Code No.: **40M03** | **MR14**

MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)

(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)
Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad

II B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY-2019

Subject: **Mathematics - III**

Branch: **CE**

Time: 3 hours **Max. Marks: 75**

PART – A

I. Answer **ALL** questions of the following **5x1Mark=5 Marks**

1. Define Odd function
2. State linear property of Z-Transformation
3. Write down simpson's 1/3 rd rule.
4. Write a demerit of the Taylor series.
5. Give examples of partial differential equation

II. Answer **ALL** questions of the following **10x2Marks=20 Marks**

1. Find Fourier transform of $f(x) = e^{\frac{-x^2}{2}}, -\infty < x < \infty$
2. Find the Fourier transform of $\frac{e^{-ax}}{x}$, $a > 0$.
3. Find $Z^{-1}\left[\frac{z}{(z^2+11z+24)}\right]$
4. Find Z transform of sin(3n+5).
5. A curve passes through (2, 8); (3, 27) ;(4, 64) & (5, 125). Find the area of the curve between the x-axis and the lines x = 2 and x = 5
6. If $\sum x = 10.5$, $\sum x^2 = 22.75$, $\sum y = 9.8$, $\sum xy = 21.945$, and y=a+bx then find a and b
7. Using Taylor's method, find y(0.1), given that $\frac{dy}{dx} = x - y^2$, y(0) =1
8. Given $y' = 3x + \frac{y}{2}$ and y(0)=1, find y(0.1) using Taylor's series method.
9. Form a partial differential equation by eliminating the arbitrary function from $z = xy + f(x^2 + y^2)$
10. Form P.D.E by eliminating the arbitrary constants a and b from $z = (x - a)^2 + (y - b)^2$

PART-B

Answer **ALL** questions of the following **5x10 Marks= 50Marks**

1. Find the Fourier cosine and sine transform of e^{-ax} , a>0 and hence deduce the inversion formula.

OR

2. Find the Fourier series of periodicity 3 for $f(x)=2x-x^2$ in $0<x<3$.
3. Solve $y_{n+2} - 6y_{n+1} + 9y_n = 3^n$ given that $y_o = 0$, $y_1 = 1$ by Z-Transforms

OR

4. Use the Z-transform to solve $u_{n+2} + 4u_{n+1} + 3u_n = 3^n$ with $u_0 = 0$, $u_1 = 1$.

5. Fit a curve of the form $y=ae^{bx}$ to the following data by the method of least squares.

X	0.0	0.5	1.0	1.5	2.0	2.5
Y	0.10	0.45	2.15	9.15	40.35	180.75

OR

6. If p is the pull required to lift a load w by means of a pully block, find a linear law of the form $p = mw + c$ connecting p and w using the following data

p=	12	15	21	25
w=	50	70	100	120

Where p and w are taken in kg.wt compute p when w=150 kg.wt.

7. Find y(1.1), y(1.2) using Runge Kutta fourth order formula given that $\frac{dy}{dx} = x-y$ and y(1)=0.4

OR

8. Using Taylor's series method solve $\frac{dy}{dx} = x^2- y$, y(0) =1 at x = 0.1,0.2,0.3,0.4 and compare the values with exact solution.
9. Solve $z^2(p^2 + q^2) = x^2 + y^2$

OR

10. Solve $z^2(p^2x^2 +q^2)=1$.

Code No.: **30M07** | **MR13**

MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)

(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)
Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad

II B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY-2019

Subject: **Mathematics – II**

Branch: **CE**

Time: 3 hours **Max. Marks: 75**

PART – A

I. Answer **ALL** questions of the following **5x1Mark=5 Marks**

1. Define Irrotational vector.
2. Find the Fourier coefficient a_0 of the function f (x) = x in $(0, 2\pi)$
3. State the principle of least squares.
4. Define Transcendental Equations with example.
5. Write the second order Runge - Kutta formula

