

CBCS SCHEME

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17MAT31

Third Semester B.E. Degree Examination, Dec.2019/Jan.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 expansion of $f(x) = x - x^2$ in $(-\pi, \pi)$, hence deduce that $\frac{\pi^2}{12} = \frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots$. (08 Marks)
- b. Find the half range cosine series for the function $f(x) = (x - 1)^2$ in $0 \leq x \leq 1$. (06 Marks)
- c. Express y as a Fourier series upto first harmonics given :

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

(06 Marks)

OR

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

$$f(x) = \begin{cases} 1 + \frac{4x}{3} & \text{in } -\frac{3}{2} < x \leq 0 \\ 1 - \frac{4x}{3} & \text{in } 0 \leq x < \frac{3}{2} \end{cases}$$

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

(08 Marks)

- b. If $f(x) = \begin{cases} x & \text{in } 0 < x < \frac{\pi}{2} \\ \pi - x & \text{in } \frac{\pi}{2} < x < \pi \end{cases}$

Show that the half range sine series as

$$f(x) = \frac{4}{\pi} \left[\sin x - \frac{\sin 3x}{3^2} + \frac{\sin 5x}{5^2} - \dots \right]$$

(06 Marks)

- c. Obtain the Fourier series upto first harmonics given :

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

(06 Marks)

Module-2

- 3 a. Find the complex Fourier transform of the function :

$$f(x) = \begin{cases} 1 & \text{for } |x| \leq a \\ 0 & \text{for } |x| > a \end{cases} \quad \text{and hence evaluate } \int_0^{\infty} \frac{\sin x}{x} dx .$$

(08 Marks)

- b. Find the Fourier cosine transform of e^{-ax} .

(06 Marks)

- c. Solve by using z - transforms $u_{n+2} - 4u_n = 0$ given that $u_0 = 0$ and $u_1 = 2$.

(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

- 4 a. Find the Fourier sine and Cosine transforms of :

$$f(x) = \begin{cases} x & 0 < x < 2 \\ 0 & \text{elsewhere} \end{cases}$$

(08 Marks)

- b. Find the Z – transform of : i)
- n^2
- ii)
- ne^{-an}
- .

(06 Marks)

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

(06 Marks)

Module-3

- 5 a. Obtain the lines of regression and hence find the co-efficient of correlation for the data :

| | | | | | | | | | | |
|---|---|---|----|---|----|----|----|----|----|----|
| x | 1 | 3 | 4 | 2 | 5 | 8 | 9 | 10 | 13 | 15 |
| y | 8 | 6 | 10 | 8 | 12 | 16 | 16 | 10 | 32 | 32 |

(08 Marks)

- b. Fit a parabola
- $y = ax^2 + bx + c$
- in the least square sense for the data :

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

(06 Marks)

- c. Find the root of the equation
- $xe^x - \cos x = 0$
- by Regula – Falsi method correct to three decimal places in (0, 1).

(06 Marks)

OR

- 6 a. If
- $8x - 10y + 66 = 0$
- and
- $40x - 18y = 214$
- are the two regression lines, find the mean of x's, mean of y's and the co-efficient of correlation. Find
- σ_y
- if
- $\sigma_x = 3$
- .

(08 Marks)

- b. Fit an exponential curve of the form
- $y = ae^{bx}$
- by the method of least squares for the data :

| | | | | | | |
|----------------|-----|----|----|---|---|----|
| No. of petals | 5 | 6 | 7 | 8 | 9 | 10 |
| No. of flowers | 133 | 55 | 23 | 7 | 2 | 2 |

(06 Marks)

- c. Using Newton–Raphson method, find the root that lies near
- $x = 4.5$
- of the equation
- $\tan x = x$
- correct to four decimal places.

(06 Marks)

Module-4

- 7 a. From the following table find the number of students who have obtained marks :
-
- i) less than 45 ii) between 40 and 45.

| | | | | | |
|-----------------|---------|---------|---------|---------|---------|
| Marks | 30 – 40 | 40 – 50 | 50 – 60 | 60 – 70 | 70 – 80 |
| No. of students | 31 | 42 | 51 | 35 | 31 |

(06 Marks)

- b. Using Newton's divided difference formula construct an interpolating polynomial for the following data :

| | | | | | | |
|------|----|-----|-----|-----|------|------|
| x | 4 | 5 | 7 | 10 | 11 | 13 |
| f(x) | 48 | 100 | 294 | 900 | 1210 | 2028 |

and hence find $f(8)$.

