistance
   iii) Pure bending
   iv) Modulus of rupture.

(04 Marks)

OR

8 a. Derive Torsion equation stating the assumptions. (08 Marks)
  b. Determine the diameter of a solid shaft which will transmit 300kW at 250r.p.m. The maximum shear stress should not exceed 30N/mm^2 and twist should not be more than 1° in a shaft length of 2m. Assume rigidity modulus as 1×10^5 N/mm^2. (08 Marks)
  c. Define following:
     i) Pure Torsion
     ii) Torsional rigidity
     iii) Polar modulus.

(04 Marks)

Module-5

9 a. A beam of 6m is simply supported at ends and carries two point loads 48kN and 40kN at a distance 1m and 3m respectively from left support. Determine:
   i) Deflection under each load.
   ii) Maximum deflection
   iii) Point of maximum deflection.
   Assume E = 2×10^5 N/mm^2 and I = 85×10^6 mm^4. Adopt Macaulay's method. (10 Marks)
  b. A beam of uniform section and constant depth is freely supported over a span of 3m. It carries a point load of 30kN at the mid span. Take $I_{xx} = 15.614 \times 10^{-6}$ m^4. Determine:
     i) Central deflection
     ii) Slopes at the ends.
     Take E = 200GPa and use double integration method. (06 Marks)
  c. Derive an expression for relation between slope, deflection and radius of curvature.

(04 Marks)

OR

10 a. State the assumptions made in the Euler's column theory. (04 Marks)
   b. Derive expression for crippling load when both ends of the column are hinged. (06 Marks)
   c. A hollow cylindrical cast iron column is 4m long with both ends fixed. Determine the minimum diameter of the column if it has to carry a safe load of 250kN with a factor of safety of 5. Internal diameter is 0.8 times external diameter. σ_c = 550N/mm^2, $\alpha = \dfrac{1}{1600}$ in Rankine's formula.

(10 Marks)

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Third Semester B.E. Degree Examination, June/July 2023
Fluid Machines

Time: 3 hrs.   Max. Marks: 100

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. Define the following and give the SI units :
      i)   Dynamic viscosity
      ii) Surface tension
      iii) Mass density
      iv) Weight density   **(06 Marks)**
   b. Derive expression for capillary rise and fall in a liquid.   **(06 Marks)**
   c. A closed tank contains air, turpentine and bromine as indicated in Fig.Q1(c). Determine gauge pressure at the bottom of tank. Also express this pressure interms of mm of mercury. Assume atmospheric pressure as 103KPa. The specific gravity of bromine is 3.1 and that of turpentine is 0.7. The air pressure in the top of the tank is measured as 25KPa vaccum. Also express bottom pressure in absolute pressure.
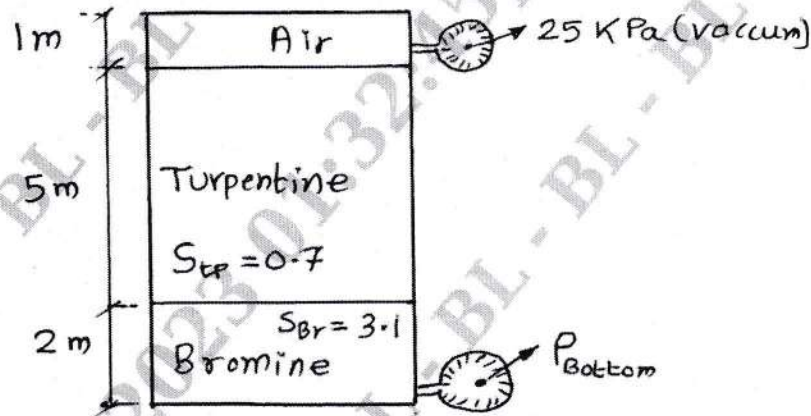
Fig.Q1(c)   **(08 Marks)**

OR

2 a. Derive an expression for variation of static pressure with depth inside a static mass of fluid.
                                                                                (06 Marks)
   b. Derive expression for finding pressure difference between two points using differential manometer.   **(06 Marks)**
   c. A shaft of diameter 400mm rotates inside a bearing of length 100mm with 200rpm. The lubricant thickness is 1.4mm, being used in the arrangement. The dynamic viscosity of lubricant is 0.7 Pa –sec. Determine the torque and power required to overcome the viscous resistance.   **(08 Marks)**

5

Module-2

3   a.   Derive an expression for total pressure and location of center of pressure for a vertically submerged plane surface. **(08 Marks)**

   b.   A circulate plate of 2.5m diameter is immersed in water in such a way that the greatest and least depths are 3m and 1m respectively. Determine the total pressure on one face and location of center of pressure from free surface. **(08 Marks)**

   c.   Determine the location of the centre of pressure for a dam shown in Fig.Q3(c) using pressure diagram method. Height of the water behind dam is 5m and width of the dam is 20m. Also find the value of total pressure.
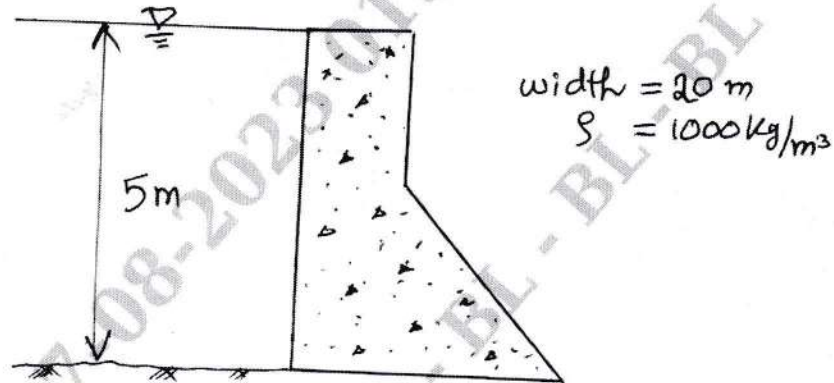

Fig.Q3(c)   **(04 Marks)**

OR

4   a.   Derive continuity equation for one dimensional flow. **(04 Marks)**

   b.   Prove that equipotential lines are orthogonal to stream lines at all points of intersection. **(08 Marks)**

   c.   In a 2 – D flow the velocity potential ϕ is given by $\phi = x[2y – 1]$. Determine the velocity at point P(4, 5). Also determine the value of stream function ψ at the point 'P'. **(08 Marks)**

Module-3

5   a.   Derive Euler's equation of motion and then obtain Bernoulli's equation. State the assumptions and limitation of Bernoulli's theorem. **(10 Marks)**

   b.   A converging pipe of 0.3m diameter at inlet and 0.15m diameter at outlet carries a water flow. Inlet is 6m above datum and outlet is 1m above the datum. Inlet pressure is $1.5 \times 10^5 N/m^2$ and inlet velocity is 5m/s. Determine the outlet velocity and pressure. Neglect the losses. **(05 Marks)**

   c.   250 LPS of water is flowing in a pipe having diameter 0.3m. The pipe is bent by 135° with respect to initial flow direction. Determine the magnitude and direction of the resultant force on the bend. Take water pressure as 392.4KPa. **(05 Marks)**

OR

6   a.   A 0.3m × 0.15m venturimeter is fixed in a vertical pipeline carrying oil of specific gravity 0.9, the flow being upwards. The difference between elevation of throat and inlet of venturimeter is 0.3m. The U – tube differential manometer shows a gauge deflection of 0.25m. Determine the oil flow rate in the pipe line and pressure difference between inlet and throat. $C_d = 0.98$ and specific gravity of mercury is 13.6. Draw the necessary diagram. **(10 Marks)**

   b.   Briefly explain the working principle of orificemeter with a sketch. **(05 Marks)**

   c.   A sub-marine moves horizontally in sea and has its axis 15m below the surface of water. A pitot tube is placed in front of the submarine and along its axis is connected to the two limbs of U-tube containing mercury. The difference of mercury level is 170mm. Find the speed of the sub-marine, assuming specific gravity of mercury as 13.6 and that of sea water as 1.026 with respect to fresh water. **(05 Marks)**

6

Module-4

7 a. Derive an expression for discharge through a triangular notch. **(06 Marks)**
   b. Give various classifications of orifice and mouthpiece. **(06 Marks)**
   c. A jet of water coming from an orifice of 25mm diameter under a heat of 1.5m falls vertically 0.915m before it strikes the ground at a distance of 2.288m measured horizontally from vena – contracta. The flow rate is 102 LPM. Determine the hydraulic coefficients. **(08 Marks)**

OR

8 a. Derive expression for hydraulic coefficients of an orifice using Jet distance measurement method. **(06 Marks)**
   b. Briefly explain :
      i) Cipolleti notch
      ii) Ventilation of notch. **(06 Marks)**
   c. A rectangular weir of crest length 0.5m is used to measure flow rate in a rectangular channel of 0.8m wide and 0.7m deep. Water level is 80mm above weir crest. Determine the flow rate in the channel. Use velocity of approach method. $C_d = 0.62$. Consider one trial. **(08 Marks)**

Module-5

9 a. Derive Darcy – Weisbach equation for friction loss in a pipe. **(08 Marks)**
   b. Briefly explain :
      i) Major loss
      ii) Minor loss
      iii) Hydraulic gradient line **(04 Marks)**
   c. The water is flowing in a pipe with velocity 1.5m/s, having length 2500m and diameter 500mm. Find the rise in pressure in the pipe of valve closed in : i) 25 seconds ii) 3 second. Assume C = 1460 m/s. **(08 Marks)**

OR

10 a. Briefly explain the term water hammer in pipes. **(06 Marks)**
   b. Derive an expression for pressure rise in a pipe when valve is gradually closed. **(06 Marks)**
   c. Three pipes of 400mm, 200mm and 300mm diameter have lengths of 400m, 200m and 300m respectively. These pipes are connected in series to form a compound pipe. The ends of pipes are connected to two tanks with a difference in water levels of 16m. The friction coefficient is 0.005 for all pipes. Determine the discharge in the compound pipe by neglecting minor losses. **(08 Marks)**

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18CV34

Third Semester B.E. Degree Examination, June/July 2023
Building Materials and Construction

Time: 3 hrs.   Max. Marks: 100

Note: 1. *Answer any FIVE full questions, choosing ONE full question from each module.*
2. *Assume missing data suitably.*

Module-1

1	a.	Write the requirements of good building stones.	(06 Marks)
	b.	Briefly explain the causes of decay of stones.	(06 Marks)
	c.	Briefly explain the process of manufacturing of clay bricks.	(08 Marks)

OR

2	a.	Briefly explain size, shape and texture of coarse aggregates.	(06 Marks)
	b.	Explain specific gravity test and moisture content on fine aggregates.	(06 Marks)
	c.	Mention the various tests conducted on bricks and explain any two of them.	(08 Marks)

Module-2

3	a.	Write the functions and requirements of good foundation.	(04 Marks)
	b.	With the help of sketch, explain (i) Combined footing (ii) Strap footing	(08 Marks)
	c.	With the help of sketches, explain salient features of English Bond and Flemish Bond.	(08 Marks)

OR

4	a.	Briefly explain the classification of size stone masonry.	(06 Marks)
	b.	With neat sketches, explain types of joints in stone masonry.	(08 Marks)
	c.	Explain the following: (i) Load bearing wall (ii) Partition wall	(06 Marks)

Module-3

5	a.	Briefly explain classification of Lintels.	(06 Marks)
	b.	Draw a neat sketch of a Segmental Arch and explain various technical terms used in arch work.	(08 Marks)
	c.	Write the requirements of good floor.	(06 Marks)

OR

6	a.	Explain the procedure for laying of flooring for the following types of floors: (i) Terrazzo flooring (ii) Granite flooring	(08 Marks)
	b.	Write the requirements of good roof.	(04 Marks)
	c.	With the help of neat sketch, explain king post truss.	(08 Marks)

Module-4

7	a.	Write the important considerations for location of Doors and Windows.	(04 Marks)
	b.	With neat sketch, explain (i) Collapsible Door (ii) Rolling Steel Door	(08 Marks)
	c.	With neat sketch, explain (i) Bay window (ii) Dormer Window	(08 Marks)

8

OR

8 a. Write the requirements of good stairs. **(06 Marks)**

   b. Design an RCC stair located in a stair case hall measuring 2.5 m × 5.5 m. The vertical distance between the floors is 4m. Draw a section showing details of reinforcement. **(08 Marks)**

   c. What is underpinning? With sketch, explain pit method of underpinning. **(06 Marks)**

Module-5

9 a. Explain the following: (i) Stucco plastering (ii) Lathe Plastering **(08 Marks)**

   b. Explain defects of plastering. **(06 Marks)**

   c. Explain various methods of damp proofing. **(06 Marks)**

OR

10 a. Explain the constituents of a good paint and their purposes. **(06 Marks)**

   b. Explain the procedure for painting of wood surface and plastered surface. **(08 Marks)**

   c. Write the defects of painting. **(06 Marks)**

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18CV35

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Third Semester B.E. Degree Examination, June/July 2023
Basic Surveying

Time: 3 hrs.   Max. Marks: 100

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

Module-1

1   a.   Discuss in detail with sketches the principles of surveying.   **(10 Marks)**
    b.   Write a note on Survey of India Map numbering system with examples.   **(10 Marks)**

OR

2   a.   With figure discuss how do you carry out direct and indirect ranging of lines.   **(10 Marks)**
    b.   Write note on :
      i)   Electronic Distance Measurement
      ii)   Booking of Field Notes
      iii)   Obstacles in chaining and ranging   **(10 Marks)**

Module-2

3   a.   What is local attraction in compass survey? Give its relevance.   **(08 Marks)**
    b.   The following bearings were taken in a closed compass traverse.

Line	Fore Bearing	Back Bearing
AB	48° 25′	230° 00′
BC	177° 45′	356° 00′
CD	104° 15′	284° 55′
DE	165° 15′	345° 15′
EA	259° 30′	79° 00′

    State the stations affected by local attraction and by how much and determine the correct bearings.   **(12 Marks)**

OR

4   a.   Give the relevance of magnetic dip and declination in compass survey.   **(08 Marks)**
    b.   The magnetic bearing of a line is N 60° 30′ W in 1994 when the declination was 5° 10′ E. Find the present magnetic hearing if declination is 3° W.   **(06 Marks)**
    c.   Distinguish between True bearing and Magnetic bearing.   **(06 Marks)**

Module-3

5   a.   Describe with sketches the collimation method of reducing levels and compare the collimation method with the rise and fall method.   **(10 Marks)**
    b.   The following consecutive readings were taken with a level and 4.0m staff on a continuously sloping ground at a common interval of 30m:
     0.780, 1.535, 1.955, 2.430, 2.985, 3.480, 1.155, 1.960, 2.365, 3.640, 0.935, 1.045, 1.630 and 2.545.
     The reduced level of the first point A = 180.750m. Calculate the reduced levels of the points by the collimation method and get the gradient of the joining first and last point?   **(10 Marks)**

10

OR

6 a. Discuss on the curvature and refraction effect in levelling? **(10 Marks)**

  b. The following notes refers to the reciprocal levels taken with one level.

Instrumentation station	Staff readings on		Remarks
	A	B	
A	1.030	1.630	Distance AB = 800m
B	0.950	1.540	RL of A = 450m

Find the true difference of elevation between A and B. Also find the collimation error of instrument. **(10 Marks)**

Module-4

7 a. State the advantages and disadvantages of plane tabling. **(10 Marks)**

  b. Discuss with sketches the intersection and resection method of plotting of points in plane tabling. **(10 Marks)**

OR

8 a. State the 3-point problem and explain how it is solved by the graphical method. **(10 Marks)**

  b. Discuss on the errors in plane table survey. **(10 Marks)**

Module-5

9 a. State and prove the trapezoidal and Simpson's rule for determining the area. **(10 Marks)**

  b. Calculate the area of the zero circle with the following data. The multiplying constant is 100 cm².

Initial Readings	Final Reading	Position of anchor point	Remarks
6.520	2.724	Outside the figure	Zero of the disk crossed fixed index mark once in clockwise direction
1.222	7.720	Inside the figure	Aero of the disc crossed the fixed index marks twice in the anticlockwise direction

(10 Marks)

OR

10 a. Discuss in detail indirect method of contouring and direct method of contouring. **(10 Marks)**

  b. From a topographical map, the areas enclosed by contour lines for a proposed dam are given below. Find the volume of the impounded water using trapezoidal formula and prismoidal formula.

Contours (m)	Area enclosed (Hectares)
500	20
505	100
510	400
515	900
520	1100

(10 Marks)

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CBCS SCHEME

18CV36

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Third Semester B.E. Degree Examination, June/July 2023
Engineering Geology

Time: 3 hrs.

Max. Marks: 100

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

Module-1

1 a. Explain the parts of the interior of the earth with neat sketches. **(12 Marks)**
   b. Describe the role of Engineering Geology in the field of Civil Engineering projects. **(08 Marks)**

OR

2 a. Critically examine the difference between the Rock forming minerals and arc forming minerals. **(06 Marks)**
   b. Differentiate between Lustre and Diaphaneity with examples. **(04 Marks)**
   c. Explain the physical properties of the following minerals and mention their uses:
      i) Quartz   ii) Calcite   iii) Magnetite **(10 Marks)**

Module-2

3 a. What are Igneous rocks? How are they formed and classify the different types of Igneous rocks based on their mode of origin. **(10 Marks)**
   b. Describe the different types of concordant Igneous Intrusion with neat sketches. **(10 Marks)**

OR

4 a. Explain the origin, mineralogical composition, crashing strength, structure and mention their uses:
      i) Granite   ii) Basalt   iii) Sandstone   iv) Gneiss **(12 Marks)**
   b. Briefly explain the classification of soil profile with neat sketches. **(04 Marks)**
   c. Explain the characteristics of rocks as materials for construction. **(04 Marks)**

Module-3

5 a. What are joints classify different types of joints with neat sketches and mention their engineering uses. **(10 Marks)**
   b. Describe the different types of uncertainty with neat sketches and mention the engineering considerations. **(10 Marks)**

OR

6 a. Explain the parts of the dam with neat sketches? Which are the preventive measures have to be taken for the selection of Dam site. **(10 Marks)**
   b. Explain the Rock Quality determination and rock structural ratings. **(04 Marks)**
   c. Differentiate between the strike Dip and Outcrops in the field how are they useful in civil engineering applications? **(06 Marks)**

Module-4

7 a. With neat sketches describe the confined and unconfined aquifers. **(12 Marks)**
   b. Explain Hydrological cycle with neat sketches. **(08 Marks)**

12

OR

8 a. Describe the vertical distribution of ground water with neat sketches. (08 Marks)
  b. Explain the ground water exploration by using Electrical resistivity method. (08 Marks)
  c. Explain the uses of porosity and permeability in ground water exploration. (04 Marks)

Module-5

9 a. What is Earthquake? Explain the types, causes and effects. (10 Marks)
  b. Explain Tsunami causes and effects. (05 Marks)
  c. What are Landslides and explain causes and effects. (05 Marks)

OR

10   Describe the following :
  a. Topographic maps
  b. Remote Sensing
  c. GIS
  d. Impact of Mining and Quarrying (20 Marks)

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18MATDIP31

Third Semester B.E. Degree Examination, June/July 2023
Additional Mathematics - I

Time: 3 hrs.

Max. Marks: 100

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

Module-1

1 a. Express the complex number $\dfrac{(3+i)(1-3i)}{2+i}$ in the form x + iy. Also find its magnitude.

(06 Marks)

   b. Find the cube roots of $\ell - i$ and represent them in an argand plane. (07 Marks)

   c. If $\vec{a} = 2\hat{i} + 3\hat{j} - 4\hat{k}$ and $\vec{b} = 8\hat{i} - 4\hat{j} + \hat{k}$ then show that $\vec{a}$ is perpendicular to $\vec{b}$, also find $|\vec{a} \times \vec{b}|$.

(07 Marks)

OR

2 a. Find the modulus and amplitude of $1 - \cos\alpha + i\sin\alpha$. (06 Marks)

   b. If $\vec{a} = \hat{i} + \hat{j} - \hat{k}$; $\vec{b} = 2\hat{i} - \hat{j} + 2\hat{k}$ and $\vec{c} = 3\hat{i} - \hat{j} - \hat{k}$, find
   i) $\vec{a} \cdot (\vec{b} \times \vec{c})$ ii) $\vec{b} \times (\vec{a} \times \vec{c})$.

(07 Marks)

   c. Prove that $[\vec{a} \times \vec{b}, \vec{b} \times \vec{c}, \vec{c} \times \vec{a}] = [\vec{a}\ \vec{b}\ \vec{c}]^2$. (07 Marks)

Module-2

3 a. Using Maclaurin's series, prove that $\sqrt{1+\sin 2x} = 1 + x - \dfrac{x^2}{2} - \dfrac{x^3}{6} + \dfrac{x^4}{24} - - - -.$ (06 Marks)

   b. If $u = \tan^{-1}\left(\dfrac{x^3 + y^3}{x - y}\right)$, prove that $x\dfrac{\partial u}{\partial x} + y\dfrac{\partial u}{\partial y} = \sin 2u$. (07 Marks)

   c. If $u = 1 - x$, $v = x(1-y)$, $w = xy(1-z)$, find $\dfrac{\partial(u, v, w)}{\partial(x, y, z)}$. (07 Marks)

OR

4 a. Obtain the Maclaurin's expansion of the function $\log(1 + e^x)$. (06 Marks)

   b. If $u = f(x-y, y-z, z-x)$, Prove that $\dfrac{\partial u}{\partial x} + \dfrac{\partial u}{\partial y} + \dfrac{\partial u}{\partial z} = 0$. (07 Marks)

   c. If $u = x + y + z$, $w = y + z$, $z = uvw$, find $\dfrac{\partial(x, y, z)}{\partial(u, v, w)}$. (07 Marks)

Module-3

5 a. A particle moves along a curve C with parametric equations $x = t - \dfrac{t^3}{3}$, $y = t^2$ and $z = t + \dfrac{t^3}{3}$, where t is the time. Find the velocity and acceleration and any time t and also find their magnitudes at t = 3.

(06 Marks)

   b. Find div $\vec{F}$ and Curl $\vec{F}$, where $\vec{F} = \nabla(x^3 + y^3 + z^3 - 3xyz)$. (07 Marks)

   c. Find the directional derivative of $\phi = x^2 yz^3$ at (1, 1, 1) in the direction of $\hat{i} + \hat{j} + 2\hat{k}$.

(07 Marks)

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OR

6 a. Show that the vector field $\vec{F} = yz\,\hat{i} + xz\,\hat{j} + xy\,\hat{k}$ is solenoidal vector field. (06 Marks)

b. If $\vec{F} = (x + y + 1)\,\hat{i} + \hat{j} - (x + y)\,\hat{k}$, show that $\vec{F} \cdot \text{curl}\,\vec{F} = 0$. (07 Marks)

c. Find the constants a , b , c such that $\vec{F} = (x + y + az)\,\hat{i} + (x + cy + 2z)\,\hat{k} + (bx + 2y - z)\,\hat{j}$ is irrotational. (07 Marks)

Module-4

7 a. Obtain the Reduction formula for $\int_0^{\pi/2} \cos^n x \, dx$. (06 Marks)

b. Evaluate $\int_0^1 \int_x^{\sqrt{x}} (x^2 + y^2)\, dy\, dx$. (07 Marks)

c. Evaluate $\int_0^1 \int_0^1 \int_0^1 (x + y + z)\, dx\, dy\, dz$. (07 Marks)

OR

8 a. Evaluate $\int_1^2 \int_0^{3-y} xy\, dx\, dy$. (06 Marks)

b. Evaluate $\int_0^1 \int_0^1 \int_0^1 e^{x+y+z}\, dx\, dy\, dz$. (07 Marks)

c. Obtain the Reduction formula $\int \sin^m x \cos^n x\, dx$. (07 Marks)

Module-5

9 a. Solve : $(x^2 + y)\, dx + (y^3 + x)\, dy = 0$. (06 Marks)

b. Solve : $x \log x \dfrac{dy}{dx} + y = 2 \log x$. (07 Marks)

c. Solve : $\dfrac{dy}{dx} + \dfrac{y}{x} = y^2 x$. (07 Marks)

OR

10 a. Solve : $y\, e^y\, dx = (y^3 + 2x\, e^y)\, dy$. (06 Marks)

b. Solve : $(x^2 - y^2)\, dx = 2xy\, dy$. (07 Marks)

c. Solve : $[1 + (x + y) \tan y]\, \dfrac{dy}{dx} + 1 = 0$. (07 Marks)

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18MAT31

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Third Semester B.E. Degree Examination, June/July 2023
Transform Calculus, Fourier Series and Numerical Techniques

Time: 3 hrs.   Max. Marks: 100

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

Module-1

1 a. Find $L\left(\dfrac{\cos at - \cos bt}{t}\right)$. **(06 Marks)**

   b. Express the function in terms of unit step function and hence find Laplace transform of
   $$f(t) = \begin{cases} \sin t & 0 < t < \frac{\pi}{2} \\ \cos t & \frac{\pi}{2} < t < \pi \end{cases}$$ **(07 Marks)**

   c. Solve $y''(t) + 4y'(t) + 3y(t) = e^t$, $y(0) = y'(0) = 1$ by using Laplace transform method. **(07 Marks)**

OR

2 a. Find : (i) $L^{-1}\left(\log\left(\dfrac{s+b}{s+a}\right)\right)$ (ii) $L^{-1}\left(\dfrac{s+3}{s^2 - 4s + 13}\right)$ **(06 Marks)**

   b. Find $L^{-1}\left(\dfrac{s}{(s^2 + a^2)^2}\right)$ by using convolution theorem. **(07 Marks)**

   c. Given $f(t) = \begin{cases} t & 0 < t < a \\ 2a - t & a < t < 2a \end{cases}$

   where $f(t) = f(t + 2a)$ then show that $L(f(t)) = \dfrac{1}{s^2}\tan h\left(\dfrac{as}{2}\right)$ **(07 Marks)**

Module-2

3 a. Obtain Fourier series for $f(x) = \dfrac{\pi - x}{2}$, $0 < x < 2\pi$. **(06 Marks)**

   b. Find Fourier series for $f(x) = 2x - x^2$, $0 < x < 2$. **(07 Marks)**

   c. Find half range Fourier cosine series for
   $$f(x) = \begin{cases} x, & 0 < x < \frac{\pi}{2} \\ \pi - x, & \frac{\pi}{2} < x < \pi \end{cases}$$ **(07 Marks)**

OR

4 a. Find Fourier series for $f(x) = |x|$, $-\pi < x < \pi$. **(06 Marks)**

   b. Obtain Fourier series for $f(x) = \begin{cases} 0 & -2 < x < 0 \\ 1 & 0 < x < 2 \end{cases}$ **(07 Marks)**

   c. Find the Fourier series upto first harmonic from the following table:

x	0	1	2	3	4	5
y = f(x)	4	8	15	7	6	2

(07 Marks)

1 of 3

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Module-3

5 a. Find Fourier transform of f(x), given:

$$f(x) = \begin{cases} 1, & |x| \le 1 \\ 0, & |x| > 1 \end{cases}$$ and hence deduce that $\int_0^\infty \frac{\sin x}{x} dx = \frac{\pi}{2}$. **(06 Marks)**

b. Find the Fourier cosine transform of

$$f(x) = \begin{cases} 4x & 0 < x < 1 \\ 4 - x & 1 < x < 4 \\ 0 & x > 4 \end{cases}$$ **(07 Marks)**

c. Solve $u_{n+2} + 4u_{n+1} + 3u_n = 3^n$, given $u_0 = 0$, $u_1 = 1$ using Z - transform. **(07 Marks)**

OR

6 a. Find the Fourier sine transform of $e^{-|x|}$ and hence evaluate $\int_0^\infty \frac{x \sin mx}{1 + x^2} dx$. **(06 Marks)**

b. Find Z-transform of $\cos n\theta$ and $a^n \cos n\theta$. **(07 Marks)**

c. Obtain the inverse Z-transform of $\frac{2z^2 + 3z}{(z + 2)(z - 4)}$. **(07 Marks)**

Module-4

7 a. Find the value of y at x = 0.1 and x = 0.2 given $\frac{dy}{dx} = x^2 y - 1$, y(0) = 1 by using Taylor's series method. **(06 Marks)**

b. Compute y(0.1), given $\frac{dy}{dx} = \frac{y - x}{y + x}$, y(0) = 1 taking h = 0.1, by using Runge-Kutta 4th order method. **(07 Marks)**

c. Find the value of y at x = 0.4, given $\frac{dy}{dx} = 2e^x - y$ with initial conditions y(0) = 2, y(0.1) = 2.010, y(0.2) = 2.04, y(0.3) = 2.09 by using Milne's predictor and corrector method. **(07 Marks)**

OR

8 a. Using modified Euler's method, find the value of y at x = 0.1, given $\frac{dy}{dx} = -xy^2$, y(0) = 2 taking h = 0.1. **(06 Marks)**

b. Solve $\frac{dy}{dx} = 3e^x + 2y$, y(0) = 0 at x = 0.1 taking h = 0.1, by using Runge-Kutta 4th order method. **(07 Marks)**

c. Find the value y at x = 0.8 given $\frac{dy}{dx} = x - y^2$ and

x	0	0.2	0.4	0.6
y	0	0.0200	0.0795	0.1762

By using Adam's Bashforth predictor and corrector method. **(07 Marks)**

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Module-5

9   a.   Solve $\dfrac{d^2y}{dx^2} = x\left(\dfrac{dy}{dx}\right)^2 - y^2$ for x = 0.2 given x = 0, y = 1 and $\dfrac{dy}{dx} = 0$ by using Runge-Kutta method. **(07 Marks)**

b.   Derive Euler's equation in the standard form $\dfrac{\partial f}{\partial y} = \dfrac{d}{dx}\left(\dfrac{\partial f}{\partial y'}\right) = 0$. **(06 Marks)**

c.   Find the extremal of the function $\int_0^1 [(y')^2 + 12xy]dx$ with y(0) = 0 and y(1) = 1. **(07 Marks)**

OR

10   a.   Find the value of y at x = 0.8, given $\dfrac{d^2y}{dx^2} = 2y\dfrac{dy}{dx}$ and

x	0	0.2	0.4	0.6
y	1	0.2027	0.4228	0.6841
y'	1	1.041	1.179	1.468

by using Milne's method. **(07 Marks)**

b.   Prove that the shortest between two points in a plane is a straight line. **(06 Marks)**

c.   Find the curve on which the functional $\int_0^1 [x + y + (y')^2]dx$ with y(0) = 1, y(1) = 2. **(07 Marks)**

* * * * *

CBCS SCHEME

21CIP37/21CIP47

USN ☐☐☐☐☐☐☐☐☐☐

Question Paper Version : D

Third/Fourth Semester B.E./B.Tech. Degree Examination, June/July 2023
CONSTITUTION OF INDIA AND PROFESSIONAL ETHICS

[Time: 1 hrs.]

