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18MAT31

Third Semester B.E. Degree Examination, Dec.2019/Jan.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 the Laplace transform of:
- (i) $\left(\frac{4t+5}{e^{2t}}\right)^2$ (ii) $\left(\frac{\sin 2t}{\sqrt{t}}\right)^2$ (iii) $t \cos at$. (10 Marks)
- b. The square wave function $f(t)$ with period $2a$ defined by $f(t) = \begin{cases} 1 & 0 \leq t < a \\ -1 & a \leq t < 2a \end{cases}$. Show that $\left(\frac{1}{s}\right) \tanh\left(\frac{as}{2}\right)$. (05 Marks)
- c. Employ Laplace transform to solve $\frac{d^2y}{dt^2} - \frac{dy}{dt} = 0$, $y(0) = y_1(0) = 3$. (05 Marks)

OR

- 2 a. Find (i) $L^{-1}\left\{\frac{s^2 - 3s + 4}{s^3}\right\}$ (ii) $\cot^{-1}\left(\frac{s}{2}\right)$ (iii) $L^{-1}\left\{\frac{s}{(s+2)(s+3)}\right\}$ (10 Marks)
- b. Find the inverse Laplace transform of $\frac{1}{s(s^2+1)}$ using convolution theorem. (05 Marks)
- c. Express $f(t) = \begin{cases} 2 & \text{if } 0 < t < 1 \\ \frac{t^2}{2} & \text{if } 1 < t < \frac{\pi}{2} \\ \cos t & t > \frac{\pi}{2} \end{cases}$ in terms of unit step function and hence find its Laplace transformation. (05 Marks)

Module-2

- 3 a. Obtain the Fourier series of $f(x) = \begin{cases} 2 & -2 < x < 0 \\ x & 0 < x < 2 \end{cases}$. (08 Marks)
- b. Find the half range cosine series of, $f(x) = (x+1)$ in the interval $0 \leq x \leq 1$. (06 Marks)
- c. Express $f(x) = x^2$ as a Fourier series of period 2π in the interval $0 < x < 2\pi$. (06 Marks)

OR

- 4 a. Compute the first two harmonics of the Fourier Series of $f(x)$ given the following table :

x°	0	60°	120°	180°	240°	300°
y	7.9	7.2	3.6	0.5	0.9	6.8

(08 Marks)

- b. Find the half range sine series of e^x in the interval $0 \leq x \leq 1$.

(06 Marks)

- c. Obtain the Fourier series of $f(x) = \frac{\pi^2}{12} - \frac{x^2}{4}$ valid in the interval $(-\pi, \pi)$

(06 Marks)

Module-3

- 5 a. Find the Infinite Fourier transform of $e^{-|x|}$.

(07 Marks)

- b. Find the Fourier cosine transform of $f(x) = e^{-2x} + 4e^{-3x}$.

(06 Marks)

- c. Solve $u_{n+2} - 3u_{n+1} + 2u_n = 3^n$, given $u_0 = u_1 = 0$.

(07 Marks)

OR

- 6 a. If $f(x) = \begin{cases} 1 & \text{for } |x| \leq a \\ 0 & \text{for } |x| > a \end{cases}$, find the infinite transform of $f(x)$ and hence evaluate $\int_0^{\infty} \frac{\sin x}{x} dx$.

(07 Marks)

- b. Obtain the Z-transform of $\cosh n\theta$ and $\sinh n\theta$.

(06 Marks)

- c. Find the inverse Z-transform of $\frac{4z^2 - 2z}{z^3 - 5z^2 + 8z - 4}$

(07 Marks)

Module-4

- 7 a. Solve $\frac{dy}{dx} = e^x - y$, $y(0) = 2$ using Taylor's Series method upto 4th degree terms and find the value of $y(1.1)$.

(07 Marks)

- b. Use Runge-Kutta method of fourth order to solve $\frac{dy}{dx} + y = 2x$ at $x = 1.1$ given $y(1) = 3$ (Take $h = 0.1$)

(06 Marks)

- c. Apply Milne's predictor-corrector formulae to compute $y(0.4)$ given $\frac{dy}{dx} = 2e^x y$, with

(07 Marks)

x	0	0.1	0.2	0.3
y	2.4	2.473	3.129	4.059

OR

- 8 a. Given $\frac{dy}{dx} = x + \sin y$; $y(0) = 1$. Compute $y(0.4)$ with $h = 0.2$ using Euler's modified method.

(07 Marks)

- b. Apply Runge-Kutta fourth order method, to find $y(0.1)$ with $h = 0.1$ given $\frac{dy}{dx} + y + xy^2 = 0$; $y(0) = 1$.