(08 Marks)

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

(06 Marks)

OR

- 8 a. In a table given below, the values of y are consecutive terms of a series of which 23.6 is the 6th term. Find the first and tenth terms of the series by Newton's formulas.

| | | | | | | | |
|---|-----|-----|------|------|------|------|------|
| x | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| y | 4.8 | 8.4 | 14.5 | 23.6 | 36.2 | 52.8 | 73.9 |

(08 Marks)

- b. Fit an interpolating polynomial of the form $x = f(y)$ for data and hence find $x(5)$ given :

| | | | |
|---|---|----|----|
| x | 2 | 10 | 17 |
| y | 1 | 3 | 4 |

(06 Marks)

- c. Use Simpson's $\frac{1}{3}$ rd rule to find $\int_0^{0.6} e^{-x^2} dx$ by taking 6 sub-intervals.

(06 Marks)

Module-5

- 9 a. Verify Green's theorem in the plane for $\oint_C (3x^2 - 8y^2)dx + (4y - 6xy)dy$ where C is the closed curve bounded by $y = \sqrt{x}$ and $y = x^2$. (08 Marks)
- b. Evaluate $\int_C xy dx + xy^2 dy$ by Stoke's theorem where C is the square in the $x - y$ plane with vertices $(1, 0)(-1, 0)(0, 1)(0, -1)$. (06 Marks)
- c. Prove that Catenary is the curve which when rotated about a line generates a surface of minimum area. (06 Marks)

OR

- 10 a. If $\vec{F} = 2xy \hat{i} + yz^2 \hat{j} + xz \hat{k}$ and S is the rectangular parallelepiped bounded by $x = 0, y = 0, z = 0, x = 2, y = 1, z = 3$ evaluate $\iint_S \vec{F} \cdot \hat{n} ds$. (08 Marks)
- b. Derive Euler's equation in the standard form viz $\frac{\partial f}{\partial y} - \frac{d}{dx} \left[\frac{\partial f}{\partial y'} \right] = 0$. (06 Marks)
- c. Find the external of the functional $I = \int_0^{\pi/2} (y^2 - y^{12} - 2y \sin x) dx$ under the end conditions $y(0) = y(\pi/2) = 0$. (06 Marks)

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17CV/CT32

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

- 1 a. Define : (i) Stress (ii) Strain (04 Marks)
- b. Derive the expression for elongation of tapering circular bar due to an axial load P. Use standard notations. (08 Marks)
- c. A circular bar of uniform cross sectional area of 1000 mm^2 is subjected to forces as shown in Fig. Q1 (c). If Young's modulus for the material is 200 GPa, determine the total deformation. (08 Marks)

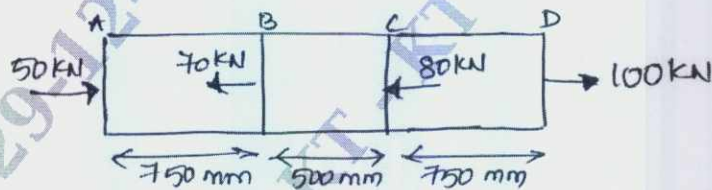


Fig. Q1 (c)

OR

- 2 a. Derive the relationship between Young's modulus, modulus of rigidity and Poisson's ratio. (06 Marks)
- b. A bar of 30 mm diameter is subjected to a pull of 60 kN. The measured extension on gauge length of 200 mm is 0.1 mm and change in diameter is 0.004 mm. Calculate (i) Young's modulus (ii) Poisson's ratio (iii) Bulk modulus. (06 Marks)
- c. A steel rod of 200 mm diameter passes centrally through a copper tube of 50 mm external diameter and 40 mm internal diameter. The tube is closed at each end and the nuts are tightened on the projecting points of rod. If the temperature of the assembly is raised by 50°C . Calculate the temperature stresses developed in copper and steel.
Take $E_s = 200 \text{ GN/m}^2$; $E_c = 100 \text{ GN/m}^2$ and $\alpha_s = 12 \times 10^{-6} \text{ per } ^\circ\text{C}$ and $\alpha_c = 18 \times 10^{-6} \text{ per } ^\circ\text{C}$. (08 Marks)

Module-2

- 3 a. Define (i) Principal stress (ii) Principal plane (04 Marks)
- b. Derive expression for normal stress and tangential stress for a member subjected to uniaxial loading. (06 Marks)
- c. At a point in a strained material, the stresses are as shown in Fig. Q3 (c). Determine the
(i) Principal stress
(ii) Normal and tangential stress on the plane AB.
(iii) Maximum shear stress. (10 Marks)

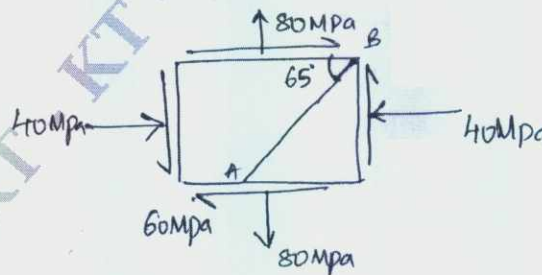


Fig. Q3 (b)

