

CBCS Scheme

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15MAT31

Third Semester B.E. Degree Examination, June/July 2018 Engineering Mathematics – III

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Obtain the Fourier series for the function :

$$f(x) = \begin{cases} -\pi, & -\pi < x < 0 \\ x, & 0 < x < \pi \end{cases}$$

Hence deduce that $\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots$. (08 Marks)

- b. Obtain the half-range cosine series for the function $f(x) = (x-1)^2$, $0 \leq x \leq 1$. Hence deduce

that $\frac{\pi^2}{6} = \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \dots$. (08 Marks)

OR

- 2 a. Find the Fourier series of the periodic function defined by $f(x) = 2x - x^2$, $0 < x < 3$. (06 Marks)
b. Show that the half range sine series for the function $f(x) = \ell x - x^2$ in $0 < x < \ell$ is

$$\frac{8\ell^2}{\pi^3} \sum_{n=1}^{\infty} \frac{1}{(2n+1)^3} \sin\left(\frac{2n+1}{\ell}\pi x\right) \pi x. \quad (05 \text{ Marks})$$

- c. Express y as a Fourier series upto 1st harmonic given :

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

(05 Marks)

Module-2

- 3 a. Find the Fourier transform of

$$f(x) = \begin{cases} 1-|x|, & |x| \leq 1 \\ 0, & |x| > 1 \end{cases}$$

and hence deduce that $\int_0^{\infty} \frac{\sin^2 t}{t^2} dt = \frac{\pi}{2}$. (06 Marks)

- b. Find the Fourier Sine and Cosine transforms of $f(x) = e^{-\alpha x}$, $\alpha > 0$. (05 Marks)

- c. Solve by using z -transforms $y_{n+1} + \frac{1}{4}y_n = \left(\frac{1}{4}\right)^n$ ($n \geq 0$), $y_0 = 0$. (05 Marks)

OR

- 4 a. Find the Fourier transform of $f(x) = e^{-|x|}$. (06 Marks)
- b. Find the Z – transform of $\sin(3n + 5)$. (05 Marks)
- c. Find the inverse Z – transform of : $\frac{z}{(z-1)(z-2)}$. (05 Marks)

Module-3

- 5 a. Find the correlation coefficient and the equation of the line of regression for the following values of x and y. (06 Marks)

x	1	2	3	4	5
y	2	5	3	8	7

- b. Find the equation of the best fitting straight line for the data : (05 Marks)

x	0	1	2	3	4	5
y	9	8	24	28	26	20

- c. Use Newton – Raphson method to find a real root of the equation $x \log_{10} x = 1.2$ (carry out 3 iterations). (05 Marks)

OR

- 6 a. Obtain the lines of regression and hence find the coefficient of correlation for the data :

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

- b. Fit a second degree parabola to the following data : (05 Marks)

x	1	2	3	4	5
y	10	12	13	16	19

- c. Use the Regula–Falsi method to find a real root of the equation $x^3 - 2x - 5 = 0$, correct to 3 decimal places. (05 Marks)

Module-4

- 7 a. Given $\sin 45^\circ = 0.7071$, $\sin 50^\circ = 0.7660$, $\sin 55^\circ = 0.8192$, $\sin 60^\circ = 0.8660$ find $\sin 57^\circ$ using an appropriate interpolation formula. (06 Marks)
- b. Construct the interpolation polynomial for the data given below using Newton's divided difference formula :

x	2	4	5	6	8	10
y	10	96	196	350	868	1746

- c. Use Simpson's $\frac{1}{3}$ rd rule with 7 ordinates to evaluate $\int_2^8 \frac{dx}{\log_{10} x}$. (05 Marks)

OR

- 8 a. Given $f(40) = 184$, $f(50) = 204$, $f(60) = 226$, $f(70) = 250$, $f(80) = 276$, $f(90) = 304$, find $f(38)$ using Newton's forward interpolation formula. (06 Marks)
- b. Use Lagrange's interpolation formula to fit a polynomial for the data :

x	0	1	3	4
y	-12	0	6	12

Hence estimate y at $x = 2$.

(05 Marks)

- c. Evaluate $\int_0^1 \frac{x}{1+x^2} dx$ by Weddle's rule taking seven ordinates and hence find $\log_e 2$.

(05 Marks)

Module-5

- 9 a. Find the area between the parabolas $y^2 = 4x$ and $x^2 = 4y$ using Green's theorem in a plane. (06 Marks)
- b. Verify Stoke's theorem for the vector $\vec{F} = (x^2 + y^2)\mathbf{i} - 2xy\mathbf{j}$ taken round the rectangle bounded by $x = 0$, $x = a$, $y = 0$, $y = b$. (05 Marks)
- c. Find the extremal of the functional : $\int_{x_1}^{x_2} [y' + x^2(y')^2] dx$. (05 Marks)

OR

- 10 a. Verify Green's theorem in a plane for $\oint_c (3x^2 - 8y^2) dx + (4y - 6xy) dy$ where c is the boundary of the region enclosed by $y = \sqrt{x}$ and $y = x^2$. (06 Marks)
- b. If $\vec{F} = 2xy\mathbf{i} + yz^2\mathbf{j} + xz\mathbf{k}$ and S is the rectangular parallelepiped bounded by $x = 0$, $y = 0$, $z = 0$, $x = 2$, $y = 1$, $z = 3$ evaluate $\iint_S \vec{F} \cdot \hat{n} ds$. (05 Marks)
- c. Find the geodesics on a surface given that the arc length on the surface is $S = \int_{x_1}^{x_2} \sqrt{x[1+(y')^2]} dx$. (05 Marks)

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15MATDIP31

Third Semester B.E. Degree Examination, June/July 2018 Additional Mathematics – I

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Find the modulus and amplitude of $\frac{(1+i)^2}{3+i}$. (05 Marks)
- b. Prove that $\left(\frac{1+\cos\theta+i\sin\theta}{1+\cos\theta-i\sin\theta}\right)^n = \cos n\theta + i\sin n\theta$. (05 Marks)
- c. If $z = \cos\theta + i\sin\theta$, then show that $x^n + \frac{1}{x^n} = 2\cos n\theta$, $x^n - \frac{1}{x^n} = 2i\sin n\theta$. (06 Marks)

OR

- 2 a. Find the sine of the angle between $\vec{a} = 2\hat{i} - 2\hat{j} + \hat{k}$ and $\vec{b} = \hat{i} - 2\hat{j} + 2\hat{k}$. (05 Marks)
- b. Find the unit vector perpendicular to both \vec{a} and \vec{b} , where $\vec{a} = \hat{i} - 2\hat{j} + 3\hat{k}$, $\vec{b} = 2\hat{i} + \hat{j} + \hat{k}$. (05 Marks)
- c. Show that (3, -2, 4), (6, 3, 1), (5, 7, 3) and (2, 2, 6) are coplanar. (06 Marks)

Module-2

- 3 a. Find the n^{th} derivative of $\sin(3x)\cos x$. (05 Marks)
- b. Find the angle between radius vector and tangent to the curve $r^m \cos m\theta = a^m$. (05 Marks)
- c. Find the pedal equation of $r = a(1 + \cos\theta)$. (06 Marks)

OR

- 4 a. If $u = \tan^{-1}\left(\frac{x^3 + y^3}{x - y}\right)$, prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \sin(2u)$. (05 Marks)
- b. If $u = f\left(\frac{x}{y}, \frac{y}{z}, \frac{z}{x}\right)$, prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z} = 0$. (05 Marks)
- c. If $u = x + y$, $v = y + z$, $w = z + x$, find $J\left(\frac{uvw}{xyz}\right)$. (06 Marks)

Module-3

- 5 a. Evaluate $\int_0^{\pi} x \cos^6 x \, dx$. (05 Marks)
- b. Evaluate $\int_0^{\infty} \frac{x^2}{(1+x^6)^{7/2}} \, dx$. (05 Marks)
- c. Evaluate $\int_0^1 x^5 (1-x^2)^{5/2} \, dx$. (06 Marks)

OR

- 6 a. Evaluate $\int_1^2 \int_3^4 (xy + e^y) \, dy \, dx$. (05 Marks)
- b. Evaluate $\int_0^1 \int_x^{\sqrt{x}} xy \, dy \, dx$. (05 Marks)
- c. Evaluate $\int_0^1 \int_0^1 \int_0^y xyz \, dx \, dy \, dz$. (06 Marks)

Module-4

- 7 a. Find the angle between the tangents to the curve $x = t^2, y = t^3, z = t^4$ at $t = 2$, and $t = 3$. (05 Marks)
- b. Find the unit normal to the curve $\vec{\gamma} = 4 \sin t \hat{i} + 4 \cos t \hat{j} + 3t \hat{k}$. (05 Marks)
- c. Find the velocity and acceleration to the curve $\vec{\gamma} = t^2 \hat{i} - t^3 \hat{j} + t^4 \hat{k}$ at $t = 1$. (06 Marks)

OR

- 8 a. Find the directional derivative of $\phi = x^3 y^3 z^3$ at $(1, 2, 1)$ in the direction of $\hat{i} + 2\hat{j} + 2\hat{k}$. (05 Marks)
- b. Find the unit normal to the surface $xy + x + zx = 3$ at $(1, 1, 1)$. (05 Marks)
- c. If $\vec{F} = \nabla(x^3 + y^3 + z^3 - 3xyz)$, find $\text{div } \vec{F}$. (06 Marks)

Module-5

- 9 a. Solve $\frac{dy}{dx} = \frac{y^2}{xy - x^2}$. (05 Marks)
- b. Solve $\frac{dy}{dx} + y \cot x = \sin x$. (05 Marks)
- c. Solve $y(x + y)dx + (x + 2y - 1)dy = 0$. (06 Marks)

OR

- 10 a. Solve $(x^2 + y)dx + (y^3 + x)dy = 0$. (05 Marks)
- b. Solve $\frac{dy}{dx} + \frac{y}{x} = xy^2$. (05 Marks)
- c. Solve $(x^2 + y^2)\frac{dy}{dx} = xy$. (06 Marks)

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Third Semester B.E. Degree Examination, June/July 2018

Strength of Materials

Time: 3 hrs.

Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.

2. Missing data, if any, may be suitably assumed.

Module-1

- 1 a. For a bar of uniform section derive an expression for elongation due to self weight. (06 Marks)
 b. Evaluate the deformation of the bar, given, $E_1 = E_2 = E_3 = 200\text{GPa}$, refer Fig.Q1(b). (10 Marks)

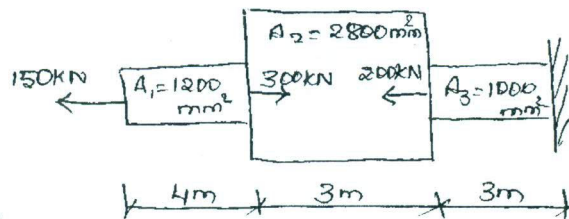


Fig.Q1(b)

OR

- 2 a. Derive an expression between Young's modulus, Modulus of rigidity and Poisson's ratio. (10 Marks)
 b. A circular rod of dia 200mm and 500mm long is subjected to a tensile force of 45kN modulus of elasticity = 200 kN/mm^2 , Find stress, strain and elongation of bar due to applied load. (06 Marks)

Module-2

- 3 At a certain point in a stressed body, the principal stresses are $\sigma_x = 80\text{ MPa}$ and $\sigma_y = -40\text{MPa}$. Determine σ and τ on the planes whose normal's are at $+30^\circ$ and $+120^\circ$ with x - axis. (16 Marks)

OR

- 4 a. Derive an expression of tangential stress and longitudinal stress of thin walled pressure vessels. (08 Marks)
 b. A rectangular block of material is subjected to a tensile stress of 100N/mm^2 on one plane and a tensile stress of 50N/mm^2 on a plane at right angles together with shear stress of 60 N/mm^2 on same planes, find : i) direction of the principal plane ii) magnitude of the principal plane iii) magnitude of greatest shear stress. (08 Marks)

Module-3

- 5 a. Define : i) bending moment ii) shear force iii) shear force diagram iv) bending moment diagram. (08 Marks)
 b. Draw SFD and BMD for the cantilever beam shown in Fig.Q5(b). (08 Marks)

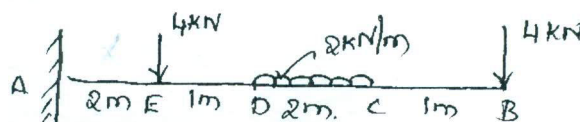


Fig.Q5(b)

OR

- 6 a. Derive the relation between load intensity, bending moment and shear force. (06 Marks)
 b. A beam ABC, 8m long has supplied at A and B, it is long between A and B. The beam carries an udl of 10kN/m between A and B. At free end point C, a point load of 15 kN acts. Draw BMD and locate point of contra-flexure, if any. (10 Marks)

Module-4

- 7 a. Explain pure bending with an suitable example and mention the assumptions of pure bending. (06 Marks)
 b. A cast iron beam section shown in Fig.Q7(b) is freely supported on a span of 5m. IF the tensile stress is not to exceed 20 N/mm^2 . Find the safe UDL which the beam can carry. Find also the maximum compressive stress. (10 Marks)

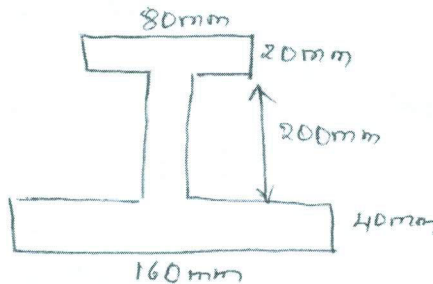


Fig.Q7(b)

OR

- 8 a. Derive an Euler's crippling load when both ends of the column are pinned. (08 Marks)
 b. A hollow cylindrical cast iron column is 4m long both ends being fixed. Design the column to carry a axial load of 250 kN. Use Rankine's formula and factor of safety = 5. The internal diameter may be taken as 0.80 time the external diameter. Take $E_c = 550 \text{ N/mm}^2$ and $\alpha = \frac{1}{1600}$. (08 Marks)

Module-5

- 9 a. Derive torsional equation for circular shaft. (08 Marks)
 b. A steel shaft transmits 105kN at 160 rpm. If the shaft is 100mm in diameter. Find the torque on the shaft and the maximum shearing stress induced. (08 Marks)

OR

- 10 a. Define pure torsion, polar modulus and torsional rigidity. (06 Marks)
 b. A solid shaft is subjected to a torque of 15 kN-m. Find the necessary diameter of the shaft if the allowable shearing stress is 60 N/mm^2 and the allowable twist is 1 degree in a length of 20 diameters of the shaft. Take $C = 8 \times 10^4 \text{ N/mm}^2$. (10 Marks)

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Third Semester B.E. Degree Examination, June/July 2018

Fluid Mechanics

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Distinguish between
 i) Ideal fluid and real fluid
 ii) Newtonian and non Newtonian fluid
 iii) Cohesion and adhesion (06 Marks)
- b. State and prove Pascal's law. (04 Marks)
- c. Calculate the specific weight, density, specific volume and specific gravity of two litres of a liquid which weighs 15 N. (06 Marks)

OR

- 2 a. With the help of neat sketches, explain (i) simple U-tube manometer and (ii) differential U-tube manometer. (06 Marks)
- b. What is capillarity? Derive an expression for capillary rise and a liquid in a glass tube. (04 Marks)
- c. A U tube differential manometer connects two pipes A and B. Pipe A contains carbon tetra chloride having specific gravity 1.594 under a pressure of 117.72 kN/m² and pipe B contains oil of specific gravity 0.8 under a pressure of 117.72 kN/m². The pipe A lies 2.5 m above pipe B. Find the difference in pressure measured by mercury as fluid filling U-tube. Assume mercury in the right limb is 50 cm below centre of pipe B. (06 Marks)

Module-2

- 3 a. Distinguish between:
 i) Steady and unsteady flow
 ii) Rotational and irrotational flow (04 Marks)
- b. Derive the expressions for total pressure and centre of pressure for a plane surface submerged vertically in a liquid. (06 Marks)
- c. A circular opening 3m diameter, in a vertical side of a tank is closed by a disc of 3m diameter which can rotate about a horizontal diameter. Calculate: (i) The force on the disc, and (ii) The torque required to maintain the disc in equilibrium in vertical position when the head of water above the horizontal diameter is 6m. (06 Marks)

OR

- 4 a. Define the terms velocity potential function and stream function. (04 Marks)
- b. Derive an expression for continuity equation for a three dimensional flow. (06 Marks)
- c. A stream function in a two dimensional flow is $\psi = 2xy$. Show that the flow is irrotational and determine the corresponding velocity potential ϕ . (06 Marks)

Module-3

- 5 a. What is pitot tube? How will you determine velocity using pitot tube? (04 Marks)
 b. State and prove Bernoulli's theorem for steady flow of an incompressible fluid. (06 Marks)
 c. The water is flowing through a taper pipe of length 100 m having diameters 600 mm at the upper end and 300 mm at the lower end at the rate of 50 litres/s. The pipe has a slope of 1 in 30. Find the pressure at the lower end if the pressure at the higher end is 196.2 kPa. (06 Marks)

OR

- 6 a. Define the terms: i) forced vortex flow and ii) free vortex flow. (04 Marks)
 b. What is venturimeter? Derive an expression for discharge through a venturimeter. (06 Marks)
 c. A pipe of 300 mm diameter conveying 300 litres/s of water has a right angled bend in a horizontal plane. Find the resultant force exerted on the bend if the pressure at inlet and outlet of bend are 245.25 kPa and 235.44 kPa. (06 Marks)

Module-4

- 7 a. Explain different hydraulic coefficient and establish the relation between them. (04 Marks)
 b. Derive an expression for discharge over a triangular notch. (06 Marks)
 c. The head of water over an orifice of diameter 100 mm is 5m. The water coming out from the orifice is collected in a circular tank of diameter 2 m. The rise of water level in circular tank is 450 mm in 30 seconds. Also the coordinates at a certain point on the jet, measured from vena-contracta are 1000 mm horizontal and 52 mm vertical. Find the hydraulic coefficients C_v , C_d and C_c . (06 Marks)

OR

- 8 a. Explain the terms:
 i) Velocity of approach
 ii) Effect of end contractions in notches (04 Marks)
 b. What is Cipolletti notch? Derive an expression for discharge over a Cipolletti notch. (06 Marks)
 c. Water flows over a rectangular weir 1.2m wide at a depth of 15 cm and afterwards passes through a triangular right angled weir. Taking coefficient of discharge for rectangular Weir 0.62 and for triangular Weir 0.59 find the depth over the triangular Weir. (06 Marks)

Module-5

- 9 a. Explain briefly:
 i) Hydraulic gradient line and
 ii) Energy gradient line (04 Marks)
 b. Derive an expression for head loss due to friction in pipes. (06 Marks)
 c. A rigid pipe conveying water is 3200 m long. The velocity of flow is 1.2 m/s. Calculate the rise of pressure behind a valve at the lower end if it is closed (i) in 20 seconds (ii) in 3 seconds. Take bulk modulus and water equal to 2000 N/mm^2 . (06 Marks)

OR

- 10 a. Explain briefly the phenomenon of water hammer. (04 Marks)
 b. Derive an expression for head loss due to sudden enlargement in a pipe flow. (06 Marks)
 c. At a sudden enlargement of a water main from 240 mm to 480 mm diameter, the hydraulic gradient rises by 10 mm. Estimate the rate of flow. (06 Marks)

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15CV34

Third Semester B.E. Degree Examination, June/July 2018 Basic Surveying

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Define surveying. (02 Marks)
b. What are the primary divisions of surveying? Explain briefly. (05 Marks)
c. The area of the plan of an old survey plotted to a scale of 10 meters to 1cm measures now as 100.2 sq.cm as found by a planimeter. The plan is found to have shrunk, so that a line originally 10cm long now measures 9.7cm only. There was a note on the plan that the 20m chain used was 8cm too short. Find the true area of plan. (09 Marks)

OR

- 2 a. By means of neat sketches show any six conventional symbols used in surveying. (06 Marks)
b. Define precision and accuracy. (02 Marks)
c. In passing an obstacle in the form of a pond, stations A and D on the main line were taken on the opposite sides of pond, on the left of AD, a line AB, 200m long was laid down and a second line AC, 250m long was ranged on right of AD points B, D and C being in the same straight line, BD and DC were then chained and found to be 125m and 150m. Find the length AD. (08 Marks)

Module-2

- 3 a. Differentiate between prismatic and surveyors compass (any 3). (06 Marks)
b. Convert the whole circle bearings to quadrantal bearings :
i) $22^{\circ}30'$ ii) $170^{\circ}12'$ iii) $211^{\circ}54'$ iv) $327^{\circ}24'$. (02 Marks)
c. Determine the value of included angles in a closed compare survey ABCD conducted in clockwise direction given the following data. Apply the check.

Line	FB
AB	40°
BC	70°
CD	210°
DA	280°

(08 Marks)

OR

- 4 a. Define : i) Face left ii) Transiting iii) Swinging as applied to theodolite surveying. (03 Marks)
b. With a neat sketch, explain the method of measurement of horizontal angle by repletion method. State the errors eliminated by this method. (05 Marks)
c. The following angles were observed in the clockwise direction in an open traverse.
 $\angle ABC = 124^{\circ}15'$, $\angle BCD = 156^{\circ}30'$, $\angle CDE = 102^{\circ}00'$, $\angle DEF = 95^{\circ}15'$, $\angle EFG = 215^{\circ}45'$
The magnetic bearing of the line AB = $240^{\circ}30'$ what would be the bearing of line FG? (08 Marks)

Module-3

- 5 a. Explain closed and open traversed with neat sketches. (06 Marks)
 b. State Bowditch's and Transit rule. (04 Marks)
 c. Calculate latitudes, departures and closing error for the following traverse conducted at a place.

Line	Length (m)	Web
AB	89.31	45°10'
BC	219.76	72°05'
CD	151.18	161°52'
DE	159.10	228°43'
EA	232.26	300°42'

(06 Marks)

OR

- 6 a. Define tacheometry under what circumstances it is used? (04 Marks)
 b. State any four characteristics of a tacheometer. (02 Marks)
 c. A tacheometer is setup at an intermediate point on a traverse course PQ and the following observations are made on a vertically held staff.

Staff stn	Vertical angle	Staff intercept	Axial hair reading
P	+8°36'	2.350	2.105
Q	+6°6'	2.055	1.895

The instrument is fitted with an anallatic lens and the constant is 100.000. Compute the length of PQ and reduced level of Q, if that of P being 321.50 meters. (10 Marks)

Module-4

- 7 a. Define the terms : i) Back sight ii) Fore sight iii) Intermediate sight iv) change point. (04 Marks)
 b. Compare height of instrument method and rise and fall method of reduction of levels. (04 Marks)
 c. The following consecutive readings were taken with a level and 5m leveling staff on continuously sloping ground at a common interval of 20 meters :
 0.835, 1.030, 1.925, 2.825, 3.730, 4.685, 0.625, 2.005, 3.110 and 4.485m.
 The reduced level of first point was 208.125m. Rule outer page of level field book and enter the readings. Calculate the reduced levels of points by rise and fall method and apply check. Calculate also the gradient of line joining the first and last point. (08 Marks)

OR

- 8 a. Explain reciprocal leveling. (04 Marks)
 b. An observer standing on the deck of ship just sees a light house. The top of light house is 42m above the sea level and the height of observers Eye is 6m above the sea level. Find the distance of observer from the light house. (05 Marks)
 c. In order to ascertain the elevation of the top (Q) of the signal on a hill, observations were made from two instrument stations P and R at a horizontal distance 100m apart, the stations P, R, and Q are in a line. The angles of elevation of Q at P and R were 28°42' and 18°6' respectively. The staff reading on a bench mark of elevation 287.28m from P = 2.870, from R = 3.750. Determine the Elevation of foot of signal if height of signal = 3M. (07 Marks)

Module-5

- 9 a. The following perpendicular offsets were taken from a chain line to an irregular boundary.

Chainage (m)	0	30	60	90	120	150	180	210
Offset length (m)	0	2.65	3.80	3.75	4.65	3.60	5.00	5.80

Calculate the area between the chain lines and irregular boundary, first and last offsets by
i) Trapezoidal rule ii) Simpson's rule. **(08 Marks)**

- b. Calculate the area enclosed by a traverse ABCD for the following data : Assume co-ordinator as (100, 200).

Line	Latitude (m)	Departure(m)
AB	+32.05	+40.20
BC	-3	+92.00
CD	-97.85	+6.402
DE	-15.8	-107.00
EA	+84.6	-31.602

(08 Marks)

OR

- 10 a. With neat sketches explain any six characteristics of contours. **(06 Marks)**
b. Calculate the area of zero circle with the following data :

IR	FR	Position anchor point	Remarks
6.520	2.724	Outside the fig	Zero of counting disc crossed index once clockwise
1.222	7.720	Inside the fig	Zero of counting disc crossed and index twice anticlockwise

Assume that tracing arm of planimeter was so set that one revolution of measuring wheel measures 100cm^2 on paper. **(06 Marks)**

- c. Write short notes on :
i) Interpolation of contours
ii) Contour gradient. **(04 Marks)**

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18MAT31

Third Semester B.E. Degree Examination, Aug./Sept.2020 Transform Calculus, Fourier Series and Numerical Techniques

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Find $L\{e^{-2t}t \cos 2t\}$. (06 Marks)
- b. Express the function in terms of unit step function and hence find Laplace transform of :
- $$f(t) = \begin{cases} 1 & 0 \leq t \leq 1 \\ t & 1 < t \leq 2. \\ t^2 & t > 2 \end{cases} \quad (07 \text{ Marks})$$
- c. Solve the equation $y''(t) + 3y'(t) + 2y(t) = 0$ under the condition $y(0) = 1, y'(0) = 0$. (07 Marks)

OR

- 2 a. Find :
- i) $L^{-1}\left\{\frac{s+3}{s^2-4s+13}\right\}$ ii) $L^{-1}\left\{\log\frac{(s^2+1)}{s(s+1)}\right\}$. (06 Marks)
- b. Find $L^{-1}\left\{\frac{s^2}{(s^2+a^2)^2}\right\}$ using convolution theorem. (07 Marks)
- c. A periodic function of period $2a$ is defined by
- $$f(t) = \begin{cases} E & 0 \leq t \leq a \\ -E & a < t \leq 2a \end{cases}$$
- Where E is a constant and show that $\text{trim } L\{f(t)\} = \frac{E}{S} \tan h\left(\frac{as}{2}\right)$. (07 Marks)

Module-2

- 3 a. Express $f(x) = x^2$ as a Fourier series in the interval $-\pi < x < \pi$. Hence deduce that
- $$\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots = \frac{\pi^2}{12} \quad (07 \text{ Marks})$$
- b. Obtain the Fourier series expression of $f(x) = \begin{cases} \pi x & 0 < x < 1 \\ \pi(2-x) & 1 < x < 2 \end{cases}$. (07 Marks)
- c. Obtain the half range cosine series for the function $f(x) = (x-1)^2, 0 \leq x \leq 1$. (06 Marks)

OR

- 4 a. Obtain the Fourier series of $f(x) = \left(\frac{\pi-x}{2}\right)$ $0 < x < 2\pi$. Hence deduce that
- $$1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \dots = \frac{\pi}{4}. \quad (07 \text{ Marks})$$
- b. Obtain the half range cosine series of $f(x) = x \sin x$ $0 \leq x \leq \pi$. (07 Marks)
- c. Express $f(x)$ as a Fourier series upto first harmonic.

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

(06 Marks)

Module-3

- 5 a. Find the Fourier cosine transform of
- $$f(x) = \begin{cases} x & \text{for } 0 < x < 1 \\ (2-x) & \text{for } 1 < x < 2. \\ 0 & \text{for } x > 2 \end{cases} \quad (07 \text{ Marks})$$
- b. Find the Fourier transform by $f(x) = e^{-|x|}$. (07 Marks)
- c. Obtain the inverse Z – transform by $u(z) = \frac{z}{(z-2)(z-3)}$. (06 Marks)

OR

- 6 a. Find the Fourier transform by
- $$f(x) = \begin{cases} 1-|x| & |x| < 1 \\ 0 & |x| > 1 \end{cases}$$
- and show that $\int_0^{\infty} \frac{\sin^2 t}{t^2} dt = \frac{\pi}{2}$. (07 Marks)
- b. Find the z-transform of : i) $\cos n\theta$ ii) $\sin n\theta$. (06 Marks)
- c. Solve using Z –transform $u_{n+2} - 4u_n = 0$ given that $u_0 = 0$ and $u_1 = 2$. (07 Marks)

Module-4

- 7 a. Using Taylor's series method solve $y(x) = x + y$, $y(0) = 1$ then find y at $x = 0.1, 0.2$ consider upto 4th degree. (07 Marks)
- b. Solve $y'(x) = 1 + \frac{y}{z}$, $y(1) = 2$ then find $y(1.2)$ with $h = 0.2$ using modified Euler's method. (06 Marks)
- c. Solve $y'(x) = x - y^2$ and the data is $y(0) = 0$, $y(0.2) = 0.02$, $y(0.4) = 0.0795$, $y(0.6) = 0.1762$ then find $y(0.8)$ by applying Milne's method and applying corrector formula twice. (07 Marks)

OR

- 8 a. Solve $y'(x) = 3x + \frac{y}{2}$, $y(0) = 1$ then find $y(0.2)$ with $n = 0.2$ using modified Euler's method. (06 Marks)
- b. Solve $y(x) = 3e^x + 2y$, $y(0) = 0$ then find $y(0.1)$ with $h = 0.1$ using Runge-Kutta method of fourth order. (07 Marks)
- c. Solve $y'(x) = 2e^x - y$ and data is

x	0	0.1	0.2	0.3
y	2	2.010	2.040	2.090

Then find $y(0.4)$ by using Adam's Bash forth method.