[Max. Marks: 50]

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the Fifty questions, each question carries one mark.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting, using whiteners** on the **OMR** sheets are strictly prohibited.

---

1. The tenure of the Council of state is,
   a) Not subject to dissolution   b) 2 years   c) 5 years   d) 4 years

2. When elections are held in one or a few constituencies due to death or resignation of candidates, it is called as _____.
   a) General election   b) Primary election
   c) By election   d) Midterm election

3. Fundamental Rights are borrowed from the constitution of,
   a) UK   b) USA   c) Germany   d) Ireland

4. What is the minimum age to become Judges of Supreme Court of India?
   a) 25 years   b) 30 years   c) 35 years   d) None of these

5. The Indian constitution gives the power of amending the constitution to,
   a) The people of India   b) The president
   c) The Parliament   d) Supreme Court of India

6. Right to Education (RTE) was introduced in _____ Amendment,
   a) 86th b) 42nd c) 44th d) 61st

7. How many types of writs can be issued by the Supreme Court for the protection of Fundamental Rights?
   a) Four   b) Five   c) One   d) Six

8. Who presides over the sessions of Rajya Sabha?
   a) Speaker   b) Home minister   c) Vice-president   d) President

Ver D – 1 of 4

9. Who appoints the Vice-Chancellors of the state universities?
a) Education minister b) District commissioner c) Chief minister d) Governor

10. Election commission is a _____ body and the term of election commission is _____ years or _____ years of age whichever is earliear.
a) Uni-member, 4 years or 62 years   b) Multi-member, 6 years or 65 years
c) Constitutional body, 5 years or 60 years   d) None of these

11. Which of the following is not the concept of responsibilities?
a) Minimalist   b) Reasonable care   c) Utilitarianism   d) Good works

12. Lying means,
a) Intentionally conveying false information to others   b) Fabrication
c) Plagarism   d) All of these

13. The three types of Justice reffered in our preamble are :
a) Social, Economic and Religious   b) Social, Economic and Natural
c) Social, Economic and International   d) Social, Economic and Political

14. An arrested person must be produced before a magistrate within _____ hours of arrest.
a) 12   b) 24   c) 36   d) 48

15. Election commission conducts the election as per which act?
a) Parliament act   b) People's representative act of 1982
c) Code of conduct act   d) State representative act

16. When the office of the president, falls vacant, the same must be filled up with in?
a) 3 months   b) 6 months   c) 1 year   d) 9 months

17. Who among the following are not entitled to form Union or Association,
a) Police   b) Teachers   c) Workers   d) Doctors

18. The MLA's of various state legislative assemblies are varying between,
a) 40 to 450   b) 50 - 500   c) 28 - 12   d) 60 - 500

19. A bill cannot become an act of parliament, unless and until _____?
a) it is passed by Lok Sabha   b) it is passed by Rajya Sabha
c) it gets assent from President   d) it gets approved by Supreme Court

20. Who hoisted the National Flag during 74th Republic day function in New Delhi?
a) Prime Minister   b) President
c) Vice-President   d) Chief justice of India

21. The member to be nominated by the President for the council of states are from,
a) Literature   b) Science   c) Sports   d) All of these

22. Which of the following Pairs is not property matched ,
a) 44th Amendment-citizenship act   b) 52nd Amendment-Anti Defection Law
c) 42nd Amendment-Fundamental duties   d) 73rd Amendment-Local self Government

23. The speaker of Lok Sabha,
a) is appointed by the President   b) is nominated by the Vice-President
c) is choosen by the members of Lok Sabha d) is elected by the members of parliament

Ver D – 2 of 4

24. Financial Emergence has been imposed in India,
    a) Once   b) Never   c) Twice   d) Thrice

25. Respect for the National Flag and the National Anthem is,
    a) a Fundamental right   b) a Fundamental Duty
    c) a Directive principle   d) an ordinary duty

26. A non-member of the state legislature can be the minister for a period not exceeding,
    a) Six month   b) One year   c) Six weeks   d) Three months

27. Engineering ethics is a,
    a) developing ethics   b) Preventive ethics
    c) natural ethics   d) Scientifically developed ethics

28. Risk estimation can be done by using,
    a) Cooking   b) Trimming   c) Event tree   d) Both (a) and (b)

29. The Patent holder does not allow others to use patented information for _____ years from the date of filing.
    a) 25   b) 30   c) 50   d) 20

30. The use of intellectual property of others without their permission or credit is referred to as,
    a) Cooking   b) Plagiarism   c) Patents   d) Formulae

31. How many members were nominated to the parliament by the president of India?
    a) 14 members   b) 12 members   c) 2 members   d) 6 members

32. Who among the following distribute portfolious for the council of minister,
    a) President   b) Vice president   c) Prime Minister   d) Speaker of Lok Sabha

33. The chief justice and other judges of the supreme court hold office till they complete,
    a) Sixty years   b) Sixty five years   c) Sixty two years   d) Seventy years

34. The council of ministers are responsible to the,
    a) Rajya Sabha   b) Vidhan Parshid   c) Lok Sabha   d) Supreme court

35. The Vice-President of India is elected by the,
    a) Judges of the supreme court   b) President
    c) Prime Minister   d) Members of parliament

36. Who can issue ordinance when the parliament is not in session:
    a) President   b) High court judges   c) Home minister   d) Finance minister

37. In case of the violation of the Fundamental Rights we may approach the,
    a) Civil Courts   b) Supreme Court   c) High Court   d) Both (a) and (b)

38. Which of the following equalities is/are included in the Right to Equality?
    a) Equality before law   b) Equal protection of law
    c) Equal opportunities in the public employment   d) All of these.

39. Prohibition of trafficking in human beings and forced labour comes under which of the following fundamental right?
    a) Right to freedom   b) Right against exploitation
    c) Cultural & Educational Right   d) Right to equality.

Ver D – 3 of 4

21

40. There is no provision in the constitution for the impeachment of the,
    a) President   b) Vice President   c) Governor   d) Supreme court Judges

41. When was the Indian constitution enacted and adopted?
    a) 26/10/1949   b) 26/11/1949   c) 26/4/1949   d) 26/01/1950

42. 'We the people of India' are the opening words of the,
    a) Preamble of the Indian constitution   b) Article 21 of the Indian constitution
    c) Fundamental rights   d) Directive principles of state policy

43. Which one of these is the primary source of the Indian constitution?
    d) British constitution   b) Irish constitution
    c) Charter Act of 1833   d) Government of India Act of 1935

44. The original Indian constitution had :
    a) 12 parts, 6 schedule and 320 Articles   b) 20 parts, 8 schedule and 380 Articles
    c) 12 parts, 8 schedule and 396 Articles   d) 12 parts, 10 schedule and 300 Articles

45. The word 'Sovereign' means that,
    a) Supreme in nature   b) A country is under dictatorship
    c) A country is poor of weak   d) A country is strong and powerfull

46. Directive principles are,
    a) Justiciable   b) Not practiced at rural levels
    c) Non-justiciable   d) Associated to the Government worker's

47. How much time was taken for training the constitution?
    a) 1 year, 11 months, 18 days   b) 5 year, 11 months, 18 days
    c) 2 year, 11 months, 18 days   d) 3 year, 11 months, 18 days

48. India is a Sovereign, socialist, selular, democratic and republic in the Indian constitution this expression occurs in,
    a) Citizenship   b) Preamble
    c) Fundamental rights   d) Directive principles

49. Who among the following is the supreme commander of the Armed forces?
    a) Air Chief Marshal   b) Prime Minister
    c) Defense Minister   d) President

50. The 91st Amendment Act (2003) is associated with,
    a) Size of the council of ministers   b) Primary education
    c) Fundamental Duty   d) Powers of the President

* * * * *

Ver D – 4 of 4

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐

21MAT31

Third Semester B.E. Degree Examination, June/July 2023
Transform Calculus, Fourier Series and Numerical Techniques

Time: 3 hrs.

Max. Marks: 100

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

Module-1

1 a. Find the Laplace transform
$$2^t + \frac{\cos 2t + \cos 3t}{t}$$
(06 Marks)

   b. Find the Laplace transform of the triangular wave of period 2C given by
$$f(t) = \begin{cases} t & 0 < t < c \\ 2c - t & c < t < 2c \end{cases}$$
(07 Marks)

   c. Using convolution theorem find the inverse Laplace transform of
$$\frac{s}{(s^2 + a^2)^2}$$
(07 Marks)

OR

2 a. Express the function f(t) in terms of unit step function and hence find the Laplace transform
of $\quad f(t) = \begin{cases} \sin t & 0 < t < \pi \\ \sin 2t & \pi < t < 2\pi \\ \sin 3t & t \geq 2\pi \end{cases}$
(06 Marks)

   b. Find the inverse laplace transform $\dfrac{2s^2 - 6s + 5}{(s-1)(s-2)(s-3)}$
(07 Marks)

   c. Solve the using Laplace transform method
$$y''(t) + 4y'(t) + 4y = e^{-t} \qquad y(0) = 0 \qquad y'(0) = 0$$
(07 Marks)

Module-2

3 a. Obtain the Fourier series of $f(x) = \dfrac{\pi - x}{2}$ in $0 < x < 2\pi$. Hence deduce that
$$1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \ldots = \frac{\pi}{4}$$
(06 Marks)

   b. Obtain the half range cosine series for the function $f(x) = 2x - 1$ in $0 < x < 1$
(07 Marks)

   c. Obtain the Fourier series of y upto the first harmonic for the following values:

x°	45	90	135	180	225	270	315	360
y	4.0	3.8	2.4	2.0	-1.5	0	2.6	3.4

(07 Marks)

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OR

4 a. Obtain the Fourier series of $f(x) = x \cos x$ in the interval $-\pi \le x \le \pi$. **(06 Marks)**

   b. Obtain the sine half range Fourier series for the function,
   $$f(x) = \begin{cases} \dfrac{2Kx}{\ell} & \text{in } 0 \le x \le \dfrac{\ell}{2} \\ \dfrac{2K}{\ell}(\ell - x) & \text{in } \dfrac{\ell}{2} \le x \le \ell \end{cases}.$$
   (07 Marks)

   c. Obtain the constant term and the first three coefficients in the Fourier cosine series of y in the following data :

x	0	1	2	3	4	5
y	4	8	15	7	6	2

   (07 Marks)

Module-3

5 a. Find the complex Fourier transform of the function,
   $$f(x) = \begin{cases} a^2 - x^2 & \text{for } |x| < a \\ 0 & \text{for } |x| > a \end{cases}.$$

   Hence evaluate $\displaystyle\int_0^\infty \left(\frac{\sin s - s \cos s}{s^3} \right) ds = \frac{\pi}{2}$. **(06 Marks)**

   b. Find the Fourier sine transform of e^{-ax}. **(07 Marks)**

   c. Find the z-transform of $\cos n\theta$ and $\sin n\theta$. **(07 Marks)**

OR

6 a. Find the Fourier cosine transform of the function, $f(x) = \begin{cases} 4x & 0 < x < 1 \\ 4 - x & 1 < x < 4 \\ 0 & x > 4 \end{cases}$. **(06 Marks)**

   b. Find the inverse z-transform of $\dfrac{2z^2 + 3z}{(z+2)(z-4)}$. **(07 Marks)**

   c. Solve by using z-transform $y_{n+2} - 4y_n = 0$ given that $y_0 = 0$ and $y_1 = 2$. **(07 Marks)**

Module-4

7 a. Classify the following partial differential equation

   i) $\dfrac{\partial^2 u}{\partial x^2} + 4\dfrac{\partial^2 u}{\partial x \partial y} + 4\dfrac{\partial^2 u}{\partial y^2} - \dfrac{\partial y}{\partial x} + 2\dfrac{\partial u}{\partial y} = 0$

   ii) $x^2 \dfrac{\partial^2 u}{\partial x^2} + (1 - y^2)\dfrac{\partial^2 u}{\partial y^2} = 0 \; -\infty < x < \infty, \; -1 < y < 1$

   iii) $(1 + x^2)\dfrac{\partial^2 u}{\partial x^2} + (5 + 2x^2)\dfrac{\partial^2 u}{\partial x \partial t} + (4 + x^2)\dfrac{\partial^2 u}{\partial t^2} = 0$

   iv) $(x + 1)\dfrac{\partial^2 u}{\partial x^2} - 2(x + 2)\dfrac{\partial^2 u}{\partial x \partial y} + (x + 3)\dfrac{\partial^2 u}{\partial y^2} = 0$

   (10 Marks)

b. Find the values of u(x, t) satisfying the parabolic equation $\dfrac{\partial^2 u}{\partial x^2} = 2\dfrac{\partial u}{\partial t}$ and its boundary conditions u(0, t) = 0 = u (4,t) and u(x, 0) = x(4 − x) by taking h = 1 find the value up to t = 5. **(10 Marks)**

OR

8 a. Solve $\dfrac{\partial u}{\partial t} = \dfrac{\partial^2 u}{\partial x^2}$ in 0 < x < 5, t ≥ 0 given that u(x, 0) = 20 u(0, t) = 0 u(5,t) = 100 compute U for the time step h = 1 by crank Nicholson method. **(10 Marks)**

   b. Solve the wave equation $\dfrac{\partial^2 u}{\partial t^2} = 4\dfrac{\partial^2 u}{\partial x^2}$ subject to the condition u(0, t) = 0 u(4, t) = 0 u_t(x, 0) = 0 and u(x, 0) = x(4 − x) by taking h = 1, K = 0.5 up to four steps. **(10 Marks)**

Module-5

9 a. Given $\dfrac{d^2 y}{dx^2} - x^2\dfrac{dy}{dx} - 2xy = 1$, y(0)) = 1, y′(0) = 0 evaluate y(0.1) using Runge-Kutta method of order 4. **(06 Marks)**

   b. Derive the Euler's equation of the form $\dfrac{\partial t}{\partial y} - \dfrac{d}{dx}\left(\dfrac{\partial t}{\partial y1}\right) = 0$. **(07 Marks)**

   c. Find the extremal of the functional $I = \int\limits_{0}^{\pi/2}(y^2 - y'^2 - 2y\sin x)dx$ under the conditions y(0) = y(π/2) = 0. **(07 Marks)**

OR

10 a. Apply Milne's predictor corrector method to solve $\dfrac{d^2 y}{d^2 x} = 1 - 2y\dfrac{dy}{dx}$ at 0.8 given that

   y(0) = 0,   y(0.2) = 0.02,   y(0.4) = 0.0795,   y(0.6) = 0.1762,
   y′(0) = 0,   y′(0.2) = 0.1996, y′(0.4) = 0.3937,   y′(0.6) = 0.5689. **(06 Marks)**

   b. Show that the geodesics on a plane are straight line. **(07 Marks)**

   c. Which curve the functional $\int\limits_{0}^{\pi/2}(y'^2 - y^2 + 2xy)dx$, y(0) = 0, y(π/2) = 0 be extremized. **(07 Marks)**

* * * * *

21KSK37

Question Paper Version : **A**

USN ☐☐☐☐☐☐☐☐☐☐

Third Semester B.E/B.Tech Degree Examination, June/July 2023

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ - **Samskruthika Kannada**

Time: 1 hrs.]

[Max. Marks: 50

ಸೂಚನೆಗಳು

1. ಎಲ್ಲ ೫0 ಪ್ರಶ್ನೆಗಳಿಗೂ ಉತ್ತರಿಸಿರಿ. ಪ್ರತಿ ಪ್ರಶ್ನೆಗೆ ಒಂದು ಅಂಕ.

2. ಓ.ಎಂ.ಆರ್ ಉತ್ತರ ಪತ್ರಿಕೆಯಲ್ಲಿ ಯು.ಎಸ್.ಎನ್ ಸಂಖ್ಯೆ ಹಾಗೂ ಪಶ್ನೆ ಪತ್ರಿಕೆಯ ಶ್ರೇಣಿಯನ್ನು ಅಂದರೆ A, B, C ಅಥವಾ D ಯನ್ನು ತಪ್ಪಿಲ್ಲದಂತೆ ಕಡ್ಡಾಯವಾಗಿ ಗುರುತಿಸುವುದು ಅಭ್ಯರ್ಥಿಯ ಜವಾಬ್ದಾರಿಯಾಗಿರುತ್ತದೆ.

3. ಓ.ಎಂ.ಆರ್ ಉತ್ತರ ಪತ್ರಿಕೆಯಲ್ಲಿ ನಿಗದಿಪಡಿಸಿರುವ ಸ್ಥಳದಲ್ಲಿ ಭರ್ತಿಮಾಡದೆ ಹಾಗೆಯೇ ಬಿಟ್ಟಲ್ಲಿ ಅಥವಾ ಭರ್ತಿಮಾಡಿದ ಮಾಹಿತಿಯಲ್ಲಿ ಯಾವುದೇ ವ್ಯತ್ಯಾಸವಿದ್ದಲ್ಲಿ ಅಂತಹ ಉತ್ತರ ಪತ್ರಿಕೆಗಳನ್ನು ರದ್ದು ಪಡಿಸಲಾಗುವುದು.

4. ಕೇವಲ ಒಂದು ಉತ್ತರವನ್ನು ಮಾತ್ರ ಉತ್ತರ ಪತ್ರಿಕೆಯಲ್ಲಿ ಗುರುತಿಸತಕ್ಕದ್ದು. ಒಂದೇ ಪ್ರಶ್ನೆಗೆ ಎರಡು ಉತ್ತರವನ್ನು ಗುರುತಿಸುವುದು ಅಮಾನ್ಯ.

5. ಎಲ್ಲಾ ಉತ್ತರಗಳನ್ನು ನಿಮಗೆ ಒದಗಿಸಲಾದ ಓ.ಎಂ.ಆರ್ ಉತ್ತರ ಪತ್ರಿಕೆಯ ಹಾಳೆಯ ಮೇಲೆ ಕಪ್ಪು ಅಥವಾ ನೀಲಿ ಶಾಹಿಯ ಬಾಲ್‌ಪಾಯಿಂಟ್ ಪೆನ್ನಿನಿಂದ ಗುರುತು ಮಾಡಬೇಕು.

---

1. ಕರ್ನಾಟಕ ಗತವೈಭವ ಗ್ರಂಥವನ್ನು ರಚಿಸಿದವರು ----------

   a) ಶ್ರೀರಂಗ

   b) ಆಲೂರು ವೆಂಕಟರಾಯ

   c) ಡಿ. ಎಲ್. ನರಸಿಂಹಚಾರ್ಯ

   d) ಕುವೆಂಪು

2. 1955 ರಲ್ಲಿ ರಾಯಚೂರಿನಲ್ಲಿ ನಡೆದ ಕನ್ನಡ ಸಾಹಿತ್ಯ ಪರಿಷತ್ತಿನ ಸಮ್ಮೇಳದ ಅಧ್ಯಕ್ಷರು.

   a) ಕೆ.ಆರ್. ಕಾರಂತ   b) ಚಂಗಲರಾಯ ರೆಡ್ಡಿ   c) ಶ್ರೀರಂಗ   d) ಶಿವಮೂರ್ತಿ ಶಾಸ್ತ್ರಿ

3. ಕನ್ನಡ ಭಾಷೆಯ ಲಿಪಿಯನ್ನು 'ಲಿಪಿಗಳ ರಾಣಿ' ಎಂದು ಕರೆದವರು.

   a) ವಿನೋಬಾಭಾವೆ

   b) ಸರೋಜಾದೇವಿ

   c) ಶಿವರಾಮ ಕಾರಂತ

   d) ಎಸ್. ಎಸ್. ಹಿರೇಮಠ

4. ಧರ್ಮ ಸಹಿಷ್ಣತೆ ಕನ್ನಡಿಗರ ಪರಂಪರೆ ಎಂದು ಯಾವ ಶಾಸನ ಕೂಗಿ ಹೇಳುತ್ತದೆ.

   a) ಬೆಂಗಳೂರಿನ   b) ಬೇಲೂರಿನ   c) ಚಿಕ್ಕಮಗಳೂರಿನ   d) ದಾವಣಗೆರೆಯ

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5. "ಹಸಿವಾದರೆ ಊರೊಳಗೆ ಭಿಕ್ಷಾನ್ನಗಳುಂಟು, ತೃಡೆಯಾದರೆ, ಕೆರೆಬಾವಿ ಹಳ್ಳಗಳುಂಟು, ಶಯನಕ್ಕೆ ಹಾಳು ದೇಗುಳಗಳುಂಟು ಎಂಬ ವಚನ ಬರೆದವರು.

    a) ಬಸವಣ್ಣ   b) ಅಕ್ಕಮಹಾದೇವಿ   c) ಅಲ್ಲಮಪ್ರಭು   d) ಜೇಡರ ದಾಸಿಮಯ್ಯ

6. ಕವಿರಾಜಮಾರ್ಗದಲ್ಲಿ ಹೇಳಿರುವ ಕನ್ನಡಿಗರ ಸ್ವಭಾವವನ್ನು ಕುರಿತ ಪದ್ಯಗಳು ಯಾವ ಶತಮಾನದಲ್ಲಿ ರಚಿಸಲಾಗಿದೆ.

    a) ಹತ್ತನೆಯ   b) ಎರಡನೆಯ   c) ಆರನೆಯ   d) ಒಂಬತ್ತನೆಯ

7. ಸರ್ ಥಾಮಸ್ ಮನ್ರೊ ಯಾರು -------

    a) ಅಧಿಕಾರಿ   b) ವೈದ್ಯ   c) ಕಲೆಕ್ಟರ್   d) ಡಿಸಿ

8. ಕನ್ನಡ ಬರಹಗಳಿಗೆ ------- ವರುಷಗಳ ಚರಿತ್ರೆಯಿದೆ.

    a) ಸಾವಿರದ ಐದುನೂರು   b) ಸಾವಿರದ ನೂರು

    c) ಹತ್ತು ಸಾವಿರ   d) ಸಾವಿರದ ಎರಡುನೂರು

9. ಭಾರತದ ಸಂವಿಧಾನ ಅಸ್ತಿತ್ವಕ್ಕೆ ಬಂದ ವರ್ಷ ----------

    a) 1947   b) 1950   c) 1998   d) 1945

10. "ಚಾಗದ ಭೋಗದಕ್ಕರದಗೇಯದ ಗೊಟ್ಟಿಯಲಂಪಿನಿಂಪುಗಳ್ಗೆ ಆಗರವಾದ ಮಾನಸರ್" ಎಂದು ಹೇಳಿದ ಕವಿ ---------

    a) ರನ್ನ   b) ಪಂಪ   c) ಕುವೆಂಪು   d) ಬಸವಣ್ಣ

11. ಆಯ್ದಕ್ಕಿ ಮಾರಯ್ಯನವರ ವಚನದಲ್ಲಿ ಯಾವುದಕ್ಕೆ ಅತ್ಯಂತ ಹೆಚ್ಚು ಮಹತ್ವವನ್ನು ನೀಡಲಾಗಿದೆ.

    a) ಬಡತನ   b) ಸಿರಿತನ   c) ಬಂಗಾರ   d) ವಜ್ರ

12. ಗುರು, ಲಿಂಗ ಮತ್ತು ಜಂಗಮ ಈ ಮೂರಕ್ಕಿಂತ ಅತ್ಯಂತ ಶ್ರೇಷ್ಠವಾದದ್ದು

    a) ಕಾಯಕ   b) ಮಾತು   c) ನಡೆನುಡಿ   d) ಸೋಮಾರಿತನ

13. ಅನ್ಯರನ್ನು ದೂಷಿಸಿದರೆ ಅಂಥವರನ್ನು ಚನ್ನಮಲ್ಲಿಕಾರ್ಜುನ ------ ತಳ್ಳುತ್ತಾನೆ.

