III ME, CV (S)

CBCS Scheme

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15MAT31

Third Semester B.E. Degree Examination, Dec.2017/Jan.2018
Engineering Mathematics – III

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Express $f(x)=(\pi-x)^2$ as a Fourier series of period 2π in the interval $0<x<2\pi$. Hence deduce the sum of the series $1+\frac{1}{2^2}+\frac{1}{3^2}+.....$ **(08 Marks)**

b. The turning moment T units of the Crank shaft of a steam engine is a series of values of the crank angle θ in degrees. Find the first four terms in a series of sines to represent T. Also calculate T when θ = 75°. **(08 Marks)**

θ:	0°	30°	60°	90°	120°	150°	180°
T:	0	5224	8097	7850	5499	2626	0

OR

2 a. Find the Fourier Series expansion of the periodic function,

$$f(x)=\begin{cases} l+x, & -l\le x\le 0 \\ l-x, & 0\le x\le l \end{cases}.$$ **(06 Marks)**

b. Obtain a half-range cosine series for $f(x)=x^2$ in $(0, \pi)$. **(05 Marks)**

c. The following table gives the variations of periodic current over a period:

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

Show that there is a direct current part 0.75 amp in the variable current and obtain the amplitude of the first harmonic. **(05 Marks)**

Module-2

3 a. Find the Fourier transform of $f(x)=\begin{cases} 1 & \text{for } |x|<1 \\ 0 & \text{for } |x|>1 \end{cases}$ and evaluate $\int_0^\infty \left(\frac{\sin x}{x}\right)dx$ **(06 Marks)**

b. Find the Fourier cosine transform of, $f(x)=\begin{cases} x & \text{for } 0<x<1 \\ 2-x & \text{for } 1<x<2 \\ 0 & \text{for } x>2 \end{cases}$. **(05 Marks)**

c. Obtain the inverse Z-transform of the following function, $\frac{z}{(z-2)(z-3)}$. **(05 Marks)**

OR

4 a. Find the Z-transform of $\cos\left(\frac{n\pi}{2}+\alpha\right)$. **(06 Marks)**

b. Solve $u_{n+2}-5u_{n+1}+6u_n=36$ with $u_0=u_1=0$, using Z-transforms. **(05 Marks)**

c. If Fourier sine transform of f(x) is $\frac{e^{-a\alpha}}{\alpha}$, $\alpha\neq 0$. Find f(x) and hence obtain the inverse Fourier sine transform of $\frac{1}{\alpha}$. **(05 Marks)**

Module-3

5 a. Calculate the Karl Pearson's co-efficient for the following ages of husbands and wives: **(06 Marks)**

Husband's age x:	23	27	28	28	29	30	31	33	35	36
Wife's age y:	18	20	22	27	21	29	27	29	28	29

b. By the method of least square, find the parabola $y = ax^2 + bx + c$ that best fits the following data: **(05 Marks)**

x:	10	12	15	23	20
y:	14	17	23	25	21

c. Using Newton-Raphson method, find the real root that lies near x = 4.5 of the equation $\tan x = x$ correct to four decimal places. (Here x is in radians). **(05 Marks)**

OR

6 a. In a partially destroyed laboratory record, only the lines of regression of y on x and x on y are available as $4x - 5y + 33 = 0$ and $20x - 9y = 107$ respectively. Calculate $\bar{x}$, $\bar{y}$ and the coefficient of correlation between x and y. **(06 Marks)**

b. Find the curve of best fit of the type $y = ae^{bx}$ to the following data by the method of least squares: **(05 Marks)**

x:	1	5	7	9	12
y:	10	15	12	15	21

c. Find the real root of the equation $xe^x - 3 = 0$ by Regula Falsi method, correct to three decimal places. **(05 Marks)**

Module-4

7 a. From the following table of half-yearly premium for policies maturing at different ages, estimate the premium for policies maturing at age of 46: **(06 Marks)**

Age:	45	50	55	60	65
Premium (in Rupees):	114.84	96.16	83.32	74.48	68.48

b. Using Newton's divided difference interpolation, find the polynomial of the given data: **(05 Marks)**

x	3	7	9	10
f(x)	168	120	72	63

c. Using Simpson's $\left(\frac{1}{3}\right)^{rd}$ rule to find $\int_0^{0.6} e^{-x^2} dx$ by taking seven ordinates. **(05 Marks)**

