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, NOVEMBER-2017

SUBJECT: MATHEMATICS - II

Branch: CE

Time: 3 hours

Max. Marks: 75

PART – A

I. Answer all the questions

5x1=5M

1. Prove that $\nabla \cdot \bar{r} = 3$

2. Find the Fourier coefficient a_0 of the function $f(x) = x$ in $(0, 2\pi)$

3. Define a shift operator

4. Give one example of transcendental equation.

5. Evaluate $\int_1^2 \frac{dx}{x}$ by Simpson's $\frac{1}{3}$ rule with four steps.

II. Answer all the questions

10x2=20M

1. If $\bar{r} = x\bar{i} + y\bar{j} + z\bar{k}$, show that grad $r = \frac{\bar{r}}{r}$

2. Find the angle between the normals to the surface $xy^3z^2 = 4$ at the points (-1, -1, 2) and (4, 1, -1)

3. Find the half range Sine series for $f(x) = x, \ 0 < x < 1$.

4. Find the Fourier transform of $f(x) = \begin{cases} 1, & if \ |x| \leq 1 \\ 0, & if \ |x| > 1 \end{cases}$

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. By the method of least squares, fit a straight line to the following table

x	1	2	3	4
y	-1	2	1	2

7. Using Newton Raphson method, find square root of a number

8. Explain the convergence criteria for system of simultaneous linear equations.

9. Write the formula for Runge-Kutta fourth order.

10. Using Picard's method of success approximation, find the first approximation of the equation $\frac{dy}{dx} = y + x, \ y(0) = 1$.

PART - B

Answer all the questions   5x10 = 50M

1. For a solenoidal vector $\overline{F}$, show that curl curl curl curl $\overline{F} = \nabla^4 \overline{F}$

(OR)

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

3. Obtain the Fourier series for the function $f(x) = e^x$, from $x=0$, to $x = 2\pi$

(OR)

4. Find Fourier Sine and Cosine transform of $f(x) = \dfrac{e^{-ax}}{x}$,

5. Find the polynomial $f(x)$ by using Lagrange's formula and hence find $f(3)$ for

x	0	1	2	5
$f(x)$	2	3	12	147

(OR)

6. Fit a second degree parabola to the data

x	0	1	2	3	4
y	1.0	1.8	1.3	2.5	6.3

7. Find the root of the equation $\cos x = x e^x$ using regula falsi method correct to four decimal places.

(OR)

8. Apply Gauss-Seidal iteration method to solve the equations

$2x - 3y + 20z = 25;$ $20x + y - 2z = 17;$ $3x + 20y - z = -18$

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

(OR)

10. Using Taylors series method, find $y(0.2)$ given that $\dfrac{dy}{dx} = 2y + 3e^x, y(0) = 0$. Compare the numerical solution obtained with the exact solution.

Code No.: **30101/40101**   MR13 & MR 14

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, NOVEMBER-2017

SUBJECT: <u>STRENGTH OF MATERIALS-I</u>

Branch: CE

Time: 3 hours   Max. Marks: 75

PART – A

I. Answer All Questions   **5x1Mark=5Marks**

1. Give the expression for strain energy due to axial force.
2. Define shear force.
3. Draw the qualitative deflected profile of a simply supported beam subjected to central point load.
4. Define conjugate beam?
5. Express the relation between Modulus of elasticity and Modulus of rigidity.

II. Answer All Questions   **10x2Marks=20Marks**

1. Name the stresses which are encountered by a deformable body.
2. Give the limitation of Hooke's law.
3. Give the number of point of contraflexures for a simply supported beam with two equal overhangs on either side subjected to udl throughout the beam.
4. Distinguish between ductile and brittle behavior of a material?
5. What do you mean by the term "The material is isotropic", which is happened to be one of the assumption in deriving the flexure formula.
6. Describe the significance of Mohrs' circle.
7. Differentiate between Bending moment and static moment.
8. What is section modulus? What is the significance of this?
9. What is the significance of theories of failure?
10. Define principal stresses and principal planes.

PART-B

Answer all questions   **5x10 Marks= 50Marks**

1. a) Sketch the stress-strain diagram for Mild steel and indicate salient points.   (4M)
   b) A simple tension member 3 m long and has a cross-sectional area of 1290 mm²carries an axial load of 22 kN. Assume Modulus of elasticity as 204GPa. Determine the total elongation in the member due to applied load.   (6M)
   (OR)
2. Derive the relationship between the three elastic Modulii.   (10M)

3.a) Define the terms ((i) Bending moment (ii) Couple (3M)

   b) The intensity of loading on a simply supported beam of 4m span increases gradually from 20kN/m at left end to 40kN/m at right end. Draw the Shear force and Bending moment diagrams. (7M)

(OR)

4. A horizontal beam 10m long is carrying UDL of 2 KN/m. The beam is supported on two supports 6m apart. Find the position of supports so that the bending moment as small possible. Also draw the Shear force and Bending moment diagrams.

5. a) Derive the bending equation(flexure formula) stating the assumptions made. (6M)

   b) A Rectangular beam 200mm X 400mm deep is used under simply supported condition over a span of 6m. The beam supports a udl of 20kN/m. Calculate the maximum stress developed in the beam and sketch the bending stress distribution. (4M)

(OR)

6. A T-section has a flange dimensions 400mm wide and 50 mm thick. The overall depth of the section is 500mm. At a section it supports a shear force of 150 kN. The width of the web is 50mm. Draw the variation in shear stress across the depth of the section. (10M)
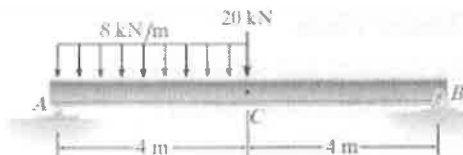
7. State and Prove Mohr's theorems. (10M)

(OR)

8. Determine the vertical displacement of point C of the beam shown in fig.1.
   Take E = 200 GPa and I = 150 X 10^6 mm^4.