(07 Marks)

Module-5

- 9 a. By applying Milne's predictor and corrector method to compute $y(0.4)$ give the differential equation $\frac{d^2y}{dx^2} = 1 - \frac{dy}{dx}$ and the following table by initial value. (07 Marks)

x	0	0.1	0.2	0.3
y	1	1.1103	1.2427	1.3990
y'	1	1.2103	1.4427	1.6990

- b. Derive Euler's equation in the standard form $\frac{\partial f}{\partial y} - \frac{d}{dx} \left(\frac{\partial f}{\partial y'} \right) = 0$. (06 Marks)
- c. Find the extremal of the functional $\int_{x_1}^{x_2} (y' + x^2 y'^2) dx$. (07 Marks)

OR

- 10 a. By Runge Kutta method solve $\frac{d^2y}{dx^2} = x \left(\frac{dy}{dx} \right)^2 - y^2$ for $x = 0.2$ correct to four decimal places. Using initial condition $y(0) = 1$, $y'(0) = 0$. (07 Marks)
- b. Prove that the shortest distance between two points in a plane is a straight line. (06 Marks)
- c. Find the curve on which the functional $\int_0^1 [y'^2 + 12xy] dx$ with $y(0) = 0$, $y(1) = 1$. (07 Marks)

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18MATDIP31

Third Semester B.E. Degree Examination, Aug./Sept.2020 Additional Mathematics – I

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Prove that $(1 + i)^n + (1 - i)^n = 2^{\frac{n}{2}+1} \cos \frac{n\pi}{4}$ (08 Marks)
- b. Express the complex number $(2 + 3i) + \frac{1}{1-i}$ in the form $a + ib$. (06 Marks)
- c. Find the modulus and amplitude of the complex number $1 - \cos\alpha + i \sin\alpha$. (06 Marks)

OR

- 2 a. If $\vec{A} = i + 2j - 3k$, $\vec{B} = 3i - j + 2k$ show that $\vec{A} + \vec{B}$ is perpendicular to $\vec{A} - \vec{B}$. Also find the angle between $2\vec{A} + 3\vec{B}$ and $\vec{A} + 2\vec{B}$. (08 Marks)
- b. Show that the vectors $i - 2j + 3k$, $2i + j + k$, $3i + 4j - k$ are coplanar. (06 Marks)
- c. Find the sine of the angle between $\vec{A} = 4i - j + 3k$ and $\vec{B} = -2i + j - 2k$. (06 Marks)

Module-2

- 3 a. Obtain the Maclaurin's series expansion of $\sin x$ upto term containing x^4 . (08 Marks)
- b. If $u = \sin^{-1} \left[\frac{x^2 + y^2}{x - y} \right]$ prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \tan u$. (06 Marks)
- c. If $u = f(x - y, y - z, z - x)$ prove that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$. (06 Marks)

OR

- 4 a. Prove that $\log(1 + x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \dots$ by using Maclaurin's series. (08 Marks)
- b. If $x = r \cos \theta$, $y = r \sin \theta$ find $\frac{\partial(x, y)}{\partial(r, \theta)}$. (06 Marks)
- c. If $z = e^{ax + by} f(ax - by)$ then show that $b \frac{\partial z}{\partial x} + a \frac{\partial z}{\partial y} = 2abz$. (06 Marks)

Module-3

- 5 a. Find the angle between the surfaces $x^2 + y^2 + z^2 = 9$ and $z = x^2 + y^2 - 3$ at the point $(2, -1, 2)$ (08 Marks)
- b. Find the unit vector normal to the surface $x^2y + 2xz = 4$ at $(2, -2, 3)$. (06 Marks)
- c. Show that the vector $(-x^2 + yz)i + (4y - z^2x)j + (2xz - 4z)k$ is solenoidal. (06 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.

OR

- 6 a. A particle moves along the curve $x = t^3 + 1$, $y = t^2$, $z = 2t + 3$ where t is the time. Find the components of its velocity and acceleration at $t = 1$ in the direction $i + j + 3k$. (08 Marks)
- b. Find the values of a , b , c such that $\vec{F} = (x + y + az)i + (bx + 2y - z)j + (x + cy + 2z)k$ is irrotational. (06 Marks)
- c. Find $\text{div } \vec{F}$ and $\text{curl } \vec{F}$ where $\vec{F} = \nabla(x^3 + y^3 + z^3 - 3xyz)$. (06 Marks)

Module-4

- 7 a. Obtain the reduction formula for $\int_0^{\pi/2} \cos^n x \, dx$, $n > 0$. (08 Marks)
- b. Evaluate $\int_0^1 \frac{x^9}{\sqrt{1-x^2}} \, dx$ (06 Marks)
- c. Evaluate $\iint xy(x+y) \, dx \, dy$ over the area between $y = x^2$ and $y = x$. (06 Marks)

OR

- 8 a. Obtain the reduction formula for $\int_0^{\pi/2} \sin^n x \, dx$, $n > 0$. (08 Marks)
- b. Evaluate $\int_0^{\infty} \frac{x^2}{(1-x^2)^{7/2}} \, dx$ (06 Marks)
- c. Evaluate $\int_0^a \int_0^x \int_0^{x+y} e^{x+y+z} \, dz \, dy \, dx$ (06 Marks)

Module-5

- 9 a. Solve $y(\log y)dx + (x - \log y)dy = 0$ (08 Marks)
- b. Solve $x \frac{dy}{dx} + y = x^3 y^6$ (06 Marks)
- c. Solve $(xy^2 - e^{1/x^3})dx - x^2 y \, dy = 0$ (06 Marks)

OR

- 10 a. Solve $(5x^4 + 3x^2 y^2 - 2xy^3) \, dx + (2x^3 y - 3x^2 y^2 - 5y^4) \, dy = 0$ (08 Marks)
- b. Solve $\frac{dy}{dx} + x \sin 2y = x^3 \cos^2 y$ (06 Marks)
- c. Solve $(xy^3 + y)dx + 2(x^2 y^2 + x + y^4) \, dy = 0$ (06 Marks)

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17MAT31

Third Semester B.E. Degree Examination, Aug./Sept. 2020 Engineering Mathematics – III

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Find the Fourier series to represent the periodic function $f(x) = x - x^2$ from $x = -\pi$ to $x = \pi$. (08 Marks)

- b. The following table gives the variations of periodic current over a period.

t sec	0	$\frac{T}{6}$	$\frac{T}{3}$	$\frac{T}{2}$	$\frac{2T}{3}$	$\frac{5T}{6}$	T
A amp.	1.98	1.30	1.05	1.30	-0.88	-0.25	1.98

Expand A as a Fourier series upto first harmonic. Obtain the amplitude of the first harmonic. (06 Marks)

- c. Find the half range cosine series for the function $f(x) = (x-1)^2$ in $0 < x < 1$. (06 Marks)

OR

- 2 a. Find the Fourier series of $f(x) = 2x - x^2$ in $(0, 3)$. (08 Marks)
 b. Obtain the constant term and the coefficients of the first sine and cosine terms in the Fourier series expansion of y as given in the following table: (06 Marks)

x:	0	1	2	3	4	5	6
y:	9	18	24	28	26	20	9

- c. Obtain the half-range sine series for the function,

$$f(x) = \begin{cases} x, & 0 < x < \frac{\pi}{2} \\ \pi - x, & \frac{\pi}{2} < x < \pi \end{cases} \quad (06 \text{ Marks})$$

Module-2

- 3 a. Find the Fourier transform of $f(x) = \begin{cases} a^2 - x^2, & |x| \leq a \\ 0, & |x| > a \end{cases}$. Hence deduce that

$$\int_0^{\infty} \frac{(\sin x - x \cos x)}{x^3} \cos \frac{x}{2} dx = \frac{3\pi}{16} \quad (08 \text{ Marks})$$

- b. Find the Z-transform of,
 (i) $\cos n\theta$ and (ii) $\cosh n\theta$ (06 Marks)
 c. Solve $y_{n+2} + 6y_{n+1} + 9y_n = 2^n$ with $y_0 = 0 = y_1$, using z-transforms technique. (06 Marks)

OR

- 4 a. Find the Fourier cosine transform of e^{-ax} . Hence evaluate $\int_0^{\infty} \frac{\cos \lambda x}{x^2 + a^2} dx$ (08 Marks)
- b. Find the Z-transform of,
 (i) $(n+1)^2$ (ii) $\sin(3n+5)$ (06 Marks)
- c. Find the inverse Z-transform of $\frac{2z^2 + 3z}{(z+2)(z-4)}$. (06 Marks)

Module-3

- 5 a. Find the two regression lines and hence the correlation coefficient between x and y from the data. (08 Marks)
- | | | | | | | | | | | |
|---|----|----|----|----|----|----|----|----|----|----|
| x | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| y | 10 | 12 | 16 | 28 | 28 | 36 | 41 | 49 | 40 | 50 |
- b. Fit a second degree parabola to the following data: (06 Marks)
- | | | | | | |
|---|---|-----|-----|-----|-----|
| x | 0 | 1 | 2 | 3 | 4 |
| y | 1 | 1.8 | 1.3 | 2.5 | 6.3 |
- c. Using Newton-Raphson method find the root of $x \sin x + \cos x = 0$ near $x = \pi$ corrected to 4 decimal places. (06 Marks)

OR

- 6 a. Two variables x and y have the regression lines $3x + 2y = 26$ and $6x + y = 31$. Find the mean values of x and y and the correlation coefficient between them. (08 Marks)
- b. Fit a curve of the form, $y = ae^{bx}$ to the following data: (06 Marks)
- | | | | | | | |
|----|----|----|----|----|----|----|
| x: | 5 | 15 | 20 | 30 | 35 | 40 |
| y: | 10 | 14 | 25 | 40 | 50 | 62 |
- c. Using Regula-Falsi method find the root of $xe^x = \cos x$ in the interval (0, 1) carrying out four iterations. (06 Marks)

Module-4

- 7 a. Using Newton's forward and backward interpolation formulae, find $f(1)$ and $f(10)$ from the following table: (08 Marks)
- | | | | | | | | |
|------|-----|-----|------|------|------|------|------|
| x | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| f(x) | 4.8 | 8.4 | 14.5 | 23.6 | 36.2 | 52.8 | 73.9 |
- b. Given that $f(5) = 150$, $f(7) = 392$, $f(11) = 1452$, $f(13) = 2366$, $f(17) = 5202$. Using Newton's divided difference formulae find $f(9)$. (06 Marks)
- c. Using Simpson's $\frac{1}{3}$ rule evaluate $\int_0^{0.6} e^{-x^2} dx$ by taking seven ordinates. (06 Marks)

OR

- 8 a. Using Newton's Backward difference interpolation formula find $f(105)$ from, (08 Marks)
- | | | | | | |
|------|------|------|------|------|------|
| x | 80 | 85 | 90 | 95 | 100 |
| f(x) | 5026 | 5674 | 6362 | 7088 | 7854 |
- b. If $f(1) = -3$, $f(3) = 9$, $f(4) = 30$, $f(6) = 132$ find Lagrange's interpolation polynomial that takes the same value as $f(x)$ at the given point. (06 Marks)
- c. Evaluate $\int_4^{5.2} \log_e x dx$ by Simpson's $\frac{3}{8}$ rule with $h = 0.1$. (06 Marks)

Module-5

- 9 a. Verify Green's theorem for $\oint_C (xy + y^2)dx + x^2 dy$ where C is bounded by $y = x$ and $y = x^2$.
(08 Marks)
- b. Using Gauss divergence theorem evaluate $\iiint_S \vec{F} \cdot \hat{n} \, ds$,
where $\vec{F} = (x^2 - yz)\hat{i} + (y^2 - zx)\hat{j} + (z^2 - xy)\hat{k}$ over the rectangular parallel piped $0 \leq x \leq a$,
 $0 \leq y \leq b$ and $0 \leq z \leq c$.
(06 Marks)
- c. With usual notations derive Euler's equation, $\frac{\partial f}{\partial y} - \frac{d}{dx} \left(\frac{\partial f}{\partial y'} \right) = 0$.
(06 Marks)

OR

- 10 a. If $\vec{F} = (5xy - 6x^2)\hat{i} + (2y - 4x)\hat{j}$, evaluate $\oint_C \vec{F} \cdot d\vec{r}$ along the curve C in the xy-plane, $y = x^3$
from (1, 1) to (2, 8).
(08 Marks)
- b. Find the extremals of the functional with $y(0) = 0$ and $y(1) = 1$.
(06 Marks)
- c. Show that Geodesics on a plane arc straight lines.
(06 Marks)

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Third Semester B.E. Degree Examination, Aug./Sept. 2020 Additional Mathematics – I

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Find the modulus and amplitude of,
 $1 + \cos \alpha + i \sin \alpha$ (06 Marks)
- b. Express the complex number $\frac{(1+i)(2+i)}{(3+i)}$ in the form $a + ib$. (07 Marks)
- c. Find a unit vector normal to both the vectors $4i - j + 3k$ and $-2i + j - 2k$. Find also the sine of the angle between them. (07 Marks)

OR

- 2 a. Show that $\left[\frac{1 + \sin \theta + i \cos \theta}{1 + \sin \theta - i \cos \theta} \right]^n = \cos n \left(\frac{\pi}{2} - \theta \right) + i \sin n \left(\frac{\pi}{2} - \theta \right)$. (06 Marks)
- b. If $\vec{A} = i - 2j - 3k$, $\vec{B} = 2i + j - k$, $\vec{C} = i + 3j - k$
 find (i) $(\vec{A} \times \vec{B}) \times (\vec{B} \times \vec{C})$ (ii) $\vec{A} \times (\vec{B} \times \vec{C})$ (07 Marks)
- c. Show that $\begin{bmatrix} \vec{a} \times \vec{b}, \vec{b} \times \vec{c}, \vec{c} \times \vec{a} \end{bmatrix} = \begin{bmatrix} \vec{a}, \vec{b}, \vec{c} \end{bmatrix}^2$. (07 Marks)

Module-2

- 3 a. If $y = (x^2 - 1)^n$ then prove that $(1 - x^2)y_{n+2} - 2xy_{n+1} + n(n+1)y_n = 0$. (06 Marks)
- b. Find the pedal equation of the curve $r^m = a^m(\cos m\theta + \sin m\theta)$. (07 Marks)
- c. Show that the following curves intersect orthogonally $r = a(1 + \cos \theta)$, $r = b(1 - \cos \theta)$. (07 Marks)

OR

- 4 a. Show that $\sqrt{1 + \sin 2x} = 1 + x - \frac{x^2}{2} - \frac{x^3}{6} + \frac{x^4}{24} \dots$ using Maclaurin's series expansion. (06 Marks)
- b. If $u = e^{ax+by} f(ax - by)$, prove that $b \frac{\partial u}{\partial x} + a \frac{\partial u}{\partial y} = 2abu$. (07 Marks)
- c. Find $\frac{\partial(u, v, w)}{\partial(x, y, z)}$ where $u = x^2 + y^2 + z^2$, $v = xy + yz + zx$, $w = x + y + z$. (07 Marks)

Module-3

- 5 a. Obtain a reduction formula for $\int \cos^n x dx$. (06 Marks)
- b. Evaluate $\int_0^2 \frac{x^4}{\sqrt{4-x^2}} dx$. (07 Marks)
- c. Evaluate $\int_0^a \int_0^x \int_0^{x+y} e^{x+y+z} dz dy dx$. (07 Marks)

OR

- 6 a. Obtain a reduction formula for $\int \sin^n x \, dx$. (06 Marks)
- b. Evaluate $\int_0^1 \int_0^{\sqrt{1-y^2}} x^3 y \, dx dy$. (07 Marks)
- c. Evaluate $\int_{-c}^c \int_{-b}^b \int_{-a}^a (x^2 + y^2 + z^2) \, dz dy dx$. (07 Marks)

Module-4

- 7 a. A particle moves along the curve $x = 1 - t^3$, $y = 1 + t^2$ and $z = 2t - 5$.
 (i) Determine its velocity and acceleration.
 (ii) Find the components of velocity and acceleration at $t = 1$ in the direction $2i + j + 2k$. (06 Marks)
- b. Find the directional derivative of $\phi = x^2 y z + 4x z^2$ at $(1, -2, -1)$ along $2i - j - 2k$. (07 Marks)
- c. If $\vec{F} = (x + y + az)i + (bx + 2y - z)j + (x + cy + 2z)k$ find a, b, c such that $\text{curl } \vec{F} = 0$ and then find ϕ such that $\vec{F} = \nabla \phi$. (07 Marks)

OR

- 8 a. If $\vec{r} = xi + yj + zk$ and $r = \left| \vec{r} \right|$ prove that $\nabla(r^n) = nr^{n-2} \cdot \vec{r}$. (06 Marks)
- b. If $\vec{F} = (x + y + 1)i + j - (x + y)k$ show that $\vec{F} \cdot \text{curl } \vec{F} = 0$. (07 Marks)
- c. Show that $\vec{F} = (y + z)i + (z + x)j + (x + y)k$ is irrotational. Also find a scalar function ϕ such that $\vec{F} = \nabla \phi$. (07 Marks)

Module-5

- 9 a. Solve: $\frac{dy}{dx} = \frac{y-x}{y+x}$. (06 Marks)
- b. Solve: $(y^3 - 3x^2 y)dx - (x^3 - 3xy^2)dy = 0$. (07 Marks)
- c. Solve: $xy(1 + xy^2) \frac{dy}{dx} = 1$. (07 Marks)

OR

- 10 a. Solve: $\frac{dy}{dx} + y \cot x = \cos x$. (06 Marks)
- b. Solve: $(4xy + 3y^2 - x)dx + x(x + 2y)dy = 0$. (07 Marks)
- c. Solve: $\frac{dy}{dx} = \frac{x + 2y - 3}{2x + y - 3}$. (07 Marks)

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15MAT31

Third Semester B.E. Degree Examination, Aug./Sept. 2020 Engineering Mathematics – III

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Obtain the Fourier series of $f(x) = x(2\pi - x)$ in $0 \leq x \leq 2\pi$ and hence deduce that :

$$\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots \quad (08 \text{ Marks})$$

- b. Express y as a Fourier series upto the second harmonics given :

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

(08 Marks)

OR

- 2 a. Obtain the Fourier series for $f(x) = e^{-x}$ in the interval $0 < x < 2$. (06 Marks)
b. Expand the function $f(x) = x \sin x$ as a Fourier series in the interval $-\pi \leq x \leq \pi$. (05 Marks)
c. Expand $f(x) = 2x - 1$ as a cosine half range Fourier series in $0 \leq x < 1$. (05 Marks)

Module-2

- 3 a. Find the Fourier transform of

$$f(x) = \begin{cases} 1 - |x| & \text{for } |x| \leq 1 \\ 0 & \text{for } |x| > 1 \end{cases}$$

And hence deduce that $\int_0^{10} \frac{\sin^2 t}{t^2} dt = \frac{\pi}{2}$ (06 Marks)

- b. Find the Fourier cosine transform of

$$f(x) = \begin{cases} x & 0 < x < 2 \\ 0 & \text{else where} \end{cases} \quad (05 \text{ Marks})$$

- c. Find the z - transform of : i) $\cos n\theta$ ii) $\sin n\theta$. (05 Marks)

OR

- 4 a. Obtain the Fourier transform of $f(x) = x e^{-|x|}$. (06 Marks)
b. If $u(z) = \frac{2z^2 + 3z}{(z+2)(z-4)}$, find the inverse z-transform. (05 Marks)
c. Solve the difference equation $y_{n+2} + 6y_{n+1} + 9y_n = 2^n$ with $y_0 = y_1 = 0$ using z - transforms. (05 Marks)

Module-3

- 5 a. Compute the co-efficient of correlation and equation of lines of regression for the data :

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

(06 Marks)

- b. Fit a best fitting parabola $y = ax^2 + bx + c$ for the following data :

x	1	2	3	4	5
y	10	12	13	16	19

(05 Marks)

- c. Use the Regula – Falsi method to find a real root of the equation $x^3 - 2x - 5 = 0$ correct to three decimal places. (05 Marks)

OR

- 6 a. Find the co-efficient of correlation for the following data :

x	10	14	18	22	26	30
y	18	12	24	6	30	36

(06 Marks)

- b. Fit a least square geometric curve $y = ae^{bx}$ for the following data :

x	0	2	4
y	8.12	10	31.82

(05 Marks)

- c. Use Newton – Raphson method to find a real root of the equation : $x \log_{10} x = 1.2$ correct to four decimal places that is near to 2.5. (05 Marks)

Module-4

- 7 a. From the following table find the number of students who have obtained :

- i) Less than 45 marks
ii) Between 40 and 45 marks.

Marks	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80
Number of students	31	42	51	35	31

(06 Marks)

- b. Find the Lagrange's interpolation polynomial for the following values $y(1) = 3$, $y(3) = 9$, $y(4) = 30$ and $y(6) = 132$. (05 Marks)

- c. Evaluate $\int_0^1 \frac{dx}{1+x}$ taking seven ordinates by applying Simpson's $\frac{3}{8}$ rule. (05 Marks)

OR

- 8 a. Give $u_{20} = 24.37$, $u_{22} = 49.28$, $u_{29} = 162.86$ and $u_{32} = 240.5$ find u_{28} by Newton's divided difference formula. (06 Marks)

- b. Extrapolate for 25.4 given the data using Newton's backward formula :

x	19	20	21	22	23
y	91	100.25	110	120.25	131

(05 Marks)

- c. Evaluate : $\int_0^1 \frac{x}{1+x^2} dx$ by Weddle's rule taking seven ordinates. (05 Marks)

Module-5

- 9 a. Verify Green's theorem for $\oint_C (xy + y^2)dx + x^2dy$ where C is the closed curve of the region bounded by $y = x$ and $y = x^2$. (06 Marks)
- b. Derive Euler's equation in the form $\frac{\partial f}{\partial y} - \frac{d}{dx} \left(\frac{\partial f}{\partial y'} \right) = 0$. (05 Marks)
- c. If $\vec{F} = xyi + yzj + zyk$ evaluate $\int_C \vec{F} \cdot d\vec{r}$ where C is the curve represented by $x = t$, $y = t^2$, $z = t^3$, $-1 \leq t \leq 1$. (05 Marks)

OR

- 10 a. Verify Green's theorem in the plane for $\int_C (x^2 + y^2)dx + 3x^2y dy$ where C is the circle $x^2 + y^2 = 4$ traced in the positive sense. (06 Marks)
- b. Evaluate $\int_C (xydx + xy^2dy)$ by Stoke's theorem C is the square in the x - y plane with the vertices $(1, 0)$, $(-1, 0)$, $(0, 1)$ and $(0, 1)$. (05 Marks)
- c. Prove that the geodesics on a plane are straight lines. (05 Marks)

CBCS SCHEME

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15MATDIP31

Third Semester B.E. Degree Examination, Aug./Sept.2020 Additional Mathematics – I

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Express $\frac{5+2i}{5-2i}$ in the form $xi + iy$. (06 Marks)
- b. Find the modulus and amplitude of $\frac{(1+i)^2}{3+i}$ (05 Marks)
- c. If $\vec{a} = (3, -1, 4)$, $\vec{b} = (1, 2, 3)$, $\vec{c} = (4, 2, -1)$ find $\vec{a} \times (\vec{b} \times \vec{c})$ (05 Marks)

OR

- 2 a. Prove that $(1 + \cos\theta + i \sin\theta)^n + (1 + \cos\theta - i \sin\theta)^n = 2^{n+1} \cos^n \frac{\theta}{2} \cdot \cos \frac{n\theta}{2}$. (06 Marks)
- b. Find the sine of angle between $\vec{a} = 2i - 2j + k$ and $\vec{b} = i - 2j + 2k$ (05 Marks)
- c. Find the value of λ , so that the vector $\vec{a} = 2i - 3j + k$, $\vec{b} = i + 2j - 3k$ and $\vec{c} = j + \lambda k$ are coplanar. (05 Marks)

Module-2

- 3 a. If $y = \tan^{-1}x$, prove that $(1+x^2)y_{n+2} + 2(n+1)xy_{n+1} + n(n+1)y_n = 0$ (06 Marks)
- b. Find the angle between the radius vector and tangent to the curve $r = a(1 - \cos\theta)$ (05 Marks)
- c. If $u = \sin^{-1}\left(\frac{x^3 + y^3}{x + y}\right)$ prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 2 \tan u$. (05 Marks)

OR

- 4 a. Find the pedal equation of the curve $r = 2(1 + \cos\theta)$ (06 Marks)
- b. Find the total derivative of $u = x^3y^2$, where $x = e^t$, $y = \log t$. (05 Marks)
- c. Obtain the Maclaurin's series expansion of the function $\sin x$. (05 Marks)

Module-3

- 5 a. Evaluate $\int_0^{\pi} x \cos^6 x \, dx$ (06 Marks)
- b. Evaluate $\int_0^1 \int_0^3 x^3 y^3 \, dx \, dy$ (05 Marks)
- c. Evaluate $\int_0^1 \int_0^1 \int_0^1 (x + y + z) \, dx \, dy \, dz$ (05 Marks)

OR

- 6 a. Evaluate $\int_0^{\pi/2} \sin^6 x \cos^5 x \, dx$ using Reduction formula. (06 Marks)
- b. Evaluate $\int_0^1 \int_x^{\sqrt{x}} xy \, dy \, dx$ (05 Marks)
- c. Evaluate $\int_0^1 \int_0^1 \int_0^y xyz \, dx \, dy \, dz$ (05 Marks)

Module-4

- 7 a. A particle moves along the curve $\vec{r} = (t^3 - 4t)\mathbf{i} + (t^2 + 4t)\mathbf{j} + (8t^2 - 3t^3)\mathbf{k}$. Determine the velocity and acceleration at $t = 2$. (06 Marks)
- b. Find the directional derivative of $\phi = x^2yz + 4xz^2$ at $(1, -2, -1)$ in the direction of $2\mathbf{i} - \mathbf{j} - 2\mathbf{k}$. (05 Marks)
- c. Find the constants a and b , such that $\vec{F} = (axy + z^3)\mathbf{i} + (3x^2 - z)\mathbf{j} + (bxz^2 - y)\mathbf{k}$ is irrotational. (05 Marks)

OR

- 8 a. Find the angle between the tangents to the curve $x = t^2 + 1, y = 4t - 3, z = 2t^2 - 6t$ at $t = 1$ and $t = 2$. (06 Marks)
- b. Find $\text{div} \vec{F}$ and $\text{curl} \vec{F}$ where $\vec{F} = (3x^2 - 3yz)\mathbf{i} + (3y^2 - 3xz)\mathbf{j} + (3z^2 - 3xy)\mathbf{k}$ (05 Marks)
- c. Find 'a' for which $\vec{F} = (x + 3y)\mathbf{i} + (y - 2z)\mathbf{j} + (x + az)\mathbf{k}$ is solenoidal. (05 Marks)

Module-5

- 9 a. Solve $\frac{dy}{dx} = 1 + \frac{y}{x} + \left(\frac{y}{x}\right)^2$ (06 Marks)
- b. Solve $x^2 \frac{dy}{dx} = 3x^2 - 2xy + 1$ (05 Marks)
- c. Solve $(x^2 + y)dx + (y^3 + x)dy = 0$ (05 Marks)

OR

- 10 a. Solve $\frac{dy}{dx} = e^{x-y} + x^2 e^{-y}$ (06 Marks)
- b. Solve $x \frac{dy}{dx} = y + x \cos^2\left(\frac{y}{x}\right)$ (05 Marks)
- c. Solve $(x^4 + y^2)dy = 4x^3y \, dx$ (05 Marks)

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Question Paper Version : A

Third Semester B.E. Degree Examination, Aug./Sept.2020
Constitution of India, Professional Ethics and Cyber Law
(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.

1. Chairman of the Constituent assembly was _____ and _____ was the chairman of drafting committee.
 - a) Dr. Rajendra Prasad and Dr.B.R. Ambedkar
 - b) Dr.B.R. Ambedkar and Dr. Rajendra Prasad
 - c) Jawaharlal Nehru and Dr.B.R. Ambedkar
 - d) Sardar Vallabhbai Patel and Dr.B.R. Ambedkar
2. Which of the following writ is issued by the court in case of an illegal detention of a person by police.
 - a) Certiorari
 - b) Mandamns
 - c) Habeas Corpus
 - d) Quo-Warranto.
3. Who are not permitted to organize unions or associations?
 - a) Armed forces
 - b) Government Servants
 - c) Unemployed Graduates
 - d) Farmers.
4. Right against exploitation seeks to protect the weaker sections of the society by
 - a) Giving equal pay for equal work for men and women
 - b) Prohibiting human trafficking and Beggar
 - c) Providing compulsory education for children below the age of 14 years
 - d) None of the these.
5. Which one of the following is a feature common to both the Indian federation and the American federation?
 - a) A single citizenship
 - b) Three lists in the constitution
 - c) Dual Judiciary
 - d) A federal Supreme Court to interpret the constitution.