    a) ಸ್ವರ್ಗಕ್ಕೆ   b) ಶ್ರಮಕ್ಕೆ   c) ನರಕ್ಕೆ   d) ಬಡತನಕ್ಕೆ

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14. ಕುರಿತೋದದೆಯ ಕಾವ್ಯ ಪ್ರಯೋಗ ಪರಣತ ಮತಿಗಳ್ ಎಂದು ಕವಿರಾಜಮಾರ್ಗಕಾರ ----- ನೇ ಶತಮಾನದಲ್ಲಿ ಹೇಳಿದ್ದರು.

    a) 2   b) 4   c) 6   d) 9

15. ಒಡತನ ಸತ್ತರೆ ------ ಸೌದಿಲ್ಲ

    a) ನನಗೆ   b) ಸುಡಲಿಕೆ   c) ಸಾಯಲು   d) ನೆಗೆಯಲು

16. ದಾಸರು ------ ಭಕ್ತರು

    a) ಶಿವನ   b) ವಿಷ್ಣುವಿನ   c) ಸರಸ್ವತಿಯ   d) ಹರಿಯ

17. ತಲ್ಲಣಿಸಿದರು ಕಂಡ್ಯ, ತಾಳು ಮನವೇ ಎಂಬ ಕೀರ್ತನೆಯನ್ನು ಬರೆದವರು.

    a) ಪುರಂದರದಾಸ   b) ಬಸವಣ್ಣ   c) ಕನಕದಾಸ   d) ಅಕ್ಕಮಹಾದೇವಿ

18. ಗೂಗೆ ಕಣ್ಣ ಕಾಣಲರಿಯದೆ ರವಿಯ ಒಯ್ಯದು ಈ ವಚನವನ್ನು ಬರೆದವರು.

    a) ಅಕ್ಕಮಹಾದೇವಿ   b) ಅಲ್ಲಮಪ್ರಭು   c) ಬಸವಣ್ಣ   d) ದಾಸಿಮಯ್ಯ

19. ರಾಗಿ ಬೀಸುವ ಕಲ್ಲೆ ----- ಒಡೆಗಲ್ಲೆ

    a) ರಾಣಿಯ   b) ದಾಸನ   c) ರಾಜಾನ   d) ದೇವರ

20. --------- ಒಲುಮೆ ಇದ್ದರೆ ಬಡತನ ನೀಗಿಸುವುದು ಕಷ್ಟವಲ್ಲ

    a) ತಾಯಿಯ   b) ತಂದೆಯ   c) ರಾಜಾನ   d) ದ್ಯೆವದ

21. ನಗವು ಸಹಜ ಧರ್ಮ ನಗಿಸುವುದು ---------

    a) ಮಾನವ   b) ಪರಧರ್ಮ   c) ಜೀವನ   d) ದೇವರವರ

22. ಅಂಬಿಕಾತನಯದತ್ತ ಎಂಬುದು ಯಾರ ಕಾವ್ಯನಾಮ.

    a) ಪುರಂದರದಾಸ   b) ಕನಕದಾಸ   c) ದ.ರಾ.ಬೇಂದ್ರೆ   d) ಅಕ್ಕಮಹಾದೇವಿ

23. ರಾಷ್ಟಕವಿ ಎಂಬ ಬಿರುದು ಪಡೆದ ಕವಿ

    a) ದ.ರಾ.ಬೇಂದ್ರೆ   b) ಬಸವಣ್ಣ   c) ಕುವೆಂಪು   d) ಅಕ್ಕಮಹಾದೇವಿ

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24. ನಾಕ ಪದದ ಅರ್ಥ

a) ನರಕ   b) ಸ್ವರ್ಗ   c) ಭೂಮಿ   d) ಮಣ್ಣು

25. ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗ ಕೃತಿಯನ್ನು ಬರೆದವರು.

a) ಕುವೆಂಪು   b) ದ.ರಾ.ಬೇಂದ್ರೆ   c) ಕನಕದಾಸ   d) ಡಿ.ವಿ.ಜಿ

26. ನಾಕುತಂತಿ ಕವನ ಸಂಗ್ರಹಕ್ಕೆ ------ ಪ್ರಶಸ್ತಿ ಬಂದಿದೆ.

a) ಪದ್ಮಭೂಷಣ   b) ಪದ್ಮವಿಭೂಷಣ   c) ಜ್ಞಾನಪೀಠ   d) ಪದ್ಮಶ್ರೀ

27. ಸಾಬಾಣ ಪದದ ಅರ್ಥ

a) ಸಾಬೂನು   b) ಅಕ್ಕಿ   c) ಕಾಯಿ   d) ಹಣ

28. ಕನ್ನಡಕ್ಕೆ ಮೊದಲ ಜ್ಞಾನಪೀಠ ಪ್ರಶಸ್ತಿಯನ್ನು ತಂದುಕೊಟ್ಟವರು

a) ಡಿ.ವಿ.ಜಿ   b) ಕುವೆಂಪು   c) ದ.ರ.ಬೇಂದ್ರೆ   d) ಕನಕದಾಸ

29. ಕುರುಡು ಕಾಂಚಾಣವನ್ನು ಯಾವ ಕವನಸಂಕಲನೆದಿಂದ ಆಯ್ದುಕೊಳ್ಳಲಾಗಿದೆ

a) ನಾಕುತಂತಿ   b) ನಾಟಕ   c) ಮಂಕುತಮ್ಮನ ಕಗ್ಗ   d) ನಾದಲೀಲೆ

30. ಡಿ.ವಿ.ಜಿಯವರ ಕಾವ್ಯನಾಮ

a) ಮಂಕುತಿಮ್ಮ   b) ಕೂಡಲಸಂಗಮದೇವ

c) ಚೆನ್ನಮಲ್ಲಿಕಾರ್ಜುನ   d) ರಾಮನಾಥ

31. ಮೊದಲಬಾರಿ ಜೋಗಜಲಪಾತ ಕಂಡು ವಿಶ್ವೇಶ್ವರಯ್ಯ ಅವರು ಉದ್ಗರಿಸಿದ್ದು

a) ಎಷ್ಟೊಂದು ಶಕ್ತಿ ಪೋಲಾಗುತ್ತಿದೆ   b) ಎಷ್ಟೊಂದು ಭೀಕರವಾಗಿದೆ

c) ಎಷ್ಟೊಂದು ಗಲಿಜಾಗಿದೆ   d) ಎಷ್ಟೊಂದು ಅದ್ಭುತವಾಗಿದೆ

32. ಡಾ. ವಿಶ್ವೇಶ್ವರಯ್ಯನವರು ------ ರಲ್ಲಿ ಸ್ವಂತ ಇಚ್ಛೆಯಿಂದ ದಿವಾನಗಿರಿಯನ್ನು ಬಿಟ್ಟುಕೊಟ್ಟರು.

a) 1920   b) 1947   c) 1919   d) 1950

33. ಕ್ರಮ, ಶಿಸ್ತು, ತರ್ಕಬದ್ಧವಾದ ಆಲೋಚನೆ ನಿಷ್ಪಕ್ಷಪತೆ ಇವು ----- ರವರ ಹುಟ್ಟು ಗುಣಗಳು

a) ಗಾಂಧೀಜಿ   b) ದೇವೇಗೌಡ   c) ವಿಶ್ವೇಶ್ವರಯ್ಯ   d) ನೆಹರು

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34. ಕೃಷ್ಣರಾಜಸಾಗರವನ್ನು ಕಟ್ಟಿಸಿದವರು ಯಾರು?

   a) ವಿಶ್ವೇಶ್ವರಯ್ಯ   b) ಗಾಂಧೀಜಿ   c) ನೆಹರು   d) ಮೋದಿ

35. ದುಡಿದವನಿಗೆ ಪ್ರತಿಫಲ ದೊರೆಯಲೇಬೇಕು ಎಂದು ಹೇಳಿದವರು

   a) ಕುವೆಂಪು   b) ದ.ರಾ.ಬೇಂದ್ರೆ   c) ಡಿ.ವಿ.ಜಿ.   d) ವಿಶ್ವೇಶ್ವರಯ್ಯ

36. ಭಾರತದಲ್ಲಿ ಯಾವ ವರ್ಷದಿಂದ ಕರಕುಶಲ ಕಲೆಗಳಿಗೆ ಬೇಡಿಕೆಯಿದೆ.

   a) 1800   b) 2500   c) 2200   d) 2900

37. ಹಳೆಬೇರು ಹೊಸಚಿಗುರು ಒಂದಾಗಿರಲು ಮರ ಸೊಬಗು ಎಂದು ಹೇಳಿದವರು.

   a) ಡಿ.ವಿ.ಗುಂಡಪ್ಪ   b) ಕುವೆಂಪು   c) ವಿಶ್ವೇಶ್ವರಯ್ಯ   d) ದ.ರಾ.ಬೇಂದ್ರೆ

38. _____ ಬಟ್ಟೆಯ ಮೇಲಿನ ಮುದ್ರಣ ಕಲೆಗೆ ಮೂಲನೆಲೆ.

   a) ಅಮೆರಿಕ   b) ಭಾರತ   c) ಶ್ರೀಲಂಕ   d) ಆಫ್ರಿಕ

39. ಭಾರತದಲ್ಲಿ ಬೇರೆ ಬೇರೆ ಬಣ್ಣಗಳನ್ನು ನೀಡುವ ಸುಮಾರು _____ ಗಿಡಗಳಿವೆ.

   a) 100   b) 200   c) 400   d) 300

40. ಕಬ್ಬಿಣ ಮತ್ತು ಉಕ್ಕಿನ ಕಾರ್ಖಾನೆ ಎಲ್ಲಿ ಇದೆ.

   a) ಭದ್ರಾವತಿ   b) ಶಿವಮೊಗ್ಗ   c) ಬೆಂಗಳೂರು   d) ಹರಿಹರ

41. ಗೋಪಣ್ಣ ಮಾಸ್ತರರ ಮಗನ ಹೆಸರೇನು?

   a) ರಾಮ   b) ರಾಜ   c) ಪ್ರಹ್ಲಾದ   d) ಪ್ರಭು

42. ಇಸ್ಮಾಯಿಲ್ _____ ಇಂಜಿನಿಯರಿಂಗ್ ಮಾಡುತ್ತಿದ್ದ.

   a) ಹಾರ್ಡ್ ವೇರ್ ಇಂಜಿನಿಯರ್   b) ಕಂಪ್ಯೂಟರ್ ಇಂಜಿನಿಯರ್

   c) ಸಿವಿಲ್ ಇಂಜಿನಿಯರ್   d) ಮೆಕ್ಯಾನಿಕಲ್ ಇಂಜಿನಿಯರ್

43. ಪ್ರಲ್ಹಾದನ ಹೆಂಡತಿಯ ಹೆಸರು ____

   a) ರೇಖಾ   b) ಮಮತ   c) ರಾಧ   d) ರೋಹಿಣಿ

44. ಯುಗಾದಿ ಕಥೆಯನ್ನು ಬರೆದವರು _____

   a) ಕನಕದಾಸ   b) ಡಿ.ವಿ.ಜಿ   c) ವಸುಧೇಂದ್ರ   d) ಕುವೆಂಪು

45. ಗೋಪಣ್ಣ ಮಾಡುತ್ತಿದ್ದ ವೃತ್ತಿ _____

   a) ವೈದ್ಯ   b) ಮಾಸ್ತರ್   c) ಇಂಜಿನಿಯರ್   d) ಮೆಕ್ಯಾನಿಕಲ್

46. ಮೆಗಾನೆ ಹಳ್ಳಿಯಲ್ಲಿ ಯಾವ ಜನಾಂಗ ವಾಸಿಸುತ್ತಿದ್ದರು

   a) ಗಿರಿಜನ   b) ಕಳ್ಳರು   c) ಕುಣಬಿ   d) ಕಾಡುಜನ

47. ಕುಣಬಿ ಜನಾಂಗದವರು ಯಾವ ರಾಜ್ಯಕ್ಕೆ ಸೇರಿದವರು.

   a) ಗೋವಾ   b) ತಮಿಳನಾಡು   c) ಆಂಧ್ರಪ್ರದೇಶ   d) ಮಧ್ಯಪ್ರದೇಶ

48. ಮೆಗಾನೆಯ ಕುಣಬಿಯ ಜನಸಂಖ್ಯೆ _____

   a) 190   b) 200   c) 180   d) 150

49. ಗಿರಿಜನರ ಜೀವನ ವಿಧಾನಗಳನ್ನು ಕುರಿತು ವೀಡಿಯೋ ಸಾಕ್ಷ್ಯ ಚಿತ್ರಗಳನ್ನು ತಯಾರಿಸುವ ಯೋಜನೆ ರೂಪಿಸಿದವರು _____

   a) ಎಸ್.ಕೆ.ಕರೀಂಖಾನ್   b) ಗಾಂಧೀಜಿ

   c) ನೆಹರು   d) ಡಿ.ವಿ.ಜಿ

50. 'ಮೆಗಾನೆ ಎಂಬ ಗಿರಿಜನ ಪರ್ವತ' ಬರೆದ ಲೇಖಕರು _____.

   a) ಕನಕದಾಸರು   b) ಆಯ್ದಕ್ಕಿ ಲಕ್ಕಮ್ಮ   c) ಪುರಂದರದಾಸ   d) ಹಿ.ಚಿ.ಬೋರಲಿಂಗಯ್ಯ

* * * * *

CBCS SCHEME

21CV32

USN ☐☐☐☐☐☐☐☐☐☐

Third Semester B.E. Degree Examination, June/July 2023
Geodetic Engineering

Time: 3 hrs.
Max. Marks: 100

Note: 1. *Answer any FIVE full questions, choosing ONE full question from each module.*
2. *Assume any missing data suitably and state the same clearly.*

Module-1

1 a. Explain briefly about i) Principles of surveying ii) Different types of meridians used for determining the bearings of lines. **(08 Marks)**

b. The bearings of a closed traverse sides AB , BC , CD , DE and EA are as shown in Table. Q1(b). Calculate the interior angles of the traverse. **(06 Marks)**

Table Q1(b)

Side	Fore bearing	Back bearing
AB	107° 15′	287° 15′
BC	22° 0′	202° 0′
CD	281° 30′	101° 30′
DE	189° 15′	9° 15′
EA	124° 45′	304° 45′

c. Explain briefly about advantages and disadvantages of plane table surveying. **(06 Marks)**

OR

2 a. Explain briefly about i) Importance of surveying in Civil Engineering ii) Magnetic dip, Magnetic declination and Local attraction. **(08 Marks)**

b. Determine the angle between the lines OA and OB, if their respective bearings are as described below for three different cases : **(06 Marks)**
i) 32° 15′ and 148° 45′   ii) 16° 10′ and 332° 18′   iii) 126° 12′ and 300° 15′

c. Explain briefly with procedure about three point problem in plane table survey. **(06 Marks)**

Module-2

3 a. Explain briefly about profile levelling and cross sectioning and their uses in Civil Engineering projects. **(06 Marks)**

b. The following data as shown in Table Q3(b), were recorded from 4.00m levelling staff with dumpy level between two main stations 'A' and 'B'. The bench mark of station 'A' is 520.450m. Determine the reduced level of station 'B' and conduct the necessary arithmetic checks. **(07 Marks)**

Table Q3(b)

Sℓ.No.	Description about leveling staff reading
1.	First reading at 'A' = 0.585
2.	Reading before changing Dumpy level = 3.940
3.	Reading after changing Dumpy level = 0.960
4.	Reading before changing Dumpy level = 3.845
5.	Reading after changing Dumpy level = 0.955
6.	Reading at 'B' = 3.015

c. The following perpendicular offsets were taken at 10.00m intervals from a survey line to an irregular boundary line : 3.82m , 4.37m , 6.82m , 5.26m , 7.59m , 8.90m , 9.52m , 8.42m and 6.43m. Determine the area enclosed between the survey line, irregular boundary line and the first and last offsets by i) Simpson's rule ii) Trapezoidal rule. **(07 Marks)**

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OR

4 a. Explain briefly about i) Procedure for determining the area of an irregular figure by using planimeter   ii) Temporary adjustments for levelling instruments.   **(08 Marks)**

   b. The reduced level of the floor in a building is 100.595m. The reading recorded by placing leveling staff on the floor is 1.795m and placing the leveling upside down below the Soffit of the roof beam is 2.295m. Determine the reduced level of the soffit of the roof beam and height of the soffit of the roof beam with respect to floor level.   **(05 Marks)**

   c. Determine the volume of earth embankment for the data given in Table. Q4(c) by Prismoidal rule and Trapezoidal rule.   **(07 Marks)**

Table Q4(c)

Chainage along centre line of embankment in m.	Cross section area of embankment in m².
0.00	0.00
30.00	150.00
60.00	155.00
90.00	153.00
120.00	156.00
150.00	148.00
180.00	152.00
210.00	154.00
240.00	157.00

Module-3

5 a. Explain briefly about measuring horizontal angle from theodolite by repetition method and state what errors will be eliminated by this method.   **(06 Marks)**

   b. Theodolite was set over station 'P' which is an temporary bench mark of reduced level 832.000m. Height of horizontal axis of the theodolite above the temporary bench mark is 1.250m. The readings recorded through statia hair of the theodolite by placing levelling staff at station Q in vertical position is 1.200m , 1.930 and 2.650 respectively with angle of elevation as 9° 30′. Determine the distance PQ and reduced level of station Q. Consider the multiplier constant as 100 and additive constant as 0.30 for the theodolite.   **(06 Marks)**

   c. Determine the elevation of the top of the chimney point 'Q' from two instrument stations 'P' and 'R' spaced at a horizontal distance of 100m between them. The base of point 'Q' is in accessible. Stations 'P' , 'R' and the point 'Q' are in one single vertical plane. The angle of elevation of point 'Q' measured from the stations 'P' and 'R' were 28° 42′ and 18° 6′ respectively. The leveling staff was placed in the bench mark and the readings recorded from stations 'P' and 'R' were 2.870 and 3.750m respectively. The reduced level of the bench mark is 287.280m. Determine the elevation of the top of the chimney point 'Q'.   **(08 Marks)**

OR

6 a. Explain briefly about temporary and permanent adjustments of theodolite.   **(06 Marks)**

   b. Explain briefly about determining distance and elevations using Tacheometric method.   **(06 Marks)**

   c. Determine the elevation of top of the building point 'Q' from two stations 'P' and 'R', spaced at 60.00m between them by double plane method. The horizontal angle measured at station 'P' between 'R' and 'Q' were found to be 60° 30′ and angle of elevation measured from station 'P' to 'Q' was 10° 12′. The horizontal angle measured at station 'R' between 'P' and 'Q' were found to be 68° 18′ and the angle of elevation measured from 'R' to 'Q' was found to be 10° 48′. Leveling staff was placed on bench mark having reduced level value of 435.065m. The readings recorded on leveling staff from the stations 'P' and 'R' were found to be 1.965m and 2.055m respectively. Consider the bore of Q as inaccessible.   **(08 Marks)**

Module-4

7 a. Explain briefly about i) Different types of circular curves ii) Transition curves
iii) Vertical curves along with their applications. **(06 Marks)**

b. Calculate the required data for setting out a simple curve from the method of offsets from the long chord. The radius of the curve is 100m, deflection angle is 60° and consider the peg interval along the long chord as 10m. **(06 Marks)**

c. Calculate the necessary data for setting out a simple circular curve of radius 600m to connect two straights intersecting at a chainage of 3605.00m by Rankine's method, using theodolite of one second accuracy. Consider the deflection angle as 25° and peg interval as 30m. **(08 Marks)**

OR

8 a. A transition curve is to be provided for a circular curve of radius 300m. Calculate the length of transition curve required for the condition of rate of gain in acceleration as $0.50 m/s^3$ and speed of the vehicle a 50 K.M.P.H. **(04 Marks)**

b. Two tangents intersect at chainage 1190.00m. Calculate the data necessary for setting out a simple curve of radius 300m, having deflection angle of 36° by offsets from chords produced. Consider the peg interval as 30m. **(06 Marks)**

c. Explain briefly about different components of a compound curve with the aid of neat figure and describe a detailed procedure for setting out the compound curve by Rankine's method. **(10 Marks)**

Module-5

9 a. Explain briefly about various methods used for plotting map details in aerial surveying. **(06 Marks)**

b. Explain briefly about remote sensing and how it differs from photogrammetry survey. **(07 Marks)**

c. Explain briefly about i) Total station ii) Electronic distance measuring systems, along with their applications. **(07 Marks)**

OR

10 a. Explain briefly about different applications of remote sensing. **(06 Marks)**

b. Explain the terms : i) Spatial data ii) Raster iii) Vector iv) Geocoding, used in GIS. **(07 Marks)**

c. Explain briefly what is GPS and what are its applications. **(07 Marks)**

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CBCS SCHEME

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21CV33

Third Semester B.E. Degree Examination, June/July 2023
Strength of Materials

Time: 3 hrs.

Max. Marks: 100

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

Module-1

1 a. Derive an expression for circular tapering bar. **(10 Marks)**
   b. A steel bar ABCD of varying section is subjected to axial force as shown in Fig.Q1(b). Determine the value of 'P' necessary for equilibrium, if $E = 20$ kN/mm². Find the total elongation of the bar and also stress in each part.
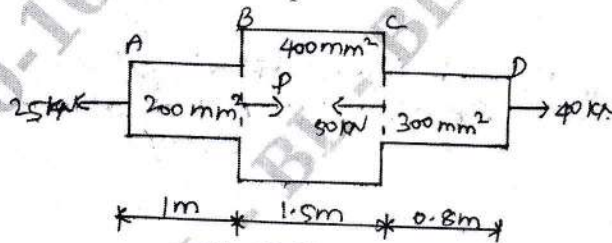
Fig.Q1(b) **(10 Marks)**

OR

2 a. A load 2 MN is applied on a column 500×500mm. The column is reinforced with 4 steel bars of 10mm diameter one in each corner. Find the stress in concrete and steel bars. Take E for steel as $2.1×10^5$ N/mm² and for concrete as $1.4×10^4$ N/mm². **(10 Marks)**
   b. A 18mm diameter steel rod passes centrally through a copper tube of 26mm diameter (internal) and 38mm external diameter. The rod is 2.6 m long is closed at each end by rigid plates of negligible thickness. The nuts are tightened lightly none on the protecting parts of the rod. If the temperature of assembly is raised by 80°C calculate thermal stresses induced in copper and steel. Take $\alpha_{cu} = 17.5×10^{-6}$/°C , $\alpha_s = 12×10^{-6}$/°C , $E_{st} = 210$ GPa $E_{cu} = 1.05×10^5$ N/mm². **(10 Marks)**

Module-2

3 a. What are the different types of load and supports? Explain the neat sketch. **(08 Marks)**
   b. Draw BMD and SFD for the beam shown in Fig.Q3(b).
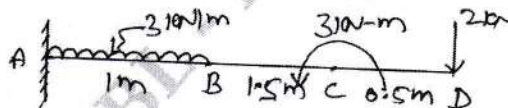
Fig.Q3(b) **(12 Marks)**

OR

4 a. Derive relationship between loading, shear force and bending moment. **(06 Marks)**
   b. Draw BMD and SFD for the beam shown in Fig.Q4(b). Indicate maximum bending moment and its location. Also indicate the point of contraflexure.
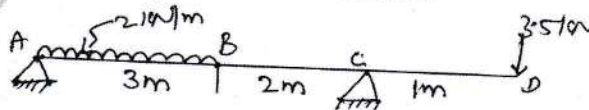

Fig.Q4(b) **(14 Marks)**

35

Module-3

5 a. What are the assumptions of simple bending? **(05 Marks)**
   b. Derive Bernoulli's equation for bending stress. **(10 Marks)**
   c. A rectangular beam 250 mm deep and 150mm width is simple supported over a span of 8m. What UDL per meter the beam can carry if the bending stress is not to exceed 140 N/mm^2. **(05 Marks)**

OR

6 a. Derive an expression for shear stress. **(10 Marks)**
   b. A beam with an I-section consists of 180×15mm flanges and curb of 280mm depth and 15mm thickness. It is subjected to a bending moment of 120 kN-m and a shear force of 60 kN. Sketch the bending stress and shear stress distribution along the depth of section. **(10 Marks)**

Module-4

7 a. What are the assumptions of pure torsion? **(05 Marks)**
   b. Derive torsion equation. **(08 Marks)**
   c. A hollow shaft is required to transit 140 kW at 160 rpm. The total angle of twist in a length of 4m is not to exceed 2° and the shear stress is limited to 65 N/mm^2. C = 0.8×10^5 N/mm^2. Determine the inner and external diameter of the shaft. **(07 Marks)**

OR

8 a. Show that in a thin cylinder the hoop stress is twice the longitudinal stress. **(08 Marks)**
   b. What are the assumptions made in Lame's equation? Derive Lame's equation. **(12 Marks)**

Module-5

9 a. Differentiate between short and long column. **(04 Marks)**
   b. Describe the limitation of Euler's theory. **(04 Marks)**
   c. Find Euler's load for a column 40mm × 50mm C/S and 2m long, if one of its end is fixed and other end is hinged. E for the material of the column is 200 N/mm^2. Find Rankine's load in the above case, if the yield stress in compression is 320 N/mm^2, α = 1/7500. **(12 Marks)**

OR

10 a. Derive relationship between slope, deflection and radius of curvature. **(10 Marks)**
    b. A simply supported beam spanning 8m carries a concentrated loads of 60 kN and 30 kN at distances of 2m and 4m from left support. Determine
    (i) the slope at the ends (ii) The location and magnitude of the maximum deflection.
    Assume E = 200 GPa and I = 20×10^8 mm^4. **(10 Marks)**

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CBCS SCHEME

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21CV34

Third Semester B.E. Degree Examination, June/July 2023
Earth Resources and Engineering

Time: 3 hrs.

