CBCS SCHEME

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15MAT31

Third Semester B.E. Degree Examination, Dec.2019/Jan.2020
Engineering Mathematics – III

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Obtain the Fourier expansion of the function $f(x) = x$ over the interval $(-\pi, \pi)$. Deduce that $\frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \ldots\ldots$ **(08 Marks)**

b. The following table gives the variations of a periodic current A over a certain period T:

t (sec)	0	T/6	T/3	T/2	2T/3	5T/6	T
A (amp)	1.98	1.30	1.05	1.30	-0.88	-0.25	1.98

Show that there is a direct current part of 0.75amp in the variable current and obtain the amplitude of the first harmonic. **(08 Marks)**

OR

2 a. Obtain the Fourier series for the function $f(x) = 2x - x^2$ in $0 \le x \le 2$. **(06 Marks)**

b. Represent the function

$$f(x) = \begin{cases} x, & \text{for } 0 < x < \pi/2 \\ \pi/2 & \text{for } \pi/2 < x < \pi \end{cases}$$

in a half range Fourier sine series. **(05 Marks)**

c. Determine the constant term and the first cosine and sine terms of the Fourier series expansion of y from the following data:

x°	0	45	90	135	180	225	270	315
y	2	3/2	1	1/2	0	1/2	1	3/2

(05 Marks)

Module-2

3 a. Find the complex Fourier transform of the function

$$f(x) = \begin{cases} 1 & \text{for } |x| \le a \\ 0 & \text{for } |x| > a \end{cases}$$ Hence evaluate $\int_0^\infty \frac{\sin x}{x} dx$. **(06 Marks)**

b. If $\bar{u}(z) = \frac{2z^2 + 3z + 12}{(z-1)^4}$ show that $u_0 = 0 \quad u_1 = 0 \quad u_2 = 2 \quad u_3 = 11$. **(05 Marks)**

c. Obtain the Fourier cosine transform of the function

$$f(x) = \begin{cases} 4x, & 0 < x < 1 \\ 4 - x, & 1 < x < 4 \\ 0 & x > 4 \end{cases}$$ **(05 Marks)**

OR

4 a. Obtain the Z-transform of $\cos n\theta$ and $\sin n\theta$. **(06 Marks)**

b. Find the Fourier sine transform of $f(x) = e^{-|x|}$ and hence evaluate $\int_0^\infty \frac{x \sin mx}{1+x^2} dx \quad m > 0$. **(05 Marks)**

c. Solve by using Z-transforms $y_{n+2} + 2y_{n+1} + y_n = n$ with $y_0 = 0 = y_1$. **(05 Marks)**

Module-3

5 a. Fit a second degree parabola $y = ax^2 + bx + c$ in the least square sense for the following data and hence estimate y at x = 6. **(06 Marks)**

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

b. Obtain the lines of regression and hence find the coefficient 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

(05 Marks)

c. Use Newton-Raphson method to find a real root of $x\sin x + \cos x = 0$ near $x = \pi$. Carryout the iterations upto four decimal places of accuracy. **(05 Marks)**

OR

6 a. Show that a real root of the equation $\tan x + \tanh x = 0$ lies between 2 and 3. Then apply the Regula Falsi method to find third approximation. **(06 Marks)**

b. Compute the coefficient of correlation and the equation of the lines of regression for the data:

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

(05 Marks)

c. Fit a curve of the form $y = ae^{bx}$ for the data:

x	0	2	4
y	8.12	10	31.82

(05 Marks)

Module-4

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

i) Less than 45 marks

ii) Between 40 and 45 marks.

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

(06 Marks)

b. Construct the interpolating polgnomial for the data given below using Newton's general interpolation formula for divided differences and hence find y at x = 3.

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

(05 Marks)

c. Evaluate $\int_0^1 \frac{x}{1+x^2} dx$ by Weddle's rule. Taking seven ordinates. Hence find $\log_e 2$. **(05 Marks)**

OR

8 a. Use Lagrange's interpolation formula to find f(4) given below. **(06 Marks)**

x	0	2	3	6
f(x)	-4	2	14	158

b. Use Simpson's $3/8^{th}$ rule to evaluate $\int_1^4 e^{1/x} dx$. **(05 Marks)**

c. The area of a circle (A) corresponding to diameter (D) is given by

D	80	85	90	95	100
A	5026	5674	6362	7088	7854

Find the area corresponding to diameter 105 using an appropriate interpolation formula. **(05 Marks)**

