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-2018

Subject: **Mathematics – II**

Branch: **CE**

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

PART – A

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

1. What is curl $\bar{r}$?
2. What is the Fourier series expansion of a function f(x) in the interval $(\alpha, \alpha+2\pi)$?
3. Define a shift operator
4. Obtain Newton Raphson formula to find reciprocal of a number N.
5. Evaluate $\int_0^3 \frac{1}{1+x}dx$ by Simpson $\frac{3}{8}^{th}$ rule by dividing the interval in to three parts.

II. Answer ALL questions of the following **10x2Mark=20 Marks**

1. Find the constants a, b,c if the vector $\bar{f}$= (2x+3y+az)i+(bx+2y+3z)j+(2x+cy+3z)k is irrotational.
2. Find curl $\bar{f}$, where $\bar{f}$ = grad ($x^3+y^3+z^3$-3xyz).
3. Find the half range Sine series for f (x) = x, 0 < x < 1.
4. Find Fourier Sine series of f(x)= x in the interval (0,2).
5. By the method of least squares, fit a straight line to the following table

x	1	2	3	4
y	-1	2	1	2

6. Fit a second degree curve , in least square dense , making use of the table:

x	-2	0	1	4
y	8	0	-1	8

7. Present computed values of x , y in 3 iterations employing Gauss-Seidal iteration method from the System: 10 x + 2 y = - 10 ; 2 x+ 20 y = -2.
8. Explain $\int_0^{\frac{\pi}{2}} \sqrt{sinx}$ dx by Simpson's $\frac{1}{3}$ rule
9. Compute , by Trapezoidal method , numerical value of $\int_0^5 g(x)dx$ *when* g(x) is known from :

x	0	1	2	3	4	5
y = g(x)	1	1	3	7	13	21

10. Solve $\frac{dy}{dx}$ = - y given y=1 when x=0, using Euler method for x=0.01, 0.02, 0.03, 0.04 with h=0.01

PART-B

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

1. Verify the Strokes theorem for the vector field $\bar{F}$= (2x-y) i-yz^{2}j-y^{2}zk over the upper half surface of

   $x^2 + y^2 + z^2 = 1$, bounded by its projection of the xy-plane.

OR

2. Verify Stoke's theorem for f = (y-z+2) i+(yz+4)j - xzk where s is the surface of the cube x=0, y=0, z=0 x=2, y=2, z=2, above the xy - plane.
3. Find complex form of Fourier Integral representation for the function f (x) =

   $\begin{Bmatrix} |x|, -\pi < x < \pi \\ 0 \quad elsewhere \end{Bmatrix}$

OR

4. Find the Fourier sine and cosine transform of f(x) = $\frac{e^{-ax}}{x}$ and deduce that $\int_0^\infty \frac{e^{-ax}-e^{-bx}}{x}$ sinsx dx = $\text{Tan}^{-1}(\frac{s}{a}) - \text{Tan}^{-1}(\frac{s}{b})$
5. Fit a power function y = ax^b to the following data by the method of Least squares method

x	1	2	3	4	5
y	0.5	2	4.5	8	12.5

OR

6. Using Lagrange's interpolation formula, find the value of y(10) from the following table.

X	5	6	9	11
Y	12	13	14	16

7. Find a real root of the equation x^3-2x-5=0 by the method of false position.

OR

8. Solve by Jacobi's iteration method, the equations

   20x + y - 2z = 17;

   3x + 20y - z = -18;

   2x -3y + 20z = 25

9. Use the trapezoidal rule to estimate the integral $\int_0^2 e^{x^2} dx$

OR

10. Solve by Taylor's series method the equation $\frac{dy}{dx}$ = logxy for y(1.1) and y(1.2) given y(1) =2.

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-2018

Subject: **Fluid Mechanics**

Branch: **CE**

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

PART – A

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

1. List different properties of fluid.
2. Classify fluid flows.
3. What are the limitations of the Bernoulli's equations?
4. Define displacement thickness.
5. What are the uses of Moody's chart?

II. Answer ALL questions of the following **10x2Mark=20 Marks**

1. What is a manometer? How are manometers classified?
2. What is vapour pressure? How does it vary with temperature?
3. Differentiate between Irrotational and Rotational flows with examples.
4. Derive Euler's equation of motion.
5. What is momentum equation? What are its applications?
6. Define and explain significance of energy correction factor.
7. Explain the development of boundary layer along a thin flat and smooth plate held parallel to uniform flow.
8. Explain the effect of turbulence on flow properties.
9. Derive Euler's equation of motion.
10. What is Cipoletti weir? What is its discharge equation?

PART-B

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

1) A fluid of absolute viscosity 8 poise flows past a flat plate and has a velocity 100 cm/s at the vertex which is at 20 cm from the plate surface. Make calculations for the velocity gradients and shear stress at points 5, 10 amd 15 cm from the boundary. Assume (i) a straight line velocity distribution (ii) a parabolic velocity distribution.

(OR)

2) A sector gate in the form of circular arc of radius 5m retains water to a height of 4m above its sill. Calculate the magnitude and direction of the resultant force per unit length of the gate.