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

- 4 a. Derive expression for hoop stress and longitudinal stress for a thin cylindrical vessel subjected to an internal fluid pressure. (10 Marks)
- b. Determine the maximum and minimum hoop stress across the section of a pipe of 400 mm internal diameter and 100 mm thick, when the pipe contains a fluid at a pressure of 8 N/mm². Also sketch the radial pressure distribution and hoop stress distribution. (10 Marks)

Module-3

- 5 a. Derive the relationship between load intensity, shear force and bending moment. (08 Marks)
- b. For a simply supported beam subjected to a UDL of intensity W/unit length throughout plot the SFD and BMD and prove that maximum bending moment is $\frac{\omega l^2}{8}$. (06 Marks)
- c. For the Cantilever beam shown in Fig. Q5 (c), plot the SFD and BMD.

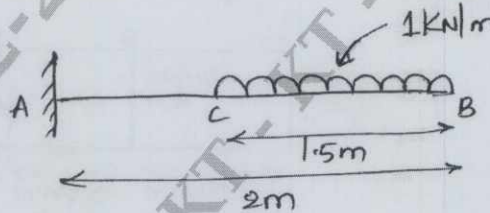


Fig. Q5 (c)

(06 Marks)

OR

- 6 a. A simply supported beam is subjected to a UDL of 30 kN/m together with a point load of 30 kN as shown in Fig. Q6 (a). Draw SFD and BMD. Find also point of zero shear and its corresponding BM.

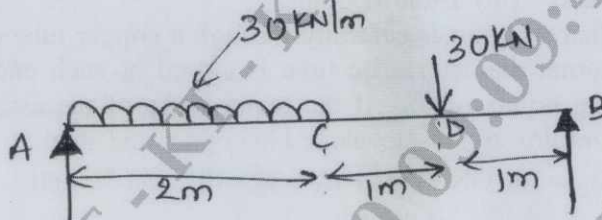


Fig. Q6 (a)

(10 Marks)

- b. For the overhanging beam shown in Fig. Q6 (b), plot the SFD and BMD. Locate points of contraflexure if any.

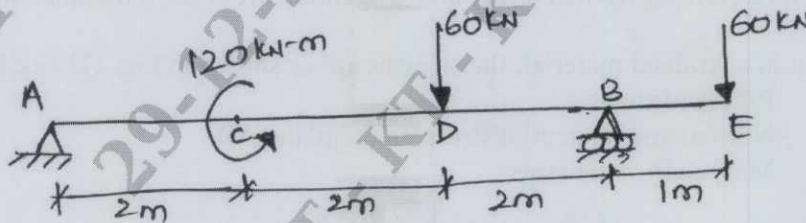


Fig. Q6 (b)

(10 Marks)

Module-4

- 7 a. State the different theories of failure. Explain any two briefly. (10 Marks)
- b. Derive the torsion equation with usual notations. (10 Marks)

OR

- 8 a. A solid shaft is to transmit 300 kN-m at 100 rpm. If the shear stress of the material should not exceed 80 MPa, find the diameter required. What percentage saving in weight would be obtained if this shaft is replaced by a hollow one whose $d_i = 0.6d_o$, the length, material and shear stress remaining same. (10 Marks)
- b. Determine the diameter of a bolt which is subjected to an axial pull of 9 kN together with a transverse shear force of 4.5 kN using,
- Maximum principal stress theory
 - Maximum principal strain theory.
- Given the elastic limit in tension = 225 N/mm²; Factor of safety = 3
Poisson's ratio = 0.3 (10 Marks)

Module-5

- 9 a. What are the assumptions in bending theory? (04 Marks)
- b. Derive the equation $\frac{M}{I} = \frac{\sigma}{y} = \frac{E}{R}$ of theory of simple bending with usual notations. (08 Marks)
- c. A rolled steel joint of I-section has the dimensions as shown in Fig. Q9 (c). This beam of I-section carries a UDL of 40 kN/m run on a span of 10 m. Calculate the maximum stress produced due to bending. (08 Marks)

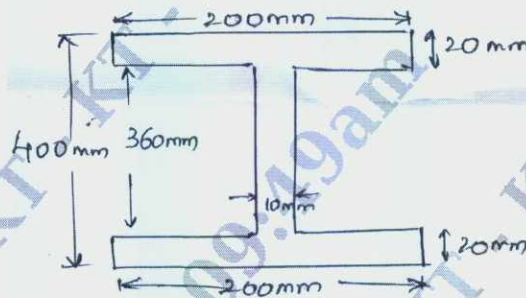


Fig. Q9 (c)