OR

8 a. Find the number of men getting wages below ₹ 35 from the following data: **(06 Marks)**

Wages in ₹ :	0 – 10	10 – 20	20 – 30	30 – 40
Frequency :	9	30	35	42

b. Find the polynomial f(x) by using Lagrange's formula from the following data: **(05 Marks)**

x:	0	1	2	5
f(x):	2	3	12	147

c. Compute the value of $\int_{0.2}^{1.4} (\sin x - \log_e x + e^x) dx$ using Simpson's $\left(\frac{3}{8}\right)^{th}$ rule. **(05 Marks)**

Module-5

9 a. A vector field is given by $\vec{F} = \sin y\,\hat{i} + x(1+\cos y)\hat{j}$. Evaluate the line integral over a circular path given by $x^2 + y^2 = a^2$, $z = 0$. **(06 Marks)**

b. If C is a simple closed curve in the xy-plane not enclosing the origin. Show that $\int_C \vec{F}.d\vec{R} = 0$, where $\vec{F} = \frac{y\hat{i} - x\hat{j}}{x^2 + y^2}$. **(05 Marks)**

c. Derive Euler's equation in the standard form viz., $\frac{\partial f}{\partial y} - \frac{d}{dx}\left[\frac{\partial f}{\partial y'}\right] = 0$. **(05 Marks)**

OR

10 a. Use Stoke's theorem to evaluate $\int_C \vec{F}.d\vec{R}$ where $\vec{F} = (2x - y)\hat{i} - yz^2\hat{j} - y^2z\hat{k}$ over the upper half surface of $x^2 + y^2 + z^2 = 1$, bounded by its projection on the xy-plane. **(06 Marks)**

b. Show that the geodesics on a plane are straight lines. **(05 Marks)**

c. Find the curves on which the functional $\int_0^1 \left((y')^2 + 12xy\right)dx$ with $y(0) = 0$ and $y(1) = 1$ can be extremized. **(05 Marks)**

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CBCS Scheme

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15CV/CT32

Third Semester B.E. Degree Examination, Dec.2017/Jan.2018
Strength of Materials

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Draw stress versus strain curve for mild steel specimen subjected to axial tension indicating the salient points. **(03 Marks)**

b. Derive the expression for elongation of tapering circular bar due an axial load P. Use standard notations. **(06 Marks)**

c. A circular bar of uniform cross sectional area of $1000mm^2$ is subjected to forces as shown in fig. Q1(c). If Young's Modulus for the material is 200GPa, determine the total deformation. **(07 Marks)**

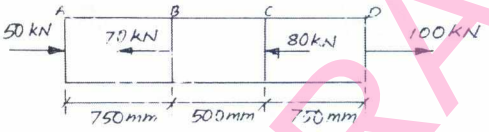


Fig.Q1(c)

OR

2 a. Define the four Elastic constants. **(04 Marks)**

b. A compound bar consists of a steel rod of 20mm diameter rigidly fitted into a copper tube of 20mm internal dia and 5mm thickness. Determine the stresses induced in the different materials when the compound bar is subjected to an axial tensile load of 50kN. Take Es = 200GPa and Ec = 120 GPa. **(06 Marks)**

c. A steel bar is 20m long at a temperature of 20^0C. Find the free expansion of the rod, if the temperature is raised to 65^0C. Take E = 200GPa , $\alpha = 12 \times 10^{-6}/^0$C. Find the thermal stress produced when i) free expansion of the rod is completely prevented ii) the rod is permitted to expand by 5.8mm only. **(06 Marks)**

Module-2

3 a. Show that the shear stress on the principal plane is zero. **(06 Marks)**

b. At a point in a strained material the stresses acting are as shown in fig. Q3(b). Determine the
i) Principal stresses and their planes ii) Maximum shear stresses and their planes
iii) Normal and shear stresses on the inclined plane AB. **(10 Marks)**