(06 Marks)

- c. Using Adams-Bashforth method, find $y(4.4)$ given $5x \left(\frac{dy}{dx} \right) + y^2 = 2$ with

x	4	4.1	4.2	4.3
y	1	1.0049	1.0097	1.0143

(07 Marks)

Module-5

- 9 a. Solve by Runge Kutta method $\frac{d^2y}{dx^2} = x\left(\frac{dy}{dx}\right)^2 - y^2$ for $x = 0.2$ correct 4 decimal places, using initial conditions $y(0) = 1, y'(0) = 0, h = 0.2$. (07 Marks)
- 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, $\int_{x_1}^{x_2} y^2 + (y')^2 + 2ye^x dx$. (07 Marks)

OR

- 10 a. Apply Milne's predictor corrector method to compute $\frac{d^2y}{dx^2} = 1 + \frac{dy}{dx}$ and the following table of initial values:

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

(07 Marks)

- b. Find the extremal for the functional, $\int_0^{\frac{\pi}{2}} [y^2 - y'^2 - 2y \sin x] dx$; $y(0) = 0$; $y\left(\frac{\pi}{2}\right) = 1$. (06 Marks)
- c. Prove that geodesics of a plane surface are straight lines. (07 Marks)

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18CV32

Third Semester B.E. Degree Examination, Dec.2019/Jan.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

- Define the four elastic constants. (06 Marks)
 - Derive an expression for the displacement of a tapering circular bar subjected to an axial force. (08 Marks)
 - The modulus of elasticity and shear modulus of a bar is 200Gpa and 80Gpa respectively. Compute the bulk modulus and reduction in diameter of a circular bar 36mm diameter and 3m long, when stretched by 3mm. (06 Marks)

OR

- Write a note on temperature stress in simple bars. (05 Marks)
 - Derive the relation between modulus of elasticity, modulus of rigidity and Poisson's ratio. (08 Marks)
 - A composite tube consists of a steel tube 165mm internal diameter and 15mm thick enclosed by an aluminium tube 200mm internal diameter and 15mm thick. The composite tube carries an axial load of 1500kN. Compute the stresses in each material, load carried by each material and the compression of the composite tube, if its length is 300mm. $E_s = 200\text{Gpa}$ and $E_{AL} = 70\text{Gpa}$. (07 Marks)

Module-2

- Explain maximum shear stress theory of failure. (06 Marks)
 - A closed cylindrical steel vessel 8m long and 2m internal diameter is subjected to an internal pressure of 5MPa with the thickness of the vessel being 36mm. Compute hoop stress, longitudinal stress, maximum shear stress, change in length, change in diameter and change in volume. Assume $E = 200 \text{ kN/mm}^2$ and $\mu = 0.3$. (08 Marks)
 - An element is subjected to a tensile stress of 120N/mm^2 on the vertical plane and another compressive stress of 80N/mm^2 on the horizontal plane. Compute the normal and tangential stresses on a plane making an angle of 30° anticlockwise with the vertical plane. (06 Marks)

OR

- The stresses acting at a point in a two dimensional system is shown in Fig.Q4(a). Determine the principal stresses and planes, maximum shear stress and planes, normal and shear stresses on plane AB. (10 Marks)

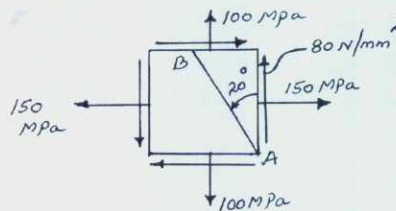


Fig.Q.4(a)

- b. Differentiate between thin and thick cylinders. (03 Marks)
- c. Compute the thickness of the wall of a thick cylinder subjected to an internal pressure of 40 N/mm^2 . The internal diameter of the cylinder is 200 mm and the permissible hoop stress is 140 MPa . Sketch the hoop stress and radial pressure across the thickness assuming zero external pressure. (07 Marks)

Module-3

- 5 a. Define SF, BM and point of contraflexure. (03 Marks)
- b. A simply supported beam AB of span L is subjected to a concentrated load at distance 'a' from left support A. Develop expressions for SF and BM. Sketch SFD and BMD. (05 Marks)
- c. Sketch SFD and BMD for the beam shown in Fig.Q.5(c) indicating the salient points. (12 Marks)

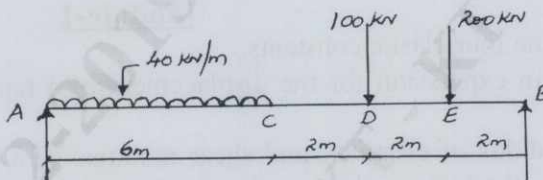


Fig.Q.5(c)

OR

- 6 a. Sketch SFD and BMD for the beam shown in Fig.Q.6(a) indicating salient points.

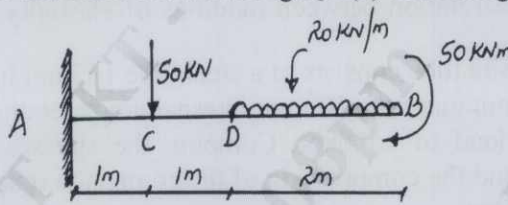


Fig.Q.6(a)

- b. Sketch SFD and BMD for the beam shown in Fig.Q.6(b) indicating salient points including point of contraflexure. (12 Marks)

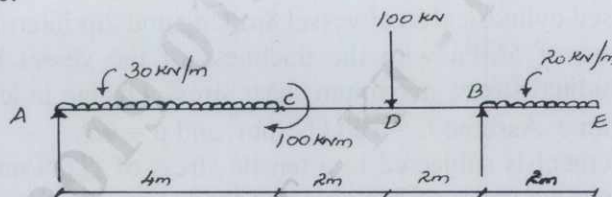


Fig.Q.6(b)

