

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech I Year II Semester Regular Examinations November 2021
DIFFERENTIAL EQUATIONS AND COMPLEX ANALYSIS

(Common to CE, EEE, ECE & ME)

Time: 3 Hours

Max. Marks: 60

Answer one question from each unit (5 x 12 = 60 Marks)

UNIT-I

- 1 a) Solve $(1 + y^2)dx = (\tan^{-1}y - x)dy$ L1 6M
b) Solve $\frac{dy}{dx} + \frac{y\cos x + \sin y + y}{\sin x + x\cos y + x} = 0$ L3 6M

OR

- 2 a) Solve $(D^2 - 4D + 3)y = 4e^{3x}$ given $y(0) = -1, y'(0) = 3$. L2 6M
b) Solve $(D^2 - 4D)y = e^x + \sin 3x \cdot \cos 2x$ L3 6M

UNIT-II

- 3 a) Solve $(D^2 - 2D)y = e^x \sin x$ by method of variation of parameters. L6 6M
b) Solve $(x^2D^2 - 4xD + 6)y = x^2$ L3 6M

OR

- 4 a) Solve $\frac{dx}{dt} = 3x + 2y$; $\frac{dy}{dt} + 5x + 3y = 0$. L3 6M
b) Solve $\frac{d^2y}{dx^2} + \frac{1}{x} \frac{dy}{dx} = \frac{12 \log x}{x^2}$ L6 6M

UNIT-III

- 5 a) Form the Partial Differential Equation by eliminating the constants from $(x - a)^2 + (y - b)^2 = z^2 \cot^2 \alpha$. where ' α ' is a parameter L2 6M
b) Form the Partial Differential Equation by eliminating the arbitrary function from $z = xy + f(x^2 + y^2)$ L2 6M

OR

- 6 a) Form the Partial Differential Equation by eliminating the arbitrary functions from $z = f(x) + e^y \cdot g(x)$ L2 6M
b) Solve by the method of separation of variables $4u_x + u_y = 3u$, given $u(0, y) = e^{-5y}$ L6 6M

UNIT-IV

- 7 Show that $u(x, y) = e^{2x}(x \cos 2y - y \sin 2y)$ is harmonic and find its harmonic conjugate. L2 12M

OR

- 8 a) Find 'a' and 'b' if $f(z) = (x^2 - 2xy + ay^2) + i(bx^2 - y^2 + 2xy)$ is analytic. Hence find $f(z)$ in terms of z . L1 6M
b) Find the bilinear transformation which maps the point $s(\infty, i, 0)$ into the points $(0, i, \infty)$. L1 6M

UNIT-V

- 9 Verify Cauchy's theorem for the function $f(z) = 3z^2 + iz - 4$ if c is the square with vertices at $1 \pm i$ and $-1 \pm i$. L6 12M

OR

- 10 a) Evaluate using Cauchy's integral formula $\int_c \frac{\sin^6 z}{\left(z - \frac{\pi}{2}\right)^3} dz$ around the circle $c: |z| = 1$. L5 6M

- b) Find the Laurent series expansion of the function $f(z) = \frac{z^2 - 6z - 1}{(z-1)(z-3)(z+2)}$ in the region $3 < |z+2| < 5$ L1 6M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)
B.Tech I Year II Semester Regular Examinations November 2021
PROBABILITY & STATISTICS
(CSE)

Time: 3 Hours

Max. Marks: 60

Answer one question from each unit (5 x 12 = 60 Marks)

UNIT-I

- 1 a) Two cards are drawn at random from an ordinary deck of 52 playing cards. What is the probability of getting two aces if (i) the first card is replaced before the second card is drawn; (ii) the first card is not replaced before the second card is drawn? L1 6M
- b) If the probability density of a random variable is given by L3 6M
- $$f(x) = \begin{cases} x & \text{for } 0 < x < 1 \\ 2-x & \text{for } 1 \leq x < 2 \\ 0 & \text{elsewhere} \end{cases}$$

find the probabilities that a random variable having this probability density will take on a value (i) between 0.2 and 0.8; (ii) between 0.6 and 1.2.

OR

- 2 a) In a certain town 40% have brown hair, 25% have brown eyes and 15% have both brown hair and brown eyes. A person is selected at random from the town. L2 6M
- i) If he has brown hair, what is the probability that he has brown eyes also?
- ii) If he has brown eyes, determine the probability that he does not have brown hair?
- b) A discrete random variable X has the following probability distribution given below: L5 6M
- | | | | | | | | | |
|------------|---|-----|------|------|------|-------|--------|------------|
| Value of X | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| $P(X = x)$ | 0 | k | $2k$ | $2k$ | $3k$ | k^2 | $2k^2$ | $7k^2 + k$ |
- (i) Find the value of 'k'. (ii) Find $P(X < 6)$, $P(0 < X < 4)$ and $P(X \geq 6)$.

UNIT-II

- 3 a) Find the mean and variance of The Binomial distribution. L5 6M
- b) Suppose the weights of 800 male students are normally distributed with mean 140 L3 6M
pounds and S.D. 10 pounds, find the number of students whose weights are i)
Between 138 and 148 pounds ii) more than 152 pounds.
- OR**
- 4 a) Out of 2000 families with 4 children each, how many would you expect to have (i) at L1 6M
least 1 boy (ii) 2 boys (iii) 1 or 2 girls (iv) no girls?
- b) If 3 % of the electric bulbs manufactured by a company are defective, find the L1 6M
probability that in a sample of 100 bulbs, (i) 0 (ii) 1 (iii) 2 (iv) 3 (v) 4 (vi) 5 bulbs
will be defective.

