B.L.D.E.A's V.P. Dr. P.G. Halakatti College of Enginering and Technology Vijayapur-586103

Department of Civil Engineering

Question Papers Dec.2024/Jan.2025

CBCS SCHEME

USN | | | | | | | | | | **18CIV14/24**

First/Second Semester B.E. Degree Examination, Dec.2024/Jan.2025
Elements of Civil Engineering and Mechanics

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Explain briefly about impact of infrastructure on socioeconomic development of a society. **(06 Marks)**

b. Write a short note on:

i) Transportation Engineering

ii) Water resource Engineering. **(06 Marks)**

c. Determine the resultant of forces which are acting over a body as shown in Fig.Q.1(c).

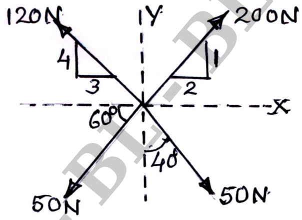

Fig.Q.1(c)

(08 Marks)

OR

2 a. State and prove law of parallelogram of forces. **(06 Marks)**

b. State and prove Varignon's theorem of moment. **(06 Marks)**

c. Determine the resultant of force system acting over a body as shown in Fig.Q.2(c). Also locate the position of resultant with respect to point D. **(08 Marks)**

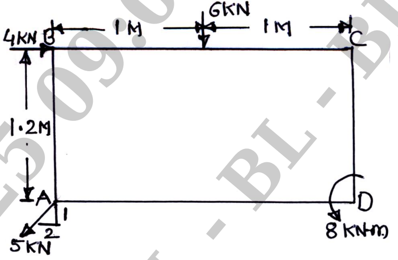

Fig.Q.2(c)

Module-2

3 a. Explain the following:

i) Coefficient of friction

ii) Cone of friction. **(04 Marks)**

b. Determine the value of W_1 and W_2 as shown in Fig.Q.3(b) to keep the member BC horizontal. **(08 Marks)**

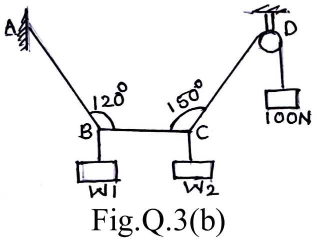

Fig.Q.3(b)

c. Determine the necessary force ‘P’ acting parallel to the plane as shown in Fig.Q.3(c) in order to cause motion to impend. Take $\mu = 0.25$. **(08 Marks)**

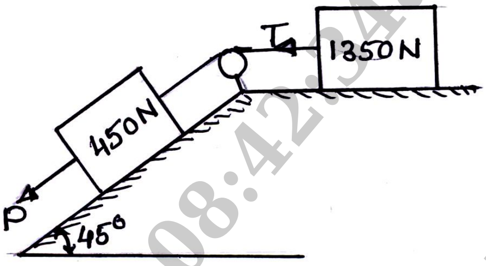

Fig.Q.3(c)

OR

4 a. What is equilibrium? What are conditions of equilibrium for concurrent and on concurrent force system? **(04 Marks)**

b. Three cylinders A, B and C of diameter 200 mm, 300 mm and 250 mm having weight of 75 N, 200 N and 100 N respectively are placed in a rectangular tough as shown in Fig.Q.4(b). Assuming contact surfaces as smooth, determine the reactions between cylinder A and vertical wall. **(10 Marks)**

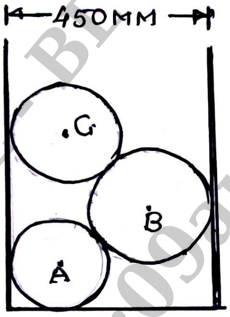

Fig.Q.4(b)

c. A uniform ladder of weight 850 N and of length 6 m rest on a horizontal ground and cleans against a smooth vertical wall. The angle made by the ladder with the horizontal is 65°, when a man of weight 700 N stands on the ladder at a distance of 4 m. From the top of the ladder at a distance of 4 m from the top of the ladder as shown in Fig.Q.4(c). The ladder is at the point of sliding. Determine the coefficient of friction between the ladder and the floor. **(06 Marks)**

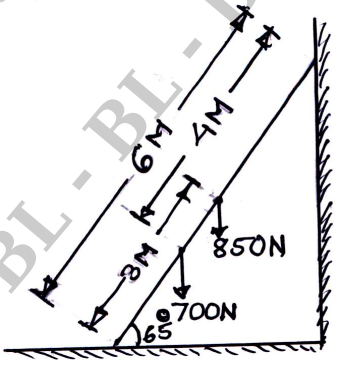

Fig.Q.4(c)

Module-3

5 a. Explain briefly about different types of supports provided for beams. **(06 Marks)**

b. What are assumptions made in the analysis of rigid frames? **(06 Marks)**

c. Find the reactions at support A and B for the beam as shown in Fig.Q.5(c). **(08 Marks)**

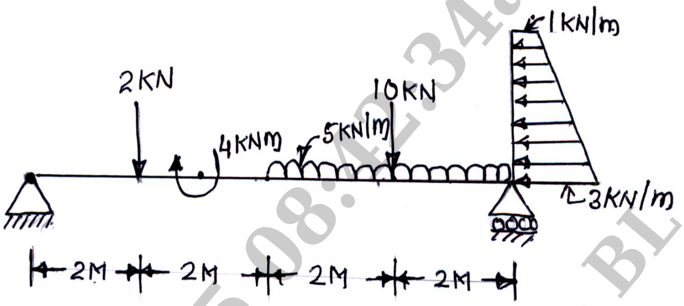

Fig.Q.5(c)

OR

6 a. Differentiate between statically determinate and statically indeterminate structure. **(04 Marks)**

b. Explain different types of clouds in the analysis of beams. **(03 Marks)**

c. Find the support reactions and member forces for the pin jointed plane truss as shown in Fig.Q.6(c) by method of joints. Also tabulate the results. **(13 Marks)**

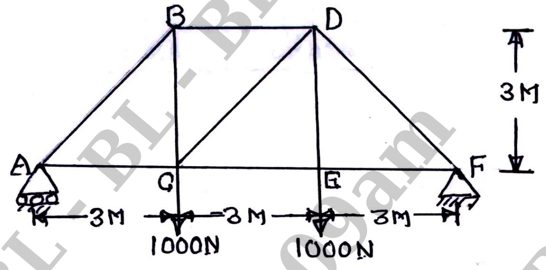

Fig.Q.6(c)

Module-4

7 a. Determine the centroid of semicircular lamina of radius 'R' using method of integration. **(08 Marks)**

b. Determine the moment of inertia of the section as shown in Fig.Q.7(b) about its centroidal axis. Calculate the least radius of gyration for the section. **(12 Marks)**

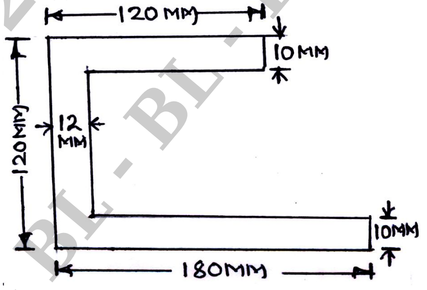

Fig.Q.7(b)

OR

8 a. State and prove parallel axis theorem. **(06 Marks)**

b. Derive an expression for moment of inertia of a triangular lamina with respect to its horizontal centroidal axis. **(06 Marks)**

c. Locate the centroid of the shaded area as shown in Fig.Q.8(c) with respect to point ‘O’. **(08 Marks)**

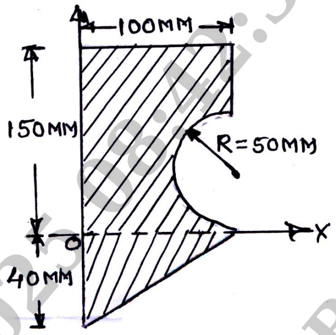

Fig.Q.8(c)

Module-5

9 a. What is Projectile? Define the following term:
- i) Angle of projection
- ii) Horizontal range
- iii) Vertical height
- iv) Time of flight. **(10 Marks)**

b. A burglar’s car starts at an acceleration of 2 m/sec^2. A police vigilant party came after 5 sec and continued to chase the burglar’s car with a uniform velocity of 20 m/sec. Find the time taken in which the police van will overtake the car. **(10 Marks)**

OR

10 a. State D’Alembert’s principle and write its significance in structural dynamics. **(06 Marks)**

b. Define:
- i) Centrifugal force
- ii) Superelevation **(04 Marks)**

c. Find the least initial velocity with which a projectile is to be projected so that it clears a wall of 4 m height located at a distance of 5 m and strikes the ground at a distance 4 m beyond the wall as shown in Fig.Q.10(c). The point of projection is at the same level as the foot of the wall.

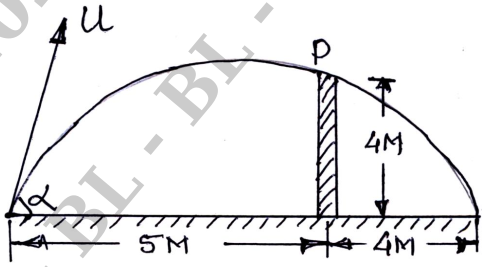

Fig.Q.10(c)

(10 Marks)

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CBCS SCHEME

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18CIV14/24

First/Second Semester B.E. Degree Examination, Dec.2024/Jan.2025

Elements of Civil Engineering and Mechanics

Time: 3 hrs. Max. Marks: 100

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

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

Module-1

1 a. Explain briefly about impact of infrastructure on socioeconomic development of a society. **(06 Marks)**

b. Write a short note on:
i) Transportation Engineering
ii) Water resource Engineering. **(06 Marks)**

c. Determine the resultant of forces which are acting over a body as shown in Fig.Q.1(c).

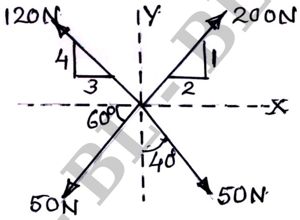

Fig.Q.1(c)

(08 Marks)

OR

2 a. State and prove law of parallelogram of forces. **(06 Marks)**

b. State and prove Varignon's theorem of moment. **(06 Marks)**

c. Determine the resultant of force system acting over a body as shown in Fig.Q.2(c). Also locate the position of resultant with respect to point D. **(08 Marks)**

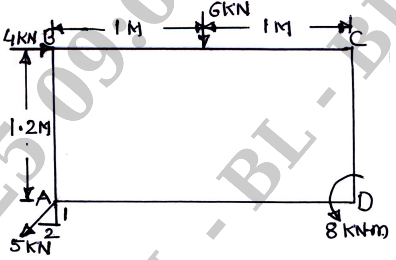

Fig.Q.2(c)

Module-2

3 a. Explain the following:
i) Coefficient of friction
ii) Cone of friction. **(04 Marks)**

b. Determine the value of W_1 and W_2 as shown in Fig.Q.3(b) to keep the member BC horizontal. **(08 Marks)**

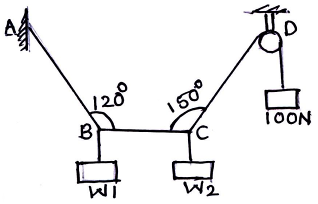

Fig.Q.3(b)

c. Determine the necessary force 'P' acting parallel to the plane as shown in Fig.Q.3(c) in order to cause motion to impend. Take $\mu = 0.25$. **(08 Marks)**

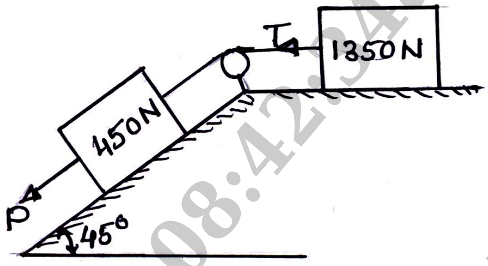

Fig.Q.3(c)

OR

4 a. What is equilibrium? What are conditions of equilibrium for concurrent and on concurrent force system? **(04 Marks)**

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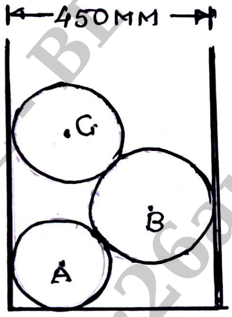

Fig.Q.4(b)

c. A uniform ladder of weight 850 N and of length 6 m rest on a horizontal ground and cleans against a smooth vertical wall. The angle made by the ladder with the horizontal is 65°, when a man of weight 700 N stands on the ladder at a distance of 4 m. From the top of the ladder at a distance of 4 m from the top of the ladder as shown in Fig.Q.4(c). The ladder is at the point of sliding. Determine the coefficient of friction between the ladder and the floor. **(06 Marks)**

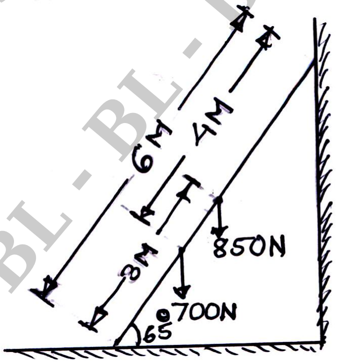

Fig.Q.4(c)

Module-3

5 a. Explain briefly about different types of supports provided for beams. **(06 Marks)**

b. What are assumptions made in the analysis of rigid frames? **(06 Marks)**

c. Find the reactions at support A and B for the beam as shown in Fig.Q.5(c). **(08 Marks)**

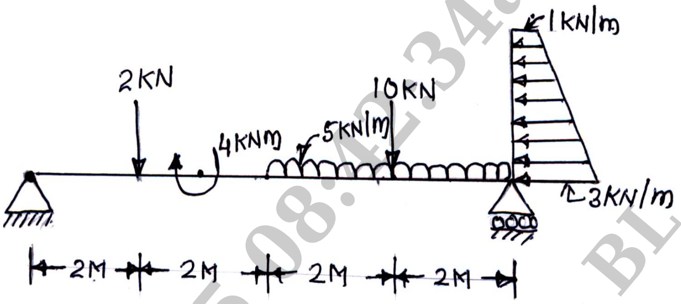

Fig.Q.5(c)

OR

6 a. Differentiate between statically determinate and statically indeterminate structure. **(04 Marks)**

b. Explain different types of clouds in the analysis of beams. **(03 Marks)**

c. Find the support reactions and member forces for the pin jointed plane truss as shown in Fig.Q.6(c) by method of joints. Also tabulate the results. **(13 Marks)**

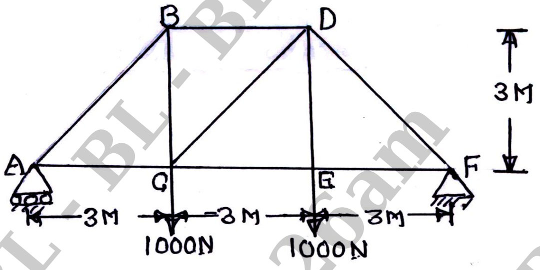

Fig.Q.6(c)

Module-4

7 a. Determine the centroid of semicircular lamina of radius 'R' using method of integration. **(08 Marks)**

b. Determine the moment of inertia of the section as shown in Fig.Q.7(b) about its centroidal axis. Calculate the least radius of gyration for the section. **(12 Marks)**

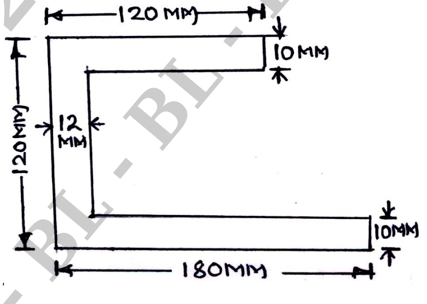

Fig.Q.7(b)

OR

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b. Derive an expression for moment of inertia of a triangular lamina with respect to its horizontal centroidal axis. **(06 Marks)**

c. Locate the centroid of the shaded area as shown in Fig.Q.8(c) with respect to point 'O'. **(08 Marks)**

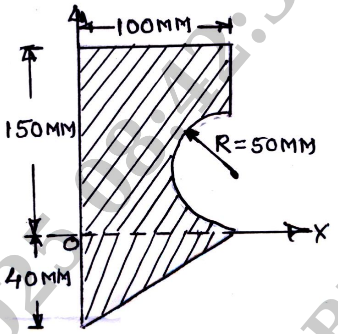

Fig.Q.8(c)

Module-5

9 a. What is Projectile? Define the following term:
   i) Angle of projection
   ii) Horizontal range
   iii) Vertical height
   iv) Time of flight. **(10 Marks)**

b. A burglar's car starts at an acceleration of 2 m/sec^2. A police vigilant party came after 5 sec and continued to chase the burglar's car with a uniform velocity of 20 m/sec. Find the time taken in which the police van will overtake the car. **(10 Marks)**

OR

10 a. State D'Alembert's principle and write its significance in structural dynamics. **(06 Marks)**

b. Define:
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c. Find the least initial velocity with which a projectile is to be projected so that it clears a wall of 4 m height located at a distance of 5 m and strikes the ground at a distance 4 m beyond the wall as shown in Fig.Q.10(c). The point of projection is at the same level as the foot of the wall.

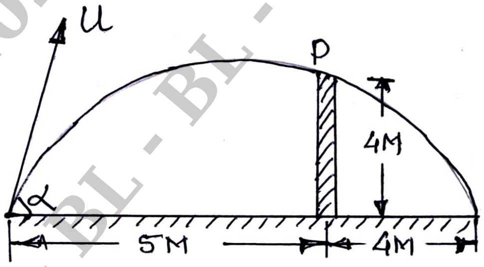

Fig.Q.10(c)

(10 Marks)

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐

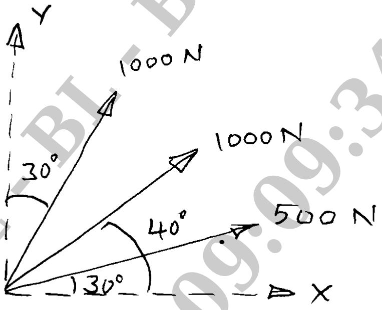
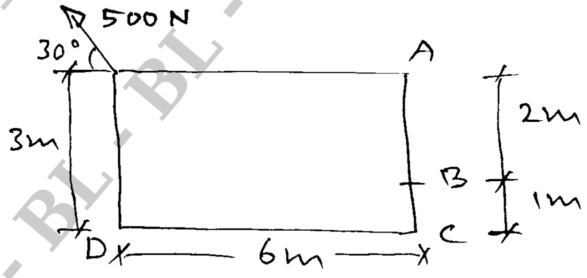
BCIVC103/203

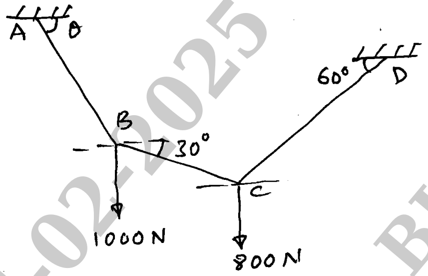
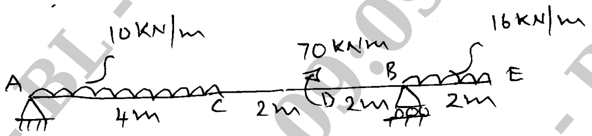
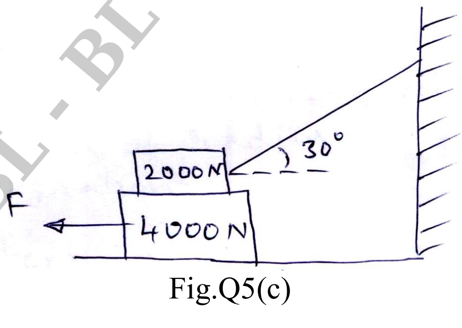
First/Second Semester B.E/B.Tech. Degree Examination, Dec.2024/Jan.2025

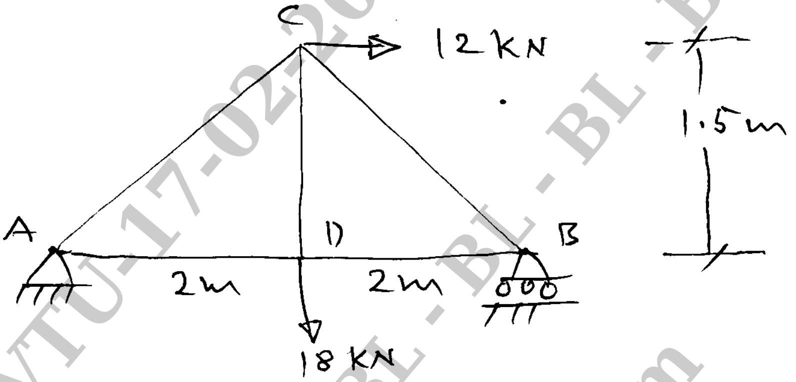
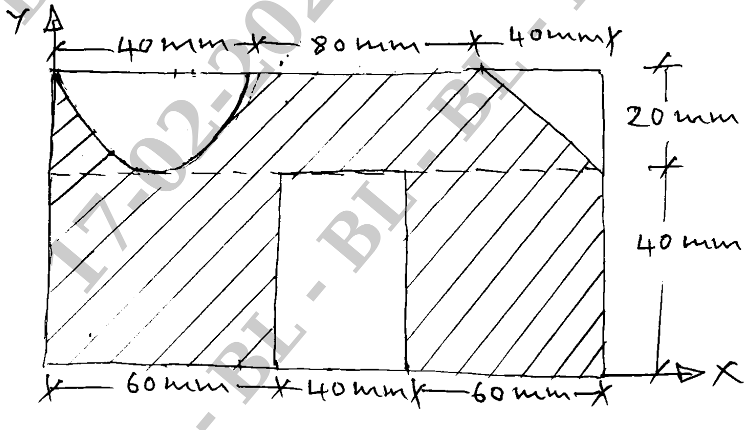
Engineering Mechanics

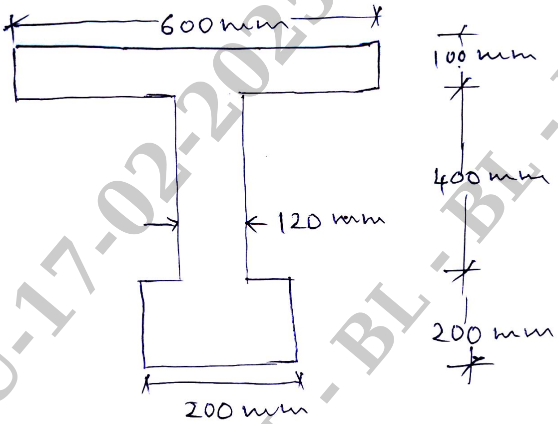
Time: 3 hrs. Max. Marks:100

Note: ***1. Answer any FIVE full questions, choosing ONE full question from each module.***
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	**M**	**L**	**C**
1	a.	Write a note on principle of transmissibility of forces and its limitations.	**6**	**L1**	**CO1**
	b.	What is a force? What are its characteristics?	**6**	**L1**	**CO1**
	c.	Two forces acting on a body are 500 N and 1000 N as shown in Fig.Q1(c). Determine the third force F such that the resultant of all the three forces is 1000 N, directed at 40° to the x-axis.  Fig.Q1(c)	**8**	**L3**	**CO1**
		OR			
2	a.	What is a couple? List its characteristics.	**6**	**L1**	**CO1**
	b.	State and prove Varignon's theorem.	**6**	**L2**	**CO1**
	c.	Find the moment of 500 N force about the points A, B, C and D as shown in Fig.Q2(c).  Fig.Q2(c)	**8**	**L3**	**CO1**

		Module – 2			
3	a.	Explain with a neat sketch, the different types of supports.	**6**	**L2**	**CO2**
	b.	State and prove Lami's theorem.	**6**	**L2**	**CO2**
	c.	Calculate the tension in the strings. Also calculate 'θ' in Fig.Q3(c).  Fig.Q3(c)	**8**	**L3**	**CO2**
		OR			
4	a.	Explain the types of loading on the beams.	**6**	**L2**	**CO2**
	b.	Write short notes on the following with examples : i) Determinate beams ii) Indeterminate beams.	**6**	**L1**	**CO2**
	c.	Find support reactions for the beam shown in Fig.Q4(c).  Fig.Q4(c)	**8**	**L3**	**CO2**
		Module – 3			
5	a.	What are the assumptions made in the analysis of trusses?	**4**	**L1**	**CO3**
	b.	State the laws of static friction.	**4**	**L2**	**CO3**
	c.	A block weighting 4000 N is resting on horizontal surface supports another block of 2000 N as shown in Fig.Q5(c). Find the horizontal force F just to move the block to the left. Take coefficient of friction for all surfaces of contact to be 0.2.  Fig.Q5(c)	**12**	**L3**	**CO3**

		OR			
6	a.	Explain different types of trusses.	**4**	**L2**	**CO3**
	b.	Explain : i) Angle of friction ii) Cone of friction.	**4**	**L2**	**CO3**
	c.	Analyse the frame and tabulate the member forces for the frame shown in Fig.Q6(c).  Fig.Q6(c)	**12**	**L3**	**CO3**
		Module – 4			
7	a.	State and prove parallel axis theorem.	**8**	**L2**	**CO4**
	b.	Locate centriod of the shaded area shown in the Fig.Q7(b).  Fig.Q7(b)	**12**	**L3**	**CO4**

		OR			
8	a.	Determine the centriod of a semi circular lamina of radius 'R' by the method of integration.	**8**	**L3**	**CO4**
	b.	Determine the moment of inertia of a pre-stressed concrete beam section shown in Fig.Q8(b), about horizontal and vertical axis passing through centriod.  Fig.Q8(b)	**12**	**L3**	**CO4**
		Module – 5			
9	a.	Derive the equations of motion.	**6**	**L2**	**CO5**
	b.	What is super elevation? Why is it necessary?	**4**	**L1**	**CO5**
	c.	A ball is dropped from the top of a tower 30 high. At the same instant another ball is thrown upward from the ground with an initial velocity of 15 m/s. When and where do they cross?	**10**	**L3**	**CO5**
		OR			
10	a.	State and explain D'Alembert's principle.	**4**	**L2**	**CO5**
	b.	Define the following with a neat sketch : i) Angle of projection ii) Horizontal range iii) Time of flight.	**4**	**L1**	**CO5**
	c.	A cricket ball is thrown by a player from a height of 2 m above the ground at an angle of 30° to the horizontal with a velocity 20 m/s is caught by another fieldsman at a height of 1 m from the ground. Find the distance between the two players.	**12**	**L3**	**CO5**

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CBCS SCHEME

USN

BMATC101

First Semester B.E/B.Tech. Degree Examination, Dec.2024/Jan.2025

Mathematics–I for Civil Engineering Stream

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, choosing ONE full question from each module.*
2. M : Marks , L: Bloom's level , C: Course outcomes.
3. VTU formula Handbook is permuted.

		Module – 1	**M**	**L**	**C**
1	a.	With usual notation prove that $\tan\phi = r\dfrac{d\theta}{dr}$.	**6**	**L2**	**CO1**
	b.	Find the angle between the curves $r = 4\sec^2(\theta/2)$ and $r = 9\operatorname{cosec}^2(\theta/2)$.	**7**	**L2**	**CO1**
	c.	Find the radius of curvature of the curve. $\sqrt{x}+\sqrt{y}=\sqrt{a}$ at $\left(a/_4, a/_4\right)$.	**7**	**L3**	**CO1**
		OR			
2	a.	Find the pedal equation of the curve $r^m = a^m(\cos m\theta + \sin m\theta)$.	**6**	**L2**	**CO1**
	b.	Derive the radius of curvature in Cartesian form.	**7**	**L2**	**CO1**
	c.	Using modern mathematical tool write a program to plot the curve $r = 2(1 + \cos\theta)$.	**7**	**L3**	**CO5**
		Module – 2			
3	a.	Using Maclaurin's series expand $e^{\sin x}$ in powers of x upto the term containing x^5.	**6**	**L2**	**CO2**
	b.	If $u = f\left(\dfrac{x}{y}, \dfrac{y}{z}, \dfrac{z}{x}\right)$ prove that $x\dfrac{\partial u}{\partial x} + y\dfrac{\partial u}{\partial y} + z\dfrac{\partial u}{\partial z} = 0$.	**7**	**L3**	**CO2**
	c.	Find the extreme values of the function : $f(x,y) = x^3 + y^3 - 3x - 12y + 20$.	**7**	**L3**	**CO2**
		OR			
4	a.	Evaluate : i) $\lim\limits_{x\to 0}\left(\dfrac{\tan x}{x}\right)^{1/x^2}$ ii) $\lim\limits_{x\to 0}(\sin x)^{\tan x}$.	**6**	**L2**	**CO2**
	b.	If : $u = x + 3y^2 - z^3$; $v = 4x^2yz$; $w = 2z^2 - xy$ find $\dfrac{\partial(u,v,w)}{\partial(x,y,z)}$ at $(1, -1, 0)$.	**7**	**L3**	**CO2**
	c.	Using modern mathematical tool write a program to evaluate $\lim\limits_{x\to 0}(\sin x)^{\tan x}$.	**7**	**L3**	**CO5**

Module – 3

Q.No.		Question	Marks	Level	CO
5	a.	Solve : $x\frac{dy}{dx}+y\log y=xye^{x}$.	**6**	**L2**	**CO3**
	b.	Find the orthogonal trajectories of the family of curves $y^2 = 4ax$.	**7**	**L3**	**CO3**
	c.	Solve : $yp^2 + (x – y)p – x = 0$.	**7**	**L3**	**CO3**

OR

Q.No.		Question	Marks	Level	CO
6	a.	Solve $(4xy + 3y^2 - x)dx + x(x + 2y)dy = 0$.	**6**	**L2**	**CO3**
	b.	A bottle of mineral water at a room temperature of 72°F is kept in a refrigerator where the temperature is 44°F. After half am hour water cooled to 61°F. What is the temperature of the water in another half an hour?	**7**	**L3**	**CO3**
	c.	Find the general and singular solution of $xp^2 – py + kp + a = 0$.	**7**	**L3**	**CO3**

Module – 4

Q.No.		Question	Marks	Level	CO
7	a.	Solve $(D^4 + 18D^2 + 81)y = 0$.	**6**	**L2**	**CO3**
	b.	Solve $D^3y + 8y = \sin(2x)$.	**7**	**L2**	**CO3**
	c.	Solve Legendre's linear differential equation : $(1+x)^2\frac{d^2y}{dx^2}+(1+x)\frac{dy}{dx}+y=4\cos[\log(1+x)]$.	**7**	**L2**	**CO3**

OR

Q.No.		Question	Marks	Level	CO
8	a.	Solve $D^2y + 3Dy + 2y = 12x^2$.	**6**	**L2**	**CO3**
	b.	Solve by method of variation of parameters $\frac{d^2y}{dx^2}+y=\sec x\tan x$.	**7**	**L2**	**CO3**
	c.	Solve $x^2\frac{d^2y}{dx^2}+5x\frac{dy}{dx}+4y=x^4$.	**7**	**L2**	**CO3**

		Module – 5			
9	a.	Find the rank of the matrix $A = \begin{bmatrix} 0 & 2 & 3 & 4 \\ 2 & 3 & 5 & 4 \\ 4 & 8 & 13 & 12 \end{bmatrix}$.	**6**	**L2**	**CO4**
	b.	Using Gauss-elimination method solve : $x + y + z = 9$ $x - 2y + 3z = 8$ $2x + y - z = 3$.	**7**	**L3**	**CO4**
	c.	Using Rayleigh's power method find the dominant eigen value and the corresponding eigen vector of the matrix $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$, taking initial vector as $[1, 1, 1]^T$.	**7**	**L3**	**CO4**
		OR			
10	a.	Apply Gauss – Jordan method to solve the equations : $x + y + z = 9$ $2x - 3y + 4z = 13$ $3x + 4y + 5z = 40$.	**6**	**L2**	**CO4**
	b.	Test for consistency and solve : $x + y + z = 6$ $x - y + 2z = 5$ $3x + y + z = 8$.	**7**	**L2**	**CO4**
	c.	Write a program to solve the system of equations using Gauss – Seidel method by taking initial approximations (0, 0, 0). Carry out 3 iterations. $x + y + 54z = 110$ $27x + 6y - z = 85$ $6x + 15y + 2z = 72$.	**7**	**L3**	**CO5**

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **BMATC201**

Second Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

Mathematics – II for Civil Engineering Stream

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. VTU Formula Hand Book is permitted.
3. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	**M**	**L**	**C**
Q.1	**a.**	Evaluate $\int_0^1\int_x^{\sqrt{x}}(x^2+y^2)\,dy\,dx$.	**7**	**L2**	**CO1**
	b.	Evaluate $\int_0^a\int_y^a \frac{x}{x^2+y^2}\,dx\,dy$ by changing the order of integration.	**7**	**L3**	**CO1**
	c.	Derive the relation $\beta(m,n)=\frac{\gamma(m).\gamma(n)}{\gamma(m+n)}$.	**6**	**L2**	**CO1**
		OR			
Q.2	**a.**	Evaluate $\int_{-a}^{a}\int_0^{\sqrt{a^2-x^2}}\sqrt{x^2+y^2}\,dy\,dx$ by changing into polar coordinates.	**7**	**L3**	**CO1**
	b.	Using double integration find the area of a plane in the form of a quadrant of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$.	**7**	**L2**	**CO1**
	c.	Using modern mathematical program to evaluate the integral, $\int_0^3\int_0^{3-x}\int_0^{3-x-y}xyz\,dz\,dy\,dx$.	**6**	**L3**	**CO5**
		Module – 2			
Q.3	**a.**	If $\vec{F}=\nabla(xy^3z^2)$, find div $\vec{F}$ and curl $\vec{F}$ at the point (1, -1, 1).	**7**	**L2**	**CO2**
	b.	Define an irrotational vector. Find the constants a, b, c such that $\vec{F}=(x+y+az)\,i+(bx+2y-z)\,j+(x+cy+2z)\,k$ is irrotational.	**7**	**L2**	**CO2**
	c.	Find the directional derivative of $\phi=x^2yz+4xz^2$ at the point (1, -2, -1) in the direction of the vector $2\hat{i}-j-2\hat{k}$.	**6**	**L2**	**CO2**