Module-5

9 a. Evaluate Green's theorem for $\oint_c (xy + y^2)\, dx + x^2 dy$ where c is the closed curve of the region bounded by $y = x$ and $y = x^2$. **(06 Marks)**

b. Find the extremal of the functional $\int_a^b \left(x^2 + y^2 + 2y^2 + 2xy\right) dx$. **(05 Marks)**

c. Varity Stoke's theorem for $\vec{F} = (2x - y)\,\hat{i} - yz^2\hat{j} - y^2z\,\hat{k}$ where S is the upper half surface of the sphere $x^2 + y^2 + z^2 = 1$ C is its boundary. **(05 Marks)**

OR

10 a. Derive Euler's equation in the standard form $\frac{\partial f}{\partial y} - \frac{d}{dx}\left(\frac{\partial f}{\partial y1}\right) = 0$. **(06 Marks)**

b. If $\vec{F} = 2xy\hat{i} + y^2z\hat{j} + xz\hat{k}$ and S is the rectangular parallelepiped bounded by x = 0, y = 0, z = 0, x = 2, y = 1, z = 3. Evaluate $\iint_S \vec{F}.\hat{n}\, ds$. **(05 Marks)**

c. Prove that the shortest distance between two points in a plane is along the straight line joining them or prove that the geodesics on a plane are straight lines. **(05 Marks)**

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15CV/CT32

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

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. State Hooke's law. Derive the expression for change in length of bar using Hooke's law. **(04 Marks)**

b. A steel bar of 25 mm diameter is acted upon by forces as shown in Fig. Q1 (b). Determine the total extension of the bar. $E = 2\times10^5$ N/mm^2. **(06 Marks)**

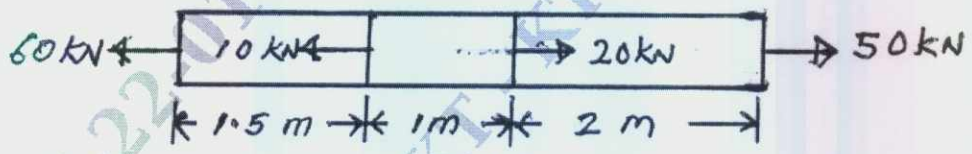

Fig. Q1 (b)

c. The Bronze bar 3 m long with 320 mm^2 cross sectional area is placed between two rigid walls at -20°C. There is a gap $\Delta = 2.5$ mm as shown in Fig. Q1 (c). Find the magnitude and the type of stress induced in the bar when it is heated to a temperature of 50.6°C. For bronze bar take $\alpha_b = 18\times10^{-6}/^\circ$C and $E_b = 80$ GPa. **(06 Marks)**

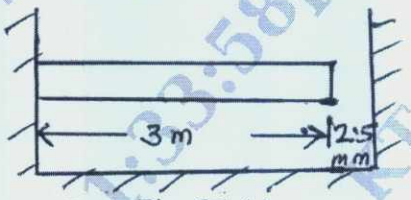

Fig. Q1 (c)

OR

2 a. Derive the relation between modulus of elasticity and modulus of rigidity. **(06 Marks)**

b. Find the total elongation of the bar shown in Fig. Q2 (b) subjected to an axial tensile force of 50 KN on the bar of material having modulus of elasticity = 2.1×10^5 N/mm^2. **(04 Marks)**

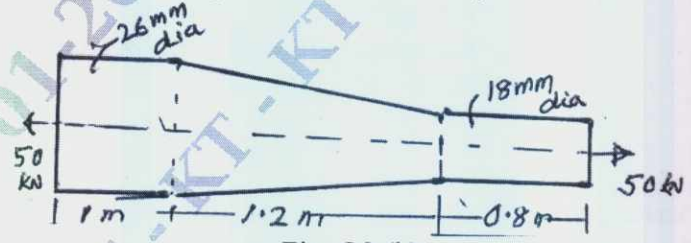

Fig. Q2 (b)

c. A copper rod, 25 mm in diameter is enclosed in steel tube 30 mm internal diameter and 35 mm external diameter. The ends are rigidly attached. The composite bar is 500 mm long and is subjected to an axial pull of 30 KN. Find the stresses induced in the rod and the tube. Take E for steel = 2×10^5 N/mm^2 and E for copper as 1×10^5 N/mm^2. **(06 Marks)**