UNIT-III

- 5 a) Find arithmetic mean to the following data using step deviation method ; L1 6M
- | | | | | | |
|-----------|-------|-------|-------|-------|-------|
| Marks | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 |
| frequency | 5 | 8 | 25 | 22 | 10 |
- b) Obtain the rank correlation coefficient for the following data : L5 6M
- | | | | | | | | | | | |
|---|----|----|----|----|----|----|----|----|----|----|
| x | 68 | 64 | 75 | 50 | 64 | 80 | 75 | 40 | 55 | 64 |
| y | 62 | 58 | 68 | 45 | 81 | 60 | 68 | 48 | 50 | 70 |

OR

- 6 a) Find two regression equations from the following data : L1 6M
- | | | | | | | | | |
|---|----|----|----|----|----|----|----|----|
| x | 10 | 25 | 34 | 42 | 37 | 35 | 36 | 45 |
|---|----|----|----|----|----|----|----|----|

y	56	64	63	58	73	75	82	77
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b) Find the median to the following data ;

x	5	8	11	14	17	20	23
f	2	8	12	20	10	6	3

L3 6M

UNIT-IV

a) By method of least squares fit a straight line to the following data ;

L1 6M

7

x	1	2	3	4	5
y	14	27	40	55	68

b) The average income of persons was Rs. 210 with S.D of Rs. 10 in a sample of 100 people of a city. For another sample of 150 persons the average income was Rs. 220 with standard deviation of Rs. 12. The S.D of incomes of the people of the city was Rs. 11. Test whether there is any significant difference between the average incomes of the localities. Use a 0.05 level of significance.

L2 6M

OR

8 a) Fit an exponential curve of the form $y = ab^x$ to the following data:

L3 6M

x	2	3	4	5	6
y	8.3	15.4	33.1	65.2	127.4

b) A random sample of 100 recorded deaths in the United States during the past year showed an average life span of 71.8 years. Assuming a population standard deviation of 8.9 years, does this seem to indicate that the mean life span today is greater than 70 years? Use a 0.05 level of significance.

L2 6M

UNIT-V

9 a) The following are the average weekly losses of worker-hours due to accidents in 10 industrial plants before and after a certain safety program was put into operation:

L4 6M

Before:	45	73	46	124	33	57	83	34	26	17
After:	36	60	44	119	35	51	77	29	24	11

Use the 0.05 level of significance to test whether the safety program is effective.

b) It is desired to determine whether there is less variability in the silver plating done by Company 1 than in that done by Company 2. If independent random samples of size 12 of the two companies' work yield $s_1 = 0.035$ mil and $s_2 = 0.062$ mil, test the null hypothesis $\sigma_1^2 = \sigma_2^2$ against the alternative hypothesis $\sigma_1^2 < \sigma_2^2$ at the 0.05 level of significance.

L2 6M

OR

10 To determine whether there really is a relationship between an employee's performance in the company's training program and his or her ultimate success in the job, the company takes a sample of 400 cases from its very extensive files and obtains the results shown in the following table:

L4 12M

Performance in training program					
Success in job Average (employer's rating)		Below average	average	Above average	Total
	Poor	23	60	29	112
	average	28	79	60	167
	Very good	9	49	63	121
	Total	60	188	152	400

Use the 0.01 level of significance to test the null hypothesis that performance in the training program and success in the job are independent.

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)
B.Tech I Year II Semester Regular Examinations November 2021
ENGINEERING CHEMISTRY

(CIVIL)

Time: 3 Hours

Max. Marks: 60

Answer one question from each unit (5 x 12 = 60 Marks)

UNIT-I

- 1 a) Explain the process of scale and sludge formation in boilers. L2 6M
b) What are the units to express hardness of water? L1 6M

OR

- 2 a) Describe the Ion exchange process for demineralization of water. L3 12M
What are the advantages and disadvantages of ion exchange process?

UNIT-II

- 3 a) What is secondary Battery? Write a note on Lithium Ion rechargeable cell. L1 6M
b) Describe the Construction and Working of Methanol - Oxygen Fuel cell L3 6M

OR

- 4 a) Define corrosion? Discuss in detail about chemical or dry corrosion. L3 12M

UNIT-III

- 5 a) Explain the mechanism of addition polymerization! L2 12M

OR

- 6 a) Describe the method employed for the refining of petroleum with neat sketch! L3 12M

UNIT-IV

- 7 a) What is meant by lubricant? Give the classification and examples of the lubricants? L1 12M

OR

- 8 a) What are the applications of Composite materials? L1 12M

UNIT-V

- 9 a) Write any two methods synthesis of colloids with suitable examples. L1 12M

OR

- 10 a) Explain principle, instrumentation and applications of Scanning Electron microscopy (SEM) L2 12M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech I Year II Semester Regular Examinations November 2021

APPLIED PHYSICS

(ECE & EEE)

Time: 3 Hours

Max. Marks: 60

Answer one question from each unit (5 x 12 = 60 Marks)

UNIT-I

- 1 a) Describe the formation of Newton's ring with necessary theory with relevant diagram and derive the expressions for dark and bright fringes. L3 9M
b) In a Newton's rings experiment, the diameter of the 5th ring is 0.30 cm and the diameter of the 15th ring is 0.62 cm. Calculate the diameter of the 25th ring. L4 3M

OR

- 2 a) Explain the theory of Fraunhofer diffraction due to single slit. L4 8M
b) Obtain conditions for bright and dark fringes in single slit diffraction pattern and draw intensity distribution. L4 4M

UNIT-II

- 3 a) Describe the electrical conductivity in a metal using quantum free electronic theory. L3 8M
b) Write advantages quantum free electron theory over classical free electron theory. L1 4M

OR

- 4 a) State and Explain Gauss's Theorem for divergence. L4 6M
b) State and Explain Stoke's Theorem for curl. L4 6M

UNIT-III

- 5 a) Explain population inversion. L4 4M
b) Derive the relation between the various Einstein's coefficients of absorption and emission of radiation. L4 8M

OR

- 6 a) Describe optical fiber communication system with block diagram. L3 7M
b) Mention the application of optical fiber in sensors. L1 5M

UNIT-IV

- 7 a) Explain the formation of p-type and n-type semiconductors with band diagrams. L4 12M