6. Which of the following laws exercised the most profound influence in framing Indian constitution?
a) British Constitution
b) US Constitution
c) Irish Constitution
d) The Government of India Act, 1935
7. Who headed the Interim Cabinet formed in the 1946?
a) Rajendra Prasad
b) Jawaharlal Nehru
c) Sardar Vallabai Patel
d) Rajagopala Chari.
8. The preamble in the constitution of independent India is modified version of which of the following:
a) Bill of Rights in USA
b) Objectives resolutions moved by Jawaharlal Nehru
c) British Magna Carta
d) Ideals of Communism.
9. Which one of the following determines that the Indian Constitution is federal?
a) A Written and rigid constitution
b) An Independent judiciary
c) Vesting of residuary powers with the centre
d) Distribution of powers between the centre and the states.
10. As per Indian protocol, who among the following ranks the highest in the order of precedence?
a) Deputy Prime-minister
b) Former President
c) Governor of a state within his state/the state
d) Speaker of Loka-Sabha
11. Which of the following constitutional provision strengthens Indian federalism?
a) Single Citizenship
b) Written Constitution
c) Rigidity of Constitution
d) Emergency provisions in the constitution.
12. The concept of public interest litigation originated in
a) UK
b) Australia
c) USA
d) Canada
13. Which of the following is/are the constitutional provisions facilitating union control over the states?
i) All India services ii) Unified Judiciary iii) Officers of Governor iv) Grants-in-aid
Select the answer which is correct using the code given below.
a) 1 only b) 1 and 4 only c) 2 and 4 only d) 1, 3 and 4 only
14. In which of the following countries, the no-confidence motion to bring down the Government is adopted only when the confidence motion is passed in the alternate council of ministers?
a) France b) Germany c) Italy d) Portugal
15. Indian Parliamentary system is different from the British parliamentary system in which of the following respects?
a) Both a real and a nominal executive
b) A system of collective responsibility
c) Bicameral legislature
d) A different judicial review
16. Which one of the following words was not contained in the original preamble to the Indian Constitution?
a) Sovereign b) Secular c) Democratic d) Republic

17. Consider the following statements regarding “Economic Justice” as enshrined in the preamble to the Constitution of India.
- It refers to absence of unemployment in India
 - It refers to equal wealth with everyone in India
 - It refers to possession of all forms of wealth under public sector
 - It refers to equal opportunity to everyone to raise one’s standard of living.
18. In the Indian constitution, the right to equality is granted by
- Article 16 to 20
 - Article 15 to 19
 - Article 14 to 18
 - Article 13 to 17
19. An American citizen staying in India can not claim right to
- Freedom of trade and profession
 - Equality before the law
 - Protection of life and property, personal liberty
 - Freedom of Religion
20. The Constitution of India recognizes
- Only religious minorities
 - Only linguistic minorities
 - Linguistic and religious minorities
 - Religious, Linguistic and Ethnic minorities
21. Which one of the following rights was described by Dr.B.R. Ambedkar as the heart and soul of the constitution?
- Right of freedom of religion
 - Right to property
 - Right to Equality
 - Right to constitutional remedies
22. Which one of the following comes under the jurisdiction of both the High Court and the Supreme Court?
- Disputes between the centre and the state
 - Disputes between the states inter-states
 - Protection of the fundamental rights
 - Disputes on inter-state rivers
23. Which one of the following article of the directive principles of state policy deals with the promotion of International peace and security?
- 51
 - 48A
 - 43A
 - 41
24. The purpose of the inclusion of directive principles of the state policy in the Indian Constitution is to establish.
- Political Democracy
 - Legal democracy
 - Gaudian Democracy
 - Social and Economic democracy
25. Uniform Civil code is the proposal to replace the personal laws with a common set governing every citizen. The uniform civil code does not pertain to which of the following matters.
- Marriage
 - Inheritance
 - Maintenance
 - Defamation
26. The ideal of “Welfare State” in the Indian Constitution is enshrined in its.
- Preamble
 - Directive Principles of state policy
 - Fundamental rights
 - 7th schedule of the constitution
27. For a citizen of India, the duty to pay taxes is a
- Fundamental duty
 - Legal obligation
 - Constitutional obligation
 - Moral obligation

28. Fundamental Duties enshrined in our constitution are inspired from which of the following countries?
a) Ex-USSR b) Swedan c) Norway d) USA
29. The president can be impeached for
a) Violating the constitution
b) Disregarding the parliament
c) For not abiding by the advice of the Prime-Minister
d) All of the above
30. The Chief-minister of a state in India is not eligible to vote in the presidential election if
a) He himself is a candidate
b) He is yet to prove his majority on the floor of the lower house of the state legislature
c) He is a member of the upper house of the state legislature
d) He is a caretaker chief-minster
31. Consider the following acts of parliament. Which of the following is not undertaken as per the discretionary power of the president?
a) President asks the leader of a political party to form Government who enjoys majority in Lok-Sabha
b) President asks the parliament to reconsider the financial bill
c) President calls the session of the parliament when he has not been asked to do so
d) President warns the council of ministers on their recommendation to appoint a particular person as CAG of India
32. In which of the following elections does the Vice-President participate?
a) President b) Chairperson of Rajys Sabha
c) Deputy chairperson of a Rajya Sabha d) None of the above
33. The Tenure of the Vice-president is ____
a) 06 years b) 05 years
c) 03 years d) Till he enjoys the support of the party
34. Who is the head of the council of ministers in the Union Cabinet/Ministers?
a) Home minster b) Prime-Minister
c) Speaker of parliament d) President
35. Who is the chief Advisor to President of India from the parliament?
a) President b) Prime Minister
c) Speaker of Parliament d) Vice-President
36. Council of Ministers is headed by the _____ and are appointed by president on the advice of _____.
a) Prime Minister and Prime Minister b) President and Prime Minister
c) Prime Minister and President d) President and chief justice of India
37. The Cabinet includes only the _____ ministers.
a) Prime Minister b) Cabinet
c) State d) Union and State Rank

38. _____ cabinet comprises Prime Minister and very close associates of Prime Minister.
 a) General b) Kitchen c) Particular d) House
39. Who is the highest law officer in the country?
 a) Additor General b) Chief Justice
 c) President d) Attorney General
40. According to Article 88, _____ has the right to take part in parliamentary proceedings including right to speak.
 a) Vice-President b) Attorney General
 c) Advisor of parliament member d) Speaker of Loka Sabha
41. In India, the Union Legislature is called
 a) Lokasabha b) Rajyasabha c) Parliament d) Vidhana Sabha
42. Rajyasabha is also known and called as
 a) Council of States b) Council of the Lokasabha
 c) Council of cabinet d) Council of Union Administration
43. Vice President of India is Ex-Officer Chairperson of
 a) Lokasabha b) Rajyasabha c) Supreme Court d) President office
44. The life of the Lokasabha shall not exceed 06 months after the end of
 a) War b) National Emergency c) States term d) President power
45. The minimum attendance of the members required for a proceedings of any house to begin is known as
 a) Assembly b) Parliament c) Quorum d) Legislature
46. Presiding officer of Lokasabha is
 a) Prime Minister b) Home Minister c) Speaker d) President
47. Leader of opposition in Lokasabha enjoys a statutory status equal to that of a _____
 a) Speaker b) Deputy Prime Minister
 c) Cabinet Minister d) Ministers of State Ranking
48. Delimitation of constituencies refers to redrawing of constituencies based on the latest _____
 a) Census figures b) MP seats c) MLA/MLC seats d) People
49. As per convention, there are _____ sessions of parliament
 a) Three regular b) Four regular c) Five regular d) Two regular
50. If refers to the end of session of parliament. Pending bills do not lapse by the act of _____
 a) Adjournment b) Session c) Prorogation d) Parliament
51. Which article provides the information for the disqualification of the members of parliament?
 a) 100 b) 101 c) 102 d) 103

52. Which hour starts immediately after the end of question hour and lasts until the agenda for the day t.e regular business of the house is taken up
 a) Question b) Notice c) Zero d) Replay
53. Any matter which is not covered under money, financial, or constitution amendment bill is covered under
 a) Money bill b) Ordinary bill c) Financial bill d) Parliament bills
54. Joint sitting/session is conveyed by the _____ and presided by the speaker of Lokasabha.
 a) Prime minister b) President c) Vice-President d) Deputy speaker
55. The maximum life of an ordinance can be
 a) 06 weeks b) 06 months
 c) 06 months and 06 weeks d) Till the parliament disapproves the ordinance
56. Who is not eligible to be a member of Departmental standing committee?
 a) Prime minster b) Minister c) Speaker d) President
57. Which article deals with the appointment of High Court Judges?
 a) 117 b) 217 c) 317 d) 417
58. 99th Amendment Act has provided the information about the creation/establishment of
 a) NHRC b) NJAC c) VICE d) NTSC
59. Under article 129, _____ court has been declared as a court of Record.
 a) District b) Regional c) High d) Supreme
60. The CAG is appointed by the president of India on the advice of
 a) President b) Chief Justice c) Speaker d) Council of Ministers
61. Who/which of the following is the custodian of the constitution of India?
 a) President of India b) Prime Minister of India
 c) Loka Sabha secretariat d) Supreme Court of India
62. The Governor shall hold office for a period of 05 years, subject to _____
 a) Pleasure of CM b) Pleasure of Chief Justice
 c) Pleasure of central ministers d) Pleasure of President
63. Article 164 states that _____ shall be appointed by the governors.
 a) KPSC president b) Aditor general
 c) Chief justice of High Court d) Chief ministers
64. In India, the Advocate general is a legal advisor to the
 a) Central Government b) State Government
 c) PM d) CM
65. At the state level, bills are divided into _____ categories
 a) 01 b) 02 c) 03 d) 04

66. Who is the chief patron of NALSA (National Legal Service Authority)?
 a) President
 b) Vice-President
 c) Prime Minister
 d) Chief Justice of India
67. Article 326 of the constitution prescribes for elections to the lokasabha and legislative assemblies
 a) Universal Adult Franchise
 b) Voting powers of Foreigners
 c) Not vote in the elections
 d) Removal of name from the voters list.
68. The election commission is a _____ members body
 a) 02
 b) 03
 c) 05
 d) 09
69. _____ ensures free and fair elections in the country (during elections time) from the date of announcement.
 a) Moral code of conduct
 b) More rules to vote
 c) Constitution
 d) Supreme Court to vote
70. What is considered as an alternative to an earlier procedure to reject all Candidates-section 49(0), Conduct of Election Rules, 1961?
 a) VVPT
 b) MCC
 c) NOTA
 d) NLSA
71. Right to vote in Lokasabha and state assembly elections is a _____ right
 a) Constitutional
 b) Statutory
 c) Moral
 d) Fundamental
72. Who is responsible for proper conduct of elections at a polling booth? And he/she is appointed by district election officer?
 a) Polling officer
 b) Returning officer
 c) Tahasildhar
 d) Presiding officer
73. 73rd Amendment Act, 1992 provides information about _____ bodies and added part IX and 11th schedule.
 a) Rural local
 b) Urban local
 c) Muncipolities
 d) BBMP
74. Parliament approves National Emergency for period of _____ months. And it is required to approve emergency within a month by special majority.
 a) 03 Months
 b) 06 Months
 c) 01 year and 06 months
 d) 05 years and 06 months
75. Under article 360, when the president is satisfied that either financial stability of India or credit of India or any part of its territory is under threat, president can proclaim emergency.
 a) National Emergency
 b) States Emergency
 c) President Rules Emergency
 d) Financial Emergency
76. What is the minimum age for contesting in the elections of panchayaths?
 a) 18 years
 b) 21 years
 c) 25 years
 d) 30 years
77. 97th Amendment Act provided constitutional status to
 a) Rural Panchayath system
 b) Town Muncipal Councils
 c) CO-operative societies
 d) Zilla panchayaths

78. Planning is defined as the process of
 a) Organizing
 c) Forecasting future problems
 b) Management
 d) Objective
79. The process of implementing the objective into actual practice becomes the executive
 a) Function of workers
 c) function of unions
 b) Function of Management
 d) Labours
80. One of the characteristics of profession is
 a) It gives scope to exercise one's skill
 b) It gives monopoly on service
 c) It provides opportunity to help the poor and needy
 d) It demands high standard of honesty
81. Engineering Ethics is _____
 a) A macro ethics
 c) A preventive ethics
 b) Business ethics
 d) A code of scientific rules based on ethics
82. Conflict of Interest may be _____
 a) False
 b) Imaginary
 c) Created
 d) Potential
83. Good work means _____
 a) Superior work done with great care and skill
 b) Responsible work
 c) Work above and beyond the call of duty
 d) Work involving high risk
84. The code of ethics can be taken as guidelines by Engineers to _____
 a) Overcome the work pressure
 c) Formulate the problem
 b) Resolve the conflicts
 d) Escape from the Responsibility
85. This is not dishonesty in Engineering.
 a) Trimming
 b) Blending
 c) Negligently
 d) Intentionality
86. The formula of MTR Sambar Masala is an example of
 a) Patent
 b) Trademark
 c) Copyright
 d) Trade Secret
87. Corrupt professional judgement leads to _____
 a) Integrity in R and D
 c) Conflict of Interest
 b) Reliability
 d) None of these
88. Which of the following is not preserved as an Intellectual property?
 a) Trade Secret
 c) Formulae
 b) Government Regulations
 d) Patents
89. These are not trade secrets
 a) Formulas
 b) Principles
 c) Patterns
 d) Devices

90. Which of the following is not a type of cyber crime?
a) Data theft
b) Forgery
c) Damage to data and systems
d) Installing Antivirus for protection
91. Which of the following is not a type of peer-to-peer cyber-crime?
a) Phishing
b) Injecting Trojans to a target victim
c) MiTM
d) Credit card details leak in deep web
92. All of the following are examples of real security and privacy threats except:
a) Hackers
b) Virus
c) Spam
d) Worm
93. Unsolicited commercial email is known as _____
a) Spam
b) Malware
c) Virus
d) Spyware
94. Which of the following is a class of computer threat?
a) Phishing
b) Soliciting
c) DoS attacks
d) Stalking
95. The way of manipulating data into information is called as
a) Storing
b) Processing
c) Deletion
d) Organizing
96. Pharming is also known as:
a) Black hat
b) Web Jacking
c) Crackers
d) None of them
97. When a person is harassed repeatedly by being followed, called or be written to he/she is target of
a) Bullying
b) Stalking
c) Identity theft
d) Phishing
98. Which of the following is not an external threat to a computer or a computer networks?
a) Ignorance
b) Trojan horses
c) Adware
d) Crackers
99. Firewall is a type of _____
a) Virus
b) Security threat
c) Worm
d) None of the above
100. Viruses are _____
a) Man Made
b) Naturally occur
c) Machine made
d) All of the above

* * * * *

8. The Union Council of Ministers are collectively responsible to the
a) Lok Sabha b) Prime Minister c) President d) Parliament
9. The total number of elected members in Rajya Sabha (Council of States) are
a) 250 b) 240 c) 238 d) 230
10. A judge of the Supreme Court holds office until he attains the age of
a) 58 years b) 60 years c) 62 years d) 65 years
11. The size of the State Council of Ministers including Chief Minister shall not be more than _____ percent of the members strength of State Legislative Assembly.
a) 10 b) 15 c) 18 d) 20
12. The minimum age to become eligible for the office of the governor of a State is _____
a) 50 years b) 35 years c) 55 years d) no age limit is fixed
13. Who appoints the Chief Election Commissioner of India?
a) Prime Minister b) Chief Justice of India
c) President d) Union Law Minister
14. Elections to Lok Sabha and the state Legislative Assemblies are conducted on the basis of _____
a) Single transferable vote b) Limited suffrage
c) Proportional representation d) Adult franchise
15. Who is authorized to initiate a bill for Constitutional Amendment?
a) Lok Sabha only b) Rajya Sabha only
c) Either House of the Parliament d) Both Parliament and State Legislatures
16. Right to property is taken away from fundamental rights and re-enacted as legal right under Article 300A by way of
a) 7th Constitution Amendment b) 30th Constitution Amendment
c) 42th Constitutional Amendment d) 44th Constitution Amendment
17. This is not the ground for proclaiming National Emergency under Art, 352
a) War b) Internal disturbances
c) Armed rebellion d) External aggression
18. Financial emergency under Art 360 proclaimed by the president has to be approved by the parliament within
a) Six weeks b) Two months c) One month d) Three months
19. Seats for scheduled castes and scheduled tribes are not reserved in
a) Lok Sabha b) State Legislative assemblies
c) Rajya Sabha d) All these
20. The National Commission for Women (NCW) was established under the
a) NCW Act, 1990 b) NCW Act, 1992
c) NCW Act, 1989 d) NCW Act, 1994

21. What is the tenure of the chairman of the National Human Rights Commission?
 a) 5 years or upto 62 years of age
 b) 5 years or upto 65 years of age
 c) 6 years or upto 65 years of age
 d) 5 years or upto 70 years of age
22. When was National Human Rights Commission (NHRC) of India constitution?
 a) 1st India January, 1990
 b) 10th July, 1992
 c) 12th October, 1993
 d) 15th August, 1995
23. Powers, authority and responsibilities of municipalities have been provided under
 a) Article 246M
 b) Article 243N
 c) Article 243S
 d) Article 243 W
24. Which one is not the principle of co-operative societies?
 a) Self help and mutual help
 b) Restricted membership
 c) Equality
 d) Democratic controls
25. The professional ethics deals with _____ accepted by the professional group
 a) Scientific standards
 b) Moral standards
 c) Ethical standards
 d) None of the above
26. As applied to responsibility, avoiding blame or being safe is the prime concern in
 a) Reasonable care
 b) Minimalist approach
 c) Good works view
 d) Both (a)&(b)
27. Tendency of shifting responsibility will logically come down if there is
 a) Group thinking
 b) Microscopic vision
 c) Fear
 d) Both (b)&(c)
28. These are not trade secrets
 a) Formulas
 b) Principles
 c) Patterns
 d) Devices
29. One of the elements of risk is
 a) The exact source of risk
 b) The possible remedy to avoid risk
 c) Detecting failure modes
 d) None of the above
30. When the risk of harm is equated by the probability of producing benefits, the risk is considered to be
 a) Reasonable Risk
 b) Unavoidable risk
 c) Inevitable risk
 d) Acceptable risk.

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Third/Fourth Semester B.E. Degree Examination, Aug./Sept. 2020

ಕನ್ನಡ ಮನಸು

(COMMON TO ALL BRANCHES)

Time: 2 hrs.]

[Max. Marks: 30

ಸೂಚನೆಗಳು

1. ಎಲ್ಲ ೩೦ ಪ್ರಶ್ನೆಗಳಿಗೂ ಉತ್ತರಿಸಿರಿ. ಪ್ರತಿ ಪ್ರಶ್ನೆಗೆ ಒಂದು ಅಂಕ.
2. ಓ.ಎಂ.ಆರ್ ಉತ್ತರ ಪತ್ರಿಕೆಯಲ್ಲಿ ಯು.ಎಸ್.ಎನ್ ಸಂಖ್ಯೆ ಹಾಗೂ ಪಶ್ಚಿಮ ಪತ್ರಿಕೆಯ ಶ್ರೇಣಿಯನ್ನು ಅಂದರೆ A, B, C ಅಥವಾ D ಯನ್ನು ತಪ್ಪಿಲ್ಲದಂತೆ ಕಡ್ಡಾಯವಾಗಿ ಗುರುತಿಸುವುದು ಅಭ್ಯರ್ಥಿಯ ಜವಾಬ್ದಾರಿಯಾಗಿರುತ್ತದೆ.
3. ಓ.ಎಂ.ಆರ್ ಉತ್ತರ ಪತ್ರಿಕೆಯಲ್ಲಿ ನಿಗದಿಪಡಿಸಿರುವ ಸ್ಥಳದಲ್ಲಿ ಭರ್ತಿಮಾಡದೆ ಹಾಗೆಯೇ ಬಿಟ್ಟಲ್ಲಿ ಅಥವಾ ಭರ್ತಿಮಾಡಿದ ಮಾಹಿತಿಯಲ್ಲಿ ಯಾವುದೇ ವ್ಯತ್ಯಾಸವಿದ್ದಲ್ಲಿ ಅಂತಹ ಉತ್ತರ ಪತ್ರಿಕೆಗಳನ್ನು ರದ್ದು ಪಡಿಸಲಾಗುವುದು.
4. ಕೇವಲ ಒಂದು ಉತ್ತರವನ್ನು ಮಾತ್ರ ಉತ್ತರ ಪತ್ರಿಕೆಯಲ್ಲಿ ಗುರುತಿಸತಕ್ಕದ್ದು. ಒಂದೆ ಪ್ರಶ್ನೆಗೆ ಎರಡು ಉತ್ತರವನ್ನು ಗುರುತಿಸುವುದು ಅಮಾನ್ಯ.
5. ಎಲ್ಲಾ ಉತ್ತರಗಳನ್ನು ನಿಮಗೆ ಒದಗಿಸಲಾದ ಓ.ಎಂ.ಆರ್ ಉತ್ತರ ಪತ್ರಿಕೆಯ ಹಾಳೆಯ ಮೇಲೆ ಕಪ್ಪು ಅಥವಾ ನೀಲಿ ಶಾಹಿಯ ಬಾಲ್‌ಪಾಯಿಂಟ್ ಪೆನ್ನಿನಿಂದ ಗುರುತು ಮಾಡಬೇಕು.

1. 'ಶ್ರಾವಣ' ಪದ್ಯದಲ್ಲಿ 'ಬೆಟ್ಟ' ತೊಟ್ಟಿರುವುದು ----- ಅಂಗಿ.
 ಅ) ಹತ್ತಿಯ ಬ) ಕುತನಿಯ ಕ) ರೇಷ್ಮೆಯ ಡ) ಕಲ್ಲಾರಿನ.
2. ವಿಶ್ವೇಶ್ವರಯ್ಯನವರನ್ನು ಕುರಿತು ಪ್ರಯಾಣಿಕನೊಬ್ಬ ಮಾಡಿದ ಉದ್ಗಾರ '-----'.
 ಅ) ಇವೆಲ್ಲ ವಿಶ್ವೇಶ್ವರಯ್ಯ ಬ) ಮಾಹಾನ್ ದಿವಾನರು
 ಕ) ಶ್ರೇಷ್ಠ ಇಂಜಿನಿಯರ್ ಡ) ಅತಿ ದೇವಭಕ್ತ.
3. ಜೀವದ ಹೆದರಿಕೆ ಇರುವವನಿಗೆ ವಾಯು ಸಂಚಾರ ----- ಒಳ್ಳೆಯದು.
 ಅ) ಅಮೇರಿಕಾದಲ್ಲಿ ಬ) ಸ್ವಪ್ನದಲ್ಲೇ ಕ) ಭಾರತದಲ್ಲೇ ಡ) ಎಲ್ಲ ಕಡೆಯೂ.
4. ಅಣ್ಣಪ್ಪನಿಗೆ ಬಂದಿದ್ದುದು ----- ಕಾಯಿಲೆ.
 ಅ) ಮಲೇರಿಯಾ ಬ) ಟೈಫಾಯ್ಡ್ ಕ) ಕ್ಯಾನ್ಸರ್ ಡ) ನ್ಯೂಮೋನಿಯಾ.

5. ಎಮ್ಮೆ ----- ಸೃಷ್ಟಿಯೆಂದು ಹೇಳುತ್ತಾರೆ.
 ಅ) ವಸಿಷ್ಠನ ಬ) ಚಮದಗ್ನಿಯ ಕ) ವಿಶ್ವಾಮಿತ್ರನ ಡ) ದೇವರ.
6. ನಾಪತ್ತೆಯಾದ ಪಂಚಕನೈಯರು ಸಿಕ್ಕಿದ್ದು -----
 ಅ) ರೂಮಿನಲ್ಲಿ ಬ) ಆನೆಹಳ್ಳದಲ್ಲಿ ಕ) ಬಿಡಾರಿನಲ್ಲಿ ಡ) ಕಾಡಿನಲ್ಲಿ.
7. 'ತ್ರಿವೇಣಿ' ಅವರ ಮೂಲ ಹೆಸರು
 ಅ) ಸರೋಜಾ ಬ) ಭಾಗೀರಥಿ ಕ) ರೇವತಿ ಡ) ವೈದೇಹಿ.
8. 'ರೊಟ್ಟಿ ಮತ್ತು ಕೋವಿ' ಪದ್ಯದಲ್ಲಿ ಹಸಿದ ಕೈಗಳು ----- ಗಳಂತೆ ಇಳಿದು ಸಿಕ್ಕ ಎಂಜಲಿನೆಲೆಯನ್ನು ಹಿರಿದು ತೆಗೆದವು.
 ಅ) ಹಾವು ಬ) ಪಕ್ಷಿ ಕ) ನರಿ ಡ) ಉಡ.
9. ಲಂಕೇಶ ನಿರ್ದೇಶಿಸಿದ ಚಲನಚಿತ್ರ -----
 ಅ) ದಾಟು ಬ) ಮತದಾನ ಕ) ಗೃಹಭಂಗ ಡ) ಪಲ್ಲವಿ.
10. ಕುದುರೆ ಅಬ್ಬಿಯಲ್ಲಿ 'ನದಿ' ಜಲಪಾತವಾಗಿ ಧುಮ್ನಿಕ್ಕುತ್ತದೆ.
 ಅ) ಕಾವೇರಿ ಬ) ಕೃಷ್ಣಾ ಕ) ಭದ್ರಾ ಡ) ತುಂಗಭದ್ರಾ.
11. ಅಸ್ತತ್ಯೆಗೆ ಬಂದ ಹುಡುಗನ ಹೆಸರು
 ಅ) ನೆಹರು ಬ) ವಿನೋಬಾ ಕ) ಬೋಸ್ ಡ) ಗಾಂಧಿ.
12. ಸಿದ್ಧಲಿಂಗಯ್ಯ ಅವರ ಪದ್ಯದಂತೆ, "ಅವರ ತೋಟದ ತೆಂಗಿನಲ್ಲಿ ನಮ್ಮ ----- ಎಳನೀರು".
 ಅ) ದುಡಿಮೆಯ ಬ) ಶಕ್ತಿಯ ಕ) ರಕ್ತದ ಡ) ದುಡ್ಡಿನ.
13. 'ಎಲ್ಲ ಹುಡುಗಿಯರ ಕನಸು' ಪದ್ಯದಂತೆ, "----- ಹೂ ಬಿಡಿಸಿ ತುರುಬಿಗೆ ಮುಡಿಸಿದ".
 ಅ) ಮಲ್ಲಿಗೆಯ ಬ) ಜಾಜಿಯ ಕ) ತುಂಬೆಯ ಡ) ಗುಲಾಬಿಯ.

14. 'ನೀರು' ಕತೆಯ ಲೇಖಕರು
 ಅ) ಲಂಕೇಶ ಬ) ಅಮರೇಶ ಕ) ಬಸವರಾಜ ಡ) ಸವಿತಾ.
15. 'ಕನ್ನಡದ ಮೊದಲ ಕೃತಿ '-----' ದಲ್ಲಿ ಪರರ ಧರ್ಮ ಮತ್ತು ವಿಚಾರಗಳನ್ನು ಸಹಿಸುವುದೇ ಬಂಗಾರ ಎಂಬ ಮಾತಿದೆ.
 ಅ) ರಾಮಾಯನ ದರ್ಶನಂ ಬ) ಆದಿ ಪುರಾಣ
 ಕ) ಹಸುರು ಹೊನ್ನು ಡ) ಕವಿರಾಜಮಾರ್ಗ.
16. ಬಿಸಿಲಿಗೆ ಉದಿಟ್ಟ ಒಂದು ಬಲೂನು ----- ಹೆಚ್ಚಾದಾಗ ಒಡೆದು ಹೋಗುತ್ತದೆ.
 ಅ) ಶಾಖ ಬ) ತಂಪು ಕ) ಬಿಸಿಲು ಡ) ನೀರಾವಿ.
17. 'ಕೊಣವೇಗೌಡ' ಒಂದು
 ಅ) ಜನಪದ ಗೀತೆ ಬ) ಭಾವಗೀತೆ ಕ) ಭಕ್ತಿಗೀತೆ ಡ) ತ್ರಿಪದಿ.
18. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ
 ಅ) ಬಹುರೂಪಿಯಾಗಿದೆ ಬ) ವರ್ಣರಂಜಿತವಾಗಿದೆ
 ಕ) ಸಂಘರ್ಷವೂ ಇದೆ ಡ) ಎಲ್ಲವು ಸೇರಿ ಜೀವಂತವಾಗಿದೆ.
19. 'ನೀರು' ಕತೆಯಲ್ಲಿ ಬರುವ 'ಅಸುನಿ' ಎಂದರೆ
 ಅ) ಸಾವು ಬ) ಮರಣ ಕ) ಅಶ್ವಿನಿ ನಕ್ಷತ್ರ ಡ) ಹುಟ್ಟು.
20. ಎಲ್ಲ ಹುಡುಗಿಯರ ಕನಸು ಪದ್ಯದ ಹುಡುಗ ಮಿಂಚಿನ ಹುಳುವಲ್ಲೇ ----- ಮಾಡಿದ
 ಅ) ಓಲೆಯ ಬ) ಮೂಗುತಿಯ ಕ) ಆಭರಣವ ಡ) ಎಲ್ಲ.
21. "ಮನುಷ್ಯ ಸಾಯ್ತೆ ----- ಸತ್ತಾದ. ಸುಮ್ಮಿರು ಮಂತೆ" ಎಂದು ಸಂತ್ಯಸುತ್ತಾ ಕರಿಸಿದ್ದೇಗೌಡ ಹೇಳಿದ.
 ಅ) ಕಲ್ಲು ಬ) ಮಣ್ಣು ಕ) ಹಾಸಿಗೆ ಡ) ನೀರು.
22. 'ಹಕ್ಕಿ ಹಾರುತಿದೆ ನೋಡಿದಿರಾ?' ಎಂದು ಪದ್ಯದಲ್ಲಿ ಕೇಳಿದವರು -----
 ಅ) ಲಂಕೇಶ ಬ) ಬೇಂದ್ರೆ ಕ) ಕುವೆಂಪು ಡ) ಬಸವಣ್ಣ.

