CBCS SCHEME

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18MAT31

Third Semester B.E. Degree Examination, Jan./Feb. 2021
Transform Calculus, Fourier Series and Numerical Techniques

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Find the Laplace transform of $\cos t \cos 2t \cos 3t$. **(06 Marks)**

b. If $f(t) = \begin{cases} t, & 0 < t < a \\ 2a - t, & a < t < 2a \end{cases}$ and $f(t + 2a) = f(t)$, show that $L\{f(t)\} = \frac{1}{s^2} \tan h \left(\frac{as}{2}\right)$. **(07 Marks)**

c. Find the Inverse Laplace transforms of :

i) $\frac{2s+1}{s^2+6s+13}$ ii) $\frac{1}{3}\log\left(\frac{s^2+b^2}{s^2+a^2}\right)$. **(07 Marks)**

OR

2 a. Express the function f(t) in terms of unit step function and find its Laplace transform, where

$$f(t) = \begin{cases} 1, & 0 < t \le 1 \\ t, & 1 < t \le 2 \\ t^2, & t > 2 \end{cases}.$$ **(06 Marks)**

b. Find the Inverse Laplace transform of $\frac{s^2}{(s^2+a^2)^2}$ using Convolution theorem. **(07 Marks)**

c. Solve by the method of Laplace transforms, the equation $y'' + 4y' + 3y = e^{-t}$ given $y(0) = 0$, $y'(0) = 0$. **(07 Marks)**

Module-2

3 a. Obtain the Fourier series of the function $f(x) = x^2$ in $-\pi \le x \le \pi$. **(06 Marks)**

b. Obtain the Fourier series expansion of

$$f(x) = \begin{cases} x, & 0 < x < \pi \\ x - 2\pi, & \pi < x < 2\pi \end{cases}.$$ **(07 Marks)**

c. Find the Cosine half range series for $f(x) = x(\ell - x)$, $0 \le x \le \ell$. **(07 Marks)**

OR

4 a. Obtain the Fourier series of $f(x) = |x|$ in $(-\ell, \ell)$. **(06 Marks)**

b. Find the sine half range series for

$$f(x) = \begin{cases} x, & 0 < x < \pi/2 \\ \pi - \pi, & \pi/2 < x < \pi \end{cases}.$$ **(07 Marks)**

c. Obtain the constant term and the coefficients of the first cosine and sine terms in the Fourier expansion of y from the table. **(07 Marks)**

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

Module-3

5 a. If $f(x) = \begin{cases} 1-x^2 & , |x|<1 \\ 0 & , |x|\ge 1 \end{cases}$. Find the Fourier transform of f(x) and hence find value of $\int_0^\infty \frac{x\cos x - \sin x}{x^3} dx$. **(06 Marks)**

b. Find the Fourier Cosine transform of
$$f(x) = \begin{cases} 4x, & 0<x<1 \\ 4-x, & 1<x<4 \\ 0, & x>4 \end{cases}.$$ **(07 Marks)**

c. Find the Z – transform of $\cos\left(\frac{n\pi}{2}+\frac{\pi}{4}\right)$. **(07 Marks)**

OR

6 a. Solve the Integral equation
$$\int_0^\infty f(\theta)\cos\alpha\theta\, d\theta = \begin{cases} 1-\alpha & , 0\le\alpha\le 1 \\ 0 & , \alpha>1 \end{cases}$$ hence evaluate $\int_0^\infty \frac{\sin^2 t}{t^2} dt$. **(06 Marks)**

b. Find the Inverse Z – transform of $\frac{2z^2+3z}{(z+2)(z-4)}$. **(07 Marks)**

c. Using the Z – transform, solve $Y_{n+2} - 4Y_n = 0$, given $Y_0 = 0$, $Y_1 = 2$. **(07 Marks)**