<table>
<tr><td colspan="6">OR</td></tr>
<tr><td>Q.4</td><td>a.</td><td>Using Green's theorem, evaluate $\oint (3x^2-8y^2)dx+(4y-6xy)dy$, where C is the boundary of the region enclosed by $y=\sqrt{x}$ and $y=x^2$.</td><td>7</td><td>L3</td><td>CO2</td></tr>
<tr><td></td><td>b.</td><td>If $\vec{F}=xyi+yzj+zxk$, evaluate $\int_C \vec{F}\cdot \vec{dr}$ where C is the curve represented by, $x=t, y=t^2, z=t^3 \quad -1\le t\le 1$</td><td>7</td><td>L2</td><td>CO2</td></tr>
<tr><td></td><td>c.</td><td>Write the modern mathematical tool program to find the divergence of the vector field, $\vec{F}=x^2yz\hat{i}+y^2zx\hat{j}+z^2xy\hat{k}$.</td><td>6</td><td>L3</td><td>CO5</td></tr>
<tr><td colspan="6">Module – 3</td></tr>
<tr><td>Q.5</td><td>a.</td><td>Form the partial differential equation by eliminating the arbitrary function from the relation,
$\ell x+my+nz=f(x^2+y^2+z^2)$</td><td>7</td><td>L2</td><td>CO3</td></tr>
<tr><td></td><td>b.</td><td>Solve $\frac{\partial^2 z}{\partial y^2}=Z$, given that y = 0, $z=e^x$ and $\frac{\partial z}{\partial y}=e^{-x}$.</td><td>7</td><td>L3</td><td>CO3</td></tr>
<tr><td></td><td>c.</td><td>Solve $x(y^2-z^2)p+y(z^2-x^2)q=z(x^2-y^2)$ using Lagrange's multipliers.</td><td>6</td><td>L2</td><td>CO3</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td>Q.6</td><td>a.</td><td>Form the partial differential equation by eliminating the arbitrary constants from $(x-a)^2+(y-b)^2+z^2=C^2$.</td><td>7</td><td>L2</td><td>CO3</td></tr>
<tr><td></td><td>b.</td><td>Solve $\frac{\partial^2 z}{\partial x\partial y}=\sin x\sin y$ for which $\frac{\partial z}{\partial y}=-2\sin y$, when x = 0 and z = 0 if y is an odd multiple of $\frac{\pi}{2}$.</td><td>7</td><td>L3</td><td>CO3</td></tr>
<tr><td></td><td>c.</td><td>Derive one dimensional wave equation.</td><td>6</td><td>L2</td><td>CO3</td></tr>
<tr><td colspan="6">Module – 4</td></tr>
<tr><td>Q.7</td><td>a.</td><td>By Newton's-Raphson method find the root of $x\sin x+\cos x=0$, which is near to $x=\pi$.</td><td>7</td><td>L2</td><td>CO4</td></tr>
<tr><td></td><td>b.</td><td>The population of a town is given by the following table :
<table>
<tr><td>Year</td><td>1951</td><td>1961</td><td>1971</td><td>1981</td><td>1991</td></tr>
<tr><td>Population</td><td>19.96</td><td>39.65</td><td>58.81</td><td>72.21</td><td>94.61</td></tr>
</table>
Using Forward and Backward Newton's interpolation formula, calculate the increase in population between the years 1955 to 1985.</td><td>7</td><td>L2</td><td>CO4</td></tr>
<tr><td></td><td>c.</td><td>Evaluate $\int_0^{\frac{\pi}{2}}\sqrt{\cos\theta}\,d\theta$ by taking 7 ordinates using Simpson's $\left(\frac{1}{3}\right)^{rd}$ rule.</td><td>6</td><td>L3</td><td>CO4</td></tr>
</table>

<table>
<tr><td colspan="6">OR</td></tr>
<tr><td>Q.8</td><td>a.</td><td>Compute the real root of the equation $x\log_{10}x - 1.2 = 0$ by the Regula Falsi method taking Four decimal places.</td><td>7</td><td>L2</td><td>CO4</td></tr>
<tr><td></td><td>b.</td><td>Compute the value of y when x = 4, using Lagrange's interpolation formula given,
<table><tr><td>x</td><td>0</td><td>2</td><td>3</td><td>6</td></tr><tr><td>f(x)</td><td>-4</td><td>2</td><td>14</td><td>158</td></tr></table></td><td>7</td><td>L2</td><td>CO4</td></tr>
<tr><td></td><td>c.</td><td>Evaluate $\int_0^{0.3}(1-8x^3)^{\frac{1}{2}}\,dx$ by using Simpson's $\left(\frac{1}{3}\right)^{rd}$ rule, by taking 3 equal parts.</td><td>6</td><td>L3</td><td>CO4</td></tr>
<tr><td colspan="6">Module – 5</td></tr>
<tr><td>Q.9</td><td>a.</td><td>Solve by using modified Euler's method. $\frac{dy}{dx} = x - y^2$, y(0) = 1 taking h = 0.1, find y(0.2).</td><td>7</td><td>L2</td><td>CO4</td></tr>
<tr><td></td><td>b.</td><td>Applying Milne's predictor and corrector method, find y(0.8) from $\frac{dy}{dx} = x - y^2$ and given y(0) = 0, y(0.2) = 0.02, y(0.4) = 0.0795, y(0.6) = 0.1762.</td><td>7</td><td>L2</td><td>CO4</td></tr>
<tr><td></td><td>c.</td><td>Using Runge-Kutta method of order 4, find y at x = 0.1, given that $\frac{dy}{dx} = 3e^x + 2y$, y(0) = 0 and h = 0.1.</td><td>6</td><td>L3</td><td>CO4</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td>Q.10</td><td>a.</td><td>Use Taylor's series method to find y(0.1) from $\frac{dy}{dx} = x - y^2$ and y = 1 at x = 0 upto 4th degree.</td><td>7</td><td>L2</td><td>CO4</td></tr>
<tr><td></td><td>b.</td><td>Using the Runge-Kutta method of order 4, solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ with y(0) = 1 at h = 0.2, find y(0.2).</td><td>7</td><td>L2</td><td>CO4</td></tr>
<tr><td></td><td>c.</td><td>Using mathematical tools, write a code to find the solution of $\frac{dy}{dx} = 1 + \frac{y}{x}$ at y(2) taking h = 0.2 given that y(1) = 2 by Runge-Kutta method of order 4.</td><td>6</td><td>L3</td><td>CO5</td></tr>
</table>

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **18CV32**

Third Semester B.E. Degree Examination, Dec.2024/Jan.2025
Strength of Materials

Time: 3 hrs. Max. Marks: 100

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

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

Module-1

1 a. Explain in brief St. Venant's principle. **(04 Marks)**

b. Derive an expression for the deformation of a circular bar tapering uniformly subjected to axial tensile force 'P'. **(08 Marks)**

c. Find the elongation of the bar shown in Fig.Q1(c). Take E = 210 GN/m^2.

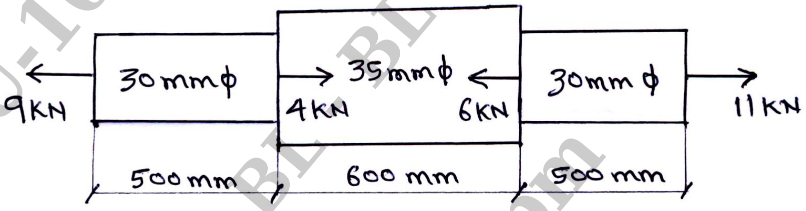

Fig.Q1(c) **(08 Marks)**

OR

2 a. Write a short note on temperature stress in simple bars. **(05 Marks)**

b. A reinforced concrete column of size 230 mm × 400 mm has 8 steel bars of 12 mm diameter distributed evenly on all sides. If the column is subjected to an axial compression of 600 KN, find the stresses developed in steel and concrete. Modular ratio = 18.67. **(07 Marks)**

c. A compound bars is made up of a central steel plate 60 mm wide and 10 mm thick to which copper plates 40 mm wide by 5 mm thick are connected rigidly on each side. The length of the bar at normal temperature is 1 metre. If the temperature is raised by 80°C, determine the stresses in each metal and change in length.
Take $E_s = 200$ GN/m^2 $\alpha_s = 12\times10^{-6}$/°C
$E_c = 100$ GN/m^2 $\alpha_c = 17\times10^{-6}$/°C **(08 Marks)**

Module-2

3 a. Discuss briefly compound stresses in beams. **(06 Marks)**

b. Explain the procedure for determining stresses in a general two dimensional stress system using Mohr's circle. **(06 Marks)**

c. The principal stresses at a certain point in a strained material are 150 N/mm^2 and 48 N/mm^2 both tensile. Find the normal and tangential stresses on a plane inclined at 20° with the major principal plane. Also determine the resultant stress, obliquity and maximum shear stress. **(08 Marks)**

OR

4 a. In a thin cylinder show that the hoop stress is twice the longitudinal stresses. **(08 Marks)**

b. A thick cylinder of external and internal diameter of 300 mm and 180 mm is subjected to an internal pressure of 42 N/mm^2 and external pressure 6 N/mm^2. Determine the stresses in the material. Now if the external pressure is doubled, what internal pressure can be maintained without exceeding the previously determined maximum stress? **(12 Marks)**

Module-3

5 a. Establish the relationship between load intensity, SF and BM. **(04 Marks)**

b. Draw SFD and BMD for the beam shown in Fig.Q5(b).

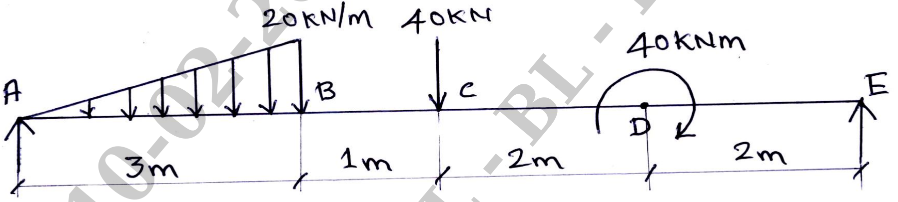

Fig.Q5(b) **(08 Marks)**

c. Draw SFD and BMD for the beam shown in Fig.Q5(c).

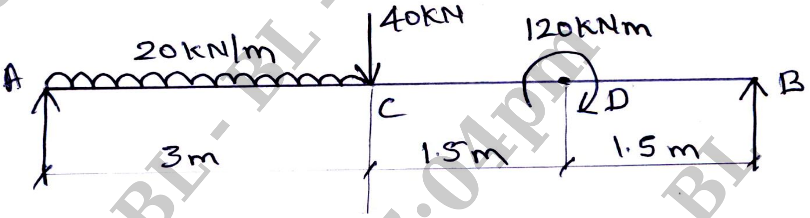

Fig.Q5(c) **(08 Marks)**

OR

6 a. Explain in brief shear force and bending moment. **(04 Marks)**

b. Draw SFD and BMD for the beam shown in Fig.Q6(b). Determine the position at which the positive BM occurs. Find also magnitude of the maximum positive and negative bending moment.

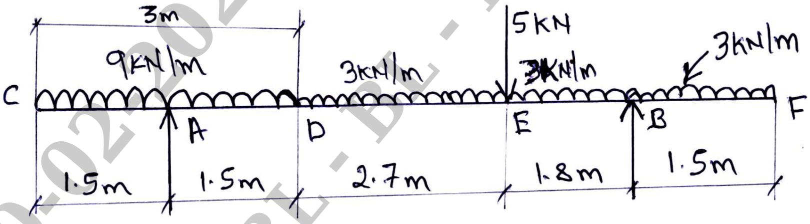

Fig.Q6(b) **(10 Marks)**

c. Draw SFD and BMD for the beam shown in Fig.Q6(c).

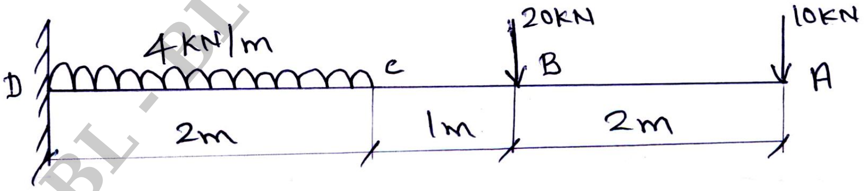

Fig.Q6(c) **(06 Marks)**

Module-4

7 a. Explain in brief the theory of simple bending. **(04 Marks)**

b. Derive the equation of pure bending with usual notations. **(10 Marks)**

c. A cantilever beam of span 1 m has rectangular c/s of size 200 mm × 400 mm. Determine the concentrated load which placed at the free end produce shear stress intensity of 1.5 N/mm^2. Hence compute maximum bending stresses in the c/s at the fixed end of cantilever. **(06 Marks)**

OR

8 a. Prove that a hollow is stronger and stiffer than the solid shaft of same material, length and weight. **(10 Marks)**

b. A shaft is required to transmit 245 KW @ 240 RPM. The maximum torque may be 1.5 times the mean torque. The shear stress in the shaft should not exceed 40 N/mm^2 and the twist 1° per metre length. Determine the diameter required if (i) Shaft is solid. (ii) Shaft is hollow with external diameter twice the internal diameter. **(10 Marks)**

Module-5

9 a. Determine the expression for slope and deflection in a simply supported beam subjected to UVL throughout, with loading intensity maximum at the left support and zero at the right support. **(08 Marks)**

b. A cantilever beam AB 2 m long is carrying a load of 20 kN at free end and 30 kN at a distance of 1 m from the free end. Find slope and deflection at the free end. Take E = 200 GPa and I = 150×10^6 mm^4. **(08 Marks)**

c. Define (i) Buckling load (ii) Slenderness ratio **(04 Marks)**

OR

10 a. Write the assumptions made in Euler's theory. **(04 Marks)**

b. Distinguish between long and short column. **(04 Marks)**

c. Determine the section of a cast iron hollow cylindrical column 3 m long with both ends firmly built in, if it carries an axial load of 800 kN. The ratio of internal to external diameter is 5/8. Use a factor of safety 4. Take f_c = 550 N/mm^2 and Rankine's constant for both ends hinged case = 1/1600. **(12 Marks)**

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CBCS SCHEME

USN | | | | | | | | | | | **18CV33**

Third Semester B.E. Degree Examination, Dec.2024/Jan.2025
Fluid Mechanics

Time: 3 hrs. Max. Marks: 100

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

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

Module-1

1 a. Define the following fluid, properties and mention their SI units :
- i) Specific weight
- ii) Kinematic viscosity
- iii) Surface extension. **(06 Marks)**

b. Explain the phenomenon of capillarity. Derive an expression for capillary rise of a liquid. **(06 Marks)**

c. A differential manometer is connected at two points A and B as shown in Fig.Q1(c). At B, air, pressure is 9.81 N/cm^2. Find the pressure at A. **(08 Marks)**

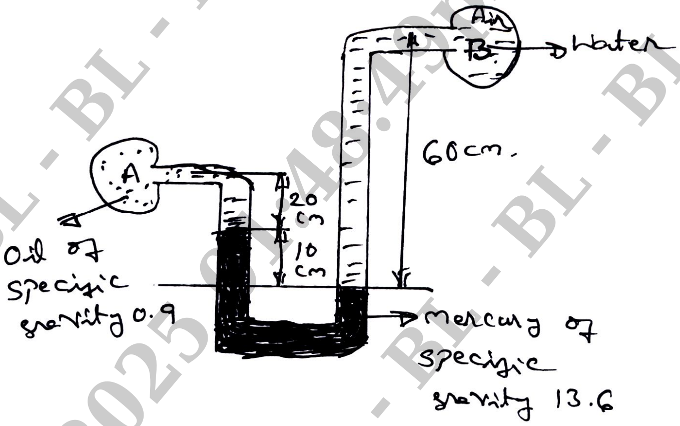

Fig.Q1(c)

OR

2 a. State and prove Pascal's law. **(06 Marks)**

b. Cleary distinguish between :
- i) Absolute pressure
- ii) Gauge pressure
- iii) Vacuum pressure
- iv) Atmospheric pressure.

Indicate their relative positions on a chart. **(06 Marks)**

c. The dynamic viscosity of oil used for lubrication between a shaft and sleeve is 6 poise. The shaft is of diameter 0.4 m and it rotates at 190 rpm. Calculate the power lost in the bearing for a sleeve length of 90 mm. The thickness of the oil film is 1.5 mm. **(08 Marks)**

Module-2

3 a. Define :
   i) Total pressure
   ii) Center of pressure. **(04 Marks)**

b. Derive an expression for total pressure and centre of pressure for a vertical plane surface submerged in a liquid. **(08 Marks)**

c. A 30 cm diameter pipe conveying water branches into two pipes of diameter 20 cm and 15 cm respectively. If the average velocity in the 30 cm diameter pipe is 2.5 m/s, find the discharge in this pipe. Also determine the velocity in 15 cm pipe. If the average velocity in 20 cm diameter pipe is 2 m/s. **(08 Marks)**

OR

4 a. Define the following types of flow :
   i) Steady and unsteady flow
   ii) Laminar and turbulent flow
   iii) Compressible and incompressible flow. **(06 Marks)**

b. Derive the continuity equation for a three dimensional steady, incompressible flow in Cartesian coordinates. **(08 Marks)**

c. Determine the total pressure and centre of pressure of an isosceles triangular plate of base 4 m, altitude 4 m when it is immersed vertically in an oil of specific gravity 0.9. The base of the plate coincides with the free surface of oil. **(06 Marks)**

Module-3

5 a. Derive Euler's equation of motion along a stream line. Obtain Bernoulli's equation from Euler's equation. Mention the assumptions made. **(08 Marks)**

b. Explain the working principle of Pitot tube with a sketch. **(04 Marks)**

c. A horizontal venturimeter with inlet diameter 20 cm and throat diameter 10 cm is used to measure the flow of water. the pressure at inlet is 17.658 N/cm^2 and the vacuum pressure at the throat is 30 cm of Hg. Find the discharge of water. take C_d= 0.98. **(08 Marks)**

OR

6 a. State and explain the principle of momentum equation. **(04 Marks)**

b. Derive an expression for discharge through a venturimeter. **(08 Marks)**

c. A pipe line carrying oil of specific gravity 0.87 changes in diameter from 200 mm at position A to 500 mm at a position B which is 4 m at higher level. If the pressure at A and B are 10 N/cm^2 and 6 N/cm^2 respectively and discharge is 200 liters/s, determine the loss of head and indicate the direction of flow. **(08 Marks)**

Module-4

7 a. Derive an expression for discharge over a triangular notch. **(08 Marks)**

b. Write a note on classification of mouthpieces. **(04 Marks)**

c. Determine the height of a rectangular weir of length 6 m to be built across a rectangular channel if the maximum depth of water on the upstream side of weir is 1.8 m and discharge is 2000 litres/s. Take C_d = 0.6 and neglect end contractions. **(08 Marks)**

OR

8 a. Define the hydraulic coefficients C, C_d and C_v of on orifice and obtain the relation between them. **(08 Marks)**

b. Explain ventilation of weirs. **(04 Marks)**

c. The head of water over a an orifice of diameter 100 mm is 10 m. The water coming out from the orifice is collected in a circular tank of diameter 1.5m. The rise of water level in the tank is 1 m in 25 seconds. The coordinates of a point of the jet measured from vena contracta are 4.3 m horizontal and 0.5 m vertical. Find the coefficients C_d, C_c and C_v. **(08 Marks)**

Module-5

9 a. Derive Darcy – Weishbach equation for head loss due to friction n a pipe. **(08 Marks)**

b. Mention major and minor losses in a pipe flow. **(04 Marks)**

c. Water is required to be supplied to a colony of 4000 residents at a rate of 180 liters per person from a source 3 km away. If half the daily requirement needs to be pumped in 8 hours against a frictional head of 18 m, find the size the main pipe supplying water. Assume coefficient of friction as 0.007. **(08 Marks)**

OR

10 a. Explain the reasons for water hammering in pipes. **(06 Marks)**

b. Obtain an expression for the rise of pressure when the flowing water in a pipe is brought to rest by sudden closure of valve and the pipe is elastic. **(08 Marks)**

c. Find the loss of head when a pipe of diameter 200 mm is suddenly enlarged to a diameter of 400 mm. The rate of flow of water through the pipe is 250 liters/s. **(06 Marks)**

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **18CV34**

Third Semester B.E. Degree Examination, Dec.2024/Jan.2025
Building Materials and Construction

Time: 3 hrs. Max. Marks:100

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

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

Module-1

1 a. Mention the importance of stones bricks and Timber as construction materials. **(06 Marks)**
b. Explain the manufacture process of brick with necessary flow chart. **(08 Marks)**
c. What is Bulking of Sand? Explain its importance in construction field. **(06 Marks)**

OR

2 a. What are the requirements of good building stones? **(06 Marks)**
b. What are the constituents of good brick earth? Explain. **(06 Marks)**
c. Which are the methods of seasoning of Timber? Describe them brief. **(08 Marks)**

Module-2

3 a. Explain the functions of foundation. **(06 Marks)**
b. How piles are classified based on function? Explain with sketches. **(06 Marks)**
c. Draw the plan of one and half brick thick english bond. Mention its salient features. **(08 Marks)**

OR

4 a. Differentiate between strip footing and strap footing with sketch. **(06 Marks)**
b. Write a note on Ashlar type of stone masonry. **(06 Marks)**
c. Describe the construction and necessity of Grillage foundation with its plan sketch. **(08 Marks)**

Module-3

5 a. Draw a neat sketch of an arch and explain the technical terms used. **(08 Marks)**
b. Explain i) Chejja ii) Canopy iii) Balcony iv) Lintel. **(08 Marks)**
c. Write a note on stability of arch. **(04 Marks)**

OR

6 a. List the types of flooring and explain the method of laying of cement concrete flooring in detail. **(08 Marks)**
b. List the classification of pitched roof. With neat sketches explain any two of them. **(08 Marks)**
c. What are the factors to be considered while selecting a roof covering? **(04 Marks)**

Module-4

7 a. Differentiate brick layer's scaffolding over Mason's Scaffolding. **(06 Marks)**
b. What are the requirements of good stair? Briefly explain the types of stairs. **(06 Marks)**
c. With a neat sketch, explain i) Bay window ii) Dormer window. **(08 Marks)**

OR

8	a.	Explain Raking shore with a neat sketch.	**(06 Marks)**
	b.	Write the requirements of locating door and window.	**(06 Marks)**
	c.	Explain salient features of framed and paneled double shutter door with sketch.	**(08 Marks)**

Module-5

9	a.	What are the objectives of plastering? Explain the defects in plastering.	**(10 Marks)**
	b.	Briefly explain the methods of damp proofing.	**(10 Marks)**

OR

10	a.	Explain the method of laying stucco plastering and lathe plastering.	**(10 Marks)**
	b.	Explain the constituents of a paint and explain the procedure of painting on new wood works.	**(10 Marks)**

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CBCS SCHEME

USN | | | | | | | | | | |

18CV35

Third Semester B.E. Degree Examination, Dec.2024/Jan.2025
Basic Surveying

Time: 3 hrs. Max. Marks: 100

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

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

Module-1

1 a. Define and explain plane and Geodetic surveying. **(08 Marks)**
b. Name and Explain important sources of Errors in surveying. **(06 Marks)**
c. Explain the terms Plans and Maps. Mention their application.. **(06 Marks)**

OR

2 a. A field tape, standardized at 20°C measured 100.0056m. Determine the temperature at which it will be exactly of the nominal length of 100m. Take $\alpha = 11.2 \times 10^{-6}$ per °C. **(06 Marks)**
b. Name and explain the various instruments for chaining in surveying. **(14 Marks)**

Module-2

3 a. Distinguish between :
i) Magnetic meridian and True Meridian ii) WCB and QB.
iii) Isgonic line and Agonic line. **(06 Marks)**
b. Differentiate between prismatic compass and surveyor's compass. **(06 Marks)**
c. Following bearing were observed with a compass. Calculate the interior angles. **(08 Marks)**

Line	AB	BC	CD	DE	EA
Fore bearing	60°30′	122°0′	46°0′	205°30′	300°0′

OR

4 a. Define : i) True meridian and time bearing ii) Isogonic line and Agonic line.
iii) Fore bearing and Back bearing. **(06 Marks)**
b. The following are the bearings of a closed traverse ABCDEA. At what stations , do you suspect the local attraction? Find the corrected bearings of the lines. **(07 Marks)**

Line	FB	BB
AB	124°30′	304°30′
BC	68°15′	246°0′
CD	310°30′	135°15′
DA	200°15′	17°45′

c. In the following traverse ABCDE, the length and bearing of line EA is omitted, calculate the length and bearing of line EA. **(07 Marks)**

Line	Length (m)	Fore Bearing (FB)
AB	204.0	87°30′
BC	226.0	20°20′
CD	187.0	280°0′
DE	192.0	210°03′
EA	?	?

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)**

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. Explain the working operations of plane table. **(06 Marks)**

b. Explain Radiation and Traversing methods of plane table surveying with sketches. **(08 Marks)**

c. Describe with sketches two-point problem in plane table surveying. **(06 Marks)**

OR

8 a. Explain briefly Intersection and Resection Methods of plane table surveying with sketches. **(10 Marks)**

b. Describe the different Errors in plane table surveying. **(10 Marks)**

Module-5

9 a. Define a contour. Explain the characteristics of contour. **(08 Marks)**

b. The following perpendicular offsets were taken at 10 mt intervals from a survey time to an irregular boundary line : 3.25, 5.60, 4.20, 6.65, 8.75, 6.20, 3.25, 4.20, 5.65

Calculate the area enclosed between the survey line, the irregular boundary line and the first and last offset by the applications of i) Average ordinate rule ii) Trapezoidal rule. iii) Simpson's rule. **(12 Marks)**

OR

10 a. Discuss the methods of determining volumes. **(06 Marks)**

b. List the uses of contours. **(04 Marks)**

c. A Railway embankment is 10 mt wide with side slopes $1\frac{1}{2}:1$. Assuming the ground to be level in a direction transverse to the centre line, calculate the volume contained in a length of 120 mt, the centre heights at 20 mt intervals being in meters.

2.2 , 3.7 , 3.8 , 4.0 , 3.8 , 2.8 , 2.5

Use Trapezoidal and Prismoidal rules. **(10 Marks)**

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **18CV36**

Third Semester B.E. Degree Examination, Dec.2024/Jan.2025
Engineering Geology

Time: 3 hrs. Max. Marks: 100

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

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

Module-1

1 a. Identify the branches of geology and choose at least any five branches with brief note. **(10 Marks)**

b. Apply the applications of geology in civil engineering practices. **(10 Marks)**

OR

2 a. Define mineral and organize their properties. Identify the quartz group of minerals and their physical properties. **(10 Marks)**

b. What is an ore? Make use of the physical properties of the Fe, Cr, A*l* and Cu ore minerals with examples. **(10 Marks)**

Module-2

3 a. What is Rock? Explain the formation and classification of different group of rocks with examples. **(10 Marks)**

b. Classify the following rocks and write their physical properties with engineering uses:
i) Granite ii) Basalt iii) Sand stone iv) Gneiss v) Marble. **(10 Marks)**

OR

4 a. What is landform? Add a note on landform and their classification. **(10 Marks)**

b. Describe in detail the physical, chemical and biological weathering of rocks. Add a note on weathering products and its role in civil engineering. **(10 Marks)**

Module-3

5 a. What is Fold? Select the parts of different types of folds with neat sketches and utilize the importance of folds in site selection of dams, reservoir and tunnels. **(10 Marks)**

b. Write a note on Rock Quality determination (RQD) and Rock Structure Rating (RSR). **(10 Marks)**

OR

6 a. What is Coastline? Explain their engineering consideration. **(08 Marks)**

b. Define Fault. Explain the parts and classification of different types of faults with their neat sketches. Add a note on importance of faults in site selection of dams, reservoirs and tunnels. **(12 Marks)**

Module-4

7 a. With a neat labeled diagram, explain the vertical distribution of ground water in brief. **(04 Marks)**

b. Add a note on the following water quality aspects:
i) SAR ii) RSC iii) TH **(06 Marks)**

c. What is an aquifer? How are they formed? Explain the different types of aquifers with neat sketches and aquifer parameters. **(10 Marks)**

OR

8 a. What are the methods of ground water exploration? Explain in brief. **(04 Marks)**

b. What is meant by artificial recharge structure of ground water? Describe in detail the various techniques and design of artificial recharge structures with suitable neat sketches. **(10 Marks)**

c. Explain the sea water intrusion into fresh water zone. Give suggestive remedial measures for control of sea water intrusions in coastal aquifer. **(06 Marks)**

Module-5

9 a. Define earthquake. How it is caused? Explain the types of seismic waves and their effects. **(10 Marks)**

b. What are landslides? How are they caused? Discuss the effects of landslides. Explain the various types of landslides with neat sketches and add a note on their control. **(10 Marks)**

OR

10 a. What is topographic map? Write a brief note on features and uses of topographic map in civil engineering projects. **(06 Marks)**

b. Explain in brief the following:

i) Geographical information system
ii) Global positioning system
iii) LandSat imagery
iv) Aerial photography. **(08 Marks)**

c. Write a note on the impact of mining and quarrying. Explain in brief the impact on reservoirs. **(06 Marks)**

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **21CV34**

Third Semester B.E. Degree Examination, June/July 2024

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. What is geology? Explain the importance of geology in the field of civil engineering . **(10 Marks)**

b. With a neat sketch, explain the details of internal dynamics of earth. **(04 Marks)**

c. What is seismogram? Explain the working principle of seismograph with neat labelled sketch. **(06 Marks)**

OR

2 a. What is an earthquake? Write a brief note on earthquake resisting structure. **(06 Marks)**

b. What are landslides? Mention factors responsible for landslides. Add a note on its preventive measures. **(08 Marks)**

c. Define volcano. Explain the causes of it. **(06 Marks)**

Module-2

3 a. Define mineral. Explain briefly rock forming and ore forming minerals. **(06 Marks)**

b. Explain Moh's scale of hardness. **(06 Marks)**

c. Describe the minerals with respect to their engineering properties :
i) Orthoclase ii) Calcite iii) Gypsum iv) Asbestos **(08 Marks)**

OR

4 a. Describe physical properties of minerals :
i) Form ii) Hardness iii) Fracture iv) Clearage. **(08 Marks)**

b. Explain the classification of metamorphic rocks with neat sketches based ion foliation structure. **(06 Marks)**

c. Write short notes on the following :
i) Railway Ballast
ii) Selection of rocks are material of construction. **(06 Marks)**

Module-3

5 a. Write a note on soil profile with neat sketch. **(06 Marks)**

b. What is weathering? Describe physical and chemical weathering. **(07 Marks)**

c. Write a note on selection of site for artificial recharge. **(07 Marks)**

OR

6 a. What is river morphology? Write the factors controlling channel development. **(05 Marks)**

b. Write short notes on morphemetric analyses of river basin. **(08 Marks)**

c. What is an idea behind interlinking of rivers? Add its benefits. **(07 Marks)**

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

Module-4

7 a. Three bore hole sunk at equilateral triangle whose sides are 480m each. P is west of Q, and R is north of midpoint PQ. The bore hole PQR reaches upper surface of rich coal seam at 100m, 220m and 260m respectively.

i) Determine the altitude

ii) Another bore hole is sunk at 'S' midpoint of QR. Determine at what depth the bore hole 'S' reaches the same coal seam. **(10 Marks)**

b. Define fold, with relevant sketch, explain its parts with types of folds. **(10 Marks)**

OR

8 a. Explain with neat sketch, ground water investigation by Electrical resistivity method. **(06 Marks)**

b. A bed of shale is dipping maximum of 32° along SE. Find its inclineaiton along S80°E and its strike direction. **(08 Marks)**

c. Write the difference between fault and joint. **(06 Marks)**

Module-5

9 a. Define topography and contour map. **(04 Marks)**

b. What is remote sensing? Write its principles on which it works. Write its applications in civil engineering. **(09 Marks)**

c. What is photogrammetry? Write its objectives. **(07 Marks)**

OR

10 a. Define GIS. Explain its components and application. **(10 Marks)**

b. Describe the application of GPS (Global Positioning System). **(05 Marks)**

c. A camera having focal length of 20cm is used to take a vertical photograph to a terrain having an average elevation of 1600m. What is height above MSL at which on air craft must fly in order to get photograph at a scale of 1 : 10000. **(05 Marks)**

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CBCS SCHEME

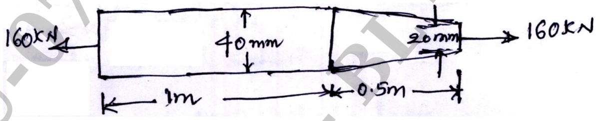
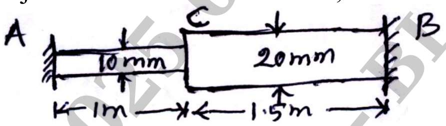
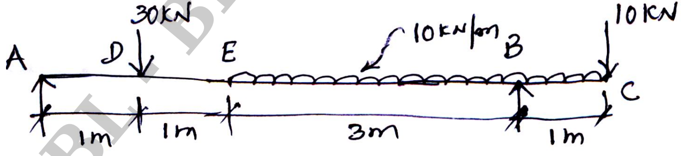
USN ☐☐☐☐☐☐☐☐☐☐ **BCV301**

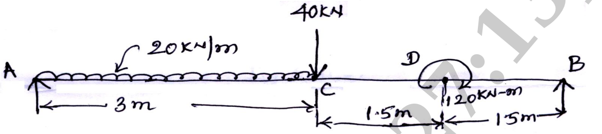
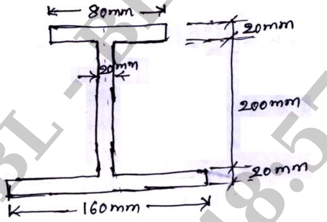
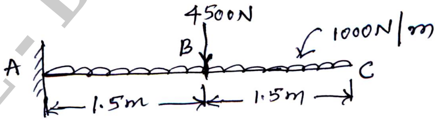
Third Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

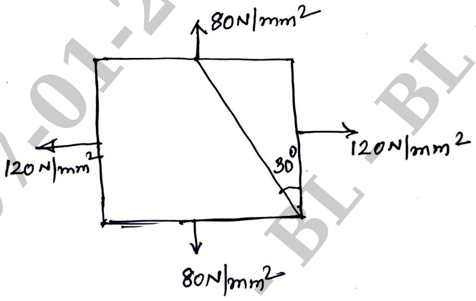
Strength of Materials

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	**M**	**L**	**C**
Q.1	**a.**	Sketch a typical stress-strain curve for a ductile material and explain briefly the salient features of the curve.	**6**	**L2**	**CO1**
	b.	Define: i) Strain ii) Poisson's ratio.	**4**	**L1**	**CO1**
	c.	A 1.5 m long steel bar is having uniform diameter of 40 mm for a length of 1 m. In the next 0.5 m its diameter gradually reduces from 40 mm to 20 mm as shown in Fig.Q.1(c). Determine the elongation of this bar when subjected to an axial tensile load of 160 kN. Given E = 200 GN/m^2.  Fig.Q.1(c)	**10**	**L3**	**CO1**
		OR			
Q.2	**a.**	What are the elastic constants and explain them briefly?	**6**	**L2**	**CO1**
	b.	Explain St Venant's principle.	**4**	**L2**	**CO1**
	c.	The steel rod shown in Fig.Q.2(c) is in two parts. It has a diameter of 10 mm for a length of 1 m and 20 mm for the remaining length of 1.5 m. If it is constrained between two parts A and B and is stress free at 20°C. Find the stress in the material, when it is subjected to 70°C. E = 200 GPa, $\alpha = 12 \times 10^{-6}/°C$.  Fig.Q.2(c)	**10**	**L3**	**CO1**
		Module – 2			
Q.3	**a.**	For a cantilever beam subjected to a udl of intensity w/unit length throughout, plot SFD and BMD.	**6**	**L3**	**CO2**
	b.	For a simply supported overhanging beam as shown in Fig.Q.3(b), draw SFD and BMD and locate point of contraflexure.  Fig.Q.3(b)	**14**	**L3**	**CO2**

		OR			
Q.4	**a.**	For a simply supported beam subjected to udl of w/unit length throughout. Plot SFD and BMD.	**6**	**L3**	**CO2**
	b.	Draw SFD and BMD for the beam shown in Fig.Q.4(b).  Fig.Q.4(b)	**14**	**L3**	**CO2**
		Module – 3			
Q.5	**a.**	Derive the relation between bending stress and radius of curvature $\frac{\sigma}{y} = \frac{E}{R}$.	**6**	**L3**	**CO3**
	b.	Define: i) Neutral axis ii) Section modulus	**4**	**L2**	**CO3**
	c.	A hollow propeller shaft of a steam ship is to transmit 3750 KW at 240 rpm. If the internal diameter is 0.8 times the external diameter and if the maximum shear stress developed is to be limited to 160 N/mm^2, determine the size of the shaft.	**10**	**L3**	**CO4**
		OR			
Q.6	**a.**	Derive the torsion equation with usual notations.	**8**	**L3**	**CO4**
	b.	The unsymmetrical I-section shown in Fig.Q.6(b) is subjected to a shear force of 40 KN. Draw the shear stress variation diagram across the depth.  Fig.Q.6(b)	**12**	**L3**	**CO3**
		Module – 4			
Q.7	**a.**	Derive differential equation for beam deflection with usual notations.	**8**	**L3**	**CO4**
	b.	Determine the critical load for a hollow cast iron rectangular column of external dimensions 200 mm × 150 mm with the thickness of the metal being 25 mm. The height of the column is 6 m and both ends are fixed. Use Euler's formula and compare the value with that obtained by using Rankine's formula taking σ_c = 500 N/mm^2 and a = 1/1600, which of the above formula decides the safe crippling load?	**12**	**L3**	**CO4**
		OR			
Q.8	**a.**	Derive an expression for Euler's crippling load for both ends hinged columns with usual notations.	**8**	**L3**	**CO4**
	b.	Compute the mid-span and maximum deflection for the beam shown in Fig.Q.8(b). Given E = 210 GN/m^2 and moment of inertia = 36000 × 10^{-9} m^4.  Fig.Q.8(b)	**12**	**L3**	**CO4**

Module – 5					
Q.9	**a.**	With a neat sketch, explain the two-dimensional stress system.	**8**	**L2**	**CO5**
	b.	A cylindrical shell is 3 m long and is having 1 m internal diameter and 15 mm thickness. Calculate the maximum intensity of shear stress induced and also the changes in the dimensions of the shell, if it is subjected to an internal fluid pressure of 1.5 N/mm^2.	**12**	**L3**	**CO5**
OR					
Q.10	**a.**	Derive Lame's equation for radial and hoop stress for thick cylinder subjected to internal and external fluid pressure.	**10**	**L3**	**CO5**
	b.	The direct stresses acting at a point in a strained material are shown in Fig.Q.10(b). Find the normal, tangential and resultant stresses on plane 30° to the plane of major principal stress. Find the obliquity of the resultant stress also.  Fig.Q.10(b)	**10**	**L3**	**CO5**

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **BCV302**

Third Semester B.E/B.Tech. Degree Examination, Dec.2024/Jan.2025

Engineering Survey

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, choosing ONE full question from each module.*
2. M : Marks , L: Bloom's level , C: Course outcomes.