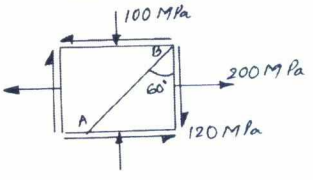


Fig.Q3(b)

OR

4 a. Derive Lame's equations for radial and hoop stresses for thick cylinder subjected to internal and external fluid pressures. **(06 Marks)**

b. A closed cylindrical steel vessel of 4mm plate thickness with plane ends carries fluid under a pressure of 3MPa. The diameter of cylinder is 25cm and length is 75cm. Calculate the longitudinal and hoop stresses in the cylinder wall. Also determine the change in diameter , length and volume of cylinder. Take E = 210GPa , $\mu = 0.286$. **(10 Marks)**

Module-3

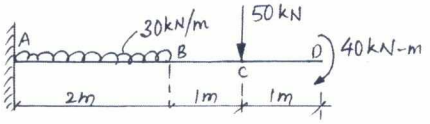
5 a. Derive the relationships between load intensity, shear force and bending moment. **(06 Marks)**

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 $\frac{W\ell^2}{8}$. **(10 Marks)**

OR

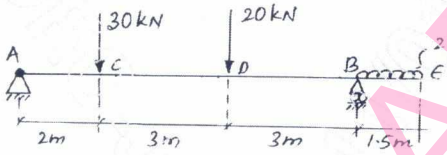
6 a. For the cantilever beam shown in fig.Q6(a), plot the SFD and BMD. **(06 Marks)**

Fig.Q6(a)



b. For the overhanging beam shown in fig.Q6(b), plot the SFD and BMD. Locate points of contra flexure if any. **(10 Marks)**

Fig.Q6(b)



Module-4

7 a. List the assumptions in theory of Simple bending. **(04 Marks)**

b. Define : i) Section modulus ii) Modulus of rupture iii) Moment of resistance. **(03 Marks)**

c. A T – beam with a flange of 100mm × 20mm and with a web of 20mm × 100mm is used as a simply supported beam over a span of 8m. It carries a UDL of 1.5kN/m throughout. Determine the maximum compressive and maximum tensile stresses and plot the variation across the depth of the beam. **(09 Marks)**

OR

8 a. Derive the Euler's equation for buckling load on an elastic column with both ends pinned or hinged. **(06 Marks)**

b. A hollow rectangular cast iron column has external dimensions of 150mm × 200mm and all round metal thickness of 25mm. The column is 5m long with both ends fixed. If E for column material is 120GPa, compute the critical value of load on this column by Euler's formula. Compare the value of load obtained by Rankine's formula. Take f_c = 500MPa and $\alpha = \frac{1}{1600}$. **(10 Marks)**

Module-5

9 a. Derive the torsion equation with usual notations. **(08 Marks)**

b. State the different theories of failure. Explain any two briefly. **(08 Marks)**

OR

10 a. Prove that a hollow circular shaft is stiffer and stronger than a solid circular shaft in torsion which have same material , length and weight. **(10 Marks)**

b. A solid shaft transmits 20kW of power, rotating at 2rps. Determine the required diameter of the shaft if the shearing stress is not to exceed 40MN/m^2 and angle of twist is limited to 6^0 in a length of 3m. Take G = 83 × 10^{3}N/mm^2. **(06 Marks)**

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CBCS Scheme

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15CV33

Third Semester B.E. Degree Examination, Dec.2017/Jan.2018

Fluid Mechanics

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Define the terms 'continuum' and 'rheology'. **(04 Marks)**

b. Explain why an inflated balloon will rise to a definite height once it starts to rise, whereas a submarine will always sink to the bottom of ocean once it starts to sink, if no changes are made. How then can a submarine stay at a definite level under the water? **(04 Marks)**

c. Prove that the relative density of mixture of 'n' fluids is greater when equal volumes are taken than when equal weights are taken, assuming no changes in volume as the result of mixing. **(08 Marks)**

OR

2 a. Why does the viscosity of a liquid decrease with increase in temperature whereas it increases with increase in temperature in the case of gas? **(04 Marks)**

b. Find the increase in the pressure required to reduce the volume of water by 0.8 percent. Given $K = 2.075 \times 10^9\ Nm^{-2}$. **(04 Marks)**

c. Determine the pressure difference $(p_A - p_B)$ in Fig.Q2(c).