9. At a point in a strained material, there are normal stresses of 60Mpa(Compressive) and 40Mpa(Tensile) at right angles to each other with a shear stress 20MPa(negative). Determine the principal stresses, maximum shear stress and plane on which they act. Show them on the sketches of properly oriented elements. (10M)

(OR)

10. Discuss in detail various theories of failure. (10M)

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, NOVEMBER-2017

SUBJECT: Fluid Mechanics

Branch: CE

Time: 3 hours   Max. Marks: 75

PART – A

I. Answer All Questions   5x1Mark=5Marks

1. What are the units of surface tension?
2. Define stream line
3. What is local acceleration?
4. How much is velocity gradient at verge of boundary layer separation?
5. Define Reynolds number

II. Answer All Questions   10x2Marks=20Marks

1. The velocity distribution over a plate is $u = 2y - y^2$. If $\mu = 0.01$ Pa-s, what is wall shear stress
2. A square plate of side 1.5 m is kept vertical in water such that top edge is touching water surface. Determine hydrostatic force on one side of plate.
3. If $\psi = 2xy$, find magnitude of velocity at $(2,1)$
4. Define steady and uniform flows.
5. What are surface and body forces give examples?
6. A jet of water is issued at 20m/s at 30° to horizontal, what is the maximum height attained by jet above horizontal?
7. A laminar boundary layer has velocity distribution $u/U = y/\delta$. What is the displacement thickness?
8. What is Karman momentum integral equation?
9. If flow Reynolds number is 500 in a pipe, what is Darcy's friction factor?
10. If there is 2% error in measurement of head over V-notch, what is the corresponding error in measurement of discharge?

PART-B

Answer all questions   5x10 Marks= 50Marks

Q1. a) Give detailed classification of fluids based on viscosity.

b) A vertical gate 2.0 m wide and 3 m high is subjected to water pressure at one side. The water surface coincides with top of the gate. The gate is hinged at bottom and is held by horizontal chain at top, Calculate tension in chain.

(OR)

Q2. 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?

Q3. The velocity components in 2D incompressible flow are u =2xy and
v = $a^2+x^2+y^2$.Obtain relevant stream function. What is component of rotation at (2,2) if a=3

(OR)

Q4. a) A water tank has top area 1.5 m^2. The inflow velocity through 3cm diameter pipe is 2m/s and outflow rate is 110 liter/min. What will be change of water level in tank?

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

Q5. Derive Bernoulli's equation for 3D, incompressine flow from first principles. What are the situations when Bernoulli's equation is not applicable?

(OR)

Q6. a) A turbine has inlet pressure 300 kpa and exit pressure -4 m of water. The discharge through the turbine is 0.4 m^3/s. Assuming same velocity head at inlet and exit and efficiency as 90% estimate output power.

b) In a horizontal pipe the diameter is reducing from 30cm to 15 cm. If the pressure and mean velocity at 15cm diameter section are 15 kpa and 6m/s respectively. Neglecting losses calculate reaction on transition

Q7. The velocity distribution in a laminar boundary layer over a flat plate is $u/U = 2(y/\delta) - 2(y/\delta)^2 + (y/\delta)^4$. Prove that $\delta/x = 5.835/(\sqrt{Rex})$ by Karman momentum integral equation.

(OR)

Q8. 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.

Q9. A straight pipe 25 cm in diameter is connected between two reservoirs having elevation difference of 25 m. The length of pipeline is 5 km. Assuming Darcy's friction factor as 0.025 a) determine the discharge. b) To increase the discharge the same 25 cm diameter pipe is added in parallel to later half of existing pipe .calculate percentage increase in discharge.

(OR)

Q10 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.

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, NOVEMBER-2017

SUBJECT: Building Materials Construction & Planning

Branch: CE

Time: 3 hours   Max. Marks: 75

PART – A

I. Answer All Questions   5x1Mark=5Marks
1. What is the standard size of brick?
2. What is an admixture?
3. What is a lintel?
4. Name the defects in plastering?
5. What do you mean by roominess in principles of planning?

II. Answer All Questions   10x2Marks=20Marks
1. Define "quarrying" of a stone.
2. What is the importance of preservation of wood?
3. What is the chemical composition of cement?
4. Which admixture is used in RMC transit mixer and why it is used?
5. List the different types of arches?
6. Write down the characteristics of acoustics?
7. Name different types of pointing work?
8. What is the difference between formwork and scaffolding?
9. Name four principles of planning of buildings?
10. In a building, why kitchen has to be placed facing east?

PART-B

Answer all questions   5x10 Marks= 50Marks

Q1. (a) What are the characteristics of a good building stone?   (5m)
    (b) What is meant by dressing of stone? Explain different dressed surfaces with neat
        sketches.   (5m)
                                    (OR)
Q2. Explain the process involved in burning of bricks by Bull trench kiln with neat sketch. (10m)
Q3. Explain about the different types of cement available?   (10m)
                                    (OR)
Q4. List out different tests performed on cement. Explain any two in detail.   (10m)
Q5. Classify the types of foundations. Explain with neat sketches   (10m)

                                    (OR)
Q6. What are the essentials of air-conditioning and explain the types.   (10m)

Q7. (a) What are the characteristics of a good paint?   (5m)
    (b) What are the constituents of paint?   (5m)
                                    (OR)
Q8. What are the different types of scaffolding? Explain with the help of neat sketches. (10m)

Q9. Explain about the various classification of buildings in detail.   (10m)
                                    (OR)
Q10. Discuss in detail about building bye-laws?   (10m)