

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 Sem Regular & Supplementary Examinations, NOVEMBER-2017**SUBJECT: Elementary Calculus And Transforms****Branch: Common to CE, ME, EEE & ECE****Time: 3 hours****Max. Marks: 60****PART – A****Answer All Questions****5x2Mark=10 Marks**

1. Find a_0 in the Fourier series expansion of $f(x) = 2x$ in $[0, 2\pi]$.
2. Find the Z- Transform of $e^n \cos n\theta$
3. Change the order of integration $\int_{-a}^a \int_0^{\sqrt{a^2-y^2}} f(x, y) dx dy$
4. State Lagrange's Mean Value Theorem.
5. If $\phi = x^2 + y^2 + z^2 - 3xyz$ then evaluate $\text{curl}(\text{grad } \phi)$.

PART-B**Answer Any 5 Questions****5x10 Marks= 50 Marks**

1. Obtain the Fourier series for the function $f(x) = (1 + (2x / \pi))$ if $-\pi \leq x \leq 0$ and $(1 - (2x / \pi))$ if $0 \leq x \leq \pi$. Hence, deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots = \frac{\pi^2}{8}$.
2. a) If $U(z) = \frac{2z^2 + 5z + 14}{(z-1)^4}$, evaluate u_2 and u_3 .
b) Form the partial differential equation from: $z = f(x + at) + g(x - at)$.
3. Change the order and hence evaluate $\int_0^1 \int_{x^2}^{2-x} xy dy dx$.
4. Divide 24 into three parts such that the continued product of the first, square of the second and the cube of the third may be maximum.
5. a) Evaluate the line integral $\int_C \bar{F}(\bar{r}) \cdot d\bar{r}$ where $\bar{F} = \cosh x i + \sin hy j + e^z k$ and $C: \bar{r} = t i + t^2 j + t^3 k$ from $(0, 0, 0)$ to $(\frac{1}{2}, \frac{1}{2}, \frac{1}{2})$.
b) Show that: $\text{div}(\text{grad}(r^n)) = n(n+1)r^{n-2}$, where $r^2 = x^2 + y^2 + z^2$.
6. Expand $f(x) = x \sin x$, as a Fourier series in the interval $0 < x < 2\pi$
7. Using Convolution theorem find $Z^{-1} \left\{ \frac{z^2}{(z-a)(z-b)} \right\}$
8. Evaluate $\int_0^\infty \int_0^\infty e^{-(x^2+y^2)} dx dy$ by changing to polar coordinates. Hence show that $\int_0^\infty e^{-x^2} dx = \sqrt{\pi}/2$.

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II B.Tech I Sem Regular & Supplementary Examinations, NOVEMBER-2017SUBJECT: Strength of Materials

Branch: CE

Time: 3 hours

Max. Marks: 60

PART – A

Answer All Questions

5x2Mark=10 Marks

1. Define Principal Planes and Principal Stresses.
2. Define Resilience and Modulus of Resilience.
3. Define shear stress and write the relation between maximum shear stress and average shear stress for a rectangular section.
4. Draw the conjugate beam for a simply supported beam with an overhang on one end, subjected to U-D-L for entire span.
5. State and explain the maximum shear stress theory of failure of materials. For which type of material is this suitable and why?