Module-2

3 a. State principal stresses and principal planes. **(04 Marks)**

b. An element is subjected to stresses as shown in Fig. Q3 (b). Find out stresses on inclined plane AB by Mohr's graphical method. **(06 Marks)**

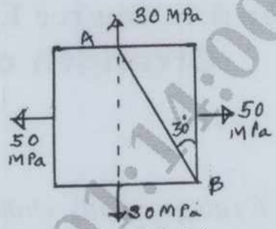

Fig. Q3 (b)

c. A point in a strained material is subjected to the stresses as shown in Fig. Q3 (c). Locate the principal stresses. Also determine the maximum shear stress. Use analytical approach. **(06 Marks)**

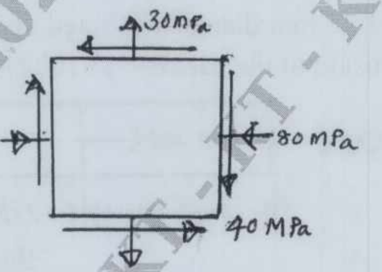

Fig. Q3 (c)

OR

4 a. Differentiate thick and thin cylinders. **(04 Marks)**

b. A cylindrical shell has an external diameter of 500 mm and wall thickness 10 mm. The length of the cylinder is 1.7 m. Determine the increase in its internal diameter and length when inside pressure is 1 N/mm^2. Given E = 210 GPa and Poisson's ratio = 0.3 **(06 Marks)**

c. Draw the radial and hoop stress distribution diagram over the wall of a thick cylinder. The outside diameter of pipe is 150 mm while inside diameter is 70 mm. The pipe is subjected to internal and external pressures 6 MPa and 4 MPa respectively. **(06 Marks)**

Module-3

5 a. Draw SFD and BMD for a simply supported beam carrying udl of intensity ω/m over the entire length. **(04 Marks)**

b. Draw SFD and BMD for a overhanging beam loaded as shown in Fig. Q5 (b). Indicate all salient features. **(12 Marks)**

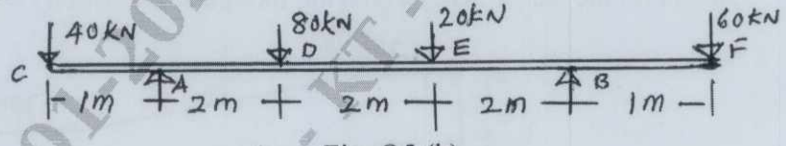

Fig. Q5 (b)

OR

6 a. Derive the relation between load, shear force and bending moment. **(04 Marks)**

b. From the given shear force diagram, shown in Fig. Q6 (b) develop the load diagram and draw BMD. Also determine points of contraflecture if any. **(12 Marks)**

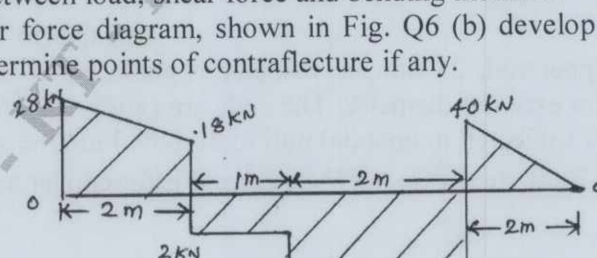

Fig. Q6 (b)

Module-4

7 a. State the assumptions made in theory of pure bending. Derive bending equation $\frac{M}{I}=\frac{f}{Y}=\frac{E}{R}$ with usual notations. **(06 Marks)**

b. A beam with an I section consists of 180mm ×15mm flanges and a web of 280 mm deep and 15 mm thickness. It is subjected to a bending moment of 120 KN-m and a shear force of 60 kN. Sketch the bending and shear stress distribution along the depth of the section. Refer Fig. Q7 (b). **(10 Marks)**

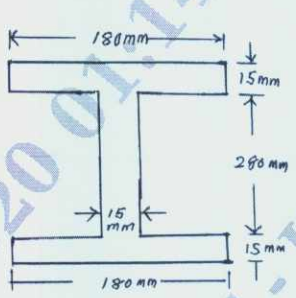

Fig. Q7 (b)

OR

8 a. Derive Euler's expression for buckling load on column with both ends pinned. **(06 Marks)**

b. Design the section of a circular cast iron column to carry a load of 1000 KN. The length of the column is 6 m. Use Rankine's constant $\frac{1}{1600}$ and factor of safety of 3. One end of the column is fixed and other is free. Critical stress is 560 MPa. **(10 Marks)**

Module-5

9 a. With torsional equation explain the following terms :

(i) Torsional rigidity.