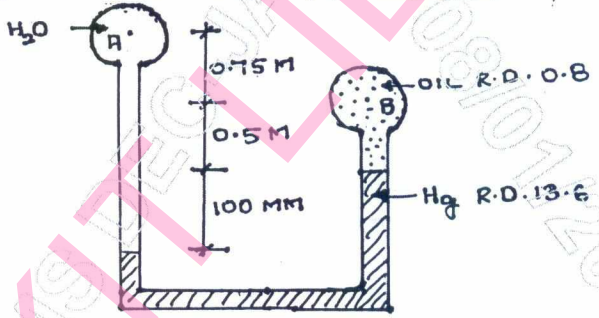

Fig.Q2(c) **(08 Marks)**

Module-2

3 a. Prove that for a plate kept vertical in a liquid will have its centre of pressure below its centroid. **(07 Marks)**

b. In each of the following cases state, giving reasons whether the flow is steady, unsteady, uniform or non uniform.

i) $U = 10xt + 15x^2$
ii) $U = 20$
iii) Flow in pipe bend with constant discharge.
iv) Flow in a converging pipe in which discharge is gradually increased.
v) Flow in a constant diameter pipe in which discharge is continuously increasing. **(05 Marks)**

c. If the equation of stream lines for a given fluid flow problem is $x^2 - y^2 =$ constant, determine the magnitude and direction of velocity vector at (3, 4). **(04 Marks)**

OR

4 a. A 60° radial gate of 5m radius and 3m length stores water upto its top as shown in Fig.Q4(a). Determine the components of total force and its point of application.

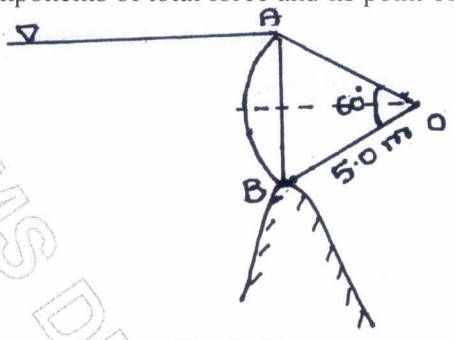

Fig.Q4(a) **(06 Marks)**

b. Show that the stream lines and velocity potential lines cross each other orthogonally. **(05 Marks)**

c. Stating the assumptions made, derive the Euler's equation. Hence obtain Bernoulli's equation from it. **(05 Marks)**

Module-3

5 a. A pitot tube is mounted on an air plane to indicate the speed of the plane relative to the prevailing wind. What differential pressure intensity in kPa will the instrument register when the plane is travelling at a speed of 200 kmph in a wind of 60 kmph blowing against the direction of the plane? $\rho_{air} = 1.2$ kg/m^3. **(05 Marks)**

b. State impulse momentum equation. Derive the expression for force exerted by a flowing fluid on a pipe bend. **(05 Marks)**

c. Derive the equation for the discharge through the venturimeter. **(06 Marks)**

OR

6 a. In a 45° bend a rectangular air duct of 1 m^2 cross sectional area is gradually reduced to 0.5 m^2 area. Find the magnitude and direction of force required to hold the duct in position if the velocity of flow at 1 m^2 section is 10 ms^{-1}, and pressure is 30 kN/m^2. Take the specific weight of air as 0.0116 kN/m^3. **(06 Marks)**

b. A pitot static tube is inserted in a 30 cm diameter pipe. The static pressure in the pipe is 12.5 cm of mercury (vacuum). The stagnation pressure at the centre of the pipe is 1.15 N/cm^2 (gauge). Calculate the rate of flow of water through the pipe. The mean velocity of flow is 0.875 times the central velocity. Take $C_V = 0.985$. **(06 Marks)**

c. Define the terms 'Orifice' and 'Mouthpiece'. Give the detailed classification of mouth pieces with neat sketches. **(04 Marks)**