Max. Marks: 100

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

Module-1

1   a.   Explain the Internal structure and composition of earth with neat sketch. **(10 Marks)**
     b.   Define Landslide. What are the causes for landslide? Write the preventive measures for landslide. **(10 Marks)**

OR

2   a.   What is Plate tectonics? Describe different plate boundaries. Add a note on Lithosphere and Asthenosphere. **(10 Marks)**
     b.   What is Earthquake? How they are classified based on causes as well as depth of focus? Describe characteristics of P & S waves. **(10 Marks)**

Module-2

3   a.   Explain physical properties of Minerals , Hardness , Habit , Clearage Fracture and Streak. **(10 Marks)**
     b.   Define Igneous rocks. Explain classification of Igneous rocks based on Silica percentage and depth of formation. **(10 Marks)**

OR

4   a.   Based on physical properties, describe how the rocks can be used as construction material. **(10 Marks)**
     b.   What is an Aquifer? Discuss various aquifer parameters. Add a note on water bearing properties of various geological formations. **(10 Marks)**

Module-3

5   a.   What is Weathering? Describe different types of physical and chemical weathering. **(10 Marks)**
     b.   Describe various erosional and depositional coastal landforms. **(06 Marks)**
     c.   Distinguish between Black cotton soil and Laterite soil. **(04 Marks)**

OR

6   a.   Discuss briefly the Geomorphological aspects in the selection of site for dam construction. Add a note on suitable site for Arch dam. **(10 Marks)**
     b.   Discuss various erosional and depositional features of river morphology. Add a note on influence of erosional and depositional process on Civil Engineering Project. **(10 Marks)**

Module-4

7   a.   P. Q and R are test boreholes there sunk at 3 points of an equilateral triangle whose sides are 480m each. P is west of Q and R is north of midpoint of PQ. Boreholes P. Q and R reached the upper surface of a shear zone at 100m, 220m and 260m depth respectively.
     i)   Determine strike and dip of the shear zone.
     ii)   Another bore hole is sunk at 'T' (midpoint of Q & R). Determine at what depth bore hole T reach the same shear zone. **(10 Marks)**

1 of 2

37

b. Define an Unconformity. Explain various types of an unconformity with neat labeled sketches. **(10 Marks)**

OR

8 a. What is a Fault? With a neat sketch, explain Normal and Reverse fault? How the faults can be recognized in the field. **(10 Marks)**

b. What is ground improvement technique? Explain the process of rock bolting , rock jointing and grouting. **(05 Marks)**

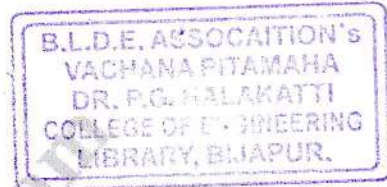c. Write a short note on effect of joints in a tunnel project. **(05 Marks)**

Module-5

9 a. Define Remote Sensing. List the applications of remote sensing in Civil Engineering practices. **(08 Marks)**

b. Define GIS. Describe briefly various components of GIS. **(08 Marks)**

c. Write a short note on Toposhete and its significance. **(04 Marks)**

OR

10 a. Define Photogrametry. Describe briefly the basic attributes of Areal Photographes to be used in photogrametry. **(08 Marks)**

b. What is GPS? Describe various segments of GPS. **(06 Marks)**

c. What is GPR? Write applications of GPR in Civil Engineering practices. **(06 Marks)**

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CBCS SCHEME

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21MAT31

Third Semester B.E. Degree Examination, June/July 2023
Transform Calculus, Fourier Series and Numerical Techniques

Time: 3 hrs.   Max. Marks: 100

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

Module-1

1   a.   Find the Laplace transform
$$2^t + \frac{\cos 2t + \cos 3t}{t}$$
(06 Marks)

b.   Find the Laplace transform of the triangular wave of period 2C given by
$$f(t) = \begin{cases} t & 0 < t < c \\ 2c - t & c < t < 2c \end{cases}$$
(07 Marks)

c.   Using convolution theorem find the inverse Laplace transform of
$$\frac{s}{(s^2 + a^2)^2}$$
(07 Marks)

OR

2   a.   Express the function f(t) in terms of unit step function and hence find the Laplace transform
of $$f(t) = \begin{cases} \sin t & 0 < t < \pi \\ \sin 2t & \pi < t < 2\pi \\ \sin 3t & t \geq 2\pi \end{cases}$$
(06 Marks)

b.   Find the inverse laplace transform $\dfrac{2s^2 - 6s + 5}{(s-1)(s-2)(s-3)}$
(07 Marks)

c.   Solve the using Laplace transform method
$$y''(t) + 4y'(t) + 4y = e^{-t} \qquad y(0) = 0 \qquad y'(0) = 0$$
(07 Marks)

Module-2

3   a.   Obtain the Fourier series of $f(x) = \dfrac{\pi - x}{2}$ in $0 < x < 2\pi$. Hence deduce that
$$1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \dots = \frac{\pi}{4}$$
(06 Marks)

b.   Obtain the half range cosine series for the function $f(x) = 2x - 1$ in $0 < x < 1$ (07 Marks)

c.   Obtain the Fourier series of y upto the first harmonic for the following values:

x°	45	90	135	180	225	270	315	360
y	4.0	3.8	2.4	2.0	-1.5	0	2.6	3.4

(07 Marks)

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OR

4 a. Obtain the Fourier series of $f(x) = x\cos x$ in the interval $-\pi \le x \le \pi$. **(06 Marks)**

b. Obtain the sine half range Fourier series for the function,

$$f(x) = \begin{cases} \dfrac{2Kx}{\ell} & \text{in } 0 \le x \le \dfrac{\ell}{2} \\[2mm] \dfrac{2K}{\ell}(\ell - x) & \text{in } \dfrac{\ell}{2} \le x \le \ell \end{cases}.$$

(07 Marks)

c. Obtain the constant term and the first three coefficients in the Fourier cosine series of y in the following data :

x	0	1	2	3	4	5
y	4	8	15	7	6	2

(07 Marks)

Module-3

5 a. Find the complex Fourier transform of the function,

$$f(x) = \begin{cases} a^2 - x^2 & \text{for } |x| < a \\ 0 & \text{for } |x| > a \end{cases}.$$

Hence evaluate $\displaystyle\int_0^\infty \left(\frac{\sin s - s\cos s}{s^3}\right) ds = \frac{\pi}{2}$. **(06 Marks)**

b. Find the Fourier sine transform of e^{-ax}. **(07 Marks)**

c. Find the z-transform of $\cos n\theta$ and $\sin n\theta$. **(07 Marks)**

OR

6 a. Find the Fourier cosine transform of the function, $f(x) = \begin{cases} 4x & 0 < x < 1 \\ 4 - x & 1 < x < 4 \\ 0 & x > 4 \end{cases}$. **(06 Marks)**

b. Find the inverse z-transform of $\dfrac{2z^2 + 3z}{(z+2)(z-4)}$. **(07 Marks)**

c. Solve by using z-transform $y_{n+2} - 4y_n = 0$ given that $y_0 = 0$ and $y_1 = 2$. **(07 Marks)**

Module-4

7 a. Classify the following partial differential equation

i) $\dfrac{\partial^2 u}{\partial x^2} + 4\dfrac{\partial^2 u}{\partial x \partial y} + 4\dfrac{\partial^2 u}{\partial y^2} - \dfrac{\partial y}{\partial x} + 2\dfrac{\partial u}{\partial y} = 0$

ii) $x^2 \dfrac{\partial^2 u}{\partial x^2} + (1 - y^2)\dfrac{\partial^2 u}{\partial y^2} = 0 \; -\infty < x < \infty, \; -1 < y < 1$

iii) $(1 + x^2)\dfrac{\partial^2 u}{\partial x^2} + (5 + 2x^2)\dfrac{\partial^2 u}{\partial x \partial t} + (4 + x^2)\dfrac{\partial^2 u}{\partial t^2} = 0$

iv) $(x + 1)\dfrac{\partial^2 u}{\partial x^2} - 2(x + 2)\dfrac{\partial^2 u}{\partial x \partial y} + (x + 3)\dfrac{\partial^2 u}{\partial y^2} = 0$

(10 Marks)

40

b. Find the values of u(x, t) satisfying the parabolic equation $\frac{\partial^2 u}{\partial x^2} = 2\frac{\partial u}{\partial t}$ and its boundary conditions u(0, t) = 0 = u (4,t) and u(x, 0) = x(4 − x) by taking h = 1 find the value up to t = 5. **(10 Marks)**

OR

8 a. Solve $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ in 0 < x < 5, t ≥ 0 given that u(x, 0) = 20 u(0, t) = 0 u(5,t) = 100 compute U for the time step h = 1 by crank Nicholson method. **(10 Marks)**

b. Solve the wave equation $\frac{\partial^2 u}{\partial t^2} = 4\frac{\partial^2 u}{\partial x^2}$ subject to the condition u(0, t) = 0 u(4, t) = 0 $u_t(x, 0) = 0$ and u(x, 0) = x(4 − x) by taking h = 1, K = 0.5 up to four steps. **(10 Marks)**

Module-5

9 a. Given $\frac{d^2 y}{dx^2} - x^2\frac{dy}{dx} - 2xy = 1$, y(0)) = 1, y'(0) = 0 evaluate y(0.1) using Runge-Kutta method of order 4. **(06 Marks)**

b. Derive the Euler's equation of the form $\frac{\partial t}{\partial y} - \frac{d}{dx}\left(\frac{\partial t}{\partial y1}\right) = 0$. **(07 Marks)**

c. Find the extremal of the functional $I = \int_0^{\pi/2}(y^2 - y'^2 - 2y\sin x)dx$ under the conditions y(0) = y(π/2) = 0. **(07 Marks)**

OR

10 a. Apply Milne's predictor corrector method to solve $\frac{d^2 y}{d^2 x} = 1 - 2y\frac{dy}{dx}$ at 0.8 given that

y(0) = 0, y(0.2) = 0.02, y(0.4) = 0.0795, y(0.6) = 0.1762,
y'(0) = 0, y'(0.2) = 0.1996, y'(0.4) = 0.3937, y'(0.6) = 0.5689. **(06 Marks)**

b. Show that the geodesics on a plane are straight line. **(07 Marks)**

c. Which curve the functional $\int_0^{\pi/2}(y'^2 - y^2 + 2xy)dx$, y(0) = 0, y(π/2) = 0 be extremized. **(07 Marks)**

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CBCS SCHEME

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18CV42

Fourth Semester B.E. Degree Examination, June/July 2023
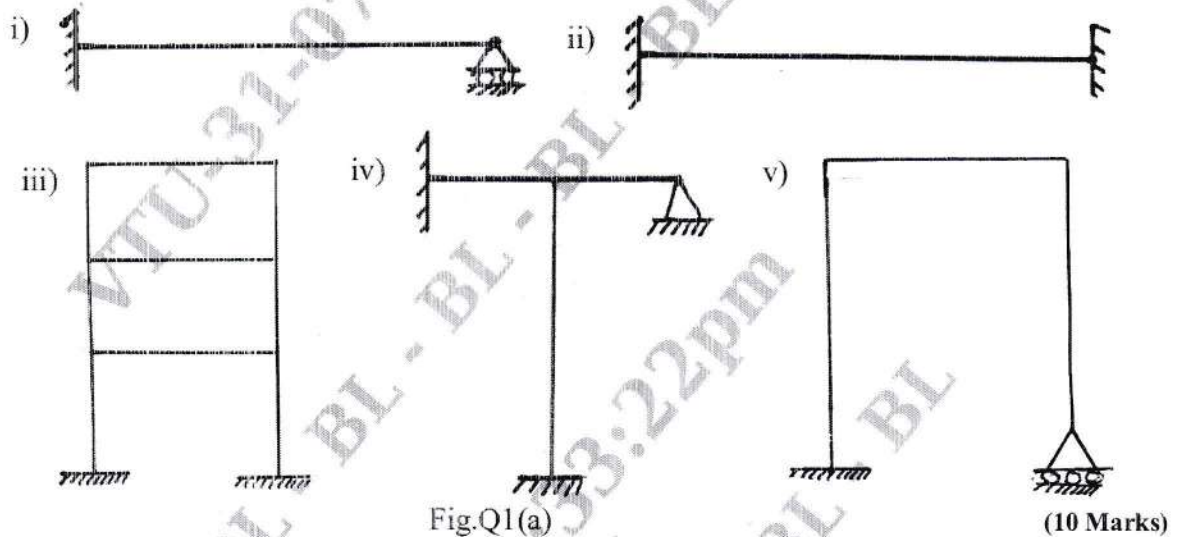## Analysis of Determinate Structures

Time: 3 hrs.

Max. Marks: 100

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

Module-1

1 a. Determine the static degree of indeterminacy for the following structures shown in Fig.Q1(a). Neglect axial deformation.

Fig.Q1(a)   **(10 Marks)**

b. A simply supported beam of 15 meter span is subjected to uniform dead load of 50kN/m covering the entire span and a uniform live load 100kN/m (longer than the span). Determine the value of positive as well as negative shear force at left quarter span. **(10 Marks)**

OR

2 a. A simply supported beam has a span of 15m. Uniformly distributed load of 40kN/m and 5m long crosses the girder from left to right. Draw the influence line diagram for shear force and bending moment at a section 6m from left end. Use these diagrams to calculate the maximum shear force and bending moment at this section. **(10 Marks)**

b. Using influence line diagrams determine the shear force and bending moment at section 'C' in the simply supported beam as shown in Fig.Q2(b).
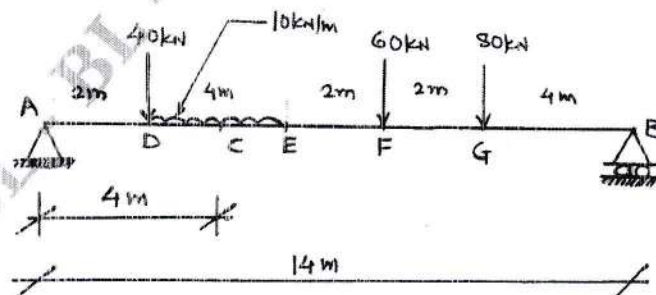

Fig.Q2(b)   **(10 Marks)**

Module-2

3 a. A uniformly distributed load of intensity 2kN/m and 5m long crosses a simply supported beam of 20 meter span from left to right. Calculate :
   i) Maximum shear force and maximum bending moment at a section 8m from the left support
   ii) Absolute maximum bending moment. (10 Marks)

   b. Two wheel loads of 160kN (leading loads) and 400kN spaced 2 meters apart move on a simply supported beam girder of span 16 meters from left to right. Find the maximum positive and negative shear force at a section.
   i) 4 meters from the left end
   ii) 6 meters from the left end. (10 Marks)

OR

4 a. The system of concentrated loads shown in Fig.Q4(a) rolls from left to right on the girder of span 15m, 40kN load leading. For a section 4m from left support, determine :
   i) Maximum bending moment
   ii) Maximum shear force.
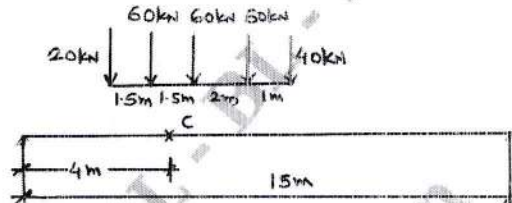
Fig.Q4(a) (10 Marks)

   b. Draw influence line diagram for members L_1L_2, U_1L_2 and U_1U_2 of the truss as shown in Fig.Q4(b).
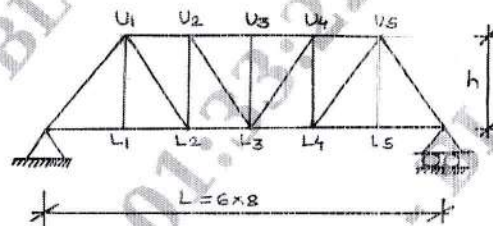

Fig.Q4(b) (10 Marks)

Module-3

5 a. Write the conjugate beam theorems. (02 Marks)

   b. Determine θA, θB, θC and deflection at 'C' in the beam shown in Fig.Q5(b) by conjugate beam method.
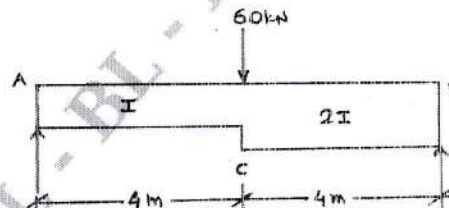

Fig.Q5(b) (08 Marks)

   c. Determine the slope and deflections at B and C in the cantilever beam shown in Fig.Q5(c) by conjugate beam method.
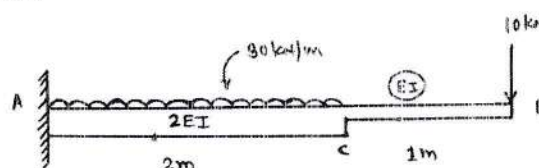

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OR

18CV42

6 a. Write the moment area theorem. **(02 Marks)**

b. Determine the slope and deflection at the free end of a cantilever beam as shown in Fig.Q6(b) by moment area method. (Take $EI = 4000 kN\,m^2$).
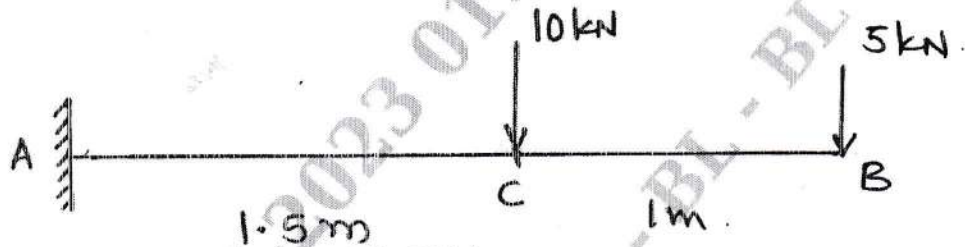

Fig.Q6(b) **(08 Marks)**

c. Determine the rotation at supports and defection at mid-span and under the loads in the simply supported beam as shown in Fig.Q6(c).
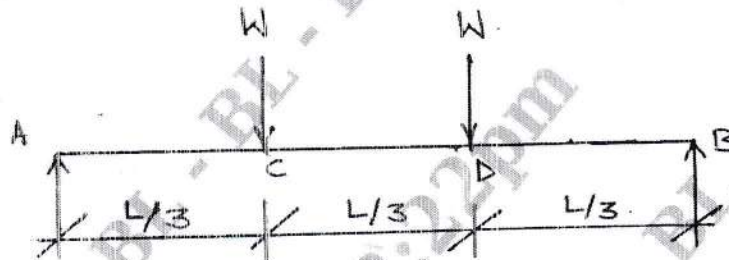

Fig.Q6(c) **(10 Marks)**

Module-4

7 Determine the vertical and horizontal displacement at the free end 'D' in the Fig.Q7(a). Take $EI = 12 \times 10^{13}$ N-mm^2. Use Castigliano's theorem.
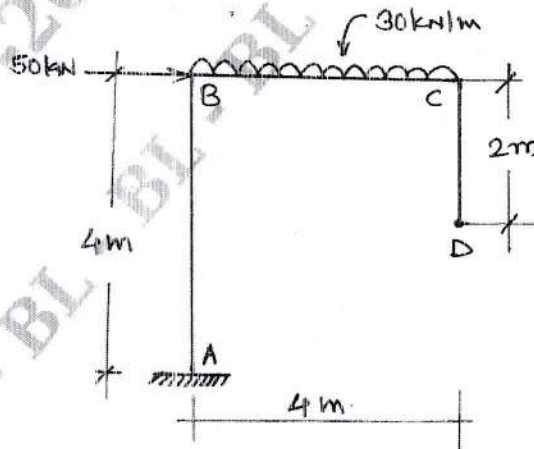

Fig.Q7(a)

(20 Marks) 45

OR

8 a. Find the vertical deflection of the joint B in the truss loaded as shown in Fig.Q8(a). The cross-sectional area of the members in mm are shown in brackets. Take E = 200kN/mm^2.
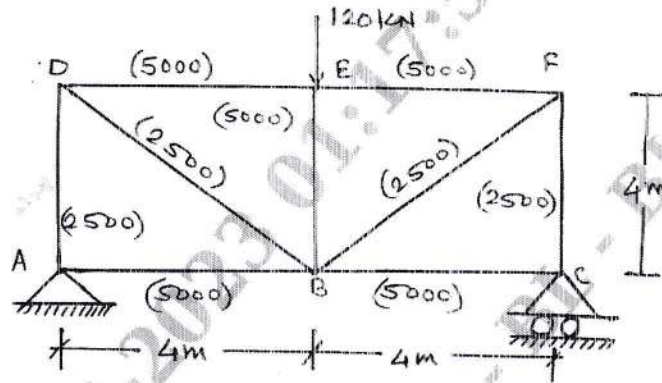

Fig.Q8(a)   (10 Marks)

b. Determine the vertical deflection of point 'D' in the truss shown in Fig.Q8(b). The cross-sectional areas of members AD and DE are 1500mm^2 while those of the other members are 1000mm^2. Take E = 200kN/mm^2.
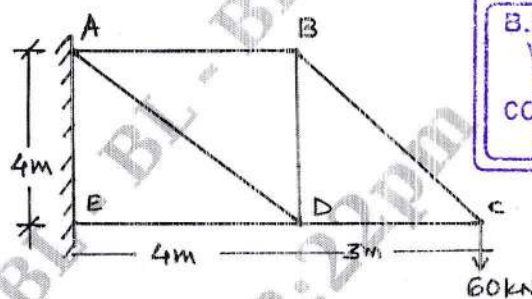
Fig.Q8(b)   (10 Marks)

Module-5

9 a. A three hinged circular arch hinged at the springing and crown points has a span of 40m and a central rise of 8m. It carries a uniformly distributed load 20kN/m over the left-half of the span together with a concentrated load of 100kN at the right quarter span point. Find the reactions at the supports, normal thrust and shear at a section 10m from left support.
                                                             (10 Marks)

b. A light cable 18m long is supported at two ends at the same level. The supports are 16m apart. The cable supports 120N load dividing the distance into two equal ports. Find the shape of the cable and tension in cable.   (10 Marks)

OR

10 a. A circular arch of span 25m with a central rise 5m is hinged at the crown and springing. It carries a point load of 100kN at 6m from the left support. Calculate :
   i)   The reactions at the supports
   ii) The reactions at crown
   iii) Moment at 5m from the left support.   (10 Marks)

b. A light flexible cable 18m long is supported at two ends at the same level. The supports are 16m apart. The cable is subjected to uniformly distributed load of 1kN/m of horizontal length over its entire span. Determine the reactions developed at the support.   (10 Marks)

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USN [   ]   **18CV43**

Fourth Semester B.E. Degree Examination, June/July 2023
Applied Hydraulics

Time: 3 hrs.   Max. Marks: 100

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

Module-1

1 a. Define the terms : (i) Reynold's number (ii) Froude's number (iii) Euler's number
      (iv) Webber's number (v) Mach number   **(05 Marks)**

   b. Using Buckingham's π-theorem, show that the velocity through a circular orifice is given by
      $$V = \sqrt{2gH}\phi\left[\frac{\Delta}{H}, \frac{\mu}{\rho VH}\right],$$ where H is the head causing flow, Δ is the diameter of the orifice,
      μ is co-efficient of viscosity, ρ is the mass density and g is the acceleration due to gravity.
                                                                            (15 Marks)

OR

2 a. State and prove the Buckingham's π-theorem. Why this theorem is considered superior over
      the Rayleigh's method.   **(10 Marks)**

   b. A pipe of diameter 1.5 m is required to transport an oil of Sp.Gr. 0.90 and viscosity 3×10^{-2}
      poise at the rate of 3000 litre/s. Tests were conducted on a 15 cm diameter pipe using water
      at 20°C. Find the velocity and rate of flow in the model. Viscosity of water at 20°C = 0.01
      poise.   **(10 Marks)**

Module-2

3 a. What is meant by economical section of a channel? Derive the condition for the most
      economical rectangular section.   **(10 Marks)**

   b. The discharge of water through a rectangular channel of width 8 m is 15 m³/s. when depth of
      flow of water is 1.2 m. Calculate (i) Specific energy of the flowing water (ii) Critical depth
      and critical velocity (iii) Value of minimum specific energy.   **(10 Marks)**

OR

4 a. Derive an expression for discharge through open channel by Chezy's formula and obtain an
      expression for conveyance.   **(10 Marks)**

   b. A trapezoidal channel has side slopes of 3H to 4V and slope of its bed is 1 in 2000.
      Determine the optimum dimensions of the channel, if it is to carry water at 0.5 m³/s.
      [C = 80].   **(10 Marks)**

Module-3

5 a. The depth of flow of water, at a certain section of a rectangular channel of 2 m wide, is
      0.3 m. The discharge through the channel is 1.5 m³/s. Determine whether a hydraulic jump
      will occur, and if so, find its height and loss of energy.   **(10 Marks)**

   b. Define the terms : (i) Afflux (ii) Back water curve. Prove that the length of the back water
      curve is given by, $L = \dfrac{(E_2 - E_1)}{i_b - i_e}$.   **(10 Marks)**

1 of 2

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OR

6 a. Explain the term hydraulic jump. Derive an expression for the depth of hydraulic jump in terms of the upstream Froude number. **(10 Marks)**

   b. Find the slope of the free water surface in a rectangular channel of width 20 m, having depth of flow 5 m. The discharge through the channel is 50 m^3/s. The bed of the channel is having a slope of 1 in 4000. Take the value of Chezy's constant C = 60. **(10 Marks)**

Module-4

7 a. Obtain an expression for the work done per sec by water on the runner of a pelton wheel. Hence derive an expression for max. efficiency of pelton wheel. **(10 Marks)**

   b. A jet of water of dia. 10 cm strikes a flat plate normally with a velocity of 15 m/s. The plate is moving with a velocity of 6 m/s in the direction of the jet and away from the jet. Find

   (i) The force exerted by the jet on the plate.

   (ii) Work done by the jet on the plate per second. **(10 Marks)**

OR

8 a. Draw a neat sketch of hydro electric power plant and mention the function of each component. **(10 Marks)**

   b. A Pelton wheel is to be designed for the following specifications:
   Shaft power = 11772 kW, Head = 380 m, Speed = 750 rpm, Overall efficiency = 86%, Jet diameter is not to exceed one-sixth of the wheel diameter.
   Determine (i) Wheel dia. (ii) No. of jets (iii) Dia. of jet. **(10 Marks)**

Module-5

9 a. Draw a neat sketch of Kaplan Turbine and explain the function of each part in brief. **(10 Marks)**

   b. Derive an expression for the minimum starting speed of a centrifugal pump. **(10 Marks)**

OR

10 a. With a neat sketch, explain the components and working of a centrifugal pump. **(10 Marks)**

   b. A Kaplan turbine develops 24647.6 kW power at an average head of 39 m. Assuming a speed ratio of 2, flow ratio of 0.6, diameter of the base equal to 0.35 times the diameter of the runner and an overall efficiency of 90%, calculate the diameter, speed and specific speed of the turbine. **(10 Marks)**

CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐

18CV44

Fourth Semester B.E. Degree Examination, June/July 2023
Concrete Technology

Time: 3 hrs.

Max. Marks: 100

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

Module-1

1 a. Explain the manufacture of cement by wet process with a flow chart. **(08 Marks)**
   b. Explain the initial setting time and final setting time test procedure of cement. **(08 Marks)**
   c. Describe the hydration of cement. **(04 Marks)**

OR

2 a. Explain the procedure of Aggregate Crushing Value Test. **(08 Marks)**
   b. Explain about (i) Acceleration   (ii) Retarders **(08 Marks)**
   c. Explain about the Rice Husk Ash. **(04 Marks)**

Module-2

3 a. Define workability. How do you measure the workability of the concrete by slump cone apparatus? **(08 Marks)**
   b. Explain the process of manufacturing of concrete. **(08 Marks)**
   c. Explain about (i) Segregation   (ii) Bleeding. **(04 Marks)**

OR

4 a. What are the different methods of wiring of concrete? Explain any two methods in detail. **(08 Marks)**
   b. What are the factors affecting the workability of the concrete? Explain them briefly. **(08 Marks)**
   c. Explain how heat of hydration is controlled in mass concrete works. **(04 Marks)**

Module-3

5 a. What are the factors influencing the strength of the concrete? Explain any two factors which affect the strength of the concrete in detail. **(08 Marks)**
   b. Define shrinkage of concrete. Explain about (i) Plastic shrinkage (ii) Drying shrinkage. **(08 Marks)**
   c. Define creep. What are the factors affecting creep. **(04 Marks)**

OR

6 a. Explain in detail (i) Sulphate attack   (ii) Chloride attack **(08 Marks)**
   b. Explain the corrosion. How do you control the corrosion of reinforcement? **(08 Marks)**
   c. Explain the rebound Hammer Test in detail. **(04 Marks)**

Module-4

7 a. Explain the selection criteria of ingredients used for Mix Design in brief. **(08 Marks)**
   b. Illustrate the steps to be followed as per IS recommendation method of Mix Design. **(08 Marks)**
   c. Mention the different methods of Mix Design. **(04 Marks)**

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OR

8 a. Determine the Mix proportion for a concrete Mix grade of M20 with the following data:
   (i) Specific gravity of cement = 3.15
   (ii) Maximum size of coarse aggregate = 20 mm
   (iii) Specific gravity of coarse aggregate = 2.60
   (iv) Specific gravity of fine aggregate = 2.60
   (v) Degree of quality control = good
   (vi) Type of exposure = mild
   (vii) Water absorption of C.A and F.A = 0.5% and 1.0%
   Assume any other data if required. **(16 Marks)**
   b. Define the terms: (i) Standard deviation (ii) Coefficient of variation **(04 Marks)**

Module-5

9 a. What is RMC? Explain briefly the methods of concreting and advantages of RMC. **(10 Marks)**
   b. Mention the need of self compacting concrete. Mention its application and properties. List out the different tests carried out for determining SCC. **(10 Marks)**

OR

10 a. Write a short notes on the following:
   (i) Fiber reinforced concrete
   (ii) Light weight concrete **(06 Marks)**
   b. Explain about:
   (i) Geo polymer concrete
   (ii) (ii) High strength concrete **(06 Marks)**
   (08 Marks)

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Fourth Semester B.E. Degree Examination, June/July 2023
Advanced Surveying

Time: 3 hrs.   Max. Marks: 100

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

Module-1

1   a.   Explain the Repetition method of measuring horizontal angles by a transit theodolite. List the errors eliminated by this method.   **(10 Marks)**

    b.   To measure the elevation of a tower , observations were made from two instrument stations P & Q. Determine the elevation to the top of the tower.