Module-4

- 7 a. Derive the equation of pure bending $\frac{M}{I} = \frac{\sigma}{y} = \frac{E}{R}$ with usual notations. (10 Marks)
- b. A shaft of hollow C/S rotates at 200 rpm transmitting a power of 800 kW with internal diameter = 0.8 times external diameter. Compute the diameters if the maximum shear stress is limited to 100 N/mm^2 and the angle of twist to 1° in a length of 4 m . Assume that the maximum torque is 30% greater than the mean torque and $G = 80 \text{ GPa}$. (10 Marks)

OR

- 8 a. State the assumptions made in the theory of pure torsion. (05 Marks)
 b. Derive an expression for power transmitted by a shaft. (05 Marks)
 c. A I-section consists of flanges 200×15 with web 10mm thick. Total depth of the section is 500mm. If the beam carries a UDL of 35kN/m over a span of 8m, computer the bending and shear stresses at centre and support respectively. Sketch their distributions. (10 Marks)

Module-5

- 9 a. Derive an expression for slope and deflection in a simply supported subjected to UDL throughout. Calculate the maximum slope and deflection. (06 Marks)
 b. Define:
 i) Buckling load
 ii) Effective length
 iii) Slenderness ratio. (06 Marks)
 c. Compute the crippling loads using Euler's and Rankine's formula for a hollow circular column 200mm external diameter and 25mm thick. The length of the column is 4m with both ends hinged. Assume $E = 200\text{GPa}$, Rankine's constants $\sigma_c = 320\text{MPa}$ and $a = 1/7500$. (08 Marks)

OR

- 10 a. Derive an equation for buckling load in a long column with both ends hinged using Euler's column theory. (08 Marks)
 b. Determine the slopes at A and B, deflections at C, D and E in the beam shown in Fig.Q.10(b) in terms of EI. (12 Marks)

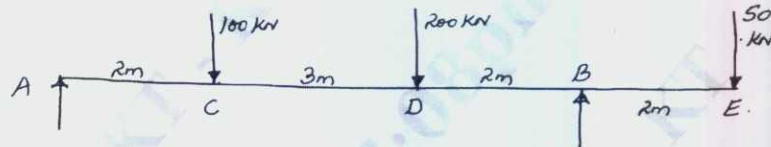


Fig.Q.10(b)

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18CV33

Third Semester B.E. Degree Examination, Dec.2019/Jan.2020

Fluid Mechanics

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Define the following terms: (i) Ideal fluids and Real fluids.
(ii) Surface tension and capillarity. (06 Marks)
- b. State Newton's law of viscosity. Derive an expression for the same. (06 Marks)
- c. The space between the two square flat parallel plates is filled with oil. Each side of the plate is 60cm. The thickness of the oil film is 12.5 mm. The upper plate which moves at 2.5 m/s requires a force of 98.1 N to maintain the speed. Determine the dynamic viscosity of the oil in poise. Also find the kinematic viscosity of the oil in stokes, if the specific gravity of the is 0.95. (08 Marks)

OR

- 2 a. Explain with neat sketches the differential manometer and simple manometer. (06 Marks)
- b. Calculate the gauge pressure and absolute pressure at a point 3 m below the free surface of a liquid having a density of $1.53 \times 10^3 \text{ kg/m}^3$, if the atmospheric pressure is equivalent to 750 mm of mercury. (06 Marks)
- c. Petrol of specific gravity 0.8 flows upwards through a vertical pipe. A and B are two points in the pipe, B being 0.3 m higher than A, connections are led from A and B to a U tube containing mercury. If the difference of pressure between A and B is 0.18 kgf/cm^2 . Find the difference in the mercury level in the differential manometer. (08 Marks)

Module-2

- 3 a. Derive an expression for total pressure and centre of pressure on an inclined plane surface submerged in the liquid. (08 Marks)
- b. A circular plate of 3 m diameter is immersed in water in such a way that its greatest and least depth below the free surface are 4 m and 1.5 m respectively. Determine the total pressure on one face of the plate and position of centre of pressure. (06 Marks)
- c. In a two dimensional flow $\phi = 3xy$ and $\psi = \frac{3}{2}(y^2 - x^2)$. Determine the velocity components at the points (1, 3) and (3, 3). Also find the discharge passing between the streamlines passing through the points given above. (06 Marks)

OR

- 4 a. Define : (i) Uniform flow and Non uniform flow.
(ii) Steady and Unsteady flow.
(iii) Velocity potential and stream function. (06 Marks)
- b. A vertical gate closes a horizontal tunnel 3 m high and 3 m wide running full with water. The pressure at the bottom of the gate is 196.2 kN/m^2 . Determine the total pressure on the gate and position of the centre of pressure. (08 Marks)
- c. Show that streamlines and equipotential lines form a set of perpendicular lines. (06 Marks)

Module-3

- 5 a. Obtain an expression for Euler's equation of motion along a stream line and deduce it to Bernoulli's equation. (08 Marks)
- b. Define impulse momentum equation and give its applications. (04 Marks)