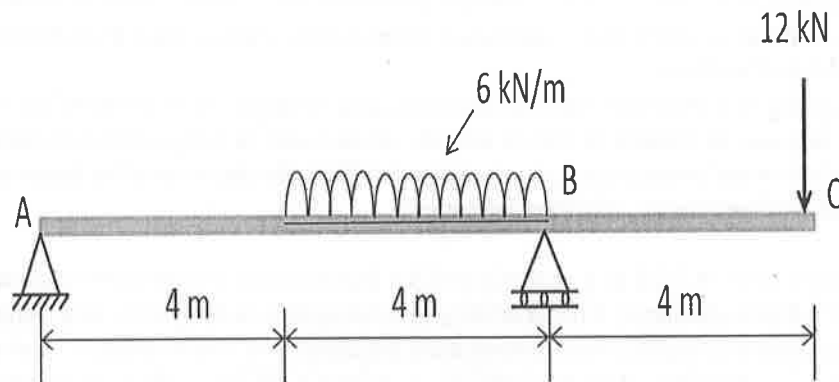
PART-B

Answer Any 5 Questions

5x10 Marks= 50 Marks

1. a) A prismatic metallic bar of rectangular section 500mm x 250mm and 2m long is subjected to a load of 170kN applied gradually on it. If the stress at elastic limit of the bar material is 200N/mm^2 , determine strain energy at given load, proof resilience and modulus of resilience.
b) At a point in a strained material, the principal stresses are 400N/mm^2 and 300N/mm^2 . The first one is tensile in nature and the second one is compressive in nature. Determine the following stresses on a plane inclined at 60° to the direction of the larger stress. (i) Normal stress. (ii) Shear stress. (iii) Resultant stress.
2. a) A steel tube of 25.0 mm external and 15.0 mm internal diameters encloses a copper rod of 12.0 mm diameter. The assembly is held rigidly at both ends at a temperature of 20°C . Compute the maximum temperature the assembly can withstand. Assume $E_s=200\text{ GPa}$, $E_c=100\text{ GPa}$, $\alpha_s=11.0\times 10^{-6}/^\circ\text{C}$, $\alpha_c=18.0\times 10^{-6}/^\circ\text{C}$. Maximum permissible stress in steel is 230.0 MPa and that in copper is 120.0 MPa.
b) A square bar of size 20 x 20 mm is subjected to direct tensile force. Find the largest value of tensile force the bar can sustain, if its shear strength is 100.0 MPa. Determine the stress on a plane at 60° with the bar axis under maximum load.
3. A simply supported beam of length 12m, carries the uniformly distributed load of 10kN/m over a length of 4m starting from 4m from the left support. Point loads of 50kN and 40kN acts at a distance of 4m and 8m from the left support. Draw the S.F and B.M diagrams for the beam. Also calculate the maximum bending moment.

4. a) Compute the strain energy in a steel bar ($E = 200 \text{ GPa}$) of length 2.7 m and 22 mm diameter under a load of 50 kN . What is the resilience modulus of the bar, if the yield stress is 240 MPa ? (4M)
- b) A beam of length 12 m is simply supported and carries point loads of 10 kN each at a distance of 3 m and 9 m from the left end and also a uniformly distributed load of 2 kN/m between the point loads. Draw the S.F and B.M diagrams for the beam. (6M)
5. a) A steel plate of width 100 mm and of thickness 18 mm is bent into a circular arc of radius 10 m . Determine the maximum stress induced and the bending moment which will produce the maximum stress. Take $E = 2 \times 10^5 \text{ N/mm}^2$.
- b) A rectangular beam 100 mm wide and 250 mm deep is subjected to a maximum shear force of 50 kN . Determine Average shear stress, Maximum shear stress and shear stress at a distance of 25 mm above the neutral axis.
6. a) A strip of aluminum 900 mm long and 3 mm thick is bent into an arc so that the angle subtended by the two ends of the strip at the center of curvature is 60° . If modulus of elasticity of aluminum is 130 kN/mm^2 , find the maximum stress induced in the metal.
- b) Calculate the maximum stress induced in a cast iron pipe of external diameter 40 mm , of internal diameter 20 mm and of length 4 m when the pipe is supported at its ends and carries a point load of 100 N at its centre.
7. a) A steel cantilever of 2.5 m effective length carries a load of 25 kN at its free end. If the deflection at the free end is not to exceed 0.5 cm , what must be the value of 'I' for the section of the cantilever? Use Moment Area Method. Take $E = 210 \text{ GPa}$. (4M)
- b) A beam ABC of length 12 m has one support to the left end and the other support at a distance of 8 m from the left end. The beam carries a point load of 12 kN at the right end and also carries a uniformly distributed load of 6 kN/m over a length of 4 m as shown in the figure. Determine slope and deflection at point C. Take $E = 2 \times 10^5 \text{ N/mm}^2$ and $I = 5 \times 10^8 \text{ mm}^4$. (6M)



8. a) Describe various failure criteria, and their applications and relative merits.
- b) Develop the torsion equation, and discuss its assumptions and limitations.

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II B.Tech I Sem Regular & Supplementary Examinations, NOVEMBER-2017SUBJECT: Surveying

Branch: CE

Time: 3 hours

Max. Marks: 60

PART – A

Answer All Questions

5x2Mark=10 Marks

1. What is magnetic dip?
2. What are the uses of contours?
3. Name the different methods available for determining area of an irregular boundary.
4. What is tacheometric surveying?
5. Write an expression to determine
 - a. Length of long chord
 - b. Mid Ordinate

PART-B

Answer Any 5 Questions

5x10 Marks= 50 Marks

1. Examine the following notes on a compass survey for local attraction. Determine correct bearings. Also determine the included angles at A, B, C, D and E.

Station	FB	BB
A	S10°0'W	N85°0'E
B	S77°0'E	N10°0'E
C	N05°0'E	N75°0'W
D	N54°0'W	S02°0'W
E	S89°0'W	S50°0'E

2. The following consecutive readings were taken along AB with a 4m leveling staff on continuously sloping ground at intervals of 20m: 0.34m on A, 1.450, 2.630, 3.875, 0.655, 1.745, 2.965, 3.945, 1.125, 2.475, 3.865 on B. The elevation A was 100.000. Enter the above readings in a level book form and work out RLs by Rise and Fall method. Also find the gradient of the line AB.
3. Explain briefly different components of theodolite with a neat sketch.
4. A tacheometer was set up at station A and the following readings were obtained on a vertically held staff.