II. Answer **ALL** questions of the following **10x2Marks=20 Marks**

1. Use Green's theorem to evaluate $\oint_c (x + y^2)dx + (x^2 + y)\,dy$ where C is the circle of radius 2 with centre at the origin O of the x y plane.
2. Prove that div grad F = $\nabla^2 f = \frac{\partial^2 f}{dx^2} + \frac{\partial^2 f}{dy^2} + \frac{\partial^2 f}{dz^2}$
3. Show that the fourier transform of $\exp(-x^2/2)$ is self reciprocal.
4. State the change of scale property of Fourier transform.
5. Using Newton's backward interpolation formula, find f (2.5) from the following table

x	0	1	2	3
f(x)	1	3	5	6

6. Fit a straight line to the following data

x	0	1	2	3	4
y	1	1.8	3.3	4.5	6.3

7. Find a positive root between 0 and 1 of $xe^x = 1$ employing bisection method.
8. Find the root of the equation $2x - \log_{10} x = 7$, which lies between 3.5 and 4 by Regular-Falsi method.
9. Explain LU Decomposition Method.
10. Evaluate $\int_0^1 \frac{dx}{1+x}$ applying the Simpson's 1/3rd rule.

PART-B

Answer **ALL** questions of the following **5x10 Marks= 50Marks**

1. Verify Green's theorem for $\int_c [(3x^2 - 8y^2)dx + (4y - 6xy)dy]$ where 'C' is the boundary of the region bounded by x= 0, y = 0 and x+y = 1

OR

2. a) Find the values of a & b such that the surfaces $ax^2 - byz = (a+2)x$ and $4x^2y + z^3 = 4$ cut orthogonally at (1,-1,2)

   b) If R= xi+yi +zk and $r = \sqrt{x^2 + y^2 + z^2}$, show that grad $(\text{div}\ \frac{R}{r}) = -\frac{2R}{r^3}$

3. Find the Fourier cosine transform of e^{-x^2}.

OR

4. If f(x) = $\begin{cases} 0, -\pi \leq x \leq 0 \\ sinx, 0 \leq x \leq \pi \end{cases}$ Prove that f(x) = $\frac{1}{\pi} + \frac{sinx}{2} - \frac{2}{\pi}\sum_{n=1}^{m} \frac{cos2nx}{4n^2-1}$. Hence, show that

$\frac{1}{1.3} - \frac{1}{3.5} + \frac{1}{5.7} \ldots\ldots\ldots\ldots = \frac{1}{4}(\pi - 2)$

5. Given $\{S_n\}$ a set of values of x, y on $[x_o, x_n]$ arbitrarily spaced. Is the collocation polynomial $P_n(x)$ unique? State Lagrange's Interpolation for this data. Find $P_n(x)$ for the data:

x	0	1	3	4
y	-12	0	12	24

OR

6. Find the parabola of the from $y = a+bx+cx^2$ which fits most closely with the observations

x	-3	-2	-1	0	1	2	3
y	4.68	2.11	0.67	0.09	0.63	2.15	4.58

7. Represent graphically some of the procedures in numerical computations for root finding problem. Apply Newton —Raphson iterative method with good initial approximation $x = x_o$ to a root ξ of the equation $e^x \sin x = 1$.

OR

8. Solve the system of equation x+y+z =1, 3x+y-3z=5, x-2y-5z=10 by LU Decomposition method.
9. Tabulate all the computations ,by the following methods , of value of integral, for comparison, $\int_0^1 \frac{1}{1+x}\, dx$; i) Gauss-legendre three-point ii) Simpson's 1/ 3 rule (iii) Trapezoidal method with h=0.1

OR

10. Use Runge -Kutta method of 4th order find y when x=1.2 in steps of 0.1 given that $\frac{dy}{dx} = x^2 + y^2$ and y (1) =0

Code No.: **30103/40103**

MR13/MR14

MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)

(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)
Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad

II B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY-2019

Subject: **Fluid Mechanics**

Branch: **CE**

Time: 3 hours **Max. Marks: 75**

PART – A

I. Answer **ALL** questions of the following **5x1Mark=5 Marks**

1. Define the Hydrostatic Law.
2. Define Velocity Potential function.
3. What is Linear Momentum Equation?
4. How much is velocity gradient at verge of boundary layer separation?
5. Name the major loss in the pipe flow. How to evaluate it?