OR

- 10 a. State the assumptions made in Euler's theory. (04 Marks)
- b. Derive the Euler's equation for buckling load on an elastic column with both ends pinned or hinged. (08 Marks)
- c. A simply supported beam of length 40 m is subjected to a UDL of 30 kN/m over the whole span and deflects 15 mm at the centre. Determine the crippling loads when this beam is used as a column with the following conditions:
- One end fixed and other end hinged.
 - Both ends pin jointed.
- Take length of beam, $l = 4000$ mm and UDL, $w = 30$ kN/m, Deflection at centre = 15 mm. (08 Marks)

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17CV33

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

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- Define the following with symbols and units:
i) Mass density ii) Specific weight iii) Specific gravity. (06 Marks)
 - An oil film of thickness 1.5mm is used for lubrication between a square plate of size 0.9m × 0.9m and an inclined plane having an angle of inclination 20°. The weight of the square is 392.4N and it slides down the plane with a uniform velocity of 0.2m/s. Find the dynamic viscosity of the oil. (06 Marks)
 - Find the manometer reading 'h' for the Fig.Q.1(c) shown below. (08 Marks)

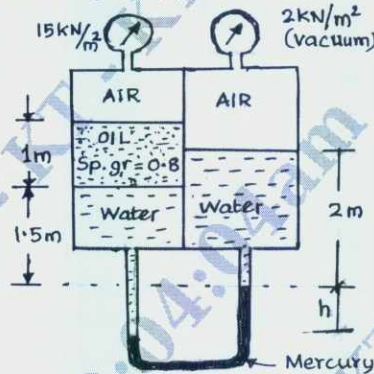


Fig.Q.1(c)

OR

- The surface tension of water in contact with air is given as 0.0725 N/m. The pressure outside the droplet of water of diameter 0.02mm is atmospheric (10.32 N/cm²). Calculate the pressure within the droplet of water. (04 Marks)
 - A shaft of diameter 120mm is rotating inside a journal bearing of diameter 122mm at a speed of 360rpm. The space between the shaft and the bearing is filled with a lubricating oil of viscosity 6 poise. Find the power absorbed in oil if the length of bearing is 100mm. (08 Marks)
 - State and prove the Pascal's law. (08 Marks)

Module-2

- Derive an expression for the force exerted on a submerged vertical plane surface by the static liquid and locate the position of centre of pressure. (10 Marks)
 - In a two-dimensional incompressible flow, the fluid velocity components are given by $u = x - 4y$ and $v = -y - 4x$. Show that velocity potential exists and determine its form. Find also the stream function. (10 Marks)

OR

- 4 a. What are the methods of describing fluid flow? Explain briefly. (04 Marks)
 b. Define the equation of continuity. Obtain an expression for a three-dimensional continuity equation in Cartesian coordinate system. (08 Marks)
 c. Find the magnitude and direction of the resultant water pressure acting on a curved face of a dam which is shaped according to the relation $y = x^2/9$ as shown in Fig.Q.4(c). The height of the water retained by the dam is 10m. Consider the width of the dam as unity. (08 Marks)

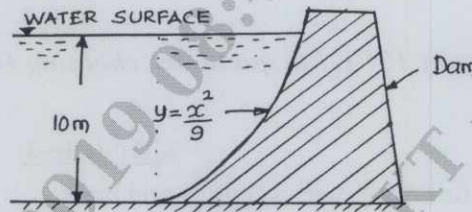


Fig.Q.4(c)

Module-3

- 5 a. State Bernoulli's theorem. Derive an expression for Bernoulli's theorem from first principle and state the assumptions made for such a derivation. (10 Marks)
 b. A horizontal venturimeter with inlet diameter 30cm and throat diameter 15cm is used to measure the flow of oil of specific gravity 0.8. The discharge of oil through venturimeter is 50 litres/s, find the reading of the oil-mercury differential manometer. Take $C_d = 0.98$. (10 Marks)

OR

- 6 a. A pipe line carrying oil of specific gravity 0.87, changes in diameter from 200mm diameter at a position A to 500mm diameter at a position B, which is 4 metres at a higher level. If the pressures A and B are 9.81 N/cm^2 and 5.886 N/cm^2 respectively and the discharge is 200 litres/s determine the loss of head and direction of flow. (10 Marks)
 b. A 45° reducing bend is connected in a pipe line, the diameters at the inlet and outlet of the bend being 40cm and 20cm respectively. Find the force exerted by water on the bend if the intensity of pressure at inlet of bend is 21.58 N/cm^2 . The rate of flow of water is 500 litres/s. (10 Marks)

Module-4

- 7 a. Define an orifice and a mouthpiece. What are hydraulic coefficients? Explain them. (06 Marks)
 b. The head of water over an orifice of diameter 40mm is 10m. Find the actual discharge and actual velocity of the jet at vena-contracta. Take $C_d = 0.6$ and $C_v = 0.98$. (04 Marks)
 c. Water flows over a rectangular weir 2m wide at a depth of 200mm and afterwards passes through a triangular right-angled weir. Take C_d for the rectangular and triangular weir as 0.63 and 0.59 respectively, find the depth over the triangular weir. (10 Marks)