- c. A 300 mm diameter pipe carries water under a head of 20 m with a velocity of 3.5 m/s. If the axis of the pipe turns through 45° . Find the magnitude and direction of the resultant force at the bend. (08 Marks)

OR

- 6 a. Derive the equation for discharge through venturimeter. (08 Marks)
 b. A venturimeter is to be fitted in a pipe of 0.25 m diameter where the pressure head is 7.6 m of flowing liquid and the maximum flow is $8.1 \text{ m}^3/\text{minute}$. Find the diameter of the throat of the venturimeter. Take $C_d = 0.96$. (06 Marks)
 c. A pipeline carrying oil of specific gravity of 0.87 changes in diameter from 200 mm at a point A to 500 mm diameter at point B which is 4 m higher. If the pressure at A and B are 9.81 N/cm^2 and 5.886 N/cm^2 respectively and the discharge is 200 l/s . Determine the loss of head and direction of flow. (06 Marks)

Module-4

- 7 a. Define the hydraulic coefficients (C_C , C_d , C_v) of an orifice and obtain the relation between them. (06 Marks)
 b. Explain the classification of orifice and mouthpiece based on their shape, size, sharpness and discharge. (06 Marks)
 c. Water flows through a triangular right angled weir first and then over a rectangular weir of 1 m width. The C_d values of triangular and rectangular weir are 0.6 and 0.7 respectively. If the depth of water over the triangular weir is 360 mm, find the depth of water over the rectangular weir. (08 Marks)

OR

- 8 a. Explain Cipolletti notch. What is the advantage of Cipolletti notch over trapezoidal notch. (06 Marks)
 b. Water discharge at the rate of 98.2 litre/sec through a 120 mm diameter vertical sharp edged orifice placed under a constant head of 10 m. A point on the jet measured from the venacontracta of the jet has co-ordinate (4.5, 0.54). Find the coefficients C_C , C_v , C_d of the orifice. (08 Marks)
 c. Derive an expression for discharge through a V-notch. (06 Marks)

Module-5

- 9 a. Explain major and minor losses in a pipe flow. Give an expression for head loss due to sudden expansion in pipe line. (08 Marks)
 b. Three pipes of lengths 800 m, 500 m and 400 m and of diameters 500 mm, 400 mm and 300 mm respectively are connected in series. These pipes are to be replaced by a single pipe of length 1700 m. Find the diameter of the single pipe. (06 Marks)
 c. What is the maximum permissible velocity in a cast iron pipeline 10 mm diameter and 15 mm thick which can be suddenly stopped by a valve at the outlet end of the pipe without letting the rise of pressure in the pipe to exceed $1.545 \times 10^3 \text{ kN/m}^2$.
 Take E for cast iron = $123.606 \times 10^9 \text{ N/m}^2$, K for water = $206.01 \times 10^7 \text{ N/m}^2$. Neglect effect of Poisson's ratio. (06 Marks)

OR

- 10 a. Define the term compound pipe and equivalent pipe. Derive the expression for diameter of equivalent pipes. (06 Marks)
 b. Explain Hardy cross method used in pipe networks. (06 Marks)
 c. The population of a city is 8,00,000 and it is to be supplied with water from a reservoir 6.4 km away. Water is to be supplied at the rate of 140 litres per head per day and half the supply is to be delivered in 8 hours. The full supply level of the reservoir is RL 180.00 and its lowest water level is RL 105.00. The delivery end of the main is at RL 22.50 and the head required there is 12 m. Find the diameter of the pipe. Take $f = 0.04$. (08 Marks)

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18CV34

Third Semester B.E. Degree Examination, Dec.2019/Jan.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. Mention the importance of stones Bricks and Timber as construction materials. (06 Marks)
b. Explain the manufacture process of Brick with necessary flow chart. (08 Marks)
c. What is Bulking of Sand? Explain its importance in construction field. (06 Marks)

OR

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

Module-2

- 3 a. Which are the functions of foundation? Explain them briefly. (06 Marks)
b. Sketch the plan of alternate courses I brick thick wall in English bond. Mention its essential features. (08 Marks)
c. What are the General principles to be observed in stone masonry? (06 Marks)

OR

- 4 a. Differentiate between strip footing and strap footing with sketches. (06 Marks)
b. Sketch the elevation of Flemish bond and mention its special features. (08 Marks)
c. Differentiate between uncoursed rubble masonry and Random rubble masonry with a sketch. (06 Marks)

Module-3

- 5 a. Draw a neat sketch of an arch and Label its parts. (06 Marks)
b. Explain the procedure for laying Marble flooring in Grand floor with a sketch. (06 Marks)
c. Mention the requirements of good roof. Draw the sketch of wooden king post truss (half part). (08 Marks)

OR

- 6 a. Discuss various modes of failure of an arch. What are the remedies? (06 Marks)
b. Explain the procedure for laying Mosaic flooring in ground floor with a sketch. (06 Marks)
c. Draw the sketch of wooden Queen post truss (half part) and label its parts. (08 Marks)

Module-4

- 7 a. Draw a sketch of a wooden door frame with shutter and label its parts. (06 Marks)
b. What are the requirements of good stair? (06 Marks)
c. What is meant by shoring? Explain Raking shore with a neat sketch. (08 Marks)