Inst. Station	Staff station	Vertical angle	Stadia hair readings (m)	Remarks
A	B.M.	-2° 18'	3.225, 3.550, 3.875	RL of B.M = 425.515
A	B	+08° 36'	1.650, 2.515, 3.380	

Find the distance between A and B, R.L of B.

5. Describe the various stages in geographical information system. State its uses?
6. Differentiate between Prismatic and Surveyor's Compass.
7. a) Describe the 'height of instrument' and 'rise and fall' methods of computing the levels. Discuss the merits and demerits of each?
b) What are the characteristics of contours?
8. a) The following perpendicular offsets were taken at 10 metres intervals from a survey line to an irregular boundary line. 3.25, 5.60, 4.20, 6.65, 8.75, 6.20, 3.25, 4.20, 5.65.
Calculate the area using average ordinate rule, trapezoidal rule and Simpson's rule.
b) Explain the temporary and permanent adjustments of a theodolite?

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II B.Tech I Sem Regular & Supplementary Examinations, NOVEMBER-2017**SUBJECT: Human Values And Professional Ethics****Branch: Common to CE, ME & MINING****Time: 3 hours****Max. Marks: 60****PART – A****Answer All Questions****5x2Mark=10 Marks**

1. Bring out the difference between morals and values.
2. How does good Character helps to become successful engineer?
3. Why co-operation is important in professional life?
4. How do you differentiate Right and Wrong?
5. What is Humanistic education?

PART-B**Answer Any 5 Questions****5x10 Marks= 50 Marks**

1. a) Define consensus and controversy. Discuss how these two have a significant role to play in professional ethics.
b) Bring out the differences between Kohlberg's theory and Gilligan's theory of Moral development.
2. Explain models of professional roles. How these roles helps to an engineering student to make career in the engineering field.
3. Write short note on
 - a) Kohlberg's theory
 - b) Computer ethics
4. Discuss various human values and in what way it will help Engineers?
5. a) Define a Goal and discuss the purpose of goal setting.
b) Write short notes on types of goals and smarter goals.
6. Write a short note on
 - a) Integrity and Adaptability
 - b) Commitment
7. a) Write a note on human-human relationships.
b) Write a note on humanistic education in detail.
8. a) What are the foundational values of relationships? How can they be used to ensure strong and mutually relationships?
b) What are the values in interaction of human beings with the material things? Give one example of each.

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II B.Tech I Sem Regular & Supplementary Examinations, NOVEMBER-2017**SUBJECT: Building Materials Construction & Planning**

Branch: CE

Time: 3 hours**Max. Marks: 60****PART – A****Answer All Questions****5x2Mark=10 Marks**

1. Define the natural bed of stones and decay of timber.
2. Mention various types of Admixtures used in Building Construction.
3. Define Dampproofing.
4. Explain English bond with neat sketch
5. What is the Impact of green buildings on Environment?

PART-B**Answer Any 5 Questions****5x10 Marks= 50 Marks**

1. Explain in detail the Classification of Building Stones
2. List out the different laboratory tests performed on cement and explain any two tests in detail.
3. a) Compare merits and demerits of flat and pitched roofs.
b) What are the principles and factors to be considered for a good acoustical design?
4. a) What is "Composite masonry"? Enumerate various types of composite masonry, and state the circumstances under which each type is used.
b) State the requirements of a good formwork.
5. a) List out the main features of Green building materials and their advantages in using in construction.
b) Enumerate the basic concepts and Necessity of Green Buildings.
6. a) Write the structural requirements of bricks
b) Briefly explain the dressing of stones
7. Describe the classification of mineral admixtures
8. What are the different types of staircases? Explain the different technical terms used in a staircase.

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II B.Tech I Sem Regular & Supplementary Examinations, NOVEMBER-2017**SUBJECT: Engineering Economics And Accountancy**

Branch: CE

Time: 3 hours

Max. Marks: 60

PART – A**Answer All Questions****5x2Mark=10 Marks**

1. What is 'law of demand'?
2. What is meant by 'Break-even Analysis'?
3. Write a note on Peak Load Pricing.
4. List the importance of payback method.
5. Explain Importance of Ratio analysis.