23. ಸು.ರಂ. ಎಕ್ಕುಂಡಿಯವರು ತಮ್ಮ ----- ಗಳಿಂದ ಹೆಸರಾದವರು.
ಅ) ಕಾದಂಬರಿ ಬ) ಕತೆ ಕ) ಪ್ರಬಂಧ ಡ) ಕಥನಕವಿತೆ
24. ಬಿ.ಜಿ.ಎಲ್ ಸ್ವಾಮಿಯವರ ----- ಕೃತಿಗೆ ಕೇಂದ್ರ ಸಾಹಿತ್ಯ ಅಕಾಡೆಮಿ ಪ್ರಶಸ್ತಿ ಬಂದಿದೆ.
ಅ) ಹಸಿರು ಹೊನ್ನು ಬ) ಸಸ್ಯ ವಿಜ್ಞಾನ
ಕ) ತಮಿಳು ತಲೆಗಳ ನಡುವೆ ಡ) ಸಸ್ಯಕಾಶಿ.
25. ನಲವತ್ತು ಕೋಟಿ ಜನಕ್ಕೆ ನಿತ್ಯ ಹತ್ತು ಔನ್ಸ್ ----- ಸಹ ದೊರೆಯುವಷ್ಟು ಒಳ್ಳೆಯ ಹಸುಗಳು ನಮ್ಮ ದೇಶದಲ್ಲಿ ಇಲ್ಲ (ಗೊರೂರು ಅವರು ಹೇಳುವಂತೆ).
ಅ) ಹಾಲು ಬ) ಗಂಜಲು ಕ) ಮಜ್ಜೆಗೆ ಡ) ತುಪ್ಪ.
26. ಸಾಮಾನ್ಯವಾಗಿ ಮಲೆನಾಡಿನಲ್ಲಿ, ಜನಗಳು ಕಾಯಿಲೆಯಾದರೆ ಮೊದಲು ----- ಹೇಳಿಕೊಳ್ಳುತ್ತಾರೆ.
ಅ) ದೆವ್ವಕ್ಕೆ ಬ) ವೈದ್ಯರಿಗೆ ಕ) ದೇವರಿಗೆ ಡ) ಶಾಸ್ತ್ರಗಳಿಗೆ.
27. 'ಶ್ರಾವಣ ಪದ್ಯದಲ್ಲಿ 'ಜಗದ್ಗುರು' ಎಂದು ಕರೆದಿರುವುದು -----.
ಅ) ಕೃಷ್ಣನನ್ನು ಬ) ರಾಮನನ್ನು ಕ) ತುಳಸಿದಾಸರನ್ನು ಡ) ಬೇಂದ್ರೆಯವರನ್ನು
28. ಗಾಂಧೀಜಿ ಹೇಳಿದ್ದು : 'ಭಗವಂತ ಮಾನವರಿಗೆ ಕಾಣಿಸಿಕೊಂಡರೆ, ಮೂದಲು ----- ರೂಪದಲ್ಲಿ ಕಾಣಿಸಿಕೊಳ್ಳಬೇಕು'.
ಅ) ವಸ್ತ್ರದ ಬ) ಅನ್ನದ ಕ) ನೀರಿನ ಡ) ನಿಸರ್ಗದ.
29. ಮರದ ಪಾತ್ರಗೆ ದೋಣಿ ಎಂದು ಹೆಸರು. ಆ ಪಾತ್ರ ತೀರ ಚಿಕ್ಕದಾದರೆ ----- ಎಂದೆನಿಸಿಕೊಳ್ಳುತ್ತದೆ.
ಅ) ಪಾತಿ ಬ) ಓಡ ಕ) ಮಂಜಿ ಡ) ಪಡೆ.
30. ಬೇಂದ್ರೆಯವರಿಗೆ ಜ್ಞಾನಪೀಠ ಪ್ರಶಸ್ತಿ ತಂದುಕೊಟ್ಟ ಕೃತಿ -----.
ಅ) ಶ್ರಾವಣ ಬ) ಗರಿ ಕ) ನಾಕುತಂತಿ ಡ) ನಾದಲೀಲೆ.

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CBCS SCHEME

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18CV32

Third Semester B.E. Degree Examination, Aug./Sept.2020 Strength of Materials

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Sketch a typical stress-strain curve for a ductile material and explain briefly the salient features of the curve. (05 Marks)
- b. Derive an expression for the deformation of a rectangular tapering bar of uniform thickness. (05 Marks)
- c. Determine the value of P that will not exceed a maximum deformation of 2mm or a stress of 120 MPa in steel, 80 MPa in Aluminium and 115 MPa in bronze (Fig.Q1(c)). Given the following data:
 $A_b = 600 \text{ mm}^2$, $E_b = 0.84 \times 10^5 \text{ N/mm}^2$
 $A_a = 800 \text{ mm}^2$, $E_a = 0.7 \times 10^5 \text{ N/mm}^2$
 $A_s = 400 \text{ mm}^2$, $E_s = 2.1 \times 10^5 \text{ N/mm}^2$

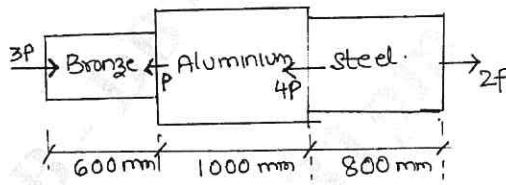


Fig.Q1(c)

(10 Marks)

OR

- 2 a. Derive the relationship between Young's modulus and bulk modulus. (05 Marks)
- b. A load of 270 kN is acting on a RCC column of size 200mm × 200mm. The column is reinforced with 10 bars of 12mm diameter each. Determine the stress in steel and concrete. $E_s = 16.5 E_c$. (05 Marks)
- c. A bar of brass 25mm diameter is enclosed in a steel tube of 50mm external diameter and 25mm internal diameter. The bar and tube are both initially 1m long and rigidly fastened at both the ends. Find the stresses in the two materials when the temperature rises from 10°C to 90°C.

If the composite bar is then subjected to an axial tensile load of 60 kN, find the resulting stresses given that : $E_s = 200 \times 10^3 \text{ MPa}$, $E_b = 100 \times 10^3 \text{ MPa}$, $\alpha_s = 11.6 \times 10^{-6}/^\circ\text{C}$, $\alpha_b = 18.7 \times 10^{-6}/^\circ\text{C}$. (10 Marks)

Module-2

- 3 a. Explain the maximum shear stress theory. (05 Marks)
- b. Explain the procedure for determining stresses in a general two dimensional stress system using Mohr's circle. (05 Marks)
- c. At a point in a strained material, the state of stresses is as shown in Fig.Q3(c), Determine the principal stresses, maximum shear stress and sketch the orientation of the principal planes.

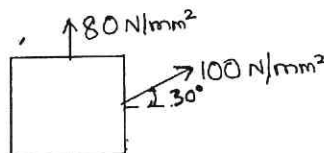


Fig.Q3(c)

(10 Marks)

OR

- 4 a. In a thin cylinder, show that the hoop stress is twice the longitudinal stress. (08 Marks)
 b. The maximum stress permitted in a thick cylinder of internal diameter 100mm and external diameter 150mm is 16 N/mm^2 . If the internal pressure is 12 N/mm^2 , what external pressure can be applied? Plot curves showing the variation of Hoop stress and radial stress through the material. (12 Marks)

Module-3

- 5 a. Define the terms:
 (i) Bending Moment (ii) Point of Inflexion. (04 Marks)
 b. Draw SFD and BMD for the cantilever beam shown in Fig.Q5(b).

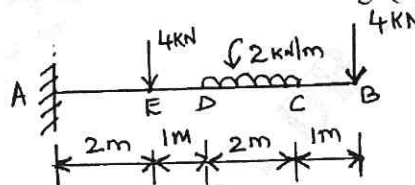


Fig.Q5(b)

(06 Marks)

- c. Draw SFD and BMD for a simply supported beam carrying two point loads of 12 kN at $1/3^{\text{rd}}$ span from either supports in addition to a UDL of 10 kN/m throughout span of beam is 6m. (10 Marks)

OR

- 6 a. Establish the relationship between shear force, bending moment and load intensity. (06 Marks)
 b. Draw SFD and BMD for the beam shown in Fig.Q6(b). Locate maximum shear force, maximum bending moment and point of contraflexure.

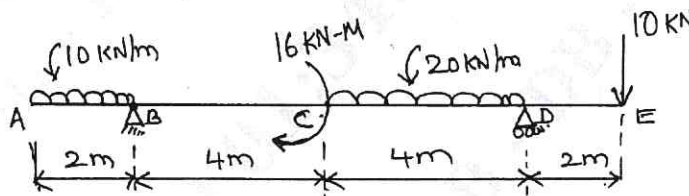


Fig.Q6(b)

(14 Marks)

Module-4

- 7 a. Derive the simple bending equation in the form $\frac{M}{I} = \frac{f}{y} = \frac{E}{R}$ with usual notations. (08 Marks)
 b. A beam of I section consists of 180mm \times 15mm flanges and a web of 280mm \times 15mm. It is subjected to a bending moment of 120 kN-m and a shear force of 60 kN. Sketch the bending stress distribution and shear stress distribution along the depth of the section. (12 Marks)

OR

- 8 a. Derive the torsion equation for a circular shaft subjected to pure torsion. (10 Marks)
 b. A solid shaft of 60mm diameter is to be replaced by a hollow shaft of same length. The outer diameter of hollow shaft is same as that of solid shaft. If the angle of twist per unit torsional moment is the same in both cases, determine the inner diameter of hollow shaft. Take the modulus of rigidity of hollow shaft to be three times that of solid shaft. (10 Marks)

Module-5

- 9 a. Derive an expression for the slope and deflection of a simply supported beam carrying a central concentrated load. (08 Marks)
- b. A simply supported beam of constant cross section is 10m long. It is loaded with two point loads of 100 kN and 80 kN at points 2m and 6m from the left end respectively. Calculate the deflection under each load the maximum deflection. Take $E = 200 \text{ GPa}$ and $I = 18 \times 10^8 \text{ mm}^4$. (12 Marks)

OR

- 10 a. Distinguish between long and short columns. (04 Marks)
- b. What are the limitations of Euler's column theory? (04 Marks)
- c. A hollow cast iron column whose outside diameter is 200mm has a thickness of 20mm. It is 4.5m long and fixed at both ends. Calculate (i) Slenderness ratio (ii) Ratio of Euler's and Rankine's critical loads. Take $E = 100 \text{ GPa}$, $\alpha = \frac{1}{1600}$ and $\sigma_c = 550 \text{ N/mm}^2$. (12 Marks)

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18CV33

Third Semester B.E. Degree Examination, Aug./Sept.2020 Fluid Mechanics

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Define the following with symbols. Dynamic Viscosity, kinematic viscosity, surface tension. (06 Marks)
- b. Derive the expression for pressure intensity inside a soap bubble. (06 Marks)
- c. If 10,000 liters of certain liquid weigh 1329kN. Calculate:
- i) Specific weight ii) Mass density iii) Specific volume and iv) Specific gravity. (08 Marks)

OR

- 2 a. Define gauge pressure, absolute pressure and atmospheric pressure and give the relation between them. (08 Marks)
- b. What is the difference between U-tube differential manometer and inverted U-tube differential manometer? Where are they used? (04 Marks)
- c. An U tube differential manometer connects two pressure pipes A and B. Pipe A contains carbon tetra chloride (1.594) under a pressure of 11.772N/cm^2 and pipe B contains oil (0.8) under a pressure of 11.772N/cm^2 . The pipe A lies 2.5m above pipe B. Find the difference of pressure measured by mercury (13.6) as manometric fluid. The centre of pipe B coincides with manometer liquid in left limb. (08 Marks)

Module-2

- 3 a. Explain the procedure of finding the resultant pressure on a curved surface immersed in a liquid. (04 Marks)
- b. A circular plate of diameter 0.75m is immersed in a liquid of relative density 0.80 with its plane making an angle of 30° with the horizontal. The centre of the plate is at a depth of 1.50m below the free surface. Calculate the total pressure force on one side of the plate and the location of the centre of pressure. (08 Marks)
- c. A fluid flow field is given by $V = x^2yi + y^2zj - (2xyz + yz^2)K$. Prove that it is a core of possible steady in compressible fluid flow. Calculate the velocity and acceleration at the point (2, 1, 3). (08 Marks)

OR

- 4 a. Define:
- i) Steady and unsteady flow
- ii) Compressible and incompressible flow. (04 Marks)
- b. Define velocity potential function and stream function and give their properties. (08 Marks)
- c. Check whether the stream function $\psi = 5xy$ is irrotational and if so, determine the corresponding velocity potential function ϕ . (08 Marks)

Module-3

- 5 a. State Impulse-Momentum principle and give its any two applications. (04 Marks)
 b. Derive the Euler's equation of motion and then obtain Bernoulli's equation. (08 Marks)
 c. A reducer bend having an outlet diameter of 15cm discharges freely, the bend, connected to a pipe of 20cm diameter has a deflection of 60° (that is, change from initial to final direction is 60°) and lies in horizontal plane. Determine the magnitude and direction of force on the bend, when a discharge of $0.3\text{m}^3/\text{sec}$ passes through the pipe. (08 Marks)

OR

- 6 a. List the forces present in fluid motion and give equations of motion. (06 Marks)
 b. What is Pitot tube? Explain how it is used to find the velocity of flow in pipes or channel. (06 Marks)
 c. Find the discharge of water flowing through a pipe 30cm diameter placed in an inclined position where a venturimeter is inserted, having a throat diameter of 15cm. The difference of pressure between the main and the throat is measured by a liquid of specific gravity 0.6 in an inverted U-tube which gives a reading of 30cm. The loss of head between the main and the throat is 0.2 times the kinetic head of the pipe. (08 Marks)

Module-4

- 7 a. Give the classification of orifices. (04 Marks)
 b. Derive the expression for discharge through a rectangular notch. (08 Marks)
 c. A tank has two identical orifices in one of its vertical sides. The upper orifice is 3.0m below the water surface and lower orifice is 5.0m below the water surface. If the value of coefficient of velocity for each orifice is 0.96, find the point of intersection of the two jets. (08 Marks)

OR

- 8 a. Explain the different types of Nappe with sketches. (06 Marks)
 b. Derive the expression for maximum discharge over a broad crested weir. (08 Marks)
 c. Water flows over a rectangular weir 1.0m wide at a depth of 150mm and afterwards passes through a triangular right angles weir, taking coefficient of discharge for the rectangular and triangular weir as 0.62 and 0.59 respectively. Find the depth of water over the triangular weir. (06 Marks)

Module-5

- 9 a. Derive Darcy-Weisbach equation for head loss due to friction in a pipe. (08 Marks)
 b. List the different types of loss in pipe flow. (04 Marks)
 c. When a sudden contraction from 60cm diameter to 30cm is introduced in a horizontal pipeline, the pressure drops from 100kPa at the upstream of the contraction to 80kPa on the downstream. Assuming a coefficient of contraction of 0.65, i) Estimate the flow rate in the pipe and ii) the loss of head due to sudden contraction. (08 Marks)

OR

- 10 a. What is water hammer? List the factors upon which it depends. (06 Marks)
 b. Obtain Dupit's equation for equivalent pipe. (06 Marks)
 c. Derive an expression for pressure rise in a pipe due to sudden closure of valve considering the elasticity of pipe material and compressibility of fluid. (08 Marks)

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18CV34

Third Semester B.E. Degree Examination, Aug./Sept.2020 Building Materials and Construction

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Write the requirements of good building stones. Explain the factors causing deterioration of stone work and preservation of stone work. (10 Marks)
b. Explain briefly the tests conducted on bricks. (10 Marks)

OR

- 2 a. Explain the importance of size, shape and texture of coarse aggregates. (10 Marks)
b. Explain bulking with reference to fine aggregates with its importance and how the test for bulking is done. (10 Marks)

Module-2

- 3 a. Explain briefly the essential requirement of good foundation. (10 Marks)
b. Explain with sketches the following types of foundation :
(i) Combined footing
(ii) Strap beam footing. (10 Marks)

OR

- 4 a. Explain with sketches the features of English bond and Flemish bond in brick masonry, with their merits and demerits. (10 Marks)
b. Explain briefly following types of walls:
(i) Load bearing wall
(ii) Partition wall
(iii) Cavity wall. (10 Marks)

Module-3

- 5 a. Explain various modes failures of an arch. (10 Marks)
b. Define Lintel. Draw a neat sketch of an R.C.C. lintel with chejja indicating the positions of reinforcements. (10 Marks)

OR

- 6 a. Explain the factors which contribute in selection of flooring materials. (10 Marks)
b. Draw a neat sketch of a kind post truss indicating various elements. (10 Marks)

Module-4

- 7 a. Explain briefly the guidelines to be followed while locating doors and windows. (10 Marks)
b. Explain with neat sketches the following :
(i) Corner window
(ii) Bay window (10 Marks)

OR

- 8 a. Plan a doglegged stair for a building in which vertical distance between the floors is 3.6m. The stair room measures 3m × 5m (internal dimensions). (10 Marks)
- b. Write short notes on :
- (i) Shoring
 - (ii) Under pinning (10 Marks)

Module-5

- 9 a. Mention the objectives of plastering? Explain the requirements of good plaster and defects in plastering. (10 Marks)
- b. What are the causes of dampness? Explain any one method of damp proofing. (10 Marks)

OR

- 10 a. Mention the objectives of painting and point out the characteristics of an ideal paint. (10 Marks)
- b. Explain the procedure for :
- (i) Painting on new wood work
 - (ii) Painting on new iron work and steel work. (10 Marks)

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18CV35

Third Semester B.E. Degree Examination, Aug./Sept.2020

Basic Surveying

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Distinguish between : (i) Plane survey and Geodetic survey. (ii) Plan and map. (iii) Accuracy and precision. (06 Marks)
- b. What is ranging? Explain indirect or reciprocal ranging with neat sketch. (08 Marks)
- c. A line was measured by a 20 mt chain which was accurate before starting the day's work. After chaining 900 mt, the chain was found to be 6 cms too long. After chaining a total distance at 1575 mt, the chain was found to be 14 cms too long. Find the true distance at the line. (06 Marks)

OR

- 2 a. How is chaining performed on sloping ground by Direct method? Explain. (06 Marks)
- b. Explain the Basic Principles of surveying. (06 Marks)
- c. In chaining pasta pond, stations A and D on the main line, were taken on the opposite sides of the pond. On the Left of AD, a line AB, 200 mt long was laid down and a second line, AC 250 mt long was ranged on the right of AD, the points B, D and C being in the same straight line. BD and DC were then chained and found to be 125 mt and 150 mt respectively. Find the length of AD. (08 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 menedian 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. Define the following terms:
 (i) Benchmark (ii) Back sight (iii) MSL (iv) Reduced Level. (04 Marks)
- b. Explain the temporary adjustments of Dumpy level. (07 Marks)
- c. Following consecutive readings were taken with a level and a 4 mt leveling staff on a continuously sloping ground at common interval at 30 mt.
 0.855 (on A), 1.545, 2.335, 3.115, 3.825, 0.455, 1.380, 2.055, 2.855, 3.455, 0.585, 1.015, 1.850, 2.755, 3.845 (on B).
 The R.L of A was 380.500 mt. Make entries in a level book format and apply the usual check. Also determine the gradient at the line AB. (09 Marks)

OR

- 6 a. Define the following terms:
 (i) Benchmark (ii) Reciprocal leveling (iii) Height of Instrument
 (iv) Change point (06 Marks)
- b. Explain the temporary adjustments of Dumpy level. (07 Marks)
- c. The following staff reading were observed successively with a level, the instrument having been moved after 3rd, 6th and 8th readings:
 2.228, 1.606, 0.988, 2.090, 2.864, 1.262, 0.602, 1.982, 1.044, 2.684
 Enter the readings in level book format and calculated RL of all the points by Rise and Fall method if the first reading was taken with a staff held on Benchmark of elevation 432.384 mt. (07 Marks)

Module-4

- 7 a. List the advantages and disadvantages of plane table surveying. (08 Marks)
- b. What is the practical utility of three-point point? (04 Marks)
- c. Explain Radiation and intersection method of plane table surveying. (08 Marks)

OR

- 8 a. Explain the term orientation of plane table. Discuss orientation by back sighting. (06 Marks)
- b. List the methods of plane table surveying. Explain radiation method. (07 Marks)
- c. What is three-point problem? How is it solved graphically by Bessel's method? (07 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 line 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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18CV36

Third Semester B.E. Degree Examination, Aug./Sept.2020 Engineering Geology

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. What is Geology? Describe the importance of Geology in Civil Engineering. (10 Marks)
b. What is Mineral? Define, describe the different physical properties which helps in the identification of minerals. (10 Marks)

OR

- 2 a. Describe the Earth's crust, Mantle and Core, with a neat diagram. (08 Marks)
b. Describe the following with mineral examples :
i) Lustre and its types ii) Fracture and its types. (06 Marks)
c. Write the physical properties, chemical composition and uses of :
i) Orthoclase ii) Calcite. (06 Marks)

Module-2

- 3 a. Explain Rock cycle. (05 Marks)
b. Give the classification of Igneous rocks. (10 Marks)
c. Describe the properties of GRANITE and its uses in different Civil Engineering Construction. (05 Marks)

OR

- 4 a. What is Rock Weathering? Describe the different types of weathering. (10 Marks)
b. What is Metamorphism? Describe the different agents of metamorphism. (10 Marks)

Module-3

- 5 a. What is Fold? With a neat diagram, describe the different parts of fold. (05 Marks)
b. Describe the different types of faults based on their mode of occurrence, with neat diagram. (10 Marks)
c. What are Joints? Write the classification and describe different types of tension joints. (05 Marks)

OR

- 6 a. What is Fault? With a neat diagram, describe the different parts of a fault. (08 Marks)
b. Describe the different types of folding on the basis of their axial plane, with neat diagram. (07 Marks)
c. Describe the causes of folding. (05 Marks)

Module-4

- 7 a. Describe with a neat diagram the hydrological cycle. (07 Marks)
b. Describe the vertical distribution of ground water in soil and rock. (07 Marks)
c. Describe : i) Specific yield ii) Specific retention. (06 Marks)

OR

1 of 2

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.

- 8 a. What is an Aquifer? Describe the types of aquifer. (08 Marks)
b. Describe i) Porosity ii) Permeability. (04 Marks)
c. Describe the ground water exploration by Electrical Resistivity Method. (08 Marks)

Module-5

- 9 a. What is an Earth quake? Describe its causes and effects. (07 Marks)
b. What is Remote sensing? Describe the principles , advantages and disadvantages of remote sensing. (08 Marks)
c. Describe the process involved in Geographic Information System (GIS). (05 Marks)

OR

- 10 a. What are Landslides? Describe the causes and control measures. (08 Marks)
b. Describe the impact of mining on Environment. (06 Marks)
c. Describe the impact of reservoir on Environment. (06 Marks)

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17CV/CT32

Third Semester B.E. Degree Examination, Aug./Sept. 2020 Strength of Materials

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Define the four elastic constants. (08 Marks)
- b. A steel rod of 30 mm in diameter is enclosed in an aluminium tube of 32 mm internal diameter and 60 mm external diameter. Both the bars are of length 750 mm and are rigidly connected to each other. The composite bar is subjected to an increase in temperature of 40°C. Compute the stresses in each material due to the temperature increase. If the bar is also subjected to a compression of 200 kN, compute the resultant stresses. Also, find the final deformation of the compound bar.
- Material properties are : $E_S = 200 \text{ GPa}$, $\alpha_S = 12 \times 10^{-6} / ^\circ \text{C}$
 $E_A = 80 \text{ GPa}$, $\alpha_A = 22 \times 10^{-6} / ^\circ \text{C}$ (12 Marks)

OR

- 2 a. Sketch a typical stress strain curve for mild steel and briefly discuss the salient points on the curve. (06 Marks)
- b. Derive an expression for elongation of a tapering rectangular plate of uniform thickness subjected to an axial load. (08 Marks)
- c. A steel flat of thickness 25 mm tapers uniformly from 300 mm to 150 mm over a length of 750 mm. If the flat is subjected to an axial tension of 300 kN, compute the elongation of the flat. What is the % error if average area is used in calculating the extension? $E_s = 200 \text{ KN/mm}^2$. Also, compute the maximum stress. (06 Marks)

Module-2

- 3 a. Show that the sum of the normal stresses on any two perpendicular planes in a general two dimensional system is $(\sigma_x + \sigma_y)$. (06 Marks)
- b. A closed cylindrical steel vessel 8 m long and 3.2 m internal diameter is subjected to an internal pressure of 5 MPa with thickness of vessel being 50 mm. Assuming $E = 200 \text{ GPa}$ and $\mu = 0.3$, compute hoop and longitudinal stresses, maximum shear stress and changes in length, diameter and volume. (08 Marks)
- c. Compute the maximum and minimum hoop stress and plot their variation across the pipe thickness having an internal diameter of 500 mm and thickness 80 mm if the pipe is subjected to an internal fluid pressure of 10 MPa. (06 Marks)

OR

- 4 a. Derive expressions for circumferential and longitudinal stresses in a thin cylinder subjected to internal pressure, p. (06 Marks)
- b. Direct stresses of magnitude 120 MPa tensile and 80 MPa compressive are acting at a point along with a shear stress of 50 N/mm². Compute the normal and tangential stresses on a plane inclined at 40° anticlockwise with the plane on which 120 MPa tensile stress is acting. Also, compute the magnitudes of principal stresses and planes. Sketch the stresses and their planes. (14 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. A Cantilever beam is subjected to a UDL of 20 kN/m throughout its length. Sketch SFD and BMD indicating salient values. Cantilever length = 3 m. (05 Marks)
- b. Sketch SFD and BMD for the beam shown in Fig. Q5 (b) indicating salient values (including point of contraflexure, maximum -ve and maximum +ve BMS and maximum SF). (15 Marks)

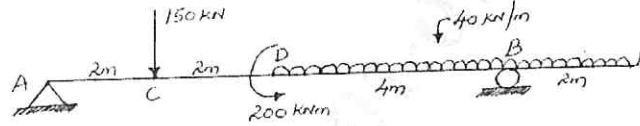


Fig. Q5 (b)

OR

- 6 a. A simply supported beam of span 8 m is carrying a concentrated load of 100 kN at a distance of 3 m from the left support. Sketch SFD and BMD indicating salient values. (05 Marks)
- b. Sketch SFD and BMD for the beam shown in Fig. Q6 (b) indicating salient values (including point of contraflexure, maximum -ve and maximum +ve BMS and maximum SF). (15 Marks)

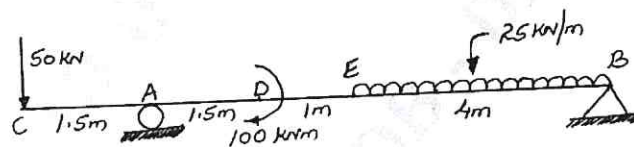


Fig. Q6 (b)

Module-4

- 7 a. Show that the strength of hollow shafts is greater than solid shaft having same material, length and weight. (08 Marks)
- b. Explain maximum shear stress theory of failure. (06 Marks)
- c. A steel shaft of diameter 150 mm transmits 250 kW at 200 rpm with $T_{\max} = 1.35 T_{\text{mean}}$. Compute the maximum shear stress and sketch the stress variation. (06 Marks)