OR

- 8 a. Write a note on Bay window with a sketch. (06 Marks)
b. Plan a dog legged stair for a building in which the vertical distance between the floors is 3.6m. The stair hall measure 2.5m × 5m. (08 Marks)
c. Write a note on Revolving Door with a neat sketch. (06 Marks)

Module-5

- 9 a. What are the requirements of plastering? (06 Marks)
b. Explain various causes of Dampness in building. (06 Marks)
c. Describe the constituents of a paint, mentioning the specific functions of each. (08 Marks)

OR

- 10 a. Write a note on various defects in plastering. (06 Marks)
b. What are the ill effects of dampness in building? Explain them briefly. (06 Marks)
c. Describe the procedure of painting: i) Newly plastered surfaces ii) Iron and steel surfaces. (08 Marks)

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18CV35

Third Semester B.E. Degree Examination, Dec.2019/Jan.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 and explain plane and Geodetic surveying. (08 Marks)
b. Name and Explain important sources of Errors in surveying. (06 Marks)
c. Explain the terms Plans and Maps. Mention their application. (06 Marks)

OR

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

Module-2

- 3 a. Distinguish between prismatic and surveyor's compass. (08 Marks)
b. Name and briefly explain temporary adjustments for prismatic compass. (06 Marks)
c. Define local attraction and explain the Elimination of local attraction in compass surveying. (06 Marks)

OR

- 4 a. Explain with sketches an open traverse and closed traverse. (06 Marks)
b. Determine the correct magnetic bearings of the liner. The following bearings were observed in running a closed traverse:

Line	F.B	B.B
AB	71° 05'	250° 20'
BC	110° 20'	292° 35'
CD	161° 35'	341° 45'
DE	220° 50'	40° 05'
EA	300° 50'	121° 10'

(14 Marks)

Module-3

- 5 a. Define leveling and explain it. (04 Marks)
b. Describe with neat sketch parts of dumpy level. (16 Marks)

OR

- 6 a. Explain the terms mentioning their purpose:
i) Station
ii) Back sight
iii) Turning point
iv) Height of Instruments. (08 Marks)

- b. A level is set up on an extended line BA in a position 70m from A and 100m from B, reads 1.684m on a staff held at A and 2.122m on a staff held at B, the bubble having been carefully brought to the centre of its run before each reading. It is known that the reduced levels of the tops of the pegs at A and B are 89.62m and 89.222m respectively. Find:
- The Collimation error.
 - The Reading that would have been obtained had there been no Collimation error.
- (12 Marks)

Module-4

- 7 a. Explain the working operations of plane table. (06 Marks)
 b. Explain Radiation and Traversing methods of plane table surveying with sketches. (08 Marks)
 c. Describe with sketches two-point problem in plane table surveying. (06 Marks)

OR

- 8 a. Explain briefly Intersection and Resection Methods of plane table surveying with sketches. (10 Marks)
 b. Describe the different Errors in plane table surveying. (10 Marks)

Module-5

- 9 a. What are the General methods of determining Areas? (04 Marks)
 b. 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, 3.8, 3.75, 4.65, 3.6, 4.95, 5.85m. Compute the area between the chain line, the curved boundary and the end offsets by
- Average ordinate rule
 - Trapezoidal rule
 - Simpson's rule.
- (16 Marks)

OR

- 10 a. Explain with sketch planimeter. (07 Marks)
 b. What are the methods of locating Contours in Surveying? (08 Marks)
 c. Explain the calculation of the volume of the capacity of a reservoir with any one relationship. (05 Marks)

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18CV36

Third Semester B.E. Degree Examination, Dec.2019/Jan.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. Discuss the scope of Geology in the field of Civil Engineering. (06 Marks)
b. Explain the Internal structure and Composition of Earth, with neat sketch. (08 Marks)
c. Write description of any two carbonate group of minerals. (06 Marks)

OR

- 2 a. Explain the physical properties of Mineral Hardness, Luster, Structure and Fracture. (12 Marks)
b. Write the description of Minerals :
i) Asbestos ii) Galena iii) Hematite iv) Gypsum. (08 Marks)

Module-2

- 3 a. Define Igneous Rocks. Explain Formation and Forms of Igneous Rocks. (08 Marks)
b. Write short note on Metamorphism. (06 Marks)
c. Explain briefly Soil profile and Drainage patterns. (06 Marks)

OR

- 4 a. Write briefly selection of Rocks as materials for construction. (10 Marks)
b. Explain the classification of sedimentary rocks and write the description of Sand stone and Conglomerate. (10 Marks)

Module-3

- 5 a. Define Fault. With relevant sketch, explain parts and type of faults. (12 Marks)
b. Write short note on Rock Quality Determination and Rock Structure Rating. (08 Marks)

OR

- 6 a. Define Dip and Strike. Discuss briefly selection of site for Dams. (12 Marks)
b. Write difference between Faults and Joints. (08 Marks)

Module-4

- 7 a. What is Aquifers? With neat sketch, explain types of Aquifers. (10 Marks)
b. Discuss the Artificial Recharge and Rain Water Harvesting Methods. (10 Marks)

OR

- 8 a. Explain with a neat sketch, Ground Water Investigation by Electrical Resistivity Method. (10 Marks)
b. Write short note on Hydrological cycle and Water pollution. (10 Marks)

Module-5

- 9 a. Define Earthquake. With a neat sketch, explain Seismograph. (08 Marks)
b. Write briefly Development of Remote Sensing. (06 Marks)
c. Define Topography and Contour Maps. (06 Marks)

OR

- 10 Write short note on :
a. Global positioning system
b. Tsunami.
c. Soil creep.
d. Components of GIS. (20 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.