Module-4

7 a. Using Taylor's series method, solve the Initial value problem
$\frac{dy}{dx} = x^2y - 1$, $y(0) = 1$ at the point $x = 0.1$. Consider upto 4^{th} degree term. **(06 Marks)**

b. Use modified Euler's method to compute y(0.1), given that $\frac{dy}{dx} = x^2 + y$, $y(0) = 1$ by taking $h = 0.05$. Consider two approximations in each step. **(07 Marks)**

c. Given that $\frac{dy}{dx} = x - y^2$, find y at x = 0.8 with

x :	0	0.2	0.4	0.6
y :	0	0.02	0.0795	0.1762

By applying Milne's method. Apply corrector formula once. **(07 Marks)**

OR

8 a. Solve the following by Modified Euler's method
$\frac{dy}{dx} = x + |\sqrt{y}|$, $y(0) = 1$ at $x = 0.4$ by taking $h = 0.2$. Consider two modifications in each step. **(06 Marks)**

b. Given $\frac{dy}{dx} = 3x + \frac{y}{2}$, $y(0) = 1$. Compute y(0.2) by taking h = 0.2 using Runge – Kutta method of order IV. **(07 Marks)**

c. Given $\frac{dy}{dx} = (1+y)x^2$ and $y(1) = 1$, $y(1.1) = 1.233$, $y(1.2) = 1.548$, $y(1.3) = 1.979$, determine y(1.4) by Adam's Bashforth method. Apply corrector formula once. **(07 Marks)**

Module-5

9 a. Given $y'' - xy' - y = 0$ with $y(0) = 1$, $y'(0) = 0$. Compute $y(0.2)$ using Runge – Kutta method. **(06 Marks)**

b. Derive Euler's equation in the form $\frac{\partial f}{\partial y} - \frac{d}{dx}\left(\frac{\partial f}{\partial y'}\right) = 0$. **(07 Marks)**

c. Prove that the geodesics on a plane are straight lines. **(07 Marks)**

OR

10 a. Find the curve on which functional $\int_0^1 [(y')^2 + 12xy]dx$ with $y(0) = 0$, $y(1) = 1$ can be extremized. **(06 Marks)**

b. Obtain the solution of the equation $\frac{2d^2y}{dx^2} = 4x + \frac{dy}{dx}$ by computing the value of dependent variable corresponding to the value 1.4 of the independent variable by applying Milne's method using the following data. Apply corrector formula once. **(07 Marks)**

x :	1	1.1	1.2	1.3
y :	2	2.2156	2.4649	2.7514
y' :	2	2.3178	2.6725	3.0657

c. A heavy cable hangs freely under gravity between two fixed points. Show that the shape of the cable is Catenary $y = c\cosh\left(\frac{x+a}{c}\right)$. **(07 Marks)**

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CBCS SCHEME

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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 2500mm^2. Find the stresses in steel and concrete if $E_s=15E_c$.
If stress in concrete must not exceed 4.5MN/m^2, what area of steel is required in order that column may support a load of 480KN. **(10 Marks)**

Module-2

3 a. Derive Lame'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/m^2 and compressive stress of 400MN/m^2 acting on two mutually perpendicular planes and two equal shear stresses of 200MN/m^2 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/mm^2. 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.

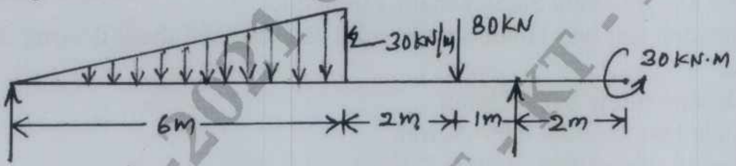

Fig. Q5(b) **(14 Marks)**

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.

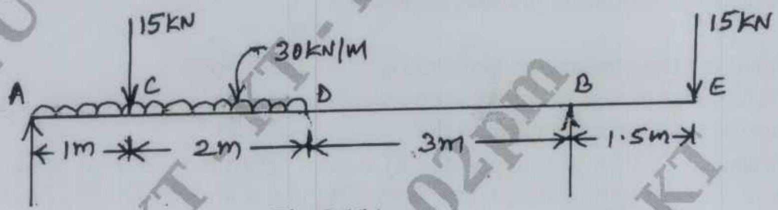

Fig.Q6(b) **(14 Marks)**

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=210GPa. 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 = 200GPa and I = 50×10^6mm^4. **(14 Marks)**

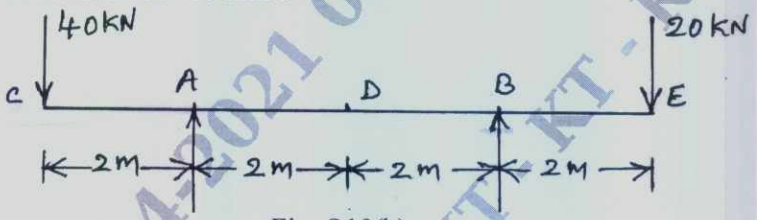

Fig. Q10(b).