OR

- 8 a) Describe the construction and working mechanism of LED. L3 8M
b) Determine the wavelength of LED fabricated by the CdS material with band gap of 2.42 eV. L3 4M

UNIT-V

- 9 a) Prove that super conductor is a very good diamagnetic material. L4 8M
b) Write the properties of Superconductors. L1 4M

OR

- 10 a) What is nanomaterial? Write the classification of nanomaterials. L1 4M
b) Explain Sol-Gel technique for synthesis of nanomaterial. L4 8M

**SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)**

B.Tech I Year II Semester Regular Examinations November 2021

ENGINEERING PHYSICS

(ME)

Time: 3 Hours

Max. Marks: 60

Answer one question from each unit (5 x 12 = 60 Marks)

UNIT-I

- 1 a) Describe the formation of Newton's ring with necessary theory with relevant diagram and derive the expressions for dark and bright fringes. L3 9M
 b) In a Newton's rings experiment, the diameter of the 5th ring is 0.30 cm and the diameter of the 15th ring is 0.62 cm. Calculate the diameter of the 25th ring. L4 3M

OR

- 2 a) Describe Fraunhofer diffraction due to double slit and derive the conditions for principal maxima, secondary maxima and minima. L3 8M
 b) A plane transmission grating having 4250 lines per cm is illuminated with sodium light normally. In the second order spectrum, the spectral lines are deviated by 30°. What is the wavelength of the spectral line? L4 4M

UNIT-II

- 3 a) Derive the packing factor of SC. L4 6M
 b) Derive the packing factor of BCC. L4 6M

OR

- 4 a) Explain how the X-ray diffraction can be employed to determine the crystal structure. L4 9M
 b) The Bragg's angle for reflection from the (111) plane in a FCC crystal is 19.2° for an X-ray wavelength of 1.54 Å. Calculate cube edge of the unit cell. L4 3M

UNIT-III

- 5 a) Define following terms L1 8M
 (1) Reverberation (2) Absorption coefficient (3) Pitch and (4) Loudness of sound
 b) A class room of volume 200 m³ has a reverberation time 1.6 seconds. Calculate the total sound absorption coefficient of the class room? L4 4M

OR

- 6 a) Explain Piezoelectric effect. L4 4M
 b) Describe the application of Ultrasonic in non-destructive testing (NDT) of material L3 8M

UNIT-IV

- 7 a) What is Hooke's law? Explain. L1 4M
 b) Describe the behavior of a wire under an increasing load. L3 8M

OR

- 8 a) Deduce an expression for energy stored per unit volume in stretched wire. L4 7M
 b) Estimate the work done in stretching a wire of cross section 1.25 mm² and length 1.9 m through 0.14 mm. The Young's modulus of wire is 45×10^9 N/m². L4 5M

UNIT-V

- 9 a) Prove that super conductor is a very good diamagnetic material. L4 8M
 b) Write the properties of Superconductors. L1 4M

OR

- 10 a) Explain Sol-Gel technique for synthesis of nanomaterial? L4 8M
 b) Write advantages of sol-gel process. L1 4M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)
B.Tech I Year II Semester Regular Examinations November 2021
APPLIED CHEMISTRY

(CSE)

Time: 3 Hours

Max. Marks: 60

Answer one question from each unit (5 x 12 = 60 Marks)

UNIT-I

- 1 a) What is Electrochemical cell? Give an example. L1 6M
b) Derive the Nernst equation for a single electrode potential L3 6M

OR

- 2 a) Draw the neat sketch of electrochemical sensor and its applications L3 6M
b) What is primary Battery? Write a brief note on Zinc-Air battery L1 6M

UNIT-II

- 3 a) Write De-Broglie's equation L1 6M
b) Explain Heisenberg Uncertainty principle. L2 6M

OR

- 4 a) Explain pi- molecular orbital of Benzene with a neat sketch L3 6M
b) Explain pi- molecular orbital's of Butadiene with a neat sketch. L3 6M

UNIT-III

- 5 a) Explain the mechanism of Free radical addition polymerization. L2 6M
b) Explain the mechanism of Condensation or Step growth polymerization L2 6M

OR

- 6 a) Define conducting polymers and its classification L1 6M
b) Write the synthesis applications of poly acetylene L5 6M

UNIT-IV

- 7 a) Explain the working principle of Atomic Absorption Spectrometer(AAS) L2 6M
b) Give an account on principle and instrumentation of IR spectroscopy L2 6M

OR

- 8 a) Explain the main components of gas chromatography L2 6M
b) Describe any two methods for separating the Liquid Mixtures L3 6M

UNIT-V

- 9 a) Write short notes on application of semiconductors L1 6M
b) Classification of Insulating material and their applications L2 6M

OR

- 10 a) What is meant by Nanomaterials? How are Nanomaterials Classified and its applications L3 6M
b) Write an account on Carbon Nano Tubes. L1 6M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)
B.Tech I Year II Semester Regular Examinations November 2021
C Programming and Data Structures
(EEE, ECE & MECH)

Time: 3 Hours

Max. Marks: 60

Answer one question from each unit (5 x 12 = 60 Marks)

UNIT-I

- | | | | | |
|---|----|---|----|----|
| 1 | a) | Describe the Structure of C Program with neat diagram. | L1 | 6M |
| | b) | Define a Variable. What are the rules for declaring a variable? | L3 | 6M |

OR

- | | | | |
|---|--|----|-----|
| 2 | Examine with examples of different decision statements | L2 | 12M |
|---|--|----|-----|

UNIT-II

- | | | | | |
|---|----|---|----|----|
| 3 | a) | Write a C program for displaying smallest element in array. | L1 | 6M |
| | b) | Distinguish between call by value and call by reference with examples | L3 | 6M |

OR

- | | | | | |
|---|----|--|----|----|
| 4 | a) | Write a program for finding the sum of an array elements. | L1 | 6M |
| | b) | Write a C program for displaying largest element in array. | L4 | 6M |

