Hall Ticket Number :										

R-15

Code: 5GC31

II B.Tech. I Semester Regular Examinations November 2016

Engineering Mathematics –III

(Common to CE & ME)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70Marks)

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UNIT–I

1. a) Find the rank of the matrix $\begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$ by reducing it into Row-Echelon form. 8M

b) Test for consistency and solve the system of equations:
$2x + 6y + 11 = 0, \quad 6x + 20y - 6z + 3 = 0, \quad 6y - 18z + 1 = 0$ 6M

OR

2. a) Verify Cayley-Hamilton theorem for $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ and express the matrix polynomial $A^5 - 4A^4 - 7A^3 + 11A^2 - A - 10I$ as linear polynomial in A. 7M

b) Find the eigen values and eigen vectors of the matrix $A = \begin{bmatrix} 2 & 0 & 1 \\ 0 & 2 & 0 \\ 1 & 0 & 2 \end{bmatrix}$. 7M

UNIT–II

3. a) Using Regula-falsi method, find the root of the equation $x e^x = 2$ correct to three decimal places. 7M

b) Apply Lagrange's interpolation scheme to estimate the value of x when $y = 15$ for the following data.

x	5	6	9	11
y	12	13	14	16

7M

OR

4. Evaluate $\int_0^{\frac{\pi}{2}} \sin x \, dx$ using i) Trapezoidal rule ii) simpson's 3/8 rule.

(Divide the range into 10 equal parts) 14M

UNIT–III

5. Use Modified Euler's method to find an approximate value of y when $x = 1$, given that $\frac{dy}{dx} = x + y,\ y(0) = 0$ (choose step length $h = 0.2$). 14M

OR

6. Apply 4th order Runge-Kutta method to find $y(0.2)$ for the equation $\frac{dy}{dx} = \frac{y - x}{y + x}\ y(0) = 1$ insteps of 0.1 14M

UNIT–IV

7. Obtain Fourier cosine series and sine series of a function $f(x) = x,\ 0 \le x \le ®$. Hence deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \frac{1}{7^2} + - - - - = \frac{®^2}{8}$. 14M

OR

8. a) Form the partial differential equation by eliminating arbitrary function F from $F(xy + z^2,\ x + y + z) = 0$. 7M

   b) Solve $\frac{\partial^3 z}{\partial x^2 \partial y} - \cos(2x + 3y) = 0$ by the method of separation of variables. 7M

UNIT–V

9. a) If $f(z)$ is an analytic function of z, show that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right)|f(z)|^2 = 4|f'(z)|^2$. 9M

   b) Determine the analytic function whose real part is $y + e^x \cos y$. 5M

OR

10. Evaluate $\oint_c \frac{e^{-3®z}}{2z + i} dz$, where c the boundary of the square with the vertices $\pm 1 and \pm i$. 14M

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Hall Ticket Number :										

R-15

Code: 5G538

II B.Tech. I Semester Regular Examinations November 2016

Electrical & Mechanical Technology

(Civil Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70Marks)

Use separate booklets for Part-A & Part-B

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PART-A

UNIT-I

1. a) State and explain Ohm's law and Kirchhoff's laws
   b) Three resistances 2Ω, 4Ω and 6Ω are connected in series across a D.C. voltage supply. Voltage across 2 Ω resistor is 4V. Find the voltage across remaining resistances and total voltage.

OR

2. a) Explain the action of commutator in DC generators.
   b) Explain the constructional features of a dc machine in detail.

UNIT-II

3. a) Explain the losses that occur in transformers.
   b) A 30 KVA single phase transformer has an iron loss of 457 watts and copper loss of 125 watts when delivering half the full load. At what percentage of full load will the transformer have maximum efficiency?

OR

4. a) Explain with the help of diagram how a rotating magnetic field is produced in a 3-phase Induction Motor.
   b) Explain about Torque- slips Characteristics of 3- phase Induction motor.

PART-B

UNIT-III

5 a) List the advantages and disadvantages of a gas welding over arc welding process.
   b) Illustrate the formation of neutral, oxidizing and reducing flames in a welding torch of a gas welding.

OR

6. Describe the working of the following welding methods and with their specific applications:
   i. TIG Welding ii. MIG Welding

UNIT-IV

7. Explain the working of a two stroke petrol engine with neat sketches. In what context it differs from a two stroke diesel engine?