II. Answer **ALL** questions of the following **10x2Marks=20 Marks**

1. Draw micro manometers explain its functionality
2. What is a manometer? How are manometers classified?
3. If $\Psi = 2xy$, find magnitude of velocity at (2,1)
4. Derive Euler's equation of motion.
5. Describe the various forces involved in the pipe bend.
6. What are surface and body forces give examples?
7. Explain the skin and friction drag .How it is evaluated.
8. What is Karman momentum integral equation?
9. Draw orifice meter and name the parts.
10. Mention the advantages and limitations of an orifice plate as a flow metering device.

PART-B

Answer **ALL** questions of the following **5x10 Marks= 50Marks**

1. a) Discuss How to evaluate Total pressure and position of center of pressure for the curved submerged planes.

   b) Determine the total pressure on circular plate of diameter 1.5 m which is placed vertically in water in such a way that a centre of the plate is 3m below the free surface of water. Find the centre of pressure also.

OR

2. a) Explain in detail difference between absolute and gauge pressure.

   b) A differential manometer is connected to a 30° inclined pipe carrying water across points A and B. Points A and B are 5m apart. The deflection of mercury is 5cm .What is the pressure difference between A and B?

3. a) Derive continuity equation for the three dimensional parallelepiped fluid elements.

   b) Differentiate various concepts of velocity potential function stream function.

   c) What is stream tube? How it is useful in the fluid Analysis.

OR

4. a) What is a flow net. Give detailed applications of flow net in civil engineering.

   b) The velocity vector in a fluid flow is given $V=4x^3$ i-$10x^2$ yz+2tk Find the velocity and acceleration of a fluid particle (2,1,3) at a time t=1

5. a) Derive Bernoulli's equation using the integration of Euler equation of stream line

   b) Write explanatory note of Navier stoke equation

   c) The water is flowing through taper pipe of 100 m having diameters 600mm at the upper end 300mm at the lower end, at the lower end at the rate of 50 litres/s .the pipe has a slope of 1 in 30. Find the pressure at the lower end if the pressure at the higher level is 19.62 N/cm^2.

OR

6. What are the surface and body forces associated with fluid flow? Derive the Euler's equation by incorporating these body forces. 10M

7. a) Derive the velocity and pressure distribution through the fixed parallel plates.

   b) What is important of Reynaud Experiment? Draw neat sketch and explain

   c) What is the importance of prandle contribution? Explain.

OR

8. a) Explain in detail boundary layer growth over flat plate and boundary layer separation.

   b) A smooth flat plate 2.0 m wide and 2.5 m long is towed in oil of RD 0.8 at a velocity 1.5m/s along its length. Find boundary layer thickness and shear stress at trailing edge. Also determine power required to move the plate. Kinematic viscosity of oil is 0.0001 m^2/s.

9. a) A Horizontal venturimeter with inlet diameter 20cm and throat diameter 10cm is used to Measure the flow of water. The pressure at inlet is 17.658N/cm^2 and the vacuum pressure at the throat is 30cm of mercury. Find the discharge of water through venturimeter, take C_d=0.98

   b) A rectangular notch has discharge of 21.5 cubic meter per meter, when the head of water is half the length of the notch. Find the length of the notch. Assume cd = 0.6

OR

10. a) Explain how to estimate friction factor with help of Moody's diagram.

    b) A culvert of diameter 0.9 m and length 20 m is used convey flood water. The flood discharge is $2m^3/s$. The d/s water surface elevation is RL 10.0m.Find water surface elevation on upstream of culvert. Consider all losses.

Code No.: **30101/40101** | **MR13/MR14**

MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)

(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)
Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad

II B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY-2019

Subject: **Strength of Materials - I**

Branch: **CE**

Time: 3 hours **Max. Marks: 75**

PART – A

I. Answer **ALL** questions of the following **5x1Mark=5 Marks**

1. Define Stress at a point in a material, and mention its units.
2. What do you mean by a statically indeterminate beam?
3. Draw Shear stress distribution across the T section.
4. What is the maximum deflection of a simply supported beam carrying udl over the entire span?
5. Define principle plane and principle stress.