UNIT-III

- | | | | | |
|---|----|--|----|----|
| 5 | a) | How do you define structure within a structure? Explain with an example. | L1 | 6M |
| | b) | Briefly explain bit fields concept. | L5 | 6M |

OR

- | | | | |
|---|---|----|-----|
| 6 | Discuss below terms with examples:
(a) Nested structures. (b) Array of structures. | L3 | 12M |
|---|---|----|-----|

UNIT-IV

- | | | | | |
|---|----|--|----|----|
| 7 | a) | What is data structure? Explain the linear and nonlinear data structure in detail. | L1 | 6M |
| | b) | What are the advantages and disadvantages of stack and queue. | L1 | 6M |

OR

- | | | | |
|---|---|----|-----|
| 8 | What are the advantages and disadvantages of stack? Write a program to illustrate stack operations. | L6 | 12M |
|---|---|----|-----|

UNIT-V

- | | | | |
|---|--|----|-----|
| 9 | Explain the difference between merge sort and quick sort with suitable examples. | L1 | 12M |
|---|--|----|-----|

OR

- | | | | |
|----|--|----|-----|
| 10 | Define sorting? Mention different types of sorting. Explain Quicksort in detail. | L3 | 12M |
|----|--|----|-----|

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech I Year II Semester Regular Examinations November 2021
ENGINEERING GRAPHICS
(CIVIL & CSE)

Max. Marks: 60

Time: 3 Hours

Answer one question from each unit (5 x 12 = 60 Marks)

UNIT-I

- 1 Construct an ellipse, with distance of the focus from the directrix as 50 mm and L3 12M
eccentricity as 2/3. Also draw normal and tangent to the curve at a point 40 mm from
the directrix

OR

- 2 Draw an Epi-cycloid of rolling circle of diameter 40 mm which rolls outside another L3 12M
circle (base circle) of 150 mm diameter for one revolution and construct a tangent and
normal at any point on the curve

UNIT-II

- 3 Draw the projections of the following points, keeping the distance between the L3 12M
projectors as 25mm on the same reference lines.

- A - 20mm above HP and 30mm in front of VP
- B - 20mm above HP and 30mm behind VP
- C - 20mm below HP and 30mm behind VP
- D - 20mm below HP and 30mm in front of VP
- E - On HP and 30mm in front of VP
- F - On VP and 20mm above HP
- G - Lying on both HP and VP

OR

- 4 Draw the projections of a straight line AB of 70 mm long, in the following positions: L3 12M

- a) Inclined at 30° to VP, in HP and one end on VP
- b) Inclined at 45° to HP, one end 20 mm above HP and parallel to and 30 mm in front
of VP
- c) Inclined at 60° to VP, one end 20 mm in front of VP and parallel to and 25 mm
above HP

UNIT-III

- 5 An equilateral triangular plane ABC of side 40mm has its plane parallel to VP and L3 12M
20mm away from it. Draw the projections of the plane when one of its sides is (i)
perpendicular to HP (ii) parallel to HP and (iii) inclined to HP at an angle of 45° .

OR

- 6 A pentagonal prism of base side 30 mm and axis 60mm is resting on one of its L3 12M
rectangular faces on HP, with the axis parallel to VP. Draw its projections.

UNIT-IV

- 7 A hexagonal prism of side of base 30 mm and length of axis 75 mm is resting on its base L3 12M
on HP. It is cut by a section plane inclined at 45° to HP and passing through top corner.
Draw the front and sectional top views of the solid and true shape of the section.

OR

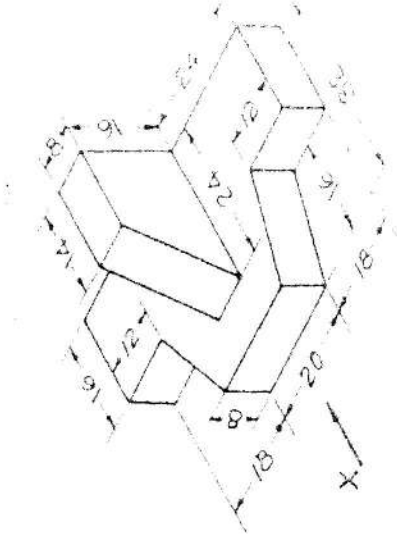
- 8 A cone of base 50 mm diameter and height 65 mm rests with its base on HP. A section L3 12M
plane perpendicular to VP and inclined at 30° to HP bisects the axis of the cone. Draw
the development of the lateral surface of the truncated cone.

UNIT-V

- 9 Draw the isometric view of a cylinder of base diameter 50mm and axis 60 mm the L3 8M
axis of the cylinder is perpendicular to the HP
Draw the isometric view of a circular lamina of diameter 50mm on all the three L3 4M
principal planes using four centre methods.

OR

- 10 Draw three views of the blocks shown pictorially in figure according to first angle L3 12M
projection.



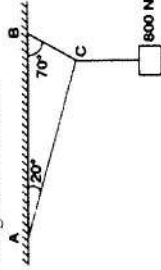
Time: 3 Hours

Max. Marks: 60

Answer one question from each unit (5 x 12 = 60 Marks)

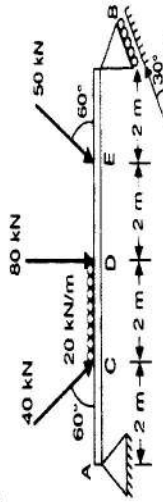
UNIT-I

- 1 (a) State and prove parallelogram law of forces. L2 6M
(b) A weight of 800N is supported by two chains as shown in below figure. Determine the tension in each chain using Lami's theorem L3 6M



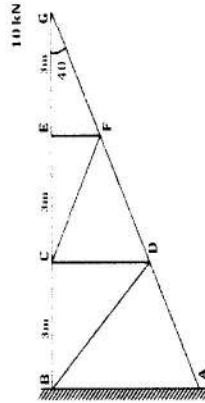
OR

- 2 A simply supported beam AB of length 8m, carries a system of loads as shown in the below figure. Calculate the reactions at A and B. L4 12M