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18MATDIP31

Third Semester B.E. Degree Examination, Dec.2019/Jan.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. Express the following complex number in the form of $x + iy$: $\frac{(1+i)(1+3i)}{1+5i}$. (06 Marks)
- b. Prove that $\left(\frac{\cos\theta + i\sin\theta}{\sin\theta + i\cos\theta}\right)^4 = \cos 8\theta + i\sin 8\theta$. (07 Marks)
- c. If $\vec{a} = (3, -1, 4)$, $\vec{b} = (1, 2, 3)$ and $\vec{c} = (4, 2, -1)$, find $\vec{a} \times (\vec{b} \times \vec{c})$. (07 Marks)

OR

- 2 a. Find the angle between the vectors, $\vec{a} = 5\hat{i} - \hat{j} + \hat{k}$ and $\vec{b} = 2\hat{i} - 3\hat{j} + 6\hat{k}$. (06 Marks)
- b. Prove that $\left[\vec{a} \times \vec{b}, \vec{b} \times \vec{c}, \vec{c} \times \vec{a}\right] = \left[\vec{a}, \vec{b}, \vec{c}\right]^2$ (07 Marks)
- c. Find the fourth roots of $-1 + i\sqrt{3}$ and represent them on the argand diagram. (07 Marks)

Module-2

- 3 a. Obtain the Maclaurin's expansion of $\log_e(1+x)$. (06 Marks)
- b. If $u = \sin^{-1}\left[\frac{x^3 + y^3}{x + y}\right]$, prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = 2 \tan u$. (07 Marks)
- c. If $u = x(1-y)$, $v = xy$, find $\frac{\partial(u, v)}{\partial(x, y)}$. (07 Marks)

OR

- 4 a. Obtain the Maclaurin's series expansion of the function $\log_e \sec x$. (06 Marks)
- b. If $u = x^2 - 2y$; $v = x + y$ find $\frac{\partial(u, v)}{\partial(x, y)}$. (07 Marks)
- c. If $u = f(x-y, y-z, z-x)$, prove that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$. (07 Marks)

Module-3

- 5 a. Find the velocity and acceleration of a particle moves along the curve, $\vec{r} = e^{-2t}\hat{i} + 2\cos 5t\hat{j} + 5\sin 2t\hat{k}$ at any time t . (06 Marks)
- b. Find $\text{div } \vec{F}$ and $\text{curl } \vec{F}$, where $\vec{F} = \nabla(x^3 + y^3 + z^3 - 3xyz)$. (07 Marks)
- c. Show that $\vec{F} = (2xy + z^2)\hat{i} + (x^2 + 2yz)\hat{j} + (y^2 + 2xz)\hat{k}$ is conservative force field and find the scalar potential. (07 Marks)

OR

- 6 a. Show that the vector field, $\vec{F} = (3x + 3y + 4z)\hat{i} + (x - 2y + 3z)\hat{j} + (3x + 2y - z)\hat{k}$ is solenoidal. (06 Marks)
- b. Find the directional derivative of $\phi = \frac{xz}{x^2 + y^2}$ at $(1, -1, 1)$ in the direction of $\vec{A} = \hat{i} - 2\hat{j} + \hat{k}$. (07 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. (07 Marks)

Module-4

- 7 a. Find the reduction formula for $\int_0^{\frac{\pi}{2}} \sin^n x dx$. (06 Marks)
- b. Evaluate $\int_0^1 \int_0^3 x^3 y^3 dx dy$. (07 Marks)
- c. Evaluate $\int_0^3 \int_0^2 \int_0^1 (x + y + z) dz dx dy$. (07 Marks)

OR

- 8 a. Evaluate: $\int_0^{\frac{\pi}{6}} \sin^6(3x) dx$. (06 Marks)
- b. Evaluate: $\int_0^1 \int_x^{\sqrt{x}} xy dy dx$. (07 Marks)
- c. Evaluate: $\int_0^1 \int_0^{1-x} \int_0^{1-x-y} xyz dz dy dx$. (07 Marks)

Module-5

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

OR

- 10 a. Solve: $(5x^4 + 3x^2y^2 - 2xy^3)dx + (2x^3y - 3x^2y^2 - 5y^4)dy = 0$. (06 Marks)
- b. Solve: $\frac{dy}{dx} + x \sin 2y = x^3 \cos^2 y$. (07 Marks)
- c. Solve: $[1 + (x + y) \tan y] \frac{dy}{dx} + 1 = 0$. (07 Marks)