Top of tower	Station Points	Horizontal Angle	Vertical Angle	Staff reading	Remarks
R	P	62° 18′	20° 12′	2.240 mts	• R.L of BM = 500 mts
	Q	72° 42′	21° 06′	3.300 mts	• Distance b/w P & Q = 80 mts

(10 Marks)

OR

2   a.   Define the following with reference to a theodolite :   **(04 Marks)**
         i) Horizontal Axis   ii) Line of Collimation   iii) Left Face Observation   iv) Swinging.

    b.   Explain the horizontal axis adjustment of a transit theodolite by the spine test.   **(06 Marks)**

    c.   The top of a signal spine P was sighted from two points A & B, being at very different levels and in line with 'P' the angle of elevation from A & B to P were 40° 20′ and 20° 30′ respectively. The angle of elevation from B to a target 2.5m above the foot of the staff held at A is 16° 15′. The height of instrument A and B are 1.750 mts and 1.545 mts. The horizontal distance between A and B was 100 mts. The R.L of B was 150.500 mts. Determine the RL of P and horizontal distance of the signal spire from B.   **(10 Marks)**

Module-2

3   a.   Derive the distance and elevation formula for a staff held vertical and line of sight being inclined in tachometry.   **(06 Marks)**

    b.   Explain Satellite stations and Reduction to centre.   **(04 Marks)**

    c.   To determine the gradient between two points A & B, the following observations were made with a tacheometer fitted with an analytical lens and having multiplying constant 100, with the staff kept vertical.   **(10 Marks)**

Instrument e	Staff e	Bearing	Vertical angle	Stadia Reading
P	A	134°	+10° 32′	1.360, 1.915, 2.470
	B	224°	+ 5° 6′	1.065, 1.885, 2.705

OR

4   a.   Explain First order , Second order and Third order triangulation system.   **(06 Marks)**

    b.   What are important factors to be considered in selection of site for a base line?   **(06 Marks)**

    c.   From an eccentric station S, 12.25 mts to nest of main station B, the following angles were measured ∠BSC = 76° 25′ 32″   ;   ∠CSA = 54° 32′ 20″. The stations S and C are to opposite sides of line AB. Calculate the correct angle ABC if the length of AB and BC are 5286.50 and 4932.20 mts respectively.   **(08 Marks)**

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Module-3

5 a. Define the following with a neat sketch : i) Point of curvature   ii) Length of long chord
iii) Deflection angle   iv) Vertex distance.
(04 Marks)

b. Explain various types of vertical curves with sketches.
(04 Marks)

c. The following data refer to a compound curve which bears to right :
   - Total deflection angle = 93°   • Degree of 1ˢᵗ curve = 4°   • Degree of 2ⁿᵈ curve = 5°
   - Point of intersection is at 45 + 21 (20m units).

Determine in 20mts units the running distance of the tangent points and point of compound curvature , given the latter is 6 + 24 from point of intersection @ back angle of 290° 36′ from the 1ˢᵗ tangent.
(12 Marks)

OR

6 a. What is Transition curve? List the functions and essential requirements of an ideal transition curve.
(04 Marks)

b. A road bond deflects 80° and is to be designed for a maximum speed of 100 kmph and centrifugal ratio ¼. The maximum rate of change of acceleration = 30cm/sec³. The curve consists of a circular are combined with two spirals. Calculate the radius of circular curve , length of transition curve, total length of combined curve, chainages at beginning and end of transition curve and junctions of transition curve with circular curve? The chainage at point of intersection is 42862 mts.
(08 Marks)

c. Explain the method of setting out simple curve by deflection distances method. **(08 Marks)**

Module-4

7 a. Define the following : i) Vertical photograph   ii) Nadir point   iii) Drift
iv) Exposure station   v) Flight line   vi) Focal length.
(06 Marks)

b. Explain Scale of a vertical photograph.
(04 Marks)

c. Two points A & B having elevations 500mts and 300mts respectively above datum appear on a vertical photograph having focal length 20cm and flying altitude of 2500 mts their corrected photographic coordinates are

Point	X(cm)	Y(cm)
a	+ 2.64	+ 1.36
B	- 1.92	+ 3.65

Determine the length of the ground AB.
(10 Marks)

OR

8 a. What is Relief displacement? Derive its expression.
(08 Marks)

b. List the reasons for overlap.
(04 Marks)

c. The scale of a aerial photograph is 1cm = 100m. The photography size is 30cm × 20cm. Determine the number of photographs required to cover an area 10km × 10km, if the longitudinal overlap is 60% and side lap is 30%.
(08 Marks)

Module-5

9 a. Mention advantages of total station and describe its working principle.
(10 Marks)

b. Define Remote Sensing. Explain the idealized remote sensing system.
(10 Marks)

OR

10 a. Explain GIS and mention its applications in Civil Engineering.
(10 Marks)

b. Define GPS. Explain the working principle of GPS.
(10 Marks)

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02 of 2

CBCS SCHEME

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Fourth Semester B.E. Degree Examination, June/July 2023
Water Supply and Treatment Engineering

Time: 3 hrs. Max. Marks: 100

Note: 1.Answer any FIVE full questions, choosing ONE full question from each module.
2.Draw neat diagrams wherever required.

Module-1

1 a. Define "per capita demand". How is it estimated? Discuss the factors that influence the per capita demand. **(08 Marks)**

   b. Discuss the decreasing rate of growth method and the logistic curve method of population forecasting **(06 Marks)**

   c. A water supply scheme has to be designed for a city having a population of 2.5 lakhs. Estimate the important kinds of drafts which may be required to be recorded for an average water consumption of 180 lpcd. Also record the required capacities of major components of the proposed water works system for the city using a river as a source of supply. Assume suitable data, wherever needed. Take maximum daily draft as 1.8 times the average. **(06 Marks)**

OR

2 a. Explain the terms:
   i) Fire demand   ii) Coincident draft   iii) Whole some water   iv) Design period **(08 Marks)**

   b. Enumerate the significance of public water supply scheme in the present-day civil life. **(06 Marks)**

   c. The population of a locality as obtained from census report is as follows:

Census year	1971	1981	1991	2001	2011
Population	3,50,000	4,66,000	9,94,000	15,60,000	16,23,000

   Estimate the population in the locality in the year 2021 and 2041 by incremental inverse method. **(06 Marks)**

Module-2

3 a. Discuss the objectives of water treatment. With a flow chart, explain the significance of each unit in the process of water treatment. **(08 Marks)**

   b. With a neat sketch, explain the working of an infiltration gallery. **(06 Marks)**

   c. Enumerate the significance of the following from water quality criteria:
   (i) Chlorides   (ii) Hardness   (iii) E-coli **(06 Marks)**

OR

4 a. Compare the surface and sub-surface sources of water with respect to available forms, quality and quantity. **(08 Marks)**

   b. With a neat sketch, explain the working of a wet intake tower. **(06 Marks)**

   c. Write short notes on :
   (i) Specific conductivity of water   (ii) Turbidity of water **(06 Marks)**

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Module-3

5 a. With a neat sketch, explain the various components of a coagulation-sedimentation tank.

(08 Marks)

b. Compute he settling velocity of a discrete particle in water under the condition when Reynolds number is less than 0.5. The diameter and specific gravity of the particle is 0.05mm and 2.65 respectively. Temperature of water is 20°C and kinematic viscosity of water is 1.01×10^{-2} m²/sec.

(04 Marks)

c. Design a rapid sand filter unit for treating and MLD of water. Assume 4% of filtered water is used for washing water everyday for a period of 30 minutes. Take length of filter bed as 1.5 times the width and rate of filtration as 5,000 litres/hour/sq.m.

(08 Marks)

OR

6 a. Explain the mechanism of filtration.

(06 Marks)

b. Design six slow sand filter beds from the following data:
Population to be served : 50,000 persons ;   Per capita demand : 150 litres/head/day
Rate of filtration : 180 litres/head/sq.m   ;   Length of each bed : Twice the breadth.
Assume maximum demand as 1.8 times the average daily demand, and one unit, out of six, will be kept as standby.

(06 Marks)

c. A rectangular sedimentation tank is to handle 12 MLD of raw water with length equal to twice its width. The particles are larger than 0.04 mm in size. Assuming the specific gravity of the particles as 2.65 and the temperature as 20°C, determine the tank dimensions. If the depth of the tank is 4m, compute the detention time.

(08 Marks)

Module-4

7 a. Compare lime-soda process with zeolite process of softening water under the following criteria:
(i) Sludge   (ii) Post-Treatment   (iii) pH of treated water   (iv) Bacteria
(v) Hardness removal   (vi) Economy.

(06 Marks)

b. Explain :
(i) Reverse osmosis   (ii) Nano-filtration

(06 Marks)

c. Discuss :
(i) Super-chlorination   (ii) Break-point Chlorination   (iii) Dechlorination
Results of chlorine demand test on a raw water are given below Table 7(c). Sketch a "Chlorine demand curve". Determine the "break point dosage" and the "chlorine demand" at dosage of 1.2 mg/l.

Table 7(c)

Sample No.	Chlorine dosage (mg/l)	Residual chlorine after 10 minutes contact (mg/l)
1	0.2	0.19
2	0.4	0.36
3	0.6	0.50
4	0.8	0.48
5	1.0	0.2
6	1.2	0.4
7	1.4	0.6
8	1.6	0.8

(08 Marks)

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OR

8 a. Discuss the various forms of chlorine that can be used in disinfection process. **(06 Marks)**
  b. With a sketch explain the Nalgonda Technique of defluorination of water. **(06 Marks)**
  c. The analysis of a hard water shows the following composition.
  Free CO_2 = 3 mg/l
  Alkalinity = 68 mg/l
  Non-carbonate hardness = 92 mg/l
  Total magnesium = 15 mg/l
  Assume that it is possible to remove all but 35 mg/l of carbonate hardness with lime and that the treated water is to have a total hardness of 80 mg/l. Determine the quantity of hydrated lime and soda required for treatment per million litre of raw water.
  (Atomic weights in gms : Ca = 40, Mg = 24, C = 12, O = 16, H = 1, Na = 23) **(08 Marks)**

Module-5

9 a. Explain the types of distribution systems. **(06 Marks)**
  b. Discuss the factors influencing the selection of pipe materials. **(06 Marks)**
  c. Water has to be supplied to a town with one lakh population at the rate of 150 litres per capita per day from a river 2 kms away. The difference in elevation between the lowest water level in the sump and the reservoir is 36m. If the demand has to be supplied in 8 hours, determine size of the main and BHP of the pumps required. Assume maximum demand as 1.5 times the average demand, coefficient of friction of pipe material = 0.0075, Velocity = 2.4 m/sec, Efficiency of pump = 80%. **(08 Marks)**

OR

10 a. Define "economical diameter" of a rising main. Discuss how is it determined. **(04 Marks)**
  b. Explain the post fire hydrant and fresh fire hydrant in a water distribution system. **(06 Marks)**
  c. It is proposed to construct a distribution reservoir for the water supply of rural population with daily requirement of 2,25,000 litres. The pattern of draw-off is as follows:
  7 A.M. to 8 A.M. – 30% of days supply
  8 A.M. to 5 P.M. – 35% of days supply
  5 P.M. to 6.30 P.M. – 30% of days supply
  6.30 P.M. to 7 A.M. – 5% of days supply
  Pumping has to be done at a constant rate of 8 hours per day (from 8 A.M. to 4 P.M.).
  Estimate the storage of capacity of the reservoir by drawing the mass curve of demand. **(10 Marks)**

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18MAT41
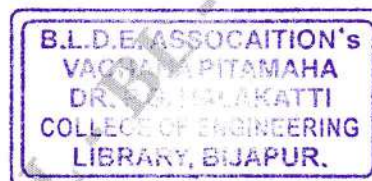
Fourth Semester B.E. Degree Examination, June/July 2023
Complex Analysis, Probability and Statistical Methods

Time: 3 hrs.

Max. Marks: 100

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

Module-1

1 a. Find analytic function u + iv, where u is given to be $u = e^x[(x^2 - y^2)\cos y - 2xy \sin y]$. **(06 Marks)**

   b. Derive Cauchy Reimann equations in polar form. **(07 Marks)**

   c. Show that $u = e^{2x}[x\cos 2y - y\sin 2y]$ is harmonic. Find the analytic function $f(z) = u + iv$. **(07 Marks)**

OR

2 a. Derive Cauchy Reimann equation in Cartesian form. **(06 Marks)**

   b. Determine analytic function $f(z) = u + iv$ if $u - v = e^x[\cos y - \sin y]$. **(07 Marks)**

   c. Show that $w = z^n$ is analytic and hence find its derivative. **(07 Marks)**

Module-2

3 a. Discuss the transformation $w = z + \dfrac{1}{z}, z \neq 0$. **(06 Marks)**

   b. Find the Bilinear transformation which maps the points $z = 1, i, -1$ onto $w = 0, 1, \infty$. **(07 Marks)**

   c. Evaluate $\displaystyle\int_0^{2+i} (\bar{z})^2 \, dz$ along i) line $y = x/2$ ii) real axis to 2 and then vertically to $2 + iy$. **(07 Marks)**

OR

4 a. Discuss the transformation $w = z^2$. **(06 Marks)**

   b. State and prove Cauchy's integral formula $f(a) = \dfrac{1}{2\pi i}\displaystyle\int_C \dfrac{f(z)}{(z-a)}\,dz$. **(07 Marks)**

   c. Evaluate using Cauchy's integral formula.
   $\displaystyle\int_C \dfrac{e^{2z}}{(z-1)(z-2)}\,dz$ $C : |z| = 3$. **(07 Marks)**

Module-3

5 a. Define: i) Random variable ii) Discrete probability distribution with an example. **(06 Marks)**

   b. The probability that man aged 60 will live upto 70 is 0.65. What is the probability that out of 10 men, now aged 60   i) Exactly 9   ii) atmost 9   iii) Atleast 7 will live up to age of 70 years. **(07 Marks)**

   c. In a normal distribution, 3% of items are under 45 and 8% are over 64. Find the mean and standard deviation, given that $A(0.5) = 0.19$ and $A(1.4) = 0.42$. **(07 Marks)**

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OR

6 a. The probability distribution of a finite random variable X is given by

X :	-2	-1	0	1	2	3
P(x) :	0.1	K	0.2	2K	0.3	K

Find 'K', mean and variance of X. **(06 Marks)**

b. If probability of bad reaction from certain injection is 0.001. Determine the chance that out of 2000 individuals more than two will get bad reaction, and less than two will get bad reaction. **(07 Marks)**

c. The frequency of accidents per shift in a factory is shown in the following table:

Accidents per shift	0	1	2	3	4
Frequency	192	100	24	3	1

Calculate mean numbers of accidents per shift. Find the corresponding Poisson distribution. **(07 Marks)**

Module-4

7 a. Fit a second degree parabola $y = a + bx + cx^2$ for the following data:

x	0	1	2	3	4	5
y	1	3	7	3	21	31

(06 Marks)

b. Find the coefficient of correlation, lines of regression of x on y and y on x. Given,

x	1	2	3	4	5	6	7
y	9	8	10	12	11	13	14

(07 Marks)

c. If θ is an acute angle between line of regression, then show that $\tan\theta = \dfrac{\sigma x}{\sigma_x^2 + \sigma_y^2}\left(\dfrac{1 - r^2}{r}\right)$.

Indicate the significance of the cases $r = 0$ and $r = \pm 1$. **(07 Marks)**

OR

8 a. Fit the curve of the form ax^b and hence estimate y when x = 8.

x	5	10	15	20	25	30	35
y	2.76	3.17	3.44	3.64	3.81	3.95	4.07

(06 Marks)

b. Find the rank correlation coefficient for the following data:

x	93	44	53	08	71	81	6	10	32	31
y	45	62	12	28	92	84	73	3	51	32

(07 Marks)

c. With the usual notations compute $\bar{x}$, $\bar{y}$ and r from the following lines of regression:
$y = 0.516x + 33.73$ and $x = 0.512y + 32.52$. **(07 Marks)**

Module-5

9 a. The joint probability distribution for following data

X \ Y	-2	-1	4	5
1	0.1	0.2	0	0.3
2	0.2	0.1	0.1	0

Determine the marginal distributions of X and Y also calculate E(x), E(y), COV (xy). **(06 Marks)**

b. Define: i) Null hypothesis   ii) Confidence limits   iii) Type I, Type II errors.   **(07 Marks)**

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c. The following table gives the distribution of digits in the numbers chosen at random from a telephone directory:

Digits	0	1	2	3	4	5	6	7	8	9
Frequency	1026	1107	997	966	1075	933	1107	972	964	853

Test whether the digits may be taken to occur equally frequently in the directory. (given $\chi^2_{0.05} = 16.92$ at n = 9). **(07 Marks)**

OR

10 a. A fair coin is tossed thrice. The random variable X and Y are defined as follows. X = 0 or 1 according as head or tail occurs on first loss, Y = number of heads.
   i) Determine distribution of X and Y.
   ii) Joint probability distribution of X and Y.
   iii) Expectation of X, Y and XY. **(06 Marks)**

b. It is claimed that a random sample of 49 tyres has a mean life of 15200km. Is the sample drawn from population whose mean is 15,150km and standard deviation is 200km? Test the significance level at 0.05 level. **(07 Marks)**

c. Ten individuals are choosen at random from the population and their height in inches are found to be 63, 63, 66, 67, 68, 69, 70, 70, 71, 71. Test the hypothesis that the mean height of universe is 66' (value of $t_{0.05} = 2.262$ for 9.D.F). **(07 Marks)**

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18MATDIP41

Fourth Semester B.E. Degree Examination, June/July 2023
Additional Mathematics – II

Time: 3 hrs.

Max. Marks: 100

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

Module-1

1 a. Find the rank of the matrix by applying elementary row operations :

$$A = \begin{bmatrix} 0 & 2 & 3 & 4 \\ 2 & 3 & 8 & 4 \\ 4 & 8 & 13 & 12 \end{bmatrix}$$

(06 Marks)

b. Test for consistency and solve the system :

$x + y + z = 6$
$x - y + 2z = 5$
$3x + y + z = 8$.

(07 Marks)

c. Find the eigen value and the corresponding eigen vectors of the matrix :

$$A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}.$$

(07 Marks)

OR

2 a. Reduce the matrix A to the echelon firm, where

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

(06 Marks)

b. Find the values of λ and μ such that the system

$x + y + z = 6$
$x + 2y + 3z = 10$
$x + 2y + \lambda z = \mu$

may have
i) unique solution
ii) infinite solution
iii) no solution.

(07 Marks)

c. Solve :

$2x + y + 4z = 12$
$4x + 11y - z = 33$
$8x - 3y + 2z = 20$

By Gauss elimination method

(07 Marks)

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Module-2

3 a. The area of a circle (A) corresponding to diameter (D) is given in the following table :

D	80	85	90	95	100
A	5026	5674	6362	7088	7854

Find the area when D = 105 using an appropriate interpolation formula. **(06 Marks)**

b. Find the real root of the equation $\cos x = 3x - 1$ correct to three decimal places using Regula – Falsi method. **(07 Marks)**

c. Evaluate $\int_0^1 \frac{x \, dx}{1 + x^2}$ using Weddle's rule. Take seven ordinates. **(07 Marks)**

OR

4 a. Find $u_{0.5}$ from the data $u_0 = 225$, $u_1 = 238$, $u_2 = 320$, $u_3 = 340$ by using an appropriate interpolation formula. **(06 Marks)**

b. Use Newton – Raphson method to find a real root of the equation $x^3 + 5x - 11 = 0$ correct to the three decimal places. **(07 Marks)**

c. Using Simpson's 1/3rd rule, evaluate $\int_0^1 \frac{dx}{1 + x^2}$ by dividing the interval [0, 1] into six equal parts. Hence deduce the value of $\log_e 2$. **(07 Marks)**

Module-3

5 a. Solve $(D^3 - 6D^2 + 11D - 6) y = 0$. **(06 Marks)**

b. Solve $(D^2 - 4)y = \cos h (2x - 1) + 3^x$. **(07 Marks)**

c. Solve $\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 2y = 4\cos^2 x$. **(07 Marks)**

OR

6 a. Solve $\frac{d^3y}{dx^3} + y = 0$. **(06 Marks)**

b. Solve $y'' + 9y = \cos 2x \cdot \cos x$ **(07 Marks)**

c. Solve $y'' - (a + b)y' + aby = e^{ax} + e^{bx}$. **(07 Marks)**

Module-4

7 a. Form a partial differential equation by eliminating the arbitrary constants in $ax^2 + by^2 + z^2 = 1$. **(06 Marks)**

b. Form the partial differential equation by eliminating the arbitrary function from $\ell x + my + nz = \phi(x^2 + y^2 + z^2)$. **(07 Marks)**

c. Solve $\frac{\partial^2 z}{\partial x^2} = a^2 z$, given that when x = 0, z = 0 and $\frac{\partial z}{\partial x} = a \sin y$. **(07 Marks)**

60

2 of 3

OR

8 a. Form a partial differential equation by eliminating the arbitrary constructs from :

$$z = xy + y\sqrt{x^2 - a^2} + b.$$

(06 Marks)

    b. Solve $\dfrac{\partial^2 z}{\partial x^2} = x + y$ by direct integration.

(07 Marks)

    c. Solve $\dfrac{\partial^2 z}{\partial y^2} = z$, given that $z = 0$, $\dfrac{\partial z}{\partial y} = \sin x$, when $y = 0$.

(07 Marks)

Module-5

9 a. Define :
    i)   Sample space
    ii) Mutually exclusive events
    iii) Mutually independent events.

(06 Marks)

    b. A box contains 4 black, 5 white and 6 red balls. If 2 balls are drown at random, what is the probability that :
    i)   both are red
    ii) one black and one white.

(07 Marks)

    c. State and prove Baye's theorem.

(07 Marks)

OR

10 a. If A and B are events with $P(A \cup B) = \dfrac{7}{8}$, $P(A \cap B) = \dfrac{1}{4}$ and $P(A \cap \bar{B}) = \dfrac{1}{3}$.
    Find :
    i)   P(A)
    ii) P(B)
    iii) $P(\bar{A} \cap B)$.

(06 Marks)

    b. A problem is given to four students A, B, C, D whose chances of solving it are $\dfrac{1}{2}, \dfrac{1}{3}, \dfrac{1}{4}, \dfrac{1}{5}$ respectively. Find the probability that the problem is solved.

(07 Marks)

    c. Three machines A, B and C produce 50%, 30% and 20% of the items in a factory. The percentage of defective outputs of these machines are 3, 4, and 5 respectively. If an item is selected at random, what is the probability that it is defective? If a selected item is defective, what is the probability that it is from machine A?

(07 Marks)

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① 21 IVth sem CV

CBCS SCHEME
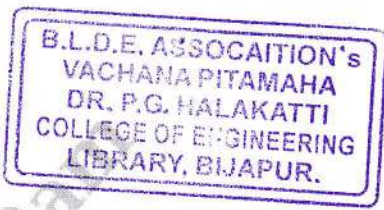
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21CV42

Fourth Semester B.E. Degree Examination, June/July 2023
Fluid Mechanics and Hydraulics

Time: 3 hrs.