UNIT-II

- 3 A cantilever truss is loaded with a point load of 10kN as shown in below figure. Find the forces in the member CE, EG, EF, CF and DF, GF using method of section. L3 12M

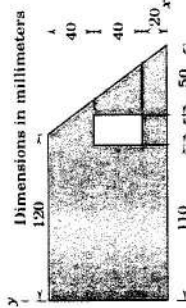


OR

- 4 A ladder 5m long rests on a horizontal ground and leans against a smooth vertical wall at an angle 70° with the horizontal. The weight of the ladder is 900N and acts at its middle. The ladder is at the point of sliding, when a man weighing 750N stands on a rung 1.5m from the bottom of the ladder. Calculate the coefficient of friction between the ladder and the floor. L4 12M

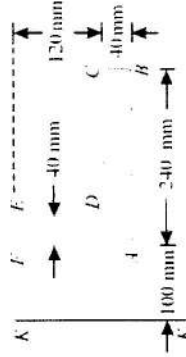
UNIT-III

- 5 Determine the co-ordinate of the C.G for the composite plane figure shown in below figure. L3 12M



OR

- 6 Below Figure shows an area ABCDEF. Compute the moment of inertia of the above area about axis K-K. L3 12M



UNIT-IV

- 7 A steel rod of 2cm diameter is enclosed centrally in a hollow copper tube of external diameter 4cm and internal diameter 3.5cm. The composite bar is subjected to an axial pull of 50kN. If the length of each bar is 20cm, E.S = 200GPa, EC = 100GPa determine,
(i) The stress in the rod and tube, and (ii) Load carried by each bar. L4 12M

OR

- 8 (a) A bar of 25 mm diameter is tested in tension. It is observed that when a load of 60 kN is applied, the extension measured over a gauge length of 200 mm is 0.12 mm and contraction in diameter is 0.0045 mm. Find Poisson's ratio and elastic constants E, G, K. L4 8M
(b) A metallic bar 320mm long, 40mm wide and 30mm thick is subjected to a pull of 250 kN in the direction of its length. Determine the change in volume, if E = 20 x 10⁶ N/cm² & μ = 0.25. L4 4M

UNIT-V

- 9 Derive an expression for determining the circumferential stress (or hoop stress) and longitudinal stress for thin cylinder. L4 12M
- 10 A pipe of 200mm internal diameter and 50mm thickness carries a fluid at a pressure of 10MN/m². Calculate the maximum and minimum intensities of circumferential stresses across the section. Also sketch the radial stress (pressure) distribution and circumferential stress distribution across the section. L3 12M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
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B.Tech I Year II Semester Regular Examinations November 2021
FUNDAMENTALS OF ELECTRICAL CIRCUITS

Time: 3 Hours

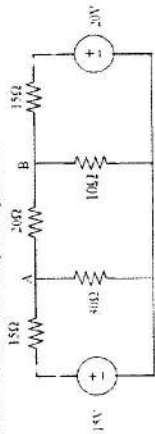
Max. Marks: 60

Answer one question from each unit (5 x 12 = 60 Marks)

UNIT-I

- 1 a) State and prove Kirchhoff's laws with suitable examples.
- b) Determine the current in branch A-B by using KVL.

L3 6M
L3 6M



OR

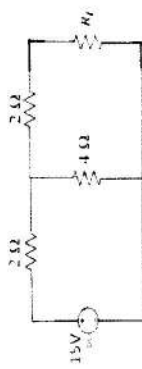
- 2 a) State and explain Ohm's law.
- b) Determine the Equivalent Resistance when three resistors are connected in Series & Parallel.

L3 6M
L3 6M

UNIT-II

- 3 a) State & explain Thevenin's theorem
- b) Find load current by using Thevenin's theorem for the following circuit where $R_L = 3\Omega$

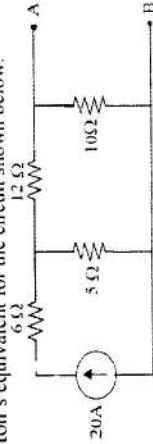
L1 4M
L3 8M



OR

- 4 a) State & explain Norton's theorem.
- b) Find the Norton's equivalent for the circuit shown below.

L1 4M
L3 8M



UNIT-III

- 5 a) Explain about Quality factor of parallel resonance.
- b) Determine the variation of impedance and phase angle of series resonant circuit with frequency

L2 6M
L2 6M

OR

- 6 a) Explain about Parallel resonance with phasor diagrams.
- b) Determine the quality factor of coil for the series circuit consisting of $R=10\Omega$, $L=0.111$ and $C=10\mu F$

L2 6M
L2 6M

UNIT-IV

- 7 a) What are single and double tuned circuits? Where the tuned coupled circuits are employed?
- b) What is dot convention? Why it is required?

L2 6M

L3 6M

OR

- 8 a) Explain coefficient of coupling
- b) A 15mH coil is connected in series with another coil. The total inductance is 70mH. when one of the coil is reversed, the total inductance is 30mH. Find the self-inductance of second coil, mutual inductance and coefficient of coupling.

L2 6M

L4 6M

UNIT-V

- 9 a) Define cut-set. Define tie-set.
- b) Write the procedure for constructing cut-set matrix

L1 3M

L1 3M

L4 6M

OR

- 10 a) Explain the relationship between branch current matrix and loop current matrix
- b) a) Define graph.
b) Define duality.