OR

- 8 a. Derive an expression for the discharge over a triangular notch. (10 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 0.45m in 30 seconds. Also the coordinates of a certain point on the jet, measured from vena-contracta are 100cm horizontal and 5.2cm vertical. Find the hydraulic coefficients C_{α} , C_v and C_c . (10 Marks)

Module-5

- 9 a. Derive Darcy-Weisbach equation for head loss due to friction in a pipe. (10 Marks)
- b. 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 intensity pressure in smaller pipe is 11.772 N/cm^2 . Determine:
- Loss of head due to sudden enlargement
 - Pressure intensity in large pipe
 - Power lost due to enlargement. (10 Marks)

OR

- 10 a. A pipe line of 0.6m diameter is 1.5km long. To increase the discharge, another line of the same diameter is introduced parallel to the first in the second half of the length. Neglecting minor losses, find the increase in discharge if $4f = 0.04$. The head at inlet is 300mm. (10 Marks)
- b. 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 sudden closure of valve and pipe is elastic. (10 Marks)

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17CV34

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

- Differentiate clearly between plane and geodetic surveying. (06 Marks)
 - Discuss in brief the basic principles of surveying. (06 Marks)
 - A rectangular plot of land measures 20 cm × 30 cm on a village map drawn to a scale of 100 m to 1 cm. Calculate its area in hectares. If the plot is redrawn on a toposheet to a scale of 1 km to 1 cm, what will be its area on toposheet. Also determine the RF of the scale of village map as well as toposheet. (08 Marks)

OR

- Explain: (i) Method of taping on sloping ground (ii) Direct method of ranging. (08 Marks)
 - To continue a survey line AB past an obstacle, a line BC 200 meters long was set out perpendicular to AB and from C angles BCD and BCE were set out at 60° and 45° respectively. Determine the lengths which must be chained off along CD and CE in order that ED may be in AB produced. Also, determine the obstructed length BE. (08 Marks)
 - A 100 meter tape is suspended between the ends under a pull of 200 N. The weight of the tape is 30 N. Find the correct distance between the tape ends. (04 Marks)

Module-2

- Differentiate between: (i) WCB and QB (ii) Prismatic compass and surveyor's compass. (10 Marks)
 - The following bearing were observed while running a closed traverse:

| LINE | FB | BB |
|------|---------|---------|
| AB | 75°5' | 254°20' |
| BC | 115°20' | 296°35' |
| CD | 165°35' | 345°35' |
| DE | 224°50' | 44°5' |
| EA | 304°50' | 125°5' |

Mention the stations which are affected from local attraction and the corrected bearings.

(10 Marks)

OR

- With the help of tabular column, explain the procedure of measuring horizontal angle by (i) Repetition method (ii) Reiteration method (14 Marks)
 - What is spire test? How it is carried? (06 Marks)

Module-3

- Explain Bowditch's rule and Transit rule for adjusting a closed traverse. (10 Marks)
 - The table below gives the length and bearing of the lines of a traverse ABCDE. Find the length and bearing of EA.

| Line | AB | BC | CD | DE | EA |
|---------|--------|--------|--------|--------|----|
| Length | 204 | 226 | 187 | 192 | ? |
| Bearing | 87°30' | 20°20' | 280°0' | 210°0' | ? |

(10 Marks)

OR

- 6 a. Find the expression for distance and elevation when the staff is held vertical and line of sight is inclined. (10 Marks)
- b. To determine the gradient between two points A and B a tacheometer was set up to another station 'C' and the following observation were made, keeping the staff vertical.

| Staff at | Vertical Angle | Staff Reading (m) |
|----------|----------------|---------------------|
| A | +4°20'00" | 1.300; 1.610; 1.920 |
| B | +0°10'40" | 1.100; 1.410; 1.720 |

If the horizontal angle ACB is 35°20', determine the average gradient between A and B.
K = 100, C = 0. (10 Marks)

Module-4

- 7 a. Define: (i) BS (ii) FS (iii) BM (iv) Elevation. (04 Marks)
- b. Give the step by step procedure for temporary adjustment of a dumpy level. (06 Marks)
- c. The following staff readings were observed successively with a level, the instrument having been moved after third, sixth and eighth reading: 2.228, 1.606, 0.988, 2.090, 2.864, 1.262, 0.602, 1.982, 1.044, 2.684 metres. Enter the above readings in a page of a level book and calculate the RL of points if the first reading was taken with a staff held on a bench mark of 432.384 m. Use H.I method. (10 Marks)

OR

- 8 a. With a neat sketch explain reciprocal levelling. (06 Marks)
- b. Explain the following with neat sketches:
(i) Single plane method [instruments are at same level]
(ii) Double plane method. (14 Marks)