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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 filed 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/cm^2. **(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 × 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 lires 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 GN/m^2 and Poisson's ration = 0.25. The bulk modulus of water, K = 206 GN/m^2. Thickness of pipe wall is 5 mm. **(08 Marks)**

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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)**

OR

8 a. Write a note on
i) Shoring ii) Underpinning. (08 Marks)
b. Plan a dogged stair for a building in which vertical distance between the floors is 3.6m. The stair hall measures 2.8m×5.0m (internal dimension). (08 Marks)
c. With the help of a neat sketch explain
i) Tread and Riser ii) Flight and Landing. (04 Marks)

Module-5

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

OR

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

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CBCS SCHEME

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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°

(08 Marks)

c. What is local attraction? How it is detected and eliminated? Also give the reason for it. **(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) Borometric 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)**

CBCS SCHEME

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18CV36

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 Antidine. **(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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CBCS SCHEME

18CPC39/49

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Question Paper Version : A

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

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1. The fundamental rights guaranteed by the Constitution of India to its citizens can be protected by
   a) Parliament b) President
   c) Supreme court d) Union Home Minister

2. Which is the key to open the minds of the makers of the constitution?
   a) Preamble b) Parliament c) Judiciary d) Part – III (FRS)

3. Who was the Chairman and Chief Architect of the Indian Constitution?
   a) Jawaharlal Nehru b) Mahatma Gandhi
   c) Dr. B.R. Ambedkar d) Mount Batten

4. Which is the basis or test for the classification of people under Art.14?
   a) Caste b) Intelligible quotient
   c) Intelligible differentia d) Annual income

5. The Parliamentary system of Government of India is based on the pattern of
   a) USA b) UK c) USSR d) China

6. Which of the following is not a fundamental right?
   a) Right to trade b) Right to property
   c) Right to life d) Right to form an association or union

7. The directive principles of state policy are
   a) Enforceable by court b) Not enforceable by court
   c) Absolute principles d) None of these

8. The practice of untouchability is prohibited under
   a) Art.14   b) Art.15   c) Art.16   d) Art.17

9. Which of the ground replaced the internal disturbance by amendment in the year 1977?
   a) War   b) External aggression
   c) Armed rebellion   d) Terrorist activities

10. Which article has amended recently to remove the special status to the state of Jammu and Kashmir?
    a) Art. 368   b) Art. 370   c) Art. 372   d) Art. 380

11. How many members are there in the election commission including its chairman?
    a) 5   b) 4   c) 3   d) 2

12. Who is empowered to proclaim the state emergency?
    a) Union President   b) Parliament   c) Governor of a state   d) Prime Minister

13. Who is having the power to amend the provisions of the Constitution under Article 368?
    a) Parliament   b) President   c) Union cabinet   d) Supreme court

14. How many members are nominated to Rajyasabha by the President of India?
    a) Two   b) 20   c) 12   d) One

15. High Court Judge retires at the age of ....
    a) 65 years   b) 58 years   c) 60 years   d) 62 years

16. Who can appoint the Chief Justice of Supreme court of India?
    a) Prime Minister   b) Law Minister   c) President   d) Attorney-General

17. Money Bill will be introduced only in .....
    a) Cabinet   b) Loka Sabha   c) Rajya Sabha   d) Any one of these

18. "Equal Pay for Equal Work" for the men and women is included under
    a) Part-II Citizenship   b) Part-III : Fundamental Rights
    c) Part-IV DPSP   d) Part-V-A : Fundamental Duties

19. The right to freedom of press and publication are included in .....
    a) Right to personal liberty   b) Right to speech and expression
    c) Right to move anywhere in India   d) Right to trade

20. By which amendment, right to education made fundamental right and a new provision, Art.21-A was included in the constitution?
    a) 44th Amendment   b) 76th Amendment   c) 86th Amendment   d) 91st Amendment

21. The term of the selection commissioner is
    a) 3 years
    b) 4 years
    c) 6 years or till he attains the age of 65 years
    d) 5 years or till he attains the age of 62 years

