

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-2019**Subject: **ADVANCED CALCULUS**

Branch: Common to CE,ME,EEE,ECE,CSE,IT

Time: 3 hours

Max. Marks: 60

PART – A**I. Answer ALL questions of the following****5x2M=10 M**

1. Find jacobian of $u = x^2 - y^2$ and $v = 2xy$ with respect to x and y .
2. Evaluate $\int_0^a \int_0^b \int_0^c xyz \, dx dy dz$.
3. Prove that $\nabla r^n = nr^{n-2} \vec{r}$, where $\vec{r} = x\vec{i} + y\vec{j} + z\vec{k}$ and $r = |\vec{r}|$.
4. State Stoke's theorem.
5. Solve $pq + q + p = 0$.

PART-B**Answer ALL questions of the following****5x10 M= 50M**

1. a) If $x = r \sin \theta \cos \phi$; $y = r \sin \theta \sin \phi$; $z = r \cos \theta$ then find $\frac{\partial(x, y, z)}{\partial(r, \theta, \phi)}$.
b) Find the volume of the largest rectangular parallelepiped that can be inscribed in the ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$.
2. a) Find the maximum and minimum values of $f(x) = x^3 + 3xy^2 - 3x^2 - 3y^2 + 4$
b) Using Rolle's Theorem, show that $f(x) = 8x^3 - 6x^2 - 2x + 1$ has a zero between 0 and 1
3. a) Evaluate $\int_0^\infty \int_0^\infty e^{-(x^2+y^2)} dx dy$.

b) Evaluate the integral by changing the order of integration in $\int_0^1 \int_{x^2}^{2-x} xy \, dx dy$.

OR

4. Evaluate $\int_0^\infty \int_0^x x e^{\frac{-x^2}{y}} dy dx$ by changing the order of integration.

5. a) If \vec{a} is a differentiable function and ϕ is a differentiable scalar function then prove that $\text{curl}(\phi \vec{a}) = (\text{grad} \phi) \times \vec{a} + \phi \text{curl} \vec{a}$.
b) Find the values of a and b such that the surface $ax^2 - byz = (a+2)x$ and $4x^2y + z^3 = 4$ cut orthogonally at $(1, -1, 2)$.

OR

6. Find the directional derivative of $\phi = x^2yz + 4xz^2$ at the point $(2, -1, 2)$ in the direction of vector $2\mathbf{i} - \mathbf{j} - 2\mathbf{k}$.

7. Verify Green's theorem for $\int_C (xy + y^2)dx + x^2dy$, where C is bounded by $y = x$ and $y = x^2$.

OR

8. A vector field is given by $F = (\sin y)\mathbf{i} + x(1 + \cos y)\mathbf{j}$ evaluate the line integral over the Circular path $x^2 + y^2 = a^2, z = 0$.

9. Solve $\cos(x + y)p + \sin(x + y)q = z$.

OR

10. (a) Solve $z = px + qy + p^2q^2$.

(b) Solve $16p^2z^2 + 9q^2z^2 + 4z^2 - 4 = 0$ by Charpit's method..

Code No.: 70101

MR17

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

Subject: STRENGTH OF MATERIALS

Branch: CE

Time: 3 hours

Max. Marks: 60

PART – A

Answer ALL questions of the following

5x2M=10 M

1. Classify the Stresses and Strains.
2. Give the relationship between shear force and bending moments.
3. Sketch the shear stress distribution for I and T sections.
4. State the two theorems in moment area method.
5. State the formulae for the resultant stress and maximum shear stress.

PART-B

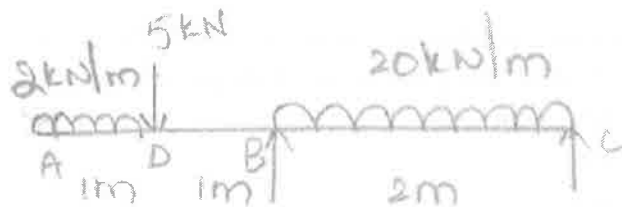
Answer ALL questions of the following

5x10 M= 50M

1. A tension bar 5m long is made up of two parts, 3 metre of its length has a cross-sectional area of 10 cm^2 while remaining 2 metre has a cross sectional area of 20 cm^2 . An axial load of 80 kN is gradually applied. Find the total strain energy produced in the bar and compare this value with that obtained in a uniform bar of same length and having the same volume when under the same load. Take $E = 2 \times 10^5 \text{ N/mm}^2$.

OR

2. A reinforced concrete column 500mm x 500mm has Six Reinforcement bars of Steel each 18 mm in diameter. Calculate the safe load the column can take if the permissible stress in concrete is 8.2 MN/m^2 and Modular ratio of Steel to concrete is 2.
3. Draw the shear force and bending moment diagrams for the fig shown.