(ii) Torsional stiffness. **(04 Marks)**

b. With usual notations derive the equation for torsion. **(06 Marks)**

c. A hollow shaft has outer diameter 100 mm and inner diameter 70 mm. Calculate shear stress acting on elements at the outer and inner surfaces, respectively, due to a torque of 7000 N-m. Draw sketch showing how the shear stress vary in magnitude along a radial line. **(06 Marks)**

OR

10 a. Explain the following theories of failure:

(i) St. Venant's theory.

(ii) Tresca's theory. **(08 Marks)**

b. At a point in a steel member the major principal stress is 200 MN/m^2 and the minor principal stress is compressive. If the tensile yield point of the steel is 250 MN/m^2, find the value of the minor principal stress at which yielding will commence, according to each of the following criteria of failure,

(i) Maximum shearing stress.

(ii) Maximum total strain energy.

(iii) Maximum shear strain energy.

Poisson's ratio = 0.28 **(08 Marks)**

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15CV33

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

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Define the following terms. Mention their units and dimensions.
(i) Mass density (ii) Weight density (iii) Specific volume (iv) Specific gravity **(08 Marks)**

b. A U tube manometer is used to measure the pressure of oil of specific gravity 0.85 flowing in a pipe line. Its left end is connected to the pipe and right limb is open to atmosphere. The center of the pipe is 100 mm below the level of mercury (Sp.Gr = 13.6). In the right limb. If the difference of mercury levels in the right limb and left limb is 160 mm, determine the absolute pressure of oil in the pipe. **(08 Marks)**

OR

2 a. State and prove Pascal's law. **(08 Marks)**

b. A 400 mm shaft is rotating at 200 rpm in a bearing of length 100 mm. If the thickness of the oil film is 1.4 mm and the dynamic viscosity of the oil is 0.7 N-S/m^2. Determine
(i) Torque required to overcome friction in bearing.
(ii) Power utilized in overcoming viscous resistance.
Assume a linear velocity profile. **(08 Marks)**

Module-2

3 a. Derive an expression for total pressure on one side of an inclined plane and show that the center of pressure lies lower than its centroid. **(08 Marks)**

b. If for a two dimensional potential flow, the velocity potential is given by $\phi = x(2y-1)$. Determine the velocity at the point P(4, 5). Determine also the value of stream function ψ at the point P. **(08 Marks)**

OR

4 a. Obtain an expression for continuity equation in three dimensional form. **(08 Marks)**

b. A vertical Gate closes a horizontal tunnel 5 m high and 3 m wide running full with water. The pressure at the bottom of the gate is 196.20 kN/m^2. Determine the total pressure on the gate and position of the centre of pressure. **(08 Marks)**

Module-3

5 a. Obtain Euler's equation of motion along a stream tube and hence derive Bernoulli's equation. List out the assumptions made. **(08 Marks)**

b. A horizontal venutrimeter with inlet diameter of 25 cm and throat diameter of 15 cm is used to measure. The flow of water. The pressure at the throat is 30 cm of mercury (vaccum) and that at the inlet is 200 KN/m^2 (gauge). Find the discharge of water through the meter. Take $C_d = 0.98$. **(08 Marks)**

OR

6 a. Derive the equation for the discharge through venturimeter. List out the assumptions made. **(08 Marks)**

b. 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)**

Module-4

7 a. Define various hydraulic coefficients of an orifice and derive the relation for discharge through an orifice. **(08 Marks)**

b. 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 $C_d = 0.6$ **(08 Marks)**

OR

8 a. Derive an expression for discharge over a triangular notch. **(08 Marks)**

b. A rectangular orifice 1.5 m wide and 1.0 m deep is discharging water form a tank. If the water level in the tank is 3 m above the top edge of the orifice, find the discharge through the orifice. Take $C_d = 0.6$ **(08 Marks)**

Module-5

9 a. Derive the Darcy-Weisbach equation for head loss due to friction in a pipe. **(08 Marks)**

b. 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) An equivalent length of 0.4 m pipe.