22. Which one is not a kind of trade mark?
    a) Designs   b) Symbols   c) Sounds   d) Goodwill

23. Which is the very essential element in professional ethics?
a) Honesty b) Responsibility c) Risk d) Over-confidence

24. Who is the ex-officio-chairman of Rajya Sabha?
a) President b) Vice-President c) Prime Minister d) None of these

25. Which one of the following is not a fundamental right under Art. 21?
a) Right to life b) Right to dignity c) Right to privacy d) Right to suicide

26. If the Head of the State is an elected functionary for a fixed term, it is known as
a) Unitary b) Federal c) Republic d) Democratic

27. Which schedule gives details regarding the subjects included in the three lists – Central, State and Concurrent?
a) Schedule - VII b) Schedule - VIII c) Schedule - V d) Schedule - IV

28. 'Sovereign' means
a) Independent Supreme Authority b) Absolutism
c) Dependent Authority d) Dictatorship

29. A person can move to the Supreme Court directly for any violation of his Fundamental Right under Article .....
a) 12 b) 22 c) 32 d) 226

30. Which one of the following is not included under the definition of state in Art.12?
a) Parliament b) Corporations c) Executive d) Judiciary

31. Indian Constitution is silent on the concept of
a) Deputy Speaker of Loka Sabha b) Deputy Prime Minister
c) Deputy Chief Minister d) Both (b) and (c)

32. Who is the Presiding Officer of the joint-session to discuss on the controversial bill of the parliament?
a) President b) Vice-President
c) Speaker of Loka Sabha d) Prime Minister

33. Who has the power to pardon the death sentence?
a) President b) Chief Justice of Supreme Court
c) Governor of a State d) Both (b) and (c)

34. Who can disqualify the MLAs, if they act against anti-defection law?
a) Speaker of Loka Sabha b) Speaker of Legislative Assembly
c) Prime Minister d) Chief Minister of a State

35. What is the term of member of Rajya Sabha?
a) 5 years b) 6 years c) 4 years d) 2 years

36. Which bill is to be introduced only in Loka Sabha?
a) Ordinary bill b) Money bill c) Amendment bill d) None of these

37. The protection, "No person is to be forced or compelled to say the witness against himself" is
a) Ex-Post Facto Law b) Double Zeo Pardy
c) Self-Incrimination d) Testimonial Compulsion

38. Phishing is
a) a cyber crime b) civil wrong c) a net work d) a type of computer

39. Child Pornography is
a) Exposure of social behaviour of children
b) Exploitation of children in the porn industry
c) Not a cyber crime
d) appreciable one

40. Which is the India's cybercrime capital?
a) Bombay b) Delhi c) Bengaluru d) Calcutta

41. Federal type of Government means
a) Division of powers between Centre and State
b) Distribution of powers between legislature and executive
c) Separation of powers between President and Prime Minister
d) None of the above

42. How much time taken to draft the Indian Constitution to adopt?
a) 03 years 10 months 07 days b) 05 years 11 months 19 days
c) 04 years 11 months 17 days d) 02 years 11 months 18 days

43. The seat of Supreme Court is in
a) Bangaluru b) Delhi c) Mumbai d) Chennai

44. Which article recognized the international law under constitution?
a) Art. 32 b) Art. 42 c) Art. 50 d) Art. 51

45. Writ of 'Habeaus Corpus' means
a) To command to do a duty b) To quash the decision
c) To produce the person before the court d) On what authority?

46. The right to public appointment has been provided in
a) Art. 14 b) Art. 15 c) Art. 16 d) Art. 20

47. Reasonable restrictions can be imposed by the state under the provision of ....
a) Art. 19(1)(a) to (g) b) Art. 19 (2) to (6)
c) Art. 20 (a) to (c) d) Art. 21

48. An arrested person is to be allowed to ....
a) Choose his own advocate b) Contact the political people
c) Contact nearest magistrate d) Contact his relative

49. Any law made by the Parliament in contravention to the fundamental rights is declared as.......
a) Valid b) Illegal c) Void d) Incorrect

50. Who are not entitled to form a Union or Association?
a) Police b) Students
c) Teachers d) Workmen of an industry

51. The punishment for identity theft (making use of the electronic signature or password fraudulently) in India is ....
a) 6 years b) 3 years c) 10 years d) 3 months