3) A velocity potential for a two dimensional flow is given by the expression $\phi = x^2 - y^2$. Determine:
(i) velocity components in the x and y directions. Check to see whether the velocity components satisfy the conditions of flow continuity and irrotationality.
(ii) stream function and the flow rate between the streamlines (1,0) and (1,1).
Also show that the streamlines and potential lines intersect orthogonally at the point (1,1).

(OR)

4) Derive the continuity equation in cylindrical polar coordinates.

5) Derive Euler's equation of motion along a streamline and hence derive the Bernoullis theorem.

(OR)

6) 200 liters per second of water is flowing in a pipe having a diameter of 40cm. The pipe is bent by 135^0 and the pressure of water owing in the pipe is 350KPa. Sketchthe configuration. Find the magnitude and direction of resultant force on the bend.

7) Explain the essential features of Blasiu's method of solving laminar boundary layer equations for a flat plate. Derive expression for boundary layer thickness and local skin friction coefficient from this solution.

(OR)

8) Using Hagen-Poiseuille equation derive an expression for head loss in a pipe of diameter D and length L in terms of Reynolds number and velocity head.

9) For the distribution main of a city water supply a 36 cm dia. pipe is required. As pipes above 30 cm are not available, it is decided to lay two parallel mains of the same diameter, assuming the friction factor of all the pipes to be same, determine the dia. of the parallel mains.

(OR)

10) a) Explain Francis's and Bazin's Formulae.
b) The head of water over a rectangular weir is 40 cm. The length of the crest of the weir with end contraction suppressed is 1.5 m. Find the discharge using the following formulae

i. Francis's Formulae and
ii Bazin's Formulae

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-2018

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. Draw the bending moment diagram for a simply supported beam of length L with concentrated load W on the mid-span.
3. Write the bending equation, defining all the terms in the equation.
4. Write the differential equation for the beam to find deflections.
5. State the Maximum Shear Stress Theory of Failure.

II. Answer ALL questions of the following **10x2Mark=20 Marks**

1. Explain the meaning of strain energy. Also define the proof resilience of a material.
2. Derive the relationship between Young's modulus and Bulk Modulus.
3. Draw bending moment diagram for a simply supported beam of length L with an anti-clockwise moment M applied at the mid-span.
4. What is a point of contraflexure? How many points of contraflexure will exist for a uniformly loaded simply supported beam overhanging at one end. Explain with a neat sketch.
6. 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. Draw the bending stress and shear stress distribution diagrams for a rectangular beam section.
7. Derive the slope and deflection at the free end of a cantilever beam of length L and constant flexural rigidity *EI*, carrying a point load W at its 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. In a two dimensional stress system, the direct stresses on two mutually perpendicular planes are 200 kN/mm^2. These planes also carry a shear stress of 50 kN/mm^2. Find the principal stresses and the maximum shear stress.

PART-B

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

Q1. A steel bar of 25 mm diameter was tested in tension and following were observed: Limit of Proportionality = 196.32 kN; Load at yield = 218.13 kN, Ultimate load = 278.20 kN. At the proportional limit, the elongation measured over a gauge length of 100 mm was 0.189 mm. After fracture, the length between the gauge points was 112.62 mm and the minimum diameter was 23.64. Determine the Young's modulus and measures of ductility (percentage elongation and percentage contraction),

(OR)

Q2. A steel rod of 3cm diameter and 5m long is connected to two grips and the rod is maintained at a temperature of 95°C. Determine the stress and pull exerted when the temperature falls to 30°C, if (i) the ends do not yield, and (ii) the ends yield by 0.12cm. Take E = 2x10^5 MN/m^2 and α = 12x10^{-6}/°C.

Q3. Draw the shear force and bending moment diagrams for a cantilever beam of length 4 m if two anti-clockwise moments of 15 kNm and 10 kNm are applied at the mid-span and the free end, respectively.

(OR)

Q4. 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.

Q5. A timber beam of rectangular section is simply supported at the ends and carries a point load at the centre of the beam. The maximum bending stress is 12 N/mm^2 and maximum shearing stress is 1 N/mm^2, find the ratio of span to depth.

(OR)

Q6. An I-section has the following dimensions: Flange: 150mm x 20mm, Web: 30mm x 10mm. The maximum shear stress developed in the beam is 16.8 N/m^2. Find the shear force to which the beam is subjected.

Q7. A cantilever of length 3m is carrying a point load of 50kN at a distance of 2m from the fixed end. If $I = 10^8 mm^4$ and $E = 2 \times 10^5$ N/mm^2, find slope and deflection at free end using conjugate beam method.

(OR)

Q8. A horizontal beam of uniform section is pinned at its ends which are at the same level and is loaded at the left hand pin with an anticlockwise moment M and at the right hand pin with a clockwise moment 2M both in the same vertical plane. The length between the pins is L. Find the angles of slope at each end and the deflection of the midpoint of the span in terms of M, L, E and I.

Q9. The stresses at a point in a bar are 250 N/mm^2 (tensile) and 150 N/mm^2(compressive). Determine the resultant stress in magnitude and direction on a plane inclined at 30^o to the axis of major stress. Also determine the maximum intensity of shear stress in the material at that point.

(OR)

Q 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 ν = 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