			M	L	C
		Module – 1	**M**	**L**	**C**
1	a.	What is Surveying? Explain the principles of surveying.	**8**	**L2**	**CO1**
	b.	Compare between : i) True and magnetic bearing ii) Plane and geodetic surveying iii) Cadastral and hydrographic surveying.	**6**	**L1**	**CO1**
	c.	Write the advantages and disadvantages of plane table surveying.	**6**	**L1**	**CO1**
		OR			
2	a.	Discuss on importance of surveying in civil engineering.	**6**	**L2**	**CO1**
	b.	Explain the different methods of measuring distances with examples.	**6**	**L2**	**CO1**
	c.	Differentiate between : i) Chain and chainage ii) Laser distance meter and distance measuring wheel iii) EDM and GPS iv) Topographical and construction survey.	**8**	**L1**	**CO1**
		Module – 2			
3	a.	The following consecutive readings were taken with a level and a 4m staff on a continuously sloping ground at a common interval of 20m : 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 RL of first point A was 180.750m. Rule out a page of level field book and enter the above readings. Compute the RL's by HI method. Also calculate the gradient of the line joining the first and last points.	**10**	**L3**	**CO2**
	b.	List the salient features of total station.	**6**	**L2**	**CO2**
	c.	Why fly and flyback leveling is required?	**4**	**L2**	**CO2**
		OR			
4	a.	Explain the temporary adjustments of dumpy level.	**6**	**L2**	**CO2**
	b.	Explain the method of measuring horizontal angle by repetition method along with the tabular column.	**10**	**L3**	**CO2**
	c.	Discuss on different fundamental measurements of total station.	**4**	**L1**	**CO2**
		Module – 3			
5	a.	What are contours? Explain the characteristics of contours with neat sketches.	**10**	**L3**	**CO3**
	b.	Brief on longitudinal and cross-sectioning with typical sketches.	**8**	**L2**	**CO3**
	c.	What are the input data required while creating job file in total station?	**2**	**L1**	**CO3**

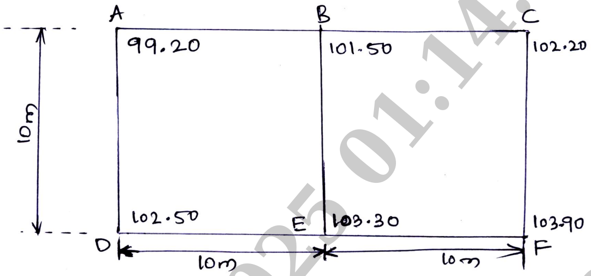
<table>
<tr><td colspan="6">OR</td></tr>
<tr><td>6</td><td>a.</td><td>Plot the contours of RL 100.00, 101.00, 102.00, and 103.00 in the given square blocks of 10 m × 10 m. The reduced levels of guide points are given in Fig.Q6(a).


Fig.Q6(a)</td><td>10</td><td>L3</td><td>CO3</td></tr>
<tr><td></td><td>b.</td><td>Explain the following related to total station :
i) Back sight data
ii) Coordinates data
iii) Command to plot contours in auto CAD.
iv) Data transferring.</td><td>4</td><td>L2</td><td>CO3</td></tr>
<tr><td></td><td>c.</td><td>Explain the procedure and select the contour internal.</td><td>6</td><td>L2</td><td>CO3</td></tr>
<tr><td colspan="6">Module – 4</td></tr>
<tr><td>7</td><td>a.</td><td>Calculate the necessary data for setting out simple curve of radius 300m with the deflection angle of 50° 30′. The two tangents intersect at a chainage of 1192.00m. Take peg interval as 20m and tabulate the results using Rankine's method.</td><td>6</td><td>L3</td><td>CO4</td></tr>
<tr><td></td><td>b.</td><td>List the different types of curves.</td><td>4</td><td>L1</td><td>CO4</td></tr>
<tr><td></td><td>c.</td><td>The following perpendicular offsets were taken from chain line to an irregular boundary. Calculate the area enclosed by trapezoidal rule.
<table>
<tr><td>Chainage (m)</td><td>0</td><td>30</td><td>60</td><td>90</td><td>120</td><td>150</td><td>180</td><td>210</td></tr>
<tr><td>Offset (m)</td><td>0</td><td>2.65</td><td>3.80</td><td>3.75</td><td>4.65</td><td>3.60</td><td>5.0</td><td>5.80</td></tr>
</table>
</td><td>10</td><td>L2</td><td>CO4</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td>8</td><td>a.</td><td>A railway embankment is 10m wide with side slopes 1.5 to 1.0. Assuming ground to be level in a direction transverse to center line, calculate the volume contained in a length of 120 meters, the centre heights at 20m intervals being are 2.2, 3.7, 3.8, 4.0, 3.8, 2.8 and 2.5m. Use both trapezoidal and prismoidal method.</td><td>10</td><td>L3</td><td>CO4</td></tr>
<tr><td></td><td>b.</td><td>Sketch out a compound curve and show the elements of it.</td><td>4</td><td>L2</td><td>CO4</td></tr>
<tr><td></td><td>c.</td><td>Define the following related to setting out works :
i) Stake ii) Post iii) Batter – board iv) Sight rail.</td><td>6</td><td>L1</td><td>CO4</td></tr>
<tr><td colspan="6">Module – 5</td></tr>
<tr><td>9</td><td>a.</td><td>Discuss on the various segments of GPS.</td><td>8</td><td>L2</td><td>CO5</td></tr>
<tr><td></td><td>b.</td><td>List the applications of RS and GIS in civil engineering.</td><td>6</td><td>L1</td><td>CO5</td></tr>
<tr><td></td><td>c.</td><td>List out the steps in drone surveying.</td><td>6</td><td>L1</td><td>CO5</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td>10</td><td>a.</td><td>Discuss on GPS receivers.</td><td>8</td><td>L2</td><td>CO5</td></tr>
<tr><td></td><td>b.</td><td>List the features and applications of drone surveying.</td><td>8</td><td>L1</td><td>CO5</td></tr>
<tr><td></td><td>c.</td><td>Name the type of sensors used in drone surveying.</td><td>4</td><td>L1</td><td>CO5</td></tr>
</table>

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **BCV303**

Third Semester B.E/B.Tech. Degree Examination, Dec.2024/Jan.2025

Engineering Geology

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, choosing ONE full question from each module.*
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	**M**	**L**	**C**
1	a.	Explain importance of geology in Civil Engineering.	**5**	**L2**	**CO1**
	b.	Describe internal structure of earth with labelled sketch.	**10**	**L2**	**CO1**
	c.	What is land slide? Explain causes at landslides.	**5**	**L1**	**CO1**
		OR			
2	a.	Discuss causes and effect of earthquake.	**7**	**L2**	**CO2**
	b.	What is Tsunami? Add a note on mitigation of Tsunami.	**7**	**L3**	**CO3**
	c.	Explain causes and types of volcanoes.	**6**	**L2**	**CO2**
		Module – 2			
3	a.	What is mineral? Explain properties of mineral.	**8**	**L2**	**CO2**
	b.	Explain different types of igneous rocks.	**6**	**L2**	**CO2**
	c.	What is metamorphism? Discuss types of metamorphism.	**6**	**L2**	**CO2**
		OR			
4	a.	Describe properties of following minerals : i) Orthoclase ii) Biotite iii) Haematite.	**6**	**L2**	**CO2**
	b.	Enumerate stages of development of sedimentary rock.	**7**	**L2**	**CO2**
	c.	Discuss important uses of different rock type.	**7**	**L2**	**CO2**
		Module – 3			
5	a.	With a neat sketch explain soil profile.	**7**	**L2**	**CO3**
	b.	What is weathering? Explain types of weathering.	**8**	**L2**	**CO3**
	c.	Discuss classification of different soil type.	**5**	**L2**	**CO3**
		OR			
6	a.	Explain classification of soil based on grain size.	**7**	**L2**	**CO3**
	b.	Discuss the effect of weathering on monumental rock.	**7**	**L2**	**CO3**
	c.	Write a note on : i) Drifted soil ii) Laterite soil.	**6**	**L1**	**CO3**

Module – 4

7	a.	Explain different rock deformation and causes.	**8**	**L2**	**CO4**
	b.	A bed of lime stone is dip 25° East and it has width of outcrop – 160 m. Determine true and vertical thickness.	**6**	**L3**	**CO4**
	c.	What is fault? Explain type of fault.	**6**	**L2**	**CO4**

OR

8	a.	Discuss feasibility of Dam site in folded and faulted region.	**7**	**L2**	**CO4**
	b.	A bed of shale is dipping maximum of 45° along S 60°E. Determine the amount and apparent dip along S 70°E.	**6**	**L2**	**CO4**
	c.	Write a note on : i) Dip and strike ii) Out crip.	**7**	**L2**	**CO4**

Module – 5

9	a.	Explain different water bearing formations.	**8**	**L2**	**CO5**
	b.	What an Aquifer? Discuss types of aquifer.	**8**	**L2**	**CO5**
	c.	Write a note on co-efficient of permeability.	**4**	**L1**	**CO5**

OR

10	a.	Explain electrical resistivity survey method in ground water exploration.	**12**	**L2**	**CO5**
	b.	Discuss factors affecting on permeability of rocks.	**8**	**L2**	**CO5**

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **BCV304**

Third Semester B.E/B.Tech. Degree Examination, Dec.2024/Jan.2025
Water Supply and Wastewater Engineering

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, choosing ONE full question from each module.*
2. M : Marks , L: Bloom's level , C: Course outcomes.

<table>
<tr><th></th><th></th><th>Module – 1</th><th>M</th><th>L</th><th>C</th></tr>
<tr><td>1</td><td>a.</td><td>Briefly explain the need and importance of protected water supply system.</td><td>6</td><td>L2</td><td>CO1</td></tr>
<tr><td></td><td>b.</td><td>Explain the various types of water demand.</td><td>8</td><td>L2</td><td>CO1</td></tr>
<tr><td></td><td>c.</td><td>Describe the incremental method of estimating the population of a locality.</td><td>6</td><td>L2</td><td>CO1</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td>2</td><td>a.</td><td>What is meant by per capita demand? Mention the factors that affect per capita demand.</td><td>6</td><td>L1</td><td>CO1</td></tr>
<tr><td></td><td>b.</td><td>Give the drinking water standards for the following parameters. Discuss their effect when theory exceed their limits :
i) Turbidity
ii) Hardness
iii) Fluoride
iv) Nitrate.</td><td>8</td><td>L2</td><td>CO2</td></tr>
<tr><td></td><td>c.</td><td>The population data of a town are given below :
<table>
<tr><td>Year</td><td>1990</td><td>2000</td><td>2010</td><td>2020</td><td>2030</td></tr>
<tr><td>Population</td><td>90,000</td><td>1,20,000</td><td>1,60,000</td><td>2,50,000</td><td>2,60,000</td></tr>
</table>
Estimate the expected population in the year 2050 by geometric increase method.</td><td>6</td><td>L3</td><td>CO1</td></tr>
<tr><td colspan="6">Module – 2</td></tr>
<tr><td>3</td><td>a.</td><td>Briefly explain the unit treatment processes of a water treatment plant with flow chart.</td><td>10</td><td>L2</td><td>CO3</td></tr>
<tr><td></td><td>b.</td><td>The maximum daily demand at a water purification plant has been estimated as 12 million liter per day. Design a rectangular sedimentation tank (fitted with mechanical sludge removal arrangements) for the raw supplies, assuming a detention period of 6 hours and the velocity of flow as 20 cm per minute.</td><td>5</td><td>L3</td><td>CO3</td></tr>
<tr><td></td><td>c.</td><td>Explain theory of filtration.</td><td>5</td><td>L3</td><td>CO3</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td>4</td><td>a.</td><td>What is meant by aeration? Explain the different types of aerators.</td><td>6</td><td>L1</td><td>CO3</td></tr>
<tr><td></td><td>b.</td><td>What is coagulation? List the different types of coagulants used in water treatment plant.</td><td>4</td><td>L1</td><td>CO3</td></tr>
<tr><td></td><td>c.</td><td>Explain the construction and working of a rapid gravity sand filter with a neat sketch.</td><td>10</td><td>L2</td><td>CO3</td></tr>
<tr><td colspan="6">Module – 3</td></tr>
<tr><td>5</td><td>a.</td><td>List the minor methods of disinfection and explain any two methods in detail.</td><td>8</td><td>L1</td><td>CO3</td></tr>
<tr><td></td><td>b.</td><td>Explain the need for sanitation. Define the following terms :
i) Sullage ii) Sewage.</td><td>6</td><td>L2</td><td>CO4</td></tr>
<tr><td></td><td>c.</td><td>Define sampling of water or wastewater. Explain the different methods of sampling.</td><td>6</td><td>L2</td><td>CO4</td></tr>
</table>

		OR			
6	a.	What is softening of water? List the methods used to remove hardness of water. Explain any one method in detail.	**6**	**L2**	**CO3**
	b.	Define disinfection. Explain break point chlorination.	**4**	**L2**	**CO3**
	c.	List the different types of sewerage systems with their advantages and disadvantages.	**10**	**L2**	**CO4**
		Module – 4			
7	a.	Explain with a neat flow diagram the various treatment unit operations and process used in municipal wastewater treatment.	**10**	**L2**	**CO4**
	b.	What is meant by activated sludge process? Describe with sketch, the treatment of sewage by activated sludge process.	**10**	**L2**	**CO4**
		OR			
8	a.	Discuss briefly with a neat sketch grit chamber and oil an grease removal tank.	**10**	**L2**	**CO4**
	b.	An average operating data for conventional activated sludge treatment plant is as follows : i) Wastewater flow = 35000 m^3/d ii) Volume of aeration tank = 10900 m^3 iii) Influent BOD = 250 mg/L iv) Effluent BOD = 20 mg/L v) Mixed liquor suspended solids (MLSS) = 2500 mg/L vi) Effluent suspended solids = 30 mg/L vii) Waste sludge suspended solids = 9700 mg/L viii) Quality of waste sludge = 220 m^3/d Based on the given information, Determine : i) Aeration period (hrs) ii) F/M ratio iii) Percentage efficiency of BOD removal iv) Sludge age (days).	**10**	**L3**	**CO4**
		Module – 5			
9	a.	Explain with a neat sketch the construction and operation of a trickling filter.	**10**	**L2**	**CO4**
	b.	Explain the following : i) Rotating biological contactors ii) Aerobic and anaerobic process.	**10**	**L2**	**CO5**
		OR			
10	a.	Determine the volume depth and efficiency of a building filter unit for influent sewage of 4.5 MLD, BOD_5 of the influent is 160 mg/L. The organic loading is to be 160 $gm/m^3/day$ and surface loading is 2000 $l/m^2/day$.	**10**	**L3**	**CO4**
	b.	Explain the following : i) Oxidation pond ii) Stages in sludge digestion process.	**10**	**L2**	**CO5**

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USN ☐☐☐☐☐☐☐☐☐☐

Question Paper Version : A

Third Semester B.E./B.Tech. Degree Examination, June/July 2024

Personality Development for Civil Engineering

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.

---

1. ______ is a term used to describe a set of basic skills acquired through learning
a) Life skills b) Vocational skills
c) Literacy skills d) None of these

2. _____ is the how one perceives himself positively/negatively.
a) Self Image b) Self Control
c) Self Esteem d) Self talk

3. _____ are defined as psycho-social abilities for adaptive and positive behavior
a) Recreational skill b) Soft skill
c) Life skill d) Vocational skill

4. Time Management, getting a Job, Interview, Computer, Cooking, Driving are the
a) Livelywood skills b) Life skills
c) Learning skills d) None of these

5. Collective qualities or characteristics that distinguish a person
a) Attitude b) Personality
c) Character d) Self Image

6. ______ is the concept that describe the believes or an individual or culture
a) Values b) Attitude
c) Behaviour d) Personality

7. _______ is defined the feeling or pitty and sorrow for someone else's misfortune
a) Empathy b) Sympathy
c) Values d) Courtesy

8. ______ is a balanced curiosity leading to a deeper understanding of another human being
a) Empathy
b) Sympathy
c) SWOT
d) Co-operation

9. ______ thinking enables us to analyze information and experience
a) Critical
b) Creative
c) Positive
d) Negative

10. ______ thinking is not criticism but it links between positive thinking and creative thinking
a) Creative
b) Critical
c) Superficial
d) Self

11. ______ is an obstacle which makes it difficult to achieve a desired goal
a) Value
b) Problem
c) Person
d) Money

12. Trying to find a solution to a problem is known as
a) Problem solving
b) Decision making
c) Self awareness
d) None of these

13. _____ is the management or a problem in a way that successfully match the goal establishing for treaties
a) Problem
b) Solution
c) Idea
d) Values

14. ______ is the exchange of information between the people
a) Problem
b) Communication
c) Decision
d) Behaviour

15. _____ is an ability to express our self both verbally and non verbally
a) Communication
b) Creative thinking
c) Decision Making
d) Problem solving

16. Verbal skills, non verbal skills, listening skills are the elements of
a) Effective communication
b) Self awareness
c) Problem solving
d) Creative thinking

17. _____ relationships are between two or more people
a) Interpersonal
b) Intra personal
c) Intimate
d) None of these

18. _____ is an establishment of a spontaneous relationship based on respect, mutual and trust
a) Rapport building
b) Questioning
c) Attending
d) None of these

19. Rapport building, questioning, attending, reassurance, sensitivity are the sub skills of
a) Self Awareness
b) Problem Solving
c) Coping with Emotion
d) Effective Communication

20. Stress signals fall into following category
a) Thoughts
b) Behaviour
c) Physical symptoms
d) All of these

21. _____ is the ability to imagine or invent something new
a) Creativity
b) Capacity
c) Communication
d) Awareness

22. What term is applied to our global assessment of self worth?
a) Self Esteem
b) Self Assessment
c) Self Identity
d) Self Evaluation

23. Self concept is ______ experience
a) Synomous to
b) Derived from
c) an alteration of
d) Independent of

24. ______ lays a moral and meaningful foundation for life
a) Ethics
b) Integrity
c) Work
d) Morals

25. ______ refers to learning the service policies, procedure, norms and conditions
a) Work Ethics
b) Service learning
c) Integrity
d) Truth

26. _____ person is the ethical person
a) Moral
b) Kind
c) Honest
d) Virtuous

27. Honesty is a virtue and it is exhibited in which aspects
a) Truthfulness
b) Happiness
c) Awareness
d) Comfortness

28. ______, sympathy, empathy and concern for others
a) Compassion
b) Holism
c) Alertness
d) Being visionary

29. ______ is the fundamental virtue in Human Relationship
a) Behaviour
b) Honesty
c) Self Esteem
d) Morality

30. ______ referred to something that affects a number of countries and populations
a) Global Issues
b) Global Warming
c) Crime
d) None of these

31. Some jobs cannot be done alone and some can be done better if you possess the quality of
a) Responsibility
b) Respect
c) Team work
d) Co-operation

32. It is always important to _____ yourself, others and the place where you work
a) Appearance
b) Co-operate
c) Communicate
d) Respect

33. Ethics and law overlap is called as

a) Yellow Area	b) White Area
c) Black Area	d) Grey Area

34. Which of this is a second stage of moral development?

a) Principled	b) Conventional
c) Pre conventional	d) None of these

35. The word Ethics comes from

a) Ethos	b) Ethernity
c) Elementary	d) Essentiality

36. ______ are the beliefs and attitudes we have that can actually conflict with our ethical decisions

a) Morals	b) Principles
c) Virtues	d) Values

37. Business Ethics are basically different from personal ethics

a) True	b) False

38. Which of the virtue mentions that Industry and society are an interactive system?

a) Ethics	b) Moral
c) Work Ethics	d) Values

39. The common reflections of honesty are

a) Honesty in Acts	b) Honesty in speech
c) Honesty in discretion	d) All of these

40. Which is not the models of professional role?

a) Saviour	b) Bureucratic Servant
c) Game Player	d) Selfish

41. Psychology is defined as the scientific study of

a) People and things	b) Emotions and beliefs
c) Perception and religion	d) Mind and behavior

42. ______ consists of a system of symbols we use to communicate with each other

a) Perception	b) Concepts
c) Language	d) Thinking

43. ______ is a stage of intragroup conflict

a) Storming	b) Norming
c) Performing	d) Adjourning

44. Factors affecting organizational behavior are

a) People	b) Environment
c) Technology	d) All of these

45. ______ explains internal process of choice among different behaviours

a) Equity Theory	b) Expectancy Theory
c) Goal Attain Theory	d) Goal Setting Theory

46. Individuals such as Albert Einstein, Edwin Land and Steven jobs lead through which type of power.

a) Legitimate	b) Reward
c) Expert	d) Charismatic

47. A manager with good ______ can make the work place more pleasant

a) Communication	b) Knowledge
c) Experience	d) Interpersonal skills

48. Which of these are vital for any organization?

a) Debates	b) Group Discussions
c) Speeches	d) Arguments

49. Which of these must be avoided in business letters?

a) Polite words	b) Formal words
c) Abbrevations	d) Clear details

50. What does a time-bound goal have?

a) No deadline	b) A flexible time line
c) A specific time frame for completion	d) No relevance to the individual

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CBCS SCHEME

USN | | | | | | | | | | |

18CV42

Fourth Semester B.E. Degree Examination, Dec.2024/Jan.2025
Analysis of Determinate Structures

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.***

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

Module-1

1 a. Define degree of freedom. What is the degree of freedom for a (i) Hinged support (ii) Fixed support **(06 Marks)**

b. Find the static and kinematic indeterminacy for the following structures shown in Fig.Q1(b).

Fig.Q1(b) **(04 Marks)**

c. Determine the influence line diagram for the support reactions of the truss shown in Fig.Q1(c). Also, sketch ILD for member AC of the truss.

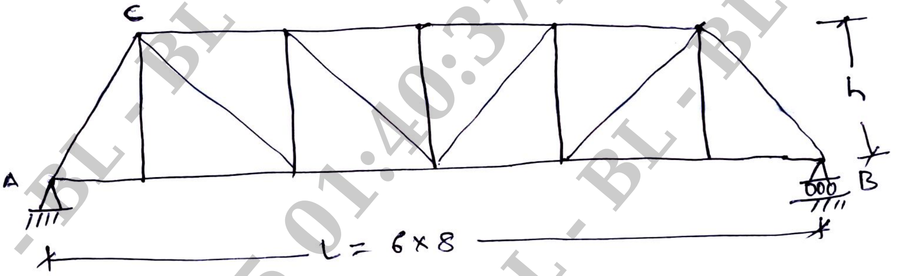

Fig.Q1(c) **(10 Marks)**

OR

2 a. Differentiate between statically determinate and indeterminate structures. State linear and non-linear analysis in structures. **(10 Marks)**

b. Determine the ILD for reactions at support, shear force and bending moment at C for the diagram shown in Fig.Q2(b).

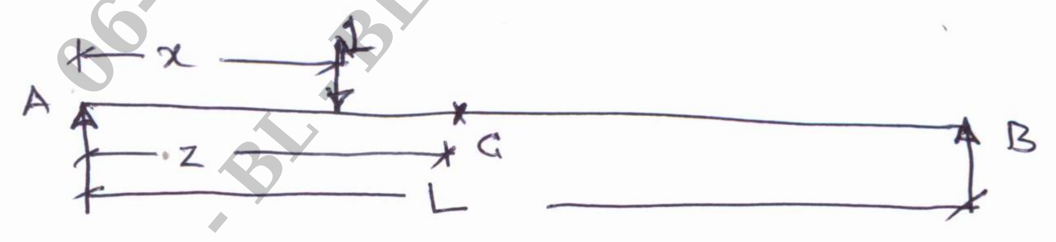

Fig.Q2(b) **(10 Marks)**

Module-2

3 A simply supported girder of span 16 m is subjected to a set of moving loads as shown in Fig.Q3. Determine the absolute maximum shear force and bending moment developed in the beam.

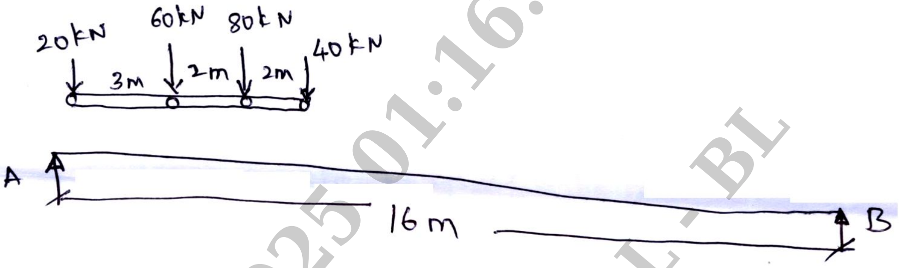

Fig.Q3 **(20 Marks)**

OR

4 Determine the maximum forces in members CE, DE and DF of the truss shown in Fig.Q4, due to a dead load of 10 kN/m and a moving load of 20 kN/m over the lower chord of the truss.

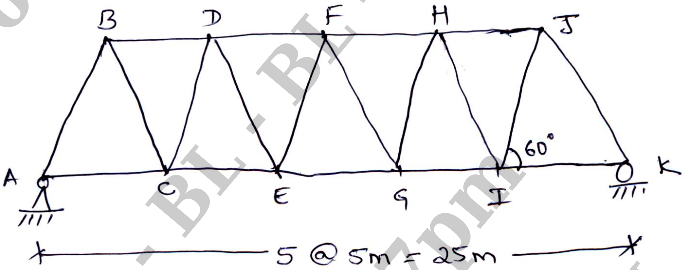

Fig.Q4 **(20 Marks)**

Module-3

5 a. State and prove theorems of moment area method. **(08 Marks)**

b. Determine the slope and deflection at the free end for the cantilever beam shown in Fig.Q5(b) by Moment Area Method. Take EI = 6×10^3 kN.m^2.

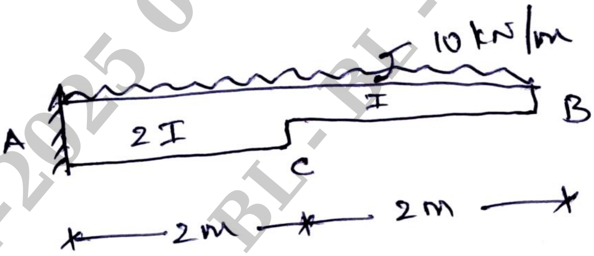

Fig.Q5(b) **(12 Marks)**

OR

6 a. Differentiate between real beams and conjugate beam with sketches. **(08 Marks)**

b. Find the maximum slope and deflection for the beam shown in Fig.Q6(b) by conjugate beam method. Take EI = 10.2×10^3 kN-m^2.

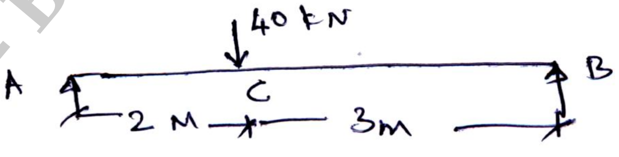

Fig.Q6(b) **(12 Marks)**

Module-4

7 a. Derive the expression for strain energy in an elastic member due to bending. **(10 Marks)**

b. Determine the vertical deflection at the free end for the overhanging beam shown in Fig.Q7(b). Assume constant EI. Use Castiglione's method.

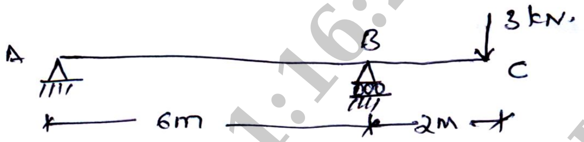

Fig.Q7(b) **(10 Marks)**

OR

8 a. State and prove principal of virtual displacements and principal of virtual work done in deformable bodies. **(08 Marks)**

b. Determine the vertical deflection at D for the loaded frame shown in Fig.Q8(b) by using unit load method. The cross sectional areas of members are 1500 mm^2 for AD and DE, while others are 1000 mm^2. Take E = 200 kN/mm^2.

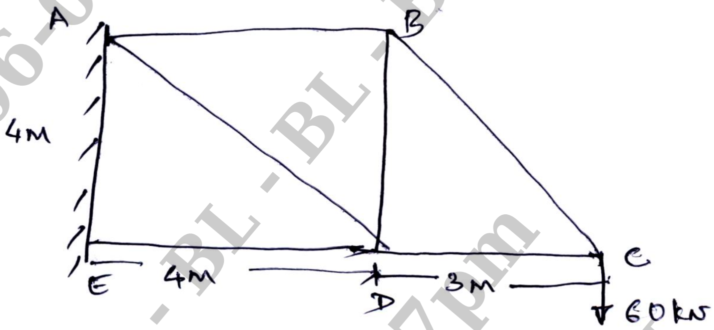

Fig.Q8(b) **(12 Marks)**

Module-5

9 A three hinged parabolic arch hinged at the supports and at the crown has a span of 24 m and a central rise of 4m. It carries a concentrated load of 75 kN at 18 m from the left support and a uniformly distributed load of 45 kN/m over the left half of the portion. Determine the bending moment, normal thrust and radial shear at a section 6m from the left support. **(20 Marks)**

OR

10 A cable of span 20 m and a central dip 4 m carries a udl of 20 kN/m over the whole span. Find:
- (i) Maximum tension in the cable
- (ii) Minimum tension in the cable
- (iii) Length of the cable
- (iv) Horizontal and vertical forces transmitted on to the supporting pier, if the cable is passed over a smooth frictionless pulley. **(20 Marks)**

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **18CV43**

Fourth Semester B.E. Degree Examination, Dec.2024/Jan.2025

Applied Hydraulics

Time: 3 hrs. Max. Marks: 100

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

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

Module-1

1 a. What are the types of similarities? Explain with equations. **(06 Marks)**

b. What are the conditions of equilibrium of floating and submerged bodies? **(06 Marks)**

c. The pressure difference ΔP in a pipe of dia. D and length ℓ due to turbulent flow depends on the velocity v viscosity μ, density ρ and roughness k, using Buckingham π theorem obtain expression for ΔP. **(08 Marks)**

OR

2 a. Explain the dimensionsless numbers with equation. **(06 Marks)**

b. Derive the equation for metacentric height by analytical method. **(08 Marks)**

c. A solid cylinder of diameter 4.0m has a height of 3m. Find the meta – centric height of the cylinder when it is floating in water with its axis vertical. The sp.gr of the cylinder = 0.6. **(06 Marks)**

Module-2

3 a. Derive the equation for discharge through open channel by Cherys formula. **(06 Marks)**

b. Explain specific energy and specific energy curve with a neat sketch. **(08 Marks)**

c. A trapezoidal channel with side slope of 1:1 has to be designed to convey $10m^3/s$ at a velocity of 2m/s so that the amount of concrete living for the need and sized in the minimum. Calculate area of living vertical for 1m length of canal. **(06 Marks)**

OR

4 a. For most economical trapezoidal channel, derive the condition for hydraulic mean depth. **(08 Marks)**

b. Explain critical depth, critical velocity and minimum specific energy with equations. **(06 Marks)**

c. The specific energy for a 5m rectangular channel is to be 4Nm/N. If the rate of flow of water through the channel is $20m^3/s$, determine the alternate depth of flow. **(06 Marks)**

Module-3

5 a. Derive the expression for depth of hydraulic jump. **(08 Marks)**

b. Derive the equation for Gradually Varied Flow (GVF). **(06 Marks)**

c. A slice gate discharges water in to a horizontal rectangular channel with a velocity of 10m/s and depth of flow of 1m. Determine the depth of flow after the jump and consequent loss of tidal head. **(06 Marks)**

OR

6 a. Derive the expression for the length of back water curve. **(08 Marks)**

b. Explain back water curve and afflux. **(04 Marks)**

c. Find the scope of free water surface in a rectangular channel of width 20m having depth of flow 5m. The discharge through the channel is 50 m^3/s. The bed of channel is having a slope of 1 in 4000. Take C = 60. **(08 Marks)**

Module-4

7 a. Find the force exerted by a jet on stationary curved plate, when jet strikes the plate at one end tangentially when the plate is symmetrical. **(10 Marks)**

b. A jet of water having a velocity of 40 m/s strikes a curved vane which is moving with a velocity of 20 m/s. The jet makes an angle of 30° with the direction of motion of vane at inlet and leaves at an angle of 90° to the direction of motion of vane at outlet. Draw the velocity triangles at inlet and outlet and determine the vane angle at inlet and outlet so that the water enters and leaves for vane without shock. **(10 Marks)**

OR

8 a. Explain efficiencies of turbine with equations. **(06 Marks)**

b. What are the parts of Pelton wheel? Explain with sketch. **(06 Marks)**

c. Determine the power given by the jet of water to the runner of a Pelton wheel which is having tangential velocity as 20 m/s. The net head on the turbine is 50 m and discharge through the jet water is 0.03 m^3/s, the side clearance angle is 15° and take $C_v = 0.975$. **(08 Marks)**

Module-5

9 a. Explain the main parts of radial flow reaction turbine with the sketches. **(08 Marks)**

b. Explain efficiency of centrifugal pumps. **(06 Marks)**

c. A conical draft tube having inlet and outlet diameter 1 m and 1.5 m discharges water at outlet with a velocity of 2.5 m/s. The total length of the draft tube is 6 m and 1.2 m of the length of draft tube is immersed in water. If the atmospheric pressure head is 10.3 m of water and cross of head due to friction inter draft tube is equal to 0.2 x velocity head at outlet of the tube. Find pressure head at inlet and efficiency of the draft tube. **(06 Marks)**

OR

10 a. What are the main parts of centrifugal pumps?. **(06 Marks)**

b. Explain draft tube theory and efficiency of draft tube. **(06 Marks)**

c. A single stage centrifugal pump with impeller diameter of 30 cm rotates at 2000 rpm and lift 3 m^3 of water per second to height of 30 m with an efficiency of 75%. Find the number of stages and diameter of each impeller of a similar multistage pump to lift 5m^3 of water per second to a height of 200 m, when rotating at 1500 rpm. **(08 Marks)**

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **18CV44**

Fourth Semester B.E. Degree Examination, Dec.2024/Jan.2025
Concrete Technology

Time: 3 hrs. Max. Marks: 100

Note : 1. ***Answer any FIVE full questions, choosing ONE full question from each module.***
2. ***IS code : 10262 : 2019 is permitted.***

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

Module-1

1 a. Briefly explain the manufacturing of cement by wet process. **(10 Marks)**

b. Explain the constituents of cement with their percentage and their function. **(10 Marks)**

OR

2 a. What are admixtures? Classify them and briefly explain their role in concrete technology. **(10 Marks)**

b. Explain the importance of size , shape and texture of aggregates. **(10 Marks)**

Module-2

3 a. Define Workability. Explain the factors affecting workability of fresh concrete. **(10 Marks)**

b. Write short notes on segregation and bleeding. **(10 Marks)**

OR

4 a. Briefly explain the importance of curing and explain 4 different methods of curing of concrete. **(10 Marks)**

b. Mention various stages involved in manufacturing of concrete. Discuss any two stages. **(10 Marks)**

Module-3

5 a. Define Shrinkage and creep of concrete. Discuss about factors affecting shrinkage of concrete. **(10 Marks)**

b. Mention non – destructive tests conducted on hardened concrete. Explain any two of them. **(10 Marks)**

OR

6 a. What is durability of concrete? What are the factors affecting durability of concrete? **(10 Marks)**

b. What is maturity of concrete? Explain its significance in gaining the strength of concrete. **(10 Marks)**

Module-4

7 a. What is the significance of concrete mix design? Write the steps involved in it using IS : 10262 – 2009 code. **(14 Marks)**

b. Discuss the variables in proportioning of concrete. **(06 Marks)**

OR

8 Arrive at a mix proportion for concrete of mix grade M25 to suit the following given data :
Max. size of aggregate – 20 mm
Slump required – 100 mm
Quality control – good
Exposure condition – mild [RCC]
Cement – 53 grade OPC
Specific gravity of cement – 3.15
Specific gravity of FA and CA – 2.56 & 2.74 respectively
Water absorption – 0.5 % for CA
1 % for FA
Fine aggregate conforming to zone II
Chemical admixture – Super plasticizer. **(20 Marks)**

Module-5

9 a. Mention the materials used in self compacting concrete. State advantage and disadvantage of self compacting concrete. **(10 Marks)**

b. Discuss the advantages and disadvantages of Ready mix concrete. **(10 Marks)**

OR

10 a. What is Light weight concrete? State the characteristics of light weight concrete. **(10 Marks)**

b. Write short notes on fibre reinforced concrete. **(10 Marks)**

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐

18CV45

Fourth Semester B.E. Degree Examination, June/July 2024
Advanced Surveying

Time: 3 hrs. Max. Marks: 100

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

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

Module-1

1 a. What are the fundamental lines of a theodolite? State the desired relationships between them. **(10 Marks)**

b. Explain with a sketch "two peg method" adopted in the permanent adjustments of a level. **(10 Marks)**

OR

2 a. Explain the method of determining the distance and elevation of an object using trigonometric leveling. When the base is inaccessible and the instrument stations are in the same plane as that of the object. Derive the required equations. **(10 Marks)**

b. Find the elevation of top of the Chimney from the following data:

Instrument Station	Reading on BM	Angle of elevation	Remarks
P	0.865	37° 24′ 0″	RL of BM = 100
R	0.865	31° 26′ 15″	Distance between P and R = 12m

(10 Marks)

Module-2

3 a. Derive the tacheometry equation for horizontal line of sight and hence obtain the tacheometric equation for inclined line of sight. **(10 Marks)**

b. Determine the gradient from a point A to a point B from the following observations made with a tacheometer fitted with an anallactic lens. The constant of the instrument was 100 and the staff was held vertically.