52. What is serious crime in Cyber Law which attracts a prison sentence for 20 years or more?
a) Fraud b) Child pornography c) Software Piracy d) Hacking

53. One of the ways of misusing the truth is
a) Making the confused statement b) Falsihood
c) Deliberate deception d) Misrepresentation

54. One of the aims of engineering ethics is to
a) Acquire new skills in engineering
b) Stimulate to conduct research
c) Stimulate the moral imagination
d) Train to acquire self-confidence in their duties

55. Which of the provisions cannot be suspended during national emergency?
a) Arts. 14 and 15 b) Arts. 23 and 24 c) Arts. 20 and 21 d) Arts. 17 and 18

56. The constitution expressly permits the state to make special provisions for
a) Women and unemployed persons
b) Socially and educationally backward class people
c) Old, sick and disabled persons
d) Senior citizens

57. 'Creamy layer' means
a) Highly educated persons b) Illiterate persons
c) Highly cultured persons d) Persons having higher incomes

58. Under fundamental rights, Minority may be considered on the basis of
a) Linguistic or religious b) Regional or national
c) Racial or regional d) Caste or racial

59. The right against exploitation prohibits
a) Labourers b) Mining employees sufferings
c) Traffic in human beings d) None of these

60. The Supreme Court can issue the appropriate writ when there is a violation of …..
a) Fundamental right b) Fundamental duties
c) Directive principles d) None of these

61. Which writ can be issued to quash the decision of lower courts?
a) Habeaus corpus b) Mandamus c) Prohibition d) Certiorari

62. The rights of citizens to take out processions or meeting is conferred by
a) Right to form an association b) Right to move anywhere in India
c) Right to assembly d) Right to carryon any trade

63. Which of the following word was added to the preamble of the constitution by the 42nd Amendment Act, 1976?
a) Secular b) Republic c) Sovereign d) Democratic

64. Who can appoint the Chief Justice and other Judges of the Supreme Court?
a) Prime Minister b) President c) Law Minister d) Vice-President

65. The doctrine of 'Rule of Law' is profounded by
a) Dr. A.V. Dicey b) Dr. B.R. Ambedkar c) Kelson d) Bentham

66. What is the source of law in India?
a) Common law principles
b) Constitution of India
c) Supreme Court of India
d) Union Legislature (Parliament)

67. Who can be removed by the process of "impeachment"?
a) Prime Minister b) Governor c) District Judge d) President

68. What is the basic attitude towards responsibility of engineer?
a) Absolute responsibility
b) Reasonable care
c) Personal safety
d) Strict guidelines

69. Which fund is utilized to meet the unforeseen expenditure?
a) Contingency Fund of India
b) Consolidated Fund of India
c) Public Revenue Fund
d) Political Party Fund

70. Attorney-General of India is appointed by
a) Prime Minister
b) Law Minister
c) President
d) Chief Justice of Supreme Court

71. Who can certify the money bill immediately when it is introduced in the Loka Sabha?
a) Speaker b) Deputy Speaker c) Finance Minister d) Prime Minister

72. Under which Article the state has been directed to secure for the citizens a 'uniform civil code' in India?
a) Art. 44 b) Art. 45 c) Art. 48 d) Art. 54

73. Which of the following refers to dishonesty in engineering ethics?
a) Self-interest b) Cooking c) Self-deception d) Fear

74. Who among the following is empowered to suspend or revoke the license to issue digital signature certificate granted to a certifying authority?
a) Adjudicating Officer
b) Central Government
c) Controller
d) Cyber Appellate Tribunal

75. Who can appoint the Presiding Officer of the cyber appellate tribunal?
a) Central Government
b) State Government
c) President
d) Chief Justice of India

76. Software Piracy means
a) An attacker harasses a victim on line
b) Sending huge volumes of e-mail by an abuser to target address
c) Illegal copying, distribution, or use of software/computer
d) any software used to disrupt computer or mobile operations

77. Gaining and unauthorized access to the data or information stored in a computer system is called:
a) Malware b) Hacking c) Phishing d) Web Jacking

78. What is a Mobile or SIM cloning?
a) Thefting of information
b) Someone obtains others personal information
c) Copying the identity of one mobile telephone to another mobile telephone
d) All of the above

79. One of the modes of regulation of internet is .....
a) Customs b) Norms c) International Law d) Native code

80. An important law relating to Indian cyber laws is
a) Right to Information Act b) Right to Education Act
c) the Information Technology Act d) E-Commerce Code