OR

- 8 a. Explain maximum strain energy theory of failure. (06 Marks)
- b. A hollow circular shaft rotates at 200 rpm transmitting a power of 600 KW. Compute the diameters of the shaft if the external diameter is 1.5 times the internal diameter permissible shear stress in the material is 80 MPa and the angle of twist is 1.1° over a length of 3 m. $T_{\max} = 1.35 T_{\text{mean}}$ and $G = 80 \text{ GPa}$. Also, calculate the torque carried by a solid shaft of same length, cross sectional area and material as that of hollow shaft with the permissible shear stress and angle of twist being same. What is the percentage difference in torque carrying capacities? (14 Marks)

Module-5

- 9 a. Derive an expression for Euler's crippling load in a column with one end fixed and other end free. (10 Marks)
- b. An unsymmetrical I section with top flange 300×20 , bottom flange 150×15 and web thickness of 12 mm is used as a simply supported beam of span 6 m with a uniformly distributed load of 40 kN/m over its entire length. Overall depth of beam is 400 mm. Compute the maximum tensile and compressive stresses and sketch the bending stress distribution. Also, compute the shear stresses at salient points and sketch the shear stress distribution at support. (10 Marks)

OR

- 10 a. Derive an expression for shear stress in a beam with usual notations. (10 Marks)
- b. A hollow rectangular column having external dimensions of 250×375 with thickness = 10 mm is used as a column of length 3.5 m with both ends of the column being fixed. Compute the buckling load using both the formulae. $E = 200 \text{ GPa}$, Rankine's constant are $\alpha = \frac{1}{7500}$ and $\sigma_c = 320 \text{ N/mm}^2$. Comment on the formula giving larger load. (10 Marks)

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17CV33

Third Semester B.E. Degree Examination, Aug./Sept.2020 Fluid Mechanics

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Distinguish between:
- (i) Ideal fluids and real fluids
 - (ii) Surface tension and capillarity
 - (iii) Absolute pressure and gauge pressure
 - (iv) Newtonian and non Newtonian fluids
- (10 Marks)
- b. Calculate the dynamic viscosity of oil which is used for lubrication between a square plate 0.8×0.8 m size and inclined plane with angle of inclination of 30° . The weight of square plate is 300 N and it slides down the inclined plane with a uniform velocity of 0.3 m/s the thickness of oil film is 1.5 mm.
- (06 Marks)
- c. An oil of specific gravity is 0.8 under a pressure of 137.2 kN/m^2 . What is the pressure head
- (i) expressed in metre of water
 - (ii) expressed in metre of oil?
- (04 Marks)

OR

- 2 a. State and prove Pascal's law. (06 Marks)
- b. Calculate the capillary rise in a glass tube of 2.5 mm diameter when immersed vertically in (i) water (ii) mercury. Take surface tension $\sigma = 0.0725 \text{ N/m}$ for water and $\sigma = 0.52 \text{ N/m}$ for mercury. For mercury angle of contact = 130° . (06 Marks)
- c. A simple U – tube manometer containing mercury is connected to a pipe in which a fluid of specific gravity 0.8 and having vacuum pressure is flowing. The other end of the manometer is open to atmosphere. Find the vacuum pressure in pipe. If the difference of mercury level in the two limbs is 40 cm and the height of fluid in the left from the centre of pipe is 15 cm below. (08 Marks)

Module-2

- 3 a. Derive an expression for total pressure and center of pressure for a vertical plane surface submerged in the liquid. (08 Marks)
- b. If for a two-dimensional potential flow, the velocity potential is given by $\phi = x(2y - 1)$. Determine the velocity at the point P(4, 5). Also determine the value of stream function ψ at the point P. (06 Marks)
- c. Determine the total pressure on a circular plate of diameter 1.5 m which is placed vertically in water in such a way that the centre of plate is 3m below the free surface of water. Find also the position of centre of pressure. (06 Marks)

OR

- 4 a. Derive the three dimensional continuity equation in the Cartesian coordinates. (06 Marks)
- b. Find the total pressure and position of centre of pressure on a triangular plate of base 2m and height 3m which is immersed in water in such a way that the plane of the plate makes an angle of 60° with the free surface of the water. The base of the plate is parallel to water surface and at a depth of 2.5 m from water surface. (08 Marks)

- c. The velocity components in a two dimensional flow are $u = \frac{y^3}{3} + 2x - x^2y$ and $v = xy^2 - 2y - \frac{x^3}{3}$. Show that these components represent a possible case of an irrotational flow. (06 Marks)

Module-3

- 5 a. State the Bernoulli's theorem. Derive the Bernoulli's equation starting from Euler's equation of motion along a stream line. (08 Marks)
 b. Define: (i) Forced vortex (ii) Free vortex with examples. (04 Marks)
 c. The inlet and throat diameters of a horizontal venturimeter are 30 cm and 10 cm respectively. The liquid flowing through the venturimeter is water. The pressure intensity at inlet is 13.734 N/cm^2 while the vacuum pressure head at the throat is 37 cm of mercury. Find the rate of flow. Take $C_d = 0.98$. (08 Marks)

OR

- 6 a. Derive an expression for the discharge through a venturimeter. (08 Marks)
 b. 250 l/s of water flowing in a pipe having a diameter of 300 mm. If the pipe is bend by 135° (i.e. change from initial to final direction is 135°). Find the magnitude and direction of the resultant force on the bend, when the pressure of water flowing is 39.24 N/cm^2 . (08 Marks)
 c. A pilot static tube is used to measure the velocity of water in a pipe. The stagnation pressure head is 6m and static pressure head is 5m. Calculate the velocity of flow assuming coefficient of tube = 0.98. (04 Marks)

Module-4

- 7 a. Define hydraulic coefficients and obtain the relation between them. (06 Marks)
 b. Differentiate between : (i) Notch and Weir (ii) Orifice and mouth piece (06 Marks)
 c. A rectangular weir of crest length 50 cm is used to measure the rate of flow of water in a rectangular channel of 80 cm wide and 70 cm deep. Determine the discharge in the channel if the water level is 80 mm above the crest of weir. Take velocity of approach into consideration, $C_d = 0.62$. (08 Marks)

OR

- 8 a. Derive an expression for discharge through a triangular notch. (08 Marks)
 b. A right angled V-notch is used for measuring a discharge of 30 l/s. An error of 1.5 mm was made while measuring the head over the notch. Calculate the percentage error in discharge $C_d = 0.62$. (06 Marks)
 c. The head of water over an orifice of diameter 100 mm is 10 m. The water coming out from orifice is collected in a circular tank of diameter 1.5m. The rise of water level in this tank is 1.0 m in 25 seconds. Also the coordinates of a point on the jet, measured from vena contracta are 4.3 m horizontal and 0.5m vertical. Find the hydraulic coefficient of orifice. (06 Marks)

Module-5

- 9 a. Explain: (i) Equivalent pipe (ii) Pipe in parallel (iii) Pipe in series (06 Marks)
 b. A pipe of diameter 20 cm and length 2000 m connects two reservoirs, having difference of water levels as 20 m. Determine the discharge through the pipe, if an additional pipe of diameter 20 cm and length 1200 m is attached to the last 1200 m of length of the existing pipe. Find the increase in discharge. Take $f = 0.015$ and neglect minor losses. (10 Marks)
 c. Explain water hammer in pipes. (04 Marks)

OR

- 10 a. Explain minor losses. Give expression for head loss due to :
(i) Sudden expansion (ii) Major loss. (06 Marks)
- b. A valve is provided at the end of a cast iron pipe of diameter 150 mm and of thickness 10 mm. The water is flowing through the pipe which is suddenly stopped by closing the valve. Find the maximum velocity of water when the rise of pressure due to sudden closure of valve is 196.2 N/cm^2 . Take K for water as $19.62 \times 10^4 \text{ N/cm}^2$ and E for cast iron pipe as $11.772 \times 10^6 \text{ N/cm}^2$. (06 Marks)
- c. Explain:
(i) Hydraulic gradient line and total energy line
(ii) Hardy cross method
(iii) Gradual closure of valve (08 Marks)

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17CV34

Third Semester B.E. Degree Examination, Aug./Sept.2020 Basic Surveying

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Define Surveying. Explain briefly principles of surveying. (08 Marks)
b. Differentiate between Plan and Map. (04 Marks)
c. A 20m chain was found to be 10cm too long after chaining a distance of 1500m. It was found to be 18cm too long at the end of days work after chaining a total distance of 2900m. Find the true distance if the chain was correct before the commencement of the work. (08 Marks)

OR

- 2 a. Define Ranging. Explain indirect or reciprocal ranging. (06 Marks)
b. Discuss the classification of surveying. (08 Marks)
c. In passing an obstacle in the form of a pond, stations, A & D on the main line, were taken on the opposite sides of the pond. On the left of AD, a line AB, 200m long was laid down and a second line AC 250m long was ranged on the right of AD, the points B, D and C being in the same straight line. BD and DC were chained and found to be 125m and 150m respectively. Find the length of AD. (06 Marks)

Module-2

- 3 a. Distinguish between i) Fore bearing and back bearing ii) Whole circle bearing and quadrantal bearing iii) Closed traverse and open traverse. (06 Marks)
b. Differentiate between Prismatic compass and Surveyor's compass. (06 Marks)
c. The following bearings were observed with a compass. Calculate the interior angles and apply the check.

Line	AB	BC	CD	DE	EA
FB	60° 30'	122° 0'	46° 0'	205° 30'	300° 0'

(08 Marks)

OR

- 4 a. Explain the measurement of a horizontal angle by repetition method. List the errors eliminated by this method. (07 Marks)
b. What are the permanent adjustment of a theodolite? Explain the spire test. (06 Marks)
c. The following bearings were observed while traversing with a compass.

Line	AB	BC	CD	DE
FB	45° 45'	96° 55'	29° 45'	324° 48'
BB	226° 10'	277° 5'	209° 10'	144° 48'

Mention which stations were affected by local attraction and determine the corrected bearings. (07 Marks)

Module-3

- 5 a. What is meant by balancing of traverse? Explain the Bowditch's and Transit method of adjusting the traverse. (08 Marks)
b. Define : i) Latitude and Departure ii) Dependent co-ordinates and independent co-ordinates. (04 Marks)

- c. Calculate the error of closure of adjust the following traverse by using transit rule. (08 Marks)

Line	PQ	QR	RS	SP
Latitude	123.35	93.82	-177.44	-39.21
Departure	35.68	205.86	70.11	-312.25

OR

- 6 a. Derive the expression for distance and elevation when the staff held vertical and the line of sight is inclined. (10 Marks)
- b. Determine the gradient from point A to a point B from the following observations made with a tachometer fitted with an annalistic lens. The constant of instrument was 100 and the staff was held vertically. (Take RL of instrument axis 100.000m).

Inst station	Staff point	Bearing	Vertical angle	Staff readings
P	A	134 ⁰	+10 ⁰ 32'	1.360, 1.915, 2.470
	B	224 ⁰	+5 ⁰ 6'	1.065, 1.885, 2.705

(10 Marks)

Module-4

- 7 a. Define the following terms : i) Benchmark ii) Back sight iii) Reduced level iv) For sight v) Height of instrument vi) Turning point. (06 Marks)
- b. Explain the temporary adjustment of a dumpy level. (06 Marks)
- c. To find the elevation of the top 'Q' of a hill, a flag staff of 2m height was erected and observations were made from stations 'P' & 'R' 60m apart. The horizontal angle measured at P between R and the top of the flag staff was 60⁰ 30' and that measured at R between the top of the flag staff and P was 68⁰ 18'. The angle of elevation to the top of the flag staff 'Q' was measured to be 10⁰ 12' at P and that at R was 10⁰ 48'. Staff reading on BM when the instrument was at P is 1.965m and with the instrument at R 2.055m. Calculate the elevation of the top of the hill if that of B.M was 435.065 meters. (08 Marks)

OR

- 8 a. Derive an expression for the horizontal distance, vertical distance and elevation of an object by single plane method, when the base is inaccessible. (10 Marks)
- b. The following staff readings were observed successively with a level, the instrument was shifted after third, sixth and eight readings : 2.228 , 1.606 , 0.988 , 2.090 , 2.864 , 1.262 , 0.602 , 1.982 , 1.044 , 2.684 meters. Rule out a page of level book and determine the RL of points if the first reading was taken with a staff held on a bench mark of 432.384m. (10 Marks)

Module-5

- 9 a. Discuss the methods of determining areas and volumes. (06 Marks)
- b. Define Contour. List the uses of contour maps. (06 Marks)
- c. A series of offsets were taken from a chain line to a curved boundary line at intervals of 15 meters in the following order. 0 , 2.65 , 3.80 , 3.75 , 4.65 , 3.60 , 4.95 , 5.85m. Compute the area between chain line, the curved boundary and the end offsets by i) Trapezoidal rule ii) Simpsons's rule. (08 Marks)

OR

- 10 a. Explain the characteristics of contours with a sketches. (07 Marks)
- b. Define the following terms : i) Contour interval ii) Horizontal equivalent iii) Contour gradient. (03 Marks)
- c. A railway embankment is 10m wide with side slopes 1½ to 1. Assuming the ground to be level in a direction transverse to the centre line, calculate the volume contained in a length of 120 meters, the centre heights at 20m intervals being in meters. 2.2 , 3.7 , 3.8 , 4.0 , 3.8 , 2.8 , 2.5. By i) Trapezoidal rule ii) Simpson's rule / Prismoidal rule. (10 Marks)

CBCS SCHEME

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17CV36

Third Semester B.E. Degree Examination, Aug./Sept.2020 Building Materials and Construction

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. What are the qualities of good building stone? Discuss them. (08 Marks)
b. Explain Bricks classification. (06 Marks)
c. What are the advantages of Conc block over bricks? (06 Marks)

OR

- 2 a. Explain Mortar classification in detail. (08 Marks)
b. Explain defective timber. (06 Marks)
c. Explain the requirements of good bricks. (06 Marks)

Module-2

- 3 a. Define Foundation. Explain different types of foundation with suitable sketches. (10 Marks)
b. Explain English Bond Flemish Bond with suitable sketches. (10 Marks)

OR

- 4 a. Explain different types of stone masonry with suitable sketches. (10 Marks)
b. Find dimension of a combined rectangular footing for two column A and B carrying a load of 500 kN and 750 kN. Column A 300×300mm, Column B 400×400 mm in size centre to centre of column is 3.4 mts SBC of soil 150 kN/m². Width of footing is limited to 1.8m. (10 Marks)

Module-3

- 5 a. What is a lintel? Explain different types of lintel. (10 Marks)
b. Draw a typical segmental Arch and explain various elements of Arch. (10 Marks)

OR

- 6 a. Explain the classification of Arches with sketches. (10 Marks)
b. Draw typical section of
(i) RCC Lintel
(ii) RCC Lintel with chajja projection. (10 Marks)

Module-4

- 7 a. Define door and windows. (06 Marks)
b. Explain different types of Doors. (07 Marks)
c. Write a note on (i) Scaffolding (ii) Shoring (07 Marks)

OR

- 8 a. Write a note on Types of windows and explain briefly each type. (07 Marks)
b. What do you mean by underpinning? How do you active this? (06 Marks)
c. What are the requirements of good stair? (07 Marks)

Module-5

- 9 a. Explain methods of plastering in details. (07 Marks)
b. Explain types of paints. (07 Marks)
c. What is pointing explain with sketches. (06 Marks)

OR

- 10 a. What are the defects in painting? (07 Marks)
b. Explain different types of plaster finishes. (07 Marks)
c. What are the defects in plastering? (06 Marks)

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CBCS SCHEME

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15CV/CT32

Third Semester B.E. Degree Examination, Aug./Sept.2020 Strength of Material

Time: 3 hrs.

Max. Marks: 80

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

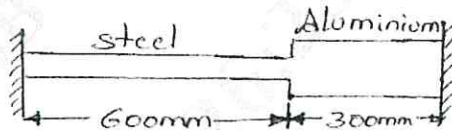
Module-1

- 1 a. Derive an expression for circular bar of uniformly varying cross - section. (08 Marks)
- b. A composite section comprises a steel tube 100mm internal diameter 120mm, externally fitted inside a brass tube of 140mm internal diameter and 160mm external diameter. The assembly is subjected to a compressive load of 500kN. Find the load carried by the tube and the stresses generated in them. The length of tube is 1500mm. Take $E_{\text{steel}} = 200 \times 10^3 \text{ N/mm}^2$ and $E_{\text{brass}} = 100 \times 10^3 \text{ N/mm}^2$. What is the change in length of tube? (08 Marks)

OR

- 2 a. Derive the relationship between Bulk modulus (K) , Young's modulus (E) and Poisson's ratio (μ). (08 Marks)
- b. A composite bar made of aluminum and steel is held between two supports as shown in fig. Q2(b). What will be the stress in bars? When temperature falls by 20°C , given that the bars were initially stress - free. The supports are unyielding. Cross - sectional area of steel bar is 200mm^2 and that of aluminum is 300mm^2 . (08 Marks)

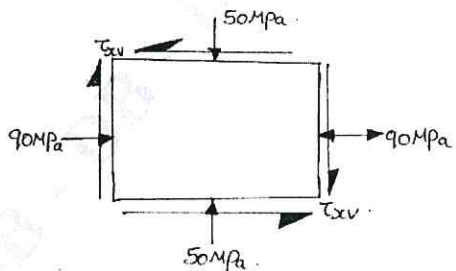
Fig.Q2(b)



Module-2

- 3 a. Derive an expression for maximum normal stress on a plane inclined at an angle ' θ ', subjected to two dimensional stress systems. (08 Marks)
- b. For the two - dimensional stressed element, shown in fig. Q3(b), determine the value of
i) Minimum principal stress ii) Shear stress iii) The normal stress on the plane of maximum shear iv) The maximum shear stress if major principal stress is 100 MPa. (08 Marks)

Fig.Q3(b)

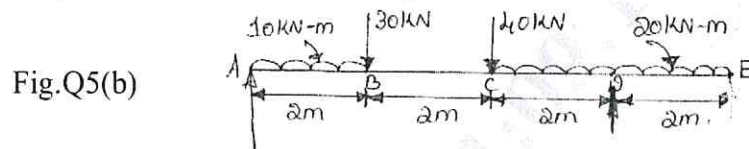


OR

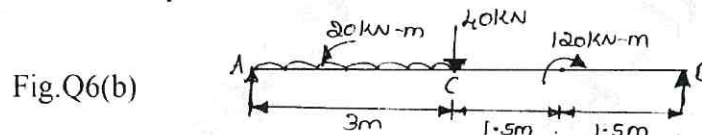
- 4 a. Derive Lamé's equation for thick cylinder. (08 Marks)
- b. A thick cylinder of internal diameter 160mm is subjected to an internal pressure of 25N/mm^2 . If the allowable stress in the material is 120N/mm^2 , find the required wall thickness of the cylinder. (08 Marks)

Module-3

- 5 a. With a neat sketch, explain types of beams, types of loads and types of supports. (08 Marks)
 b. For the beam, shown in fig. Q5(b), draw the shear force and bending moment diagram and locate the point of contra flexure if any. (08 Marks)

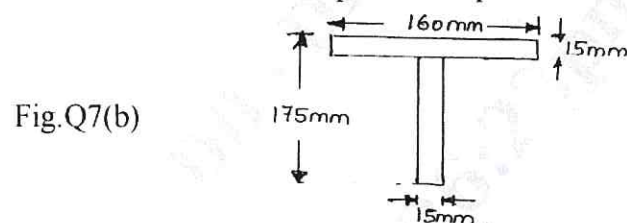
**OR**

- 6 a. Derive the relation between UDL, SF and BM. (06 Marks)
 b. Draw SFD and BMD for the beam shown in Q6(b). Determine the maximum BM and its location. Locate the points of contraflexure. (10 Marks)

**Module-4**

- 7 a. Derive the general Bending equation

$$\frac{M}{I} = \frac{E}{R} = \frac{f}{Y}$$
 (08 Marks)
 b. A cross section of beam is as shown in fig. Q7(b). the shear force on the section is 400 kN. Estimate the shear stress at various points and plot the shear stress distribution diagram.



(08 Marks)

OR

- 8 a. Show that $P_{cr} = \frac{\pi^2 EI}{l^2}$ for a long column hinged at both ends. (08 Marks)
 b. A solid round bar of 60mm diameter and 2.5m long is used as a strut. Find the safe compressive load for the strut if i) Both ends are hinged ii) Both ends are fixed. (08 Marks)

Module-5

- 9 a. Derive $\left[\frac{T}{I_p} = \frac{f_s}{R} = \frac{C\theta}{L} \right]$. (08 Marks)
 b. Define the followings in theories of failures in brief : i) Rankines theory ii) Tresca's theory iii) Beltrami & Haieghs theory iv) St. Venants theory. (08 Marks)

OR

- 10 a. A hollow shaft having internal diameter 40% of external diameter, transmits 562.5kW power of 100 rpm. Determine the cross - section dimension of the shaft if shear stress is not to exceed 60MPa and twist in a length of 2.5m should not exceed 1.3° , Maximum torque transmitted is 25% , higher than average torque Rigidity modulus = 90 GPa. (08 Marks)
 b. A solid circular shaft that transmits 250 kN at 100 rpm. If the shear stress is not to exceed 75 MPa. What should be the diameter of the shaft? If this shaft is to be replaced by a hollow one, whose diameter ratio is 0.6. Determine the size and percentage saving in weight, the maximum shear stress being is same. (08 Marks)

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Third Semester B.E. Degree Examination, Aug./Sept.2020 Fluid Mechanics

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Define : Mass density , Specific gravity , Specific weight. Give the relationship between them. Also write their units and dimensions. (08 Marks)
- b. A closed tank contains 0.5m depth of mercury, 2m of water and 3m of oil (S = 0.6) with air above the oil. If the gauge pressure at the bottom of the tank is 196.2kPa, what is the pressure of air at top of the tank? Also find absolute pressure if $P_{atm} = 101.043\text{kPa}$. (08 Marks)

OR

- 2 a. Define Absolute , Gauge and Atmospheric pressure. Give relationship between them through sketch. (04 Marks)
- b. One litre of crude oil weighs 9.6N. Calculate specific weight, density and specific gravity. (06 Marks)
- c. A cube of 25cm sides slides down on incline plane of 2V : 3H with a velocity of 20m/s. The inclined surface is covered by 0.02mm thick oil film of viscosity 2.2×10^{-3} Pas. What is the weight of the cube? (06 Marks)

Module-2

- 3 a. Distinguish between : i) Center of pressure and Center of gravity ii) Stream line and Path line iii) Convective acceleration and temporal acceleration. (06 Marks)
- b. A circular disc of diameter 0.75m is immersed in a liquid of S = 0.8 with its plane making 30° with horizontal. The centre of plate is at 1.5m below free surface. Calculate the total pressure and center of pressure. (04 Marks)
- c. The velocity vector for a 2D flow is given by :

$$\vec{V} = \left[\frac{y^3}{3} + 2x - x^2y \right] \mathbf{i} + \left[xy^2 - 2y - \frac{x^3}{3} \right] \mathbf{j}. \text{ Obtain the expression for stream function.}$$

(06 Marks)

OR

- 4 a. Derive the continuity equation for a 3D flow using Cartesian coordinate system for steady incompressible flow. (08 Marks)
- b. The velocity vector in a fluid flow is $\vec{V} = 4x^3 \mathbf{i} - 10x^2y \mathbf{j} + 2t \mathbf{k}$. Find velocity and acceleration components at point (2, 1, 3) when $t = 1$. (08 Marks)

Module-3

- 5 a. Derive an expression for discharge through horizontal venturimeter carrying water. (06 Marks)
- b. List the assumptions made during derivation of Bernoulli's equation. (04 Marks)
- c. Water is flowing through a tapering pipe having diameters 300mm and 150mm at section 1 and 2 which are 10m above and 6m below datum respectively. If the pressure at section 1 is 400 kPa and discharge is 40 lps determine velocity and pressure at section 2. What is velocity at section 1? Neglect losses. (06 Marks)

OR

- 6 a. Derive an equation for velocity of flow at a point using pitot tube. (04 Marks)
 b. 300 lps of water is flowing in a pipe of 30cm diameter with a gauge pressure of 400kN/m^2 . If the pipe is bent by 90° , find the magnitude and direction of force on the bend. (07 Marks)
 c. A horizontal venturimeter with inlet and throat diameter 25cm and 15cm respectively is used to measure discharge of water in a pipe. $C_d = 0.98$. If the U – tube mercury manometer connected to it reads 30cm level difference, find the discharge. (05 Marks)

Module-4

- 7 a. Derive the expression $C_v = \frac{x}{2\sqrt{yH}}$ with usual notations. (06 Marks)
 b. The head over rectangular notch is 90cm and discharge is 300lps. Find the length of crest. $C_d = 0.62$. (04 Marks)
 c. Give classification of orifices and mouth pieces. (06 Marks)

OR

- 8 a. Derive an equation for discharge over a rectangular sharp crested weir. (08 Marks)
 b. A 25mm diameter orifice discharges 22m^3 of water per minute when the head is 6m. The diameter of jet at Vena – Contracta is 22.5mm. Determine C_c , C_d and C_v . (08 Marks)

Module-5

- 9 a. Derive Darcy – Weisbach equation for head loss through a pipe. (08 Marks)
 b. A 0.5m diameter and 100m long pipeline carrying $0.5\text{m}^3/\text{s}$ of water is fitted with a valve at downstream end. Calculate the rise in pressure caused due to closure of valve in time :
 i) 0.1 sec and ii) 1 sec. Take sonic velocity = 1430m/s. (08 Marks)

OR

- 10 a. A pipe of 40m length is connected to water tank at one end and discharges freely into the atmosphere at other end. For the first 25m length from the tank the pipe is 15cm in diameter and for remaining part, its diameter is 30cm. The pipe is horizontal and water level in tank is 8m above the center of pipe. Taking $f = 0.01$ in $h_f = \frac{FLV^2}{2gD}$ and considering all losses, determine the discharge through pipe. Also sketch HGL and TEL. (12 Marks)
 b. Derive an expression for instantaneous pressure in the pipe due to gradual closure of valve fitted at the end. (04 Marks)

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15CV34

Third Semester B.E. Degree Examination, Aug./Sept.2020 Basic Surveying

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Define Surveying, Enumerate the objects of Surveying. (08 Marks)
b. The area of the plan of an old survey plotted to a scale of 10m to 1cm now measures as 90.5cm^2 as found by a planimeter. The plan is found to have shrunk, so that a line originally 10cm long now measures 9.5cm only. A note on the plan also states that the 20cm chain used was 9cm too short, find the true area of the survey. (08 Marks)

OR

- 2 a. Define the term EDM, explain the principle of pulse distance meter method with sketches. (08 Marks)
b. A river is flowing from west to east for determining the width of the river, two points A and B are selected on the southern bank, such that distance AB = 100m point A is west wards. The bearings at a tree C on the northern bank are observed to be 40° and 340° respectively from A and B, calculate the width of the river. (08 Marks)

Module-2

- 3 a. Comparison between Prismatic compass and surveyor's compass. (06 Marks)
b. A closed compass traverse ABCD was conducted round a lake and the following bearings were obtained. Determine which of the stations are suffering from local attraction and give the values of the corrected bearings:

Line	Force bearing	Back bearing
AB	$74^\circ 20'$	$256^\circ 0'$
BC	$107^\circ 20'$	$286^\circ 20'$
CD	$224^\circ 50'$	$44^\circ 50'$
DA	$206^\circ 40'$	$126^\circ 00'$

(10 Marks)

OR

- 4 a. Explain the source of errors in a theodolite survey. (08 Marks)
b. Explain the method of repetition for measuring the horizontal angle using Transit theodolite and mention their advantages. (08 Marks)

Module-3

- 5 a. Define the term Latitude and Departure, Enumerate the Transit method of adjusting the transverse. (08 Marks)
b. Define tacheometry. Discuss the types of tacheometry. (08 Marks)

OR

- 6 a. Explain briefly concept of stadia method of tacheometry. (06 Marks)
- b. Determine the gradient from a point P to another point Q from the following observations made with a tacheometer fitted with an anallactic lens. The constants of the instrument were 100 and 0, and the staff was held vertical.