(ii) Equivalent size pipe 3600 m long. **(08 Marks)**

OR

10 a. Water is flowing in a pipe of 150 mm diameter with a velocity of 2.5 m/s. When it is suddenly brought to rest by closing the valve. Find the pressure rise assuming the pipe is elastic, given $E = 200\ GN/m^2$, Poisson's ratio 0.25 and K for water = 2 GN/m^2, pipe wall is 5 mm thick. **(08 Marks)**

b. Write short notes on: (i) Minor losses in pipe flow (ii) Hardy cross method (iii) Water hammer in pipes. **(08 Marks)**

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15CV34

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

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Distinguish between plane surveying and geodetic surveying. **(06 Marks)**

b. Explain the following:
(i) Principle of working from whole to part
(ii) Topo sheets and their numbering **(06 Marks)**

c. Explain different types of errors. **(04 Marks)**

OR

2 a. With a neat sketch, explain step by step procedure for conducting reciprocal leveling. **(06 Marks)**

b. Explain how will you continue chaining past the following obstacles: (i) river (ii) a building. **(06 Marks)**

c. A steel tape of 30 m long was standardized at a temperature of 20°C at a pull of 65N. Find the correction per tape length if the temperature and pull at the time of measurement are 30°C and 100 N. Cross section area of tape = 0.08 cm^2. Modulas of elasticity of steel = 2.1×10^5 N/mm^2, coefficient of thermal expansion = 1.16×10^{-5}/°C **(04 Marks)**

Module-2

3 a. Distinguish between
(i) True meridian and magnetic meridian
(ii) Declination and Dip **(04 Marks)**

b. The following interior angles were measured with a sextant in a closed traverse. The bearing of the line AB was measured as 65°0′ with prismatic compass. Calculate the bearing of all other lines if ∠A = 80°30′; ∠B = 71°30′; ∠C = 100°30′; ∠D = 107°30′. **(06 Marks)**

c. The following bearings were observed while traversing with a compass in clockwise direction.

Line	FB	BB
AB	220°15′	40°15′
BC	150°0′	329°45′
CD	77°30′	256°0′
DE	41°30′	222°45′
EA	314°15′	134°5′

Determine the local attraction and corrected bearing. **(06 Marks)**

OR

4 a. Define the following: Line of collimation, Axis of level tube, Face left observation, Transiting. **(06 Marks)**

b. Briefly explain repetition method of measuring horizontal angles. Give advantages and also state what errors are eliminated by repetition method. **(06 Marks)**

c. What are the desired relationship between fundamental lines of a theodolite? **(04 Marks)**

Module-3

5 a. Distinguish between closed traverse and open transverse. **(06 Marks)**

b. Briefly explain Bowditch's rule and transit rule. **(04 Marks)**

c. Calculate the latitude and departure of a closed traverse from the following details:

Line	Length (m)	WCB
AB	130	92°
BC	158	172°
CD	145	220°
DE	308	279°
EA	337	48°

State weather the traverse needs adjustment or not. **(06 Marks)**

OR

6 a. Briefly explain various types of tacheometry. **(06 Marks)**

b. The following notes refer to a line leveled tacheometrically with an anallactic tacheometer, the multiplying constant being 100:

Inst. Station	Height of axis	Staff stations	Vertical angle	Hair reading
P	1.50	BM	–6°12′	0.963, 1.515, 2.067
P	1.50	Q	+7°5′	0.819, 1.341, 1.863
Q	1.60	R	+12°27′	1.860, 2.445, 3.030

Compute the reduced levels of P.Q and R and the horizontal distance PQ and QR. Given RL of BM = 202.000 **(10 Marks)**

Module-4

7 a. Define level surface, horizontal surface, datum, bench mark. **(04 Marks)**

b. Compare the height of instrument method and rise and fall method of reduction of levels. **(06 Marks)**

c. The following staff readings were observed with a level, the instrument having been moved forward after 3rd and 7th reading.

0.875, 1.245, 2.380, 1.46, 2.885, 3.240, 3.960, 0.120, 1.920

The first reading was taken with the staff held upon a bench mark of elevation 200.00 m. Enter the reading in a page of level book form and calculate the reducing levels of all stations. Apply arithmetic check. **(06 Marks)**

OR

8 a. Explain:

(i) Profile levelling
(ii) Check levelling
(iii) Reciprocal levelling
(iv) Fly levelling **(08 Marks)**

b. Explain the method if determining the distance and elevation of an object using trignomatric leveling. When the bale is inaccessible and the instrument stations are in the same plane as that of the object. Derive the required equations. Assume the station faraway from object is at higher level. **(08 Marks)**

Module-5

9 a. Write a short note on planimeter. **(04 Marks)**

b. The following perpendicular offsets, in meters were taken at 12m intervals from a chain line to an irregular boundary 4.85, 3.86, 7.48, 6.20, 8.08, 9.82, 10.32, 6.82 and 9.46. Calculate the area in sq.m enclosed between the chain line and the irregular boundary using Simpson's rule and trapezoidal rule. **(06 Marks)**

c. The following table gives the corrected latitudes and departures (in meters) of the sides of a closed traverse ABCD.