Module-4

7 a. Water flows over a rectangular weir in wide at a depth of 15 cm and afterwards passes through a triangular right angled weir. Taking C_d for rectangular weir 0.62 and for triangular 0.59. Find the depth over the triangular weir. **(06 Marks)**

b. Explain cipolletti notch. What is the advantage of cipolletti notch over trapezoidal notch? Give the equation of discharge over a cipolletti notch. **(10 Marks)**

OR

8 a. A rectangular notch 40 cm long is used for measuring a discharge of 30 LPS. An error of 1.5 mm was made while measuring the head over the notch. Calculate the percent error in the discharge. Take $C_d = 0.6$. **(06 Marks)**

b. Mention the advantages of triangular notch over rectangular notch. **(04 Marks)**

c. Define hydraulic coefficients and to discuss how to determine the hydraulic coefficients experimentally. **(06 Marks)**

Module-5

9 a. Define the terms 'compound pipe' and 'equivalent pipe'. Derive the expression for diameter of equivalent pipe. **(06 Marks)**

b. Water flowing through a rigid pipe of diameter 500 mm with 1.5 m/s is suddenly brought to rest. Find the instantaneous pressure rise if K_{water} = 2 GPa. **(04 Marks)**

c. A compound piping system consists of 1800 m of 0.5 m, 1200 m of 0.4 m and 600 m of 0.3 m new cast iron pipes connected in series. Convert the system to: i) Equivalent length of 0.4 m pipe; ii) Equivalent size pipe 3600 m long. **(06 Marks)**

OR

10 a. Derive an expression for instantaneous rise in pressure in an elastic pipe due to sudden closure of valve. **(08 Marks)**

b. Water is to be supplied to the inhabitants of a college campus, through a supply main. The following data is given:
Distance of the reservoir from the campus = 3000 m
Number of inhabitants = 4000
Consumption of water per day of each inhabitants = 180 liters
Loss of head due to friction = 18 m
Coefficient of friction for the pipe, f = 0.007
If one half of the daily supply is pumped in 8 hours, determine the size of the supply main. **(08 Marks)**

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CBCS Scheme

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15CV34

Third Semester B.E. Degree Examination, Dec.2017/Jan.2018
Basic Surveying

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Define surveying. Explain briefly principles of surveying. **(07 Marks)**

b. What is 'Ranging'? Explain indirect or reciprocal ranging with neat sketch. **(06 Marks)**

c. A steel tape 20 m long standardized at 55°F with a pull of 10 kg was used for measuring a baseline. Find the correction per tape length, if the temperature at the time of measurement was 80°F and pull exerted was 16 kg. Weight of 1 cubic cm of steel is 7.86 gms. Weight of tape = 0.8 kg and $E = 2.109 \times 10^6$ kg/cm^2 coefficient of expansion of tape per 1°F = 6.2×10^{-6}. **(03 Marks)**

OR

2 a. Differentiate between plane and geodetic surveying. **(06 Marks)**

b. In passing an obstacle in form of a pond, stations A and D, on the main line were taken an opposite sides of the pond. On the left of AD, a line AB 200 m long was laid down and a second line AC 250 m long was ranged on AD, the points B, D and C being in the same straight line. BD and DC were then chained and found to be 125 m and 150 m respectively. Find length of AD. **(06 Marks)**

c. Distinguish between accuracy and precision in surveying. **(04 Marks)**

Module-2

3 a. What are the temporary adjustments to be carried out for theodolite? **(08 Marks)**

b. Following bearings were observed with a compass. Calculate the interior angles. **(05 Marks)**

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

c. Define the terms: (i) True bearing. (ii) Magnetic bearing. (iii) Magnetic declination. **(03 Marks)**

OR

4 a. Explain step by step procedure of measuring horizontal angle by Repetition method. **(08 Marks)**

b. The following are the bearings of closed traverse ABCDA. At what station do you suspect the local attraction? Find the corrected bearings of the sides. If magnitude of magnetic declination at the place is 2°20' W, compute the true bearings of the lines. **(08 Marks)**

Line	Fore bearing	Back bearing
AB	124°30'	304°30'
BC	68°15'	246°0'
CD	310°30'	135°15'
DA	200°15'	17°45'