PART-B**Answer Any 5 Questions****5x10 Marks= 50 Marks**

1. "Managerial economics is the study of how scarce resources are directed most efficiently to achieve managerial goals." Justify the statement and brief on need for demand analysis for business decision making.
2. **Write short notes on:**
 - (a) External test marketing and controlled experiments in forecasting methods.
 - (b) "What are Isoquants and Isocosts?"
3. Define 'Cost'. How are costs classified? Explain any five important cost concepts useful for managerial decisions.
4. a) Explain the long-run cost analysis with graph.
b) Explain fixed cost, variable cost and marginal cost.
5. a) Explain price output determination in case of long run.
a) Brief on Price-Output determination in case of Perfect Competition and Monopoly.
6. (a) What are the causes for the emergence of Monopoly?
(b) How is the equilibrium position attained by a monopolist under varying cost Conditions?
7. (a) Briefly write a note on Capital and its significance.
(b) How do you Estimate the fixed and working capital requirements for an IT firm?
8. From the following particulars pertaining to Assets and Liabilities of a company, calculate the following ratios.
(a) Current Ratio (b) Quick Ratio
(c) Debt-Equity Ratio (d) Debtors Turnover Ratio

Liabilities	Amount (Rs.)	Assets	Amount (Rs.)
5000 equity shares Rs. 10 each	5,00,000	Land & Building	5,00,000
8% 2000 pre shares Rs. 100 each	2,00,000	Plant & Machinery	6,00,000
9% 4000 Debentures of Rs. 100 each	4,00,000	Debtors	2,00,000
Reserves	3,00,000	Stock	2,40,000
Creditors	1,50,000	Cash and Bank	5,50,000
Bank overdraft	50,000	Prepaid expenses	5,000
Total	16,00,000	Total	16,00,000

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II B.Tech I Sem Regular & Supplementary Examinations, NOVEMBER-2017**SUBJECT: FLUID MECHANICS**

Branch: CE

Time: 3 hours

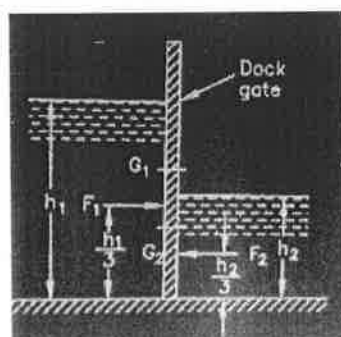
Max. Marks: 60

PART – A**Answer All Questions****5x2Mark=10 Marks**

1. What is Pascal law? Can we apply Pascal law for a liquid which is opened to atmosphere? Write your comments.
2. Explain about surface tension with an example.
3. Mention the advantages and limitations of an orifice plate as a flow metering device.
4. What is Laminar sub layer? Define it.
5. What is Broad Crested weir?

PART-B**Answer Any 5 Questions****5x10 Marks= 50 Marks**

1. a) Define Newton's law of viscosity. Explain the importance of viscosity in fluid motion. What is the effect of temperature on viscosity of water and that of air.
b) The right limb of a simple U-tube manometer containing mercury is open to the atmosphere while the left limb is connected to a pipe in which a fluid of Specific Gravity 0.9 is flowing. The centre of the pipe is 12cm below the level of mercury in the right limb. Find the pressure of fluid in the pipe if the difference of mercury level in the two limbs is 20cm.
2. A two-dimensional flow is described by the velocity components, $u = 5x^3$, $v = -15x^2y$. Evaluate the stream function, velocity and acceleration at point P (1,2).
3. Water flows through a horizontal venturimeter of inlet diameter 15 cm and inlet pressure 215 kpa (absolute). Find the minimum throat diameter for the meter to pass a discharge of 150 lps without causing cavitations. Assume saturation vapour pressure of water = - 80 kpa (gauge). Assume atmospheric pressure = 76 cm of mercury and $C_d = 0.978$.
4. Derive an expression for flow between parallel plates.
5. a) Define equivalent pipe and derive Dupuit's equation for three pipes. (5M)
b) Find the discharge over a rectangular weir of length 80m. The head of water over the weir is 1.2 m. The velocity of approach is given as 1.5 m/sec. Take $C_d = 0.6$. (3M)
c) Explain Moody's diagram. (2M)
6. a) What do you understand by single column manometer? Deduce the expression for pressure measurement.
b) A vertical dock gate is 5 m wide (perpendicular to the paper) has shown in figure given below. There is water 10 m on one side and 4 m to the other side. Find the resultant horizontal force on the gate and position of its action.



7. The streamlines are represented by : (i) $\Psi = x^2 - y^2$ (ii) $\Psi = x^2 + y^2$
- Determine the velocity and its direction at (2, 2)
 - Sketch the streamlines and show the direction of flow in each case.
8. a) Write statement of momentum equation and derive it by considering a pipe bend.
- b) The diameter of a pipe changes from 220mm at a section 6m above datum to 95mm at a section 2.5m above datum. The pressure of water at first section is 400kPa. If the velocity of flow at the first section is 2m/sec, determine the intensity of pressure at the second section.