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

(10 Marks)

OR

4 a. What are the important factors to be considered in selection of site for a base line? **(08 Marks)**

b. Explain satellite stations and reduction to centre. **(06 Marks)**

c. Explain orders of triangulation. **(06 Marks)**

Module-3

5 a. Define the following terms with a neat sketch:
- i) Back Tangent
- ii) Point of Tangency
- iii) Compound curve
- iv) Transition curve

(10 Marks)

b. Two tangents intersect at chainage 59 + 60, the deflection angle being 50° 30′. Calculate the necessary data for setting out a curve of 15 chain radius to connect the two tangents if it is intended to setout the curve by offsets from chords. Take peg interval equal to 100 links, length of chain is 20m (100 links). **(10 Marks)**

OR

6 a. Explain the features of vertical curve. **(04 Marks)**

b. Explain how a simple curve is setout by perpendicular offsets from long chord. **(06 Marks)**

c. Two tangents at chainage 1250m. The angle of intersection is 150°. Calculate all data necessary for setting out a curve of radius 250m by the deflection angle method. The peg intervals may be taken as 20m. Prepare a setting out table when the least count is 20″. Calculate the data for field checking. **(10 Marks)**

Module-4

7 a. Define vertical photograph, tilted photograph and oblique photograph. **(07 Marks)**

b. Describe how mosaic differs from a map. **(07 Marks)**

c. Explain scale of a vertical photograph. **(06 Marks)**

OR

8 a. Define: perspective projection, Nadir point and tilt. **(06 Marks)**

b. List the reasons for keeping overlap in photographs. **(06 Marks)**

c. What is relief displacement? Derive its expression. **(08 Marks)**

Module-5

9 a. Explain Electromagnetic energy. **(06 Marks)**

b. Explain energy interaction with earth surface features. **(06 Marks)**

c. Explain applications of remote sensing. **(08 Marks)**

OR

10 a. Explain components GIS. **(08 Marks)**

b. Explain the applications of total station. **(06 Marks)**

c. Give a brief description of GPS. **(06 Marks)**

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CBCS SCHEME

USN | | | | | | | | | | | 18CV46

Fourth Semester B.E. Degree Examination, Dec.2024/Jan.2025
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. Assume any suitable missing data.

Module-1

1 a. Justify the need for protected water supply. **(05 Marks)**

b. Explain Master Plan method or zoning method of forecasting population. **(05 Marks)**

c. If the design population of a town is 1,50,000 having average water consumption rate of 150 LPCD, estimate the maximum daily demand, hourly demand, fix demand and coincident demand. **(10 Marks)**

OR

2 a. Write a note on design period and factors governing the design period. **(06 Marks)**

b. Define per Capita demand. Also list the factors affecting the per capita demand. **(04 Marks)**

c. The population of a certain town from 1970 to 2010 is as given below. Find out the population after two and three decades beyond the last known decade by :
(i) Arithmetical increase method
ii) Geometrical increase method and
iii) Incremental Increase method :

Year	1970	1980	1990	2000	2010
Population	45000	48000	54000	62000	67000

(10 Marks)

Module-2

3 a. Enumerate the difference between surface and sub surface sources. **(04 Marks)**

b. Give the acceptable and permissible limits as per IS 10500 : 2012 drinking water quality standards for below :
(i) pH
(ii) Total Hardness
(iii) Chlorides
(iv) Nitrates **(06 Marks)**

c. With the aid of neat sketches, explain the following :
(i) River Intakes
(ii) Canal Intakes **(10 Marks)**

OR

4 a. List the types of aerators. Explain any one type in detail. **(06 Marks)**

b. Mention the factors governing the selection of a particular source of water. **(04 Marks)**

c. Write down a flow chart of a typical water treatment plant and explain each unit with its specific role in the water treatment process. **(10 Marks)**

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

Module-3

5 a. Explain the jar test step by step procedure to determine optimum dosage of coagulants. **(05 Marks)**

b. At a water treatment plant serving 50000 people at the water supply rate of 180 litres per capita per day, 50 tones per annum of Alum is used. Find
   (i) Daily requirement of Alum
   (ii) Alum dosage applied in mg/lt. **(05 Marks)**

c. Design a rectangular sedimentation basin to treat 2.5 million litres of raw water per day. The detention period may be assumed to be 3 hrs. **(10 Marks)**

OR

6 a. Differentiate between rapid sand filters and slow sand filters. Also explain the operational troubles in rapid sand filters. **(10 Marks)**

b. Design a set of 6 rapid sand filters for treating water at water works, which has to supply water to a town of population of 1,50,000 with the water supply rate of 200 lpcd. Also consider one unit out of 6 units will be kept as stand by unit. **(10 Marks)**

Module-4

7 a. Explain break point chlorination with the aid of neat graph. **(10 Marks)**

b. Calculate the amount of Pure Lime and Soda (85% pure) required for the treatment of 40 m^3 of water, whose analysis is as follows :
$Ca(HCO_3)_2$ = 48.0 PPM, $Mg(HCO_3)_2$ = 40.0 PPM
$MgSO_4$ = 35.0 PPM, $CaSO_4$ = 37.5 PPM
$MgCl_2$ = 25.0 PPM, NaCl = 10.0 PPM
Fe_2O_3 = 40.0 PPM, SiO_2 = 30.0 PPM **(10 Marks)**

OR

8 a. Explain Zeolite process. Give its advantages and disadvantages. **(10 Marks)**

b. Chlorine usage in the treatment of 25000 m^3/day is 9 kg/day. The residual chlorine after 10 min contact is 0.2 mg/lt. Calculate the dosage in milligrams per litre and the chlorine demand of water. **(06 Marks)**

c. Explain the Nalagonda Technique of defluoridation process. **(04 Marks)**

Module-5

9 a. Give the comparison of Reciprocating Pumps with the centrifugal pumps. **(06 Marks)**

b. Write a note on the Economical Diameter of the pumping mains. **(04 Marks)**

c. List and explain the different methods of distribution of water. **(10 Marks)**

OR

10 a. With the aid of neat diagrams, explain the following :
   (i) Air relief value
   (ii) Fire hydrant. **(10 Marks)**

b. Write down the factors affecting the selection of pipe materials. **(04 Marks)**

c. Explain any two water distribution layouts with their advantages and disadvantages. **(06 Marks)**

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CBCS SCHEME

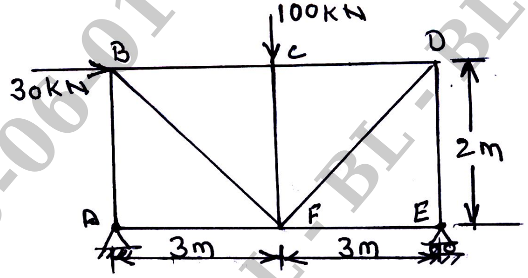
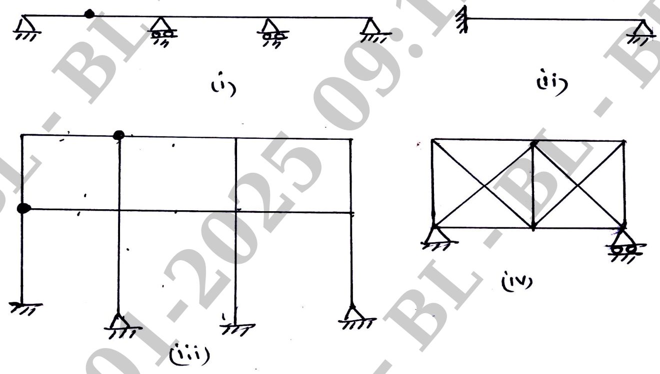
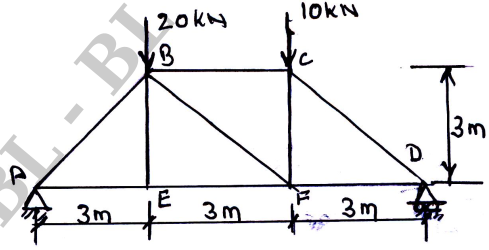
USN ☐☐☐☐☐☐☐☐☐☐ **BCV401**

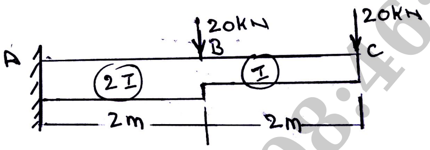
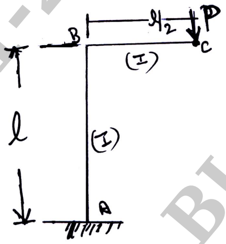
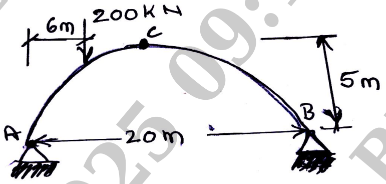
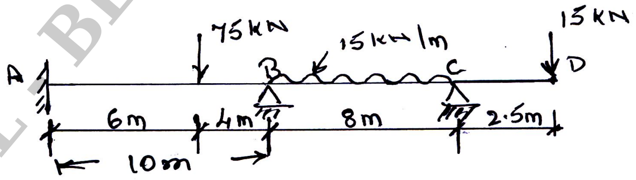
Fourth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

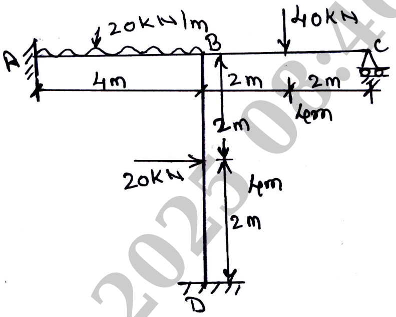
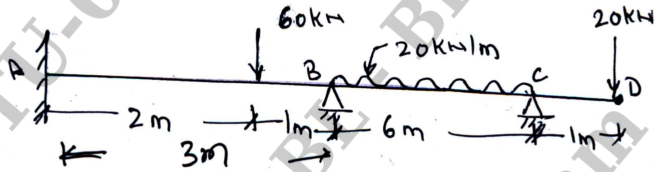
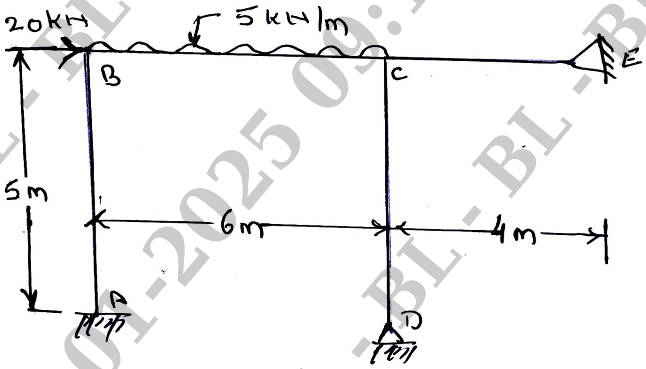
Analysis of Structures

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	**M**	**L**	**C**
Q.1	**a.**	Differentiate between statically determinate and indeterminate beams with an example for each.	**08**	**L1**	**CO1**
	b.	Determine the forces in all the members of the truss as shown in Fig.Q1(b). Use the method of joints.  Fig.Q1(b)	**12**	**L3**	**CO1**
		OR			
Q.2	**a.**	Define equilibrium and compatibility conditions.	**03**	**L1**	**CO1**
	b.	Determine static and kinematic indeterminacy for the following shown in Fig.Q2(b).  Fig.Q2(b)	**08**	**L2**	**CO1**
	c.	Determine the support reactions and the forces in members EF, BC and BF for the truss shown in Fig.Q2(c) by method of section.  Fig.Q2(c)	**09**	**L3**	**CO1**

		Module – 2			
Q.3	**a.**	State and explain Mohr's theorems.	**06**	**L1**	**CO2**
	b.	Determine the slope and deflection at free end of cantilever by using moment area method. [Refer Fig.Q3(b)]  Fig.Q3(b)	**14**	**L3**	**CO2**
		OR			
Q.4	**a.**	Derive the expression for strain energy due to bending.	**08**	**L1**	**CO2**
	b.	Determine the horizontal and vertical deflection at the free end of bracket shown in Fig.Q4(b).  Fig.Q4(b)	**12**	**L3**	**CO2**
		Module – 3			
Q.5	**a.**	Show that the parabolic shape is a funicular shape for a three hinged arch subjected to UDL over its entire span.	**08**	**L2**	**CO3**
	b.	A three hinged parabolic arch of span 20 m and a central rise of 5 m carry a point load of 200 kN at 6 m from the left support. Find the support reactions at A and B. Calculate normal thrust and radial shear at 6 m from the left support. Also draw the BMD. Refer Fig.Q5(b).  Fig.Q5(b)	**12**	**L3**	**CO3**
		OR			
Q.6	**a.**	Derive the equation for cable profile and tension in the cable when it is supported at the same level and subjected to horizontal UDL.	**08**	**L2**	**CO3**
	b.	A cable of span 120 m and central dip 4 m carries a UDL of 20 kN/m. Determine (i) The maximum and minimum tension in the cable and its inclination (ii) Length of cable (iii) The size of cable if the permissible stress is 200 N/mm^2.	**12**	**L3**	**CO3**
		Module – 4			
Q.7		Analyze the continuous beam shown in Fig.Q7 by slope deflection method. Draw BMD and SFD.  Fig.Q7	**20**	**L2**	**CO1**

		OR			
Q.8	**a.**	Explain fixed end moments for different loading and support conditions with relevant diagrams.	**05**	**L1**	**CO4**
	b.	Analyse the given frame as shown in Fig.Q8(b) by slope deflection method. EI is constant for all the members. Draw BMD and Elastic curve.  Fig.Q8(b)	**15**	**L4**	**CO4**
		Module – 5			
Q.9		Analyse the continuous beam as shown in Fig.Q9 by moment distribution method and draw the BM diagram. The support B sinks by 9 mm. Take EI = 1×10^{12} N-mm^2.  Fig.Q9	**20**	**L4**	**CO5**
		OR			
Q.10		Analyse the frame shown in Fig.Q10 by moment distribution method and draw the BMD. Assume EI constant.  Fig.Q10	**20**	**L4**	**CO5**

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **BCV402**

Fourth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

Fluid Mechanics and Hydraulics

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	**M**	**L**	**C**
Q.1	**a.**	Define the following terms along with symbols and units: (i) Compressibility (ii) Mass density (iii) Specific weight (iv) Relative density (v) Surface tension	**10**	**L1**	**CO1**
	b.	A differential manometer is connected at the two points A and B of two pipes. The centre of pipe A is 3 m above centre of pipe B. Pipe 'A' contains liquid of specific gravity 1.5, while pipe B contains a liquid of specific gravity 0.9. The manometric liquid mercury is 5m below the centre of pipe A. The pressure at A and B are 1 kgf/cm^2 and 1.8 kgf/cm^2 respectively. Find the difference in mercury level in the differential manometer.	**10**	**L4**	**CO1**
		OR			
Q.2	**a.**	Derive an expression for total pressure and centre of pressure for a vertical plane surface submerged in liquid.	**08**	**L2**	**CO2**
	b.	What is the bulk modulus of elasticity of a liquid which is compressed in a cylinder from a volume of 0.0125 m^3 at 80 N/cm^2 pressure to a volume of 0.0124 m^3 at 150 N/cm^2 pressure?	**06**	**L3**	**CO2**
	c.	An equilateral triangular plate of 5m side length is immersed in water with its base and apex at 2 m and 6 m below the free surface of water respectively. Calculate the total force and position of centre of pressure.	**06**	**L4**	**CO2**
		Module – 2			
Q.3	**a.**	Distinguish between : (i) Steady and unsteady flow (ii) Uniform and non-uniform flow (iii) Laminar and turbulent flow	**06**	**L1**	**CO2**
	b.	Derive an expression for continuity equation for a three dimensional flow in Cartesian coordinate.	**08**	**L2**	**CO2**
	c.	In a 2D incompressible flow, the fluid velocity components are given by $u = x - 4y$ and $v = -y - 4x$. Show that velocity potential exists.	**06**	**L3**	**CO2**
		OR			
Q.4	**a.**	State the assumptions and derive Bernoulli's equation of energy along a streamline.	**10**	**L2**	**CO2**
	b.	The following are the data given for laying water supply pipeline. The change in diameter is gradual from 20 cm at 'A' to 50 cm at B. Pressure at A and B is 80 kN/m^2 and 60 kN/m^2 respectively. The end B is 3m higher than A. If the flow in the pipe is 200 LPS, find: (i) Direction of flow (ii) Head loss between A and B.	**10**	**L4**	**CO2**
		Module – 3			
Q.5	**a.**	Derive an expression for the discharge over a triangular notch.	**08**	**L2**	**CO3**
	b.	Distinguish between pipes in series and pipes in parallel.	**04**	**L1**	**CO3**
	c.	A 0.5 m diameter and 100 m long pipeline carrying 0.5 m^3/sec of water is fitted with valve at the downstream end. Calculate the rise of pressure caused within the pipe due to valve closure. If: (i) Instantaneously (ii) In one second. Assume sonic velocity as 1430 m/s.	**08**	**L4**	**CO3**

		OR			
Q.6	**a.**	Derive Darcy-Weisback equation for head loss due to friction with assumptions.	**08**	**L2**	**CO3**
	b.	Water flows over a rectangular weir 1 m wide at a depth of 150 mm and afterwards passes through a triangular right angled weir. Take C_d for rectangular weir as 0.62 and for triangular weir as 0.59. Find the depth over triangular weir.	**08**	**L3**	**CO3**
	c.	Explain Water Hammer phenomenon.	**04**	**L1**	**CO3**
		Module – 4			
Q.7	**a.**	With neat sketches, differentiate between flow through pipes and flow through open channels with examples.	**06**	**L2**	**CO4**
	b.	What is meant by economical section of a channel? Derive the condition for the most economical rectangular section.	**08**	**L1**	**CO4**
	c.	A discharge of 18 m^3/sec flows through a rectangular channel 6m wide at a depth of 1.6 m. Find: (i) Specific energy (ii) Critical depth (iii) State weather the flow is subcritical or supercritical	**06**	**L4**	**CO4**
		OR			
Q.8	**a.**	Explain the term hydraulic jump. Derive an expression for the depth of hydraulic jump.	**10**	**L2**	**CO4**
	b.	A sluice gate discharges water into a horizontal rectangular channel with a velocity of 6 m/sec and depth of flow is 0.4 m. The width of the channel is 8m. Determine whether a hydraulic jump will occur or not, if occur find its height and loss of energy per kg of water. Also determine the power lost in the hydraulic jump.	**10**	**L4**	**CO4**
		Module – 5			
Q.9	**a.**	Explain impulse momentum principle.	**02**	**L2**	**CO5**
	b.	Explain concept of velocity triangles. Also obtain an expression for work done per second by jet striking unsymmetrical moving vane tangentially at one end of the tips.	**08**	**L3**	**CO5**
	c.	Design a pelton wheel turbine required to develop shaft power of 95.6475 KW working under a head of 60 m at a speed of 200 rpm. The overall efficiency may be taken as 85%. Take C_v = 0.98 and velocity of the buckets = 0.45 times the velocity of the jet.	**10**	**L4**	**CO5**
		OR			
Q.10	**a.**	Draw a neat sketch of the hydro electric power plant. Mention the functions of each component.	**08**	**L2**	**CO5**
	b.	A centrifugal pump is to discharge 0.118 m^3/sec at a speed of 1450 rpm against a head of 25 m. The impeller diameter is 250 mm, its width at outlet is 50 mm and manometric efficiency is 75%. Determine the vane angle at the outer periphery of the impeller.	**08**	**L4**	**CO5**
	c.	Distinguish between turbine and pump.	**04**	**L1**	**CO5**

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **BCV403**

Fourth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

Transportation Engineering

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	**a.**	Briefly explain characteristics of road transport and Jayakar committee recommendations.	**10**	**L1**	**CO1**
	b.	With a neat sketches, explain various tractors affecting alignment.	**10**	**L2**	**CO1**
		OR			
Q.2	**a.**	Briefly explain about attainment of super elevation.	**10**	**L1**	**CO1**
	b.	Calculate length of transition curve for design speed 65 kmph, radius of curve 220 m, pavement width including extra widening 7.5 m. Allowable rate of introduction of super elevation lin/so (pavement rotated about centre line).	**10**	**L3**	**CO1**
		Module – 2			
Q.3	**a.**	What are properties of Bituminous mixes? Explain briefly.	**8**	**L2**	**CO2**
	b.	With a neat sketch, briefly explain different types of rigid pavement joints.	**12**	**L1**	**CO2**
		OR			
Q.4	**a.**	Briefly explain about various functions of components of flexible pavement.	**10**	**L1**	**CO2**
	b.	Briefly explain importance and requirements of Highway Drainage system.	**10**	**L2**	**CO2**
		Module – 3			
Q.5	**a.**	Briefly explain about Road user and vehicular characteristics.	**10**	**L2**	**CO3**
	b.	Spot speed studies were conducted out at a certain stretch of a highway with mixed traffic flow and consolidated data collected are given below. Determine: i) Upper and lower values of speed limits. ii) Design speed.	**10**	**L4**	**CO3**

Speed range kmph	No of vehicles observed	Speed range kmph	No of vehicles observed
0-10	12	50-60	255
10-20	18	60-70	119
20-30	68	70-80	43
30-40	89	80-90	33
40-50	204	90-100	9

		OR			
Q.6	**a.**	Explain O and D studies objectives and methods of data collections.	**12**	**L3**	**CO3**
	b.	Explain the steps involved in the IRC method of signal design.	**8**	**L2**	**CO3**
		Module – 4			
Q.7	**a.**	With neat sketch, explain permanent way and its requirements.	**10**	**L1**	**CO4**
	b.	Estimate the quantities of materials required to construct 1 km long B.G. track with sleeper density.	**10**	**L3**	**CO4**
		OR			
Q.8	**a.**	Briefly explain the functions and requirements of sleeper and ballast.	**10**	**L1**	**CO4**
	b.	Define station yards. Explain different types of station yards.	**10**	**L2**	**CO4**
		Module – 5			
Q.9	**a.**	Explain the characteristics of an aircraft which affects the planning and design of air ports.	**10**	**L2**	**CO4**
	b.	Write the comparison between runway of highway.	**10**	**L1**	**CO4**
		OR			
Q.10	**a.**	Draw a neat sketch of layout of an airport and explain the functions of various components ports.	**10**	**L2**	**CO4**
	b.	The length of runway under standard conditions is 1700 m. The airport site is at an elevation of 260 m. Its reference temperature 32°C. If the runway is to constructed with an effective gradient of 0.2%. Determine corrected runway length.	**10**	**L3**	**CO4**

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CBCS SCHEME

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BCV405D

Fourth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

Watershed Management

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	With a neat sketch, explain different water availability on planet earth.	8	L2	CO1
	b.	What are the objectives of Watershed Management?	6	L2	CO1
	c.	Explain briefly conjunctive use of water.	6	L2	CO2
		OR			
Q.2	a.	With a neat sketch, describe the Hydrological cycle.	8	L2	CO1
	b.	Explain briefly the Human influences in the water resources system.	6	L2	CO1
	c.	Briefly describe the importance of Watershed.	6	L2	CO1
		Module – 2			
Q.3	a.	List the principles of Watershed Management. Explain briefly.	6	L2	CO2
	b.	With a neat sketch, explain the any one of the river basins characteristics of India.	6	L2	CO2
	c.	What is Morpho metric analysis of Watershed? Explain how it helps Watershed Management.	8	L2	CO2
		OR			
Q.4	a.	Briefly explain the different Watershed Management practices in arid regions.	6	L2	CO2
	b.	Write a short notes on : i) Watershed Management through wells. ii) Management of water supply.	8	L2	CO2
	c.	Explain the short terms and long term strategic planning for Watershed Management.	6	L2	CO2
		Module – 3			
Q.5	a.	Describe the perspective on recycle and reuse of Waste Water Management.	6	L2	CO3
	b.	Explain briefly the social aspects of Watershed Management.	6	L2	CO3
	c.	Explain the community participation helps for the management of watershed in a basin.	8	L2	CO3

		OR			
Q.6	**a.**	Explain integrated development of watershed with a case study.	**6**	**L2**	**CO3**
	b.	Describe how water legislation helps for the development and management of watershed.	**6**	**L2**	**CO3**
	c.	With a neat sketch, explain the methods for Rainwater harvesting.	**8**	**L2**	**CO3**
		Module – 4			
Q.7	**a.**	Briefly explain the sustainable integrated Watershed Management.	**6**	**L3**	**CO4**
	b.	Write a note on : i) Check dams ii) Aquifer storage.	**8**	**L2**	**CO4**
	c.	What are the agricultural practices flowed in an watershed which helps to improve the water potentiality in the basin?	**6**	**L2**	**CO4**
		OR			
Q.8	**a.**	Explain the various best agricultural practices flowed in India for water conservation.	**10**	**L2**	**CO4**
	b.	Write a note on : i) Integrated farming ii) Soil erosion and conservation.	**10**	**L2**	**CO4**
		Module – 5			
Q.9	**a.**	Explain the role of decision support system in Watershed Management.	**10**	**L2**	**CO5**
	b.	Explain characteristics of Watershed in Coastal regions.	**10**	**L2**	**CO5**
		OR			
Q.10	**a.**	Describe the uniqueness of Coastal Water resources. Explain its uses in developing water shed in that area.	**10**	**L3**	**CO5**
	b.	With example how RS and GIS helps for the development and management of watershed.	**10**	**L2**	**CO5**

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CBCS SCHEME

BCV456C

USN ☐☐☐☐☐☐☐☐☐☐

Question Paper Version : A

Fourth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan. 2025
Electronic Waste Management - Issues and Challenges

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. E – waste is also known as
a) Electronic waste b) Essential waste c) European waste d) Economic waste

2. E – waste is mainly composed of
a) Valuable metals b) Glass and plastic c) Toxic substances d) all of these

3. International electronic waste day is held on
a) March 14 b) November 14 c) October 14 d) January 14

4. What is expanded form of WEEE?
a) Wastes from Electronic and Electrical Equipment
b) Wastes from Environment and Engineering Equipment
c) Wiring Boards of Electrical and Electronic Equipment
d) Wastes from Engineering and Eco-friendly Equipment

5. China along with _____ produces one – third of the World's e - waste
a) Canada b) USA c) Australia d) Germany

6. Which international event used medals made with gold extracted from e-waste?
a) ICC Cricket World Cup
b) FIFA World Cup 2022
c) Tokyo Olympics 2020
d) Expo 2020

7. Which one of these is NOT a category of e-waste?
a) Screens and monitors
b) Plastic bottles
c) Heat exchange equipments
d) Mobile phones

8. E – Waste constitutes of valuable metals like
a) Gold b) Silver c) Copper d) All of these

9. Which of the following elements make e – waste hazardous in nature?
a) Plastic b) Iron c) Lead d) Glass

10. Which among the following is a good way to dispose of e-waste?
a) Burn it
b) Give it to an e-waste - recycler
c) Throw it in the street
d) none of these

11. What is the iron and steel percentage of e-waste?
a) 20% b) 30% c) 40% d) 50%

12. What is the hazardous pollutant released from LED's?
a) Arsenic b) Barium c) Cobalt d) Cadmium

13. Identify the hazardous pollutant released from circuit boards?
a) Arsenic b) Barium c) Lead d) Copper

14. What happens to old electronic items in poor countries?
a) E-waste litters town and leaves a lot of health risks
b) E-waste is collected and recycled
c) Nothing
d) Well managed

15. Which electronic device contributes the most to global e-waste generation?
a) Refrigerators b) Washing machines c) Televisions d) Mobile phones

16. What is the primary goal of e-waste management?
a) To reduce landfill usage
b) To recover valuable materials
c) To minimize environmental impacts
d) All of these

17. Where does plastic go when we throw it in the dust bin?
a) Landfill b) Ocean
c) Recycling factory d) All of these

18. Pely Vinyl chloride (PVC) is used in electronic and electrical devices mainly as
a) Insulators b) Solders c) TV screens d) Thermostats

19. The unsound practices observed in e-waste sites include
a) Scavenging b) Open burning
c) Manual disassembly d) All of these

20. Which toxic compound is not found in e-waste?
a) Mercury b) Lead c) Neon d) Cadmium

21. The environmental impacts of e-waste are
a) Loss of resources b) Impact on air quality
c) Impact on soil d) All of these

22. What are the adverse effects of Arsenic on human health?
a) Lung cancer
b) Damages kidneys and brain
c) Softens bones
d) Asthmatic bronchitis

23. 'Selenosis' is caused by the high concentration of
a) Mercury b) Cadmimum c) Barium d) Selenium

24. Which component of e-waste causes brain disorders?
a)Lead b) Mercury c) Cadmium d) All of these

25. Mercury used in electrical and electronic equipments can cause health issues such as :
a) Brain disorders b) Kidney disorders c) Disorders in foetus d) All of these

26. How does e-waste contribute to global warming?
a) By releasing toxic gases during burning
b) By increasing landfill mass
c) By consuming non-renewable resources
d) All of these

27. Why is it important to dispose of e-waste safely?
a) To prevent environmental pollution
b) To protect public health
c) To conserve natural resources
d) All of these

28. _____ from leachates cause abdominal pain in humans in case of acute exposure.
a) Lead b) Benzene c) Mercury d) Phenol

29. Name the hazardous pollutant released form luminous substances used in electronic and electrical devices
a) Arsenic b) Barium c) Zinc d) Silver

30. Which constituent in e-waste gives out carcinogenic dioxins and furans on open burning?
a) Lead b) Barium c) Plastic d) Zinc

31. The economic benefits related to e-waste management includes
a) Increased production cost
b) Market saturation
c) Recovering valuable materials
d) Trade deficits

32. India's first e-waste clinic has been established in
a) Bengaluru b) Bhopal c) Chennai d) Kochi

33. A method of creatively repurposing e-waste into new products with higher environmental value
a) Recycling b) Precycling c) Upcylcing d) None of these

34. Which continent has the highest rate of collection and recycling of e-waste?

a) Asia b) Africa c) Europe d) Australia

35. _____ are obsolete devices from the past that have become outdated (like vacuum tubes) and are new part of e-waste stream.

a) Special e-waste b) Historical e-waste
c) Hazardous waste d) None of these

36. Which factor contributes significantly to the increase in e-waste generation?

a) Rapid technological advancement
b) Longer life span
c) Decrease in device usage
d) Increasing recycling rates

37. What does the '3R' principle in e-waste management stand for?

a) Reclaim, recycle, reduce
b) Reduce, Reuse, Recycle
c) Recovery, Reuse, Reclaim
d) Refurbish, Resell, Rest

38. The first step in e-waste management is

a) Incineration of e-waste
b) Dispose it in landfills
c) Export it to other countries
d) Collect e-waste and segregate it

39. Consider the following statement on e-waste

1) Electronic products that reached its useful life are classified as e-waste
2) E-waste is not harmful to environment if it is properly recycled

a) 1 and 2 are correct
b) Only 1 is correct
c) Only 2 is correct
d) Neither 1 nor 2 are correct

40. Why is e-waste management important?

a) To increase the production of electronic devices
b) To reduce the amount of e-waste generated
c) To encourage improper disposal of e-waste
d) To export e-waste to other countries