Instrument station	Staff station	Bearing	Vertical angle	Staff readings (m)
R	P	130°	+10°32'	1.255, 1.810, 2.365
	Q	220°	+5°06'	1.300, 2.120, 2.940

(10 Marks)

Module-4

- 7 a. List out the difference between the line of collimation method and rise and fall method in leveling. (06 Marks)
- b. The following staff readings were observed with a dumpy level,

0.795, 1.655, 2.890, 3.015, 0.655, 0.625, 0.955, 0.255, 1.635, 0.860, 2.375
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The instrument was shifted after the fourth and the eighth readings. The first reading was taken on a benchmark whose R.L. is 550.605 meters, rule out a page of a level field book and enter the above readings. Calculate the reduced levels of the stations by the rise and fall method and apply the usual checks. (10 Marks)

OR

- 8 a. Define leveling, list out the errors in leveling. (06 Marks)
- b. Two points A and B are 1530m apart across a wide river. The following reciprocal levels are taken with one level,

Levels at	Readings on	
	A	B
A	2.165	3.810
B	0.910	2.355

The error in the collimation adjustments of the level is -0.004m in 100m. Calculate the true difference of level between A and B and the refraction. (10 Marks)

Module-5

- 9 a. What is meant by planimeter constant and enumerate the adjustments of planimeter. (06 Marks)
- b. Determine the area in hectares between the line AB and a meandering stream for offsets taken at a regular interval of 20m along the line AB. Use both the trapezoidal rule and Simpson's rule. (10 Marks)

Point	A								B
Distance (m)	0	20	40	60	80	100	120	140	160
Offset length (m)	23	40	42	30	32	60	10	14	22

OR

- 10 a. Define the term contour, explain with neat sketches, for the characteristics of contours. (08 Marks)
- b. Write a note on:
- Interpolations of contours
 - Contour Gradient. (08 Marks)

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Third Semester B.E. Degree Examination, Jan./Feb. 2021 Strength of Materials

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. State and explain Elastic constants. (04 Marks)
 b. A bar of 20mm is tested in tension. It is observed that when a load of 40kN is applied, the extension measured over a gauge length of 200mm is 0.12mm and contraction in diameter is 0.0036mm. Find Poisson's ratio and elastic constants E, C, K. (12 Marks)

OR

- 2 a. Define temperature stresses and state its importance. (06 Marks)
 b. A composite bar is rigidly fitted at the supports A and B as shown in the Fig.Q.2(b). Determine the reactions at the supports when temperature rises by 20°C. Take $E_a = 70 \text{ GN/m}^2$, $E_s = 200 \text{ GN/m}^2$, $\alpha_a = 11 \times 10^{-6}/^\circ\text{C}$ and $\alpha_s = 12 \times 10^{-6}/^\circ\text{C}$. (10 Marks)

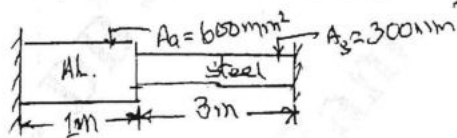


Fig.Q.2(b)

Module-2

- 3 a. Define principal planes and principal stresses. (04 Marks)
 b. Stresses acting at a point in a two dimensional stress system shown in the Fig.Q.3(b), find:
 i) Normal and shear stresses on the inclined plane
 ii) Principal stresses and their planes
 iii) Maximum shear stresses and their planes.

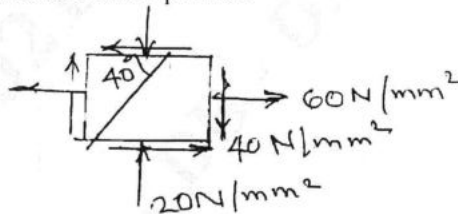


Fig.Q.3(b)

(12 Marks)

OR

- 4 a. Derive expressions for hoop stress and longitudinal stress in a thin cylinder. (06 Marks)
 b. A cylindrical thin shell 800mm diameter and 3m long is having 10mm metal thickness. The shell is subjected to an internal pressure of 2.5N/mm². Determine:
 i) Change in diameter
 ii) Change in length
 iii) Change in volume
 Take $E = 2 \times 10^5 \text{ N/mm}^2$ $\mu = 0.3$ (10 Marks)

Module-3

- 5 a. Derive the relationship between intensity of load, shear force and bending moment. (06 Marks)
- b. Draw shear force and bending moment diagrams for the beam shown in the Fig.Q.5(b).

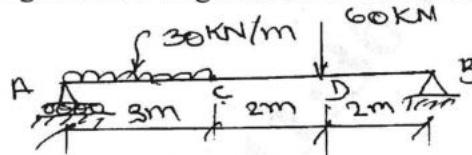


Fig.Q.5(b)

(10 Marks)

OR

- 6 a. Explain:
- Sagging bending moment
 - Hogging bending moment
 - Point of contra flexure.
- b. Draw shear force and bending moment diagrams for the beam shown in the Fig.Q.6(b). Locate the points of contra flexure. (10 Marks)

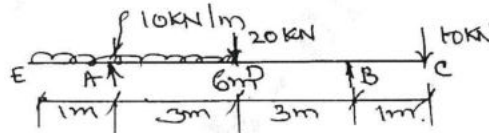


Fig.Q.6(b)

Module-4

- 7 a. What are assumptions made in bending theory? (04 Marks)
- b. Derive the bending equation $\frac{M}{I} = \frac{\sigma}{y} = \frac{E}{R}$ with usual notations. (06 Marks)
- c. Prove that maximum shear stress is 1.5 times the average shear stress in rectangular section. (06 Marks)

OR

- 8 a. What is effective length of column? How it is related with end conditions of column and explain with neat sketches. (08 Marks)
- b. A hollow cast iron column whose outside diameter is 200mm and has a thickness of 20mm, 4.5m long and is fixed at both ends. Evaluate Rankine's crippling load using $f_c = 550\text{N/mm}^2$. Take Rankines constant $\frac{1}{1600}$. (08 Marks)

Module-5

- 9 a. Derive the Torsion equation $\frac{I}{J} = \frac{\tau}{R} = \frac{C\theta}{L}$ with usual notation. (06 Marks)
- b. A solid circular shaft is to be designed to transmit 440kW power at 280rpm. If the maximum shear stress is not to exceed 40N/mm^2 and the angle of twist is not to exceed 1° per meter length, determine the diameter of the shaft. Take modulus of rigidity 84kN/mm^2 . (10 Marks)

OR

- 10 a. Explain: i) Maximum principal stress theory ii) Maximum shear stress theory. (06 Marks)
- b. A bolt is required to resist an axial tension of 25kN and a transverse shear of 20kN. Find the size of the bolt by using i) Maximum principal stress theory ii) Maximum shear stress theory $\sigma_c = 300\text{N/mm}^2$, F.S = 3 (10 Marks)

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15CV33

Third Semester B.E. Degree Examination, Jan./Feb. 2021 Fluid Mechanics

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Define the following with units:
 i) Mass Density ii) Specific gravity iii) Dynamic viscosity iv) Surface tension. (06 Marks)
- b. Derive an expression for capillary rise in a liquid in the form $h = \frac{4\sigma}{\rho g d}$ with usual notations. (04 Marks)
- c. If the velocity profile of a fluid over a plate is a parabolic with the vertex 20cm from the plate, where the velocity is 120cm/sec. Calculate the velocity gradients and shear stress at a distance of zero and 10cm from the plate assuming the viscosity of the fluid as 0.85 NS/m^2 . (06 Marks)

OR

- 2 a. State and prove Pascal's law. (06 Marks)
- b. Explain the working of a Bourdan's pressure gauge with a sketch. (04 Marks)
- c. A single column manometer is connected to a pipe containing a liquid of specific gravity 0.9 as shown in Fig.Q.2(c). Find the pressure in the pipe if the area of the reservoir is 100 times the area of the tube for the manometer reading shown in Fig.Q.2(c). The specific gravity of heavier liquid is 13.6. (06 Marks)

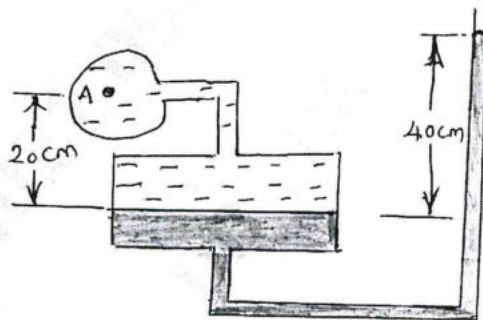


Fig.Q.2(c)

Module-2

- 3 a. Derive an expression for total pressure and centre of pressure on a vertically immersed plane surface. (08 Marks)
- b. The stream function for a two dimensional flow is given by $\psi = 2xy$. Determine the velocity at point P(2, 3). Also find the velocity potential. (06 Marks)
- c. What is flow net? Mention two uses of flow nets. (02 Marks)

OR

- 4 a. A rectangular plane surface 1m wide and 3m deep lies in water in such a way that its plane makes an angle of 30° with the free surface of water. Determine the total pressure and the depth of centre of pressure when the upper edge of the plate is 2m below the free surface. (06 Marks)
- b. Explain:
- Steady and unsteady flow
 - Rotational and irrotational flow
 - Laminar and turbulent flow. (06 Marks)
- c. The following case represents the two velocity components. Determine the third component of velocity such that they satisfy continuity equation - $v = 2y^2$, $w = 2xyz$. (04 Marks)

Module-3

- 5 a. Define momentum equation and give its applications. (03 Marks)
- b. Derive the Bernoulli's equation starting from Euler's equation of motion with a neat sketch. (06 Marks)
- c. A pipe of diameter 400mm carries water at a velocity of 20m/s. The pressures at the points E and F are given as 29N/cm^2 and 22N/cm^2 respectively while the datum head at E and F are 18m and 20m. Find the loss of head between E and F. (07 Marks)

OR

- 6 a. Derive an expression for discharge through venturimeter. (05 Marks)
- b. Water flows at the rate of $0.147\text{m}^3/\text{s}$ through a 150mm diameter orifice inserted in a 300mm diameter pipe. If the pressure gauges fitted upstream and downstream of the orifice plate have shown readings of 176.58kN/m^2 and 88.29kN/m^2 respectively, find the coefficient of discharge 'C' of the orifice meter. (05 Marks)
- c. A 45° reducing bend is connected in a pipe line, the diameter at the inlet and outlet of the bend being 600mm and 300mm respectively. Determine the force exerted by water on the bend if the intensity of pressure at inlet to bend is $8.829 \times 10^4\text{N/m}^2$ and rate of flow of water is 600 litre/s. (06 Marks)

Module-4

- 7 a. Define the hydraulic coefficients (C_c , C_d , C_v) for an orifice and obtain a relation between them. (04 Marks)
- b. Show that the side slopes in a Cipolletti notch is $\tan \theta/2 = 1/4$, to reduce end contractions. (07 Marks)
- c. Mention two advantages of triangular notch over rectangular notch. Find the discharge over a triangular notch of angle 60° when the head over the V-notch is 0.3m. Assume $C_d = 0.6$. (05 Marks)

OR

- 8 a. Explain how do you classify the mouth piece and show that discharge for Borda's mouth piece running free, $Q = 0.5a \sqrt{2g} \bar{h}$ with usual notations. (06 Marks)
- b. Explain ventilation of Weir's. (04 Marks)
- c. A broad crested weir of 50m length has 50cm height of water above its crest. Find the maximum discharge i) neglecting velocity of approach ii) Considering velocity of approach, when the channel has a cross sectional area of 50m^2 on the upstream side. (06 Marks)

Module-5

- 9 a. Derive Darcy Weisbach expression for the loss of head due to friction in pipes. (06 Marks)
 b. Three pipes of lengths 1000m, 800m and 500m and diameters 500mm, 400mm and 300mm respectively are connected in series. These pipes are to be replaced by a single pipe of length 2300m. Find the diameter of the single pipe. (04 Marks)
 c. At a sudden enlargement of water main from 240mm to 480mm diameter, the hydraulic gradient rises by 10mm. Determine the rate of flow. (06 Marks)

OR

- 10 a. Explain the terms hydraulic gradient and total energy line. (04 Marks)
 b. Derive the expression for pressure rise due to sudden closure of the valve when the pipe is rigid. (04 Marks)
 c. For a pipe network shown in Fig.Q.10(c), determine the flow in each pipe. The value of 'n' may be assumed as 2.0. (08 Marks)

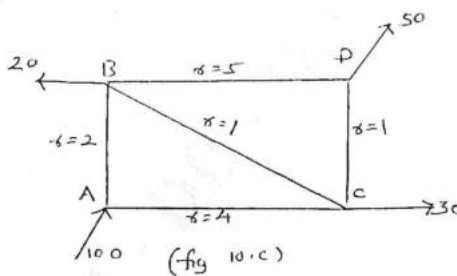


Fig.Q.10(c)

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17CV/CT32

Third Semester B.E. Degree Examination, Jan./Feb. 2021 Strength of Materials

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Define: (i) Young's modulus (ii) Bulk modulus (iii) Poisson's ratio. Derive a relationship between them. (10 Marks)
- b. Two solid cylindrical rods are connected and loaded as shown in Fig.Q1(b). Determine:
(i) Total deformation (ii) Deformation at point B. $E_s = 200 \text{ GPa}$, $E_b = 100 \text{ GPa}$.

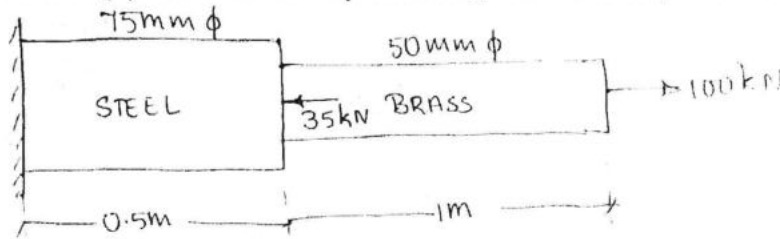


Fig.Q1(b)

(10 Marks)

OR

- 2 a. A compound bar made of steel plate 60 mm wide and 10 mm thick to which a copper plate 60 mm wide and 5 mm thick are rigidly connected to each other. The length of the bar is 0.7 m. If the temperature is raised by 80°C . Determine the stress in each metal and the change in length.
 $E_s = 200 \text{ GPa}$, $\alpha_s = 12 \times 10^{-6}/^\circ\text{C}$; $E_{cu} = 100 \text{ GPa}$, $\alpha_{cu} = 17 \times 10^{-6}/^\circ\text{C}$ (12 Marks)
- b. Derive an expression for extension of the bar due to its self weight only having area 'A' and length L suspended from its top. (04 Marks)
- c. Write a note on thermal stresses. (04 Marks)

Module-2

- 3 a. At a certain point in a strained material the stress condition shown in Fig.Q3(a) exists. Find:
(i) The normal and shear stress on the inclined plane AB
(ii) Principal stresses and principal planes
(iii) Maximum shear stresses and their planes

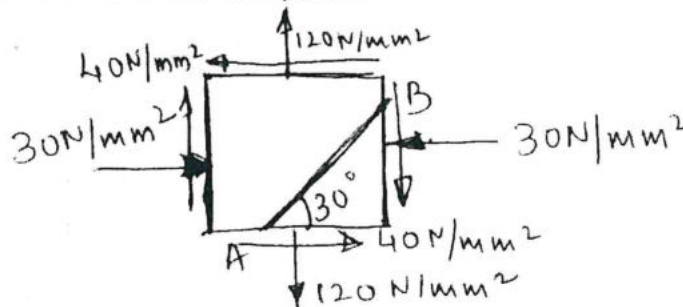


Fig.Q3(a)

(12 Marks)

- b. Derive an expressions for volumetric strain in case of a thin cylindrical shell of diameter 'd' subjected to internal pressure 'p'. (05 Marks)
- c. Define: (i) Principal stresses (ii) Principal planes (03 Marks)

OR

- 4 a. A cylindrical shell is 3m long 1m internal diameter and is subjected to an internal pressure of 1 N/mm^2 . If thickness of the shell is 12mm, find the circumferential stress and longitudinal stress. Also find maximum shear stress and the changes in the dimensions of the shell. Take $E = 200 \text{ kN/mm}^2$ and $\mu = 0.3$. (10 Marks)
- b. A thick metallic cylindrical shell of 150 mm, internal diameter is required to withstand an internal pressure of 8 MPa. Find the necessary thickness of cylinder, if permissible stress of the section is 20 MPa. (10 Marks)

Module-3

- 5 a. Derive relation between shear force, bending moment and load. (06 Marks)
- b. Calculate SF and BM at salient points and draw SFD and BMD for the beam shown in Fig.Q5(b).

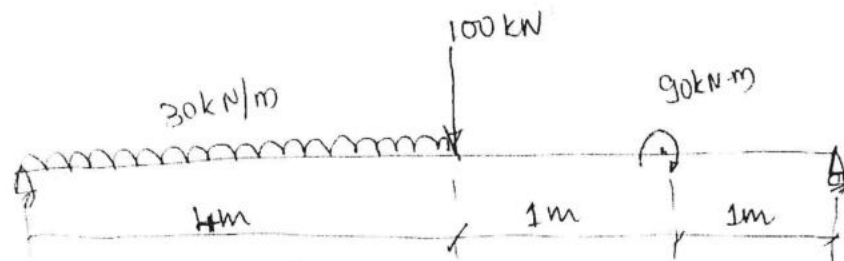


Fig.Q5(b)

(14 Marks)

OR

- 6 a. Define: (i) Bending moment (ii) Shear force (04 Marks)
- b. Draw SFD and BMD for beam shown in Fig.Q6(b).

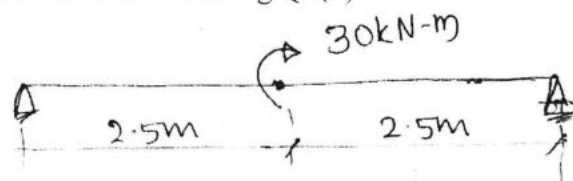


Fig.Q6(b)

(06 Marks)

- c. Draw SFD and BMD for simply supported beam of length L with point load ' P ' placed at a distance ' a ' from right support and ' b ' from left support. (10 Marks)

Module-4

- 7 a. Define: (i) Torsional strength (ii) Torsional stiffness (iii) Torsional rigidity (06 Marks)
- b. A shaft transmits 300 KW power at 120 rpm. Determine:
 (i) The necessary diameter of solid circular shaft.
 (ii) The necessary outer diameter of hollow circular section such that the inner diameter being $2/3$ of the outer diameter. Take allowable shear stress as 70 N/mm^2 . (14 Marks)

OR

- 8 Write short notes on any four:
 a. Maximum principal stress theory
 b. Maximum shear stress theory
 c. Maximum principal strain theory
 d. Maximum strain energy theory
 e. Maximum shear strain energy theory (20 Marks)

Module-5

- 9 a. Show that for a rectangular cross section maximum shear stress is 1.5 times average shear stress. (06 Marks)
- b. A simply supported beam of span 6 m has a cross section as shown in Fig.Q9(b). It carries 2 point loads each of 30 kN at a distance of 2m from each support. Calculate the bending stress and shear stress for maximum values of bending moment and shear force respectively. Draw neat diagram of bending stress and shear stress distribution across the cross section.

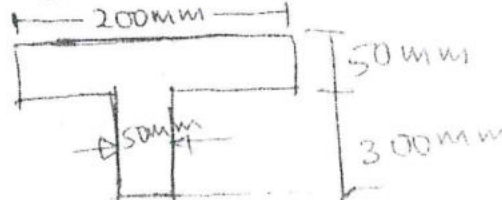


Fig.Q9(b)

(14 Marks)

OR

- 10 a. Derive an expression for Euler's buckling load for long column with one end fixed and other end free. (08 Marks)
- b. The cross section of a column is a hollow rectangular section with its external dimensions 200 mm × 150 mm. The internal dimensions are 150 × 100 mm. The column is 5m long and fixed at both ends. If $E = 120 \text{ GPa}$, calculate the critical load using Euler's formula. Compare the above load with the value obtained from Rankine's formula. The permissible compressive stress is 500 N/mm^2 . The Rankine's constant is $1/6000$. (12 Marks)

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Third Semester B.E. Degree Examination, Jan./Feb. 2021 Fluid Mechanics

Time: 3 hrs.

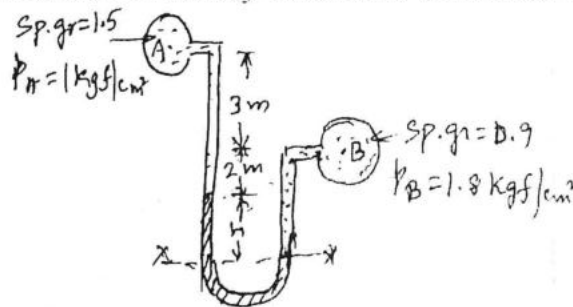
Max. Marks: 100

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

Module-1

- 1 a. Define the following fluid properties. Also mention their units.
 i) Specific Gravity ii) Viscosity iii) Mass Density iv) Specific Volume. (06 Marks)
- b. Define capillarity and derive expressions for capillary rise and capillary fall. (06 Marks)
- c. A differential manometer is connected at the two points A and B of two pipes as shown in Fig.Q.1(c). The pipe A contains a liquid of specific gravity of 1.5, while pipe B contains a liquid of specific gravity of 0.9. The pressures 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. (08 Marks)

Fig.Q.1(c)



OR

- 2 a. With neat sketch, explain Bourdon tube pressure gauge. (06 Marks)
- b. State and prove hydrostatic law of pressure. (06 Marks)
- c. The dynamic viscosity of an oil used for lubrication between a shaft and sleeve is $0.6 \text{ N}\cdot\text{sec/m}^2$. The shaft is of diameter 0.4m and rotates at 190rpm. Calculate the power lost in the bearing for a sleeve length of 90mm. The thickness of the oil film is 1.5mm. (08 Marks)

Module-2

- 3 a. Define total pressure and centre of pressure. Also derive expressions for total pressure and centre of pressure for a plane surface submerged vertically in a liquid. (08 Marks)
- b. Distinguish between:
 i) Laminar Flow and turbulent flow
 ii) Uniform flow and non uniform flow
 iii) Steady flow and unsteady flow. (06 Marks)
- c. Determine the total pressure and centre of pressure on an isosceles triangular plate of base 4m and altitude 4m 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)

OR

- 4 a. Derive the three dimensional continuity equation in the Cartesian coordinates. (06 Marks)
- b. The velocity vector in a fluid flow is given as $V = 4x^2i - 10x^2yj + 2tk$. Find the velocity and acceleration of a fluid particle at (2, 1, 3) at time $t=1$. (08 Marks)
- c. Determine the total pressure on a circular plate of diameter 1.5m which is placed vertically in water in such a way that the centre of the plate is 3m below the free surface of water. Find the position of centre of pressure also. (06 Marks)

Module-3

- 5 a. Define free vortex flow and forced vortex flow. Also mention two examples for each. (04 Marks)
- b. Derive Euler's equation of motion along a stream line and obtain Bernoulli's equation from Euler's equation. Also mention the assumptions made in derivation. (10 Marks)
- c. A 30cm × 15cm venturimeter is inserted on a vertical pipe carrying water, flowing in upward direction. A differential mercury manometer connected to the inlet and throat gives a reading of 20cm. Find the discharge. Take $C_d = 0.98$. (06 Marks)

OR

- 6 a. Derive an expression for discharge through a venturimeter. (06 Marks)
- b. List the various instruments that works on the Bernoulli's principle. Also explain how pilot tube is used to measure velocity of flow. (06 Marks)
- c. A 300mm diameter pipe carries water under a head of 20m with a velocity of 3.5m/s. If the axis of the pipe turns through 45° , find the magnitude and direction of the resultant force on the bend. (08 Marks)

Module-4

- 7 a. Give a detailed note on classification of orifices mouth pieces. (06 Marks)
- b. Derive an expression for discharge through a Borda's mouth piece running free. (06 Marks)
- c. Water flows over a rectangular weir 1m wide at a depth of 150mm and afterwards passes through a triangular right angled weir. Taking C_d for the rectangular weir and triangular weir as 0.62 and 0.59 respectively. Find the depth over triangular weir. (08 Marks)

OR

- 8 a. Give a detailed note on classification of weirs. Derive an expression for discharge through a triangular notch. (10 Marks)
- b. Define hydraulic coefficients. Also mention the general values of hydraulic coefficients. (06 Marks)
- c. A jet of water, issuing from a sharp edged vertical orifice under a constant head of 10cm at a certain point, has the horizontal and vertical coordinates measured from the vena-contracta as 20cm and 10.5cm respectively. Find the value of C_v and also value of C_c if $C_d = 0.6$. (04 Marks)

Module-5

- 9 a. Give a brief note on loss of energy in pipes. Also derive Darcy's Weisbach equation for loss of energy due to friction. (10 Marks)
- b. Give a brief note on water hammer in pipes. (04 Marks)
- c. Three pipes of lengths 800m, 500m and 400m and diameters 500mm, 400mm and 300mm respectively are connected in series. These pipes are to be replaced by a single pipe of length 1700m. Find the diameter of the single pipe. (06 Marks)

OR

- 10 a. Derive an expression for the loss of head due to sudden enlargement of pipe section. (08 Marks)
- b. The water is flowing with a velocity of 1.5m/s in a pipe of length 2500m and of diameter 500mm. At the end of the pipe, a valve is provided. Find the rise in pressure if the valve is closed in 25 seconds. Take the value of $C = 1460\text{m/s}$. (06 Marks)
- c. An oil of specific gravity 0.7 is flowing through a pipe of diameter 300mm at the rate of 500l/s. Find the head lost due to friction and power required to maintain the flow for a length of 1000m. Take $\gamma = 0.29$ stokes. (06 Marks)

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17CV34

Third Semester B.E. Degree Examination, Jan./Feb. 2021 Basic Surveying

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Explain classification of Surveying in detail. (10 Marks)
b. Explain principles of Surveying in detail. (06 Marks)
c. Distinguish between Plane and Geodetic survey. (04 Marks)

OR

- 2 a. Discuss accessories required for horizontal measurements in detail. (10 Marks)
b. To measure a base line, a steel tape 30m long standardized at 15°C with a pull of 100N was used. Find the correction per tape length if the temperature at the time of measurement was 20°C and the pull exerted was 160 N. If the length of 250m is measured on a slope of 1 in 4, find the horizontal length. Take $E = 2.1 \times 10^5 \text{ N/mm}^2$; $\alpha = 11.2 \times 10^{-6}/^\circ\text{C}$ and cross-sectional area of tape = 0.08 cm². (10 Marks)

Module-2

- 3 a. Define Local attraction? How it detected? Explain. (06 Marks)
b. Distinguish between Prismatic compass and Surveyor's compass. (04 Marks)
c. Determine the bearings of sides of regular pentagon of sides 5m, if the bearing of the first line AB is 80°. (10 Marks)

OR

- 4 a. Explain the temporary adjustment of transit theodolite in detail. (10 Marks)
b. Discuss the methods of Repetition and reiteration for measuring horizontal angle in detail with neat sketch. (10 Marks)

Module-3

- 5 a. What is meant by balancing of Traverse? Explain the Bowditch method of adjusting the traverse. (10 Marks)
b. In a closed traverse ABCDE, the length and bearings of EA has been omitted. Compute the length and bearing of the line EA.

Line	Length (m)	Bearing
AB	204	87° 30'
BC	226	20° 20'
CD	187	280° 0'
DE	192	210° 3'
EA	?	?

(10 Marks)

OR

- 6 a. Derive the distance and elevation formulae for stadia tachometry, when the staff is held vertical and the line of sight being inclined upwards and downwards with neat sketch. (10 Marks)

- b. A tacheometer, fitted with an anallactic lens and having the multiplying constant 100, was setup at station C to determine the gradient between two points A and B and the following observations were taken, keeping the staff vertical.

Staff at	Vertical angle	Stadia readings
A	+4° 20' 0"	1.300, 1.610, 1.920
B	+0° 10' 40"	1.100, 1.410, 1.720

(10 Marks)

Module-4

- 7 a. The following readings were observed successively with a levelling instrument. The instrument was shifted after 5th and 11th readings.
0.585, 1.010, 1.735, 3.295, 3.775, 0.350, 1.300, 1.795, 2.575, 3.375, 3.895, 1.735, 0.635 and 1.605m.
Draw up a page of level book and determine the RL of various points if RL of first point is 136.440m. Use Rise and Fall method. (10 Marks)
- b. Enumerate the errors in leveling in detail. (10 Marks)

OR

- 8 a. Derive an equation to determine the difference in elevation of the instrument station and top of a Chimney using Double plane method. (10 Marks)
- b. The following observations were made on a hill top to ascertain its elevation. The height of the target F was 5m. The instrument stations were 100m apart and were in line with F.