Module-3

5 a. Discuss transit method and Bawditch method. **(06 Marks)**

b. The following data is available for a closed traverse ABCDEA. Check for angular error and correct it if necessary. Determine closing error and adjust the traverse using "Transit rule". Taking coordinates of station 'A' as (400, 400), compute coordinates of all stations. **(10 Marks)**

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

OR

6 a. The elevation of point 'P' is to be determined by observations from two adjacent stations of a tacheometric survey. The staff was held vertically upon the point, and the instrument is fitted within an anallactic lens, the constant of the instrument being 100. Compute the elevation of the point 'P' from the following data, taking both observations as equally trustworthy. Also calculate the distance of A and B from 'P'. **(10 Marks)**

Inst. station	Height of axis	Staff point	Vertical angle	Staff readings	Elevation of station
A	1.42	P	$+2^{0}24'$	1.230, 2.055, 2.880	77.750 m
B	1.40	P	$-3^{0}36'$	0.785, 1.800, 2.815	97.135 m

b. Derive distance and elevation formulae for stadia tacheometry, when the staff held normal to line of sight and both for an angle of elevation and angle of depression. **(06 Marks)**

Module-4

7 a. Define the following terms:
(i) Bench mark (ii) Parallax (iii) Line of collimation (iv) Back sight
(v) MSL (vi) Reduced level **(06 Marks)**

b. The following staff readings were observed successively with a level, the instrument having been moved after third, sixth and eighth readings. Enter the readings and calculate RL of points by Rise and Fall method if first readings was taken with a staff held on BM = 432.384 m
2.228 m, 1.606, 0.988, 2.090, 2.864, 1.262, 0.602, 1.982, 1.044, 2.684 m. **(10 Marks)**

OR

8 a. What is sensitiveness of bubble tube? Explain any one method of determining sensitivity. **(06 Marks)**

b. In order to determine the elevation of top 'Q' of a signal on a hill, observations were made from two stations 'P' and 'R'. The stations P, R and Q were on the same plane. If angles of elevation of the top 'Q' of signal measured at 'P' and 'R' were 25°35' and 15°05' respectively. Determine the elevation of the foot of the signal if height of signal above its base was 4 m. The staff readings upon the B.M (RL 105.42) were respectively 2.755 and 3.855 m when the instrument was at 'P' and at 'R'. The distance between 'P' and 'R' was 120 m. **(10 Marks)**

Module-5

9 a. What are the characteristics of contours? **(08 Marks)**

b. The following perpendicular offsets were taken from a chain line to a hedge –

Chainage (m)	0	15	30	45	60	70	80	100	120	140
Offsets (m)	7.6	8.5	10.7	12.8	10.6	9.5	8.3	7.9	6.4	4.4

Calculate the area between survey line, the hedge and end offsets by,

(i) Trapezoidal rule.

(ii) Simpson's rule. **(08 Marks)**

OR

10 a. Discuss the methods for determining areas and volumes. **(06 Marks)**

b. A railway embankment 400 m long is 12 m wide at the formation level and has side slope of 2 to 1. The ground levels at every 100 m along the centre line are as under –

Distance	0	100	200	300	400
R.L	204.8	206.2	207.5	207.2	208.3

The formation level at zero chainage is 207.00 and the embankment has a rising gradient of 1 in 100. The ground is level across the centre line. Calculate the volume of earth work. **(10 Marks)**

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CBCS Scheme

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15CV/CT35

Third Semester B.E. Degree Examination, Dec.2017/Jan.2018
Engineering Geology

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. What is Engineering Geology? Discuss its role in Civil Engineering Projects. **(08 Marks)**

b. With a neat sketch, explain the structure and composition of the earth. **(08 Marks)**

OR

2 a. Explain briefly i) Rock forming mineral ii) Economic mineral. **(04 Marks)**

b. Name the physical properties which are helpful to identify the minerals. Explain Luster and Fracture of a mineral, with suitable examples. **(06 Marks)**

c. Write the chemical composition , cleavages and uses of the following minerals :
i) Calcite ii) Quartz iii) Gypsum. **(06 Marks)**