41. Which legislation regulates e-waste management in India?

a) The Water Act, 1974
b) Air Act, 1981
c) E-waste (management) Rules, 2022
d) None of these

42. Which year did India implement its first e-waste management rules?

a) 2001 b) 2011 c) 2016 d) 2018

43. Under the E-waste (management) rules, who is responsible for setting up e-waste collection mechanisms?

a) Municipalities b) State Governments
c) Producers of electronic goods d) Consumers

44. Which international convention addresses the transboundary movement of hazardous wastes, including e-wastes?
a) Basel convention
b) Stockholm convention
c) Kyoto protocol
d) Montreal protocol

45. The e-waste management rules, 2022 shall apply to every
a) Manufacturer b) Producer c) Recycler d) All of these

46. What is the penalty framework for non-compliance under the e-waste (management) rules, 2022?
a) A fine of upto Rs. 1000
b) Imprisonment of upto 2 years
c) A Fine of upto Rs. 1 lakh
d) Community service

47. Which of these is a compliance requirement for producers under the E-waste (management) rules, 2016?
a) Setting up collection centers for e-waste
b) Providing buy – back arrangement for old products
c) Both (a) and (b)
d) None of these

48. What additional responsibility do manufacturers and producers have under the 2022 rules?
a) Reporting quarterly returns
b) Developing of better business models
c) Increase their production
d) Ensuring proper disposal of e-waste

49. Despite regulations, e-waste is still illegally transported across borders. Which counties are particularly affected?
a) Developed countries
b) Developing countries
c) Poor and under-developed countries
d) None

50. e-waste (Management) Rules, 2022 came into effect from
a) 1st June 2022
b) 1st December 2022
c) 1st April 2023
d) 1st January 2023

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CBCS SCHEME

18CIV59

USN

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

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. The ecology is defined as the study of
a) Relation between organisms to their environment
b) Relation between group of organisms to their environment
c) Both (a) and (b)
d) None

2. Concentration of pollutants in successive tropic levels is known as
a) Bio-magnification b) Bio-remediation
c) Bio-accumulation d) All of these

3. Physical environment includes
a) Hydrosphere b) Lithosphere c) Atmosphere d) All of these

4. Word environment day is celebrated on
a) April 22nd b) July 22nd c) June 5th d) Aug 22nd

5. Forest rich area in Karnataka is found in
a) Bandipura b) Nagarhole c) Westernghat's d) Mangalore

6. Phytoplankton as an aquatic system can be considered as
a) Micro consumer b) Consumer c) Producer d) Organism

7. World Food Summit (1996) is pledged to reduce the number of hungry people to
a) 500 million b) 400 million c) 250 million d) 100 million

8. Organic farming is a farming without using
a) Synthetic fertilizers b) Pesticides c) Green manures d) Both (a) and (b)

9. EIA is not required for projects like
a) Dams b) Highways c) Urbanization d) None of these

10. Mineral sources are
a) Renewable b) Non-renewable
c) Equally distributed d) None of these

11. In an eco system the flow of energy is
a) Unidirectional b) Bidirectional
c) Cyclic d) Multidirectional

12. Which among the following is a climatic factor
a) Light b) Humidity
c) Temperature d) All of these

13. Plants use which of the following gas for their photosynthesis
a) Oxygen b) Methane
c) Nitrogen d) Carbon dioxide

14. A Predator is
a) An animal that is fed upon
b) An animal that feeds upon another animal
c) An animal that feeds upon both plants and animals
d) A primary consumer

15. Green revolution is
a) Crop variety improvements
b) Increased use of fertilizers
c) Expansion of irrigation
d) All of these

16. Which of it is not an example of eco-system
a) Forest b) Desert c) Water d) Grassland

17. Genetic variation between distinct populations of the same species is known as
a) Specific diversity b) Eco-system diversity
c) Genetic diversity d) Bio-diversity

18. Which of the following is an endemic species of India
a) Asian elephant b) Lion-Tailed macaque
c) Whales d) Panda

19. Who introduced the concept of biodiversity hot-spot?
a) Christopher Columbus b) Norman Myers
c) WWF d) Charles Darwin

20. Soil erosion is prevented by
a) Deforestation b) Afforestation
c) Over grazing d) Removal of vegetation

21. The DODO was extinct due to
a) Pollution
b) Invasion of non-native species
c) Over exploitation of resources
d) Global environmental change

22. Which of the following is not a world heritage site
a) Manas World life sanctuary
b) Nanda Devi National park
c) Kaziranga National park
d) Periyar National park

23. EIA can be expanded as
a) Environmental and Industrial Act
b) Environmental Impact Act Activities
c) Environmental Impact Assessment
d) Environmentally important Activity

24. Where is the largest wind farm located in India?
a) Tuticorin in Tamil Nadu
b) Jaisalmar wind park Rajasthan
c) Vaspet Wind form Maharashtra
d) Chakala Wind form Maharashtra

25. How is OTEC caused
a) By wind energy
b) By geothermal energy
c) By solar energy
d) By gravitational energy

26. Which country has world's largest tidal power plant
a) Netherlands b) South Korea c) Laus d) Bolivia

27. What does OTEC stands for
a) Ocean thermal energy conversion
b) Ocean thermal energy conservation
c) Ocean thermal energy cultivation
d) Ocean thermal energy consumption

28. Solar energy is as ideal energy source because of
a) Unlimited supply
b) No air and water pollution
c) No hazardous products
d) All of these

29. Why is it important to save energy in our daily lifers?
a) We need to burn more fossil fuels
b) So that other people can waste energy
c) We save electricity because it is easier to see in the dark
d) We need to protect our environment for the future

30. Wind energy generation depends on
a) Direction of wind b) Humidity
c) Velocity of wind d) All of these

31. The only disadvantage of hydrogen energy source is
a) Releases toxic products
b) Causes air and water pollution
c) Hazards effect due to risk of leakage
d) It takes more energy to produce hydrogen than the energy that could be obtained from it

32. What percent of the Sun's energy is absorbed by the earth?
a) 50% b) 0% c) 40% d) 10%

33. Bhopal gas disaster is a kind of
a) Natural disaster b) Man–made disaster
c) Water leakage d) None of these

34. Who is known as father of modern seismology
a) Charles Richter b) R.D. Oldham c) W.M. Davis d) None of these

35. Volcanic erupted material when inside the hill or earth or mountain is called
a) Lava b) Magma c) Lahars d) None of these

36. Generally the number on Richter scale ranges
a) 0 to 9 b) 1 to 5 c) 1 to 12 d) 0 to 6

37. Disaster management includes
a) Mitigation b) Reconstruction c) Rehabilitation d) All of these

38. In India national institute of disaster management is located at
a) Manipur b) Punjab c) Delhi d) Hyderabad

39. A disease that become usually wide-spread and even global in its reach is referred to as
a) Pandemic b) Epidemic c) Spanish flue d) Hyper endemic

40. Goal of the cloud seeding is to
a) Enhance precipitation b) Suppress hail
c) Dissipate fog d) All of these

41. The scientist who experimented cloud seeding first time
a) Isaac Newton b) Rutherford c) Vincent. J. d) C.V. Raman

42. Carbon trading deals
a) Carbon emissions b) Sulphur dioxide emissions
c) Acid rain d) None of these

43. Chemicals used for cloud seeding is
a) Dry ice b) Silver dioxide
c) Potassium dioxide d) All of these

44. One can reduce carbon foot print at lunch by
a) Don't eat food
b) Eat fast food
c) Eat lots of packaged things like lunchables
d) Buying food grown by locally and organically

45. The sources of hydrogen are
a) Biomass b) Coal c) Water d) All of these

46. Which of the following is a secondary air pollutant?
a) Carbon monoxide b) Ozone c) Sulphur dioxide d) Carbon dioxide

47. SMOG is
a) Natural phenomenon b) Colourless
c) Combination of smokes and fog d) All of these

48. Air pollution from automobiles can be controlled by fitting
a) Catalytic converter b) Wet scrubber
c) Electrostatic precipitator d) All of these

49. The sound intensity is measured in
a) dB b) NB c) Horse power d) MB

50. Noise is
a) Loud sound b) Unwanted sound
c) Constant sound d) Sound of high frequency

51. Which of the following is a nonpoint source of water pollution
a) Factories b) Sewage treatment plants
c) Urban and suburban lands d) All of these

52. Which of the following is not a marine pollutant?
a) Oil b) Plastics
c) Dissolved oxygen d) All of these

53. BOD is
a) Biochemical oxygen demand
b) A measure of the organic matter present in waste water
c) Usually less than COD
d) All of these

54. What is the first step in primary treatment plants?
a) Fine screening b) Course screening
c) Aeration d) Chlorination

55. Environmental pollution is due to
a) Rapid urbanization b) Deforestation
c) Afforestation d) Both (a) and (b)

56. Which of the following industry generates colored wastes?
a) Software industry b) Bio-medical industry
c) Textile industry d) none of these

57. Pesticide causes
a) Eye irritation b) Skin irritation c) Respiratory ailments d) All of these

58. Illegal dumping is the disposal of
a) Solid waste in non permitted area
b) Hazardous waste in non permitted area
c) Solid and hazardous waste in non permitted area
d) None of these

59. Which of the following is a biological method of disposal of muncipal solid waste
a) Composting b) Stredding c) Landfills d) Pulverization

60. The waste products in cotton mills are
a) Muncipal solid waste b) Hazardous waste
c) Non bio degradable waste d) Non hazardous waste

61. Cytotoxic and expired drugs are disposed off by
a) Dumping b) Auto clave c) Incineration d) Chemical disinfection

62. The color code of plastic bags for disposing of microbial laboratory culture waste is
a) Black b) Red c) Blue d) White

63. Which vaccination should be given to workers who deal with biomedical waste
a) Hbs Ag b) Tetanus c) Rabis d) Both (a) and (b)

64. Which of the following is the hazardous pollutant released from batteries
a) Cadmium b) Barium c) Cobalt d) Arsenic

65. Which country produces the most e-waste per year?
a) India b) China c) France d) USA

66. Which of the following element make e-waste hazardous in nature
a) Glass b) Lead c) Plastic d) Iron

67. Acid rain is caused by emissions of
a) Sulphur dioxide b) Nitrogen oxide c) Both (a) and (b) d) Carbon dioxide

68. Sulphur dioxide is produced by
a) Lightning strikes b) Volcanic eruptions
c) Gasoline engine d) All are correct

69. The international protocol to project the ozone layer is
a) The Montreal protocol b) Vienna protocol
c) Kyoto protocol d) Cartgena protocol

70. Ozone layer thickness measured in
a) Millimeter b) Centimeters c) Decibels d) Dobson units

71. People who are exposed to radon in drinking water may have risk of setting
a) Typhoid b) Cholera c) Cancer d) Blue baby syndrome

72. The radon concentrations in soil samples is measured by using
a) IR-Spectroscopy b) γ-Spectroscopy c) uv-Spectroscopy d) All of these

73. Maximum permeable concentration of fluoride in drinking water is
a) 1.5 mg/L b) 1.25 mg/L c) 1.0 mg/L d) 2.0 mg/L

74. Dental fluorosis can begin at levels over
a) 1.7 ppm b) 4 ppm c) 8 ppm d) 2 ppm

75. Excess fluoride in drinking water causes
a) Blue babies b) Fluorosis c) Taste and odour d) Intestinal irritation

76. Major source of fluoride is
a) River water b) Tooth paste c) Ground water d) Food products

77. The Kyoto protocol is
a) The response to treat the climate change
b) To reduce the emission of green house gases
c) a and b
d) To give permission to emit green house gases

78. The primary source of green house gases is
a) Wind b) Fossil fuel c) Water d) Green plants

79. The Kyoto protocol was adopted at the
a) Third conference of UNFCC in 1997
b) Convention on the transboundary effects of industrial accidents
c) United nations frame work convention on climate change in 1992
d) Convention on biological diversity

80. Ecotoxicology is the study of
a) Chemical interaction of organism and environment
b) Physical interaction of organism and environment
c) Thermal interaction of organism and environment
d) Biological interaction of organism and environment

81. Hazard estimation in eco-toxicology is done based on
a) Accumulation b) Bio-accumulation
c) SARA d) HWL

82. Eco-toxicology is based on
a) Physical characteristics of chemicals
b) Biological characteristics of chemicals
c) Toxicological characteristics of chemicals
d) All are correct

83. Green house effect causes
a) Rise in temperature of the earth
b) Increase in rain fall
c) Lowering in acid rain
d) Lowering in temperature of the earth

84. The effects of acid rain is
a) Skin cancer
b) Reduces soil fertility
c) Increases atmospheric temperature
d) Causing respiratory problem

85. Global worming could affect
a) Climate b) Increase in sea level
c) Melting of glaciers d) All of these

86. Ground water is recharged naturally by
a) Rain b) Snow melt
c) Rivers and lakes d) All of these

87. Major compound responsible for the destruction of the stratospheric ozone layer is
a) Oxygen b) CFC c) Methane d) Carbon dioxide

88. Remote sensor detects
a) Electro magnetic radiation
b) Only IR radiations
c) Only uv radiations
d) Only visible radiations

89. Indian remote sensing satellite Cartosat has been launched to monitor
a) Spot images b) Cartographic applications
c) Both (a) and (b) d) Atmospheric

90. Remote sensing is a
a) Sensor system b) Satellite system
c) Ground segment d) All of these

91. GIS stands for
a) Generic information system
b) Geological information system
c) Geographic information Sharing
d) Geographic Information system

92. GIS does not monitor
a) Deforestation b) Ozone layer depletion
c) Land covers d) None of these

93. GIS mainly deals with
a) Satellite images b) Land sat images
c) Both (a) and (b) d) None of these

94. What is the full form of NGO's?
a) Non Governmental Organization
b) Null Governmental Organization
c) Nice Governmental Organization
d) None of these

95. What is the role of NGOs in natural resource management?
a) Creating awareness among the public on current environmental issues and solution
b) Being involved in the protection of human rights to a clean environment
c) Data generation on natural resources timeline and history
d) Making profit from government

96. The instrument which records earth quake wave is called
a) Sesimograph b) Chimograph c) Hythergraph d) None of these

97. In which year the current revision of ISO 14001 get published
a) 2010 b) 2011 c) 2015 d) 2016

98. Which of the following pair of ISO 14000 standards fall under the category of environmental management system?
a) ISO 14001 and ISO 014004
b) ISO 14010 and ISO14001
c) ISO 14011 and ISO 14001
d) ISO 14011 and ISO 14004

99. Centre for science and environment is
a) Government organization
b) International body
c) Non government organization
d) None of these

100 Which of the following is NGO?
a) Narmada Bachao Andolan b) CPCB
c) KSPCB d) None of these

* * * * *

CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **18CV51**

Fifth Semester B.E. Degree Examination, Dec.2024/Jan.2025
Construction Management and Entrepreneurship

Time: 3 hrs. Max. Marks:100

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

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

Module-1

1 a. Explain in brief the types of plans based on various factors. **(08 Marks)**

b. What are the characteristics of management? **(08 Marks)**

c. What is Gantt chart? Explain with its significance. **(04 Marks)**

OR

2 a. What is project organization? Explain with a typical project organization chart. **(08 Marks)**

b. Differentiate between AOA and AON. **(04 Marks)**

c. Draw the network from the following activity and find critical path and total project duration:

Activity	A	B	C	D	E	F	G
Predecessor	-	-	A	A	B	B	D, F
Duration days	10	9	9	8	7	11	5

(08 Marks)

Module-2

3 a. What is the purpose of having material management system in construction? **(04 Marks)**

b. Enumerate the factors to be considered for selection of construction equipments. **(07 Marks)**

c. Explain different class of labour employed in construction project. **(09 Marks)**

OR

4 a. What are the factors influencing Inventory Management? **(05 Marks)**

b. Estimate the hourly production of a Shovel with bucket capacity of $0.96 m^3$ and cycle time of 30 seconds. Shovel is used to excavate hard soil in an open area. Excavated earth is to be loaded in waiting dump truck, positioned at 60^0. Equipment is utilized for 50 minutes in one hour. **(07 Marks)**

c. List the factors affecting labour productivity. Briefly discuss any three factors. **(08 Marks)**

Module-3

5 a. Define Quality and describe Quality Control and Quality Assurance in Construction. **(08 Marks)**

b. Explain the Total Quality Management process in Construction. **(08 Marks)**

c. Discuss on need of Engineering ethics. **(04 Marks)**

OR

6 a. What are the Safety procedures to be adopted during Excavation? **(06 Marks)**

b. Explain Safety through Legislation , Safety campaign and Insurances. **(08 Marks)**

c. Briefly write about :
i) Gifts and bricks
ii) Whistle blowing. **(06 Marks)**

Module-4

7 a. Explain the benefit of engineering economy in construction management. **(08 Marks)**

b. A firm invest in one of the two mutually exclusive alternative. Determine the best alternative based on annual equivalent method with the given details. **(12 Marks)**

i = 20%

Alternative	Investment (Rs)	Annual equal return (Rs)	Salvage value (Rs)
A	2,50,000	90,000	20,000
B	2,75,000	1,00,000	50,000

OR

8 a. Differentiate between Micro and Macro economics. **(08 Marks)**

b. Determine the effective interest rate for a nominal rate of 6 percent that is compounded i) Daily ii) Monthly iii) Quarterly iv) Half yearly v) Annually. **(12 Marks)**

Module-5

9 a. Write briefly about four functions of an Entrepreneur. **(04 Marks)**

b. Summarize the role of MSME in Economic development. **(08 Marks)**

c. Discuss in detail about stages in Entrepreneurial process. **(08 Marks)**

OR

10 a. Write short note on Exporting. **(04 Marks)**

b. Discuss the different types of Feasibility study. **(08 Marks)**

c. Explain the scope and role of following agencies : i) KIADB ii) KSFC. **(08 Marks)**

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CBCS SCHEME

USN | | | | | | | | | |

18CV52

Fifth Semester B.E. Degree Examination, Dec.2024/Jan.2025

Analysis of Indeterminate Structures

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 Analyze the continuous beam shown in Fig.Q1 by slope deflection method. Draw BMD, SFD and elastic curve. **(20 Marks)**

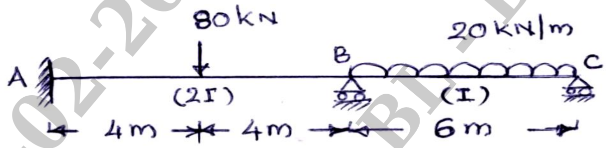


Fig. Q1.

OR

2 Analyze the portal frame shown in Fig.Q2 by slope deflection method. Draw BMD and elastic curve. **(20 Marks)**

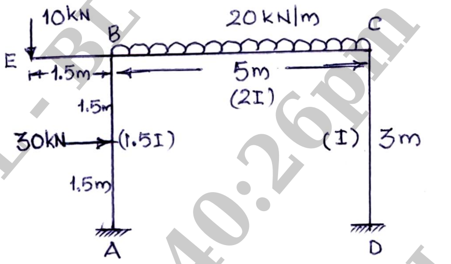


Fig. Q2

Module-2

3 Analyze the continuous beam ABCD loaded as shown in Fig.Q3 if settlement in support B and C are 5 mm and 10 mm respectively. Use moment distribution method. Take EI = 2.7×10^5 kN-m^2. Draw BMD. **(20 Marks)**

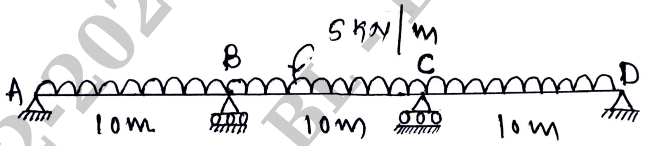
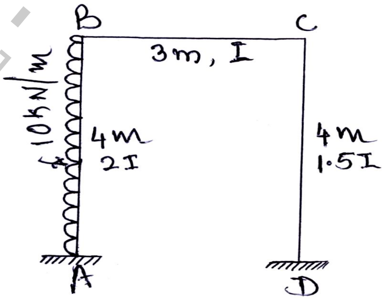


Fig. Q3

OR

4 Analyze the frame loaded as shown in Fig.Q4. Use moment distribution method. **(20 Marks)**

Fig. Q4

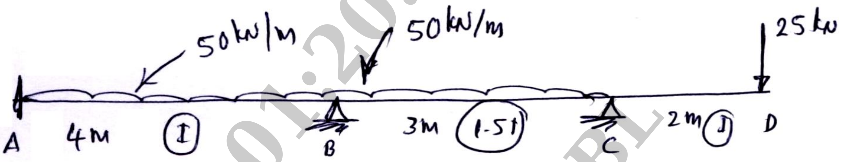


Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-3

5 Analyze the continuous beam loaded shown in Fig.Q.5 by Kani's rotation method. Draw BMD. **(20 Marks)**

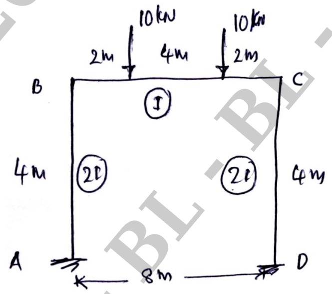
Fig. Q5



OR

6 Analyze the frame shown in Fig.Q.6 by Kani's method. Take the advantage of symmetry. **(20 Marks)**

Fig. Q6



Module-4

7 Analyze the continuous beam by using flexibility matrix method. Draw BMD, SFD and elastic curve. Refer Fig.Q7. **(20 Marks)**

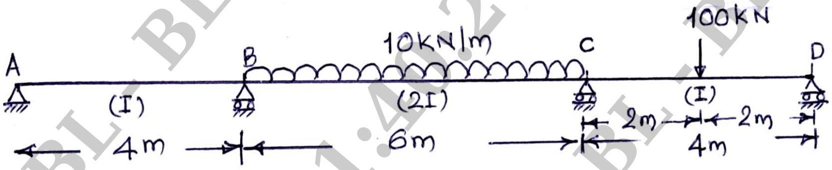


Fig. Q7

OR

8 Analyze the truss shown in Fig.Q8 by flexibility matrix method choosing force in the member AD as redundant. Assume constant EI for all the members. **(20 Marks)**

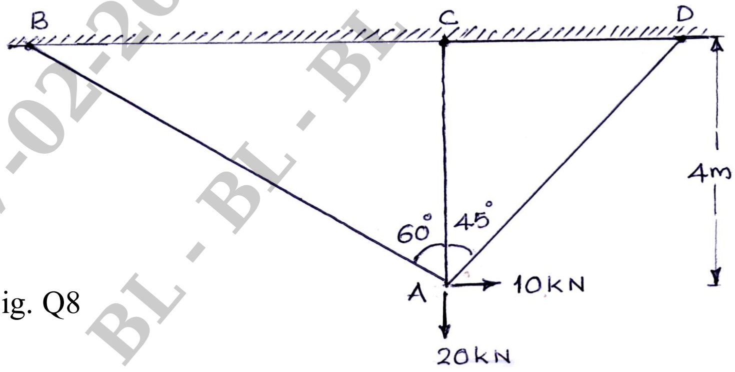


Fig. Q8

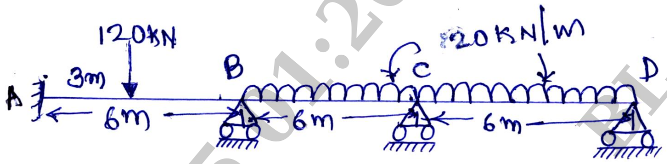
Fig. Q8

Module-5

9 Analyze the continuous beam shown in Fig.Q9 by stiffness matrix method. Take EI constant.

(20 Marks)

Fig. Q9

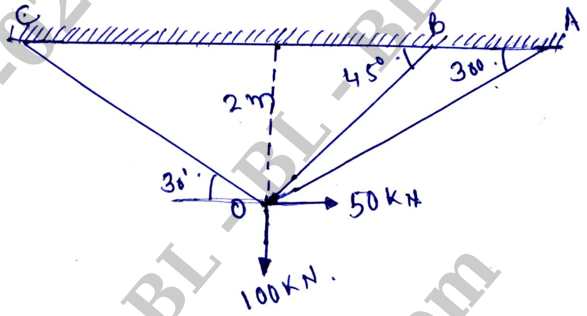


OR

10 Analyze the pin-jointed truss shown in Fig.Q10 by stiffness matrix method. Take cross-sectional area for all members = 1000 mm^2 and E = 200 kN/mm^2.

(20 Marks)

Fig. Q10



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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **18CV53**

Fifth Semester B.E. Degree Examination, Dec.2024/Jan.2025

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 IS:456-2000, SP-16 is permitted.

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

Module-1

1 a. Briefly explain the philosophy and principles of limit state method of RCC design. **(08 Marks)**

b. Write a brief notes on:
i) Characteristic loads
ii) Characteristic strength
iii) Balanced section
iv) Over reinforced section. **(12 Marks)**

OR

2 a. List the factors that affect the deflection of reinforced concrete members. **(04 Marks)**

b. A rectangular section beam 200 mm × 450 mm is reinforced with 3 bars of 16 mm diameter at an effective depth of 420 mm and with 2 bars of 12 mm hanger bars. The effective span of the beam is 5 m. The beam supports a service live load of 10 kN/m. If $f_{ck} = 20$ N/mm^2, $f_y = 415$ N/mm^2. Compute: i) The short term deflection ii) The long term deflection as per IS:456 code specifications. **(16 Marks)**

Module-2

3 a. A doubly reinforced concrete beam having a rectangular section 250 mm × 540 mm overall depth is reinforced with 2 bars of 12 mm hanger bars and 4 bars of 20 mm diameter in tension zone. Use effective cover as 40 mm, M20 grade concrete, Fe 415 HYSD bars. Estimate the flexural strength of section as per codal provisions. **(10 Marks)**

b. A reinforced concrete beam of rectangular section has a width of 250 mm and an effective depth of 500 mm. The beam is reinforced with 4 bars of 25 mm diameter on the tension side. Two of the tension bars are bent up @ 45° near the support section. In addition the beam is provided with two legged stirrups of 8 mm diameter at 150 mm c/c. If fck = 25 N/mm^2, fy = 415 N/mm^2. Calculate ultimate shear strength of the section. **(10 Marks)**

OR

4 a. Determine the area of tensile reinforcement required in a flanges beam having width of flange 750 mm, width of rib 300 mm, thickness of flange 120 mm, effective depth 600 mm to support a factored moment of 300 kN-m. Use M-20 grade concrete and Fe-415 HYSD bars. **(10 Marks)**

b. A reinforced concrete beam of rectangular section 300 mm × 600 mm is reinforced with 4 bars of 25 mm diameter at an effective depth of 550 mm. The effective span of the beam is 7 m, take fy = 415 N/mm^2, fck = 20 N/mm^2. Find the uniformly distributed ultimate load on the beam. **(10 Marks)**

Module-3

5 Design a singly reinforced concrete beam of clear span 5 m to support a design working live load of 10 kN/m. Adopt M-20 grade concrete and Fe-415 HYSD bars. Sketch reinforcement details. **(20 Marks)**

OR

6 A T-beam slab floor of reinforced concrete has a slab 150 mm thick spanning between the T-beams which are spaced 3 m c/c. The beams have a clear span of 10 m and the end bearings are 450 mm thick walls. The live load acting on the floor is 4 kN/m^2. Using M-20 grade concrete, Fe 415 HYSD bars, design one of the intermediate T-beams. **(20 Marks)**

Module-4

7 Design a simply supported R.C.C slab for an office floor having clear dimensions of 4 m × 10 m with 230 mm wall all-round. Adopt M-20 grade concrete and Fe-415 HYSD bars. Show reinforcement details. **(20 Marks)**

OR

8 a. Distinguish between one way slab and two way slab. **(08 Marks)**

b. Design a dog-legged flight of stairs of a commercial building spanning between landing beans. The flight has 12 No.s steps with tread 300 mm, rise 160 mm, width of landing beams 400 mm. Use M20 grade concrete and Fe 415 HYSD bars. Sketch the reinforcement details. **(12 Marks)**

Module-5

9 a. List out different types of columns. **(04 Marks)**

b. Design the reinforcements in a circular column of diameter 300 mm with helical reinforcement to support a factored load of 1500 kN. The columns has an unsupported length of 3 m. Use M-20 grade concrete and Fe-415 HYSD bars. **(16 Marks)**

OR

10 Design a reinforced concrete footing for a rectangular column of section 300 mm × 500 mm supporting an axial factored load of 1500 kN. The SBC of the soil @ site is 185 kN/m^2. Use M-20 grade concrete and Fe 415 HYSD bars. **(20 Marks)**

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CBCS SCHEME

USN | | | | | | | | | | **18CV54**

Fifth Semester B.E. Degree Examination, Dec.2024/Jan.2025

Basic Geotechnical Engineering

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 assumed suitably.

Module-1

1 a. Starting from three phase diagram, with usual notations deduce.

$$\gamma_b = \frac{(G + S_r e)\gamma_w}{(1+e)}$$

and hence from this equation obtain the expressions for γ_d, γ_{sat} and γ_{sub}. **(10 Marks)**

b. A saturated specimen of undisturbed inorganic clay has a volume of 19.20 cm^3 and mass 32.50 gm. After overdrying at 105°C for 24 hrs, the mass reduces to 20.90 gm. For the soil in the natural state find the following:

i) Water content
ii) Dry unit weight (γ_d)
iii) Specific gravity of soil solids
iv) Voids ratio
v) Saturated unit weight (γ_{sat}). **(10 Marks)**

OR

2 a. With a neat sketch, explain Atterberg limits. **(06 Marks)**

b. Explain with a neat sketch the particle size distribution curve. **(04 Marks)**

c. A soil sample consisting of particles of size ranging from 0.5 mm to 0.01 mm is put on the surface of still water tank of 5 m deep. Calculate the time of settlement of the coarsest and finest particles of the sample, to the bottom of the tank. Assume average specific gravity of soil particles as 2.66 and viscosity of water as 0.01 poise. **(10 Marks)**

Module-2

3 a. Explain with sketches the following clay minerals:
i) Kaolinite ii) Illite iii) Montmorillonite **(09 Marks)**

b. With sketches explain briefly primary and secondary bonds. **(05 Marks)**

c. With a neat sketch, explain diffuse double layer in fine grained soils. **(06 Marks)**

OR

4 a. Discuss compaction of soils. Distinguish between standard procotor and modified proctor compaction tests. **(06 Marks)**

b. With a neat sketch, explain zero air voids line. **(04 Marks)**

c. The following results refer to a standard compaction test:

Water content (%)	10	12	14.3	16.1	18.2
Weight of soil with mould (N)	29.25	30.95	31.50	31.25	30.70

Determine the optimum moisture context and maximum dry unit weight by plotting the compaction curve. Take G = 2.70, volume of mould = 1000 cm^3 and weight of mould = 10N. **(10 Marks)**

Module-3

5 a. Explain the following:
   i) Superficial velocity
   ii) Seepage velocity. **(04 Marks)**

b. Explain briefly factors affecting permeability. **(06 Marks)**

c. In a falling head permeability test, the soil sample used is 20 cm long with a cross sectional area 24 cm^2. Calculate the time required for the head causing flow to drop from 250 mm to 120 mm. The cross sectional area of the stand pipe is 2 cm^2. The soil sample is made up of 3 layers.
The thickness of first layer from the top is 8 cm and has a value of K as 2×10^{-4} cm/sec. The second layer has thickness of 7 cm and it has $K = 5 \times 10^{-4}$ cm/sec. The bottom most layer has a K value of 7×10^{-4} cm/sec. Flow is in a direction perpendicular to the layers. **(10 Marks)**

OR

6 a. What is a flow net? What are the uses and characteristics of flow nets? **(06 Marks)**

b. Calculate the seepage loss in m^3/day for a hydraulic structure, if the flow net contains 5 flow lines and 9 equipotential lines and the head causing flow is 20 m. K of soil is 2.6×10^{-6} cm/sec. **(04 Marks)**

c. The water table in a deposit of sand 10 m thick, is at a depth of 4 m below the surface. Above the water table, the sand is saturated with capillary water. The bulk unit weight of sand is 19 kN/m^3. Calculate the effective pressures at 2 m, 4 m and 10 m below the surface. Hence plot the variation of total pressure, neutral pressure and effective pressure over the depth of 10 m. **(10 Marks)**

Module-4

7 a. Explain Mohr-Coulomb's failure theory and draw the failure envelope for different soils. **(08 Marks)**

b. In a triaxial test on two identical soil samples, the following data was obtained.

Test No	Cell pressure (kN/m^2)	Maximum deviator stress (kN/m^2)	Maximum principal stress (kN/m^2)
1	50	120	-
2	100	-	332

Compute shear parameters. **(12 Marks)**

OR

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

b. Classify shear tests based on drainage conditions. **(03 Marks)**

c. A soil has unconfined compression strength of 120 kN/m^2. In triaxial compression test, specimen of same soil (under similar conditions) when subjected to cell pressure of 40 kN/m^2, failed at an additional stress of 160 kN/m^2. Determine:
   i) Shear strength parameters
   ii) Angle made by failure plane with axial stress direction in case of triaxial test. **(12 Marks)**

Module-5

9 a. Explain with neat sketches the mass spring analogy of consolidation of soils. **(08 Marks)**

b. Explain normally consolidated soil and over consolidated soil. **(06 Marks)**

c. The thickness of a normally consolidated clay layer is 3.0 m. The initial voids ratio of the sample is 1.0 and its liquid limit is 60%. The effective over burden pressure at the middle of the clay layer was 154 kN/m^2. Due to construction of a building the increase in effective stress is 92.4 kN/m^2. Determine the consolidation settlement of the clay layer. **(06 Marks)**

OR

10 a. What are the assumptions mode in Terzaghi's theory of one-dimensional consolidation? **(04 Marks)**

b. Explain the significance of pre-consolidation pressure. Describe the Casagrande's method of determining it. **(08 Marks)**

c. In a consolidation test voids ratio decreased from 0.70 to 0.60, when the pressure changes from 50 kN/m^2 to 100 kN/m^2. Determine:

i) Compression Index
ii) Coefficient of compressibility
iii) Coefficient of volume change. **(08 Marks)**

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐

18CV55

Fifth Semester B.E. Degree Examination, June/July 2024
Muncipal Waste Water Engineering

Time: 3 hrs. Max. Marks: 100

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

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

Module-1

1 a. Explain methods of sewage disposal and systems of disposal. **(10 Marks)**

b. Define Dry and Wet weather flow and discuss the factors affecting dry and wet weather flow. **(10 Marks)**

OR

2 a. Explain man hole with sketch. **(10 Marks)**

b. With the neat sketch, explain the basic principles of house drainage works. **(10 Marks)**

Module-2

3 a. Explain Self cleaning , Non – scouring and regime velocity in sewage flow. **(10 Marks)**

b. The main sewer was designed for an area of 50km^2. Density of population of town is 200 persons/hectare. The average flow is 250 ℓpcd. The peak discharge is 1.5 times more than average flow. Rainfall equivalent of 8mm in 24 hours, all of which are runoff. Determine i) The capacity of sewer ii) Min. velocity and gradient required to transport sewage containing coarse sand of 1mm dia. through a sewer of 35cm dia, sp. Gr of particle is 2.65 and value of K = 0.06 , f = 0.03. **(10 Marks)**

OR

4 a. Explain the municipal waste water treatment process with flow diagram. **(10 Marks)**

b. What are the physical , chemical and biological characteristics of sewage? **(10 Marks)**

Module-3

5 a. Explain the importance of screens and types of screens in the sewage treatment process. **(10 Marks)**

b. Explain the i) Sewage forming ii) Grit chamber. **(10 Marks)**

OR

6 a. Explain Oxygen sag curve and zones of purification. **(10 Marks)**

b. Sewage flow of 100 cumec from a city is discharged in a perennial river which is fully saturated with oxygen and flows at a min rate of 1250 cumec with a min velocity of 0.15m/sec in the 5 day BOD of the sewage is 260mg/ℓ. Find out where the critical DO will occur in the river. Assume coefficient of purification of river as 4.0 , coefficient of DO as 0.11 , the ultimate BOD as 125% of the 5 day BOD of the mixure of sewage and river water, temp of 20ºC for which DO is 9.17mg/ℓ and DO of effluent as zero. **(10 Marks)**

Module-4

7 a. Explain Activated Sludge processes. **(10 Marks)**

b. Design a set of two circular sedimentation tanks to treat 5 Mltrs of sewage per day. Assume detention period of 2 hours. **(10 Marks)**

OR

8 a. Explain sludge digestion areas with a neat sketch. **(10 Marks)**

b. Design a low rate filter to treat 6.00 MLD of sewage of BOD of 210 mg/ℓ. The final effluent should be 30mg/ℓ and organic loading rate is 320g/m^3/d. Assume 30% of BOD load removed in primary sedimentation. **(10 Marks)**

Module-5

9 a. Explain how cost treatment process of sewage. **(10 Marks)**

b. Explain principle and design of septic tank. **(10 Marks)**

OR

10 a. Explain Eco toilets and its process. **(10 Marks)**

b. Explain Soak pit with neat sketch. **(10 Marks)**

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **18CV56**

Fifth Semester B.E. Degree Examination, Dec.2024/Jan.2025

Highway Engineering

Time: 3 hrs. Max. Marks: 100

Note: **1.** ***Answer any FIVE full questions, choosing ONE full question from each module.***
2. ***Assume the missing data, if any, suitably as per relevant code.***

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

Module-1

1 a. List the various modes of transportation. Explain the characteristics of road transport. **(06 Marks)**

b. Apply the 3rd Road development plan formulae and calculate the length of different categories of roads in a state in India by the year 2001, if the area of state is 3,68,000 Km^2. Number of towns as per 1981 census was 300. **(08 Marks)**

c. How the roads are classified based on location and function? Explain those. **(06 Marks)**

OR

2 a. What are the various factors affecting highway alignment? Explain obligatory points. With neat sketches. **(06 Marks)**

b. What do you understand about VISION 2021? Explain its salient features. **(06 Marks)**

c. There are three alternate proposals for a backward district shown below. Suggest the order of priority for phasing, based on the utility units of 0.5, 1, 2 for the three population ranges and productivity units of 1 and 5 per 1000 tonnes of agricultural and industrial products.