L4 6M

L1 6M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech I Year II Semester Regular Examinations November 2021

FUNDAMENTALS OF DIGITAL COMPUTING SYSTEMS

(ECE)

Time: 3 Hours

Max. Marks: 60

Answer one question from each unit (5 x 12 = 60 Marks)

UNIT-I

- 1 a) Explain why Protocols and standards are an important feature of networks L1 6M
b) Explain the concept of virtualization and describe its importance. L3 6M

OR

- 2 a) Briefly explain the communication component of a computer system L2 6M
b) Discuss the various types of network media, network hardware and protocols. L2 6M

UNIT-II

- 3 a) Discuss the client-server computing with an examples. L2 6M
b) Discuss the relationship between a system and its environment. L2 6M

OR

- 4 What is the primary mission of google? With the help of diagrams, explain how google designed its IT system architecture to achieve its mission. L2 12M

UNIT-III

- 5 a) Briefly discuss number systems of a computer. L2 6M
b) Calculate the decimal value of the following binary numbers L3 6M
(i) $(1100101.1)_2$ (ii) $(1110010.11)_2$ (iii) $(11100101.1)_2$

OR

- 6 a) Convert the following numbers to decimal: L3 6M
(i) $(1100100001)_2$ (ii) $(C521)_{16}$ (iii) $(24556)_7$
b) Create multiplication tables for base 12 arithmetic. Use alphabetic characters to represent digits 10 and larger. Using your tables multiply the $2A6_{12}$ and $B1_{12}$ L3 6M

UNIT-IV

- 7 a) Briefly explain the three standards that are used in common for alpha characters. L2 6M
b) Define image metadata. Give at least three examples of metadata that would be required for a bitmap image. L2 6M

OR

- 8 Describe the most important characteristics and features of the following audio file formats: (i) .MP3 (ii) .WAV L2 12M

UNIT-V

- 9 a) Define one's complement, two's complement form and explain the relation between them. L3 6M
b) Determine the result for the following decimal numbers operation by performing addition and convert each result to five-digit 10's complementary form, L2 6M
i) 24379 ii) 24379 iii) -24379
 -5098 5098 5098

OR

- 10 a) Find the 16-bit 2's complementary binary representation for the decimal number 1987 And -1987 L3 6M
b) Briefly explain about IEEE 754 Standard. L3 6M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)
B.Tech I Year II Semester Regular Examinations November 2021
BASICS OF ENGINEERING MECHANICS
(Mechanical Engg.)

Time: 3 Hours

Max. Marks: 60

Answer one question from each unit (5 x 12 = 60 Marks)

UNIT-I

- 1 a) State and prove Varignon's theorem. L1 6M
- b) A screw jack raises a load of 40 kN. The screw is square threaded having three threads per 20 mm length and 40 mm in diameter. Calculate the force required at the end of a lever 400 mm long measured from the axis of the screw, if the coefficient of friction between screw and nut is 0.12. L3 6M

OR

- 2 a) A simply supported beam AB of span 6 m is loaded as shown in Fig.1. Determine the reactions at A and B. L3 6M

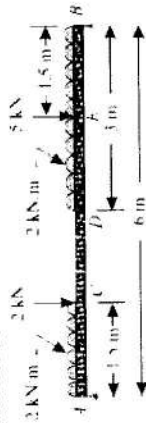


Fig.1: Simply supported beam.

b) Define the following:

- a) Limiting Force of Friction.
- b) Co-efficient of Friction.
- c) Angle of Friction.

UNIT-II

- 3 An I-section is made up of three rectangles as shown in Fig.2 Find the moment of inertia of the section about the horizontal axis passing through the centre of gravity of the section.

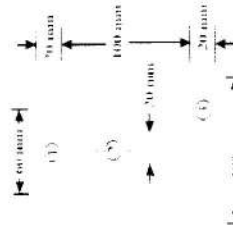


Fig.2: I-section.

OR

- 4 a) Prove the parallel axis theorem in the determination of moment of inertia of areas with the help of a neat sketch. L2 6M
- b) Find the moment of inertia of a hollow section shown in Fig.3 about an axis passing through its centre of gravity or parallel X-X axis. L3 6M

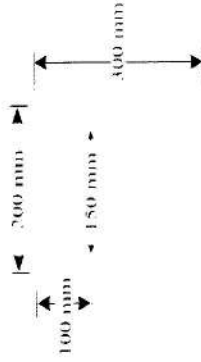


Fig.3: A hollow section.

UNIT-III

- 5 A copper rod of 40 mm diameter is surrounded tightly by a cast iron tube of 80 mm external diameter, the ends being firmly fastened together. Calculate the sharing of load when subject to a compressive load of 30 kN. Also calculate the decrease in length of the composite system if it is 2m long. Take $E_w = 75 \text{ GPa}$ and $E_c = 175 \text{ GPa}$. L3 12M

OR

- 6 a) At a certain point in a strained material the principal stresses are 100 N/mm^2 and 40 N/mm^2 both are tensile. Find the normal, tangential and resultant stresses across a plane through the point at 48° to the major principal plane, using Mohr's circle of stress. L3 6M
- b) Explain Mohr's circle for the general case of plane stress. L2 6M

UNIT-IV

- 7 A cylindrical shell 3 m long which is closed at the ends has an internal diameter of 1m and a wall thickness of 15 mm. Calculate the circumferential and longitudinal stresses induced and also change in the dimensions of the shell if it is subjected to an internal pressure of 1.5 MN/m^2 . Take: $E = 200 \text{ GN/m}^2$, and Poisson's ratio 0.3. L3 12M

OR

- 8 a) Derive Lamé's equation. L1 6M
- b) A thick cylindrical pipe of outside diameter 340 mm and internal diameter of 220 mm is subjected to an internal fluid pressure of 28 MPa and external fluid pressure of 7 MPa. Determine the hoop stress developed and draw the variation of hoop stress and radial stress across the thickness. L3 6M

UNIT-V

- 9 Draw the S.F. and B.M. diagrams for the overhanging beam carrying uniformly distributed load of 2 kN/m over the entire length and a point load of 2 kN as shown in Fig.4. Locate the point of contraflexure. L3 12M

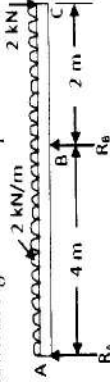


Fig.4: Overhanging beam.