OR

8. a) What are the advantages of a multi-stage compression over single stage? List the applications of a compressed air.
   b) Classify various material handling systems with examples.

UNIT-V

9. a) Compare vapour compression refrigeration system with a vapour absorption refrigeration system.
   b) Explain different properties of a refrigerant.

OR

10. Explain briefly various methods of refrigeration with neat sketches.

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Hall Ticket Number :										

R-15

Code: 5G631

II B.Tech. I Semester Regular Examinations November 2016

Strength of Materials-I

(Civil Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Derive the relation between Young's Modulus and Bulk Modulus 4M

   b) A steel tie rod 20 mm diameter is encased in a copper tube of external dia. of 36 mm and internal diameter of 24 mm with the help of washers and nuts. The nut on the tie rod is tightened and the assembly is subjected to a tensile load of 20 kN. The temperature of the assembly is now raised to 80^0C. Determine the resultant stresses in the rod and the tube.
   Take E_s = 210 GPa, E_c = 100 GPa, $\alpha_s = 11 \times 10^{-6}$ / ^{0}C and $\alpha_c = 18 \times 10^{-6}$/ ^{0}C 10M

OR

2. a) Explain the terms "Elastic Modulus and Regidity Modulus" 4M

   b) Two vertical rods, one of steel and the other of bronze, are fixed at the upper end and connected at the lower end to a rigid horizontal member as shown in fig.1. Each rod is 3 m long and 12 mm in diameter. Calculate the position of the 10 kN load such that horizontal member remains horizontal even after loading. Also calculate the stresses and deformation in both the rods. Take Es = 210kN/mm^2 and Eb = 105 kN/mm^2.

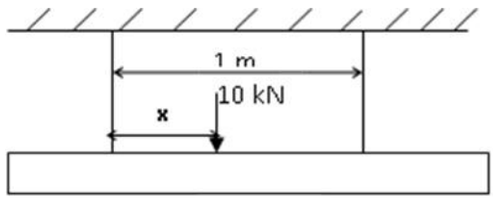

fig.1

10M

UNIT–II

3 a) Derive the relationship between shear force and bending moment 4M

   b) A cantilever beam of span 4 m is loaded by a concentrated load of 4 KN at the free end in addition to a udl of 5 kN/m, 2 m long, acting in the middle portion of the beam as shown in fig.2. Draw SFD and BMD giving salient values.

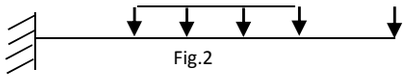

Fig.2

10M

OR

4. a) Explain the sign convention for shear force and bending moment. Explain how they differ from equilibrium sign convention. 4M

   b) Draw the shear force and bending moment diagrams for the beam loaded as shown in fig.3. The concentrated moment is acting at the centre of the beam.

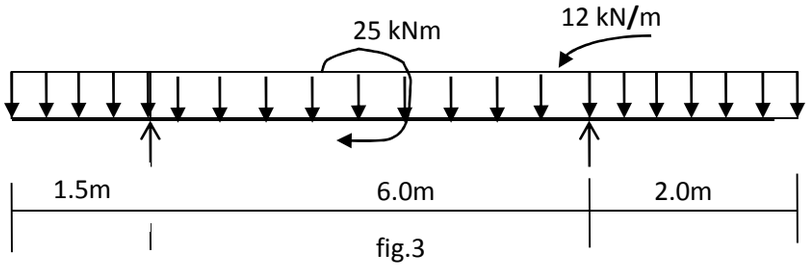

fig.3

10M

UNIT–III

5. a) Define section modulus. What is its value for a hollow pipe with external and internal diameters as 'D' and 'd'. 4M

   b) A simply supported beam of rectangular cross section 100mm x 200mm deep carries an udl on an effective span of 4 m. If the allowable stress in bending is 10 N/ mm^2 and in shear is 1 N/ mm^2, what is the safe value of the udl that can be placed on the beam? Find the maximum stresses in shear and bending, if a udl of 10 kN/m is applied. 10M

OR

6. a) Write the assumptions made in the theory of simple bending and discuss 6M

   b) A beam of I section is 250 mm deep and 200 mm wide. The flanges are 25 mm thick and web 13 mm thick. Sketch the shear stress distribution across the depth of the section and the mark salient values. Shear force at the section is 100 kN. 8M