Line	Latitude	Departure
AB	+84.58	+630.35
BC	–419.94	+95.67
CD	–100.83	–553.03
DA	+436.19	–172.99

Compute the area of traverse. **(06 Marks)**

OR

10 a. Explain the factors affecting contour interval. **(04 Marks)**

b. With the help of neat sketches describe the characteristics of contours (any 3). **(06 Marks)**

c. An embankment of width 10m and side slopes 1½ :1 is required to be made on a ground which is level in a direction transverse to the center line. The central height at 40 m intervals are as follows: 0.90, 1.25, 2.15, 2.50 and 1.85. Compute the amount of earthwork according to prismoidal formula. **(06 Marks)**

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CBCS SCHEME

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15CV35

Third Semester B.E. Degree Examination, Dec.2019/Jan.2020
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. Discuss the importance of Geology in the field of Civil Engineering. **(08 Marks)**

b. What are Rock forming minerals? Explain the importance of streak and luster in identifying the minerals. **(08 Marks)**

OR

2 a. Explain the industrial applications of Kaolin and Gypsum by giving their physical properties and chemical composition. **(08 Marks)**

b. Describe internal structure and composition of the Earth. **(08 Marks)**

Module-2

3 a. What are Igneous Rocks? Describe their classification by giving suitable rock examples. **(08 Marks)**

b. What are Joints? Describe the different types of Joints noticed in the rocks of earth crust. **(08 Marks)**

OR

4 a. Why Acidic rocks are more durable than Basic and Ultra Basic rocks? **(06 Marks)**

b. Use of Calcareous rocks building stones in Industrial areas. **(04 Marks)**

c. Horst and Garden structure. **(06 Marks)**

Module-3

5 What is Earth Quake? Explain its causes and effects – Seismic waves , Engineer's problems related to Earth quake. **(16 Marks)**

OR

6 a. What are Landforms? Explain its classification in detail. **(08 Marks)**

b. What are Floods? Explain in detail the causes and effects and their control. **(08 Marks)**

Module-4

7 a. Describe the occurrence of ground water in different terrains. **(06 Marks)**

b. What is an Aquifer? Describe the different types of aquifers. **(06 Marks)**

c. Describe the hydro logical cycle. **(04 Marks)**

OR

8 a. Explain the procedure of Electric Resistivity survey in ground water exploration. **(08 Marks)**

b. Describe the artificial recharging of ground water and its benefits. **(08 Marks)**

Module-5

9 a. What is GIS? Describe the role and its applications in the field of Civil Engineering. **(06 Marks)**

b. Discuss the Environmental impact due to mining , quarrying. **(06 Marks)**

c. Railway Ballast. **(04 Marks)**

OR

10 a. What is Remote Sensing? Describe its importance in the field of Civil Engineering. **(04 Marks)**

b. Application of GPS in Civil Engineering. **(04 Marks)**

c. Porosity and Permeability. **(04 Marks)**

d. Write a note on Topographical maps. **(04 Marks)**

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CBCS SCHEME

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15CV36

Third Semester B.E. Degree Examination, Dec.2019/Jan.2020
Building Materials and Construction

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Explain the various factors that cause deterioration of stone work and the preservation of stones. **(06 Marks)**

b. Explain dressing of stones and what are the requirements of good building stones? **(06 Marks)**

c. Explain any two Laboratory tests on bricks. **(04 Marks)**

OR

2 a. Explain briefly stabilized Mud Blocks. **(06 Marks)**

b. Briefly explain Natural and Manufactured Fine Aggregate. **(04 Marks)**

c. Write the requirements of good Mortar. **(06 Marks)**

Module-2

3 a. With neat sketches, explain the following types of foundation.
i) Raft foundation
ii) Pile foundation. **(06 Marks)**

b. What are the Preliminary investigations of the soil and foundation? **(04 Marks)**

c. Write short notes on the following with sketches
i) Combined footing
ii) Spread and strap footing
iii) Safe Bearing capacity of soil. **(06 Marks)**