II. Answer **ALL** questions of the following **10x2Marks=20 Marks**

1. What is the maximum possible value of Poisson's ratio? Discuss.
2. Define Proof resilience and Modulus of Resilience.
3. Draw BMD for a simply supported beam of length L with an anti-clockwise moment M applied at the mid-span.
4. A cantilever beam of 2.5 m span subjected to audl 3kN/m over its entire length and a point load of 4kN at the free end. Draw shear force and bending moment diagram.
5. Find the section modulus of a hollow circular section of a beam having the external diameter of 100 mm and thickness of 10 mm.
6. What is the least internal radius to which a bar of steel 100 mm wide and 10 mm thick can be bent so that the maximum stress will not exceed 500 N/mm^2. Assume $E=2x10^5$ N/mm^2.
7. Derive the expression for slope of a cantilever beam subjected to point load at the free end.
8. Draw the conjugate beam for a simply supported beam with an overhang on other end.
9. Derive an expression for the stresses on an oblique plane of a rectangular body, when the body is subjected to a simple shear stress.
10. The major and minor principal stresses on an inclined section of a bar are 50 MPa and 20 MPa respectively. What is the maximum shear stress at that section.

PART-B

Answer **ALL** questions of the following **5x10 Marks= 50Marks**

1. A circular bar ABCD is rigidly fixed at A and D and is subjected to axial forces. Determine the reactions and the forces in each portion of the bar and the displacement of points B and C. Take $E=200KN/mm^2$.

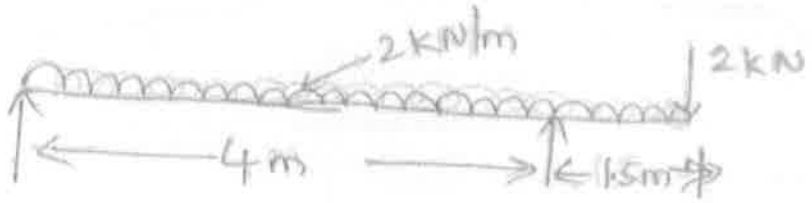
OR

2. A copper rod 2 cm in diameter is surrounded by a steel tube of 3 cm external diameter and 2.5 cm internal diameter. The rod and the tube are of same length and their ends are rigidly fixed. If the tube and rod are at 20°C, calculate the stress in each material, when the temperature raised to 120°C. Take Es=200 kN/mm^2, Ec=100 kN/mm^2, $\alpha_s=12x10^{-6}/°C$ and $\alpha_c=17x10^{-6}/°C$.

3. Draw the shear force and bending moment diagrams for a simply supported beam carrying a uniformly varying load from zero at each end to w per unit length at the centre.

OR

4. Draw the SF & BM diagrams for the overhanging beam carrying UDL of 2 KN/m over the entire length and a point load 2KN as shown below. Locate the print of contra flexure



5. A 300mmx150mm I girder has 12mm thick flanges and 8mm thick web. It is subjected to a shear force of 150KN at a particular section. Find the ratio of maximum shear stress to minimum shear stress in the web. What is the maximum shear stress in the flange?

OR

6. An I-section has the following dimensions: Flange: 150mmx20mm, Web: 30mmxl0mm. The maximum shear stress developed in the beam is 16.8N/m^2. Find the shear force to which the beam is subjected.
7. A cantilever of length 3m is carrying a point load of 50kN at a distance of 2m from the fixed end. If I=$10^8 mm^4$ & E=$2x10^5$ N/mm^2, find slope and deflection at free end using conjugate beam method.

OR

8. A simply supported beam (AB) of 6 m span, subjected to two point loads 40 kN and 30kN. The load 40 kN is acting at a distance of 3m from support A and 30 kN is acting at a distance of 4 m from support A. Calculate(i) maximum deflection and its position (ii) deflection under each point load (iii) maximum slope and its position. Take 'EI' is constant.
9. The load on the bolt consists of an axial pull of 15KN together with a transverse shear of 7.5 KN. Determine the diameter of the bolt according to (i) max. principal stress theory (ii) Max. Shear Stress theory (iii) Max. Strain theory (iv) Strain energy theory (v) Shear strain energy theory. Elastic limit in tension is 285N/mm^2 and a factor of safety of 3 is to be applied. $\mu = 0.3$.

OR

10. The principal stresses at a point in a elastic material are 30 N/mm^2 (tensile), 120 N/mm^2 (tensile) and 50 N/mm^2 (compressive). If the elastic limit in simple tension is 250 N/mm^2 and poisson's ratio $v = 0.3$, then determine whether the failure of material will occur or not according to (i) Maximum shear stress theory (ii) Maximum principal stress theory