Module-2

3 a. What are Igneous Rocks? Explain the classification of Igneous Rocks with suitable examples. Mention the Engineering considerations of Igneous Rocks. **(08 Marks)**

b. What is Rock Quality Designation (RQD)? How is RQD used for the rock mass classification? **(08 Marks)**

OR

4 a. With a neat sketch, explain the developments of folds , joints, faults and unconformities in Rocks. **(08 Marks)**

b. Mention the engineering considerations of folds, joints, faults and unconformities. **(08 Marks)**

Module-3

5 a. Discuss briefly the Geomorphological aspects in the selection of site for Dam construction. **(08 Marks)**

b. What are Tunnels? Explain the important Geological factors taken into account while Tunneling. **(08 Marks)**

OR

6 a. Explain briefly : i) Weathering of Rocks ii) Tectonic cause of Earth quake. **(08 Marks)**

b. What are the causes of Landslides? How can Landslides be prevented. **(08 Marks)**

Module-4

7 a. Briefly explain Hydrological cycle. **(04 Marks)**

b. Define Aquifers. Explain with neat sketches, various types of aquifers. **(08 Marks)**

c. Explain in brief zone of aeration and zone of saturation. **(04 Marks)**

OR

8 a. Explain in detail Ground water exploration by Electrical Resistivity method. **(10 Marks)**

b. Give an account of Artificial Recharge of ground water by various methods. **(06 Marks)**

Module-5

9 a. Discuss the application of Remote sensing and GIS Technique in Civil Engineering Projects. **(12 Marks)**

b. Write a note on Impact of Mining on Environment. **(04 Marks)**

OR

10 Write a note on :

a. Natural Disaster and Mitigation.

b. Landsat Imagery.

c. Impact of Reservoirs on Environment.

d. Uses of Topographic maps. **(16 Marks)**

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CBCS Scheme

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15CV36

Third Semester B.E. Degree Examination, Dec.2017/Jan.2018
Building Materials and Construction

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Write the requirements of good building stones. **(04 Marks)**
b. Briefly explain the causes of deterioration of stone work. **(06 Marks)**
c. Briefly explain classification of bricks with respect to properties. **(06 Marks)**

OR

2 a. Write a note on classification of Mortar. **(04 Marks)**
b. Briefly explain the importance of size, shape and texture on coarse aggregates. **(06 Marks)**
c. Explain Flakiness Index and Elongation Index test on coarse aggregates. **(06 Marks)**

Module-2

3 a. Write the functions and requirements of good foundation. **(05 Marks)**
b. Explain with the help of sketches : i) Combined footing ii) Strap footing. **(06 Marks)**
c. Explain with sketch, any one type of Pile foundation. **(05 Marks)**

OR

4 a. With the help of sketches, write the features of English bond and Flemish bond. **(06 Marks)**
b. Briefly explain classification of stone masonry. **(06 Marks)**
c. Define a Cavity wall. Write the advantages of cavity wall. **(04 Marks)**

Module-3

5 a. Briefly explain classification of Lintels. **(06 Marks)**
b. With sketches, explain classification of Arches based on number of centers. **(06 Marks)**
c. What are the factors that affect the choice of a flooring materials? **(04 Marks)**

OR

6 a. Explain the procedure of laying Terrazo flooring. **(04 Marks)**
b. Write the requirements of good roof. **(04 Marks)**
c. With the help of neat sketch, explain King Post Truss. **(08 Marks)**

Module-4

7 a. With the help of neat sketch, explain :
i) Paneled Door ii) Collapsible Door. **(08 Marks)**
b. With the help of neat sketches, explain :
i) Panelled and Glazed window ii) Bay window. **(08 Marks)**

OR

8 a. With the help of neat sketches, explain types of stairs. **(08 Marks)**
b. Write short notes on :
i) Shoring ii) Underpinning. **(08 Marks)**

Module-5

9	a.	Write the purposes of Plastering.	(05 Marks)
	b.	Explain various types of Plaster finishes.	(06 Marks)
	c.	Explain Stucco plastering.	(05 Marks)

OR

10	a.	Explain the constituents of Paint.	(06 Marks)
	b.	Explain the procedure of pointing to plastered surface.	(05 Marks)
	c.	Explain different methods of damp proofing.	(05 Marks)

