

Hall Ticket Number :

R-14**Code: 4GC31***II B.Tech. I Semester Supplementary Examinations November 2016***Mathematics –II**

(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)

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 $xe^x = 2$ correct to three decimal places.
- b) Apply Lagrange's interpolation scheme to estimate the value of x when $y = 15$ for the following data.

7M

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 $\frac{dy}{dx} = \frac{y-x}{y+x}$ $y(0) = 1$ in steps of 0.1 14M

UNIT-IV

7. Obtain Fourier cosine series and sine series of a function $f(x) = x$, $0 \leq x \leq \pi$. Hence deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \frac{1}{7^2} + \dots = \frac{\pi^2}{8}$. 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 $\oint_c \frac{e^{-3fz}}{2z+i} dz$, where c the boundary of the square with the vertices ± 1 and $\pm i$. 14M

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R-14

Code: 4G538

II B.Tech. I Semester Supplementary 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

PART-A

UNIT-I

1. a) State and explain Ohm's law and Kirchhoff's laws
b) Three resistances 2 , 4 and 6 are connected in series across a D.C. voltage supply. Voltage across 2 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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R-14

Code: 4G632

II B.Tech. I Semester Supplementary 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)

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

Compute the area between the chain line, the curved boundary line and the end Offsets by the Trapezoidal rule and by Simpsons rule.

8M
- b) Explain the following terms.

(i) Oblique offset

(ii) Reference sketch

6M

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

Code: 4G633

II B.Tech. I Semester Supplementary 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)

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° 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,

$$u = (y^3/3) + 2x - x^2y; \quad v = xy^2 - 2y - (x^3/3)$$
 - 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 $0.04 \text{ m}^3/\text{s}$. The section 1 is 5 m above the datum and section 2 is 2 m above datum. If the pressure at section 1 is $30 \times 10^4 \text{ N/m}^2$, 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 η of a fan depends on the density ρ , the dynamic viscosity μ of the fluid, the angular velocity ω , diameter D of the rotor and the discharge Q . Express η 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 Δp in a pipe of diameter D and length l due to viscous flow depends on the velocity V , viscosity μ and density ρ . Using Buckingham's π -theorem, obtain an expression for Δp . 10M