UNIT–IV

7. a) What is point of contraflexure? Draw elastic curve for a propped cantilever beam with udl throughout the span. 4M

   b) The flexural rigidity of a cantilever of span 4 m is 2 x 10^7 kN-m from the fixed end to a distance of 2.5 m and is 1 x 10^7 kN-m for the remaining part. Calculate the maximum deflection in the beam if it carries a udl of 4 kN/m over the entire span in addition to a concentrated load of 5 kN at 2.5 m from the fixed end. Use Mohr's theorems. 10M

OR

8. a) Write the moment area theorems and explain 4M

   b) A simply supported beam of span 5.0 m is carrying a point load of 30 kN at the centre in addition to self weight of 5 kN/m. Determine the maximum slope and maximum deflection. Take EI = 1 x 10^7 kN-m 10M

UNIT–V

9. a) At a point in the material the stresses on two mutually perpendicular planes are 50 MPa compressive and 30 MPa tensile. The shear stress on these planes is 20 MPa. Find

      i) the magnitude and the direction of principal stresses
      ii) Maximum shearing stress and the plane. Also, find the state of stress on an oblique plane inclined at 30° to the vertical plane. 12M

   b) Draw a key-diagram to show the stresses on the oblique plane 2M

OR

10. a) Explain the maximum strain energy theory of failure 4M

    b) Describe the procedure for the construction of Ellipse of stress. Write the advantages and disadvantages of the two different graphical methods of determining the stresses on an oblique plane. 10M

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Hall Ticket Number :										

R-15

Code: 5G632

II B.Tech. I Semester Regular Examinations November 2016

Surveying

(Civil Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Draw a neat sectional elevation of the prismatic compass, and name the parts of the instruments thereon. Explain how you would test it. **8M**

   b) Explain the following.
   (i) Local attraction
   (ii) Reduced bearings **6M**

OR

2. a) A series of offsets were taken from chain line to a curved boundary line at intervals of 10m in the following order:
   0, 2.82, 3.96, 6.42, 8.61, 8.90, 5.25, 0m **8M**
   Compute the area between the chain line, the curved boundary line and the end Offsets by the Trapezoidal rule and by Simpsons rule.

   b) Explain the following terms.
   (i) Oblique offset **6M**
   (ii) Reference sketch

UNIT–II

3. a) Describe the method of locating grade contour in the field. **7M**

   b) A railway embankment is 9m wide at formation level, with side slope of 2 to 1. Assuming the ground to be level transversely, calculate the volume of the embankment in cubic metres in a length of 180m, the centre heights at 30m intervals being 0.6, 0.8, 1.5, 1.8, 0.75, 0.3m respectively. **7M**

OR

4. a) Describe the temporary adjustments of a level and a tilting level. **7M**

   b) In levelling between two points A and B on opposite banks of a river, the level was set up near A, and the staff readings on A and B were 1.564 and 2.934 respectively. The level was then moved and set up near B and the respective readings on A and B were 1.895 and 3.271. Find the true difference of level between A and B. **7M**

UNIT–III

5. The following are the lengths and bearings of the sides of a closed traverse ABCD:

Line	Length in metres	Bearing
AB	76.80	140°12’
BC	195.60	36°24’
CD	37.20	338°48’
DA	---	----

Compute the length and bearing of the line DA. **14M**

OR

6. Explain the procedure involved in vernier micrometer and its uses. **14M**

UNIT–IV

7. Explain the method of setting a plane table with neat sketch. **14M**

OR

8. Explain the following terms.
   (i) Principle of stadia method
   (ii) Use of subtense bar **14M**

UNIT–V

9. Explain the method of fitting curves using Two theodolite methods. **14M**

OR

10. Explain the concepts involved in EDM. **14M**

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Hall Ticket Number :										

R-15

Code: 5G633

II B.Tech. I Semester Regular Examinations November 2016

Fluid Mechanics

(Civil Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) What is Capillarity? Explain with sketches. 7M

   b) Describe with the help of neat sketches different types of manometers and mechanical pressure gauges. 7M

OR

2. a) Define 'Total Pressure' and 'Centre of Pressure' 4M

   b) A gate is placed at 60^0 inclined to the horizontal and supported by a hinge at a vertical height of 3 m from the bottom. Find the height *h* of water on the other side of the gate so that the gate tips about the hinge. Take the width of the gate as unity. 10M