OR

4 a. With neat sketch, Elobarate the features of English Bond and Flemish Bond. **(06 Marks)**

b. Draw neat sketches of the following and write features
i) Ashlar Masonry
ii) Rubble Masonry. **(06 Marks)**

c. Write the advantages of cavity walls over load bearing walls with sketch. **(04 Marks)**

Module-3

5 a. With net sketch, explain various components of a segmental Arch. **(06 Marks)**

b. With neat sketches classify the Lintels. **(06 Marks)**

c. Write short note on stability of Arch. **(04 Marks)**

OR

6 a. With the help of neat sketch, explain various components of king post truss. **(06 Marks)**

b. Write the requirement of good Roof. **(04 Marks)**

c. Explain types of pitched roofs with sketches. **(06 Marks)**

Module-4

7 a. What are the requirements of good stairs. (04 Marks)
b. Explain shoring, under pinning and scaffolding. (06 Marks)
c. With sketches explain various types of stairs. (06 Marks)

OR

8 a. List the factors affecting the location of doors and windows. (04 Marks)
b. Explain types of doors with sketches. (06 Marks)
c. Write short notes on :
i) Bay windows
ii) French windows
iii) Ventilators
iv) Glazed window (06 Marks)

Module-5

9 a. What are the main objectives of plastering? (06 Marks)
b. List the requirements of a good plaster? What are the defects arise in plastering? (06 Marks)
c. What is pointing? Mention types of pointing. (04 Marks)

OR

10 a. Explain Damp proofing? What are the causes of dampness? Explain its necessity in building. (06 Marks)
b. Mention and explain different types of paints. (06 Marks)
c. Explain the procedure of painting iron and steel surfaces. (04 Marks)

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CBCS SCHEME

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15ME35A/15MEA305

Third Semester B.E. Degree Examination, Dec.2019/Jan.2020
Metal Casting and Welding

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Define Manufacturing Process. Briefly explain the classification of Manufacturing Processes. **(07 Marks)**

b. Explain different pattern allowances with neat sketches. **(09 Marks)**

OR

2 a. Explain the different properties of Moulding Sand. **(06 Marks)**

b. Explain the following processes:
(i) Sweep Moulding
(ii) Sand Slinger **(10 Marks)**

Module-2

3 a. With a neat sketch, explain coreless induction furnace and mention its merits and demerits. **(08 Marks)**

b. Sketch and explain construction and operation of Cupola. **(08 Marks)**

OR

4 a. Explain Gravity die casting with neat sketch. **(08 Marks)**

b. With neat sketches, explain thixo casting and slush casting. **(08 Marks)**

Module-3

5 a. Explain Mechanism of Solidification. **(08 Marks)**

b. Explain the different types of Nucleation. **(08 Marks)**

OR

6 a. Define the term Defect. Explain the different defects in casting. What are the causes and remedies? **(08 Marks)**

b. Define the term degasification. With neat sketch explain any two methods of degasification. **(08 Marks)**

Module-4

7 a. With neat sketches explain TIG and MIG welding. **(10 Marks)**

b. With neat sketch explain Thermit welding process. Mention its merits and demerits. **(06 Marks)**

OR

8 a. Explain Projection welding process with a neat sketch, list out advantages and disadvantages. **(08 Marks)**

b. Explain briefly the following :
(i) Seam Welding (ii) Explosive Welding. **(08 Marks)**

Module-5

9 a. What is meant by HAZ? Explain the various regions of HAZ in low carbon steel during welding. **(08 Marks)**

b. Discuss the various types of welding defects their causes and remedies. **(08 Marks)**

OR

10 a. Differentiate between soldering and Brazing list out merits, demerits and applications of these two processes. **(08 Marks)**

b. Explain ultrasonic inspection method to test welded part with advantages and disadvantages. **(08 Marks)**

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15MATDIP31

Third Semester B.E. Degree Examination, Dec.2019/Jan.2020
Additional Mathematics – I

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Find modulus and amplitude of $1-\cos\theta+i\sin\theta$. **(05 Marks)**

b. Express $\frac{3+4i}{3-4i}$ in $a+ib$ form. **(05 Marks)**

c. Find the value of 'λ' so that the points A(–1, 4, –3), B(3, 2, –5), C(–3, 8, –5) and D(–3, λ, 1), may lie on one plane. **(06 Marks)**