Max. Marks: 100

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

Module-1

1 a. Define the following with units:
   (i) Mass density
   (ii) Specific gravity
   (iii) Dynamic viscosity
   (iv) Surface tension
   (06 Marks)
   b. State and prove Pascal's law.
   (06 Marks)
   c. An U-tube differential manometer connects two pipes A and B. Pipe A contains CCl_4 (Sp. Gr. = 1.59) under 130 kN/m^2 gauge pressure. Pipe B contains oil (Sp. Gr. = 0.82) under 200 kN/m^2 gauge pressure. Pipe A is 2.5 m above pipe B. The manometer contains mercury. Calculate the difference in mercury levels. Draw neat sketch. The level of mercury connected to pipe A is in level with centre of pipe B.
   (08 Marks)

OR

2 a. Derive an expression for total pressure and centre of pressure on a plane surface immersed vertically in water.
   (06 Marks)
   b. Calculate the specific weight, density, specific volume and specific gravity of two litres of a liquid which weighs 15 N.
   (06 Marks)
   c. A 1.2 m × 1.8 m size rectangular plate is immersed in water with an inclination of 30° to the horizontal. The 1.2 m side of the plate is kept horizontal at a depth of 30 m below the water surface. Compute the total pressure on the surface and the position of centre of pressure.
   (08 Marks)

Module-2

3 a. Explain:
   (i) Steady and unsteady flow
   (ii) Rotational and irrotational flow
   (iii) Laminar and turbulent flow
   (06 Marks)
   b. Derive continuity equation in Cartesian coordinates for 3 dimensional flow.
   (08 Marks)
   c. List the assumptions made in deriving Bernoulli's equation.
   (06 Marks)

OR

4 a. State and derive the Bernoulli's equation starting from the Euler's equation of motion with a neat sketch.
   (06 Marks)
   b. What is venturimeter? Derive an expression for discharge through a venturimeter. **(06 Marks)**
   c. A horizontal venturimeter with inlet diameter 200 mm and throat diameter 100 mm is employed to measure the flow of water. The reading of the differential manometer connected to the venturimeter is 180 mm of Hg. Determine the discharge (Q) is $C_d = 0.98$.
   (08 Marks)

Module-3

5 a. Explain different hydraulic coefficients and establish the relation between them. **(06 Marks)**
   b. Derive an expression for discharge over a triangular notch.
   (06 Marks)
   c. Water flows over a rectangular notch 1.2 m wide at a depth of 15 cm and afterwards passes through a triangular right angled notch. Taking coefficient of discharge for rectangular notch

OR

6   a.   Explain:
    (i)   Major and minor losses
    (ii) Pipes in series and parallel
    (iii) Water hammer   **(06 Marks)**
    b.   Derive Darcy-Weisbach equation for head loss due to friction in a pipe.   **(06 Marks)**
    c.   Water is required to be supplied to a colony of 4000 residents at a rate of 180 litres per person from a source 3 km away. If half the daily requirements need to be pumped in 8 hours against a friction head of 18 m, find the size of the main pipe supplying water. Assume friction factor as 0.028.   **(08 Marks)**

Module-4

7   a.   Define open channel flow. Give the classification of flow through channels with example.   **(06 Marks)**
    b.   Define most economical channel section. Derive the conditions for best hydraulic triangular channel section.   **(06 Marks)**
    c.   A rectangular channel 6m wide and 1m depth of water has a bed slope of 1 in 900 and is having n = 0.012. Determine the discharge. What will be the dimensions of the channel for maximum discharge with amount of lining being kept constant? Also compute percentage increase in discharge.   **(08 Marks)**

OR

8   a.   What is specific energy curve? Draw it and derive expressions for critical depth and critical velocity for rectangular channel.   **(06 Marks)**
    b.   Derive the relationship between conjugate depths in case of hydraulic jump on a horizontal floor.   **(06 Marks)**
    c.   A rectangular channel with bottom width 4m and bed slope 0.0008 has a discharge of 1.5 m³/s. In a GVF channel the depth at a certain section is 0.3 m. If n = 0.016, determine the type of profile.   **(08 Marks)**

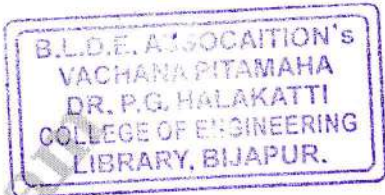## Module-5

9   a.   Show that for a free jet of water striking at the centre of semicircular vane, the maximum efficiency occurs when the vane velocity is $\frac{1}{3}$ of jet velocity and η_{max} = 59.2%.   **(06 Marks)**
    b.   With a neat sketch, explain the components of Pelton wheel.   **(06 Marks)**
    c.   Obtain an expression for the work done per second by water on the runner of a Pelton wheel. Hence derive an expression for maximum efficiency of the Pelton wheel.   **(08 Marks)**

OR

10 a.   By means of a neat sketch, explain the Francis Turbine.   **(06 Marks)**
    b.   Define: (i) Manometric head   (ii) Static head   (iii) Suction head   (iv) Delivery head, for centrifugal pump.   **(06 Marks)**
    c.   The following data is given for a Francis Turbine.
         Net head H = 60 m, speed N = 700 rpm, shaft power = 294.3 KW, η_0 = 84%, η_h = 93%, flow ratio = 0.20; breadth ratio, n = 0.1; outer diameter of the runner = 2 × inner diameter of runner. The thickness of vanes occupy 5% of circumferential area of the runner, velocity of flow is constant at inlet and outlet and discharge is radial at outlet. Determine:
         (i)   Guide blade angle
         (ii)   Runner vane angles at inlet and outlet
         (iii) Diameters of runner at inlet and outlet
         (iv)   Width of wheel at inlet   **(08 Marks)**

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CBCS SCHEME

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Module-1

1. a. Briefly explain various type of water demand. **(10 Marks)**
   b. Explain the factor affecting the design period. **(05 Marks)**
   c. Explain the method of sampling of water. **(05 Marks)**

OR

2. a. Discuss the importance of physical, chemical and biological characteristics of water. **(08 Marks)**
   b. Explain Titrimetric method of determining Alkalinity of given water ample. **(08 Marks)**
   c. Discuss the factor effecting the rate of water demand. **(04 Marks)**

Module-2

3. a. Draw a flow chart of conventional water treatment plant and indicate various units. **(05 Marks)**
   b. Design a rectangular sedimentation tank to treat 2.4 million liters of raw water per day. The detention period may be assumed to be 3 hours. **(05 Marks)**
   c. Briefly explain theory of filtration. **(05 Marks)**
   d. Explain the limitation of aeration process. **(05 Marks)**

OR

4. a. Design six sand filter beds from the following data :
   Population to be served = 50,000
   Persons per capita demand = 150 liters/head/day
   Rate of filtration = 180 liters/hr/SQ.M
   Length of each Bed = twice the breadth.
   Assume Max. Demand as 1.8 times the average daily demand. Also assume that one unit, out of six, will be kept as stand by. **(08 Marks)**
   b. Briefly explain, how you will determine the optimum coagulant quantity by jar test. **(08 Marks)**
   c. Briefly explain theory of sedimentation. **(04 Marks)**

Module-3

5. a. With the help of chemical formula explain Zeolite process of removing hardness. **(05 Marks)**
   b. Explain break point chlorination. **(05 Marks)**
   c. Briefly explain types of sewerage system. **(05 Marks)**
   d. The 5 day 30°C BOD of sewage sample is 110MG/L. Calculate its 5 days 20°C BOD. Assume the deoxgenation constant at 20°C, K_{20} AS 0.1. **(05 Marks)**

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OR

6 a. Explain theory of chlorination of water with chemical equation. (05 Marks)
   b. With the help of chemical formula explain Lime-SODA process of removing hardness.
   (05 Marks)
   c. A city discharges 1500 liters per second of sewage into a stream whose minimum rate of flow is 6000 liters per second. The temperature of sewage as well as water is 20°C. The 5 day BOD AT 20°C for sewage is 200MG/L and that of river water is 1MG/L. The D.O. content of sewage is 2 ERO and that of stream is 90% of the saturation D.O. If the minimum D.O to be maintained in the stream is 4.5MG/L. Find out the degree of sewage treatment required. Assume the de-oxgenation coefficient as 0.1 and de-oxygenation coefficients as 0.3. [Assume saturation D.O AT 20°C is 9.17 mg/ℓ]. (10 Marks)

Module-4

7 a. With neat flow diagram, explain unit operation and process of municipal waste water treatment. (06 Marks)
   b. Discuss briefly with neat sketch grit chamber and oil and grease removal tank. (08 Marks)
   c. With a neat diagram, explain activated sludge process. (06 Marks)

OR

8 a. With a neat sketch explain the working of Manhole and CATCH basin. (10 Marks)
   b. Explain the importance of screens and types of screens in the sewage treatment process.
   (10 Marks)

Module-5

9 a. With a neat sketch explain construction and operation of trickling filters. (08 Marks)
   b. With a neat sketch explain oxidation pond. (07 Marks)
   c. Briefly explain stages in the sludge digestion process. (05 Marks)

OR

10 a. Design suitable dimensions of a circular trickling filter units for treating 5 million liters of sewage per day. The BOD of the sewage is 150 MG/L. (08 Marks)
   b. Briefly explain factors affecting sludge digestion and their control. (08 Marks)
   c. Explain the advantages of two stage digestion. (04 Marks)

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CBCS SCHEME

21CV44

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Fourth Semester B.E. Degree Examination, June/July 2023
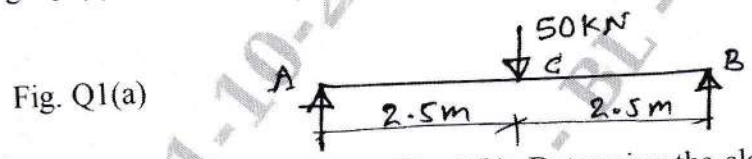### Analysis of Structures

Time: 3 hrs.

Max. Marks: 100

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

Module-1

1   a. Determine maximum slope and maximum deflection for simply supported beam as shown in the Fig. Q1(a). Take $E = 2 \times 10^5$ N/mm^2 and $I = 15 \times 10^6$ mm^4. Use Moment Area method. **(10 Marks)**
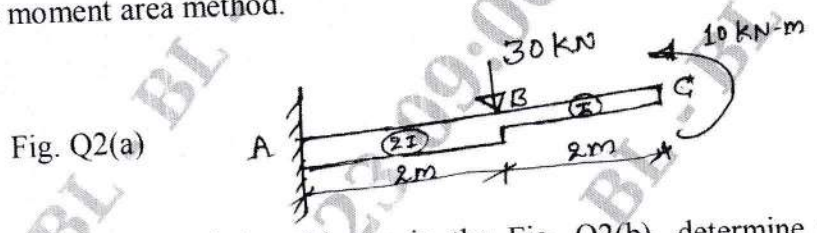
Fig. Q1(a)

   b. For the beam loaded as shown in Fig. 1(b). Determine the slope and deflection at the free end. Use Conjugate beam method. **(10 Marks)**
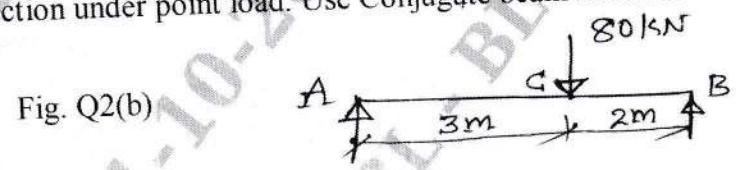
Fig. Q1(b)
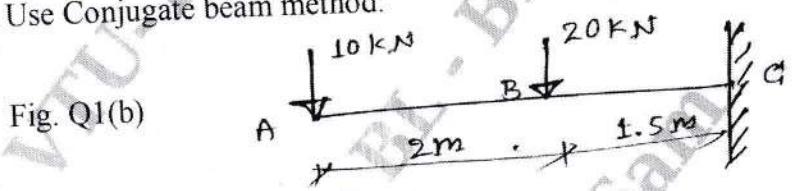
OR

2   a. Calculate slope and deflection at free end for the cantilever beam as shown in Fig. Q2(a). Use moment area method. **(10 Marks)**

Fig. Q2(a)

   b. For the beam loaded as shown in the Fig. Q2(b), determine the maximum slope and deflection under point load. Use Conjugate beam method. **(10 Marks)**

Fig. Q2(b)

Module-2

3   a. Derive an expression for strain energy due to bending. **(08 Marks)**
   b. Determine the deflection for a simply supported beam as shown in Fig. Q3(b). Under point load by using Strain energy method. $E = 200 \times 10^6$ kN/m^2 & $I = 25 \times 10^{-6}$ m^4. **(12 Marks)**
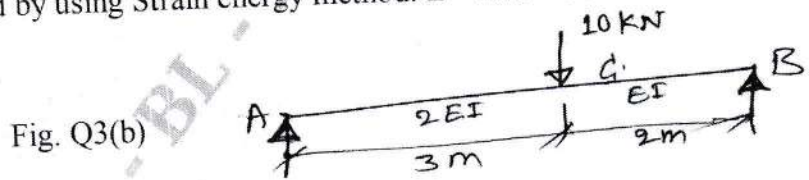
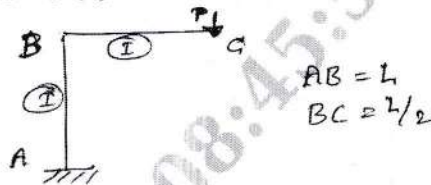Fig. Q3(b)

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OR

4 a. Derive an expression for strain energy due to shear force. **(08 Marks)**

   b. Using Cartigliano's theorem , determine the vertical and horizontal deflection at the free end of the frame as shown in Fig. Q4(b). **(12 Marks)**

Fig. Q4(b)

$AB = L$

$BC = L/2$

Module-3

5 a. A three hinged parabolic arch of span 20m and a central rise of 5m carry a point load of 200 kN at 6m from the left support. Find the support reactions at A and B. Calculate normal thrust and radial shear at 6m from the left support. Also draw the BMD. **(12 Marks)**

   b. A suspension cable having a support at same level of span 30m and maximum dip of the cable is 3m subjected to UDL of 10kN/m over the entire length. Find the support reactions at 'A' & 'B'. Also find maximum tensile force in the cable and length of the cable. **(08 Marks)**


OR

6 a. A 3 hinged parabolic arch of span 60m and a central rise of 15m carry two point loads of 200kN at 15m from the left support and 300kN at 15m from the right support. Find the support reactions at A and B. Calculate normal thrust and radial shown at 20m from the left support. Also draw the BMD. **(12 Marks)**

   b. Derive an expression to find length of a cable subjected to UDL throughout with usual notations. **(08 Marks)**

Module-4

7 Analyse a continuous beam ABCD consists of 3 spans and it is loaded as shown in the Fig. Q7 by slope deflection method. Determine the moments at supports and draw the SFD & BMD. Also draw the deflected shape of the structure. **(20 Marks)**
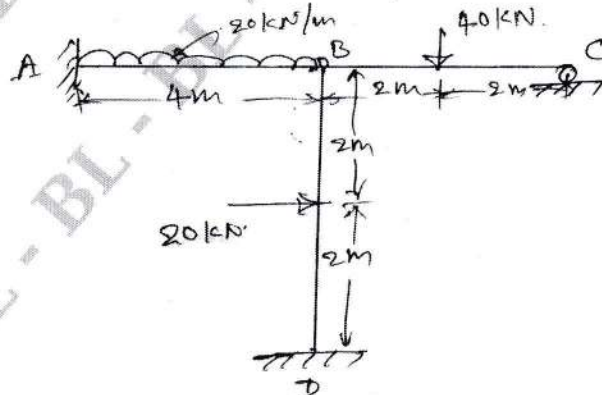
Fig. Q7
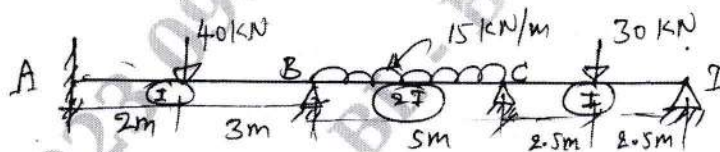
OR

8 Analyse the given frame as shown in Fig. Q8 by slope deflection method. EI is constant for all the members. Draw BMD and sketch the deflected shape of the frame. **(20 Marks)**
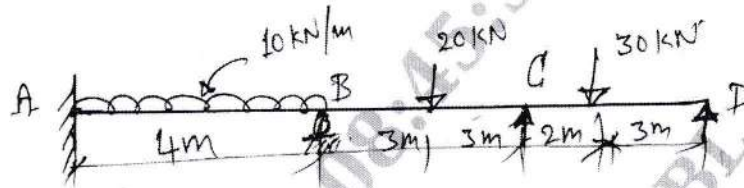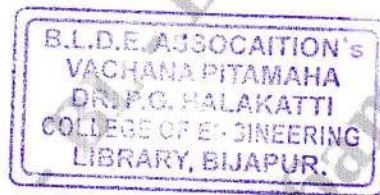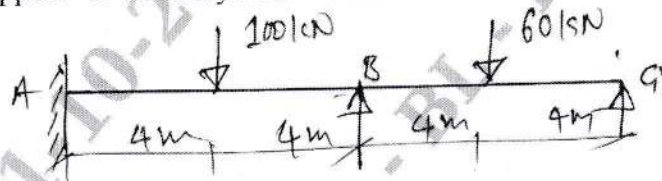
Fig. Q8

Module-5

9 Analyse the given continuous beam shown in Fig. Q9 by Stiffness method and sketch BMD & SFD. **(20 Marks)**

Fig. Q9

OR

10 Analyse the given continuous beam shown in Fig. Q10 by Stiffness method. The support 'B' sink by 300/EI and support 'C' sinks by 200/EI. Sketch BMD and SFD. **(20 Marks)**

Fig. Q10

* * * * *

CBCS SCHEME

21CV485

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Question Paper Version : B

Fourth Semester B.E. Degree Examination, June/July 2023
Green Buildings

Time: 1 hr.]

[Max. Marks: 50

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the **fifty** questions, each question carries one mark.

2. Use only **Black ball point pen** for writing / darkening the circles.

3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**

4. Darkening two circles for the same question makes the answer invalid.

5. **Damaging/overwriting, using whiteners** on the **OMR** sheets are strictly prohibited.

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1. How many set of criteria formulated by GRIHA for rating the building?
   a) 33　　　　　　b) 34　　　　　　c) 31　　　　　　d) 32

2. Which of the below is a global scale environmental issue?
   a) Eutrophication　　b) Regional Ozone　　c) Climate change　　d) Pollution

3. Carbon footprint can be measured by
   a) Carbon dating　　b) Instruments　　c) Carbon accounting　　d) Formula

4. _____ is the conventional source for hydel power
   a) Tidal wave　　b) Currents　　c) Water　　d) Ripples

5. Which of the following is not used in a passive solar heating/cooling system in building?
   a) Building walls
   c) Building floors
   b) Building roofs
   d) Air conditioners

6. Which of the following is an example of Passive solar technology?
   a) Photovoltaic
   c) Active solar water heating system
   b) Solar furnace
   d) All of these

7. Which part of a house receives majority of solar radiation?
   a) Roofs　　　　b) Side walls　　　　c) Floors　　　　d) Door

8. A Building with excessive glass cover
   a) Results in Freezing
   c) Damages the Building material
   b) Result in a pleasant temperature
   d) Results in Overheating

9. In Sandwich composites, which of the following material can be used for filling purpose?

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10. Which is the least preferred strategy of integrated solid waste management according to their Environmental benefits?
    a) Land fills   b) Composting   c) Recycling   d) Waste to Energy

11. A Building is a structure that environmentally responsible and resource efficient throughout its life cycle is called as
    a) Zero Energy Building   b) Green Building
    c) Mass housing   d) Pre cost housing

12. The building which are engineered at a factory and assembled at site are termed as
    a) Pre-Engineered Building   b) Conventional Building
    c) Precost Building   d) Pre-fabricated Building

13. When number of houses is constructed to suit the requirement of population of an area or country, then it is termed as
    a) Green Building   b) Precast Building   c) Mass Housing   d) All of these

14. A zero building produces _____ energy to meet its own annual energy consumption requirement.
    a) Solar   b) Renewable   c) Non renewable   d) Zero

15. Where is India first green building located?
    a) ITC Green center, Gurgaon   b) Suzlon earth, Pune
    c) Wipro Technologies, Gurgaon   d) Sohrabji Green Business centre, Hydrabad

16. Which of the following green rating systems are currently working in India?
    a) LEED   b) GRIHA   c) Both a and b   d) None of these

17. LEED means
    a) Leadership in Energy and Efficiency Design
    b) Leadership in Energy and Efficiency Document
    c) Leadership in Energy and Environmental Design
    d) Leadership in Energy and Environmental Document

18. LEED gives rating in form
    a) 1 star, 2 star, 3 star   b) Platinum, Gold, Silver
    c) A, B and C   d) Both a and b

19. When GRIHA was launched in India?
    a) 2008   b) 2006   c) 2010   d) 2011

20. What is the full form of IGBC?
    a) Indian Green Building Council   b) Indian Green Building Control
    c) International Green Building Council d) None of these

21. _____ Bond is considered as the strongest bond in Brick wall
    a) English   b) Flemish   c) Raking   d) Dutch

22. The _____ Bond is possible to reduce the 25% of cost of bricks.
    a) English   b) Header   c) Flemish   d) Rat trap

23. _____ is the type of wall which consists of two separate walls with a gap in between them.
    a) Partition wall   b) Cavity wall   c) Party wall   d) Separating wall

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24. In the construction of _____ elements, partial or complete elimination of form work is achieved.
    a) Ferro cement   b) Wall   c) Beams   d) Columns

25. The two separate walls in a cavity wall are called as
    a) Petals   b) Blocks   c) Leaves   d) Fragments

26. PSC stands for
    a) Pre stressed concrete   b) Post stressed cement
    c) Polymer special concrete   d) None of these

27. By using filler slab technique
    a) Aesthetic ceiling is not good   b) 20% saving of concrete is there
    c) Loads on foundation increases   d) All of these

28. The head office of COSTFORD is situated in
    a) Pune   b) Bangalore   c) Delhi   d) Thrissur

29. Which are the agency contribute for the cost effective building technologies?
    a) TATA   b) HABITAT   c) L and T   d) All of these

30. A good brick should contain about _____ of silica
    a) 5% - 7%   b) 50% - 60%   c) < 10%   d) 15% - 20%

31. Which of the following is not the purpose of a Green Building?
    a) To reduce use of water   b) To minimize damage of the environment
    c) Re use of waste materials   d) None of these

32. Sustainable planning considered environmental, social and _____ impacts of a Buildings.
    a) Technological   b) Economical
    c) Both a and b   d) None of these

33. Laterites are rich in
    a) Iron and Aluminium   b) Silica
    c) Fluorides   d) Magnesium

34. Which order is correct in the manufacturing of Mud Bricks?
    a) Preparation, Moulding, Drying, Curing   b) Preparation, Moulding, Drying, Burning
    c) Drying, Moulding, Preparation, Curing   d) Drying, Preparation, Moulding, Cutting

35. Concrete is a combination of
    a) Fine aggregate + Course aggregate + Cement + Water
    b) Course aggregate + Soil + Water
    c) Cement + Water
    d) Cement + Fine aggregate + Water

36. _____ are the Artificial Pazzolanos.
    a) Flyash, pumicite   b) Silica fumes   c) Flyash, GGBS   d) None of these

37. Gypsum is used to
    a) Bricks   b) Electric Boards

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38. The composite material consisting of mixtures of cement mortar or concrete and discontinuous, discrete, uniformly dispersed suitable fibre is called.
    a) Ferro cement concrete
    b) Fibre reinforced concrete
    c) Special concrete
    d) Normal concrete

39. Which of the following is known as "Poor Man's Timber".
    a) Rubber
    b) Teak
    c) Rorewood
    d) Bamboo

40. The best practice of disposal of Construction and Demolition (C and D) debris is
    a) Incineration
    b) Recycling
    c) Land fills
    d) Solidification

41. The process of taking out stones from natural rock is known as
    a) Weathering
    b) Quarrying
    c) Dressing
    d) Cladding

42. The solidification of molten magma when it reaches the surface of earth results in the formation of.
    a) Sedimentary rocks
    b) Metamorphic rocks
    c) Igneous rocks
    d) None of these

43. Which of the following activities has contributed maximum to global warming?
    a) Industrial processes
    b) Deforestation
    c) Agriculture
    d) Fossil fuel consumption

44. Which of the following gases has maximum global warming potential?
    a) Chloroflurocarbons
    b) Carbon di-oxide
    c) Sulphur hexafluoride
    d) Methane

45. Which of the following country is the largest emitter of carbon di oxide?
    a) USA
    b) Chine
    c) India
    d) Saudi Arabia

46. The concept of the carbon foot print was developed by
    a) UNFCC
    b) UNEP
    c) William E, Rees and Mathis Wackernagel
    d) Ernst Haeckel

47. The total set of carbon emissions caused by an individual/company/business is called
    a) Carbon hand print
    b) Carbon foot print
    c) Carbon summary
    d) Carbon sink

48. Which energy efficiency measures are in the buildings envelope?
    a) Orientation and Passive design
    b) Outside walls, Windows, doors and roof etc.
    c) HVAC, LED's, TV
    d) Bricks and stones

49. What is a helpful label for the comparison of different electricity using appliances?
    a) Shooting STAR
    b) Saving STAR
    c) STAR label
    d) STAR fish

50. _____ is building with zero net energy consumption.
    a) Zero energy building
    b) Natural energy buildings
    c) Conventional energy building
    d) None of these.

CBCS SCHEME

18CV51

USN [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

Fifth Semester B.E. Degree Examination, June/July 2023
Construction Management and Entrepreneurship

Time: 3 hrs.   Max. Marks: 100

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

Module-1

1   a. What are the functions of management? Explain any three of them.   (08 Marks)
    b. Draw the network from the following activity and find critical path and total project duration: (08 Marks)

Activity	P	Q	R	S	T	U	V
Predecessor	-	-	P	P	Q	Q	S, T
Duration days	12	11	11	10	9	13	7

    c. Differentiate between autocrat and democrat management styles.   (04 Marks)

OR

2   a. A project consists of the following activities. Draw the network diagram, calculate EST, EFT, LST, LFT, F_T and F_F.   (08 Marks)

Activity	10-20	10-30	20-40	30-40	20-50	40-50
Duration (days)	13	12	2	8	15	2

    b. Explain in brief the different types of project plans used in construction industry.   (08 Marks)
    c. What is work break down structure? Mention its uses.   (04 Marks)

Module-2

3   a. What are the factors affecting labour productivity in construction industry? Briefly explain.   (08 Marks)
    b. Calculate time required to grade and finish 50 km of road formation with width equal to thrice the width of the motor grader, using six passes of the motor grader with speed for each of the successive two passes as 6 km/h, 8 m/h and 10 km/h respectively. Assume machine efficiency based on operators skill, machine characteristics and working conditions as 80%.   (08 Marks)
    c. Discuss the class of labour in construction project.   (04 Marks)

OR

4   a. Briefly explain the points to be considered for selection of construction equipments. (08 Marks)
    b. A company has purchased on equipment for Rs.1,50,000 with an estimated life of 10 years. The estimated salvage value of the equipment at the end of its lifetime is Rs.25,000. Determine the depreciation charge and book value at the end of various years using the declining balance method of depreciation by assuming 0.2 for K.   (08 Marks)
    c. List out the functions of material management.   (04 Marks)

Module-3

5   a. Define quality and describe quality control and quality assurance in construction.   (08 Marks)
    b. What are the safety measures to be adopted during drilling and blasting?   (08 Marks)
    c. Briefly explain concepts of HSE application to construction industry.   (04 Marks)

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OR

6 a. Explain safety through legislation, safety campaign and insurances. (08 Marks)
  b. Define morals, values and ethics. (06 Marks)
  c. Briefly write about (i) Gifts and bribes   (ii) Whistle blowing (06 Marks)

Module-4

7 a. What is engineering economy? Explain the principles of engineering economics. (08 Marks)
  b. An engineer has two bids for an excavator to be installed in a new building. The details of the bids for the excavator are as follows:

Bid	Engineer's Estimate		
	Initial Cost (Rs.)	Service Life (years)	Annual Operations & Maintenance Cost (Rs.)
Company A	10,50,000	15	60,000
Company B	11,00,000	15	70,500

Determine which bid should be accepted, based on the present worth method of comparison assuming 18% interest rate, compounded annually. (12 Marks)

OR

8 a. Define the following terms related to engineering economics:
   (i) Present worth   (ii) Future worth
   (iii) Opportunity cost (iv) Capitalized cost (08 Marks)
  b. Determine the effective interest rate for a nominal annual rate of 8% that is compounded:
   (i) Daily   (ii) Monthly   (iii) Quarterly   (iv) Semi annually (12 Marks)

Module-5

9 a. Explain the function of entrepreneur. (08 Marks)
  b. What are the objectives and MSME? (04 Marks)
  c. Explain the role of MSME in economic development. (08 Marks)

OR

10 a. Explain different types of feasibility study carried out to start business. (08 Marks)
   b. What are the different ways to entry into international business? Explain any two ways. (08 Marks)
   c. Write a short note on role and functions of KIADB. (04 Marks)

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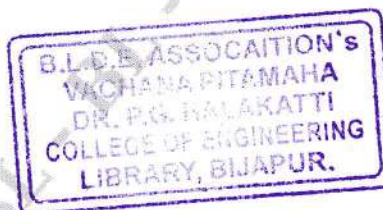
CBCS SCHEME

18CV52

USN

Fifth Semester B.E. Degree Examination, June/July 2023
Analysis of Indeterminate Structures

Time: 3 hrs.