OR

- 10 A beam of 8 m length is simply supported at its ends. It carries a uniformly distributed load of 20 kN/m run over the length of left half of its span, together with concentrated load of 20, 40 and 20 kN situated at 1, 2 and 3 m respectively from right hand support. Draw the shear force and bending moment diagrams for this beam. L3 12M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)
B.Tech I Year II Semester Regular Examinations November 2021
DIGITAL LOGIC DESIGN
(CSE)

Time: 3 Hours

Max. Marks: 60

Answer one question from each unit (5 x 12 = 60 Marks)

UNIT-I

- 1 a) Convert the following numbers L5 6M
 i) $(41.6875)_{10}$ to Hexadecimal number
 ii) $(11001101.0101)_2$ to base-8 and base-4
 b) Subtract $(111001)_2$ from (101011) using 2's complement? L5 6M

OR

- 2 a) Express the Boolean function $F=A+B'C$ as a sum of minterms. L1 6M
 b) Convert the given expression in standard POS form: $Y=A(A+B+C)$ L6 6M

UNIT-II

- 3 Simplify the Boolean expression using K-MAP L6 12M
 $F(A,B,C,D) = \sum m(1,2,3,8,9,10,11,14) + d(7,15)$

OR

- 4 Reduce the expression L6 12M
 $f(x,y,z,w) = \prod M(0,2,7,8,9,10,11,15) \cdot d(3,4)$ using K-Map?

UNIT-III

- 5 a) Explain about Binary Half Adder? L2 6M
 b) Design and draw a full adder circuit. L5 6M

OR

- 6 Implement BCD to 7-segment decoder for common anode using 4:16 decoder? L5 12M

UNIT-IV

- 7 a) Explain the Logic diagram of JK flip-flop? L2 6M
 b) Write difference between Combinational & Sequential circuits? L5 6M

OR

- 8 Explain the design of a 4 bit binary counter with parallel load in detail? L2 12M

UNIT-V

- 9 Implement the following function using PLA L5 12M
 $A(x,y,z) = \sum m(1,2,4,6)$ $B(x,y,z) = \sum m(0,1,6,7)$ $C(x,y,z) = \sum m(2,6)$

OR

- 10 a) Write difference between PROM, PLA & PAL? L5 6M
 b) Implement the following Boolean expressions using ROM L5 6M
 $F1(A,B,C) = \sum m(0,2,4,7)$
 $F2(A,B,C) = \sum m(1,3,5,7)$

Time: 3 Hours

Answer one question from each unit (5 x 12 = 60 Marks) Max. Marks: 60

- UNIT-I**
- 1 a) What is A Content Word? Define Content words with examples. [L1] 6M
b) Describe the central theme of the essay "Half a Rupee Worth". [L3] 6M
- 2 a) How did Subbaiah's profit increase during the war? [L2] 6M
b) Construct suitable dialogues for the following situation. [L3] 6M
Mohan, Anju and Siddique are discussing the idea of organizing a cultural show to collect funds for an orphanage.
- UNIT-II**
- 3 a) Frame six meaningful sentences by using appropriate Linkers. [L6] 6M
b) Why does Premchand use the title, 'The Thakur's Well' for his story, and how is this the best title he could ever have employed? [L1] 6M
- OR
- 4 a) Describe The Mechanics of Writing. [L1] 6M
b) What is the theme of the story *The Thakur's well*? [L4] 6M
- UNIT-III**
- 5 a) How does the poem "I am not that woman" depict several ways of exploitation of woman? [L1] 6M
b) Explain different types of listening. [L5] 6M
- OR
- 6 a) Write a brief report on the online classes you have attended during the pandemic time. [L1] 6M
b) How does the woman oppose her exploitation in *I am not that woman*? [L4] 6M
- UNIT-IV**
- 7 a) What made Mrs. Murthy restore to know her name in *What is My Name*? Write the antonyms for the given words [L1] 6M
b) i. Bold ii. Capable iii. Calm iv. Thick v. Successful vi. Merit [L3] 6M
- OR
- 8 a) Write six meaningful sentences on Compare and Contrast [L5] 6M
b) Transfer the information from pictorial to text. [L2] 6M



[L2]

- UNIT-V**
- 9 a) Does a man have any relation with the universe? How according to the author's father, can a man establish a link with the Cosmos? [L3] 6M
b) Illustrate the importance of festivals and celebrations in day to day life. [L5] 6M
- OR

- 10 a) Explain in detail about superficial listening and attentive listening? Correct the following sentences. [L2] 6M

- i. He speaks the English.
ii. Children prefer games than books
- b) i. My friend bought shoe yesterday
ii. She is taking milk daily
iii. It is a three years degree course
iv. I came by walk

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)
B.Tech I Year II Semester Regular Examinations November 2021
ELECTRONIC DEVICES AND CIRCUITS
(EEE)

Time: 3 Hours

Max. Marks: 60

Answer one question from each unit (5 x 12 = 60 Marks)

UNIT-I

- | | | | |
|---|--|----|----|
| 1 | a) Explain V-I characteristics of PN Junction Diode. | L1 | 6M |
| | b) Explain clamper circuit using PN Junction Diode. | L3 | 6M |

OR

- | | | | |
|---|---|----|----|
| 2 | a) How Zener Diode is Operated as Voltage Regulator. | L2 | 6M |
| | b) How Capacitance in diode circuit affects the operation of the circuit. | L3 | 6M |

UNIT-II

- | | | | |
|---|--|----|----|
| 3 | a) Draw the circuit for Full wave rectifier and explain its operation in detail. | L1 | 6M |
| | b) What is Tunnel diode? Explain its VI characteristics. | L2 | 6M |

OR

- | | | | |
|---|---|----|----|
| 4 | a) Explain how the Filter circuit is constructed using capacitor. | L3 | 6M |
| | b) Explain the operation of Bridge Rectifier and draw appropriate graph for the same. | L1 | 6M |