Road Link	Length Km	No. of village served with population range			Productivity served in 1000 tonnes	
		< 500	501-1000	1001-2000	Agricultural	Industrial
A	500	100	150	40	250	20
B	600	200	250	68	320	25
C	700	270	350	82	500	35

(08 Marks)

Module-2

3 a. Explain PIEV theory with a neat sketch. **(06 Marks)**

b. List the various objectives of providing i) Camber ii) Extra widening of pavement at curves. **(06 Marks)**

c. Calculate the stopping sight distance for a vehicle moving on a highway with a speed of 100 Kmph on i) Level road ii) On a road having 1 in 100 gradient. **(08 Marks)**

OR

4 a. Enumerate various steps for practical design of super deviation considering mixed traffic. **(06 Marks)**

b. What are the various types of gradient? Explain with standards. **(06 Marks)**

c. The speeds of overtaking and overtaken vehicles are 70 and 40 Kmph respectively, on a two way traffic road. If the acceleration of the overtaking vehicle is 0.99 m/sec^2, then calculate the safe overtaking sight distance. **(08 Marks)**

Module-3

5 a. How do you find CBR value in the laboratory? Explain the test procedure with a neat sketch. **(10 Marks)**

b. Calculate the ESWL of a dual wheel assembly carrying 2044 Kg each, for a pavement, having thickness values of 15, 20 and 25 cm. If centre to centre spacing between the two tyres = 270 mm and the clear gap between the walls of the tyres = 110 mm. **(10 Marks)**

OR

6 a. List the various properties of coarse aggregate and the tests conducted to find each property coarse aggregate. **(10 Marks)**

b. The following test data of a soil subgrade is given plot the data and determine the CBR value

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

(10 Marks)

Module-4

7 a. Explain the construction steps for cement concrete roads. **(06 Marks)**

b. Explain the functions of prime coat, tack coat and seal coat in bituminous road construction. **(06 Marks)**

c. Explain the proportioning of soil aggregate mixes by Rothfutch method. **(08 Marks)**

OR

8 a. Explain the specification of materials and the construction steps for WMM layer. **(06 Marks)**

b. Explain the various steps in Dense bituminous Macadam construction. **(06 Marks)**

c. Explain the construction procedure for WBM course. **(08 Marks)**

Module-5

9 a. Explain the various methods of sub surface drainage, with neat sketches. **(06 Marks)**

b. List the objective of i) Surface drainage ii) Sub surface drainage **(06 Marks)**

c. Explain the significance and requirements of highway drainage system. **(08 Marks)**

OR

10 a. List the various highway user benefits. **(06 Marks)**

b. Explain the various factors on which motor vehicle operating cost depends. **(06 Marks)**

c. Determine the relative economics of two types of flexible pavements by annual cost method from the following data :

Detail	Pavement Type A	Pavement Type B
Total cost per Km, Rs (lakhs)	33.00	62.00
Design life, in years	5.00	12.00
Annual rate of interest, %	10.00	9.00
Salvage value after design life, in Rs. Lakhs	20.10	30.00
Average annual maintenance cost, per Km, in lakhs	4.00	2.00

(08 Marks)

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CBCS SCHEME

21CIV57

USN | | | | | | | | | | |

Question Paper Version : A

Fifth Semester B.E./B.Tech. Degree Examination, June/July 2024
Environmental Studies

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. In an ecosystem, the flow of energy is ________.
a) Biodirectional b) Cyclic c) Unidirectional d) Multidirectional

2. Which of the following is a biotic component of an ecosystem?
a) Fungi b) Solar light c) Temperature d) Humidity

3. Which pyramid is always upright?
a) Energy b) Biomass c) Numbers d) Food chain

4. The largest reservoir of nitrogen in our planet is,
a) Oceans b) Atmosphere c) Biosphere d) Fossil fuels

5. Abiotic components include,
a) Soil b) Temperature c) Water d) All of these

6. Primary consumer is,
a) Herbivores b) Carnivores c) Macro consumers d) Omnivores

7. The word “Environment” is derived from _____.
a) Greek b) French c) Spanish d) English

8. Mineral is,
a) Organic matter b) Naturally occurring inorganic substance
c) Synthesis compound d) None of these

9. The term ecosystem was first proposed by,
a) Jacob Van Verkul b) A.G.Transley c) Costraza d) Marrie Gibbs

10. Gold occur in,
a) Sedimentary Deposits b) Places deposits
c) Hydrothermal deposits d) None of these

11. Fluorosis is caused due to,
a) No fluoride intake b) Low fluoride intake
c) Excessive fluoride intake d) None of these

12. Decrease of oxygen level in water mainly causes,
a) Fluorosis b) Death of aquatic life
c) Water pollution d) Both (b) and (c)

13. Mineral resource are,
a) Renewable b) Non-Renewable c) Equally distributed d) None of these

14. Deforestation can,
a) Increase the rainfall b) Increase Soil fertility
c) Introduce silt in rivers d) None of these

15. Plants use ________gas for photosynthesis.
a) Oxygen b) Methane c) Nitrogen d) Carbon dioxide

16. Forests prevent soil erosion by binding soil particles in their,
a) Stems b) Roots c) Leaves d) Buds

17. Nitrogen fixing bacteria exists in _____ of plants?
a) Leaf b) Roots c) Steam d) Flower

18. Which of the following is the source of ground water?
a) Oceans b) Springs c) Rivers d) All of these

19. The effluents from urban areas contain,
a) Oil and greases b) Detergents
c) Nutrients d) All of these

20. Maximum dissolved oxygen is required by,
a) Fish b) Bacteria c) Vegetables d) All of these

21. Which of the following is not a component of soil?
a) Mineral matter b) Organic matter c) Ozone d) Soil air

22. Definition of Noise is,
a) Loud sound b) Unwanted sound c) Constant sound d) Sound of high frequency

23. The Noise is measured in,
a) Decibels b) Joules c) PPM d) NTU

24. Noise pollution can be minimized by,
a) Urbanization b) Maintaining silence
c) Reducing noise at source d) None of these

25. Bursting crackers mainly causes,
a) Noise pollution b) Plastic pollution c) Marine pollution d) None of these

26. Water pollution can be minimized by,
a) Releasing sewage to ocean b) Releasing effluent to waste land
c) Treating waste water d) None of these

27. Chlorine can be used to,
a) To kill pathogenic microorganisms b) To increase the pH
c) To clear the turbidity d) All of these

28. Carbon content is higher in,
a) Soil b) Atmosphere c) Water d) Living matter

29. The depletion of trees is causing accumulation of ______.
a) NO_3 b) SO_2 c) CO_2 d) O_2

30. The adverse effect of modern agriculture is,
a) Water pollution b) Soil degradation c) Water logging d) All of these

31. E.I.A is related to,
a) Resource conservation b) Efficient Equipment process
c) Waste minimization d) All of these

32. "Earth Day" is held every year on,
a) June 5th b) November 23rd c) April 22nd d) January 26th

33. Which of the following is the most environmental friendly agriculture practice?
a) Using chemical fertilizers b) Using insecticides
c) Organic farming d) None of these

34. The diesel vehicles pollute the environmental largely through,
a) NO_x b) CO c) Unburnt hydrocarbons d) All of these

35. Which among the following is clean fuel?
a) Petrol b) Diesel c) Electricity d) CNG

36. Which among the following is not a greenhouse gas,?
a) N_2O b) CFC's c) HFA's d) None of these

37. The protocol that reduces greenhouse gas emission's are,
a) Kyoto protocol b) Cartagena protocol c) Montreal protocol d) Vienna protocol

38. Global Warming could affect,
a) Climate b) Increase in Sea level
c) Melting of glaciers d) All of these

39. Which of the following is a source of SO_2 in atmosphere?
a) Volcanoes b) Thermal power plants
c) H_2SO_4 manufacturing d) All of these

40. Atmospheric oxidation of SO_2 to SO_3 is influenced by,
a) Sunlight b) Humidity
c) Presence of hydrocarbons d) All of these

41. Acid Rain effects _____.
a) Materials b) Plants c) Soil d) All of these

42. Ozone layer is present in,
a) Troposphere b) Stratosphere c) Mesosphere d) Thermosphere

43. Which of the following is the unit for measuring the thickness of ozone layer?
a) Decibels b) Dobson unit c) Centimeter d) None of these

44. CFC's have been used as,
a) Solvents b) Refrigerants
c) Blowing agents for polymer foams d) All of these

45. Ozone hole was first discovered over,
a) Arctic b) Antarctica c) Tropical region d) Africa

46. The term acid rain was coined in the year,
a) 1952 b) 1852 c) 1652 d) 1752

47. Which of the following is not a source of CO_2 in the atmosphere?
a) Burning of fossil fuels b) Photosynthesis
c) Volcanic Eruptions d) Animal and plant respiration and decay

48. Increase in Asthma attacks has been linked to high levels of,
a) Oxygen b) Airborne dust particles
c) Nitrogen d) All of these

49. Food chain is divided into _______ basic categories.
a) Four b) Three c) Five d) Seven

50. About ¾ of the country's coal deposits are found in,
a) Karnataka b) Tamil Nadu c) Kashmir d) Bihar and Orissa.

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CBCS SCHEME

USN

21CV51

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

Hydrology and Water Resource 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 hydrologic cycle (Horton's) with process involved in it. **(10 Marks)**

b. What are the importance of hydrology with emphasis of global water availability. **(10 Marks)**

OR

2 a. Define rain gauge. Describe with a neat sketch the principle of working of Symon's non-recording gauge. **(10 Marks)**

b. A 12 – hour storm rainfall with the following depth in cm occurred over a basin :
2.0, 2.5, 7.6, 3.8, 10.6, 5.0, 7.0 10.0, 6.4, 3.8, 1.4 and 1.4.
The surface run – off resulting from the above storm is equivalent to 25.5 cm of depth over the basin. Determine the average infiltration index for the basin **(10 Marks)**

Module-2

3 a. What is runoff? List and explain Factor's affecting it. **(10 Marks)**

b. Define the following :
i) Basin recharge
ii) Direct run off
iii) Drainage density
iv) Over land flow. **(10 Marks)**

OR

4 a. Define "unit hydrograph" with the help of neat sketch explain various components of a flood hydrograph. **(10 Marks)**

b. The hourly ordinates of a two-hour unit hydrograph are given below. Derive a 6 hour unit hydrograph for the same catchment :

Time hours	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
Discharge cumecs	0.0	1.0	2.7	5.0	8.0	9.8	9.0	7.5	6.3	5.0	4.0	2.9	2.1	1.3	0.5	0.0

(10 Marks)

Module-3

5 a. Discuss the benefits and ill effects of irrigation. **(10 Marks)**

b. Explain with a neat sketch Bondhar's irrigation. List out advantages and disadvantages. **(10 Marks)**

OR

6 a. Define duty and delta. Derive the relation between them. **(08 Marks)**

b. What is irrigation efficiency? Define different efficiencies of irrigation water. **(06 Marks)**

c. What are flow irrigation and lift irrigation. Explain briefly. **(06 Marks)**

Module-4

7 a. What is canal? List its types and explain with a neat sketch its classification based on alignment. **(10 Marks)**

b. What is meant by design of canal? Bring out the difference between Kennedy's and Laccy's theory. **(10 Marks)**

OR

8 a. With sketch explain different zones of a storage reservoir. **(10 Marks)**

b. Explain hydrological investigations of reservoir planning. List the points to be considered for selection of a site for a reservoir. **(10 Marks)**

Module-5

9 a. Explain causes of floods and what are the methods adopted to flood alleviation. (control of floods). **(10 Marks)**

b. Explain how flood damage analysis is estimated. **(10 Marks)**

OR

10 a. Explain the Drought? Explain the causes of drought and measures for water conservation. **(10 Marks)**

b. Explain the different methods of rainwater harvesting. **(10 Marks)**

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USN ☐☐☐☐☐☐☐☐☐☐ **21CV52**

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

Transportation Engineering

Time: 3 hrs. Max. Marks: 100

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

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

Module-1

1 a. Explain the characteristics of Road transport in comparison with other transport. **(06 Marks)**

b. What is Jayakar Committee and what are its recommendation? How is it implemented? **(06 Marks)**

c. Determine the length of different categories of roads in a state in India using the 3rd road development plan formulae and the given data :
i) Total area of the State = 4,30,000 Sq. km.
ii) Total number of towns = 550.
iii) Overall road Density aimed at = 75km/100 km^2. **(08 Marks)**

OR

2 a. List the factors affecting the Alignment. Briefly explain the Engineering surveys for Highway alignment. **(06 Marks)**

b. List the silent features of : i) KSHIP ii) NHDP. **(06 Marks)**

c. Fix the priority for the following system of roads assuming suitable population and productivity units : **(08 Marks)**

Road Link	Length (km)	Number of villages with population served			Productivity served in Tonnes	
		<1000	1001 to 2000	> 2000	Agriculture	Industrial
A	35	18	14	6	26000	10000
B	28	13	8	5	16000	12000
C	21	12	5	3	10000	14000

Module-2

3 a. Explain briefly any two important surface characteristics influencing highway geometric design. **(06 Marks)**

b. Define Super Elevation. Derive an expression for super elevation with neat sketch. **(08 Marks)**

c. Determine SSD on a : i) Level road ii) Down grade of 1 in 120.
Take t = 2.5 secs , f = 0.35 , v = 80 kmph. **(06 Marks)**

OR

4 a. Draw a neat sketch of flexible pavement cross – section and show the component parts. Enumerate the functions of each components of the pavement. **(10 Marks)**

b. Explain 'ESWL' and the graphical method of determination of ESWL for dual wheel assembly. **(10 Marks)**

Module-3

5 a. List the soil classification systems and explain briefly the HRB soil classification system. **(07 Marks)**

b. What are the desirable properties of road aggregates? Mention the laboratory tests conducted to determine the property. **(07 Marks)**

c. Distinguish between cutback and emulsion and list the tests on Bitumen. **(06 Marks)**

OR

6 a. Explain the procedure involved in the preparation of sub – grade layer along with quality control tests. **(10 Marks)**

b. Explain step by step procedure for construction of :
i) Water Bound Macadam ii) Bituminous concrete. **(10 Marks)**

Module-4

7 a. Explain the significance and requirements of a Highway Drainage System. **(10 Marks)**

b. With a neat sketch, explain lowering of water table and control of capillary risc. **(10 Marks)**

OR

8 a. Explain briefly the quantifiable and non – quantifiable benefits for a highway user. **(10 Marks)**

b. Write a note on : i) BOT ii) BOOT iii) VOC. **(10 Marks)**

Module-5

9 a. In detail explain the road user characteristics. **(10 Marks)**

b. Discuss the various traffic studies and what are the objectives of carrying out traffic volume studies. **(10 Marks)**

OR

10 a. Define Permanent way. Draw the neat diagram of cross – sectional view of permanent way and describe the component parts. **(10 Marks)**

b. Draw a neat sketch of layout of an airport and explain the functions of each component. **(10 Marks)**

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **21CV53**

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

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. Used of US 456 – 200, SP 16 is permitted
3. Missing data, if any, may be suitably assumed.

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

Module-1

1 a. Distinguish between working stresses and limit state methods design. **(08 Marks)**

b. Write a brief note on :
- i) Balanced section
- ii) Under reinforced section
- iii) Deflection
- iv) Cracking. **(12 Marks)**

OR

2 a. Define long-term and short-time deflection. What are the factors influencing the long-term and short-term. **(08 Marks)**

b. A simply supported beam of rectangular section spans over 8m and has an effective depth of 600 mm. The beam is reinforced with 1% reinforcement on the tension side. Check for the deflection control of the beam by empirical method if :
- i) Fe – 250 grade steel
- ii) Fe – 415 grade steel
- iii) Fe – 500 grade steel. **(12 Marks)**

Module-2

3 What are the steps involved in the analysis of design, when the following area given, A_{st} or number of bars with diameter(ϕ) of bars, size of beam, grade of concrete, and steel, if load to be calculated then span is given. **(20 Marks)**

OR

4 a. Find the depth of neutral axis of a singly reinforced RC bema of 250 mm width and 500 mm effective depth. It is reinforced with 4 bars of 20 mm diameter. Use M20 concrete and FE 415 bars. Also check for type of section. **(10 Marks)**

b. A singly reinforced concrete beam 250 mm width is reinforced 4 bars of 25 mm diameter at an effective depth of 400 mm. If M20 grade concrete and Fe 415 bars are used, compute ultimate moment of resistance of the section. **(10 Marks)**

Module-3

5 List and enumerate general specification for flexure design of beams. **(20 Marks)**

OR

6 Design the T –beam as per IS : 456 – 2000. The beam is subjected to an ultimate moment of 400 kN-m. Use M20 concrete and Fe 415 steel. Following are the parameters which are used for design. b_f = 800 mm, b_w = 200 mm, D_f = 100 mm, d = 400 mm. **(20 Marks)**

Module-4

7 Design a simply supported slab on masonry walls to the following requirements. Draw plan and section showing reinforcement details.
Clear span = 2.5 m
Live load = 300 N/m^2
Use M-20 concrete and Fe-415 steel. **(20 Marks)**

OR

8 Design a dog-legged staircase for a building in which the vertical distance between floors is 3.6m. The stair hall measures 3m × 6m. Take live load on the stairs is 4 kN/m^2. The flight are supported on 230 mm walls at the ends of outer edges. So, that it spans in the direction of going. Adopt M20 concrete and Fe-415 grade steel. Sketch the reinforcement details. **(20 Marks)**

Module-5

9 a. Distinguish between short column and long column. **(10 Marks)**
b. What are the assumptions made for the limit state of collapse in compression? **(10 Marks)**

OR

10 Design on RCC short square column to the following particulars.
Axial load = 1200 kN
Grade of concrete = M-20
Length of column = 1.85m
Grade of steel = Fe-415
Sketch the reinforcement details. **(20 Marks)**

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **21CV54**

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

Geotechnical Engineering

Time: 3 hrs. Max. Marks: 100

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

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

Module-1

1 a. Define the following with the help of three phase diagram :
- i) Specific gravity
- ii) Air content
- iii) Degree of saturation
- iv) Voids ratio
- v) Water content. **(10 Marks)**

b. With usual notations prove that eS = wG. **(04 Marks)**

c. An undistrabed sample of soil has volume of 100cm^3 and mass of 100 g. On oven drying for 24 hours, the mass is reduced to 160 g, if the specific gravity of grains is 2.68. Determine the water content, voids ratio and degree of saturation of the soil. **(06 Marks)**

OR

2 a. Explain determination of in situ – density by sand replacement method. **(10 Marks)**

b. Explain soil classification according to BIS classification. **(06 Marks)**

c. Explain the particle size distribution curve. **(04 Marks)**

Module-2

3 a. Explain factors affecting permeability of soil. **(10 Marks)**

b. With neat sketch explain constant head permeability and falling head permeability test. **(10 Marks)**

OR

4 a. Explain permeability of stratified soil deposits for both the cases. **(10 Marks)**

b. Write short notes on following :
- i) Effective stress
- ii) Total stress
- iii)Neutral stress. **(06 Marks)**

c. In a falling head permeatmeter test, the initial head (t = 0) is 40 cm. The head drops by 5 cm in 10 minutes. Calculate th time required to run the test for the final head to be at 20 cm. If the sample is 6 cm is height and 50 cm^2 in cross – sectional area, Calculate the co-efficient of permeability, taking area of stand pipe is 0.5 cm^2. **(04 Marks)**

Module-3

5 a. Explain factors affecting compaction of soil. **(10 Marks)**

b. With neat sketch explain standard proctor test. **(10 Marks)**

OR

6 a. Explain mass spring analogy. **(10 Marks)**
b. With a neat sketch explain laboratory consolidation test. **(10 Marks)**

Module-4

7 a. With a neat sketch explain direct shear test. **(10 Marks)**
b. Explain Mohr – coulomb failure theory. **(10 Marks)**

OR

8 a. With a neat sketch explain Triaxial compression test. **(10 Marks)**
b. Explain factors affecting shear strength of soils. **(05 Marks)**
c. Explain Thixotrophy and sensitivity. **(05 Marks)**

Module-5

9 a. Explain the assumptions of Terzagh's analysis for bearing capacity of soil. **(07 Marks)**
b. Explain effect of water table on bearing capacity of soil **(08 Marks)**
c. Explain factors affecting bearing capacity of soil. **(05 Marks)**

OR

10 a. Explain types of settlements. **(10 Marks)**
b. Estimate the immediate statement of a concrete footing 1.5m × 1.5 m in size founded at a depth of 1 m in silty soil whose modulus of elasticity is 90 kg/cm^2. The footing is expected to transmit a unit pressure of 200 kN/m^2. **(05 Marks)**
c. Explain effect of eccentricity of loading for bearing capacity of soil. **(05 Marks)**

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **BCV501**

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

Construction Management and Entrepreneurship

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	**M**	**L**	**C**
Q.1	**a.**	Explain in detail construction project formulation.	**10**	**L2**	**CO1**
	b.	The activity data of a project is given below:	**10**	**L3**	**CO1**

Activity	Preceding activity	Duration (Days)
A	-	05
B	-	15
C	-	09
D	A	06
E	C	04

Draw the network diagram, identify the critical path, project duration and free float.

		OR			
Q.2	**a.**	What is Work Breakdown Structure (WBS)? Mention its significance in construction project.	**10**	**L2**	**CO1**
	b.	Below given table pertains to the list of activities and their time estimates of a job:	**10**	**L3**	**CO1**

Activity	Event	Optimistic time (days)	Most likely time (days)	Pessimistic time (days)
A	1 – 2	3	7	10
B	1 – 3	4	8	13
C	2 – 4	2	2	07
D	3 – 4	5	8	10

Draw the network and critical path. What is the expected completion time with the probability of 85%? (Take probability factor Z = 1.038)

		Module – 2			
Q.3	**a.**	Discuss on Class of Labour. What are the key factors of minimum wages act 1948?	**10**	**L2**	**CO2**
	b.	List the factors affecting Labour productivity? Briefly discuss any three factors.	**10**	**L2**	**CO2**
		OR			
Q.4	**a.**	Enumerate the factors to be considered for selection of Construction Equipment.	**10**	**L2**	**CO2**
	b.	Explain material management and inventory management.	**10**	**L2**	**CO2**
		Module – 3			
Q.5	**a.**	Explain types of procurement and procurement planning.	**10**	**L2**	**CO3**
	b.	Explain the sustainable procurement management.	**10**	**L2**	**CO3**
		OR			
Q.6	**a.**	Explain the different types of construction contracts.	**10**	**L2**	**CO3**
	b.	Define contractor and subcontractor. Explain the effective sub contractor management.	**10**	**L2**	**CO3**

		Module – 4			
Q.7	**a.**	Explain the process of construction project quality management.	**10**	**L2**	**CO4**
	b.	Explain the safety measures adopted during construction.	**10**	**L2**	**CO4**
		OR			
Q.8	**a.**	Explain Safety Management and Risk Management.	**10**	**L2**	**CO4**
	b.	Explain the terms: i) Facilities Management ii) Occupancy certificate	**10**	**L2**	**CO4**
		Module – 5			
Q.9	**a.**	Explain the different characteristics of a Successful Entrepreneur.	**10**	**L2**	**CO5**
	b.	Explain 5M model and communication skills.	**10**	**L2**	**CO5**
		OR			
Q.10	**a.**	Explain the Business Planning process, Marketing Plan and Financial Plan.	**10**	**L2**	**CO5**
	b.	Explain the role and significance of venture capital.	**10**	**L2**	**CO5**

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐

BCV502

Fifth Semester B.E./B.Tech. Degree Examination, June/July 2024

Geotechnical Engineering

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

<table>
<tr><th colspan="3">Module – 1</th><th>M</th><th>L</th><th>C</th></tr>
<tr><td>Q.1</td><td>a.</td><td>With neat sketch of 3 phase system of soil. Explain dry soil, partially saturated soil and fully saturated soil.</td><td>6</td><td>L1</td><td>CO1</td></tr>
<tr><td></td><td>b.</td><td>Derive the relationship: $WG = S_r e$</td><td>6</td><td>L2</td><td>CO1</td></tr>
<tr><td></td><td>c.</td><td>A fully saturated sample has water content of 25% and unit weight of $20 kN/m^3$. Calculate:
i) Dry unit weight
ii) Specific gravity
iii) Porosity
iv) Unit weight, when degree of saturation is 80%.</td><td>8</td><td>L3</td><td>CO1</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td>Q.2</td><td>a.</td><td>Explain the different types of soil structures with neat sketch.</td><td>4</td><td>L2</td><td>CO1</td></tr>
<tr><td></td><td>b.</td><td>Explain IS plasticity chart with neat sketch.</td><td>6</td><td>L2</td><td>CO1</td></tr>
<tr><td></td><td>c.</td><td>In a sieve analysis test, the weight retained on each sieve is as given below, classify the soil.
<table>
<tr><th>Soil type</th><th>A</th><th>B</th></tr>
<tr><td>% passing through 75 μm sieve</td><td>4%</td><td>52%</td></tr>
<tr><td>% passing through 4.75 mm sieve</td><td>74%</td><td>36%</td></tr>
<tr><td>D_{10} mm</td><td>0.40</td><td></td></tr>
<tr><td>D_{30} mm</td><td>1.00</td><td></td></tr>
<tr><td>D_{60} mm</td><td>2.00</td><td></td></tr>
<tr><td>Liquid limit (W_L)</td><td>-</td><td>75%</td></tr>
<tr><td>Plastic limit (W_P)</td><td>-</td><td>30%</td></tr>
</table></td><td>10</td><td>L2</td><td>CO1</td></tr>
<tr><td colspan="6">Module – 2</td></tr>
<tr><td>Q.3</td><td>a.</td><td>Explain Darcy's law with assumptions and limitations.</td><td>6</td><td>L2</td><td>CO4</td></tr>
<tr><td></td><td>b.</td><td>List and explain factors affecting permeability of soil.</td><td>6</td><td>L2</td><td>CO4</td></tr>
<tr><td></td><td>c.</td><td>A permeameter of diameter 75 mm contains a column of fine sand 400 mm long. When water flows through under constant head at the rate of 60 ml in 60 sec, the loss of head between two points 250 mm apart is 375 mm. Determine the coefficient of permeability (k). If a variable head test is made on the same soil sample using a stand pipe of diameter 30 mm. Estimate the time required for the water level in the stand pipe to fall from 1600 to 1560 mm above the outflow level.</td><td>8</td><td>L3</td><td>CO4</td></tr>
</table>

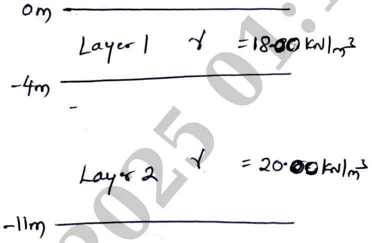
<table>
<tr><td colspan="6">OR</td></tr>
<tr><td>Q.4</td><td>a.</td><td>What is meant by total stress, neutral stress and effective stress?</td><td>6</td><td>L1</td><td>CO2</td></tr>
<tr><td></td><td>b.</td><td>What is flow net? Mention its applications.</td><td>6</td><td>L2</td><td>CO2</td></tr>
<tr><td></td><td>c.</td><td>For the soil deposit shown below, draw the total stress, pore water pressure and effective stress diagrams. Assume the water table is at ground level.


Fig.Q.4(c)</td><td>8</td><td>L3</td><td>CO2</td></tr>
<tr><td colspan="6">Module – 3</td></tr>
<tr><td>Q.5</td><td>a.</td><td>Differentiate between standard proctor test and modified proctor test.</td><td>6</td><td>L2</td><td>CO2</td></tr>
<tr><td></td><td>b.</td><td>What are the effects of compaction on soil properties? Explain.</td><td>6</td><td>L1</td><td>CO2</td></tr>
<tr><td></td><td>c.</td><td>The following data was obtained from a proctor compaction test:
<table>
<tr><td>Water content (%)</td><td>5.90</td><td>7.50</td><td>9.7</td><td>11.65</td><td>13.85</td></tr>
<tr><td>Weight of wet sample (N)</td><td>18.20</td><td>19.50</td><td>20.10</td><td>20.00</td><td>19.70</td></tr>
</table>
Assume G = 2.7, volume of mould = 9.5×10^{-4} m^3.
Plot the compaction curve. Determine OMC and MDD. Also plot Zero Air voids line.</td><td>8</td><td>L3</td><td>CO2</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td>Q.6</td><td>a.</td><td>Explain the concept of consolidation by mass spring analogy.</td><td>6</td><td>L2</td><td>CO2</td></tr>
<tr><td></td><td>b.</td><td>Explain the Terzaghi’s consolidation theory with its limitations.</td><td>6</td><td>L2</td><td>CO2</td></tr>
<tr><td></td><td>c.</td><td>The time to reach 40% consolidation of a two way drained laboratory 12 mm thick saturated clayey soil sample is 40 sec. Determine the time required for 60% consolidation of the same soil of 10 m thick on the top of a rocky surface subjected to the same loading conditions as laboratory sample.</td><td>8</td><td>L3</td><td>CO2</td></tr>
<tr><td colspan="6">Module – 4</td></tr>
<tr><td>Q.7</td><td>a.</td><td>Explain assumptions of Mohr’s strength theory and mention its limitations.</td><td>6</td><td>L2</td><td>CO3</td></tr>
<tr><td></td><td>b.</td><td>Explain the factors affecting shear strength of soil.</td><td>6</td><td>L2</td><td>CO3</td></tr>
<tr><td></td><td>c.</td><td>An unconfined compression test was conducted on an undisturbed sample of clay. The sample had a diameter of 38 mm and was 80 mm long. The load at failure measured as 30 N and the axial deformation of the sample at failure was 12 mm. Determine the unconfined compressive strength and undrained shear strength of clay, if failure angle = 50°.</td><td>8</td><td>L3</td><td>CO3</td></tr>
</table>

<table>
<tr><td colspan="6">OR</td></tr>
<tr><td>Q.8</td><td>a.</td><td>Briefly explain different drainage conditions of triaxial shear test.</td><td>6</td><td>L2</td><td>CO3</td></tr>
<tr><td></td><td>b.</td><td>Mention any 4 advantages of triaxial shear test.</td><td>4</td><td>L1</td><td>CO3</td></tr>
<tr><td></td><td>c.</td><td>A consolidated undrained test was carried out on a clayey sample and the results are as follows. Find total and effective shear parameters of soil.
<table><tr><td>Cell pressure, kN/m^2</td><td>100</td><td>200</td><td>400</td><td>600</td></tr><tr><td>Deviator stress, kN/m^2</td><td>300</td><td>410</td><td>610</td><td>850</td></tr><tr><td>Pore water pressure, kN/m^3</td><td>-45</td><td>-15</td><td>50</td><td>110</td></tr></table></td><td>10</td><td>L3</td><td>CO3</td></tr>
<tr><td colspan="6">Module – 5</td></tr>
<tr><td>Q.9</td><td>a.</td><td>Explain the assumptions of Terzaghi's bearing capacity theory.</td><td>6</td><td>L2</td><td>CO4</td></tr>
<tr><td></td><td>b.</td><td>Differentiate between general shear failure, local shear failure, punching shear failure.</td><td>6</td><td>L2</td><td>CO4</td></tr>
<tr><td></td><td>c.</td><td>What will be the gross and net safe bearing pressure of sand having $\phi = 40°$, unit weight of sand = 19 kN/m^3 under i) 1.2 m wide strip footing ii) 1.2 m square footing.
Assume the footings are placed at a depth of 1.2 m below G.L and water table is at greater depth. Also assume F.O.S. = 3 and $N_c = 95.7$, $N_q = 81.3$, $N_y = 100.4$.</td><td>8</td><td>L3</td><td>CO4</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td>Q.10</td><td>a.</td><td>Differentiate immediate settlement, consolidation and secondary settlements.</td><td>6</td><td>L2</td><td>CO4</td></tr>
<tr><td></td><td>b.</td><td>Give the tolerance limits as per BIS specifications for total and differential settlements for footing and rafts.</td><td>8</td><td>L2</td><td>CO4</td></tr>
<tr><td></td><td>c.</td><td>A clayey stratum of 5 m thick has a unit weight of 15 kN/m^3 water content of 43% liquid limit = 80%, specific gravity G = 2.7. Initial overburden pressure due to old structure is 300 kN/m^2, due to construction of a building stress increased to 120 kN/m^2. Determine the consolidation settlement.</td><td>6</td><td>L3</td><td>CO4</td></tr>
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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **BCV503**