Max. Marks:100

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. Analyse and draw BMD and SFD for the continuous beam shown in Fig.Q1 by slope deflection method.
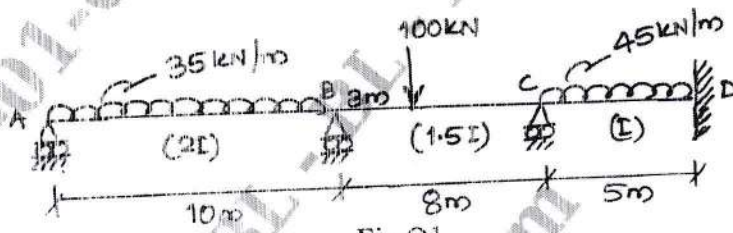

Fig.Q1

(20 Marks)

OR

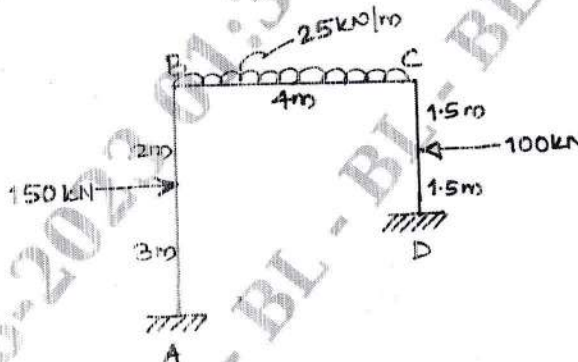2. Analyse and draw BMD for the rigid frame shown in Fig.Q2 by slope deflection method.

Fig.Q2

(20 Marks)

Module-2

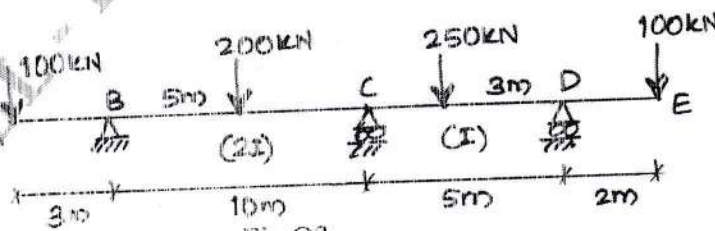3. Analyse and draw BMD and SFD for the continuous beam shown in Fig.Q3 by moment distribution method.

Fig.Q3

(20 Marks)

1 of 3

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OR

4   Analyse the portal frame shown in Fig.Q4 by moment distribution method and draw BMD.
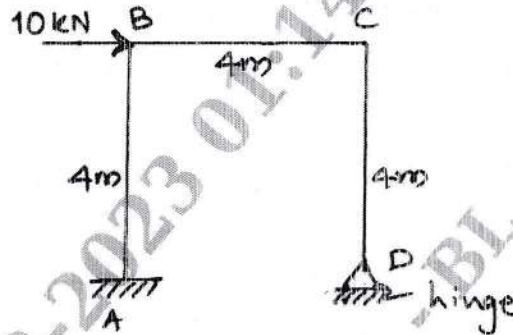

Fig.Q4   (20 Marks)

Module-3

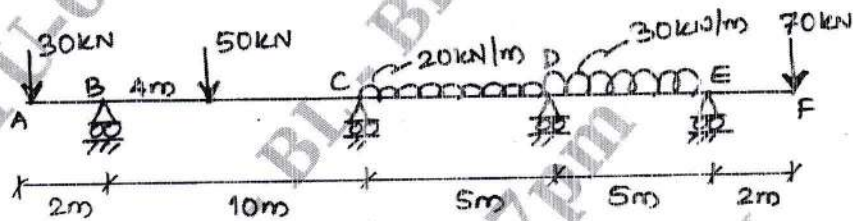5   Anlayse the continuous beam shown in Fig.Q5 by Kani's method and draw BMD.

Fig.Q5   (20 Marks)

OR

6   Analyse the portal frame shown in Fig.Q6 by Kanis method and draw BMD.
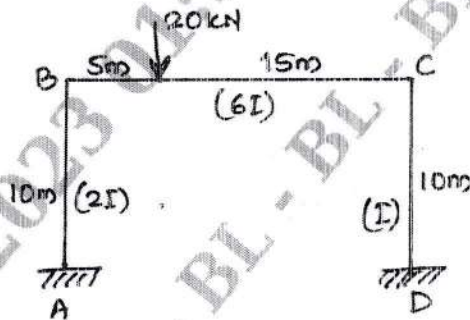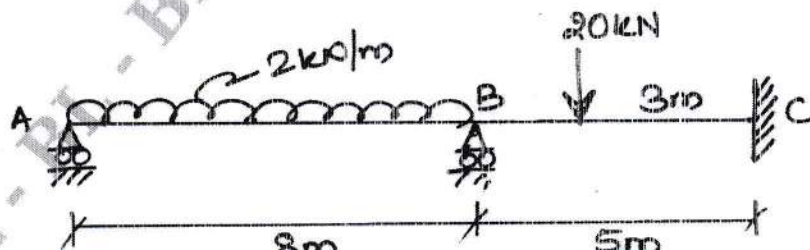

Fig.Q6   (20 Marks)

Module-4

7   Analyse the continuous beam shown in Fig.Q7 by matrix flexibility method and draw BMD and SFD. Take moments as redundant. (Use system approach).

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OR

8 Analyse the rigid frame shown in Fig.Q8 by matrix flexibility method using system approach. Take reaction at 'D' as redundant.

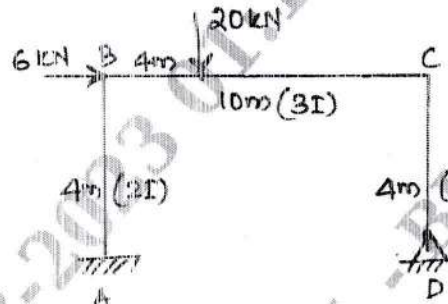Fig.Q8

(20 Marks)

Module-5

9 Analyse the continuous beam shown in Fig.Q9 by matrix stiffness method using system approach and draw BMD.
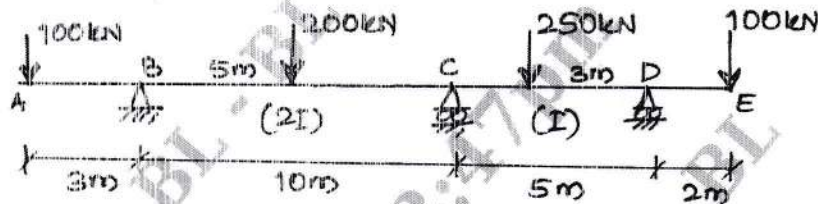

Fig.Q9

(20 Marks)

OR

10 Analyse the pin-jointed truss shown in Fig.Q10, by matrix stiffness method using system approach. Take E = constant for all members. The values in parenthesis indicates c/s area of members.
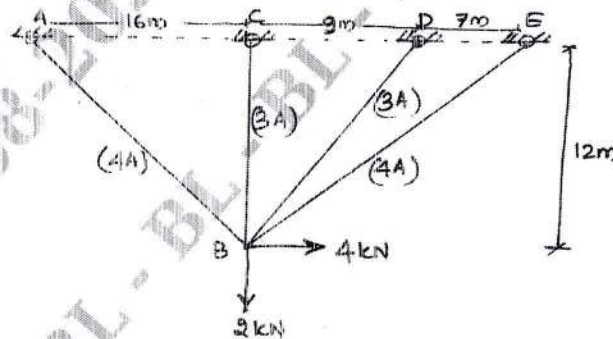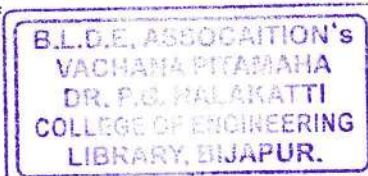

Fig.Q10

(20 Marks)

* * * * *

CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **18CV53**

Fifth Semester B.E. Degree Examination, June/July 2023
Design of RC Structural Elements

Time: 3 hrs.   Max. Marks: 100

Note: 1. *Answer any FIVE full questions, choosing ONE full question from each module.*
     2. *Use of IS456-2000 and SP(16) is permitted.*
     3. *Assume Suitable additional data, if necessary.*

Module-1

1 a. Distinguish between : i) Balanced section ii) Under reinforced section and iii) Over reinforced section with sketches. Which section is preferable and why? **(10 Marks)**

   b. What is stress block? Derive from the fundamentals the expression 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 $0.42 \times u$. **(10 Marks)**

OR

2 a. Explain : i) Short term deflection ii) Long term deflection iii) Side face reinforcement. **(09 Marks)**

   b. A cantilever of 3.5m span is 300mm wide and 600mm deep. If is subjected to a maximum bending moment of 125kN-m due to uniformly distributed service loads of which 50% moment is due to permanent loads. The beam is reinforced with 4 bars of 20mm diameter at an effective cover of 50mm in the tension zone. Determine the immediate deflection. Grades of concrete and steel M_{20} and Fe_{415}. **(11 Marks)**

Module-2

3 a. A singly reinforced beam (RCC) of 250mm × 450mm deep upto the center of reinforcement with 3 - #16 at an effective cover of 50mm, effective span of 6m. M_{20} concrete and Fe_{415} steel. Determine the central point load that can be carried/supported in addition to the self weight. **(12 Marks)**

   b. Determine the moment of resistance of a T-beam for the following data :
Effective depth = 400mm, Bredth of the flange = 740mm, Bredth of web = 240mm, Area of steel = 5 -# 20 and depth of flange = 110mm. Adopt M_{20} grade concrete and Fe415 steel. **(08 Marks)**

OR

4 a. A doubly reinforced beam section is 300mm wide and 500mm deep to the centre of tensile reinforcement. It is reinforced with compression reinforcement of $300mm^2$ at an effective cover of 50mm and tension reinforcement of $1800mm^2$. Determine the safe moment of resistance of the section. M_{20} grade concrete and Fe500 grade steel is used. **(12 Marks)**

   b. A Tee beam has the following data:
    i) C/C spacing of beams = 3.2mt
    ii) Simply supported effective Span = 8m
    iii) Depth of slab = 150mm
    iv) Size of web of beam = 300mm × 500mm
   Calculate the balanced moment of resistance. **(08 Marks)**

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Module-3

5 a. Brief about codal provisions made in providing longitudinal and lateral reinforcement in beams. **(05 Marks)**

b. A simply supported rectangular beam is supported on 300mm wide walls. Over a clear span of 6mtrs. Design the beam by using M_{25} grade concrete and Fe 415 Grade steel, superimposed load on beam is 15kN/m and breadth of beam is 230mm. **(15 Marks)**

OR

6 a. What is Torsion? Write expression for equivalence bending moment and equivalent shear force for members subjected to torsoin. **(04 Marks)**

b. Design a intermediate T – beam for a hall measuring 6.5m × 12m (clear dimension). Beams are spaced at 3m C/C. Depth of slab is 150mm. superimposed live load on slab is 4.0kN/m^2 finishes is 1.0kN/m^2, Check for deflection also use M_{20} grade concrete and HYSD bar of Fe 500 grade. Sketch the reinforcement details. **(16 Marks)**

Module-4

7 Design an RC slab for a room measuring 4m × 5m inside. The slab carries a live load of 2kN/m^2 and is finished with 20mm topping of unit weight 24kN/m^3. The slab is simply supported on all four edges with corners free to lift, No need to check for shear, Use M_{20} concrete and Fe 415 steel. **(20 Marks)**

OR

8 Design a dog legged stair for an office floor room measuring 2.8m × 5.8m, clear vertical distance between the floors is 3.6m. The width of height is to be 1.25 m.Assume imposed load of 3kN/m^2. Use M_{20} concrete and Fe 415 grade steel. Assume that the stairs are supported on 230mm width support at the outer edges of landing slabs. Sketch the reinforcement detail. Design of one height is enough. **(20 Marks)**

Module-5

9 A corner column 400×400mm is subjected to a factored loads P_u = 1300kN, M_{ux} = 190kN/m and M_{uy} = 110kN/m. Design the reinforcement in the column, assuming M_{25} concrete and Fe415 steel and effective cover of 60mm. Assume it as a short column. **(20 Marks)**

OR

10 Design a square footing for a short axially loaded column of size 300mm×300mm carrying 600kN load. Use M20 concrete and Fe 415 steel. SBC of soil is 180kN/m^2. Sketch the details of reinforcement. **(20 Marks)**

* * * * *

OR

4 a. What is field compaction control and how it is achieved. **(04 Marks)**

   b. Differentiate between standard proctor test and midfied standard proctor test. **(10 Marks)**
      The following data refers to a compaction test as per Indian standard (light compaction)

Water content (%)	8.5	12.2	13.75	15.5	18.2	20.2
Weight of wet sample (Kg)	1.5	1.94	2.00	2.05	2.03	1.98

Volume of the mould = 1000CC and specific gravity G = 2.7
Plot i) Compaction curve and obtain MDD and OMC
       ii) Plot 80% and 100% saturation line **(06 Marks)**

Module-3

5 a. List the factors that influence permeability of soils and mention the manner in which they do so. **(08 Marks)**

   b. A horizontal stratified soil deposit consists of three layers each uniform in itself. The permeability of three layers are 8×10^{-4} cm/sec, 52×10^{-4} cm/sec and 6×10^{-4} cm/sec and their thickness are 7m, 3m and 10m respectively. Find the effective average permeability of the deposit in horizontal and vertical directions. **(06 Marks)**

   c. List the characteristics of flow nets. **(06 Marks)**

OR

6 a. In a falling head test the time taken for fall in head from h_1 to h_2 is equal to that from h_2 to h_3. Deduce the relation between h_1, h_2 and h_3. **(06 Marks)**

   b. A sand deposit consists of 2 layers. The top layer is 2.5m thick ($r = 17.1$ kN/m^3) and bottom layer is 3.5m thick ($r_{sat} = 20.65$ kN/m^3). The water table is as a depth of 3.5m from the surface and the zone of capillary saturation is 1m above water table. Show a dimensional sketch and plot variation of final, neural and effective stress. **(09 Marks)**

   c. Define discharge velocity and seepage velocity of flow through soils and derive the relation between them. **(05 Marks)**

Module-4

7 a. An uncontained compression test was conducted on an undisturbed sample of clay. The sample has diameter of 37.5mm and was 80mm long. The load at failure measured by the proving ring was 28N and the axial deformation of the sample at failure was 13mm. Determine the uncontained compressive strength and undrained shear strength of clay. **(06 Marks)**

   b. Explain the classification of shear strengths based on drainage conditions. **(06 Marks)**

   c. CU triaxial tests conducted on specimens of a saturated clay soil gave the following results.

Cell pressure σ_3(kN/m^2)	Deviator stress σ_d(kN/m^2)	Pure water pressure Vat failure (kN/m^2)
150	102	80
300	200	164
450	304	246
600	405	325

Determine the effective stress strength parameters C' and Q' by Mohr circle method.
(08 Marks)

OR

8 a. State the advantages and disadvantages of direct shear test. (05 Marks)

   b. In a direct shear test, an a sand sample the normal stress was 200kN/m². Draw the Mohr's (10 Marks)
   circle and the strength envelope. Determine :
   - i) the angle of shearing resistance
   - ii) the magnitude of the major and minor principal stress
   - iii) Orientation of the principal stresses.

   c. Explain in brief Mohr-Coulomb failure criteria in soils. (05 Marks)

Module-5

9 a. Explain spring analogy to illustrate consolidation of soils. (06 Marks)

   b. The time taken to reach 40% consolidation of a two way drained laboratory sample 10mm
   thick saturated clay sample is 35sec. Determine the time required for 60% consolidation of
   the same soil 10m thick on the top of a rock surface subjected to same loading conditions on
   the laboratory sample. (08 Marks)

   c. Explain in detail how pre consolidation pressure is determined from Casagrande's method (06 Marks)

OR

10 a. What are the Assumptions and Limitations of Terzaghi's one dimensional consolidation
   theory? (06 Marks)

   b. Explain in brief normally consolidated, under consolidated and over consolidated soils. (06 Marks)

   c. Explain in detail square root of time fitting method to determine coefficient of consolidation
   of soil. (08 Marks)

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18CV55

Fifth Semester B.E. Degree Examination, June/July 2023
Municipal Wastewater Engineering

Time: 3 hrs.

Max. Marks: 100

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

Module-1

1 a. Explain necessity and importance of sanitation. **(06 Marks)**
   b. Discuss the methods for estimating the storm water. **(08 Marks)**
   c. Define time of concentration and explain the methods to calculate the t_c. **(06 Marks)**

OR

2 a. Explain the shapes of sewers with sketches. **(08 Marks)**
   b. Explain the procedure for laying of sewers on ground and different types of test for sewer water tightness. **(06 Marks)**
   c. With the sketch enumerate the principle of house drainage work. **(06 Marks)**

Module-2

3 a. With appropriate equations, explain self cleaning and non scouring velocity in sewers and their importance. **(06 Marks)**
   b. Discuss the hydraulic characteristics for a circular sewer running partial pull conditions. **(06 Marks)**
   c. The rain sewer was designed for an area of 50 km². Density of population of the town is 200 persons/hectares. The average flow is 250 lpcd. The peak discharge is one and half times more than average flow. Rainfall equivalent of 8 mm in 24 hours all of which is runoff:
   (i) What is capacity of sewer? (ii) Find minimum velocity and gradient. Take sewage containing sand of 1 mm dia, sewer die 35 cm, s = 2.65, K = 0.06, f = 0.03. Manning's n = 0.012. **(08 Marks)**

OR

4 a. Explain the sampling techniques and method for collection sewage samples. **(06 Marks)**
   b. Discuss the physical, chemical characteristics of sewage. **(06 Marks)**
   c. Explain the process of waste water treatment for municipal waste with flow diagram. **(08 Marks)**

Module-3

5 a. Explain the bar screen with the sketches. **(06 Marks)**
   b. Briefly explain the different types of grit chamber. **(08 Marks)**
   c. Enumerate the design considerations of settling tank. **(06 Marks)**

OR

6 a. Discuss self purification process and oxygen sag curve with neat sketch. **(08 Marks)**
   b. What are the methods of sewage application on land and explain sewage farming? **(08 Marks)**
   c. A town having population of 50,000 and the rate of water supply as 160 l/day, disposes off its sewage successfully by land treatment. The area of land available is 180 hectares. If 80% of water supplied is converted into sewage. Find out the consuming capacity of soil

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Module-4

7 a. Explain process involved in trickling filter with neat sketch. (06 Marks)
  b. Explain the activated sludge process with flow diagram. (08 Marks)
  c. What are the stages anaerobic sludge digestion? Explain with sketch. (06 Marks)

OR

8 a. Explain mechanism of purification in stabilization ponds with sketches. (08 Marks)
  b. Explain process in oxidation ditches and advantages and disadvantages. (08 Marks)
  c. Discuss the functions of sludge drying beds and different components. (04 Marks)

Module-5

9 a. Explain advanced oxidation process for waste water treatment. (08 Marks)
  b. Discuss the process of electro coagulation for advanced waste water treatment. (06 Marks)
  c. Explain the process of nitrification and dinitrification. (06 Marks)

OR

10 a. Explain low cost treatment of sewage. (05 Marks)
   b. With the sketch, explain the components of septic tank. (10 Marks)
   c. Discuss the functions of ECO toilet and soak pit. (05 Marks)

* * * * *

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CBCS SCHEME

18CV56

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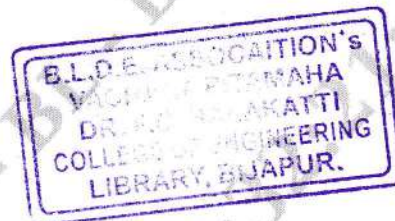
Fifth Semester B.E. Degree Examination, June/July 2023
Highway Engineering

Time: 3 hrs.   Max. Marks: 100

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

Module-1

1 a. Mention different modes of Transportation. Explain the characteristics of road transport in comparison with other systems. **(10 Marks)**

   b. 3 New Roads R1, R2 and R3 are to be completed in a District during five year period. Using the data given below workout the order of priority for placing the plan program by the principle of maximum utilities per unit length. Adopt utility unit of $0.5 < 2000$, 1.0 for 2000 – 5000 and 2.0 for > 5000, 1.0 for 1000 t of agricultural product and 1.0 for 100 t of Industrial products. **(10 Marks)**

Road	Length	No. of Villages served population			Productivity 1000 tonnes	
		< 2000	2000-5000	> 5000	Agriculture	Industries
R1	15	10	8	3	15	1.2
R2	12	16	3	1	11	0.0
R3	18	20	10	2	20	0.8

OR

2 a. Write short note on :
   i) NHDP   ii) PMGSY   iii) KSHIP   iv) KRDCL. **(10 Marks)**

   b. List out the factors affecting alignment and explain important stages of Engineering Survey of Highway Alignment. **(10 Marks)**

Module-2

3 a. Explain briefly two important surface characteristics influencing Highway Geometric Design. **(10 Marks)**

   b. The speeds of overtaking and overtaken vehicles are 70 and 40 kmph respectively on a two way traffic road. The average acceleration during overtaking operation is assumed as $0.99 m/sec^2$.
   i) Calculate safe overtaking sight distance.
   ii) What is the minimum length of overtaking zone?
   iii) Draw a neat sketch of overtakes zone indicating the positions of sign posts. **(10 Marks)**

OR

4 a. Enlist the gradients encountered in vertical Alignment and explain briefly. **(10 Marks)**

   b. A vertical summit curve is formed at the intersection of 2 gradients , +3.0% and -5.0%. Design the length of summit curve to provide a SSD for a design speed of 80 kmph. Assume missing data suitably. **(10 Marks)**

Module-3

5 a. With a neat sketch, illustrate conduction of Plate Load test to determine modulus of subgrade reaction. **(10 Marks)**

   b. List the desirable properties of Bitumen and tests to be conducted on Bitumen. **(10 Marks)**

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OR

6 a. Draw and explain the Component part and functions of each component of Flexible and Rigid pavement.

(10 Marks)

b. The CBR test results are as follows. Apply correction and determine the CBR value of the soil.

(10 Marks)

Load in kgs	0	2	4	9	20	34	49	74	92	118	125
Penetration in mm	0	0.5	1.0	1.5	2.0	2.5	3.0	4.0	5.0	7.5	10.0

Module-4

7 a. Briefly outline the design procedure of soil aggregate mixes by Ruth fatch method. (10 Marks)

b. Enumerate the requirements, specification of materials and construction steps for Wet Mix Macadom (WMM).

(10 Marks)

OR

8 a. Explain briefly the construction procedure of Bitumen concrete (BC) with Quality control checks as per MORTH.

(10 Marks)

b. List the quality checks on Cement Concrete Pavement (PQC) carried out both in the laboratory and at field.

(10 Marks)

Module-5

9 a. Explain the significance and requirements of a Highway Drainage System. (10 Marks)

b. Explain with sketches, how the subsurface drainage system is provided to lower the GWT.

(10 Marks)

OR

10 a. Explain the following with respect to Highway Financing :
   i) BOT   ii) BOOT   iii) VOC.

(10 Marks)

b. Calculate the annual cost of a stretch of Highway from the following particulars :

Item	Total cost Rs. in lakhs	Estimated life, years	Rate of interest, %
Land	35.0	100	6
Earth work	40.0	40	8
Bridges, culvert and drainage	50.0	60	8
Pavement	100.0	15	10
Traffic signs and Road Items	15.0	5	10

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

(10 Marks)

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CBCS SCHEME

18CIV59

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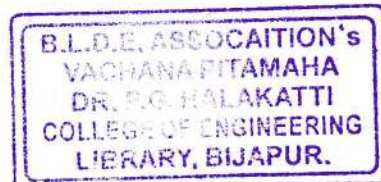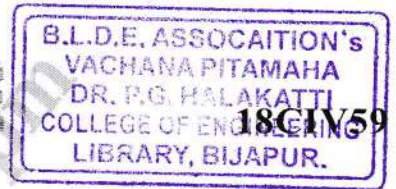
Fifth Semester B.E Degree Examination, June/July 2023
Environmental Studies
(COMMON TO ALL BRANCHES)

Time: 2 hrs.]   [Max. Marks: 100

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the hundred questions, each question carries one mark.

2. Use only **Black ball point pen** for writing / darkening the circles.

3. For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.

4. Darkening two circles for the same question makes the answer invalid.

5. **Damaging/overwriting, using whiteners** on the **OMR** sheets are strictly prohibited.

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1. How many parts are there in the forest ecosystem?
   a) One   b) Two   c) Three   d) Four

2. On which factor forest type is mainly dependent
   a) Abiotic   b) Size of forest
   c) Shape of Trees   d) Production from the trees

3. The forest cover in India has recently increased due to
   a) Increase in natural forest growth
   b) Increase in net sown area
   c) Plantation by different agencies
   d) None of the above

4. What is not entirely correct about desert?
   a) It is dry and hot   b) Waterless
   c) Without shelter   d) All of these

5. Who have learnt to live under very hot and dry conditions
   a) People   b) Plants   c) Animals   d) All of these

6. The term wet land implies
   a) Land covers by rain water only
   b) Slow moving water covered wet ground
   c) Water logged wet ground
   d) Fast moving water covered wet ground

7. World Wetland day celebrated every year on _____ February
   a) 2nd b) 3rd c) 4th d) 15th

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8. World's most saltiest sea is
   a) Mediterranean Sea   b) Dead Sea   c) Callibben Sea   d) Black Sea

9. Atmosphere contains 79 percent Nitrogen and 21 percent Oxygen by
   a) Volume   b) Weight   c) Density   d) All of these

10. In complex ecosystem the degree of species diversity is
    a) Poor   b) High   c) Medium   d) None

11. The organisms who directly feed on producers are called
    a) Herbivores   b) Carnivores   c) Decomposers   d) Sprophytes

12. Abiotic component includes
    a) Soil   b) Water   c) Temperature   d) All of these

13. Which of the following is the climatic factor
    a) Pressure   b) Humidity   c) Temperature   d) All of these

14. The basic requirements of human beings are provided by
    a) Industrialization   b) Agriculture   c) Nature   d) Urbonization

15. Which atmospheric sphere is closest to the earth surface?
    a) Troposphere   b) Stratosphere   c) Mesosphere   d) Exosphere

16. A food web consists of
    a) A portion of a food chain
    b) An organism position in a food chain
    c) Interlocking food chains
    d) A set of similar consumers

17. The pyramid of energy is
    a) Always upright
    b) Always inverted
    c) Both uplight and inverted
    d) None of these

18. Which is the most stable ecosystem
    a) Mountain   b) Desert   c) Forest   d) Ocean

19. 'Earth Day' is held every year on
    a) June 5th   b) November 23rd   c) April 22nd   d) Jan 10th

20. Which of the following is absorbed by green plants from the atmosphere?
    a) Carbon dioxide   b) Water   c) Nutrients   d) All of these

21. The most commonly used chemicals in the artificial cloud seeding
    a) Silver iodide   b) Sodium chloride   c) Dry ice   d) All of these

22. Bhopal disaster is a kind of _____
    a) Natural disaster   b) Manmade disaster   c) None of (a) & (b)   d) Other

23. National disaster management is headed by
    a) Prime minister
    b) President of India
    c) Governor of states
    d) Chief minister of states.