Module-5

- 9 a. A series of offsets were taken from a chain line to a curved boundary line at intervals of 15m in the following order. 0, 2.65, 3.80, 3.75, 4.65, 3.60, 4.95, 5.85 m. Compute the area between the chain line, curved boundary and end offsets by trapezoidal and Simpson's rule. (10 Marks)
- b. A railway embankment is 10 m wide, with a side slope of 1.5 to 1. Assuming the ground to be level in the direction transverse to the central line, calculate the volume contained in a length of 120 m, the centre heights at 20 m intervals being in metres.
2.2, 3.7, 3.8, 4.0, 3.8, 2.8, 2.5
Calculate area for all the centre height. Use (i) Prismoidal formula (ii) Trapezoidal rule. (10 Marks)

OR

- 10 a. From a contour map of reservoir the following contour areas were obtained by the planimeter. The top level of reservoirs is 200 m and bottom level is 180 m. Find the quantity of water intake.

| Contour (m) | Area (m ²) |
|-------------|------------------------|
| 200 | 3850 |
| 195 | 3450 |
| 190 | 2600 |
| 185 | 800 |
| 180 | 400 |

- Use Trapezoidal rule and prismoidal rule. (10 Marks)
- b. Discuss the characteristics and uses of contour (five each). (10 Marks)

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17CV36

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. What are the requirements for the following good quality:
i) Building stones
ii) Bricks (10 Marks)
- b. List the different tests conducted on bricks. Explain any two of them. (10 Marks)

OR

- 2 a. Explain the importance of size, shape and texture on coarse aggregates. (10 Marks)
- b. Briefly explain the following tests conducted on aggregates:
i) Bulking
ii) Specific gravity
iii) Sieve analysis (10 Marks)

Module-2

- 3 a. Briefly explain various methods of sub soil exploration. What are the factors on which the choice of a particular method depends? (10 Marks)
- b. Draw neat labeled sketches of the following types of foundations and explain where they are adopted:
i) Raft foundation
ii) Strap footing (10 Marks)

OR

- 4 a. Sketch the plan and elevation of a brick wall built in: (i) English bond (ii) Flemish bond. Compare the merits and demerits of English and Flemish bond. (10 Marks)
- b. Draw neat sketches of the following and explain:
i) Ashlar masonry
ii) Rubble masonry (10 Marks)

Module-3

- 5 a. Briefly explain classification of arches, and explain stability of an arch. (10 Marks)
- b. Define Lintel. Draw a neat labeled diagram of a reinforced concrete lintel Chajja projection showing the positions of reinforcement. (10 Marks)

OR

- 6 a. Write the requirements of good roof. Compare the advantages and disadvantages of flat roof and pitched roof. (10 Marks)
- b. What are the factors affecting choice of flooring material? Mention various types of materials used for flooring. (10 Marks)

Module-4

- 7 a. List the factors in fixing the size and location of doors and windows. And draw a neat labeled sketch of a fully paneled door. (10 Marks)
- b. Explain the following windows with neat labeled sketches:
- (i) Bay window
 - (ii) Corner window
- (10 Marks)

OR

- 8 a. Write the requirements of good stair, and briefly explain classification of stairs. (10 Marks)
- b. Plan and sketch a dog legged stair for a building in which vertical distance between floors is 3.6m. The stair hall measures 3m × 5m (internal dimensions). (10 Marks)

Module-5

- 9 a. What are the objectives of plastering? Discuss the defects in plastering. (10 Marks)
- b. Explain the method of applying
- (i) stucco plastering
 - (ii) lathe plastering.
- (10 Marks)

OR

- 10 a. Briefly explain the constituents of a paint, and defects in painting. (10 Marks)
- b. Explain damp proofing. What are the causes of dampness? (10 Marks)

CBCS SCHEME

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17MATDIP31

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. Find the modulus and amplitude of $\frac{3+i}{2+i}$ (07 Marks)
- b. If $x = \cos\theta + i \sin\theta$, then show that $\frac{x^{2n}-1}{x^{2n}+1} = i \tan n\theta$. (07 Marks)
- c. Simplify $\frac{(\cos 3\theta + i \sin 3\theta)^4 (\cos 4\theta + i \sin 4\theta)^5}{(\cos 4\theta + i \sin 4\theta)^3 (\cos 5\theta + i \sin 5\theta)^4}$ (06 Marks)

OR

- 2 a. Find the sine of the angle between $\vec{A} = 2\hat{i} + 2\hat{j} - \hat{k}$ and $\vec{B} = 6\hat{i} - 3\hat{j} + 2\hat{k}$. (07 Marks)
- b. Find the value of λ , so that the vectors $\vec{a} = 2\hat{i} - 3\hat{j} + \hat{k}$, $\vec{b} = \hat{i} + 2\hat{j} - 3\hat{k}$ and $\vec{c} = \hat{i} + \lambda\hat{k}$ are coplanar. (07 Marks)
- c. Prove that $\vec{a} \times (\vec{b} \times \vec{c}) + \vec{b} \times (\vec{c} \times \vec{a}) + \vec{c} \times (\vec{a} \times \vec{b}) = 0$. (06 Marks)