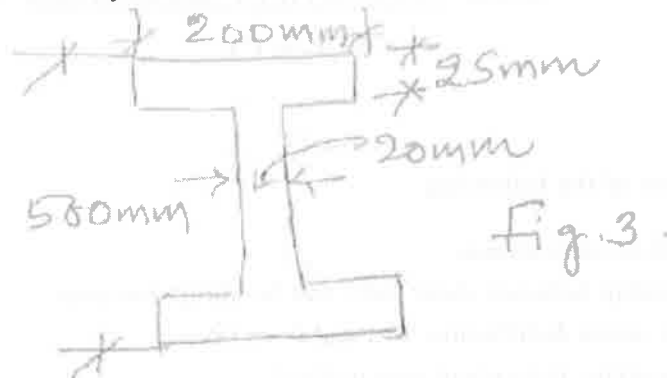
OR

4. a) A cantilever beam 1.5m long is loaded with a uniformly distribution load of 2 kN/m run over a length of 1.25m from the free end it also carries a point load of 3kn at a distance of 0.25m from the free end. Draw the shear force and bending moment diagram of the cantilever beam.
b) Define hogging bending moment.
5. a) Derive the expression for shear stress distribution for the I – section.

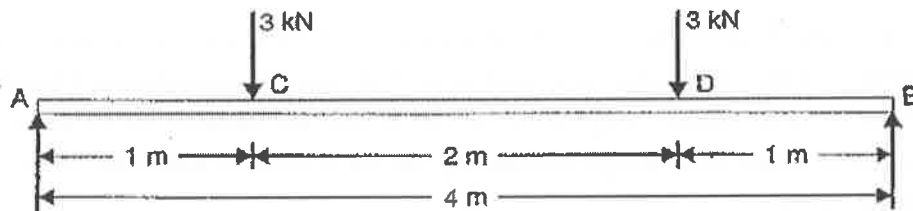
b) An I – Section beam 350mm x 150 mm has a web thickness of 10 mm and flange thickness of 20 mm. If the shear force acting on the section is 40kN, Find the maximum shear stress developed in the I – Section.

OR

6. Sketch the shear stress distribution for the figure 3 if it is subjected to a shear force F , find what percentage of shear is resisted by web.

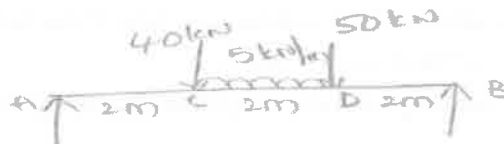


7. A simply supported beam of length 4m carries a point load of 3 kN at a distance of 1m from each end. If $E = 2 \times 10^5 \text{ N/mm}^2$ and $I = 10^8 \text{ mm}^4$ for the beam, then using Conjugate beam method, determine: i) Slope at each end. ii) Deflection under each load and at the centre.



OR

8. Find the maximum deflection and slope for the beam as shown in fig., take flexural rigidity as EI



9. A steel shaft is subjected to an end thrust producing a stress of 140 MPa and maximum shear stress on surface arising tension is 120 MPa. The yield point of simple tension is found to be 420 MPa. Calculate the factor of safety of the shaft with

- Maximum shear stress theory
- Maximum shear strain theory
- Maximum shear stress strain theory

OR

10. Direct stresses of 120 N/mm^2 tensile and 90 N/mm^2 compression exists on two mutually perpendicular planes at certain point in a body. They are also accompanied by shear stress on the planes. The greatest principal stress at a point due to this 150 N/mm^2 .

- What must be the magnitude of shearing stresses on the two planes?
- What must be the Maximum shearing stresses at the point?

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Branch: CE

Time: 3 hours

Max. Marks: 60

PART – A

Answer ALL questions of the following

5x2M=10 M

1. What is Pascal law? State its limitations.
2. Differentiate between stream function and velocity potential.
3. Water is flowing a pipe of 5cm dia under a pressure of 29.43N/cm^2 and with mean velocity of 2m/s. Find the total height or total energy per unit weight of the water at a crosssection, which is 5m above the datum line.
4. What is separation of boundary layer?
5. Differentiate between notches and weir.