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Question Paper Version : C

Third Semester B.E. Degree Examination, Dec.2019/Jan.2020
Constitution of India and 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. Who appoints Lieutenant Governor General to Delhi
a) PM b) Law Minister c) President d) Vice - President
 2. Who acts as a President when neither the President nor the Vice – President is available
a) Speaker of Lok Sabha b) Attorney General of India
c) Chief Justice of India d) Speaker of Rajya Sabha
 3. How many judges are there in the SC including Chief Justice of India?
a) 15 b) 19 c) 25 d) 31
 4. The Parliamentary system of the Indian Constitution is borrowed from
a) Britain Constitution b) Objective Constitution
c) Canada Constitution d) Australian Constitution
 5. The final interpreter to the Indian Constitution is
a) Speaker of LS b) Parliament c) President d) Supreme Court
 6. The person arrested has to be produced before Magistrate within
a) 1 week b) 24 hours c) 72 hours d) 2 months
 7. Which is the language to be used in Parliament
a) Kannada b) Hindi c) English d) Both (b) & (c)

21. To become a Judge of High Court, one must be practicing Advocate of High Court for a period of atleast _____ years
 a) 20 b) 10 c) 15 d) 5
22. The Constitution empowers State Government to make Special Law for
 a) Workers b) Teachers c) Women & Children d) Farmers
23. Directive principles come under _____ of the Constitution
 a) Part - II b) Part - III c) Part - IV d) Part - I
24. The system of Legislature in the State of Karnataka is
 a) Bicameral b) Unicameral c) Cameral d) Multi cameral
25. The Mandal Commission, was Constituted relating to
 a) Reservation of SCs b) Reservation to STs
 c) Reservation d) Reservation to Backward classes
26. Who is appointing Chief Election Commissioner?
 a) Prime Minister b) Law Minister c) President d) Vice - President
27. Who is the Ex - Officio Chairman of Rajya Sabha?
 a) President b) Vice - President c) Prime Minister d) Governor
28. Vice - President of India is elected
 a) By the people
 b) By the members of State Legislature Assembly
 c) By the members of Rajya Sabha
 d) By the members of both the houses of Parliament at a joint sitting.
29. Which Amendment deals with the establishment of Municipalities a part of Constitution system?
 a) 44th b) 74th c) 76th d) 86th
30. Who appoints the Governor of the State?
 a) Chief Justice of India b) Chief Justice of State
 c) Chief Minister d) President
31. When the Indian Constitution enacted and adopted?
 a) 26/10/1949 b) 26/12/1949 c) 26/11/1949 d) 26/01/1949
32. When the Indian Constitution gives effect
 a) 26/10/1949 b) 26/12/1949 c) 26/01/1950 d) 26/01/1949
33. Which of the following word was added in the Preamble of the Constitution by 42nd Amendment Act 1976
 a) Socialist b) Sovereign c) Federal d) Republic
34. The President power to suspend death sentence temporarily is called
 a) Respite b) Reprieve c) Remission d) Constitution

35. The Preamble of the Constitution has been amended so far
a) 4 times b) 3 times c) twice d) Once
36. Who are not entitled to form Union
a) Students b) Police c) Teachers d) Entrepreneurs
37. Which is not a Fundamental Right
a) Right against exploitation b) Right to freedom of religion
c) Right to strike d) Right to equality
38. Which of the following is not one of the 3 organs of state / Union
a) Executive b) Press c) Judiciary d) Legislation
39. How many Anglo Indians and others can be nominated by the President to the Lok Sabha and Rajyasabha
a) 2 & 12 b) 2 & 10 c) 1 & 12 d) 1 & 10
40. Which state Constitution has been removed by the Parliament of India?
a) West Bengal b) Nagaland c) Sikkim d) Jammu & Kashmir
41. When the office of the President falls vacant, the same must be filled up within
a) 4 months b) 6 months c) 12 months d) 18 months
42. The Preamble of the Constitution indicates
a) Power to make laws
b) The sovereign of Indian Constitution
c) Power of Parliament to amend the Constitution
d) Sources of Constitution.
43. Which important human right is protected under Article 21
a) Right to Equality b) Right to life and liberty
c) Right to freedom of speech d) Right to religion
44. Right to Equality is guaranteed under Article
a) 13 b) 15 c) 16 d) 14
45. No person shall be punished for same offence more than once
a) Jeopardy b) Double Jeopardy
c) Ex-post facto law d) Testimonial compulsion
46. The Rajya Sabha
a) Is a Permanent House b) Has a life of 6 years
c) Has a life of 5 years d) Has a life of 7 years
47. The Quorum or minimum number of members required to hold the meetings of either houses of the Parliament is
a) One - tenth b) One - fifth c) One - third d) One - fourth
48. The Advice of Supreme Court is
a) Binding on the President
b) Not binding on the President
c) Binding on the President if it is tendered unanimously
d) None of these