UNIT–II

3. a) Define uniform and non-uniform; laminar and turbulent flows 6M

   b) The velocity components in a two dimensional flow field for an incompressible fluid are expressed as,

   $u = (a_y^3/3) + 2_{x-x^2y}; \quad v = xy^2 - 2_y - (x^3/3)$

   i. Show that these functions represent a possible case of an irrotational flow

   ii. Obtain an expression for velocity potential 'ϕ' 8M

OR

4. a) Derive the Euler's equation for steady flow along a stream 8M

   b) The water is flowing through a pipe having diameters 0.3 m and 0.15 m at sections 1 and 2, respectively. The rate of flow through pipe is 0.04 m^3/s. The section 1 is 5 m above the datum and section 2 is 2 m above datum. If the pressure at section 1 is 30 x 10^4 N/m^2, find the intensity of pressure at section 2. 6M

UNIT–III

5. a) What is an equivalent pipe? Mentions the assumptions of equivalent pipe 4M

   b) A horizontal pipe of diameter D_1 has a sudden expansion to a diameter D_2. At what ratio D_1/D_2 would the differential pressure on either side of the expansion be maximum? What is the corresponding loss of head and differential pressure head? 10M

OR

6. a) What are the various types of mouthpieces? 6M

   b) A square orifice 1.5 m long is provided in a tank. The water level on one side of the orifice is 1 m above the top edge of the orifice and 0.5 m below the top edge on the other side of the orifice. Find the discharge through the orifice, if C_d = 0.64 8M

UNIT–IV

7. a) Define the terms Kinetic energy correction factor and momentum correction factor. 4M

   b) A laminar flow is taking place in a pipe of diameter of 0.2 m. the maximum velocity is 1.5 m/s. Find the mean velocity and the radius at which this occurs. Also, calculate the velocity at 40 mm from the wall of the pipe. 10M

OR

8. a) What do you understand by turbulent flow? What factor decides the type of flow in pipes? 7M

   b) Explain about Reynolds Experiment with the help of a neat sketch. 7M

UNIT–V

9. a) Define the term dimensional analysis and model analysis. 4M

   b) The efficiency ¦ of a fan depends on the density °, the dynamic viscosity μ of the fluid, the angular velocity µ, diameter *D* of the rotor and the discharge *Q*. Express ¦ in terms of dimensionless parameters using Rayleigh's Method. 10M

OR

10. a) Define the terms: model, prototype, model analysis, hydraulic similitude 4M

    b) The pressure difference a*p* in a pipe of diameter *D* and length *l* due to viscous flow depends on the velocity *V*, viscosity μ and density °. Using Buckingham's π-theorem, obtain an expression for a*p*. 10M

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Hall Ticket Number :										

R-15

Code: 5G634

II B.Tech. I Semester Regular Examinations November 2016

Building materials and Construction

(Civil Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70Marks)

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UNIT–I

1. a) What are the qualities you would look for in a good building stone for masonry work? 7M

   b) How would you classify stones for engineering works? 7M

OR

2. a) What are the constituents of good brick earth? What additional materials are now being used for brick preparation? Explain. 7M

   b) Briefly describe various methods of manufacture of bricks. 7M

UNIT–II

3. a) What are the characteristics of a good tile? Give different types of tiles manufactured for different purposes, in India. 7M

   b) Briefly explain the manufacturing process of a tile. 7M

OR

4. a) List the various ingredients of lime. 7M

   b) What are the constituents of lime stone? 7M

UNIT–III

5. a) Briefly explain the structure and parts of timber. 7M

   b) What are the properties of good timber? 7M

OR

6. What are the alternate materials for wood? Justify and explain in detail. 14M

UNIT–IV

7. a) How is stone masonry classified? What are the different materials required for stone masonry? 7M

   b) Distinguish between Stretcher and Header, & English and Flemish bonds. 7M

OR

8. Explain different types of shallow foundations used for buildings, with neat sketches. 14M

UNIT–V

9. a) Write, in detail, about Queen Post Truss, drawing a neat diagram. 7M

   b) What are the different types of floors in buildings? Explain about Concrete flooring, in detail. 7M

OR

10. a) What are the requirements of a good stair case? How is the proportioning of tread and rise done in a staircase? 7M

    b) Elucidate the constituents of a good paint. List the different types of paints for different types of structures. 7M

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