81. 'Fault Tree' method is used
a) To assess the risk b) In engineering research
c) To trace the fault of engineers d) to assess the accuracy of work

82. Under which law, a case is filed to recover damages when harm is caused from technology?
a) Constitutional Law b) Industrial Law c) Law of Torts d) Law of Crimes

83. Revealing confidential information amounts to
a) Misusing the truth
b) Breach of contract
c) Using of Copyright without the permission owner
d) Criminal breach of trust

84. The owner of the patent right retains his patent right for
a) 50 years b) 75 years c) 20 years d) 10 years

85. When a state emergency is declared, who can assume all the functions of State Government?
a) Prime Minister b) President of India
c) Governor of a State d) Union Cabinet

86. The Election Commission has no power to conduct the election to
a) Parliament b) President
c) Speaker of Loka Sabha d) State Legislature

87. Who can appoint Prime Minister of India?
a) The people of India b) The President of India
c) Ruling Legislative Party d) Election Commissioner

88. What is the maximum strength of Rajya Sabha?
a) 224 b) 250 c) 288 d) 543

89. Vice-President of India is elected by the
a) People of India b) Members of State Legislature
c) Members of Rajya Sabha d) Members of both the houses of parliament

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

91. Chief Minister of a state is appointed by
a) Governor b) President
c) High Command of a political party d) Chief Justice of the High Court

92. Which one of the following is not a fundamental duty?
a) Respect the National Flag and National Anthem
b) Not to destroy public property
c) Protection of environment and forest
d) Parents or wards may not send their children to school

93. The constitution empowered State Government to make special law for the protection of
a) Factory workmen
b) Unemployed youth
c) Women and children
d) Farmers

94. Every citizen of India is eligible to vote in an election after attaining the age of
a) 21 years b) 16 years c) 25 years d) 18 years

95. Total number of articles and schedules in Indian Constitution are
a) 397 Articles and 6 Schedules
b) 385 articles and 8 Schedules
c) 440 Articles and 10 Schedules
d) 445 Articles and 12 Schedules

96. In engineering ethics, "tight coupling" means
a) Strong adhesive material
b) Binding two beams tightly
c) Process tightly coupled
d) Erecting two pillars side by side

97. Who is the Constitutional Head of the Nation?
a) Chief Justice of India
b) President of India
c) Prime Minister of India
d) Union External Affairs Minister

98. The resignation letter of President can be received and accepted by
a) Chief Justice of India
b) Vice-President of India
c) Prime Minister of India
d) Speaker of Loka Sabha

99. Who can administer the oath to the Chief Minister and Cabinet Minister of State Government?
a) President of India
b) Governor of State
c) Chief Justice of High Court
d) Advocate-General of State

100. The President can promulgate on ordinance only when
a) The parliament is not in session
b) There is a disagreement between the two houses of parliament
c) The bill is in pending in the parliament for a year and above
d) The Prime Minister recommends at anytime.

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CBCS SCHEME

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18MATDIP31

Third Semester B.E. Degree Examination, Jan./Feb. 2021
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 $(1+\cos\theta+i\sin\theta)^n+(1+\cos\theta-i\sin\theta)^n=2^{n+1}\cos^n\left(\frac{\theta}{2}\right)\cos\left(\frac{n\theta}{2}\right)$. **(08 Marks)**

b. Express $1-i\sqrt{3}$ in the polar form and hence find its modulus and amplitude. **(06 Marks)**

c. Find the argument of $\frac{1+\sqrt{3}i}{1-\sqrt{3}i}$. **(06 Marks)**

OR

2 a. If $\vec{A}=4\hat{i}+3\hat{j}+\hat{k}$ and $\vec{B}=2\hat{i}-\hat{j}+2\hat{k}$ find a unit vector $\hat{N}$ perpendicular to both $\vec{A}$ and $\vec{B}$ such that $\vec{A}$, $\vec{B}$ and N from a right handed system. **(08 Marks)**

b. If $\vec{a}=\hat{i}+2\hat{j}-3\hat{k}$ and $\vec{b}=3\hat{i}-\hat{j}+2\hat{k}$ then show that $(\vec{a}+\vec{b})$ and $(\vec{a}-\vec{b})$ are orthogonal. **(06 Marks)**

c. Show that the position vectors of the vertices of a triangle $\vec{A}=3(\sqrt{3}\,\hat{i}-\hat{j})$, $\vec{B}=6\hat{i}$ and $C=3(\sqrt{3}\hat{i}+j)$ form an isosceles triangle. **(06 Marks)**