OR

2 a. Find the angle between the vectors $\vec{a}=5\hat{i}-\hat{j}+\hat{k}$ and $\vec{b}=2\hat{i}-3\hat{j}+6\hat{k}$. **(05 Marks)**

b. Prove that $\left[\vec{a}\times\vec{b},\ \vec{b}\times\vec{c},\ \vec{c}\times\vec{a}\right]=\left[\vec{a}\ \vec{b}\ \vec{c}\right]^2$. **(05 Marks)**

c. Find the real part of $\frac{1}{1+\cos\theta+i\sin\theta}$. **(06 Marks)**

Module-2

3 a. Obtain the n^{th} derivative of $\sin(ax+b)$. **(05 Marks)**

b. Find the pedal equation of $r^n=a^n\cos n\theta$. **(05 Marks)**

c. If $u=\frac{yz}{x}$, $v=\frac{zx}{y}$, $w=\frac{xy}{z}$, show that $\frac{\partial(u,v,w)}{\partial(x,y,z)}=4$. **(06 Marks)**

OR

4 a. If $u=\log\left(\frac{x^4+y^4}{x+y}\right)$ show that $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}=3$. **(05 Marks)**

b. If $u=f(x-y, y-z, z-x)$, show that $\frac{\partial u}{\partial x}+\frac{\partial u}{\partial y}+\frac{\partial u}{\partial z}=0$. **(05 Marks)**

c. If $y=a\cos(\log x)+b\sin(\log x)$, show that $x^2y_{n+2}+(2n+1)xy_{n+1}+(n^2+1)y_n=0$ **(06 Marks)**

Module-3

5 a. Evaluate $\int_0^{\pi} x\sin^8 x\,dx$. **(05 Marks)**

b. Evaluate $\int_0^1 x^2(1-x^2)^{3/2}dx$. **(05 Marks)**

c. Evaluate $\int_{-c}^{c}\int_{-b}^{b}\int_{-a}^{a}(x^2+y^2+z^2)dzdydx$. **(06 Marks)**

OR

6 a. Evaluate $\int_0^1 \int_x^{\sqrt{x}} xy\,dy\,dx$. **(05 Marks)**

b. Evaluate $\int_0^1 \int_0^1 \int_0^1 (x+y+z)\,dx\,dy\,dz$. **(05 Marks)**

c. Evaluate $\int_0^\infty \frac{x^4}{(1+x^2)^4}\,dx$. **(06 Marks)**

Module-4

7 a. If $\vec{r} = (t^2+1)\hat{i} + (4t-3)\hat{j} + (2t^2-6t)\hat{k}$, find the angle between the tangents at t = 1 and t = 2. **(05 Marks)**

b. If $\vec{r} = e^{-t}\hat{i} + 2\cos 3t\,\hat{j} + 2\sin 3t\,\hat{k}$, find the velocity and acceleration at any time t, and also their magnitudes at t = 0. **(05 Marks)**

c. Show that $\vec{F} = (y+z)\hat{i} + (z+x)\hat{j} + (x+y)\hat{k}$ is irrotational. Also find a scalar function 'φ' such that $\vec{F} = \nabla\phi$. **(06 Marks)**

OR

8 a. Find the unit normal vector to the surface $x^2y + 2xz = 4$ at (2, –2, 3). **(05 Marks)**

b. If $\vec{F} = xz^3\hat{i} - 2x^2yz\,\hat{j} + 2yz^4\hat{k}$ find $\nabla\cdot\vec{F}$ and $\nabla\times\vec{F}$ at (1, –1, 1). **(05 Marks)**

c. If $\frac{d\vec{a}}{dt} = \vec{w}\times\vec{a}$ and $\frac{d\vec{b}}{dt} = \vec{w}\times\vec{b}$, then show that $\frac{d}{dt}(\vec{a}\times\vec{b}) = \vec{w}\times(\vec{a}\times\vec{b})$ **(06 Marks)**

Module-5

9 a. Solve $\sec^2 x\tan y\,dx + \sec^2 y\tan x\,dy = 0$. **(05 Marks)**

b. Solve $(y^3 - 3x^2y)dx + (3xy^2 - x^3)dy = 0$. **(05 Marks)**

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

OR

10 a. Solve $\frac{dy}{dx} + y\cot x = \cos x$. **(05 Marks)**

b. Solve $x^2y\,dx - (x^3+y^3)dy = 0$ **(05 Marks)**

c. Solve $y(x+y)dx + (x+2y-1)dy = 0$ **(06 Marks)**

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