49. Article 19 provides
 a) 6 freedoms b) 7 freedoms c) 8 freedoms d) 5 freedoms
50. Who is the present speaker of Lok Sabha
 a) Sumithra Mahajan b) K.S Hegde c) Om Birla d) Venkiah Naidu
51. Which is the landmark Judgement passed by the Supreme Court in respect to Preamble of Constitution
 a) Beur beri b) Keshavananda Bharathi
 c) Menaka Gandhi d) Sonia Gandhi
52. Who is the neutral person in the affairs of party politics
 a) C.M b) Home Minister c) Finance Minister d) Speaker
53. Indian Constitution guarantees reservation of seats to SC & ST in
 a) Lok Sabha and Assembly b) Lok Sabha only
 c) Lok Sabha and Rajya Sabha d) Rajya Sabha
54. Who will preside over the joint session of both the houses of the Parliament
 a) President b) Prime Minister c) Speaker d) Law Minister
55. What is the minimum age for becoming M.P in Rajya Sabha and Lok Sabha
 a) 18 and 25 b) 25 and 18 c) 25 and 30 d) 30 and 25
56. India is referred to as _____ under the Indian Constitution
 a) Country b) Hindustan c) India d) Bharat
57. The citizens can enforce their Fundamental Rights before SC under
 a) Article 31 b) Article 32 c) Article 33 d) Article 34
58. Who quoted "Child of Today is Citizen of Tomorrow"?
 a) L. Tilak b) Jawaharlal Nehru c) B.R. Ambedkar d) Gandhiji
59. What is the minimum age required for casting of Vote
 a) 18 b) 19 c) 20 d) 21
60. Who quoted "Freedom is my birth right"?
 a) L. Tilak b) Jawaharlal Nehru c) Sardar Patel d) Gandhiji
61. Salaries and other emoluments of the High Court Judges shall be determined by the
 a) Governor b) Parliament c) Chief Minister d) State Legislature
62. According to 74th Amendment Act of 1993, which subject has been incorporated?
 a) Municipalities b) Co-operative Society
 c) Gram Panchayat d) Taluk Panchayat
63. IP Sec is designed to withstand replay attacks through the use of
 a) Sequence numbers b) Nonces
 c) Nonces + Sequence numbers d) Timestamps

64. The Key Confirmation Key [KCK] is used to
- Integrity – protect data between the station and the AP
 - Integrity – protect messages in the four – way hand shake
 - Encrypt data between the station and the AP
 - Encrypt the message containing the group key.
65. Which of the following is true in a Smurf Attack?
- The Victim receives large number of UDP packers to non – listening ports
 - The Victim receives large number of TCP SYN – ACK packers
 - The Victim receives large number of ICMP “Echo Request” messages
 - The Victim receives large number of ICMP “Echo Reply” messages.
66. A persistent cross – site scripting attack saves malicious code on
- The client
 - The server
 - Both client & server
 - Neither (a) & (b)
67. The possible goal of an attacker is sending packets with invalid combinations of TCP header flag is to
- Launch a SYN flood attack
 - Find which services are open
 - Perform OS finger printing
 - Determine the addressing schema within an organisation
68. The SOAP binding refers to
- The object bound to a SOAP message
 - The XML schema of a SOAP message
 - The mapping between a SOAP message underlying transport protocol
 - The headers in a SOAP message
69. The EKE protocol is resistant to
- Replay attacks
 - Man – in – the middle attacks
 - Dictionary attacks
 - Reflection attacks
70. The SIM authenticates itself to the MSC/HLR using
- A user password
 - A digital certificate
 - A response to a challenge
 - An encrypted signaling message.
71. One of the salient features of our constitution in
- It is fully rigid
 - It is fully flexible
 - It is partly rigid and partly flexible
 - None of these
72. A person to be appointed as a Governor of a State must have completed the age of
- 30 years
 - 35 years
 - 45 years
 - 50 years
73. The Chief Election Commission holds office for a period of
- 3 years
 - 6 years
 - 5 years
 - 6 years or till he attains age of 65 years
74. The procedure for amending the constitution is detailed under
- Article 360
 - Article 368
 - Article 352
 - Article 301
75. Writ of Mandamus can be issued on the ground of
- Non – performance of public duties
 - Unlawful Detention
 - Unlawful occupation of public office
 - None of these

90. One way of misusing the truth is
a) Exaggerating the truth
b) Making wrong statement
c) Making confused statement
d) Failure to seek out the truth
91. The Chief Justice of High – Court is appointed by
a) President
b) Chief Minister
c) Prime Minister
d) Governor
92. Which is Not a Fundamental right
a) Right to freedom
b) Right to Constitutional remedy
c) Right to property
d) Right to equality
93. The tenure of Vice – President
a) 2 years
b) 5 years
c) 3 years
d) 1 year
94. How many Schedules are there in Indian Constitution?
a) 7
b) 5
c) 12
d) 6
95. The membership of Legislative Assembly of State varies between
a) 60 & 500
b) 100 & 300
c) 150 & 450
d) 100 & 400
96. According to Indian Constitution, the power of amending the Constitution is vested with
a) Parliament
b) President
c) People
d) The Prime Minister of India
97. Engineers can use code of ethics as guidelines to
a) Resolve the conflicts
b) Formulate the problem
c) Shift of Responsibility
d) Overcome the work pressure
98. What is the maximum strength of Lok Sabha
a) 500
b) 545
c) 552
d) 550
99. Union list has
a) 95 subjects
b) 97 subjects
c) 105 subjects
d) 66 subjects
100. The Fundamental Rights of Indian citizen are contained in
a) Part – III of Constitution
b) Part – IV of Constitution
c) The 7th Schedule of Constitution
d) None of these