PART-B

Answer ALL questions of the following

5x10 M= 50M

1. a) What is a centre of pressure? Derive the equation for the centre of pressure for a submerged plane surface in a fluid.
b) A circular plate of diameter 0.75 m is immersed in a liquid of relative density 0.80 with its plane making an angle of 30° with the horizontal. The centre of the plate is at a depth of 1.50 m below the free surface. Calculate the total force on one side of the plate and the location of centre of pressure.
2. a) Derive expression for liquid droplet, soap bubble and liquid jet.
b) A simple U-tube manometer containing mercury is connected to a pipe in which a fluid sp .gr .0.8 and having vacuum pressure is flowing .the other end of the manometer is open to the atmosphere, find the vacuum pressure in pipe, if the difference of mercury level in two limbs is 40cm and the height fluid in the left from the center of pipe is 15cm below.
3. a) What are different types of flows? Explain in detail.
b) A 25cm dia pipe carries oil of sp.gr. 0.9 at a velocity of 3m/s . At another section of dia . Is 20 cm. Find the velocity at the section and also mass rate of flow of oil.

OR

4. Write the types of flow lines with neat sketches.
5. a) Explain the importance and application of Navier – Stokes equation.
b) a pipe of dia.400mm carries water at a velocity of 25m/s. the pressure a the point A & B are given as 29.43 N/cm^2 and 22.563N/cm^2 respectively while the datum head at A & B are 28m and 30m . find the loss of head between A & B .

OR

6. a) A pitot static tube is used to measure the velocity of water in a pipe. the stagnation pressure head is 6m and static pressure head is 5m. calculate the velocity of flow assuming the coefficient of tube equal to 0.98.
- b) The water is flowing through a pipe having diameters 20cm and 10cm at sections 1 and 2 respectively. the rate of flow through pipe is 35 liters/s. the section 1 is 6m above the datum and section 2 is 4m above the datum. If the pressure at section 1 is 39.24 N/cm^2 , find the intensity of pressure at section 2.
7. a) What are the characteristics of boundary layer formation over a flat plate?
- b) Calculate the friction drag on a flat plate 15 cm wide and 45 cm long placed longitudinally in a stream of oil of relative density 0.925 and kinematic viscosity 0.9 stoke, flowing with a free stream velocity of 6.0 m/s. Also, find the thickness of the boundary layer and shear stress at the trailing edge.

OR

8. a) For a laminar steady flow, prove that the pressure gradient in the direction of flow is equal to shear stress gradient normal to direction of motion.
- b) A pipe of 12 cm diameter is carrying an oil of dynamic viscosity 2.2 N-s/m^2 and density 1250 Kg/m^3 with velocity of 4.5 m/Sec. Determine (i) shear stress at wall surface (ii) head loss if the length of the pipe is 25 m.
9. a) A pipe carries a flow of an oil of Relative Density = 0.85. A pitot-static tube is inserted into the pipe to measure the velocity at a point M. If a differential mercury-oil gauge connected to the Pitot - static tube indicates a reading of 4 cm, calculate the velocity at M. Assume the coefficient of the pitot tube as 0.99.
- b) Explain the working of orifice meter with neat sketches.

OR

10. a) Explain orifice meter in detail with diagram. Also derive an expression for finding out the actual discharge from a given orifice meter.
- b) A 150 mm x 75 mm Venturimeter with $C_d = 0.98$ is to be replaced by an orifice meter having a value of $C_d = 0.6$. If both the meters are to give the same differential mercury manometer reading for a discharge of 100 lps and the inlet dia. to remain 150 mm, what should be the diameter of orificemeter?

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Branch: CE

Time: 3 hours

Max. Marks: 60

PART – A

Answer ALL questions of the following

5x2M=10 M

1. Define a plan and a map.
2. Name some of the errors in plane table surveying.
3. State the conventional sign for W.C.B to R.B.
4. Mention the temporary adjustments of leveling.
5. Write various methods to compute areas of Regular boundaries.

PART-B

Answer ALL questions of the following

5x10 M= 50M

1. a) Explain about Plain and Geodetic Surveying.
b) Discuss Object based Survey methods.

OR

2. The area of the Plan of an Old Survey plotted to a scale of 1cm = 10m measures now as 100.20Sqcm. The Plan is found to have shrunk so that a line originally 10cm long now measures 9.7cm only. Find i) Shrunk Scale ii) The True area of Survey.
3. Explain the Radiation method of Plane Table Surveying with the help of diagram.

OR

4. State the three-point problem. Explain how it is solved by the graphical method.
5. The bearings observed in a closed traverse are given below. Find the correct bearings by the method of included angles.

Line	Fore Bearing	Back Bearing
AB	122° 15'	302° 15'
BC	66° 00'	243° 45'
CD	308° 15'	133° 00'
DA	198° 00'	15° 30'

OR

6. a) The following angles were observed in clockwise direction in an open traverse angle $ABC = 124^\circ 15'$, angle $BCD = 156^\circ 30'$ angle $CDE = 102^\circ 0'$ angle $DEF = 95^\circ 15'$ angle $EFG = 215^\circ 30'$ magnetic bearing of line AB was $241^\circ 30'$. what would be the bearing of line $FG = ?$.
- b) What is local Attraction? How is it detected and eliminated?