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

Concrete Technology

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use IS : 456-2000, IS 10262 : 2019 are permitted.
3. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	**M**	**L**	**C**
Q.1	**a.**	Explain the chemical composition of ordinary Portland cement.	**10**	**L2**	**CO1**
	b.	Describe : i) Rapid Hardening Cement (RHC) ii) Sulphate Resisting Cement (SRC)	**10**	**L2**	**CO1**
		OR			
Q.2	**a.**	Describe briefly the classification of Aggregates.	**10**	**L2**	**CO1**
	b.	Explain the effects of fly ash and silica fresh concrete.	**10**	**L2**	**CO1**
		Module – 2			
Q.3	**a.**	Briefly explain which are the factors affecting workability.	**10**	**L2**	**CO2**
	b.	Briefly, explain any 2 lab test to measure the workability of fresh concrete.	**10**	**L2**	**CO2**
		OR			
Q.4	**a.**	Briefly explain the necessity of compaction of concrete. Also explain different methods such as Hand Compaction and compaction by needle vibrator.	**10**	**L2**	**CO2**
	b.	Explain the need for curing of concrete. Also what is water curing and membrane curing?	**10**	**L2**	**CO2**
		Module – 3			
Q.5	**a.**	Explain creep of concrete and factors affecting creep of concrete.	**10**	**L2**	**CO3**
	b.	Explain Shrinkage of concrete. Also explain plastic shrinkage and drying shrinkage of concrete.	**10**	**L2**	**CO3**
		OR			
Q.6	**a.**	Describe Sulphate attack and Chloride attack on Hardened concrete.	**10**	**L2**	**CO3**
	b.	Explain : i) Rebound Hammer test ii) Ultrasonic pulse velocity.	**10**	**L2**	**CO3**
		Module – 4			
Q.7		Explain Significance of concrete mix design and write the steps involved in concrete mix design as per IS code and also discuss the variables in proportioning of concrete.	**20**	**L2**	**CO4**

		OR			
Q.8		Design a concrete mix for grade M_{25} a) Grade designation → M-25 b) Type of cement → OPC 53 grade c) Maximum nominal Aggregate size → 20mm d) Minimum cement content → 310 Kg/m^3 e) Maximum water cement ratio → 0.45 f) Workability → 50-75 mm (Slump) g) Exposure condition → Normal h) Degree of supervision → Good i) Type of aggregate → Crushed angular aggregate j) Maximum cement content → 540 Kg/m^3 k) Chemical admixture type → Super plasticizer l) Specific gravity of cement → 3.15 m) Specific gravity of water → 1.0 n) Specific gravity of C.A → 2.882 o) Water absorption of C.A → 1% p) Free surface moisture : NiL q) Specific gravity of fine aggregate : 2.605 r) Water absorption of fine aggregate : 1.23% s) Free surface moisture of F.A : Nil.	**20**	**L3**	**CO4**
		Module – 5			
Q.9	**a.**	Explain the manufacturing process of Ready mix concrete.	**10**	**L2**	**CO5**
	b.	Explain the concept of Self Compacting Concrete (SCC). And its advantages and disadvantages of SCC.	**10**	**L2**	**CO5**
		OR			
Q.10	**a.**	What is light weight concrete? Explain different materials used in light weight concrete.	**10**	**L2**	**CO5**
	b.	Explain : i) High strength concrete ii) High performance concrete.	**10**	**L2**	**CO5**

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CBCS SCHEME

USN | | | | | | | | | |

BCV515C

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

Solid Waste Management

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	**M**	**L**	**C**
Q.1	**a.**	Briefly, discuss the policies and Legislative framework of solid waste management.	**10**	**L2**	**CO1**
	b.	Briefly explain the classification in solid waste management.	**10**	**L2**	**CO1**
		OR			
Q.2	**a.**	Discuss the Role of stakeholders in solid waste management.	**10**	**L2**	**CO2**
	b.	Discuss the need of solid waste management and explain the concept of 3R.	**10**	**L2**	**CO2**
		Module – 2			
Q.3	**a.**	Explain the various factors affecting the solid waste generation.	**10**	**L2**	**CO2**
	b.	Briefly, explain the physical properties of municipal solid waste.	**10**	**L2**	**CO2**
		OR			
Q.4	**a.**	Briefly, explain the different methods to estimate the quantity of waste generated.	**10**	**L2**	**CO2**
	b.	Briefly, explain the chemical and Biological properties of solid waste.	**10**	**L2**	**CO2**
		Module – 3			
Q.5	**a.**	Distinguish between Haulid container system and stationary container system with a schematic diagram.	**10**	**L2**	**CO2**
	b.	What are transfer stations? Briefly explain any two types of Transfer station.	**10**	**L1**	**CO2**
		OR			
Q.6	**a.**	Briefly, discuss the types of solid waste collection services and outline the importance of onsite processing.	**10**	**L2**	**CO2**
	b.	Briefly explain the following : i) Collection vehicle ii) Types of storage containers.	**10**	**L2**	**CO2**
		Module – 4			
Q.7	**a.**	Define RDF. Explain the steps unvalued in RDF.	**10**	**L1**	**CO3**
	b.	What is comporting? Explain the Bangalore method of computing with neat sketch.	**10**	**L1**	**CO3**

		OR			
Q.8	**a.**	What are the factors to be considered while designing a land fill?	**10**	**L2**	**CO3**
	b.	What is incineration? Discuss the advantages and disadvantages of incineration?	**10**	**L2**	**CO5**
		Module – 5			
Q.9	**a.**	Briefly explain the effects and disposal methods of E-waste.	**10**	**L2**	**CO3**
	b.	Explain the effects and disposal of construction and demolition waste.	**10**	**L1**	**CO3**
		OR			
Q.10	**a.**	Explain the classification of Biomedical wastes.	**10**	**L1**	**CO3**
	b.	Explain the Life Cycle Assessment in waste management.	**10**	**L1**	**CO3**

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐

18CV61

Sixth Semester B.E. Degree Examination, Dec.2024/Jan.2025

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. Use of IS-800-2007 code book, steel tables are permitted.

Module-1

1 a. What are the advantages and disadvantages of using steel structures? **(06 Marks)**

b. Explain different types of limit states. **(06 Marks)**

c. Explain various types of loads and load combinations to be used in design of steel structures. **(08 Marks)**

OR

2 a. Find the shape factor and plastic moment capacity for the section shown in the below Fig.Q2(a).

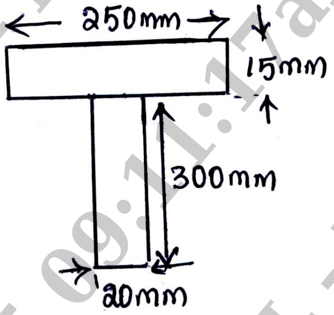

Fig.Q2(a) **(08 Marks)**

b. Explain the following :
i) Plastic hinge
ii) Collapse Mechanism **(04 Marks)**

c. Compute plastic moment capacity required for continuous beam shown in Fig.Q2(c). Take load factor as 1.5. Assume M_p constant for all span.

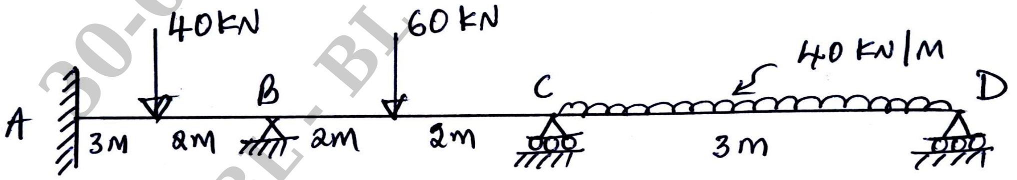

Fig.Q2(c) **(08 Marks)**

Module-2

3 a. What are the advantages and disadvantages of bolted connection? **(06 Marks)**

b. Find the efficiency of the lap joint shown in the Fig.Q3(b). Given M_{20} bolts of 4.6 grade, Fe_{410} plates are used.

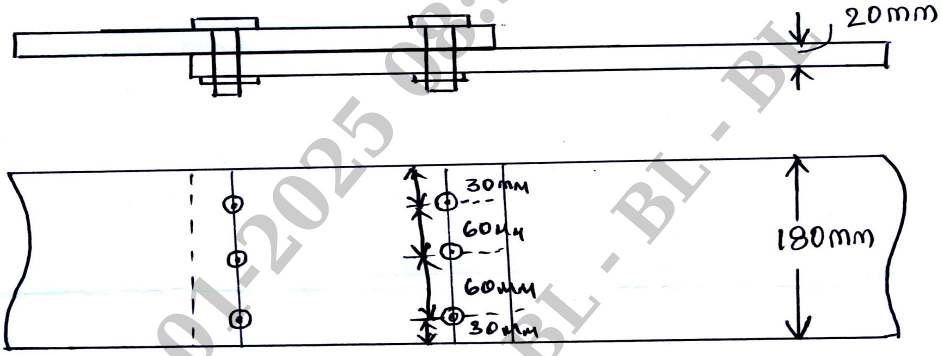

Fig.Q3(b) **(14 Marks)**

OR

4 a. What are the advantages of welded connection? Also mention the disadvantages of welded connection. **(06 Marks)**

b. Determine the minimum load that can be resisted by the bracket shown in the Fig.Q4(b) by filled weld of size 6 mm for shop weld.

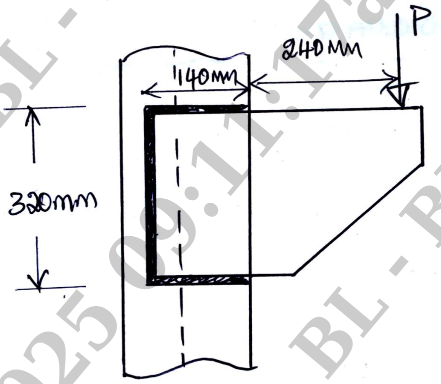

Fig.Q4(b) **(14 Marks)**

Module-3

5 a. Explain modes of failure of compression members. **(06 Marks)**

b. Design a double angle strut to carry an axial factored load of 240 kN. The axial length of strut is 3m. Bolted connections are to be used to connect it to 12 mm gusset plate. Draw the connection details. **(06 Marks)**

c. Design a compression member using double channel section to carry a load of 1500 kN. The height of the column is 6 m and both ends are fixed. Channels are arranged back to back. **(08 Marks)**

OR

6 Design a built up column using a pair of I-section placed at a suitable spacing to support a load of 1600 kN. Height of the column is 7 m with both ends of the column restrained in position and direction. Also design a suitable lacing system to the built up column. Also draw the plan and elevation. **(20 Marks)**

Module-4

7 a. Explain various design strength of tension members with neat sketch. **(08 Marks)**

b. Design a tension member using single angle section to carry a load of 200 kN (working). Also design suitable bolted connection using M_{20} property class 4.6 black bolts. Also check for slenderness ratio when member is subjected to reversal of stresses due to wind load. Take length = 2.5 m. **(12 Marks)**

OR

8 a. A diagonal member of a roof truss carries a pull of 300 kN. Design the section and its connections with a 16mm thick gusset plate. The length of the connection is limited to 340 mm. Design the lug angles also. Take Fe410 grade steel and bolts of grade 4.6 are to be used. **(10 Marks)**

b. Design a slab base for a column ISHB@577 N/M carrying an axial factored load of 1000 kN. M_{20} concrete is used for the foundation. Provide welded connection between column and base plate. **(10 Marks)**

Module-5

9 a. What do you mean by web buckling and web crippling? **(06 Marks)**

b. Design a simply supported beam of 7 m span carrying a reinforced concrete floor capable of providing lateral restraint to the top compression flange. Take uniformly distributed load on the beam as 100 kN and self weight and imposed load as 150 kN. In addition the beam carries a point load of 100 kN (50 kN DL + 50 kN LL) at mid span. (Assume a stiff bearing length 75 mm) **(14 Marks)**

OR

10 A roof of a hall measuring (8 × 12)m consisting of 100 mm thick RCC slab supported on steel I-beam spaced 3 m c/c. The finished load may be taken as 1.5 kN/m^2 and LL of 1.5 kN/m^2. Design the steel beam. **(20 Marks)**

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **18CV62**

Sixth Semester B.E. Degree Examination, Dec.2024/Jan.2025

Applied Geotechnical 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.

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

Module-1

1 a. List the objectives of subsoil exploration. **(06 Marks)**

b. Differentiate between
i) Sampling and sounding ii) Disturbed and Undisturbed samples. **(08 Marks)**

c. A sampling tube has inner diameter 70 mm with inner diameter of cutting edge being 68 mm. Their outer diameters are 72 and 74 mm respectively. the tube is pushed at the bottom of a bore hole to a distance of 550 mm and the soil sample length recovered from the sample is 530 mm. Determine area ratio, inside clearance, outside clearance and recovery ratio. Comment on the type of sampler. **(06 Marks)**

OR

2 a. Explain with a neat sketch, the seismic retraction method of soil exploration. **(06 Marks)**

b. List the different methods of lowering GWT in an excavation. Explain any two methods. **(06 Marks)**

c. To establish the location of GWT in a clayey strata, water in the bore hole is boiled out to a depth of 12 m below ground surface, Rise in water was recorded at 24 hrs interval as below:
First day = 0.6 m ; Second day = 0.55 m ; Third day = 0.5.
Estimate the position of GWT. **(08 Marks)**

Module-2

3 a. Enlist the assumptions made in deriving Boussinesq's equation. What are its limitations? **(06 Marks)**

b. Explain in brief, the construction principle and use of Newmark's chart. **(08 Marks)**

c. A water tank is supported on a ring foundation having outer diameter of 10m and inner diameter of 8 m. The intensity of loading on the foundation is 150 kN/m^2. What is the vertical stress at a depth of 5 m below the centre of foundation? **(06 Marks)**

OR

4 a. Differentiate between :
(i) Immediate and consolidation settlements
(ii) Total and differential settlements. **(06 Marks)**

b. How differential settlements are detrimental to structure? What is the BIS specification for differential settlement? **(06 Marks)**

c. A proposed new building is underlaid by 8 m thick clay layer. The existing overburden pressure at the centre of clay layer is 300 kN/m^2. The stress due to construction of a new building increases by 150 kN/m^2. The liquid limit of the soil is 65%. Water content of soil is 50%. Specific gravity of soil grains is 2.65. Estimate the consolidation settlement. **(08 Marks)**

Module-3

5 a. Define and write down the equations for coefficient of earth pressure for active, passive and at rest conditions. **(06 Marks)**

b. Explain step-by-step procedure of Culmann's graphical construction for the determination of active earth pressure. **(06 Marks)**

c. A vertical retaining wall 6 m high retains a horizontal backfill with a surcharge load of 45 kN/m^2. The soil properties ate as below:

For the 1st 3m height : $\phi_1 = 36°$; $\gamma_1 = 19.8$ kN/m^3
For the 2nd 3m height : $\phi_2 = 32°$; $\gamma_2 = 19$ kN/m^3
(bottom portion)

Find the magnitude and position of active earth pressure. **(08 Marks)**

OR

6 a. Define infinite and finite slopes. With neat sketches, discuss the types of failures encountered in finite slopes. **(06 Marks)**

b. Explain Swedish slip circle method for determining FS of a finite slope in C-ϕ soils. **(08 Marks)**

c. A canal has to excavated through a soil strata having $C_u = 15$ kN/m^2, $\phi_u = 20°$, e = 0.9 and G = 2.67. The side slope of canal is 1:1 and depth of canal is 6 m. Find the FS with respect to cohesion when canal runs full. Also find the factor of safety when the canal is rapidly emptied. Use stability numbers 0.06 and 0.114 for canal full and canal empty condition respectively. **(06 Marks)**

Module-4

7 a. With neat sketches, explain the modes of shear failure. **(05 Marks)**

b. Enlisting the assumptions of Terzaghi's b.c. theory. Write down the general b.c. equation. **(06 Marks)**

c. What will be the gross and net safe bearing pressure of sand having $\phi = 36°$, $\gamma = 19$ kN/m^3 under :

(i) 1.2 m wide strip footing?
(ii) 1.2 m wide square footing?
(iii) 1.2 m diameter circular footing?

Assume that the footing is placed at 1.2 m below ground surface and W.T. is at great depth. Use Terzaghi's b.c. equations with $N_q = 47$ and $N_r = 43$. **(09 Marks)**

OR

8 a. Explain the concept of 'useful width' for designing footings with eccentric load. **(06 Marks)**

b. Explain IS procedure for conducting plate load test. Discuss the validity of the result in the design of foundation. **(06 Marks)**

c. Calculate the safe load carried by a square footing of side 1.2 m located at a depth of 1 m. The soil properties are : C = 15 kN/m^2 , $\gamma = 18$ kN/m^3 , $\phi = 25°$, $\gamma_{sat} = 20$ kN/m^3. What will be the change in the load, if W.T. rises to GL.

Take $N_q = 10$, $N_c = 20$ and $N_\gamma = 5$ for $\phi = 25°$ and FS = 3. **(08 Marks)**

Module-5

9 a. Explain the classification of piles on the basis of material used, method of installation and its function. **(06 Marks)**

b. What is an underreamed piles? Indicate the situation where it is used. **(06 Marks)**

c. A 12 m long, 300 mm diameter pile is driven in uniform deposit of sand with $\phi = 40°$. The water table is at great depth. The unit weight of sand is 18 kN/m^3. Using $N_q = 137$, calculate the safe load carrying capacity of single pile with a FS = 2.5 and $\delta = 30°$ (angle of skin friction). Assume k = 2.0 and critical depth = 15 × diameter of pile. **(08 Marks)**

OR

10 a. What is 'group efficiency'? Explain 'Feld's rule' for determining the same. **(06 Marks)**

b. What is 'negative skin friction' of a pile? How do you estimate the same in granular and clayey soil? **(06 Marks)**

c. A group of 9 piles with 3 piles in each row were driven into a soft clay to a depth of 12m, from GL. The diameter of the pile is 400 mm and piles are spaced at 850 mm centre to centre. If the unconfined compressive strength of clay is 60 kPa, compute the safe load on the pile group for a FS = 2.5. Take adhesion factor $\alpha = 0.7$. **(08 Marks)**

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **18CV63**

Sixth Semester B.E. Degree Examination, June/July 2024

Hydrology and Irrigation Engineering

Time: 3 hrs. Max. Marks: 100

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

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

Module-1

1 a. Explain with neat sketch, qualitative representation of hydrological cycle. **(10 Marks)**

b. List and explain different types of precipitation. **(10 Marks)**

OR

2 a. Explain with neat sketch, syphon type of raingauge. **(10 Marks)**

b. Average annual rainfall of four existing raingauge stations in a basin are 105mm, 79mm, 70mm and 66mm. If the average depth of rainfall over the basin is limited with in 10% error. Determine the additional number of gauges required. **(10 Marks)**

Module-2

3 a. Explain how evaporation amount is measured using IS class-A pan. List the factors affecting it. **(10 Marks)**

b. The total observed runoff volume during a 6hr-storm with a uniform intensity of 1.5cm/hr is $21.6 \times 10^6 m^3$. If the area of the basin is $350 km^2$, find the average infiltration rate for the basin. **(10 Marks)**

OR

4 a. List the factors affecting evapo-transpiration. Write Blaney-criddle equation used to estimate evapo-trnaspiration. **(10 Marks)**

b. With a neat sketch, describe the method of determining infiltration capacity using a double ring infiltrometer. **(10 Marks)**

Module-3

5 a. What is run off? Explain the factors affecting run off. **(10 Marks)**

b. The ordinates of a storm hydrograph due to 6h isolated storm is given. Obtain the ordinates of 6h unit hydrograph for the catchment, if its area is $423 km^2$.

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

(10 Marks)

OR

6 a. Explain with a neat sketch, base flow separation methods. **(10 Marks)**

b. Define unit hydrograph. Mention the assumptions and its limitations of unit hydrograph. **(10 Marks)**

Module-4

7 a. Briefly explain the benefits and ill effects of irrigation. **(10 Marks)**

b. With a neat sketch, explain Bandhara irrigation. List its advantages and disadvantages. **(10 Marks)**

OR

8 a. Explain the factors affecting duty of water. **(10 Marks)**

b. Table gives the necessary data about the crop, their duty and area under each crop, commanded by a canal taking off from a storage tank. Taking time factor for the canal 13/20, calculate the discharge required at the head to the canal. If the capacity factor is 0.8, determine the design discharge.

Crop	Base period (days)	Area (ha)	Duty (ha/cumec)
Sugar cane	320	850	580
Overlap for sugar cane in summer	90	120	580
Wheat (Rabi)	120	600	1600
Bajri (Monsion)	120	500	2000
Veg (Hot weather)	120	360	800

(10 Marks)

Module-5

9 a. What is canal? List its types and explain the classifications based on capacity. **(10 Marks)**

b. Design the canal for the discharge of 30 cumec with silt factor 1.0. Side slope – 0.5H:1V. **(10 Marks)**

OR

10 a. Explain the investigations of reservoir planning. List the points to be considered for selection of site for a reservoir. **(10 Marks)**

b. Explain different storage zones of reservoir with neat sketch. **(10 Marks)**

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CBCS SCHEME

USN | | | | | | | | | |

18CV644

Sixth Semester B.E. Degree Examination, Dec.2024/Jan.2025

Ground Improvement Techniques

Time: 3 hrs. Max. Marks: 100

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

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

Module-1

1 a. Write a note on the different hazardous ground conditions. Specify alternate approaches for such conditions. **(10 Marks)**

b. What are reclaimed soils? Discuss types of reclaimed soils. **(10 Marks)**

OR

2 a. How do you select field compaction procedures? Discuss steps in detail. **(10 Marks)**

b. What is densification? Enumerate graphically the relation between moisture and density in compaction. **(10 Marks)**

Module-2

3 a. What are the various steps involved in design of dewatering systems? **(10 Marks)**

b. Define Seepage. Specify filter requirements for a well drainage system. **(04 Marks)**

c. Explain with a neat sketch, multi stage well point system of dewatering. **(06 Marks)**

OR

4 a. Explain with a neat sketch the pre-compression technique of pre-loading with vertical drains. **(10 Marks)**

b. What is electro-kinetic dewatering? Explain the procedure with a neat sketch. **(10 Marks)**

Module-3

5 a. Discuss the purpose of mixing additives to ground. **(10 Marks)**

b. Discuss briefly the factors affecting the cement stabilization. **(10 Marks)**

OR

6 a. What are the benefits of lime stabilization? Explain briefly. **(08 Marks)**

b. Mention admixtures or stabilizers other than cement, lime and bituminous materials. **(04 Marks)**

c. Explain soil stabilization using fly ash. **(08 Marks)**

Module-4

7 a. Explain different methods of vibro compaction done in cohesionless soils. **(10 Marks)**

b. Explain vibrofloatation with a neat sketch. **(10 Marks)**

OR

8 a. What is grouting? Write the associated objectives. **(10 Marks)**

b. Briefly explain different types of grouting. **(10 Marks)**

Module-5

9 a. Briefly explain the mechanism of soil reinforcement. **(06 Marks)**

b. Explain with neat sketches, the applications of geosynthetics as reinforcement. **(10 Marks)**

c. Mention the objectives of ground anchors. **(04 Marks)**

OR

10 Write short notes on any four of the following :
i) Gabions ii) Soil Nailing iii) Crib walls iv) Rock Anchors v) Micro Piles. **(20 Marks)**

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **18CV652**

Sixth Semester B.E. Degree Examination, June/July 2024
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 fundamental of traffic flow. **(06 Marks)**

b. Discuss total reaction time of driver using concept of PIEV theory. **(06 Marks)**

c. Explain different vehicular characteristics which affect road design. **(08 Marks)**

OR

2 a. Discuss various urban traffic problems that India facing, list some remedial measures. **(10 Marks)**

b. List and explain Road user characteristics which affect road design. **(10 Marks)**

Module-2

3 a. Define traffic volume count. List and explain different methods. **(10 Marks)**

b. Speed observations at a stretch along with the speeds and corresponding volume of subsidiary stream are as given below, determine i) Time mean speed ii) space mean speed iii) Variance about space mean speed.

Speed range kmph	Volume	Speed range kmph	Volume
2 – 5	1	26 – 29	49
6 – 9	4	30 – 33	36
10 – 13	0	34 – 37	26
14 – 17	7	38 – 41	9
18 – 21	44	42 – 45	3
22 – 25	88		

(10 Marks)

OR

4 a. Define Level of service. List significance of LOS. **(10 Marks)**

b. Mention various applications of O and D study. Explain road side interview method of collecting O and D data. **(10 Marks)**

Module-3

5 a. List and explain various forms of intersection. **(10 Marks)**

b. Briefly explain at grade and grade separation intersection. **(10 Marks)**

OR

6 a. Mention various classifications of traffic signs. Explain any two with neat sketch. **(10 Marks)**

b. The average normal flow on cross roads 'A' and 'B' during design period are 400 PCU and 250PCU per hour. The saturation flows are 1250PCU and 1000 PCU per hour respectively. The all real time required for pedestrian crossing is 12rec. design a two phase signal by Webster's method. **(10 Marks)**

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

Module-4

7 a. List various causes of accident and discuss preventive measures to reduce accidents. **(10 Marks)**

b. What are the major sources of traffic related noise pollution? Explain controlling methods of noise pollution by traffic. **(10 Marks)**

OR

8 a. What are the major air pollutants due to road traffic? Explain consequences of each. **(10 Marks)**

b. Explain how traffic will reduce due to promotion of non motorized transport. **(10 Marks)**

Module-5

9 a. Enumerate the basic principles of traffic regulations. **(10 Marks)**

b. Explain : i) TSM (Traffic System Management) ii) TDM (Traffic Demand Management) **(10 Marks)**

OR

10 a. Explain requirements of good pricing system. **(06 Marks)**

b. What are the applications of Intelligent transport systems? **(06 Marks)**

c. List well known traffic management measures. Explain any one in brief. **(08 Marks)**

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **21CV61**

Sixth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

Construction Management and Entrepreneurship

Time: 3 hrs. Max. Marks: 100

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

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

Module-1

1 a. Explain the Management Process or Functions of Management. **(10 Marks)**

b. Draw a network from the following activities and find critical path and duration of project.

Activity	1-2	1-4	1-3	2-5	3-4 (Dummy)	3-6	4-6	5-6	5-7	5-8	6-7	7-9	8-9
Duration (Days)	9	4	7	7	0	5	8	8	9	10	6	10	2

(05 Marks)

c. Define Project Management and explain briefly. **(05 Marks)**

OR

2 a. Explain in detail on Construction Project Formulation. **(08 Marks)**

b. Define Project Organization and mention the advantages of Good Organization. **(05 Marks)**

c. Draw the arrow network for a project based on the following data :

i) A & B can be performed concurrently and staff – off the project.
ii) A must proceed C & D.
iii) G must follow C
iv) M is dependent on both D & G.
v) Neither E nor F can be started before B is completed, but E & F can be performed concurrently.
vi) D must proceed H.
vii) J is dependent on both E & F.
viii) K can begin only after J , M & H are completed.
ix) L is the last operation which follows K. **(07 Marks)**

Module-2

3 a. Briefly explain Labour Production rate of Productivity. **(05 Marks)**

b. Explain factors affecting Labour output or Productivity. **(10 Marks)**

c. Explain the classification of Construction Equipments based on the function. **(05 Marks)**

OR

4 a. Explain i) Excavator ii) Dozer iii) Compactors iv) Graders and v) Dumpers. **(10 Marks)**

b. Define Material Management and its advantages. **(05 Marks)**

c. Explain the factors on affecting Inventory Management. **(05 Marks)**

Module-3

5 a. Define Construction Quality and explain processes of Project Quality Management. **(10 Marks)**

b. Explain Health and Safety Measures in Construction. **(10 Marks)**

OR

6 a. Difference between Ethics and Morality. **(07 Marks)**

b. Define : i) Ethics ii) Morals and iii) Values. **(03 Marks)**

c. Explain Whistle Blowing with its types. **(10 Marks)**

Module-4

7 a. Explain Principles of Engineering Economics. **(12 Marks)**

b. A person has taken a loan of amount of Rs 1,00,000 from a bank for a period of 5 years. Estimate the amount of money, the person will repay to the bank at the end of 5 years for the following cases :

i) Considering simple interest rate of 8% per year.
ii) Considering compound interest rate of 8% per year. **(08 Marks)**

OR

8 a. A person wishes to have a future sum of Rs 1,50,000 for his Son's education after 10 years from now. What is the Single – payment that he should deposit now so that he gets the desired amount after 10 years? The bank gives 13% interest rate compounded annually. **(06 Marks)**

b. Mention the assumptions of Breakeven analysis. **(04 Marks)**

c. Two alternative for the purchase of a transit mixer having same useful life is given below :

	Alternative 1	Alternative 2
Initial Purchase cost (Rs)	6,00,000	5,00,000
Annual Operating & Maintenance cost (Rs)	40,000	60,000
Expected Salvage value (Rs)	2,50,000	1,50,000
Useful Life (years)	5	5

Using Present worth method, determine which alternative should be selected, if the rate of interest is 10% per annum. **(10 Marks)**

Module-5

9 a. Define Entrepreneur and explain the characteristics of Entrepreneur. **(10 Marks)**

b. Explain Micro , Small and Medium Enterprise (MSMEs) and its role in Economic development. **(10 Marks)**

OR

10 a. Define Business plan and mention the objective / importance of Business plan. **(06 Marks)**

b. Explain on Financial plan. **(09 Marks)**

c. Briefly explain on entrepreneurial entry into International Business. **(05 Marks)**

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CBCS SCHEME

USN

21CV62

Sixth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025
Concrete Technology

Time: 3 hrs. Max. Marks: 100

Note:* 1. *Answer any FIVE full questions, choosing ONE full question from each module.
2. *Use IS-10262 mix design code is allowed.*

Module-1

1 a. Explain the manufacture of cement by dry process with a flow chart. **(10 Marks)**
b. Define cement. Explain the constituents of cement with their percentage and functions. **(10 Marks)**

OR

2 a. What is grading of aggregate? Explain the importance of size, shape and texture with respect to coarse aggregate? **(10 Marks)**
b. List the mineral admixtures used in concrete? Briefly explain about Flyash and GGBS as admixtures. **(10 Marks)**

Module-2

3 a. List the factors that effects workability of concrete. Mention the laboratory tests conducted to measure workability of a concrete. **(10 Marks)**
b. What is the importance of curing in concrete? Briefly discuss ant two methods. **(10 Marks)**

OR

4 a. Explain the process of manufacturing of concrete. **(10 Marks)**
b. Explain good and bad practices of making and using fresh concrete. **(06 Marks)**
c. Explain about (i) Segregation (ii) Bleeding **(04 Marks)**

Module-3

5 a. Explain the effect of chemical admixtures on fresh and hardened properties of concrete. **(10 Marks)**
b. List the different types of chemical admixtures? Explain any two. **(10 Marks)**

OR

6 Design a concrete mix by IS method for M40 Grade Concrete as per IS 10262.
1. Grade – M35
2. Cement – OPC – 43 grade
3. Maximum nominal size of aggregate : 20 mm
4. Minimum cement content : 320 kg/m^3
5. Maximum W/C ratio : 0.45
6. Workability : 100 mm slump
7. Exposure condition : Moderate (for reinforced concrete)
8. Maximum cement content : 450 kg/m^3
9. Method of concrete placing : pumping
10. Type of aggregate : crushed angular
11. Degree of supervision : Good
12. Chemical admixture : super plasticizer

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

Test data for materials:

(i) Specific gravity of cement : 3.15
(ii) Specific gravity of CA : 2.74
(iii) Specific gravity of FA : 2.74
(iv) Water absorption for, CA : 0.5%; FA : 1.0%
(v) Fine aggregate conforming to grading zone – I of table 4 of IS 383.

Assume other data wherever necessary. **(20 Marks)**

Module-4

7 a. Explain the factors influencing the strength of concrete. **(10 Marks)**

b. Mention various non-destructive testing of concrete. Explain any two methods in brief. **(10 Marks)**

OR

8 a. Explain the testing of hardened concrete. Explain the compressive strength test of concrete as per IS codes. **(10 Marks)**

b. Define the terms:
(i) Water cement ratio (ii) Gel-space ratio (iii) Maturity concept
(iv) Modulus of elasticity (v) Poisson's ratio **(10 Marks)**

Module-5

9 a. What is durability of concrete? Explain the factors influencing durability of concrete. **(10 Marks)**

b. Write short notes on: (i) Shrinkage of concrete (ii) Creep **(10 Marks)**

OR

10 a. What is sulphate attack on concrete? State the methods of controlling sulphate attack. **(10 Marks)**

b. Explain the process of carbonation, freezing and thawing in concrete. **(10 Marks)**

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **21CV63**

Sixth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

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. Use of IS800 : 2007, steel table is permitted.