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CBCS SCHEME

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15MATDIP31

Third Semester B.E. Degree Examination, Dec.2017/Jan.2018
Additional Mathematics – I

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Express complex numbers $\frac{(5-3i)(2+i)}{4+2i}$ in the form a + ib. **(06 Marks)**

b. If $x = \cos\theta + i\sin\theta$, then show that $\frac{x^{2n}-1}{x^{2n}+1} = i\tan\theta$ **(05 Marks)**

c. Prove that the area of the triangle whose vertices are A, B, C is $\frac{1}{2}[B\times C + C\times A + A\times B]$. **(05 Marks)**

OR

2 a. Find the cube root of $\sqrt{3} + i$. **(06 Marks)**

b. Find the modulus and amplitude of $\frac{3+i}{2+i}$ **(05 Marks)**

c. Prove that the vectors $i - 2j + 3k$, $-2i + 3j - 4k$ and $i - 3j + 5k$ are coplanar. **(05 Marks)**

Module-2

3 a. Find the n^{th} derivative of $e^{ax}\sin(bx + c)$. **(06 Marks)**

b. If $y = e^{a\sin^{-1}x}$, prove that $(1-x^2)y_{n+2} - (2n+1)xy_{n+1} - (n^2+a^2)y_n = 0$ **(05 Marks)**

c. If $u = \sin^{-1}\left(\frac{x^2+y^2}{x+y}\right)$, prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \tan u$. **(05 Marks)**

OR

4 a. Find the pedal equation $r = a(1 + \cos\theta)$. **(06 Marks)**

b. Expand $\tan x$ in ascending powers of x. **(05 Marks)**

c. If $u = x + y + z$, $v = y + z$, $w = z$ then find $\frac{\partial(u,v,w)}{\partial(x,y,z)}$ **(05 Marks)**

Module-3

5 a. Evaluate $\int_0^{\pi/2}\sin^n x\,dx$. **(06 Marks)**

b. Evaluate $\int_0^a \frac{x^3}{\sqrt{a^2-x^2}}dx$. **(05 Marks)**

c. Evaluate $\int_1^2\int_1^3 xy^2\,dxdy$ **(05 Marks)**

OR

6 a. Evaluate $\int_0^1 \int_0^2 \int_1^2 x^2 yz \, dx \, dy \, dz$ **(06 Marks)**

b. Evaluate $\int_0^{\pi/6} \cos^4 3x \, dx$. **(05 Marks)**

c. Evaluate $\int_0^2 \frac{x^4}{\sqrt{4 - x^2}} dx$. **(05 Marks)**

Module-4

7 a. A 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 $t = 1$ in the direction $i - 3j + 2k$. **(06 Marks)**

b. Find the unit vector normal to the surface $x^2 - y^2 + z = 2$ at the point $(1, -1, 2)$. **(05 Marks)**

c. Show that the vector $f = (2x - 5y)i + (x - y)j + (3x - z)k$ is a solenoidal. **(05 Marks)**

OR

8 a. If $f(x, y, z) = 3x^2y - y^3z^2$ then find grad f at the point $(1, -2, -1)$. **(06 Marks)**

b. Evaluate (i) div R, (ii) curl R, if $R = xi + yj + zk$. **(05 Marks)**

c. Find a, if $(axy - z^2)i + (x^2 + 2yz)j + (y^2 - axz)k$ is an irrotational vector. **(05 Marks)**

Module-5

9 a. Solve $(x^2 + y^2)dx + 2xydy = 0$ **(06 Marks)**

b. Solve $(e^x + 1)\cos x \, dx + e^y \sin x \, dy = 0$ **(05 Marks)**

c. Solve $(1 + xy)ydx + (1 - xy)xdy = 0$ **(05 Marks)**

OR

10 a. Solve $(x \log x)\frac{dy}{dx} + y = 2 \log x$ **(06 Marks)**

b. Solve $(x + 2y^3)\frac{dy}{dx} = y$ **(05 Marks)**

c. Solve $(1 + e^{x/y})dx + e^{x/y}\left(1 - \frac{x}{y}\right)dy = 0$ **(05 Marks)**

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