Module-2

- 3 a. Find the n^{th} derivative of $e^{ax} \cos(bx + c)$. (07 Marks)
- b. If $y = a \cos(\log x) + b \sin(\log x)$ prove that $x^2 y_{n+2} + (2n+1)xy_{n+1} + (n^2+1)y_n = 0$. (07 Marks)
- c. 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)

OR

- 4 a. Find the pedal equation of $r^n = a^n \cos n\theta$. (07 Marks)
- b. Expand $\log_e(1+x)$ in ascending powers of x as far as the term containing x^4 . (07 Marks)
- c. If $x = r \cos\theta$, $y = r \sin\theta$, find $\frac{\partial(x,y)}{\partial(r,\theta)}$ (06 Marks)

Module-3

- 5 a. Evaluate $\int_0^1 \int_{y^2}^y (1+xy^2) dx dy$ (07 Marks)
- b. Evaluate $\int_0^{2\pi} \sin^4 x \cos^6 x dx$ (07 Marks)
- c. Evaluate $\int_0^2 \frac{x^4}{\sqrt{4-x^2}} dx$ (06 Marks)

OR

- 6 a. Evaluate $\int_1^2 \int_3^4 (xy + e^y) dy dx$ (07 Marks)
- b. Evaluate $\int_0^\pi x \sin^8 x dx$ (07 Marks)
- c. Evaluate $\int_1^2 \int_0^1 \int_{-1}^1 (x^2 + y^2 + z^2) dx dy dz$ (06 Marks)

Module-4

- 7 a. If particle moves on the curve $x = 2t^2$, $y = t^2 - 4t$, $z = 3t - 5$ where t is the time. Find the velocity and acceleration at $t = 1$. (07 Marks)
- b. Find the angle between the tangents to the curve $\vec{r} = t^2 \hat{i} + 2t \hat{j} - t^3 \hat{k}$ at the point $t = \pm 1$. (07 Marks)
- c. If $\vec{F} = (3x^2y - z)\hat{i} + (xz^3 + y^4)\hat{j} - 2x^3z^2\hat{k}$ find $\text{grad}(\text{div } \vec{F})$ at $(2, -1, 0)$. (06 Marks)

OR

- 8 a. Find the directional derivative of $\phi = 4xz^3 - 3x^2y^2z$ at $(2, -1, 2)$ along $2\hat{i} - 3\hat{j} + 6\hat{k}$ (07 Marks)
- b. Find the unit normal to the surface $x^2y + 2xz = 4$ at $(2, -2, 3)$. (07 Marks)
- c. Show that $\vec{F} = (2xy^2 + yz)\hat{i} + (2x^2y + xz + 2yz^2)\hat{j} + (2y^2z + xy)\hat{k}$ is irrotational. (06 Marks)

Module-5

- 9 a. Solve $\frac{dy}{dx} = \sin(x + y)$ (07 Marks)
- b. Solve $\frac{dy}{dx} + y \cot x = \cos x$ (07 Marks)
- c. Solve $(x - y + 1)dy - (x + y - 1)dx = 0$ (06 Marks)

OR

- 10 a. Solve $(1 + e^{x/4})dx + e^{x/y} \left(1 - \frac{x}{y}\right)dy = 0$. (07 Marks)
- b. Solve $(x^3 \cos^2 y - x \sin 2y) dx = dy$. (07 Marks)
- c. Solve $(3x^2y^4 + 2xy)dx + (2x^3y^3 - x^2)dy = 0$ (06 Marks)

CBCS SCHEME

17CPH39/49

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Question Paper Version : A

Third/Fourth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Constitution of India, Professional Ethics & Human Rights
(COMMON TO ALL BRANCHES)

Time: 2 hrs.]

[Max. Marks: 30

INSTRUCTIONS TO THE CANDIDATES

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

-
1. The 'Government', it meant a body that,
a) Makes law
b) Implements laws made
c) Interprets the laws
d) Carrying all these functions
 2. Which one of the following is a features common to both the Indian Federation and the American Federation.
a) A single citizenship
b) A federal supremecourt to interprete the constitution
c) Three lists in the constitution
d) Dual judiciary
 3. The preamble in the constitution of independent India is modified version of which of the following :
a) Bill of Rights in USA
b) British MagnaCarta
c) Objectives resolution moved by Jawaharlal Nehru
d) Ideals of communism
 4. In the Indian constitution, the Right to Equality is granted by,
a) Article 16 – 20
b) Article 15 – 19
c) Article 14 – 18
d) Article 13 – 17
 5. Uniform civil code is one of the,
a) Fundamental rights
b) Directive principle of state policies
c) Fundamental duties
d) None of these