Instrument Station	Staff reading on BM	Vertical angle	Remarks
01	2.550	18° 6'	RL of BM
02	1.670	28° 42'	= 345.580 m

(10 Marks)

Module-5

- 9 a. A railway embankment of formation width 10m is to be built with side slope of 1 vertical to 2 horizontal. The ground is horizontal in the direction transverse to the centre line. Length of embankment is 150m. The centre height of embankment at 25m intervals are as given below:
1.8, 3.3, 3.6, 4.2, 2.9, 2.6, 2.2m
Calculate the volume of earth filling. (10 Marks)
- b. Explain the method of computation of volume by the
(i) Trapezoidal rule (ii) Prismoidal rule (10 Marks)

OR

- 10 a. Explain characteristics of contours with neat sketches. (10 Marks)
- b. Discuss the uses of contour maps for various Civil engineering works with sketches. (10 Marks)

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18CV32

Third Semester B.E. Degree Examination, Jan./Feb. 2021 Strength of Materials

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Explain longitudinal strain and lateral strain. (04 Marks)
b. State and illustrate Saint Venant's principle. (06 Marks)
c. A tension test was conducted on mild steel bar and the following data was obtained from the test:
Diameter of the bar = 18mm
Gauge length of the bar = 82mm
Load at proportional limit = 75KN
Extension at a load of 62KN = 0.113mm
Load at failure = 82KN
Final gauge length of the bar = 106mm
Diameter of the bar at failure = 14mm
Determine the Young's modulus, proportional limit, true breaking stress, %elongation and percentage reduction in cross sectional area. (10 Marks)

OR

- 2 a. What are the elastic constants and explain them briefly. (06 Marks)
b. Obtain expression for temperature stress in a bar of uniform cross section when expansion or contraction is prevented partially. (04 Marks)
c. A weight of 390KN is supported by a short column of 250mm square in section. The column is reinforced with 8 steel bars of cross sectional area 2500mm². Find the stresses in steel and concrete if $E_s = 15E_c$.
If stress in concrete must not exceed 4.5MN/m², what area of steel is required in order that column may support a load of 480KN. (10 Marks)

Module-2

- 3 a. Derive Lamé's equation for the radial and hoop stress for thick cylinder subjected to internal and external fluid pressure. (08 Marks)
b. A 2-dimensional element has the tensile stresses of 600MN/m² and compressive stress of 400MN/m² acting on two mutually perpendicular planes and two equal shear stresses of 200MN/m² on their planes. Determine
i) Resultant stress on a plane inclined at 30° wrt x-axis.
ii) The magnitude and direction of principal stresses.
iii) Magnitude and direction of maximum shear stress. (12 Marks)

OR

- 4 a. Obtain expression for volumetric strain in thin cylinder subjected to internal pressure in the form of $e_v = \frac{pd}{2tE} \left[\frac{5}{2} - \frac{2}{m} \right]$. (08 Marks)
b. A cast iron pipe has 200mm internal diameter and 50mm metal thickness and carries water under a pressure of 5N/mm². Calculate the maximum and minimum intensities of circumferential stresses and sketch the distribution of circumferential stress intensity and the intensity of radial pressure across the section. (12 Marks)

Module-3

- 5 a. Define shear force, bending moment and point of contraflexure. Explain how to calculate them? (06 Marks)
- b. Develop shear force diagram and bending moment diagrams for the beam loaded shown in Fig. Q5(b) marking the values at salient points. Determine the position and magnitude of maximum bending moment.

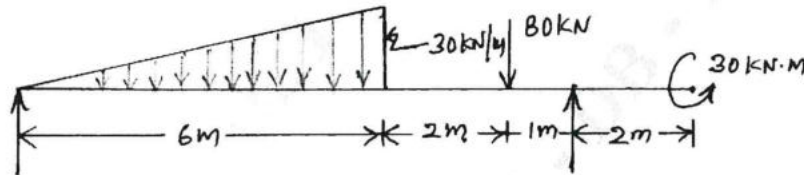


Fig. Q5(b)

(14 Marks)

OR

- 6 a. Obtain the relationship between udl, shear force and bending moment. (06 Marks)
- b. Construct SFD and BMD for the beam loaded shown in Fig. Q6(b). Also locate the point of contraflexure.

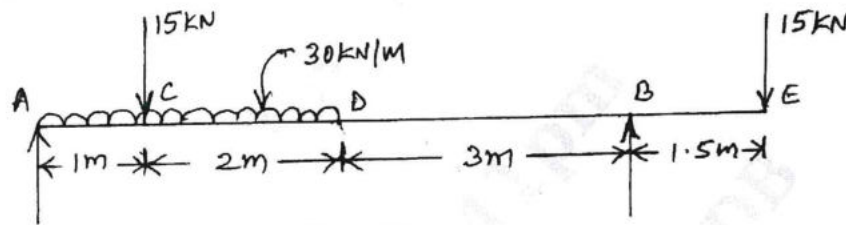


Fig. Q6(b)

(14 Marks)

Module-4

- 7 a. Derive torsional equation with usual notations. (06 Marks)
- b. A T-section of flange 120mm×12mm and overall depth 200mm with 12mm web thickness is loaded such that at a section it has a bending moment of 20kN.m and shear force of 120kN. Sketch the bending and shear stress distribution diagram marking the salient values. (14 Marks)

OR

- 8 a. Derive Bernoulli-Euler bending equation with usual notations. (08 Marks)
- b. A solid circular shaft has to transmit power of 1000kW at 120rpm. Find the diameter of the shaft if the shear stress of the material is not to exceed 80N/mm^2 . The maximum torque is 1.25 times the mean torque. What percentage saving in material could be obtained if the shaft is replaced by a hollow one whose internal diameter is 0.6 times the external diameter? The length of the shaft, material and maximum shear stress being same. (12 Marks)

Module-5

- 9 a. Define slope, deflection and elastic curve. Explain Macaulay's method of determining slope and deflection. (10 Marks)
- b. Compare the crippling loads given by Euler's and Rankine's formula for a tubular steel column 2.5m long having outer and inner diameter as 40mm and 30mm respectively. The column is loaded through pin joints at the ends. Take permissible compressive stress as 320N/mm^2 , Rankine constant as $\frac{1}{7500}$ and $E=210\text{GPa}$. For what length of the column of their cross section, does the Euler's formula cease to apply? (10 Marks)

OR

- 10 a. Differentiate between short and long column and what are the limitations of Euler's theory. (06 Marks)
- b. Calculate slope at A and deflection at D for the overhanging beam shown in Fig. Q10(b). Take $E = 200\text{GPa}$ and $I = 50 \times 10^6 \text{mm}^4$. (14 Marks)

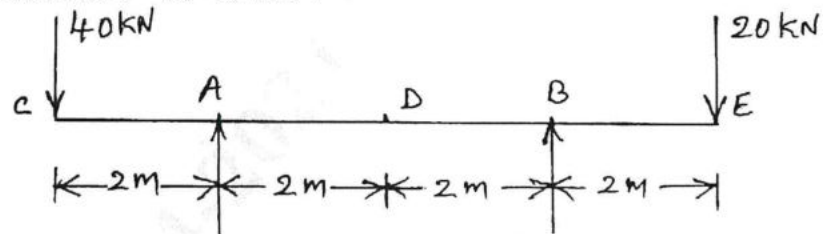


Fig. Q10(b).

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18CV33

Third Semester B.E. Degree Examination, Jan./Feb. 2021 Fluid Mechanics

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Define the following and mention their units:
(i) Capillarity (ii) Surface tension (iii) Viscosity (06 Marks)
- b. Derive an expression for capillary rise/fall of fluid in a tube of small diameter with sketches. (06 Marks)
- c. A 100 mm diameter cylinder rotates concentrically inside a 105 mm diameter fixed cylinder. The length of both the cylinders is 250 mm. find the viscosity of the liquid that fills the space between the cylinders, if a torque of 1.0 N-m is required to maintain a rotating speed of 120 rpm. (08 Marks)

OR

- 2 a. State and prove Pascal's law for the intensity of pressure at a point in a static fluid. (06 Marks)
- b. Derive an expression for difference in pressure between two points using a U-tube differential manometer. (08 Marks)
- c. Determine the pressure intensity at the bottom of a tank filled with an oil of specific gravity 0.7 to a height of 10 m. (06 Marks)

Module-2

- 3 a. Define: (i) Total pressure (ii) Center of pressure (04 Marks)
- b. Derive an expression for total pressure and center of pressure for an inclined plane surface submerged in a liquid. (08 Marks)
- c. A 1200 mm × 1800 mm size rectangular plate is immersed in water with an inclination of 30° to the horizontal. The 1200 mm side of the plate is kept horizontal at a depth of 30 m below the water surface. Compute the total pressure on the surface and the position of center of pressure. (08 Marks)

OR

- 4 a. Differentiate between:
(i) Uniform and non-uniform flow
(ii) Steady and unsteady flow (04 Marks)
- b. Derive continuity equation for a three dimensional flow in Cartesian coordinates. (08 Marks)
- c. Evaluate stream function ψ and compute velocity of flow, V , for a two-dimensional flow field given by, $u = 4x^3$ and $v = -12x^2y$ at point (1, 2). Assume $\psi = 0$ at point (0, 0). (08 Marks)

Module-3

- 5 a. State Impulse Momentum principle. Give fields where it is applied. (04 Marks)
- b. Derive an expression for force exerted by a fluid on a pipe bend. (08 Marks)
- c. A pipe of 300 mm diameter, carrying 15000 litres per minute of water is bent by 135°. Find the magnitude and direction of resultant force exerted by the flowing fluid on the bend if the pressure of the flowing water is 39.24 N/cm². (08 Marks)

OR

- 6 a. What is venture effect? Derive an expression for discharge through a venturimeter. (08 Marks)
 b. A pitot tube fixed in a pipe of 300 mm diameter is used to measure the velocity and rate of flow. If the stagnation and static pressure heads are 6.0 m and 5.0 m respectively, compute the velocity and rate of flow. Assume $C_v = 0.98$ for the pitot tube. (06 Marks)
 c. A 20 cm \times 10 cm venturimeter is used to measure the flow of water in a horizontal pipe. The pressure at the inlet of venturimeter is 17.658 N/cm^2 and the vacuum pressure at the throat is 30 cm of mercury. Find the discharge of water through the venturimeter assuming $C_d = 0.98$. (06 Marks)

Module-4

- 7 a. Define hydraulic coefficients for an orifice and give the relation between them. (06 Marks)
 b. Give classification of mouth pieces with suitable sketches. (06 Marks)
 c. A jet of water issuing from an orifice 25 mm diameter under a constant head of 1.50 m, falls 0.915 m vertically before it strikes the ground at a horizontal distance of 2.288 m from vena-contracta. The discharge is found to be 102 litres per minute. Calculate the hydraulic coefficients of the orifice. (08 Marks)

OR

- 8 a. Enumerate advantages of triangular notches over rectangular notches. (04 Marks)
 b. Derive the expression for discharge through a triangular notch. (08 Marks)
 c. A river 60 m wide has vertical banks and 1.50 m depth of flow. The velocity of flow is 1.20 m/s. A broad crested weir 2.40 m high is constructed across the river. Find the head on the weir crest considering the velocity of approach. Assume $C_d = 0.90$. (08 Marks)

Module-5

- 9 a. Derive Darcy-Weisbach equation for head loss due to friction in a pipe. (08 Marks)
 b. List 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 litres per person from a source 3 km away. If half the daily requirement needs to be pumped in 8 hours against a friction head of 18 m, find the size of the main pipe supplying water. Assume friction factor as 0.028. (08 Marks)

OR

- 10 a. What is an equivalent pipe? Derive an expression for diameter of an equivalent pipe. (08 Marks)
 b. Explain phenomenon of water hammer in pipes. (04 Marks)
 c. Water is flowing in a pipe of 150 mm diameter with a velocity of 2.5 m/s, when it is suddenly brought to rest by closing the valve. Find the pressure rise in the pipe assuming it to be elastic with $E = 206 \text{ GN/m}^2$ and Poisson's ration = 0.25. The bulk modulus of water, $K = 206 \text{ GN/m}^2$. Thickness of pipe wall is 5 mm. (08 Marks)

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CBCS SCHEME

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18CV34

Third Semester B.E. Degree Examination, Jan./Feb. 2021 Building Materials and Construction

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. What are the factors that cause deterioration of stones and explain the methods commonly adopted to preserve the stones. (08 Marks)
- b. Briefly explain the various field and laboratory tests conducted on bricks to find its suitability for construction. (08 Marks)
- c. What are the advantages of cement concrete blocks? (04 Marks)

OR

- 2 a. Lists the tests conducted on fine aggregates and explain any one of them in detail. (08 Marks)
- b. Explain impact and abrasion tests conducted on coarse aggregates. (08 Marks)
- c. What are the characteristics of good timber used for construction? (04 Marks)

Module-2

- 3 a. What are the functions of a foundation? Mention the situations during which pile foundations are adopted. (08 Marks)
- b. Write a note on:
i) Spread footing ii) Strap footing (08 Marks)
- c. Write the advantages of cavity walls. (04 Marks)

OR

- 4 a. Sketch the elevation of a brick wall built in i) English bond ii) Flemish bond. Compare the merits and demerits of English bond and Flemish bond. (08 Marks)
- b. Write a note on classification of stone masonry. (08 Marks)
- c. Write a note on partitions walls. (04 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. With the help of a neat sketch explain
i) Paneled door ii) Collapsible door. (08 Marks)
- b. Write a note on
i) Bay window ii) Steel window (08 Marks)
- c. What are the guidelines to be followed while locating doors and windows? (04 Marks)

CBCS SCHEME

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18CV35

Third Semester B.E. Degree Examination, Jan./Feb. 2021 Basic Surveying

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Define surveying. Discuss the classification of surveying. (10 Marks)
b. What is ranging? Explain the indirect method for ranging with neat sketch. (08 Marks)
c. What is well conditioned triangle? (02 Marks)

OR

- 2 a. Write short notes on optical square and prism square. (06 Marks)
b. A big pond obstructs the chain line such that P and T are on the opposite sides of a pond and line PQ and PR were selected on the left hand side and Right hand side respectively. So that point Q, T and R were in straight line. Find length PT. Take PQ 150m, PR = 230m, QT = 75m, RT = 100m. (08 Marks)
c. Explain briefly chains on slopping ground by stepping method. (06 Marks)

Module-2

- 3 a. Differentiate between :
i) True meridian and magnetic meridian ii) Dip and declination iii) Agonic and isogonic lines. (06 Marks)
b. The following bearings were observed with compass. Calculate the interior angles and draw rough diagram.

Line	AB	BC	CD	DE	EA
Bearing	60°30'	122°0'	46°0'	205°30'	300°

- c. What is local attraction? How it is detected and eliminated? Also give the reason for it. (08 Marks)
(06 Marks)

OR

- 4 a. What is traversing? What are the different types of traversing? (04 Marks)
b. What is closing error? Explain the Bowditch rule of graphical adjustment with sketch. (08 Marks)
c. Following are the observed length and bearings of the lines of a closed traverse ABCDEA. The length and bearing of line EA emitted, calculate it.

Line	Length (m)	Bearings
AB	204	87°30'
BC	226	20°20'
CD	187	280°0'
DE	192	210°30'
EA	?	?

(08 Marks)

Module-3

- 5 a. Explain the following terms. i) Elevation ii) Benchmark iii) Datum iv) Mean sea level. (04 Marks)
- b. What do you understand by balancing of sight? With figure explain how the errors are eliminated. (06 Marks)
- c. The following is the page of a level book. Find out the missing reading(X) and complete the level book. Apply usual arithmetical check.

Sl.No.	BS	IS	FS	HI	RL	Remark
1	4.000			X	X	
2		X			195.935	
3	2.150		3.995	X	X	
4		2.415			195.240	BM
5		1.665			X	
6		X			200.770	
7	3.610		X	X	X	
8			1.715		196.985	

(10 Marks)

OR

- 6 a. Write short notes on : i) Curvature and Refraction error ii) Barometric leveling and fly leveling iii) Collimation error and hypsometry. (06 Marks)
- b. Describe the procedure for reciprocal leveling with neat sketch. (06 Marks)
- c. The following observations were taken in reciprocal leveling. Determine the R.L of B if that of A is 100.150m. Also calculate the collimation error if AB = 1000m.

Inst. Station	Staff reading	
	A	B
A	1.625	2.545
B	0.725	1.405

(08 Marks)

Module-4

- 7 a. Describe briefly radiation method and intersection method of plane tabling. (10 Marks)
- b. Define two point problem. Explain the graphical method of solution of two point problem with figure. (10 Marks)

OR

- 8 a. Write short notes on : i) Orientation of plane table ii) Triangle of error iii) Alidade. (06 Marks)
- b. Discuss the temporary adjustments of plane table. (06 Marks)
- c. What are the advantages and disadvantages of plane table? (08 Marks)

Module-5

- 9 a. What is contour? What are the uses of contour lines? (08 Marks)
- b. A road embankment is 11m wide at the formation level and has side slope 1 : 2(V : H). The ground level at every 80m along centre line are shown in table. The formation level at zero chainage is 123.0 and embankment having a rising gradient 1 : 100 calculate the volume of earthwork by trapezoidal and primordial rule.

Dist.	0	80	160	240	320
RL	120.8	122.5	123.4	123.8	124.5

(12 Marks)

OR

- 10 a. Define the following terms : i) Contour interval ii) Interpolation of contour iii) Horizontal equivalent v) Contour gradient. (04 Marks)
- b. What is planimeter? Explain the polar planimeter along with essential parts. (12 Marks)
- c. Determine the area of plan from following data. Needle point out side plan. Zero of dial passed index mark once in clockwise direction : Initial reading = 8.364
Final reading = 4.234. (04 Marks)

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Third Semester B.E. Degree Examination, Jan./Feb. 2021 Engineering Geology

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Discuss in brief different branches of Geology, which are related to Civil Engineering. (04 Marks)
b. Briefly explain the internal structure of the earth based on different unconformities and add a note on its composition. (08 Marks)
c. Explain the role of Geology in the field of Civil Engineering. (08 Marks)

OR

- 2 a. What is Mineral? Describe the following Physical properties of a Mineral.
i) FORM ii) Hardness iii) Fracture. (06 Marks)
b. Explain the primary structures in Sedimentary rocks, with neat sketches. (08 Marks)
c. Write a note on Soil profile. (06 Marks)

Module-2

- 3 a. What are Folds? How are they caused? Discuss the various types of folds in rock and influences on Civil Engineering. (15 Marks)
b. What is Normal Fault? Add a note on Horst and Graben, with neat sketches. (05 Marks)

OR

- 4 a. What is Weathering? Describe Physical and Mechanical weathering. (10 Marks)
b. Explain Railway ballast with examples. (05 Marks)
c. Write notes on causes of Landslides. (05 Marks)

Module-3

- 5 a. What is an Out Crop? Describe the terms strike and DIP, with a neat sketch. (08 Marks)
b. Explain Floods, causes and its control. (06 Marks)
c. Write a note on Tunneling through the fold axis of an Anticline. (06 Marks)

OR

- 6 a. Briefly explain Exogeneous and Endogeneous geological events. (06 Marks)
b. Describe the different drainage patterns of a River basin, with neat sketches. (08 Marks)
c. Briefly explain Extrusive and Intrusive forms of Igneous rocks. (06 Marks)

Module-4

- 7 a. Explain the Electrical resistivity method for exploration of ground water. (08 Marks)
b. Explain how the quality of ground water can be determined by SAR, RSC, GTH. (04 Marks)
c. Explain how Artificial recharge of ground water can be made. (08 Marks)

OR

- 8 a. Describe with a neat diagram, Vertical distribution of Ground water. (10 Marks)
b. Write a brief note on Land forms. (10 Marks)

Module-5

- 9 a. What is an Earth Quake? Describe the Tectonic causes of Earthquake and its effects. (08 Marks)
b. Explain Aquifer and its types. (06 Marks)
c. Write a note on Specific Yield and Specific Retention. (06 Marks)

OR

- 10 a. What is Remote Sensing? Write its application in Civil Engineering. (08 Marks)
b. What is GIS? Name the different components of GIS. (06 Marks)
c. Write an application on Global Positioning System (GPS) in Civil Engineering. (06 Marks)

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Third Semester B.E. Degree Examination, July/August 2021 Strength of Materials

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions.

- 1 a. Draw stress strain diagram for mild steel and explain in brief. (06 Marks)
 b. Define Poisson's Ratio and Modulus of Rigidity. (04 Marks)
 c. A bar of uniform cross-section 20mm diameter is subjected to a load as shown in Fig.Q.1(c). Find the total elongation of the bar and maximum stress in the bar. Given $E = 200\text{GPa}$. (10 Marks)

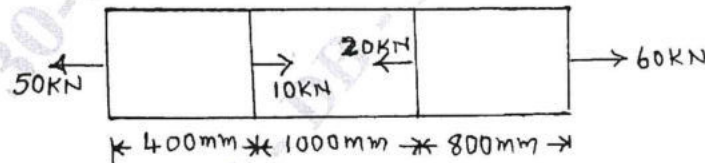


Fig.Q.1(c)

- 2 a. Derive an expression for the total extension of the tapered bar of circular cross section when it is subjected to an axial tensile load 'P'. (06 Marks)
 b. Derive the relation between Young's modulus (E) and modulus of rigidity (G) in the form $E = \frac{9KG}{3K + G}$. (06 Marks)
 c. A compound bar is made of central steel plate 50mm wide and 10mm thick to which copper plate of 50mm wide and 5mm thick are connected rigidly on each sides as shown in Fig.Q.2(c). The length of compound bar is 1000mm at room temperature. If the temperature is raised by 100°C determine stresses in each material and change in length of compound bar. Assume $E = 200\text{GPa}$, $E_c = 100\text{GPa}$, $\alpha_s = 12 \times 10^{-6}/^\circ\text{C}$ and $\alpha_c = 18 \times 10^{-6}/^\circ\text{C}$. (08 Marks)

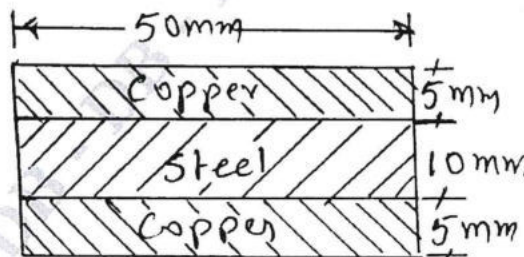


Fig.Q.2(c)

- 3 a. For thin cylinder subjected to internal pressure 'P' prove that the circumferential stress equal to $Pd/2t$ and longitudinal stress equal to $Pd/4t$ where d = Internal diameter, t = wall thickness. (06 Marks)
- b. What are principal stresses and principal planes? (04 Marks)
- c. An element in plane stress is subjected to stresses $P_1 = 120\text{N/mm}^2$ and $P_2 = 45\text{N/mm}^2$ and shear stress 30N/mm^2 as shown in Fig.Q.3(c). Determine the normal stress, shear stress, major principal stress, minor principal stress and maximum shear stress acting on an element rotated through an angle $\theta = 45^\circ$. (10 Marks)

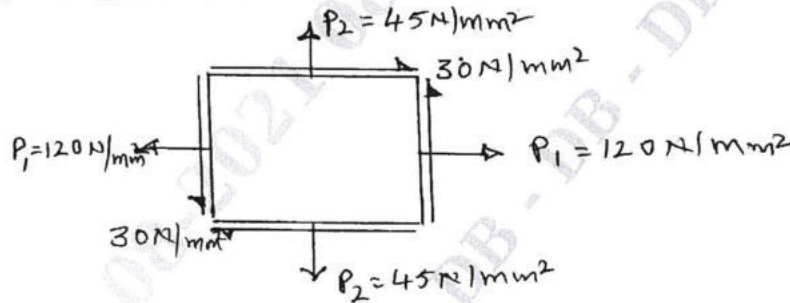


Fig.Q.3(c)

- 4 a. Explain the construction of Mohr's circle for compound stresses in two dimensional systems. (10 Marks)
- b. The external and internal radius of a thick cylinder is 300mm and 200mm respectively. The maximum stress permitted is 15.5N/mm^2 . The external pressure is 4N/mm^2 . Find the internal pressure. Plot the curves showing the hoop and radial stresses across the thickness. (10 Marks)
- 5 a. Explain:
 i) Sagging Bending moment
 ii) Hogging Bending moment
 iii) Point of contra flexure. (06 Marks)
- b. For the beam shown in Fig.Q.5(b) draw SFD and BMD, show the salient values on the figure. Locate the point of contra flexure if any. (14 Marks)

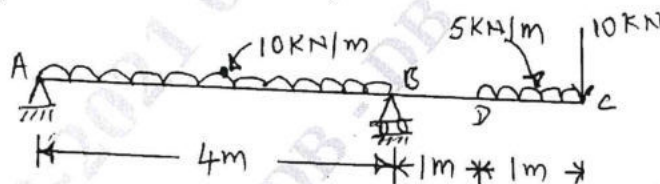


Fig.Q.5(b)

- 6 a. Derive the relation between load intensity shear force and bending moment. (06 Marks)
- b. Draw the shear force and bending moment diagram indicating principal values for an overhanging beam shown in Fig.Q.6(b). (14 Marks)

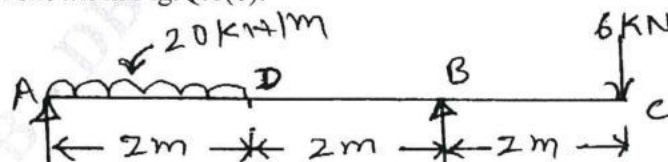


Fig.Q.6(b)

- 7 a. Explain maximum principal stress theory and maximum shear stress theory. (10 Marks)
 b. Design a shaft to transmit 1M Watt of power at 300rpm. The stress in the shaft should not exceed 60MPa and angle of twist should not be more than 1° in the length of 10 times diameter. Assume $C = 80\text{MPa}$ for the material. (10 Marks)
- 8 a. Derive the torque equation $\frac{T}{J} = \frac{C\theta}{L} = \frac{q}{R}$. (10 Marks)
 b. State the assumptions made in the theory of pure torsion. (05 Marks)
 c. Explain maximum principal strain theory. (05 Marks)
- 9 a. Derive expression for buckling load on column with both ends hinged. (06 Marks)
 b. Define the terms:
 i) Neutral axis
 ii) Section modulus
 iii) Modulus of rupture. (06 Marks)
 c. A T-section shown below in Fig.Q.9(c) is used as simply supported beam over a span of 4m. It carries a udl of 8kN/m over its entire span. Calculate maximum tensile and compressive stresses in the beam. (08 Marks)

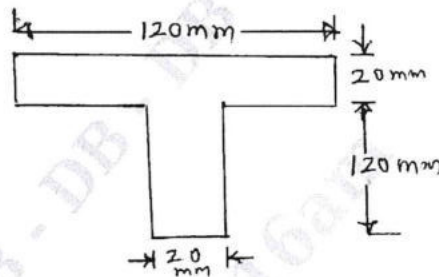


Fig.Q.9(c)

- 10 a. A 1.5m long column has a circular cross-section of 5cm diameter. One end of the column is fixed in direction and position and the other end is free. Take factor of safety as 3. Calculate safe load using.
 i) Rankines formula, taking yield stress 560N/mm^2 and $a = \frac{1}{1600}$.
 ii) Eulers formula taking $E = 1.2 \times 10^5\text{N/mm}^2$. (08 Marks)
 b. A beam with an I-section consists of 180mm \times 15mm flange and web of 280mm depth and 15mm thick. It is subjected to a moment of 80kN-m and shear force of 60kN. Sketch the bending and shear stresses distribution along the depth of the section. (12 Marks)

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Third Semester B.E. Degree Examination, July/August 2021 Fluid Mechanics

Time: 3 hrs.

Max. Marks: 100

Note: 1. Answer any FIVE full questions.
2. Assume any missing data suitably and mention about it.

- 1
 - a. Explain the concept of fluid continuum. (04 Marks)
 - b. Define the terms and give their units in S.I. system.
 - i) Mass density ii) Weight density iii) Specific gravity iv) Specific volume
 - v) Surface tension vi) Viscosity. (09 Marks)
 - c. The capillary rise in a glass tube used for measuring water level is not to exceed 0.5mm. Determine its minimum size. Given that the surface tension for water in contact with air = 0.07112 N/m. (07 Marks)

- 2
 - a. State and prove hydrostatic law. (06 Marks)
 - b. Differentiate between absolute pressure, gauge pressure and vacuum pressure with the help of an indicative diagram. (06 Marks)
 - c. The right limb of a simple U-tube manometer containing mercury is open to atmosphere while the left limb is connected to a pipe in which a fluid of specific gravity 0.9 is flowing. The center of the pipe is 12cm below the level of mercury in the right limb. Find the pressure of fluid in the pipe if the difference of mercury level in the two limbs is 20cm. (08 Marks)

- 3
 - a. Derive an expression for total pressure and center of pressure on an inclined plane surface immersed in liquid. (10 Marks)
 - b. A lock gate 15m high and 7.5m wide is hinged horizontally at the bottom and maintained in vertical position by a horizontal chain at top. Sea water stands upto a depth of 10m on one side and 7.5m on the other. Find the total tension in the chain. Specific gravity of sea water is 1.03. (10 Marks)

- 4
 - a. With the help of sketches, explain Lagrangian and Eulerian methods of describing fluid flow. (04 Marks)
 - b. Calculate velocity component V, given $u = \frac{2}{3}xy^3 - x^2y$ so that the equation of continuity is satisfied. (08 Marks)
 - c. Derive the general equation of continuity in three dimensional forms. (08 Marks)

- 5
 - a. State and prove Bernoulli's theorem for motion of fluid along a stream line, starting from Euler's equation. (06 Marks)
 - b. 250 liters per second of water is flowing in a pipe having diameter 300mm. If the pipe is bent by 135°, find the magnitude and direction of the force on the bend. The pressure of water flowing is 400kN/m². Take specific weight of water as 9.81kN/m³. (10 Marks)
 - c. List all the forces acting on a fluid in motion, which of these are considered in Euler's equation. (04 Marks)

- 6 a. Draw a neat labeled sketch of an orificemeter. (04 Marks)
 b. Derive an expression for rate of flow through venturimeter. (08 Marks)
 c. A venturimeter has its axis vertical. The inlet and throat diameters are 150mm and 75mm respectively. The throat is 225mm above the inlet. Petrol of specific gravity 0.78 flows up through the venturimeter at a rate of 29 liters per second. Find the pressure difference between the inlet and the throat. Take $C_d = 0.96$. (08 Marks)
- 7 a. What is a mouth piece and how are they classified? (06 Marks)
 b. Define hydraulic coefficients C_c , C_v and C_d and derive their inter-relationship. (06 Marks)
 c. A jet of water issuing from an orifice 25mm diameter under a constant head of 1.5m falls 0.915m vertically before it strikes the ground at a distance of 2.288m measured horizontally from the vena contracta. The discharge was found to be 102/lpm. Calculate the hydraulic coefficients of the orifice. (08 Marks)
- 8 a. What are notches? How are they classified? (06 Marks)
 b. Derive an expression for discharge over a V-notch. (08 Marks)
 c. A cipolletti weir has a crest length of 0.25m. If the head on the crest is 0.15m, calculate the discharge flowing over it. Take $C_d = 0.64$. (06 Marks)
- 9 a. Derive Darcy-Weisbach equation for headloss in pipes due to friction. (08 Marks)
 b. Which are the major and minor losses in pipe flows? (04 Marks)
 c. A water distribution network is an equilateral triangle 'ABC' in shape. If the inflow at junction 'A' is 60 units and the outflow at junctions 'B' and 'C' are 40 and 20 units respectively, find the discharge in each pipe. Take initial value of discharge from 'A' to 'B' as 15 units. Take value of 'r' in expression $h_f = r.Q^n$ as for AB:4, for BC:1 and CA:2. Take $n = 2$. (08 Marks)
- 10 a. Explain the phenomenon of water hammer in pipe flow. (04 Marks)
 b. Derive an expression for pressure rise inside a pipe due to gradual closure of valve. (08 Marks)
 c. A pipeline consists of 3 pipes in series:
 i) 300m long 15cm diameter
 ii) 150m long 10cm diameter
 iii) 240m long 20cm diameter.
 The pipeline takes off from a reservoir with water at an elevation of +500m. The elevation at the exit is +400m. Find the discharge in the pipe. Neglect minor losses. Take $f = 0.04$. (08 Marks)

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17CV34

Third Semester B.E. Degree Examination, July/August 2021 Basic Surveying

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions.