Module-1

1 a. Explain the failure criteria of steel. **(10 Marks)**

b. Explain briefly the classifications of cross sections. **(10 Marks)**

OR

2 a. Calculate the shape factor for the triangular section. **(10 Marks)**

b. Calculate the plastic moment capacity required for continuous beam subjected to working load as shown in Fig.Q.2(b). Take load factor = 1.5. **(10 Marks)**

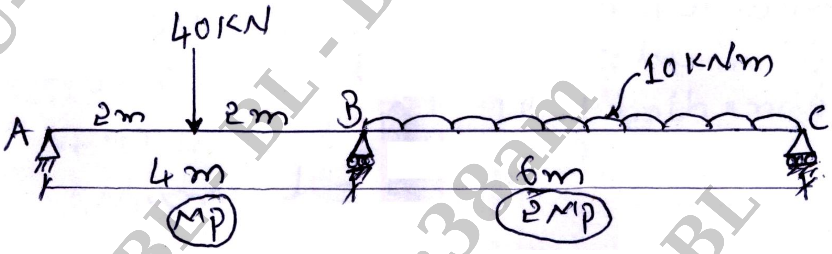

Fig.Q.2(b)

Module-2

3 a. Explain with neat sketches various modes of failure of bolted connections. **(10 Marks)**

b. Design a bolted connection for a lap joint between plates of size 100 × 16 mm and 100 × 10 mm to transmit a factored load of 100 kN using single row of bolts of grade 4.6 and grade 410 plate. Assume e = 30 mm and diameter of bolt = 16 mm. **(10 Marks)**

OR

4 a. Explain briefly the common defects in welding with neat sketches. **(10 Marks)**

b. Design a fillet weld for the angle section ISA 80 mm × 50 mm × 8 mm. welded to a 12 mm thick gusset plate at site. Assume that welding is done on 3 sides. Take Fe 410 grade steel. **(10 Marks)**

Module-3

5 a. Explain the possible modes of failure of axially loaded columns. **(10 Marks)**

b. Determine the design axial load on the column section ISMB 450 @ 710.2 N/m, length of column is 4 m and it is hinged at both ends. Assume $f_y = 250$ N/mm^2. **(10 Marks)**

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

6 Design a double angle discontinuous strut to carry a factored load of 135 kN, resulting from combination of wind load. The length of the strut is 3 m between intersections. The two angles are placed back to back (with two long legs connected) and are tack bolted. Use Fe 410 grade steel.

i) Angles are placed on the opposite sides of a 12 mm gusset plate.

ii) Angles are placed on the same sides of a 12 mm gusset plate. **(20 Marks)**

Module-4

7 a. Explain the factors affecting the strength of tension members. **(10 Marks)**

b. Determine the tensile strength of the plate 150 mm × 10 mm connected to 12 mm thick gusset plate using 6 numbers of M16 bolts in two rows. 3 number of bolts in each row with pitch = 60 mm, end distance = 30 mm, gauge distance = 90 mm. Use property class 4.6 bolts, $f_u = 410 \text{ N/mm}^2$. **(10 Marks)**

OR

8 a. Explain lug angles and column splices. **(10 Marks)**

b. Design a slab base for a column ISHB 300 @ 577 N/m carrying an axial factored load of 1000 kN. M20 concrete is used for the foundation. Provide welded connection between column and base plate. **(10 Marks)**

Module-5

9 a. Explain briefly the design steps followed while designing laterally supported beam as per IS 800 : 2007. **(10 Marks)**

b. Determine the design bending strength of a beam ISMB 300 @ 433.6 N/m. Use Fe 410 grade steel. **(10 Marks)**

OR

10 Design a cantilever beam built into a concrete wall. It supports a dead load (including self weight) of 18 kN/m and a live load of 12 kN/m. The effective span of beam is 4.5 m. Beam is laterally supported. Take $f_y = 250 \text{ N/mm}^2$, $E = 2 \times 10^5 \text{ N/mm}^2$. Also check for web buckling web crippling. **(20 Marks)**

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CBCS SCHEME

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21CV642

Sixth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025
Applied Geotechnical Engineering

Time: 3 hrs. Max. Marks: 100

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

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

Module-1

1 a. What is stabilization of borehole? Explain briefly the various methods. **(10 Marks)**

b. Describe with neat sketch wash boring and auger boring. **(10 Marks)**

OR

2 a. List the objectives of soil exploration and explain briefly purpose of soil exploration. **(10 Marks)**

b. What is soil sampling? Explain briefly disturbed sample, undisturbed sample, representative and non representative samples. **(10 Marks)**

Module-2

3 a. List the different Dewatering methods. Explain with a neat sketch electro osmosis method. **(10 Marks)**

b. Predict the ground water table given the following data depth upto which water is boiled out = 15 m, water rise on 1st day = 0.80 m, water rise on 2nd day = 0.70 m, water rise on 3rd day = 0.60 m. **(10 Marks)**

OR

4 a. What is Flow net? What are its characteristics and uses? **(10 Marks)**

b. Calculate the seepage through an earth dam resting on an impervious foundation, the relevant data are given. Height of a dam = 60 m, upstream slope = 2.75:1 (H:V), downstream slope = 2.50:1 (H:V), free board = 2.5 m, crest width = 8 m, length of drainage blanket = 120 m, coefficient of permeability of the embankment material in x-direction = 8×10^{-7} m/s, y-direction = 2×10^{-7} m/s. **(10 Marks)**

Module-3

5 a. Compute the intensities of active and passive earth pressures at depth of 8 m in dry cohesionless sand with an angle of internal friction of 30° and unit weight of 18 kN/m^3. What will be the intensities of active and passive earth pressure if the water level rises to the ground level? Take saturated unit weight of sand as 22 kN/m^3. **(10 Marks)**

b. A retaining wall of height 10 m supports cohesionless soil with the following properties G = 2.65, e = 0.65 and $\varphi = 30°$ watertable lies at 3 m depth surface of backfill is horizontal and carries surcharge of intensity 14 kN/m^2. Draw lateral active earth pressure distribution diagram. Determine total active earth pressure and its point of application. **(10 Marks)**

OR

6 a. List the factors influencing lateral earth pressure? Explain any four factors. **(10 Marks)**

b. Explain the steps involved in the design of gravity retaining wall. **(10 Marks)**

Module-4

7 a. Explain Fellinious method of obtaining centre of critical slip surface in the case of stability analysis of C-ϕ soil. **(10 Marks)**

b. An embankment is to be constructed with a soil having C = 20 kN/m^2, $\varphi = 10°$ and $\gamma = 19$ kN/m^3. The desired factor of safety with respect to cohesion as well as friction is 1.5. Determine : i) Safe height of the desired slope if slope is 2 H to 1 V ii) Safe angle of slope if the desired height is 15 m, for $\varphi = 10°$, Taylor stability numbers are as follows:

Stability No. :	0.04	0.08
Slope Angle (i) :	20	30

(10 Marks)

OR

8 a. A 5 m deep canal has side slopes of 1:1. The properties of soil are cu = 20 kN/m^2, $\varphi u = 10°$, e = 0.8 and G = 2.8. If Taylors stability number is 0.108, determine the factor of safety with respect to cohesion, when the canal runs full. Also find the same in case of sudden drawdown, if Taylors stability number for this cohesion is 0.137. **(10 Marks)**

b. Explain briefly causes of failure of slope and draw the figures for forces that act on earth slopes. **(10 Marks)**

Module-5

9 a. Define Isobar. Using Boussinesq's equation construct isobar of intensity 0.1 Q, where 'Q' is point load acting on the surface. **(10 Marks)**

b. Explain the procedure for construction of Newmark's influence chart. **(10 Marks)**

OR

10 a. Derive an equation for vertical stress below the centre of a circular area with uniform load intensity of 'q'. **(10 Marks)**

b. A water tank is required to be constructed at a place with a circular foundation having a diameter of 16 m founded at a depth of 2 m below the ground surface 325 kN/m^2. Assuming that the subsoil extends to a great depth and is isotropic and homogeneous. Determine the stresses σ_z at points

i) $z = 8$ m , $r = 0$
ii) $z = 8$ m, $r = 8$ m
iii) $z = 16$ m, $r = 0$
iv) $z = 16$ m, $r = 8$ m **(10 Marks)**

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐

21CV653

Sixth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

Occupational Health and Safety

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Define Safety. Explain the history of safety before Industrial revolution. **(10 Marks)**

b. Illustrate briefly the 3E's of safety with the aid of block diagram. **(10 Marks)**

OR

2 a. Define Accident and explain the two types of accident report. **(10 Marks)**

b. Paraphrase about the human factor theory of accident causation with figure. **(10 Marks)**

Module-2

3 a. Explain the task analysis for identifying the specific ergonomic problems along with definition of ergonomics. **(10 Marks)**

b. Explain fault tree analysis along with symbols and sample fault tree. **(10 Marks)**

OR

4 a. Define Hazard analysis and explain two approaches of hazard analysis. **(10 Marks)**

b. Illustrate the steps involved in hazard prevention and control. **(10 Marks)**

Module-3

5 a. Explain fire triangle with diagram. **(10 Marks)**

b. Explain in detail the classification of fire with source. **(10 Marks)**

OR

6 a. Discuss about the fire development and severity with graph. **(10 Marks)**

b. Explain the methods for early detection of fire. **(10 Marks)**

Module-4

7 a. Explain the different types of occupational disease. **(10 Marks)**

b. Write a short notes on silicosis and asbestosis. **(10 Marks)**

OR

8 a. Explain the different types of personal protective equipments. **(10 Marks)**

b. Explain the safety and health aspects to be considered in solid waste management. **(10 Marks)**

Module-5

9 a. Explain the safety and health aspects to be considered in water treatment plant. **(10 Marks)**

b. Illustrate the safety and health in cement industry and RMC plant. **(10 Marks)**

OR

10 a. Explain the roles and responsibilities of workers, managers and supervisors. **(10 Marks)**

b. Explain the safety measures to be taken in water testing laboratory. **(10 Marks)**

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

USN ☐☐☐☐☐☐☐☐☐☐ **18CV732**

Seventh Semester B.E. Degree Examination, Dec.2024/Jan.2025
Air Pollution and Control

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Define Air pollution. Explain primary and secondary air pollutants with examples. **(08 Marks)**
b. Explain the classification of Air pollution. **(08 Marks)**
c. Explain various types of inversion. **(04 Marks)**

OR

2 a. State the effect of air pollution on health and vegetation. **(10 Marks)**
b. Briefly explain photo chemical smog and with its effects. **(10 Marks)**

Module-2

3 a. Explain :
i) Temperature lapse rate ii) stability iii) wind velocity. **(09 Marks)**
b. Explain the plume behavior with neat diagram. **(11 Marks)**

OR

4 a. Explain Wind Rose diagram. **(06 Marks)**
b. State Meteorological variables. **(06 Marks)**
c. A factory uses 2,00,000 litres of furnace oil (specific density 0.97) per month. If for one million litres of oil used per year, the particulate matter emitted is 3.0 tonnes per year, SO_2 emitted is 59.7 tonnes per year, NO_x emitted is 7.5 tonnes per year, hydrocarbons emitted are 0.37 tonnes per year and carbon monoxide emitted is 0.52 tonnes per year, calculate the height of the chimney required to be provided for safe dispersion of the pollutants. Calculate as per central Board for prevention and control of water pollution (1984), formula. **(08 Marks)**

Module-3

5 a. Explain the preliminary consideration and stages of sampling. **(10 Marks)**
b. Explain the devices for sampling gaseous pollutants. **(10 Marks)**

OR

6 a. Explain Monitoring of Air pollutants. **(10 Marks)**
b. Explain the Air quality models – Gaussian model briefly. **(10 Marks)**

Module-4

7 a. Explain with a neat diagram setting chamber with merits and demerits. **(10 Marks)**
b. Explain Filters and ESP. **(10 Marks)**

OR

8 a. Explain the cyclone separations with a neat diagram, also with merits and demerits. **(10 Marks)**
b. Explain the site selection for Industrial plant location. **(10 Marks)**

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

Module-5

9 a. Explain Air pollution due to automobiles and control methods. **(10 Marks)**
b. State various environmental laws and acts on Air pollution. **(10 Marks)**

OR

10 a. Explain Noise pollution causes, effects and control measures. **(10 Marks)**
b. Explain briefly global Episodes :
  i) London smog
  ii) Bhopal gas tragedy. **(10 Marks)**

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐

18CV745

Seventh Semester B.E. Degree Examination, Dec.2024/Jan.2025

Urban Transport Planning

Time: 3 hrs. Max. Marks: 100

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

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

Module-1

1 a. What is urban transportation planning? List the steps in the process of transportation planning and explain them briefly. **(10 Marks)**

b. What is co-ordination of transport systems? List and explain the types of co-ordination. **(10 Marks)**

OR

2 a. Explain the systems approach in transport planning with a flow chart. **(10 Marks)**

b. Define urbanization. Explain the effects of urbanization in transportation sector. **(10 Marks)**

Module-2

3 a. What is Zoning? List out the points to be considered during zoning. **(10 Marks)**

b. Define sampling. List and explain briefly the types of sampling. **(10 Marks)**

OR

4 a. Explain the process of road side interviews conducted for collecting the data for transport planning. **(10 Marks)**

b. Define external cordon line. List the types of inventories conducted for finding transport facilities, explain briefly. **(10 Marks)**

Module-3

5 a. What is trip generation? List and explain the factors affecting. Trip generation and attraction rates. **(10 Marks)**

b. The trip rate 'y' and the corresponding household sizes 'x' from a sample are shown in the table below. Compute the trip rate. If the avg household size is 3.25. Establish the trip generation equation.

Household size (x) →				
Zones →	1	2	3	4
Trips per day (y) ↓	1	3	4	5
	3	4	5	8
	3	5	7	8

(10 Marks)

OR

6 a. What are the assumptions made in multilinear regression analysis? List and explain the types of multilinear regression analysis. **(10 Marks)**

b. The following data shows average household. Size and total trips made per day for a particular zone of study area. Develop the trip production equation and also compute coefficient of correlation.

Average Household size (x)	Total trips/day (y)
2	4
3	6
4	7
5	8
6	10

(10 Marks)

Module-4

7 a. What is Modal split? Explain with a flow chart, the modal split carried out after trip distribution. **(10 Marks)**

b. Obtain the future trip table by average factor method given the expected future trips for zone 1, 2, 3 are expected to be 360, 1260 and 3120 respectively.

O \ D	1	2	3
1	60	100	200
2	100	20	300
3	200	300	20

(10 Marks)

OR

8 a. List and explain the factors affecting the modal split. **(10 Marks)**

b. The total trips produced and attracted to the 3 zones A, B, C of a survey area in the design years are tabulated as follows:

Zone	Trips produced	Trips attracted
A	2000	3000
B	3000	4000
C	4000	2000

It is known that the trips between 2 zones are inversely proportional to the second power of the travel time between zones, which is uniformly 20 min. If the trip interchange between B and C is known to be 600. Calculate the trip interchange between zones A and B, A and C, B and A, C and A, C and B. **(10 Marks)**

Module-5

9 a. Define Traffic Assignment. List the various methods of route assignment. Explain any two methods. **(10 Marks)**

b. With a flow chart, explain the structure of a lowry model. **(10 Marks)**

OR

10 a. Explain the major requirements of the traffic assignment. **(10 Marks)**

b. What are the major factors to be considered while selecting a land-use model? Explain briefly. **(10 Marks)**

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **18CV753**

Seventh Semester B.E. Degree Examination, Dec.2024/Jan.2025
Environmental Protection and Management

Time: 3 hrs. Max. Marks: 100

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

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

Module-1

1 a. What are the unique characteristics of environmental problems faced by mankind today? Discuss same of the critical environmental issues experienced on local, regional and global scale and their probable mitigation measures. **(08 Marks)**

b. Define "Environmental Stewardship". How does the local environmental stewardships action have an impact on the socio-ecological outcomes of the region? **(04 Marks)**

c. Distinguish between:
i) Polluter pays principle and user pays principle.
ii) Principle of participation and principle of proportionality. **(08 Marks)**

OR

2 a. Explain briefly the national policies on environment abatement of pollution and conservation of natural resources and the relevant legislations enacted by the Indian government to safeguard the environment. **(10 Marks)**

b. Write a note on "Business charter for sustainable production and consumption". **(10 Marks)**

Module-2

3 a. Distinguish between:
i) Stream standards and effluent standards
ii) Emission and ambient standards. **(12 Marks)**

b. What are the objectives of conducting an environmental performance evaluation of an organization and mention the benefits derived from it. **(08 Marks)**

OR

4 a. Distinguish between:
i) Pollution control and pollution prevention
ii) Clean technologies and zero discharge technologies. **(12 Marks)**

b. Write a note on:
i) Environmental performance indicators and
ii) Bench marking. **(08 Marks)**

Module-3

5 a. Explain the basic principles of ISO:14001. **(10 Marks)**

b. How does initial environmental review help in creating Environmental Management System (EMS) of an organization. **(10 Marks)**

OR

6 a. What is EMS? What are the basic elements of EMS? **(10 Marks)**

b. Discuss the benefits derived from EMS. **(10 Marks)**

Module-4

7 a. How “Environmental Audit (EA)” differs from “Environmental Impact Assessment (EIA)”? Explain. **(10 Marks)**

b. Write a note on ISO:19001-2018 auditing management systems. **(10 Marks)**

OR

8 a. Discuss various types of environmental audits. **(10 Marks)**

b. What are the roles and responsibilities of auditors conducting an environmental audit? **(05 Marks)**

c. Write a note on “Waste Audit”. **(05 Marks)**

Module-5

9 a. Discuss the application of EMS and pollution prevention in electroplating and tanning industry. **(14 Marks)**

b. What are the four characteristics which defines a hazardous waste? What are the various minimization techniques and disposal methods adopted in managing hazardous waste? **(06 Marks)**

OR

10 a. Discuss the application of EMS and pollution prevention in sugar and textile industry. **(14 Marks)**

b. Write a note on transboundary movement of hazardous waste. **(06 Marks)**

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USN ☐☐☐☐☐☐☐☐☐☐

21CV71

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

Quantity Survey and Contract Management

Time: 3 hrs. Max. Marks: 100

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

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

1 Define estimate. Explain briefly purpose and different types of estimate (any three).

(20 Marks)

OR

2 The details of two room building are shown in Fig.Q.2. Estimate the quantities and cost of the following items of work:

i) Earthwork excavation for foundation in ordinary soil @ Rs.400/m^3.
ii) Cement concrete bed 1:4:8 for wall foundation @ Rs.3800/m^3.
iii) SSM in CM 1:6 for foundation and basement @ Rs.3000/m^3.
iv) Ist class BBM work for super structure in CM 1:6 @ Rs.5800/m^3
v) RCC 1:1·5:3 roof slab at Rs.5500/m^3.

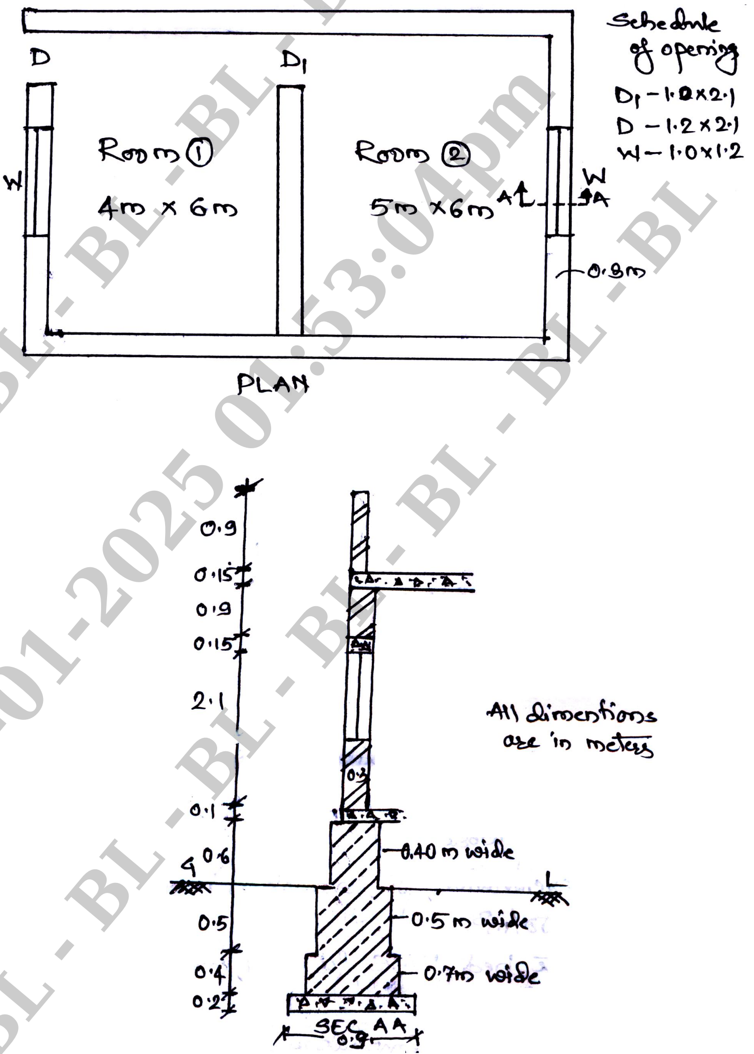

Fig.Q.2

(20 Marks)

Module-2

3 The details of a septic tank is as shown in Fig.Q.3. Estimate the quantities for the following items of work and work out the cost.

a. Earth work excavation in foundation @ Rs.400/m^3

b. Cement concrete 1:3:6 floor and foundation @ Rs.4000/m^3

c. First class brick work with cement mortar 1:4 @ Rs.6000/m^3.

d. 12 mm thick plaster for side walls @ Rs.200/m^2.

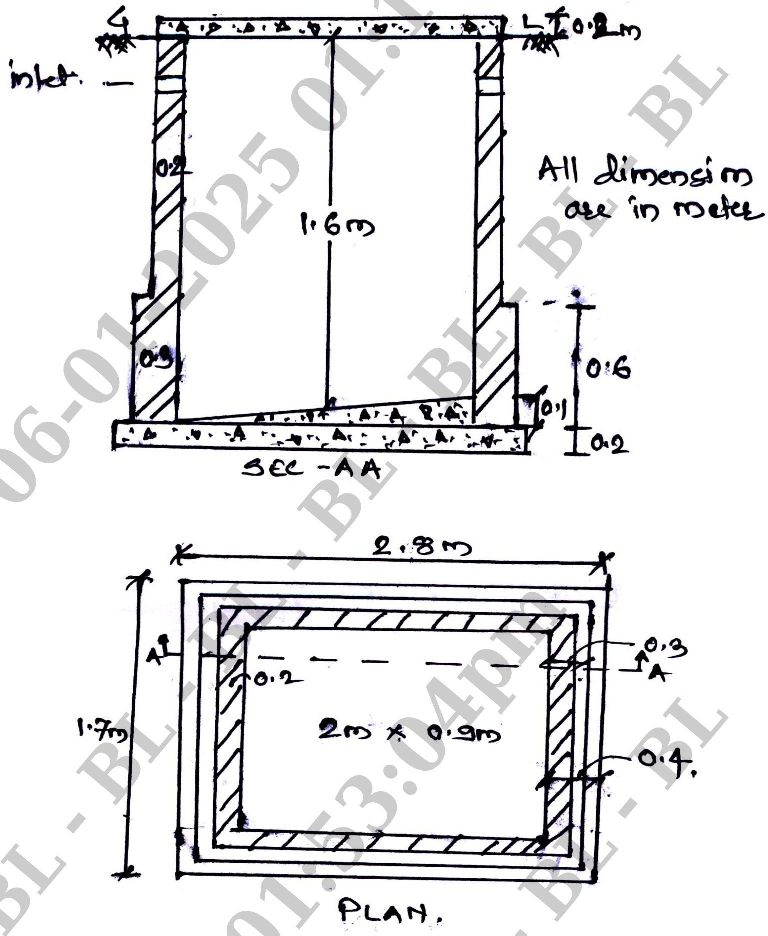

Fig.Q.3

(20 Marks)

OR

4 Reduced level (RL of ground along centerline of proposed road from chainage 10 to 20 chainage are given below. The formation level at the 10th chainage is 107 and the road is in down word gradient of 1 in 150 upto the chainage 14 and the gradient changes to 1 in 100 down word gradient. Formation width is 10m and side slope of banking are 2:1 (H:V). Length of chain is 30 m. Estimate the quantities and cost of earth at the rate for filling is Rs.250 and cutting Rs.140 by mid sec. method.

Chainage	10	11	12	13	14	15	16	17	18	19	20
RL of the GL	105.0	105.60	105.44	105.90	105.42	104.30	105.00	104.10	104.62	104.00	103.30
RL of FL	107.00										
Gradient	Down word 1 in 150					Down word 1 in 100					

(20 Marks)

Module-3

5 a. Define specification. Explain the objectives of writing specification. **(10 Marks)**
b. List the significances of microsoft excel in estimation. **(10 Marks)**

OR

6 Write detailed specification for following:
i) Bed concrete for foundation with M7.5 CC
ii) Size stone masonary for foundation in CM 1:6
iii) Plastering 12 mm thick with CM 1:5
iv) Floor filling with granite in CM 1:3 **(20 Marks)**

Module-4

7 a. Define rate analysis. Explain the purpose of rate analysis. **(10 Marks)**
b. Work out the rate analysis for R.C.C. for slab and beam in CC 1:1·5:3 and steel 1.2%. **(10 Marks)**

OR

8 Analyze rates from first principle for following:
i) Ashlar masonary for foundation in CM 1:6
ii) BBM for super structure in CM 1:6
iii) Plastering 20 mm thick in CM 1:4
iv) Pointing in CM 1:3. **(20 Marks)**

Module-5

9 a. Define contracts. Discuss the essentials of contracts. **(10 Marks)**
b. Write a note on tender documents and earnest money deposite. **(10 Marks)**

OR

10 Write short notes on following:
a. Administrative approval and technical sanction
b. Nominal muster roll
c. Security deposite
d. Running bills. **(20 Marks)**

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CBCS SCHEME

USN

21CV72

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

Construction Technology for Substructures and Super Structures

Time: 3 hrs. Max. Marks: 100

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

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

Module-1

1 a. Write a note on Micro Tunnelling. **(10 Marks)**
b. Write a note on TBM. **(10 Marks)**

OR

2 a. What is bedding of conduits explain its significance. **(10 Marks)**
b. Explain different methods of compaction technology. **(10 Marks)**

Module-2

3 a. What is underwater drilling and blasting give one case study. **(10 Marks)**
b. Explain Jet grouting with a neat sketch. **(10 Marks)**

OR

4 a. What is the role of dewatering in shallow and deep excavation and list various method. **(10 Marks)**
b. Explain well point system with a neat sketch. **(10 Marks)**

Module-3

5 a. Write a note on operation and erection of R.M.C plant. **(10 Marks)**
b. Write a note on Concrete mix design. **(10 Marks)**

OR

6 a. Explain underwater concrete and its significance and also list the various methods used. **(10 Marks)**
b. Write a note on Self-Compacting Concrete. **(10 Marks)**

Module-4

7 a. Write a note on piles in land and marine structures. **(10 Marks)**
b. Explain initial and routine tests on piles as per codal specifications. **(10 Marks)**

OR

8 a. Write a note on pile driving by vibration and construction of micro piles. **(10 Marks)**
b. Write a note on Diaphragm walls. **(10 Marks)**

Module-5

9 a. What are cofferdams and explain the construction of a double wall cofferdam? **(10 Marks)**
b. State the uses of cofferdams and explain concrete wall movable cofferdams. **(10 Marks)**

OR

10 a. What are the differences between pneumatic and open caissons? **(10 Marks)**
b. Write a note on Well foundations. **(10 Marks)**

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐

21CV731

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

Advanced Design of RCC and Steel Structures

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any TWO full questions, choosing ONE full question from each module.
2. Use of IS456, IS-800, SP(6) and Steel tables are permitted.

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

Module-1

1 Design a combined footing for two columns of size 300×300 mm and 400mm × 400mm subjected to 500 kN and 700 kN respectively. The C/C spacing between the columns is 3.5 m. The width of the footing is restricted to 1.5 m. Take SBC of the soil as 150 kN/m^2. Use M_{25} concrete and Fe_{415} steel. Design slab and beam type combined footing. Draw the sectional elevations. **(50 Marks)**

OR

2 Design a cantilever retaining wall to retain on Earth embankment 4 m high above the ground level. The density of the earth is 18 kN/m^3 and its angle of repose is 30°. The embankment is horizontal at its top. The SBC of the soil may be taken as 200 kN/m^2 and the co-efficient of friction between soil and concrete is 0.5. Adopt M_{20} grade concrete and Fe_{415} steel. Draw cross sectional elevation showing reinforcement details. **(50 Marks)**

Module-2

3 A line diagram of Root truss with internal loads and forces in each member are shown in Fig.Q3. The design of various member of the roof truss along with their end connection with bolt of property class 5.6. Also, design the bearing plate at support for the reaction and Anchor bolts for an uplift force of 15 kN. Also draw the elevation of the truss greater than half span.

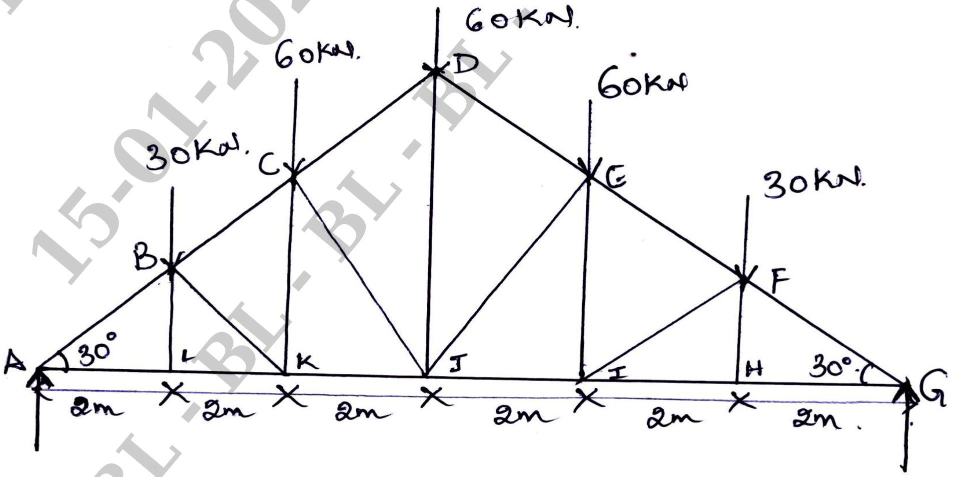

Fig.Q3

Members	Length (m)	Force (kN)	Nature of force
AB, GF	2.31	240	C
BC, FE	2.31	210	C
CD, ED	2.31	160.04	C
AL, GH	2.0	207.84	T
LK, HI	2.0	207.84	T
KJ, IJ	2.0	181.82	T
BL, FH	1.154	0	-
BK, FI	2.31	30	C
CK, EI	2.31	15	T
CJ, EJ	3.05	66	C
DJ	3.46	60	C

(50 Marks)

OR

4 Design a simply supported Gantry Girder for the following details. The Girder is electrically operated. Take yield stress of the steel as 250 MPa.

i) Span of Crane Girder = 20 m
ii) Span of Gantry Girder = 7 m
iii) Wheel base distance = 3.4 m
iv) Self weight of crane excluding crab = 200 kN
v) Weight of trolley = 60 kN
vi) Min hook approach = 1.1 m
vii) Self weight of rail = 0.3 kN/m
viii) Height of rail = 75 mm
ix) Capacity of crane = 250 kN

(50 Marks)

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CBCS SCHEME

USN | | | | | | | | | | 21CV743

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025
Pavement Design

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of IRC:37-2001 and IRC:58-2002 is permitted.

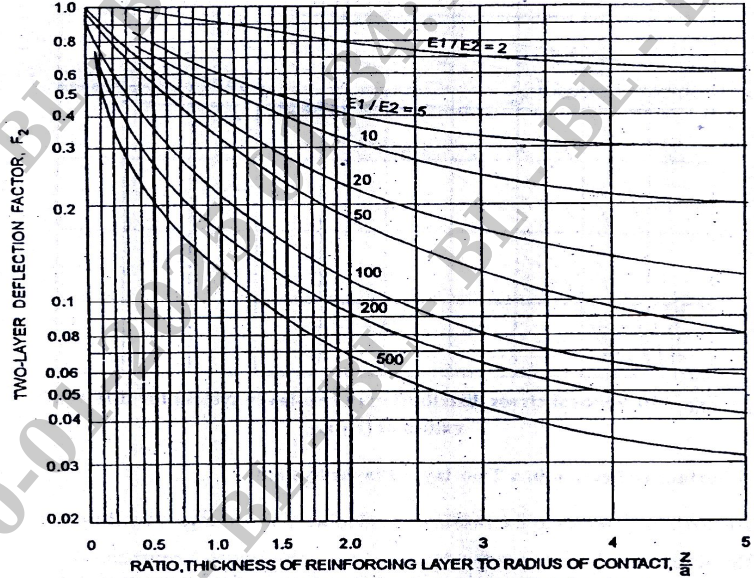
Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Explain the various components of pavements with their function with neat sketch. **(08 Marks)**
b. Write the difference between flexible and rigid pavement. **(06 Marks)**
c. Distinguish between Boussinesq's theory and Burmister theory. **(06 Marks)**

OR

2 a. Compare the salient features of flexible and rigid pavement. **(06 Marks)**
b. Bring out the difference between highway and airport pavement. **(06 Marks)**
c. Plate bearing tests were conducted using 30 cm diameter plates on soil subgrade and over a base course of thickness 45 cm. The pressure yielded at 0.5 cm deflection on the subgrade and base course were 1.25 kg/cm^2 and 8.0 kg/cm^2 respectively.
Design the thickness requirement of flexible pavement for a wheel load at 5100 kg with tyre pressure of 7.0 kg/cm^2 for an allowable deflection of 0.5 cm using Burmister's two-layer deflection factor chart Fig.Q2(c).



Burmister's two-layer deflection factors

Fig.Q2(c) **(08 Marks)**

Module-2

3 a. Explain the principle and design steps of McLeod method of pavement design. **(10 Marks)**
b. Explain determination of ESWL by graphical method. Also draw the neat sketch. **(10 Marks)**

OR

4 a. The initial traffic after completion of construction of a four lane divided highway is estimated to be 3500 cv per day. Design the flexible pavement for a life of 15 years using the data given below:
Design CBR value = 8% , growth rate of cv = 6.5% , Average VDF value of cv = 4.0. Use IRC : 37 – 2001. **(10 Marks)**

b. Explain the various factors to be considered for the design of pavement. **(10 Marks)**

Module-3

5 a. Write the principle of Benkelman beam test. Explain the procedure of determining the deflection value at any point on a flexible pavement. **(08 Marks)**

b. Briefly explain the typical types of flexible pavement failures. **(06 Marks)**

c. Explain functional evolution of pavement by unevenness index. **(06 Marks)**

OR

6 a. Write a short note on Falling Weight Deflectometer. **(08 Marks)**

b. Explain briefly the various design factors for runway pavements. **(06 Marks)**

c. Explain maintenance of Bitumenous surfaces. **(06 Marks)**

Module-4

7 a. As per IRC: 58-2002, explain the procedure of design of rigid pavements. **(10 Marks)**

b. Determine the warping stresses at interior edge and corner of a 25cm thick cement concrete pavement with transverse joints at 5.0 interval and longitudinal joints at 3.6m intervals. The modulus of subgrade reaction, k is 6.9 kg/cm^3 and radius of loaded area is 15 cm. Assume maximum temperature differential during day to be 0.6°C per cm slab thickness and maximum temperature differential of 0.4°C per cm slab thickness during the night. Data are given below : $e = 10\times10^{-6}$ per °C ; $E = 3\times10^5$ kg/cm^2 ; $\mu = 0.15$. **(10 Marks)**

OR

8 a. Explain design procedure for design of Tie Bars. **(10 Marks)**

b. The design thickness of a CC pavement is 26 cm considering a design axle load (98th percentile load) of 12,000 kg on single axle and M-40 concrete with characteristic compressive strength of 400 kg/cm^2. The radius of relative stiffness is found to be 62.2 cm. If the elastic modulus of dowel bar steel is 2×10^6 kg/cm^2, modulus of dowel concrete interaction is 41500 kg/cm^3 and joint width is 1.8 cm. Design the dowel bars for 40% load transfer considering edge loading. **(10 Marks)**

Module-5

9 a. List and explain any five types of failures in rigid pavement. **(10 Marks)**

b. With sketches, describe the various types of joints and their requirements, in rigid pavements. **(10 Marks)**

OR

10 a. Explain the desirable properties of subgrade. **(10 Marks)**

b. Explain different methods of pavement evaluation. **(10 Marks)**

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **21CV753**

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025
Environmental Protection and Management

Time: 3 hrs. Max. Marks: 100

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

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

1 a. Enumerate the various environmental management principles. Explain any two principles. **(10 Marks)**

b. Explain abatement of pollution. List out the major activities initiated under the various scheme on pollution Abetment. **(10 Marks)**

OR

2 a. Write a note on Environmental stewardship. **(10 Marks)**

b. Write a brief about the organizational drivers to the implementation of environmental management systems. **(10 Marks)**

Module-2

3 a. List and explain the environmental quality objectives. **(10 Marks)**

b. Briefly explain :
i) Clean production and clean technology
ii) Concentration and mass standards **(10 Marks)**

OR

4 a. Explain the factors of CPCB. **(10 Marks)**

b. Explain environmental performance indicators for an organization. **(10 Marks)**

Module-3

5 a. Enumerate the benefit and barriers in implementing ISO 14001 in an organization. **(10 Marks)**

b. Write a note on :
i) Initial Environmental Review (IER)
ii) Management Review (MR) **(10 Marks)**

OR

6 a. Write a note on environmental aspects and impact with an organization setup. **(10 Marks)**

b. Define environmental policy and write a note on developing environmental policy. **(10 Marks)**

Module-4

7 a. With an example, explain of environmental due-Diligence Audit. **(10 Marks)**

b. Enumerate the contents of environmental statement (Form V) **(10 Marks)**

OR

8 a. Write a note on waste minimization planning in an industry. **(10 Marks)**

b. Explain briefly :
  i) Non conformity
  ii) Roles and qualification of Auditors **(10 Marks)**

Module-5

9 a. Explain Transboundary moment of pollutant with an example. How to manage this problem. **(10 Marks)**

b. Explain the pollution prevention methods adopted in an electroplating industry. **(10 Marks)**

OR

10 a. Discuss pollution prevention opportunities in pulp paper and sugar mills. **(10 Marks)**

b. Briefly discuss the application of EMS and waste Audit. **(10 Marks)**

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