6. Concept of fundamental duties copied from which country's constitution,
a) USSR
b) USA
c) UK
d) JAPAN
7. Who is said to be an integral part of the Union Legislature (Parliament)?
a) Speaker of Lok Sabha
b) Chairman of Rajya Sabha
c) President
d) Prime Minister
8. With reference to Vice-President, consider the following statements:
i) The removal proceedings of Vice-President can be begin in lower house of parliament.
ii) There is no specific provision in the Indian constitution regarding election of Vice-President.
Which of the statements given is/are correct?
a) (i) only
b) (ii) only
c) Both (i) and (ii)
d) Neither (i) nor (ii).
9. The Supreme court of India tenders advice to the President on a matter of law or fact.
a) On its own initiative
b) Only if he seeks such advice
c) Only if the matter relates to the extent of powers of the Union
d) Only if the issue relates to international treaty or agreement
10. Consider the following statements:
i) The oath of Governor is conducted by the Chief Minister of the respective state.
ii) The constitution does not fix any tenure for the post of Governor of a state.
Which of statements given above is / are correct?
a) (i) only
b) Both (i) and (ii)
c) (ii) only
d) Neither (i) or (ii)
11. When it comes to the passage of Money Bills, how is the situation in the Union Parliament different from that in the State Legislature?
a) At the Union level, Money Bill can be introduced only in the Lok-Sabha, but at the state level, it can be introduced either house of state Legislature.
b) The time limit within which the upper house can return a money bill is 14 days, in case of the Union and one month in State Legislature.
c) In Parliament, there is no provision for joint session in case of Money Bills, but there can be joint session over money Bill in State Legislature.
d) None of the above
12. Judge of the High Court can be impeached on the ground of,
a) Proved misbehaviour
b) Corruption
c) High crimes
d) Emergency
13. Nomination papers shall be submitted with,
a) The Chief Election Commissioner
b) The Regional Election Commissioner
c) The Returning Officer
d) None of these
14. 73rd Amendment provides establishment of,
a) High courts
b) Rural local self Government
c) Lokayukta
d) Start ups

15. A college student desires to get elected to the Municipal council of his city. The validation of his nomination would depend on the important condition, among others, that
- He has attained the maturity
 - He is a member of a political party
 - His name figures in the Voter's list
 - He is the topper to the class
16. To declare emergency _____ consent is must.
- Prime Minister
 - Cabinet headed by the Prime Minister
 - Speaker of Lok Sabha
 - Chief Justice of the Supreme Court
17. It is not the effect of State emergency,
- State legislature can be dissolved
 - President assumes the state executive power
 - Parliament may make law over state list
 - Effects on state Judiciary
18. Which of following statements is / are correct in respect of co-operative societies:
- Part IX-B of the constitution deals.
 - Right to form a co-operative society is a fundamental under the constitution.
 - Co-operative societies also mentioned under Directive Principles of state policy
- Select the correct answer using the code given here.
- (i) only
 - (ii) only
 - (i) and (iii) only
 - (i), (ii) and (iii)
19. What day do countries celebrate as Human Rights Day?
- 1 January
 - 10 December
 - 2 March
 - 6 June
20. What does the International Bill of Human Rights provide?
- A list of economic human rights.
 - The rights that all citizens hold
 - A list of indivisible human rights covering civil and political rights.
 - An authoritative list of universal human rights covering civil and political rights and economic, social and cultural rights.
21. _____ is the watch dog of human rights in India.
- High court
 - Parliament
 - National Human Rights Commission
 - None of these
22. Engineering Ethics is a,
- Developing ethics
 - Preventive ethics
 - Natural ethics
 - Scientifically developed ethics
23. For engineering profession _____ is considered as its foundation.
- Honesty
 - Hard work
 - Sound common sence
 - None of these
24. A compound measure of the probability and magnitude of the adverse effect is known as,
- Benefit
 - Compensation
 - Risk
 - Both (a) and (b)

25. 'Trimming' is,
a) Retaining the entire data
b) Consolidating the data
c) Smoothing of irregularities to make the data to appear accurate and precise
d) All the above
26. A fault tree is used to,
a) Access the risk involved
b) Improve safety
c) Take free consent
d) Claim compensation
27. The formula of a soft drink is an example of,
a) Copyright
b) Trade secret
c) Patent
d) Trade mark
28. An author retains copyright of his book for,
a) 25 years
b) 50 years
c) Life time + 60 years
d) 100 years
29. This is not dishonesty in engineering,
a) Forging
b) Blending
c) Cooking
d) Trimming
30. This is not implement to responsibility,
a) Fear
b) Self respect
c) Self deception
d) Ignorance.

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