- 1 a. What is surveying? Explain the principles of surveying. (08 Marks)
b. Differentiate between Plan and Map. (02 Marks)
c. Give the broad classification of surveying. (10 Marks)
- 2 a. What are the different types of chain used in surveying? (04 Marks)
b. A 30m chain was found to be a 5 cm too long after chaining 100 chains and after chaining 180 chains the chain was found to be 10 cm too long what is the true distance chained. It was correct before commencement of work. (06 Marks)
c. There is a obstacle in the form of pond on main line AB. Two points C and D were taken on the opposite side of a pond. On the left of CD, a line CE was laid out 120m in length and a second line CF 80 m was laid on the right of CD. Such that E, C and F are in line. Determine the obstructed length CD. Given ED = 180m and DF = 165m. (10 Marks)
- 3 a. Differentiate between Prismatic compass and Surveyors compass. (05 Marks)
b. Calculate the bearing of sides of a regular pentagon of sides 4m. Traversed in anticlockwise direction. Bearing of AB = 85°. Draw a rough figure. (05 Marks)
c. In a closed compass traverse the following whole circle bearing were observed, where local attraction was suspected. Compute the correct bearing of the lines. Also T.B. if declination is 2°E. [Refer Table Q3(b)]

Line	Fore bearing	Back bearing
AB	74° 20'	256° 0'
BC	107° 20'	286° 20'
CD	224° 50'	44° 50'
DA	306° 40'	126° 0'

Table Q3(b)

(10 Marks)

- 4 a. Explain the measurement of horizontal angle by method of repetition with tabular format. Mention the errors eliminated. (10 Marks)
b. Explain the term: (i) Swinging (ii) Plunging (iii) Line of collimation (iv) Trunion axis. (04 Marks)
c. Explain the temporary adjustment of theodolite. (06 Marks)
- 5 a. Following data available for closed traverse ABCDEA. Using Bowditch rule compute the co-ordinate of all station. Taking coordinate of A(400, 400). Refer Table Q.5(a). (16 Marks)

Table Q.5(a)

Line	Length	Bearing
AB	130 m	92° 0'
BC	158 m	174° 0'
CD	145 m	220° 0'
DE	308 m	279° 0'
EA	337 m	48° 0'

- b. What is closing error? What are the methods of adjustment? (04 Marks)

- 6 a. Derive the expression for distance and elevation when the staff is vertical and line of sight is inclined. (10 Marks)
 b. Determine the gradient from a point A to B from the following observations made with tachometer fitted with analectic lens. Take $k = 100$ and staff held vertical.

Inst. Station	Staff Station	Bearing	Vert. Angle	Staff reading
P	A	134°	+10° 32'	1.360, 1.915, 2.490
	B	224°	+5° 6'	1.065, 1.885, 2.705

(10 Marks)

- 7 a. What are the temporary adjustments of Dumpy level? (06 Marks)
 b. Define : (i) MSL (ii) B.M. (iii) R.L. (iv) B.S. (04 Marks)
 c. Following observations were taken in reciprocal leveling:

Inst. at	Staff reading on		Remarks
	A	B	
A	1.545 m	2.565 m	Dist. AB = 1420 m
B	0.725 m	1.935 m	RL of A = 108.360 m

- (i) Find the RL of B (True RL) (ii) Collimation error. (10 Marks)

- 8 a. What are the classification of leveling? Explain any four in brief. (10 Marks)
 b. The following observations were made on a hill top to ascertain its elevation. The height of target F was 5m. The instruments were 100m apart and were in line with F.

Inst. Station	Staff reading on B.M.	Ver. Angle	Remarks.
O ₁	2.550	18° 6'	R.L of
O ₂	1.670	28° 42'	BM = 345.580

(10 Marks)

- 9 a. What is Zero Circle? Find the area of zero circle from the following observations. Take $m = 100 \text{ cm}^2$.
 (i) Anchor point outside the figure I.R = 8.436 F.R = 4.325 The zero of the disc passed the index mark once in clockwise direction.
 (ii) Anchor point inside the figure I.R = 2.844 F.R = 5.434 The zero of the disc passed the index mark twice in anti-clockwise direction. (10 Marks)
 b. The railway embankment 500m long has a width at formation level of 9m with side slopes of 2 to 1. The ground level at every 100m along the centre line are.

Distance in m	0	100	200	300	400	500
Ground level in m	107.8	106.3	110.5	111.0	110.7	112.2

The embankment has arising grad. of 1.2m per 100m and the formation level is 110.50m at zero chainage. Compute the volume of E/W by Trapezoidal rule and Prismoidal rule.

(10 Marks)

- 10 a. What is Simpson's rule? Derive the expression for it. (08 Marks)
 b. What is contour? What are the characteristics of contour? (06 Marks)
 c. Plot the cross staff survey of field ABCDEFG and calculate its area. [Refer Fig.Q10(c)].

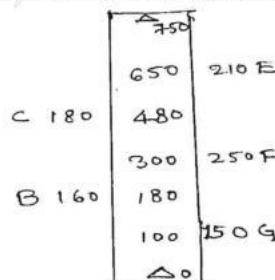


Fig.Q10(c)

(06 Marks)

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18CV32

Third Semester B.E. Degree Examination, July/August 2021 Strength of Materials

Time: 3 hrs.

Max. Marks: 100

Note: 1. Answer any FIVE full questions.

2. Missing data, if any, may be suitably assumed.

- 1 a. Define: (i) Poisson's ratio (ii) Volumetric strain (ii) Temperature stresses (06 Marks)
b. A steel bar of 20 mm diameter is subjected to tension test in lab. Determine stress, strain, Young's Modulus Percentage elongation from the following data:
Gauge length – 200 mm, extension at a load of 100 kN is 0.147 mm, total elongation 50 mm. also determine the percentage decrease in cross sectional area of the specimen. If the diameter of the rod at failure is 16 mm. (10 Marks)
c. Derive an expression for extension/shortening of bar of uniform cross sectional area. (04 Marks)
- 2 a. Derive the relationship between Young's modulus and shear modulus with usual notations. (06 Marks)
b. A bar of 20 mm diameter is tested in tension. It is observed that when a load of 37.7 kN is applied the extension measured over a gauge length of 200 mm is 0.12 mm and contraction in diameter is 0.0036 mm. Find the Poisson's ratio, Young's modulus, bulk modulus and modulus of rigidity. (08 Marks)
c. Show that volumetric strain is sum of strains in three mutually perpendicular directions. (06 Marks)
- 3 a. Derive an expression for change in volume of thin cylinders. (10 Marks)
b. For a state of stresses with $\sigma_x = 85$ MPa (tensile) $\sigma_y = 60$ MPa (compressive) with a shear stress of 45 MPa, determine the principal stresses and locate their planes. Also obtain maximum tangential stress and locate corresponding planes. [Refer Fig.Q3(b)]

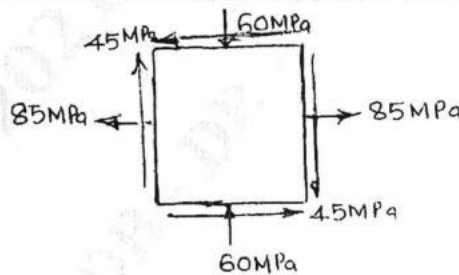


Fig.Q3(b)

(10 Marks)

- 4 a. Derive an expression for normal and tangential stresses on a plane inclined at an angle θ with plane of σ_x for an element subjected to general two dimensional stress system and show that:
(i) Sum of normal stresses in any two mutually perpendicular directions is constant.
(ii) Principal planes are planes of maximum normal stresses also. (10 Marks)
b. Find the thickness of metal necessary for a steel cylindrical shell of internal diameter 150 mm to withstand an internal pressure of 50 N/mm². The maximum hoop stress in the section is not to exceed 150 N/mm². If the thickness of cylinder is found using thin cylinder analysis, what is the percentage error? (10 Marks)

- 5 a. Derive relationship between load intensity, shear force and bending moment. (06 Marks)
 b. Draw SFD and BMD for a simply supported beam subjected to a couple moment 'M' in clockwise direction acting at a distance of 'a' from left support and 'b' from right support. (06 Marks)
 c. Draw SFD and BMD for a cantilever beam subjected to loads as shown in Fig.Q5(c).

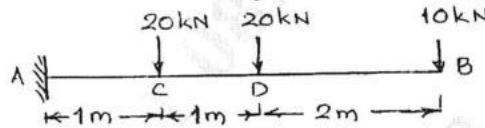


Fig.Q5(c)

(08 Marks)

- 6 a. Define: (i) Shear force (ii) Bending moment (iii) Point of contraflexure (06 Marks)
 b. Draw BMD and SFD for the overhanging beam shown in Fig.Q6(b). Clearly indicate the point contraflexure.

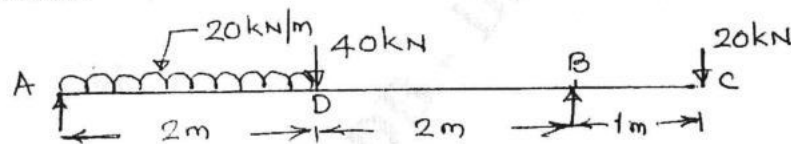


Fig.Q6(b)

(14 Marks)

- 7 a. List the assumptions made in simple theory of bending. (04 Marks)
 b. Derive the bending equation with usual notations. (08 Marks)
 c. A solid shaft transmits 250 KW at 100 rpm. If the shear stress is not to exceed 75 MPa, what should be the diameter of the shaft? If this shaft is to be replaced by a hollow one whose diameter ratio is 0.6. Determine the size and percentage saving in weight. The maximum shear stress being the same. (08 Marks)
- 8 a. Derive the torsion equation for a circular shaft $\frac{T}{J} = \frac{\tau}{r} = \frac{G\theta}{L}$ with usual notations. (10 Marks)
 b. A simply supported beam 100 mm × 200 mm in cross section carries a central concentrated load 'W'. The permissible stress in bending and shear are 15 MPa and 1.2 MPa respectively. Determine the safe load W, if the span of the beam is 3m. (10 Marks)
- 9 a. Derive the moment curvature equation of deflection. (06 Marks)
 b. Find the Euler's crippling load for a hollow cylindrical steel column of 40 mm diameter and 4 mm thick. Take the length of column as 2.3 m and column is hinged at both the ends. Also determine the crippling load by Rankine's formula using constants as 335 MPa and $\frac{1}{75000}$. Take $E = 205 \times 10^3 \text{ N/mm}^2$. (10 Marks)
 c. What are the limitations of Euler's theory of buckling? (04 Marks)
- 10 a. Derive an expression for a column when both the ends are pinned. (06 Marks)
 b. Determine the slope and deflection at free end of a cantilever beam of span 'L' subjected to udl w/m over its full length by using Macaulay's method. (06 Marks)
 c. Find the maximum value of slope and deflection for a simply supported beam subjected to point load at centre use Macaulay's method. (08 Marks)

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18CV33

Third Semester B.E. Degree Examination, July/August 2021 Fluid Mechanics

Time: 3 hrs.

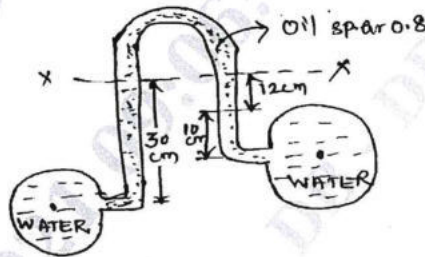
Max. Marks: 100

Note: Answer any FIVE full questions.

- 1
 - a. Differentiate between i) Liquids and gases ii) Real fluids and Ideal fluids
iii) Specific weight and Specific volume of a fluid. (06 Marks)
 - b. One litre of crude oil weighs 9.6N. Calculate its specific weight, density and specific gravity. (06 Marks)
 - c. Calculate the capillary rise in a glass tube of 3mm diameter when immersed vertically in
i) Water and ii) Mercury. Take surface tensions for mercury and water as 0.0725N/m and 0.52 N/m respectively in contact with air, specific gravity of mercury taken as 13.6. (08 Marks)

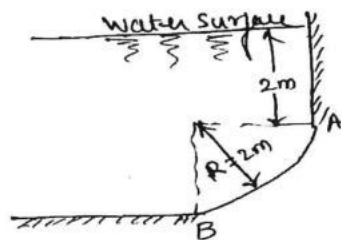
- 2
 - a. Differentiate between i) Absolute and gauge pressure ii) Simple manometer and differential manometer iii) Piezometer and pressure gauges. (06 Marks)
 - b. An open tank contains water upto a depth of 1.5m and above it an oil of Sp.gr 0.8 for a depth of 2m. Find the pressure intensity i) at the interface of the two liquids ii) at the bottom of the tank. (06 Marks)
 - c. The water is flowing through two different pipe to which an inverted differential manometer having an oil Sp.gr 0.8 is connected. The pressure head in the pipe A is 2m of water. Find the pressure in the pipe B for the manometer readings as shown in Fig. Q2(c). (08 Marks)

Fig. Q2(c)



- 3
 - a. What do you understand by 'Total Pressure' and 'Centre of Pressure'? (06 Marks)
 - b. A circular opening, 3m diameter in a vertical side of a tank is closed by a disc of 3m diameter which can rotate about a horizontal diameter. Calculate i) the force on the disc ii) the torque required to maintain the disc in equilibrium in the vertical position when the head of water above the horizontal diameter is 6m. (06 Marks)
 - c. Find the horizontal and vertical components of the total force acting on a curved surface AB, which is the form of a quadrant of a circle of radius 2m as shown in Fig. Q3(c). Take the width of the gate is 2m. (08 Marks)

Fig. Q3(c)



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.

- 4 a. Define the terms : i) Velocity potential function ii) Stream function. (06 Marks)
 b. The velocity vector in a fluid flow is given by $V = 2x^3 i - 5x^2 yj + 4tK$. Find the velocity and acceleration of a fluid particle at (1, 2, 3) at time $t = 1$. (06 Marks)
 c. If for a two – dimensional potential flow, the velocity potential is given by $\phi = 4x(3y-4)$, determine the velocity at the point (2,3). Determine also the value of stream function ψ at the point (2, 3). (08 Marks)
- 5 a. What is Euler's equation of motion? How will you obtain Bernoulli's equation from it? (06 Marks)
 b. A pipe through which water is flowing, is having diameters 40cm and 20cm at the cross – section 1 and 2 respectively. The velocity of water at section 1 is given 5m/s. Find the velocity head at the section 1 and 2 and also rate of discharge. (06 Marks)
 c. The water is flowing through a pipe having diameters 20cm and 10cm at section 1 and 2 respectively. The rate of flow through pipe is 35 litres/s. The section 1 is 6m above datum and section 2 is 4m above datum. If the pressure at section 1 is 39.24 N/cm². Find the intensity of pressure at section 2. (08 Marks)
- 6 a. What is a Pitot tube? How will you determine the velocity at any point with the help of pitot – tube? (06 Marks)
 b. A 20 × 10cm venturimeter is provided in a vertical pipe line carrying oil of sp. gr 0.8, the flow being upwards. The difference in elevation of the throat section and entrance section of the venturimeter is 50cm. The differential U – tube mercury manometer shows a gauge deflection of 40cm. Calculate i) the discharge of oil ii) the pressure difference between the entrance section and the throat section. Take $C_d = 0.98$ and Sp. Gr of mercury as 13.6. (06 Marks)
 c. A pitot – tube is inserted in a pipe of 300mm diameter. The static pressure in pipe is 100mm of mercury (vacuum). The stagnation pressure at the centre of the pipe recorded by the pitot tube is 0.981 N/cm². Calculate the rate of flow of water through pipe. If the mean velocity of flow is 0.85 times the central velocity. Take $C_V = 0.98$. (08 Marks)
- 7 a. Explain the classification of orifices and mouth pieces based in their shape , size and sharpness. (06 Marks)
 b. The head of water over an orifice of diameter 100mm is 5m. The water coming out from orifice is collected in a circular tank of diameter 2m. The rise of water level in circular tank is 45m in 30 seconds. Also the co-ordinates of a certain point on the jet, measured from vena – contracta are 100cm horizontal and 5.2cm vertical. Find the hydraulic co-efficients C_d , C_v and C_c . (06 Marks)
 c. A tank has two identical orifices on one of its vertical sides. The upper orifice is 3m below the water surface and lower one is 5m below the water surface. If the value of C_v for each orifice is 0.96, find the point of intersection of the two jets. (08 Marks)
- 8 a. How are the weirs and notches classified? (06 Marks)
 b. A right angled V – notch is inserted in the side of a tank of length 4m and width 2.5m. Initial height of water above the apex of the notch is 30cm. Find the height of water above the apex, if the time required to lower the head in tank from 30cm to final height is 3 minutes. Take $C_d = 0.6$. (06 Marks)
 c. A Cipolletti weir of crest length 60cm discharges water. The head of water over the weir is 360mm. Find the discharge over the weir if the channel is 80cm wide and 50cm deep. Take $C_d = 0.6$ (08 Marks)

- 9 a. What do you understand by Total energy line , Hydraulic gradient line , Pipes in series , Pipes in parallel and Equivalent pipe? (05 Marks)
- b. An oil of sp. gr. 0.9 and viscosity 0.06 poise is flowing through a pipe of diameter 200mm at the rate of 60 litres/s. Find the head loss due to friction for a 500m length of pipe. Find the power required to maintain this flow. (07 Marks)
- c. The rate of flow of water through a horizontal pipe is $0.25\text{m}^3/\text{s}$. The diameter of the pipe which is 200mm is suddenly enlarged to 400mm. The pressure intensity in the smaller pipe is $11.772\text{N}/\text{cm}^2$. Determine i) Loss of head due to sudden enlargement ii) Pressure intensity in the large pipe iii) Power lost due to enlargement. (08 Marks)
- 10 a. Explain the phenomenon of water hammer. Obtain an expression for the rise of pressure when the flowing water in a pipe is brought to rest by closing the valve gradually. (06 Marks)
- b. The water is flowing with a velocity of $1.5\text{m}/\text{s}$ in a pipe of length 2500m and of diameter 500mm. At the end of the pipe, a valve is provided. Find the rise in pressure of the valve is closed in 25 seconds. Take the value of $C = 1460\text{ m}/\text{s}$. (06 Marks)
- c. A valve is provided at the end of a cast iron pipe of diameter 150mm and of thickness 10mm. The water is flowing through the pipe which is suddenly stopped by closing the valve. Find the maximum velocity of water, when the rise of pressure due to sudden closure of valve is $196.2\text{ N}/\text{cm}^2$. Take K for water as $19.62 \times 10^4\text{ N}/\text{cm}^2$ and E for cast iron pipe as $11.772 \times 10^6\text{ N}/\text{cm}^2$. (08 Marks)

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Third Semester B.E. Degree Examination, July/August 2021 Building Materials and Construction

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions.

- 1 a. What are the requirements of good building stones? Explain. (06 Marks)
b. Describe the constituents of good brick earth along with their importance. (06 Marks)
c. Explain the importance of shape, size and texture of coarse aggregates in cement concrete making. (08 Marks)
- 2 a. Explain bulking of sand with its practical importance. (06 Marks)
b. Which are the factors causing deterioration of stone? And write about preservation of stones. (06 Marks)
c. Describe the construction and working of Bull's Trench Kiln with sketch. (08 Marks)
- 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)
- 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)
- 5 a. Draw the sketch of an elementary arch and level its parts. (06 Marks)
b. Write a note on : i) Stone lintel ii) RCC lintel. (06 Marks)
c. What are requirements of a good floor? Draw the sketch of ground floor marble flooring with its components. (08 Marks)
- 6 a. Explain various modes of failure of an arch with its remedial measures. (06 Marks)
b. Differentiate between sloped roof and flat roof with reference to advantages. (06 Marks)
c. Draw the sketch of King post wooden roof truss (half part) and label its parts. (08 Marks)
- 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)
- 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)
- 9 a. What are the objects and requirements of good plaster? (06 Marks)
b. Name and explain constituents of oil paint. (06 Marks)
c. Explain procedure of painting i) New wood surface ii) New plastered surface. (08 Marks)
- 10 a. Explain the defects in plastering. (06 Marks)
b. Explain the procedure adopted in cement – lime plastering. (06 Marks)
c. Briefly explain the methods of damp proofing. (08 Marks)

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18CV35

Third Semester B.E. Degree Examination, July/August 2021 Basic Surveying

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions.
2. Assume any missing data suitably.
3. Draw sketches wherever necessary.*

1.
 - a. State atleast three differences between:
 - (i) Plane survey and geodetic survey
 - (ii) Accuracy and precision (06 Marks)
 - b. Length of a line measured with 20.0 m chain was 1341.0 m. The same line when measured with 30.0 m chain, which was 20 cm too short was found to be 1350.0 m. What was the error in 20 m chain? (06 Marks)
 - c. To continue a line \overline{AB} past an obstacle, a line \overline{BC} measuring 200 m was set out perpendicular at B to \overline{AB} . From point 'C' $\angle BCD = 60^\circ$ and $\angle BCE = 45^\circ$ were set. Determine \overline{CE} and \overline{CD} such that points A, B, E and D are in a straight line. Also calculate the obstructed distance \overline{BE} . (08 Marks)
2.
 - a. List three parameters under which surveying is classified. (06 Marks)
 - b. Brief the working principle of and EDM with sketch. (06 Marks)
 - c. A line was measured with a steel tape which was exactly 30 m at a temperature of 20°C and pull of 10 kg. the measured length was 1650 m. The temperature during measurement was 30°C and applied pull was 15 kg. Find the true length of line, if cross sectional area of the tape was 0.025 cm^2 . Coefficient of thermal expansion of the tape is $3.5 \times 10^{-6}/^\circ\text{C}$, $E = 2.1 \times 10^6\text{ kg/cm}^2$. (08 Marks)
3.
 - a. Compare between prismatic and surveyor's compass for atleast six differences. (06 Marks)
 - b. What is meant by local attraction? How is it detected? (06 Marks)
 - c. The following bearings are observed in a closed traverse. Determine the correct bearings of lines affected by local attraction. Tabulate the results.

Line	AB	BC	CD	DA
FB	$32^\circ 30'$	$124^\circ 30'$	$181^\circ 0'$	$289^\circ 30'$
BB	$214^\circ 30'$	$303^\circ 15'$	$1^\circ 0'$	$108^\circ 45'$

(08 Marks)

4.
 - a. Mention the differences (at least two) between:
 - (i) WCB and QB
 - (ii) Dip Declination
 - (iii) Magnetic bearing and True bearing (06 Marks)
 - b. Explain how closing error is adjusted by Bowditch's Transit rule. (06 Marks)
 - c. Length and bearings of a compass traverse ABCD are given below. The length and bearing of line DA is omitted due to obstruction. Calculate the same.

Length m	AB	BC	CD
Length m	485	1720	1050
Bearing	342°	16°	140°

(08 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.

- 5 a. Define the following terms with respect to leveling:
 (i) Bench mark (ii) Elevation (iii) Height of collimation
 (iv) Change point (v) Back sight (vi) Station (06 Marks)
- b. Describe in sequence, the temporary adjustments to a dumpy level while starting leveling work. (06 Marks)
- c. Following details were recorded in level work. Calculate:
 (i) True RL of point B
 (ii) Angular error in collimation
 (iii) Combined correction for curvature and refraction
- | Inst. At | Staff Reading on | | Remarks |
|----------|------------------|-------|------------------|
| | A | B | |
| A | 1.030 | 1.630 | AB = 800.00 m |
| B | 0.950 | 1.540 | RL of A = 450.00 |
- (08 Marks)
- 6 a. State the different methods of leveling. Explain any one method. (06 Marks)
- b. Enumerate profile leveling in detail with sketch. (06 Marks)
- c. Following readings were taken consecutively with 4.00 m level staff and a level on a sloping ground at a common interval of 5.0 m. Calculate the R.L of all points by Rise and Fall method. Determine the gradient between First and last point. Apply usual check. A reading 0.780 is observed on a BM of 180.750 m.
 1.535, 1.955, 2.430, 2.985, 3.640, 0.935, 1.045, 1.630, 2.480, 3.480, 1.550, 1.960 and 2.225.
 (08 Marks)
- 7 a. Name the Accessories used in plane table surveying. Mention their uses. (08 Marks)
- b. Write a note on "orientation". Explain the two methods adopted for orienting a plane table. (12 Marks)
- 8 a. State the advantages and disadvantages of plane table surveying. (08 Marks)
- b. Describe the method of Resection by Bessel's three point graphical method. (12 Marks)
- 9 a. What is a "Contour" in surveying? List atleast four characteristics of a contour. (06 Marks)
- b. Perpendicular offsets are taken at 10.0 m interval along a Base line to an irregular boundary line. Calculate the area enclosed by boundary line and base line between First and Last offset by (i) Trapezoidal rule (ii) Simpson's rule. (06 Marks)
- c. Explain "Mid ordinate" of calculating area of an irregular shaped plot in plan. (08 Marks)
- 10 a. What is planimeter? Explain the polar planimeter along with essential parts. (12 Marks)
- b. 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. (08 Marks)

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18CV36

Third Semester B.E. Degree Examination, July/August 2021 Engineering Geology

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions.

- 1 a. What is Geology? Describe the role of Geology in Civil Engineering. (10 Marks)
b. Define Mineral. Describe following physical properties of Minerals :
i) FORMS ii) Fracture iii) Hardness. (10 Marks)
- 2 a. Give a detailed account of Interior of Earth. (10 Marks)
b. Write the physical properties , chemical composition and uses of
i) Calcite ii) Hematite iii) Mica. (10 Marks)
- 3 a. What is Igneous Rock? Give the classification of Igneous Rocks based on origin. (10 Marks)
b. What are Sedimentary Rocks? Explain primary structure of Sedimentary Rocks. (10 Marks)
- 4 a. What is Weathering? Explain causes and types of weathering. (10 Marks)
b. What is Soil? Explain Soil profile. (05 Marks)
c. Explain different types of Drainage patterns. (05 Marks)
- 5 a. What are Joint? Explain types of Joints and write importance in Civil Engineering field. (10 Marks)
b. What is Outcrop? Add note on : i) DIP ii) Strike. (05 Marks)
c. Write a note on Rock Quality Determination (RQD). (05 Marks)
- 6 a. What is Fault? Give the classification of Faults with neat sketch. (10 Marks)
b. Define Unconformity. Describe the types of unconformity and mention the field evidence of unconformity. (10 Marks)
- 7 a. Discuss the groundwater exploration by Electrical Resistivity method. (10 Marks)
b. What is Rain Water Harvesting? Explain different methods of Rain Water Harvesting. (05 Marks)
c. Explain Hydrological cycle. (05 Marks)
- 8 a. What is Aquifer? Explain different types of Aquifer. (10 Marks)
b. Explain following :
i) Causes of Sea water Intrusions in coastal area ii) Cyclones and its effects. (10 Marks)
- 9 a. What is an Earthquake? Write the causes and effects of Earthquake. (10 Marks)
b. What is Remote Sensing? Explain important Application of Remote Sensing in Water resources field. (05 Marks)
c. What is GPS? Describe application of GPS. (05 Marks)
- 10 a. Define GIS. Explain application of GIS and components of GIS. (10 Marks)
b. What is Landslide? Explain main causes of landslide. (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.