7. Briefly explain the method of reciprocal leveling?

OR

8. a) Reciprocal leveling was done between two points A and B situated on the opposite sides of a valley 730m wide. The following data was collected:

Instrument at	Height of Instrument (m)	Staff at	Staff reading(m)
P	1.643	Q	1.885
Q	1.643	P	0.995

Determine the difference in level between P and Q and the amount of collimation error if any.

- b) Compare Rise and Fall method over Height of Instrument method.

9. The following offsets were taken at 15 m intervals from a survey line to an irregular boundary line 3.50, 4.30, 6.75, 5.25, 7.50, 8.80, 7.90, 6.40, 4.40, 3.25 m Calculate the area enclosed between the survey line, the irregular boundary line, and the offsets, by: a) the trapezoidal rule b) Simpson's rule?

OR

10. Discuss in brief the various methods of measurements of area by off-sets from the base line. State the relative merits and demerits of each method.

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

Subject: BUILDING MATERIALS CONSTRUCTION & PLANNING

Branch: CE

Time: 3 hours

Max. Marks: 60

PART – A

Answer ALL questions of the following

5x2M=10 M

1. List out different tests to be carried out on building stones.
2. What do you mean by setting time of cement?
3. Distinguish between lintel and arch.
4. Define Bond and Masonry.
5. What do you mean by green buildings?

PART-B

Answer ALL questions of the following

5x10 M= 50M

1. Explain in detail the operations involved in the manufacture of clay tiles with neat sketches.
OR
2. Explain briefly about the classification of Rocks.
3. Discuss in detail about the ingredients of Cement along with their functions.
OR
4. Explain briefly about the normal consistency of Cement with its significance and how it is to be tested.
5. a) Explain briefly classification of fire resistant materials.
b) Describe about the ideal requirements of ideal acoustic design.
OR
6. a) Differentiate between comfort air conditioning and industrial air conditioning.
b) Explain in brief, various systems of mechanical ventilation.
7. a) What do you understand by reinforced brick masonry? When do you use it?
b) What are the defects found in plastering works?
OR
8. Explain about Flemish bond and draw the plan and elevation of one and half brick wall showing Flemish bond.
9. Explain the classification of buildings.
OR
10. a) Write short notes on Green materials.
b) Write how do you certify the Green buildings.

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1. Write the importance of structural geology with examples.
2. Differentiate between the Schistose and Gneissose structures.
3. Write the Geological Time Scale.
4. Write any four effects of tunneling on the ground.
5. Define the terms porosity and permeability.

PART-B**Answer All Questions****5 x 10M = 50 M**

1. What is meant by weathering? Explain different types of weathering and weathering agents in detail.

OR

2. a) Explain in detail the various types of chemical weathering.
b) Write brief notes on geological work of river.
3. a) Describe various Intrusive forms of igneous rocks.
b) Write briefly the important physical properties of Galena, Garnet and Bauxite.

OR

4. Write the physical properties of the following minerals
a) Muscovite b) Pyrolusite c) Kyanite d) Biotite
5. Give the principle of Electrical Resistivity Method. Explain.

OR

6. Explain briefly the Geological Time Scale with example of rock series.
7. Explain the role and importance of geological structures at the tunnel site.

OR

8. What are the effects of tunneling on the ground?
9. a) List out the classification of earthquakes.
b) Write a note on "Seismic belts" and "Shield areas".

OR

10. Define water table and Mention different types of ground water.

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II B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, NOVEMBER-2019Subject: **ENVIRONMENTAL SCIENCE**

Branch: CE & ME

Time: 3 hours

Max. Marks: 60

PART – A

Answer ALL questions of the following

5x2M=10 M

1. Define food chain and give two examples.
2. Define minerals? Give examples.
3. Define pollutant? Give two examples.
4. What are protocols related to global efforts?
5. What is geographical information system?

PART-B

Answer ALL questions of the following

5x10 M= 50M

1. Explain different types of ecological pyramids with neat labeled diagrams.
OR
2. a) Explain grassland ecosystem in detail.
b) Explain marine ecosystem in detail.
3. Explain in-situ and ex-situ conservation of biodiversity.
OR
4. Explain the following: i) Solar energy ii) Wind energy.
5. Explain various methods of control of air pollution.
OR
6. a) Explain coastal pollution in detail.
b) What are air quality standards? Explain.
7. Write a detail note on Earth summit.
OR
8. What is over-grazing? How does it contribute to environmental degradation?
9. Discuss Clean Development Mechanism.
OR
10. Discuss the environmental impacts of urban sprawl.