UNIT-III

- | | | | |
|---|--|----|----|
| 5 | a) Explain Common Emitter configuration in detail. | L1 | 6M |
| | b) Compare MOSFET with the FET | L3 | 6M |

OR

- | | | | |
|---|---|----|----|
| 6 | a) Explain the three regions of transistor in detail. | L1 | 6M |
| | b) Why FET is called as "Voltage Controlled Device". | L2 | 6M |

UNIT-IV

- | | | | |
|---|---|----|----|
| 7 | a) Draw the Load line for BJT amplifier and analyze the same. | L1 | 6M |
| | b) How operating point is selected for an amplifier. | L2 | 6M |

OR

- | | | | |
|---|---|----|----|
| 8 | a) Explain the operation of Fixed Bias circuit. | L2 | 6M |
| | b) What is Thermal Runaway? | L3 | 6M |

UNIT-V

- | | | | |
|---|---|----|----|
| 9 | a) Explain the H-parameter Model for Common Base Amplifier in detail. | L1 | 6M |
| | b) What is Small signal low frequency transistor amplifier analysis. | L2 | 6M |

OR

- | | | | |
|----|--|----|----|
| 10 | a) Why Common Collector Amplifier is called as Voltage Follower? | L1 | 6M |
| | b) Analyze small signal model of Common Source Amplifier. | L3 | 6M |

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech I Year II Semester Regular Examinations November 2021

ELECTRICAL TECHNOLOGY

(ELECTRONICS AND COMMUNICATION ENGINEERING)

Time: 3 Hours

Max. Marks: 60

Answer one question from each unit (5 x 12 = 60 Marks)

UNIT-I

1 Explain the basic principle of operation of a DC Generator with a simple loop generator? L1 12M
OR

- 2 a) Describe the different types of generator. L2 6M
b) A 4 pole generator having wave wound armature has 48 slots with 20 conductors in each slot. What will be the voltage generated in the machine when driven at 1500 rpm. Assuming flux per pole to be 7mwb? L3 6M

UNIT-II

- 3 a) What is back EMF? Describe its significance in detail. L2 6M
b) A 4 pole, 500 V DC shunt motor has 720 wave connected conductor on its armature. The full load armature current is 60 A & the flux per pole is 0.03 web, the armature resistance including brush contact is 0.2 Ω . Calculate the full load speed of the motor. L3 6M

OR

- 4 a) Explain the method used to control the speed of a dc shunt motor above the rated speed. L2 6M
b) Explain various losses and Efficiency of a D.C machine. L2 6M

UNIT-III

- 5 a) Draw the constructional diagram of a single -phase transformer and explain all the parts. L2 10M
b) What are the characteristics of ideal transformer L2 2M
- OR
- 6 a) Explain the operation of a practical single phase transformer under no load condition with phasor diagrams. L2 6M
b) In a 25KVA ,2000/200V ,transformer has Iron and copper losses are 350W and 400W respectively. Calculate the efficiency at unity power factor (i) at full load (ii) at half Load. L3 6M

UNIT-IV

- 7 a) Explain the principle of operation of 3-phase induction motor with neat sketch? L2 8M
b) Explain construction features of wound rotor machine? L2 4M

OR

- 8 a) Explain construction features of cage rotor machine? L2 6M
b) A 12 pole 3- ϕ alternator is coupled to an engine running at 500r.p.m. If supplied a 3 ϕ induction motor having full speed of 1440r.p.m. Find the %slip, frequency of rotor current and no of poles of rotor? L4 6M

UNIT-V

- 9 a) Explain the working principle of a Synchronous generator? L2 6M
b) Derive an EMF equation of an alternator. L3 6M

OR

- 10 Explain the synchronous impedance method for calculating the regulation of a three phase alternator. L4 12M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech I Year II Semester Regular Examinations November 2021

BASIC THERMODYNAMICS

(Mechanical Engineering)

Time: 3 Hours

Max. Marks: 60

Answer one question from each unit (5 x 12 = 60 Marks)

UNIT-I

- 1 a) Show that heat and work is a path function and not a property of the system L1 6M
b) What is quasi static process? What are its characteristics features? L1 6M

OR

- 2 a) Explain about Thermodynamic Equilibrium L2 6M
b) What is the difference between a closed system and an open system? L1 6M

UNIT-II

- 3 a) What are the Limitations of First laws of thermodynamics? L1 6M
b) A system changes from state 1 to state 2 along the path 1a2 absorbs 75JK of heat and does 30 KJ of work. The system is returned from state 2 to state 1 along the path 2b1 by doing a work of 10 KJ. Find out the heat transfer along the path 2b1. L3 6M

OR

- 4 State the concept of entropy of gas and availability and unavailability L1 12M

UNIT-III

- 5 a) Draw P-V and T-S diagrams on Isochoric process and Isobaric process with derive the (i) work done (ii) heat transfer (iii) internal energy. L4 6M
b) Air contained in a cylinder fitted with a piston is compressed reversibly according to the law $pV^{1.25} = \text{const}$. The mass of air in the cylinder is 0.1 kg. The initial pressure is 100 kPa and the initial temperature 20°C. The final volume is 1/8 of the initial volume. Determine the work and the heat transfer. L3 6M

OR

- 6 a) What is Avogadro's law? L1 6M
b) State Internal Energy and Enthalpy of Gas L1 6M

UNIT-IV

- 7 a) Find the change in enthalpy steam, initial pressure 10 bar and 0.98 then it will reach 20 bar and 350 temperature. By using steam tables. L3 6M
b) Explain Limitations of Carnot cycle. L2 6M

OR

- 8 Derive an expression for the thermal efficiency of Diesel cycle and draw P-V & T-S diagrams. L4 12M

UNIT-V

- 9 Describe the different operations of Rankine cycle and also derive the expression for its efficiency. L1 12M

OR

- 10 a) State the advantages and disadvantages of a Reheat cycle L1 6M
b) State the advantages of Regenerative cycle over Rankine cycle, and explain effect of operating conditions on Rankine cycle efficiency L3 6M