Module-2

3 a. Obtain the Maclaurin series expansion of log secx upto to the terms containing x^6. **(08 Marks)**

b. If $u=\tan^{-1}\left(\frac{x^3+y^3}{x-y}\right)$, prove that $xu_x+yu_y=\sin 2u$. **(06 Marks)**

c. If $u=f(x-y,y-z,z-x)$, show that $u_x+u_y+u_z=0$. **(06 Marks)**

OR

4 a. Prove that $\log(1+x)=x-\frac{x^2}{2}+\frac{x^3}{3}-\frac{x^4}{4}\ldots$ by using Maclaurin's series notation. **(08 Marks)**

b. Using Euler's theorem, prove that $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}=3u\log u$. If $u=e^{\frac{x^2y^2}{x+y}}$. **(06 Marks)**

c. If $u=x+y$, $v=y+z$, $w=z+x$, find $J\left(\frac{u,v,w}{x,y,z}\right)$. **(06 Marks)**

Module-3

5 a. A particle moves along the curve $\vec{r}=\cos 2t\,\hat{i}+\sin 2t\,\hat{j}+t\,\hat{k}$, find the velocity and acceleration at $t=\frac{\pi}{8}$ along $\sqrt{2}\,\hat{i}+\sqrt{2}\,\hat{j}+\hat{k}$. **(08 Marks)**

b. Find the unit normal to the surface, $xy+x+zx=3$ at (1, 1, 1). **(06 Marks)**

c. Find the constant 'a' such that the vector field $\vec{F}=2xy^2z^2\hat{i}+2x^2yz^2\hat{j}+ax^2y^2z\hat{k}$ is irrotational. **(06 Marks)**

OR

6 a. If $\vec{F} = (x+y+1)\hat{i} + \hat{j} - (x+y)\hat{k}$ show that $\vec{F}.\text{curl}\,\vec{F} = 0$. **(08 Marks)**

b. If $\phi(x,y,z) = xy^2 + yz^3$, find $\nabla\phi$ & $|\nabla\phi|$ at (1, -2, -1) **(06 Marks)**

c. Show that vector field $\vec{F} = \left[\dfrac{x\hat{i} + y\hat{j}}{x^2+y^2}\right]$ is solenoidal. **(06 Marks)**

Module-4

7 a. Obtain a reduction for $\int_0^{\frac{\pi}{2}} \sin^n x dx$ (n > 0). **(08 Marks)**

b. Evaluate $\int_0^1 \dfrac{x^9}{\sqrt{1-x^2}} dx$. **(06 Marks)**

c. Evaluate $\iint_R xydxdy$ where R is the first quadrant of the circle $x^2 + y^2 = a^2$, $x \geq 0$, $y \geq 0$. **(06 Marks)**

OR

8 a. Obtain a reduction formula for $\int_0^{\frac{\pi}{2}} \cos^n x dx$, (n > 0). **(08 Marks)**

b. Evaluate $\int_0^{2a} x^2\sqrt{2ax - x^2}\,dx$. **(06 Marks)**

c. Evaluate $\int_{-1}^{1}\int_0^{z}\int_{x-2}^{x+2} (x+y+z) dydxdz$ **(06 Marks)**

Module-5

9 a. Solve $\dfrac{dy}{dx} + y\cot x = \sin x$. **(08 Marks)**

b. Solve $\cos x \sin y dx + \cos y \sin x dy = 0$. **(06 Marks)**

c. Solve $\dfrac{dy}{dx} + \dfrac{y}{x} = y^2 x$. **(06 Marks)**

OR

10 a. Solve : $\dfrac{dy}{dx} + \dfrac{y\cos x + \sin y + y}{\sin x + x\cos y + x} = 0$. **(08 Marks)**

b. Solve : $\dfrac{dy}{dx} + \dfrac{y}{x} = y^2 x$. **(06 Marks)**

c. Solve : $\sqrt{1-y^2}dx = (\sin^{-1} y - x)dy$ **(06 Marks)**

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