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24. Disaster management includes
   a) Mitigation   b) Reconstruction   c) Rehabilitation   d) All of these

25. Floods can be prevented by _____
   a) Attorestation   b) Cutting the forest
   c) Tilling the land   d) Removing the top soil

26. Which of the following is not a type of primary source
   a) Crude oil   b) Coal   c) Hydrogen energy   d) Sunlight

27. Which of these energy resources are widely used in industries?
   a) Coal and Gasoline   b) Wood   c) Biogas   d) Crop residue

28. What does OTEC stands for?
   a) Ocean thermal energy cultivation
   b) Ocean thermal energy conversion
   c) Ocean techno energy conversation
   d) Ocean thermal energy consumption

29. What is the basic requirement for hydro electric power station?
   a) Reservoir   b) Turbine   c) Power house   d) Penstock

30. Photovoltaic cell converts solar energy into
   a) Heat energy   b) Electrical energy   c) Mechanical energy   d) Chemical energy

31. Which of the following is non-renewable resource?
   a) Coal   b) Forests   c) Water   d) Wildlife

32. Both power and manure is provided by :
   a) Nuclear plants   b) Thermal plants   c) Biogas plants   d) Hydroelectric plant

33. At what range of speed is the electricity from the wind turbine is generated
   a) 100 – 125 Mph   b) 450 – 600 Mph   c) 200 – 250 Mph   d) 30 – 35 Mph

34. What is used to turn wind energy into electrical energy
   a) Turbine   b) Generator   c) Yaw motor   d) Blades

35. What type of energy is wind energy?
   a) Renewable   b) Non-Renewable   c) Conventional   d) Commercial

36. How is OTEC caused?
   a) By wind energy   b) By geothermal energy
   c) By solar energy   d) By gravitational force

37. Series of parallel combination of the solar cell is known as _____
   a) Solar array   b) Solar light   c) Solar sight   d) Solar eye

38. Materials used for making solar cell is _____
   a) Silicon   b) Carbon   c) Sodium   d) Magnesium

39. Quarries are generally
   a) Open pits   b) Surface coal mines
   c) Underground mines   d) Explosive mines

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40. When the minerals are located to deep in the ground, the method used for mining is
a) Open pit method   b) Quarries   c) Surface mining   d) Sub surface mining

41. Major pollution causing agent is
a) Man
b) Animals
c) Hydrocarbon gases
d) None of these

42. The result of ozone hole is
a) Acid rain   b) UV radiations   c) Global warming   d) Green house effect

43. Which of the following causes out break of jaundice
a) Air pollution   b) Water pollution   c) Thermal pollution   d) Soil pollution

44. Minamata disease caused by pollution of water by
a) Mercury
b) Lead
c) Tin
d) Methyl ISD Cyanate

45. Noise is measured using sound meter and the unit is
a) Hertz   b) Decibel   c) Joule   d) Sound

46. Air pollution causes
a) Global warming
b) Respiratory problems
c) Soil erosion
d) None of these

47. Intake of lead may primarily cause damage of the _____
a) Brain   b) Liver   c) Lung   d) Kidney

48. According to WHO maximum permissible level of chlorides in drinking water is _____
a) 100 mg/L   b) 600mg/L   c) 800mg/L   d) 200mg/L

49. The main source of water pollution is _____
a) Sewage water
b) Industrial pollutants
c) Acid rain
d) None of these

50. What is the health effects of excess fluoride in drinking water
a) Fluoros's   b) Toothaches   c) Lung disease   d) Brain problem

51. Bacteria and micro organisms present in water will cause _____ in human and animals
a) Indigestion   b) Intestinal tract   c) Brain tumor   d) Cancer

52. Why it is difficult to recycle plastics?
a) It is very hard
b) It comes in different sizes
c) It is adhesive
d) It contains different types of polymer resins

53. The disposable wastes contain
a) Solids   b) Slurries   c) Liquids   d) All of these

54. Identify the following ones which can be recycled many times
a) Plastic   b) Wood   c) Aluminum   d) Organic materials

55. Noise pollution limits at residential area
a) 80 dB   b) 45 dB   c) 90dB   d) 120dB

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56. Which of the following make e-waste hazardous in nature
   a) Glass   b) Plastic   c) Lead   d) Iron

57. What is the hazardous pollutant released form LED's?
   a) Barium   b) Arsenic   c) Cobalt   d) Cadmium

58. What is the hazardous pollutant released form batteries?
   a) Arsenic   b) Cadmium   c) Copper   d) Cobalt

59. What proportion of health care waste is hazardous waste
   a) 25%   b) 15%   c) 50%   d) 80%

60. What is the hazardous waste released from telephones
   a) Barium   b) Copper   c) Lithium   d) Lead

61. Which of the following contains most water
   a) Atmosphere   b) Biosphere   c) Ground water   d) Lakes and Rivers

62. Hard water contains large amount of _____
   a) Lead   b) Sodium   c) Calcium   d) Silicon

63. Water that is good enough to drink is called _____
   a) Potable water   b) Ground water   c) Surface water   d) Artesian water

64. The pH value of acid rain water is
   a) 5.7   b) 7.0   c) 8.5   d) 7.5

65. The primary cause of acid rain around the world is _____
   a) CFC   b) SO_2 c) CO   d) O_3

66. Acid rain can be controlled by
   a) Reducing SO_2 and NO_2 emissions
   b) Reducing oxygen emissions
   c) Increasing number of lakes
   d) Increasing the forest cover

67 The effect of acid rain
   a) Reduces soil fertility
   b) Increases atmospheric temperature
   c) Causing respiratory problem
   d) Skin cancer

68 Major compound responsible for the destruction of stratospheric ozone layer is
   a) Oxygen   b) CFC   c) CO_2 d) Methane

69. Ozone layer thickness is measured in
   a) PPM   b) PPB   c) Decibles   d) Dobson units

70. Normal average thickness of stratospheric ozone layer across the globe is around
   a) 5 PPM   b) 300 DU   c) 400 DU   d) 500 DU

71. Chloro Fluro Carbon's (CFC) are
   a) Non-toxic   b) Non – Flammable
   c) Non Carcinogenic   d) All of these

72. Breathing radon over time causes
    a) Lung cancer   b) Oral cancer   c) Skin cancer   d) All of these

73. Radon gas is
    a) Inert   b) Colorless   c) Odorless   d) All of these

74. Ozone depletion causes
    a) Snow blindness   b) Photochemical smog
    c) Acid rain   d) Vomiting

75. World ozone day is observed on
    a) November 16   b) October 16   c) Jan 16   d) September 16

76. A great way to reduce acid rain is
    a) Use of solar power
    b) Use of wind power
    c) User of hydropower
    d) All of these

77. Ozone layer was first discovered over
    a) Arctic
    c) Tropical Region   b) Antarctical
    d) Africa

78. Animal husbandry results in
    a) Global warming   b) Acid rain
    c) Ozone depletion   d) None of these

79. Formation of ozone layer is explained by
    a) Rosenmund reaction
    b) Henderson's reaction
    c) Chapman's reaction
    d) Perkin's reaction

80. The main cause of acid rain is
    a) Soil pollution   b) Water pollution   c) Air pollution   d) All of these

81. Remote sensing technique makes use of properties of _____
    a) Electric waves   b) Sound waves
    c) Electromagnetic waves   d) Wind waves

82. The attitude distance of a geostationary satellite from earth is about
    a) 26,000 km   b) 30,000 km   c) 36000 km   d) 44000 km

83. The changes in the reflectivity/emissivity with time is called
    a) Spectral variation   b) Spatial variation
    c) Temporal variation   d) None of these

84. Which one of the following helps to find objects on the earth surface
    a) Atmospheric window   b) Signature
    c) Radiometric error   d) None of these

85. Orbital radius of GPS satellites is approximately
    a) 15000km   b) 26600km   c) 18400km   d) 36100km

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86. GIS stands for
   a) Geographic Information System
   b) Generic Information System
   c) Geological Information System
   d) Geographic Information Sharing

87. GIS deals with what kind and data
   a) Numeric data   b) Binary data   c) Spatial data   d) Complex data

88. Among the following _____ is example of hardware
   a) Arc GIS   b) Auto CAD   c) Digitization   d) Mouse

89. Among the following which do not come under components of GIS?
   a) Hardware   b) Software   c) Compiler   d) Data

90. The relation between velocity, wave length and frequency is
   a) $\lambda = cf$ b) $\lambda = c/f$ c) $\lambda = c^2 f$ d) $\lambda = cf^2$

91. A short – term EIA (Environmental Impact Assessment) has a time period of
   a) 2 – 5 years   b) 10 – 15 years   c) 5 – 10 years   d) 5 – 7 years

92. EIA commenced in the year
   a) 1960's   b) 1890's   c) 1880's   d) 1950's

93. How many strategies are there in EIA
   a) 5   b) 3   c) 2   d) 4

94. Which is the first Country to pass the Amendment in the Parliament to safeguard the environment?
   a) India   b) Brazil   c) China   d) Denmark

95. ISO 14000 standards are for the
   a) Quality Management System
   b) Environmental Management System
   c) Administration
   d) Supply Chain

96. Who among the following is the most celebrated environmental activist in contemporary India?
   a) Anna Hazare
   b) Medha Patkar
   c) Vasundhara Raje
   d) Arvind Kejrival

97. What is the full form of NGO?
   a) Non – Governmental Organization
   b) No Governance Organization
   c) Non-Governance Organization
   d) Null Governmental Organization
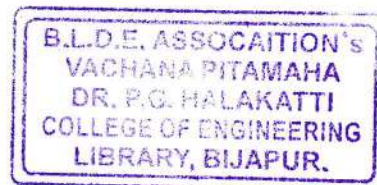
98. When did Green peace founded
   a) 1965   b) 1967   c) 1968   d) 1971

99. When did Wild Protection Act included in the Constitution of India.
   a) 1980   b) 1972   c) 1920   d) 1992

100. When did World Nature Organization (WNO) be established?
   a) 2000   b) 2001   c) 2010   d) 2014

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **18CV61**

Sixth Semester B.E. Degree Examination, June/July 2023
Design of Steel Structural Elements

Time: 3 hrs.   Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Assume any missing data.
3. Use of IS:800-2007 and steel tables are permitted.

Module-1

1 a. Mention the failure criteria of steel with examples. Explain any one in brief. **(10 Marks)**
 b. What are the advantages and disadvantages of using steel structures? Mention different types of RS sections using construction. **(10 Marks)**

OR

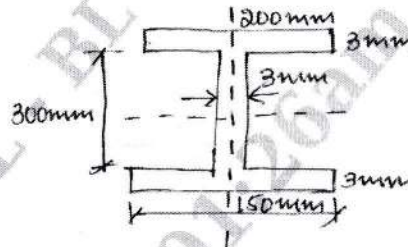**2** a. Define shape factor and determine the plastic and section modulus of a built up section as shown in Fig.Q2(a).

Fig.Q2(a) **(10 Marks)**

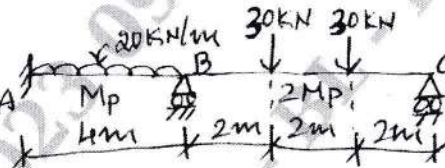 b. Determine the plastic moment capacity for the beam loaded as shown in Fig.Q2(b).

Fig.Q2(b) **(10 Marks)**

Module-2

3 a. Mention any four advantages and disadvantages of HSFG bolts and also explain various modes of failure of bolted connection. **(08 Marks)**
 b. Design a bolted connection between the flange of a column ISHB450@907 N/m and a bracket plate 15 mm thick. The bracket plate is supporting a load of 150 kN at an eccentricity of 350 mm. Adopt HSFG bolts of property class 8.8. **(12 Marks)**

OR

4 a. Mention any four advantages and disadvantages of welding. Explain common defects in welding with neat sketch. **(10 Marks)**
 b. Determine the size and effective length of the side fillets to connect two plates with cross sections of 150×10mm and 100×10mm subjected to a tension of 150 kN (Working load). **(10 Marks)**

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1 of 2

Module-3

5 a. Explain the possible modes of failure of axially loaded columns. **(04 Marks)**

   b. Design the member consists of a single angle to carry a tensile force of 200 kN. The length of tension member is 3.5m and subjected to reversal stresses due to wind forces. If the yield strength and the ultimate strength of the steel used are 250 MPa and 410 MPa and use M_{18} grade bolt. **(16 Marks)**

OR

6 a. Define Lacing and batten system with neat sketch. **(03 Marks)**

   b. Design a laced column with two channels back to back of length 8m to carry an axial factored load of 1000 kN. The column is hinged at both ends. **(17 Marks)**

Module-4

7 a. Define Lug angle. Where lug angles are provided? **(03 Marks)**

   b. Design the end connection for ISA $100 \times 100 \times 10$ mm using lug angle for its full design strength. Use M_{20} bolts, property class 4.6. Provide yield stress of steel 250 MPa. Sketch the connection details. **(17 Marks)**

OR

8 a. Explain the types of column bases. **(04 Marks)**

   b. Design a slab base for an ISHB350@661.2 N/m column to carry a factored load of 1000 kN. M_{25} concrete and Fe415 grade steel is used for the foundation. **(16 Marks)**

Module-5

9 a. What are the factors which affects lateral stability? **(03 Marks)**

   b. Design a cantilever beam which is built into concrete wall and carrying a load of 25 kN/m and live load of 10 kN/m. The span of beam is 5m. **(17 Marks)**

OR

10 a. Explain briefly
       i) Laterally Unsupported beams
       ii) Column splices **(06 Marks)**

    b. Design a simply supported I section to support the slab of a hall of 9m × 24m with beams spaced at 3m c/c. Slab is of 100mm thick. Consider floor finish load of 0.5 kN/m^2 and live load of 3 kN/m^2. Use F_y = 250 MPa steel. Assume adequate lateral support to the compression flange. Also check for deflection. **(14 Marks)**

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CBCS SCHEME

USN | | | | | | | | | | | | **18CV62**

Sixth Semester B.E. Degree Examination, June/July 2023
Applied Geotechnical Engineering

Time: 3 hrs.   Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of IS:6403 is permitted.

Module-1

1 a. What is subsurface exploration? Enumerate the objectives of subsurface exploration.
                                                                (10 Marks)
   b. Explain seismic refraction method with neat sketch. What are its limitations? **(10 Marks)**

OR

2 a. Establish the location of ground water in a Clayey strata, water in bore is bailed out to a depth of 12m below ground surface and rise of water recorded at 24 hr interval are $h_1 = 60cm$, $h_2 = 55cm$, $h_3 = 50cm$.   **(10 Marks)**
   b. What are the methods available for dewatering? Explain dewatering by electro osmosis method with neat sketch.   **(10 Marks)**

Module-2

3 a. Derive Boussinesq expression for vertical stress due to concentrated load. When r/z ratio is zero what is the value of Boussinesq influence co-efficient?   **(10 Marks)**
   b. A concentrated load of 50 kN acts on the surface of a homogeneous soil mass of large extent. Determine the stress intensity at a depth of 5m, directly under the load and at a horizontal distance of 2.5m. Use Boussinesq analysis.   **(08 Marks)**
   c. What is Isobar?   **(02 Marks)**

OR

4 a. There is a layer of soft clay 4m thick under a newly constructed building. The overburden pressure at the centre of the clay layer is 300 kN/m². Compute the settlement if there is an increase in pressure due to construction of 1000 kN/m². Take $C_C = 0.5$, $G = 2.7$ and water content $\omega = 50\%$.   **(10 Marks)**
   b. Explain the classification of foundation settlement. What are the other causes of settlement?
                                                                (10 Marks)

Module-3

5 a. What are the causes of slope failure? List and enumerate the types of failure in finite slopes.
                                                                (10 Marks)
   b. A new canal is excavated to a depth of 5m below group level through a soil having the characteristics as, $C = 14$ kN/m², $\phi = 15°$, $e = 0.8$ and $G = 2.7$. The slope of banks is 1 in 1. If the Taylors stability number is 0.083, calculate the factor of safety with respect to cohesion when the canal runs full. If it is suddenly emptied, what will be the factor of safety? Take Taylor's stability number as 0.122.   **(10 Marks)**

96

OR

6 a. Explain the procedure of Culmann's graphical method for active earth pressure. **(10 Marks)**
   b. A retaining wall with a stratified backfill and a surcharge load is shown in the Fig.Q6(b). Draw the earth pressure diagram. Also estimate the resultant thrust on the wall and its position.
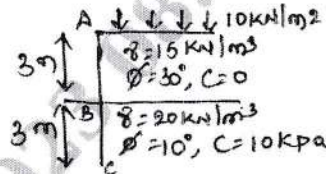

Fig.Q6(b)   **(10 Marks)**

Module-4

7 a. Explain standard penetration test and its correction. **(10 Marks)**
   b. A strip footing 2m wide carries a load intensity of 400 kN/m^2 at a depth of 1.2m in sand. The saturated unit weight of sand is 19.5 kN/m^3 and unit weight above water table is 16.8 kN/m^3. The shear strength parameters are C = 0 and $\phi = 35°$. Determine the factor of safety with respect to shear failure for the following cases of location of water table.
   i) Water table is 4 m below Ground Level.
   ii) Water table is 2.5 m below Ground Level. **(10 Marks)**

OR

8 a. Explain the effect of water table on bearing capacity of soil. **(10 Marks)**
   b. A square footing 2.5m × 2.5m is built on homogeneous bed of sand of density 19 kN/m^3 and having 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 $N_\gamma = 35$. **(10 Marks)**

Module-5

9 a. List the classification of piles based on different criteria. Explain with neat sketch classification of piles based on function. **(10 Marks)**
   b. In a 16 pile group, the pile diameter is 45 cm and centre to centre spacing of the square group is 1.5m. If C = 50 kN/m^2, determine whether the failure would occur with the pile acting individually or as a group? Neglect bearing at the tip of the pile. All piles are 10m long. Take m = 0.7 for shear mobilization around each pile. **(10 Marks)**

OR

10 Write short notes on :
   a. Efficiency of pile group
   b. Negative Skin friction
   c. Under-reamed pile
   d. Settlement of pile group **(20 Marks)**

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CBCS SCHEME

18CV63

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Sixth Semester B.E. Degree Examination, June/July 2023
Hydrology and Irrigation Engineering

Time: 3 hrs.

Max. Marks: 100

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

Module-1

1. a. With neat sketch, explain the engineering representation of the hydrological cycle. **(10 Marks)**
   b. Theissen polygon constructed for a network of the rain gauges in river basin yielded theisson weights of 0.10, 0.16, 0.12, 0.11, 0.09, 0.08, 0.07, 0.11, 0.06, 0.10. If the rainfall recorded for these gauges during a cyclonic storm are 132, 114, 162, 138, 207, 156, 135, 158, 168 and 150 mm respectively. Determined the average depth rainfall by theisson mean and arithmetic mean methods, also determine the value of surface runoff at the basin outlet. If 35% of the rainfall is lost as infiltration. Take the area of the basin as 5000 km^2 and express the answer in million cubic meter. **(10 Marks)**

OR

2. a. Explain with neat sketch how its amount is measured using Symon's raingauge. **(10 Marks)**
   b. List and explain the types of precipitation. **(10 Marks)**

Module-2

3. a. (i) Explain with neat sketch the measurement using class A pan. **(06 Marks)**
      (ii) Write the Rohwer's formula and explain its term. **(04 Marks)**
   b. Briefly explain the measurement of Evapo-transpiration. **(10 Marks)**

OR

4. a. What is evaporation? Explain its factor affecting. **(10 Marks)**
   b. Write a short notes on: (i) AET   (ii) PET **(10 Marks)**

Module-3

5. a. Define hydrograph. With a neat sketch, explain components parts of hydrograph. **(10 Marks)**
   b. Derive the UHG for the catchment of 200 km^2 if the following discharge was observed in stream as a 6 hr rainfall storm. The base flow can be assumed to have increase linearly.

Time	0	3	6	9	12	15	18	21	24	27
6 hr discharge (m^3/s)	5	110	265	230	165	30	95	70	55	50
Base flow (m^3/s)	5	10	15	20	25	30	35	40	45	50

(10 Marks)

OR

6. a. Explain the rainfall runoff relationships using regression analysis. **(10 Marks)**
   b. Derive the S-curve for the 4 hr UHG given below:

Time (Hr)	0	4	8	12	16	20	24	28
Ordinates in 4 hr UHG (m^3/s)	0	10	30	25	18	10	5	0

(10 Marks)

Module-4

7 a. A water course has a culturable command area of 1200 hectares. The intensity of irrigation for crop A is 40% and for B is 35% and both the crops are rabi crops. Crop A has a kore depth of 10 cm and kore period of 10 days and crop B has kore depth of 16 cm and kore period of 15 days. Calculate the discharge of water course. **(10 Marks)**

 b. What are Duty, Delta and Base period? Explain factors affecting duty of waters. **(10 Marks)**

OR

8 a. A channel is to be design for irrigating 5000 hectares in Kharif crop and 4000 hectares in rabi crop. The water requirement for Kharif and rabi are 60 cm and 25 cm respectively. The kore period of Kharif is 3 weeks and for rabi is 4 weeks. Determine the discharge of the channel for which it is to be designed. **(10 Marks)**

  b. What is flow irrigation and lift irrigation? Explain the Bandhara irrigation. **(10 Marks)**

Module-5

9 a. Define canal. Explain different types of canal based on alignment. **(10 Marks)**

  b. Find the section and maximum discharge of a channel with the following data:
  Bed slope = 1 in 5000
  Lacey's silt factor = 0.95
  Side slope = 1:1 **(10 Marks)**

OR

10 a. Define reservoir. With a neat sketch, explain zones of storage in a reservoir. **(10 Marks)**

  b. Design an irrigation channel with the following data:
  (i)   Full supply discharge = 6 cumex
  (ii)   Rugosity coefficient, N = 0.0225
  (iii) CVR (m) = 1
  (iv)   Bed slope = 1 in 5000
  Assume other reasonable data for the design. **(10 Marks)**

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CBCS SCHEME

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18CV644
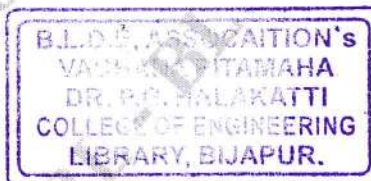
Sixth Semester B.E. Degree Examination, June/July 2023
Ground Improvement Techniques

Time: 3 hrs.

Max. Marks: 100

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

Module-1

1 a. Write a short note on formation of soil and their nature. **(06 Marks)**
   b. Explain various types of Reclamation materials. **(06 Marks)**
   c. What are the factors that must be considered in selection of ground improvement techniques? **(08 Marks)**

OR

2 a. With a neat sketch, explain dynamic compaction. **(10 Marks)**
   b. Explain about selection of field compaction procedure. **(10 Marks)**

Module-2

3 a. Briefly explain different methods of dewatering techniques. **(10 Marks)**
   b. Explain with the figure the procedure of Electro-kinetic dewatering system. **(10 Marks)**

OR

4 a. What are drains? Explain different types of drains. **(08 Marks)**
   b. Explain briefly with a figure pre-compression technique of pre loading with vertical drain. **(12 Marks)**

Module-3

5 a. Describe current stabilization. Explain the procedure of cement stabilization. **(12 Marks)**
   b. Discuss the effect of cement stabilization on permeability, swelling characteristics of soils. **(08 Marks)**

OR

6 a. Write a note on Tar on asphalt in stabilization of soil. **(10 Marks)**
   b. Write short notes on : (i) Lime stabilization (ii) Stabilization using lignin (iii) Chlorid stabilization. **(10 Marks)**

Module-4

7 a. Explain the process vibrocompaction. **(10 Marks)**
   b. Explain the blasting method of stabilization. Discuss the advantages of this method. **(10 Marks)**

OR

8 a. Mention the types of grouting and explain any two methods of grouting. **(10 Marks)**
   b. Explain the effect of grouting in soil and list out some chemicals and materials used in grouting. **(10 Marks)**

100

Module-5

9 a. List the properties of geosynthetics. Explain any three. (12 Marks)
   b. Discuss briefly the applications of geosynthetics. (08 Marks)

OR

10   Write short note on :
   a. Soil Reinforcement.
   b. Crib walls.
   c. Gabions
   d. Mattresses
   e. Micropiles. (20 Marks)

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CBCS SCHEME

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18CV652

Sixth Semester B.E. Degree Examination, June/July 2023
Traffic Engineering

Time: 3 hrs.   Max. Marks: 100

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

Module-1

1 a. Describe and explain static and dynamic characteristics of vehicle affecting road design. **(10 Marks)**

   b. A passenger car weighing 2.5tonnes is to accelerate at a rate of $3m/s^2$ in the first gear from a speed of 10kmph. The gradient is +1% and the highway has a block topped surface with tyre deformation factor 0.935. The frontal exposed area of the car is $2m^2$ and the tyres have radius of 0.33m. The rear axle gear is 3.82 : 1 and the first gear ratio is 2.78 : 1. Calculate the engine horse power needed and the speed of the engine. Take K = 90%, f = 0.025, $C_a = 0.37$. **(10 Marks)**

OR

2 a. Describe the interdependency of land use and transport with a diagram. **(10 Marks)**

   b. Discuss briefly the PIEV theory. **(05 Marks)**

   c. Describe the fundamentals of traffic flow. **(05 Marks)**

Module-2

3 a. Briefly explain procedure adopted in floating car method and analysis of data collected and representation of results. **(10 Marks)**

   b. The Table Q3(b) below gives the consolidated data of spot speed studies on a section of a road. Determine :

   i) The upper and lower values of speed limits for installing speed regulations

   ii) Modal speed for the range

   iii) Speed dispersion.

Table 3(b) : Speed Studies

Speed Range, kmph	No. of Speed Observations
0 – 10	0
10 – 20	11
20 – 30	30
30 – 40	105
40 – 50	233
50 – 60	216
60 – 70	68
70 – 80	24
80 – 90	0

(10 Marks)

OR

4 a. Explain the concept of PCU and factors affecting PCU. **(06 Marks)**
  b. With a neat sketch, explain collision diagram related to accident studies. **(04 Marks)**
  c. A vehicle of weight 3 tones skids through a distance equal to 50m, before colliding with another parked vehicle of weight 2.5 tonnes. After collision both the vehicles skid through a distance equal to 16m before stopping. Determine the speeds of vehicle assuming f = 0.4. **(10 Marks)**

Module-3

5 a. Mention the various classifications of Traffic signs. Explain any two of them with a neat sketch. **(10 Marks)**
  b. The average normal flow of traffic on cross roads A and B during design period area 400 and 250 PCU/hr, the saturation flow values on these roads are estimated as 1250 PCU/hr and 1000PCU/hr respectively. The all red time required for pedestrian crossing is 12 sec. Design two phase traffic signals by Webster's method. Sketch phase diagram also. **(10 Marks)**

OR

6 a. Write short notes on :
   i) Road markings
   ii) Channelized intersection. **(10 Marks)**
  b. Explain briefly on networking pedestrian facilities and cycle tracks. **(10 Marks)**

Module-4

7 a. Describe the causes of road accidents and also suggest preventive measures to control accidents. **(10 Marks)**
  b. What are the major air pollutants due to road traffic? Explain consequences of each. **(10 Marks)**

OR

8 a. List the various design factors of highway lighting. Explain the different types of lighting layouts with a neat sketch. **(10 Marks)**
  b. Write short notes on :
   i) Promotion and integration of public transportation
   ii) Causes of noise pollution. **(10 Marks)**

Module-5

9 a. Explain briefly congestion pricing and parking pricing. **(10 Marks)**
  b. Explain the applications of Intelligent Transport System [ITS] in traffic management, enforcement and education. **(10 Marks)**

OR

10 a. Discuss the advantages and disadvantages of one way streets and Tidal flow. **(10 Marks)**
   b. Write short notes on :
    i) Area Traffic control
    ii) TSM. **(10 Marks)**

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