

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B. Tech II Year I Semester Regular & Supplementary Examinations December 2023

MATHEMATICAL AND STATISTICAL METHODS

(CSM, CAD, CIA)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

1. a) Using Euclidean algorithm, express 270 and 192 has a linear combination. L2 6M
 b) Define Fibonacci number. What is the sum of the first 11 terms of the give sequence 1, 1, 2, 3, 5, 8... L1 6M

OR

2. a) Add $(ABAB)_{16}$ and $(BABA)_{16}$ and Subtract $(434421)_5$ from $(4434201)_5$ L3 6M
 b) Find the general solution of Linear Diophantine equation $6x+12y-15z=33$. L4 6M

UNIT-II

3. Solve the system of congruence $x \equiv 3 \pmod{10}$, $x \equiv 8 \pmod{15}$, $x \equiv 5 \pmod{84}$, using Chinese remainder theorem. L3 12M

OR

4. a) Define congruence. Find all solutions of $9x \equiv 12 \pmod{15}$. L3 6M
 b) Find the remainder when 15^{1976} is divided by 23. L3 6M

UNIT-III

5. The mean of a random sample is an unbiased estimate of the man of population 3, 6, 9, 15, 27. (a) List of all possible samples of size 3 that can be taken without replacement from the finite population? (b) Calculate the mean of each of the sample listed in (a) and assigning each sample a probability of 1/10. Verify that the man of these X is equal to the mean of the population θ . Prove that \bar{x} is an unbiased estimate of θ . L3 12M

OR

6. a) If we can assert with 95% that the maximum error is 0.05 and $p=0.2$. Find the sample size. L3 6M
 b) Prove that maximum Likelihood estimate of the parameter α of a population having density function; $L(\alpha) = f(x, \alpha) = 2 / \alpha^2 (\alpha - x); 0 < x < \alpha$. L5 6M

UNIT-IV

7. Classification of states of a Markov chain and give the example. L2 12M

OR

8. a) Suppose a communication system transmits the digits 0 and 1 through many stages. At each state the probability that the same digit will be received by the next stage as transmitted, is 0.95. What is the probability that a 0 is entered at the first stage is received as a 0 in the 5th stage? L1 6M
 b) A fair dice is tossed repeatedly. If X_n denotes the maximum of the numbers occurring in the first n tosses, find the transition probability matrix p of the Markov chain $\{X_n\}$. Find also $P\{X_2 = 6\}$ and P^2 . L3 6M

UNIT-V

9. The stenographic is attached to 6 officers or whom she performs stenographic work. She gets call from the officers at the rate of 5 per hour and takes on the average 15 min to attend to each call. If arrival rate is Poisson and service time exponential find (a) the average number of waiting calls (b) the average waiting time for an arriving call and(c) the average time an arriving call spends in the system. L3 12M

OR

10. At a railway station only one train is handled at a time. The railway yard is sufficient only for two trains to wait while other is given signal to leave the station. Trains arrive at the station at an average rate of 5 per hour and the railway station can handled them on an average of 10 per hr. Assuming Poisson arrivals and exponential service distribution, find the steady state probabilities for the various number of trains in the system. Find also the average waiting time of a new train coming into the yard. L3 12M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year I Semester Regular & Supplementary Examinations December-2023
MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
(CE & CSE)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

1. a) Identify nature of managerial economics through its definitions. L2 6M
b) What is Managerial Economics? Explain the scope of Managerial Economics. L2 6M

OR

2. a) What do you mean by demand forecasting? L1 6M
b) Evaluate various methods of demand forecasting techniques. L4 6M

UNIT-II

3. A firm has declared the following details about its sales: L6 12M
- | | Year 1 | Year 2 |
|--------------|----------|----------|
| Sales (Rs.) | 1,40,000 | 1,60,000 |
| Profit (Rs.) | 15,000 | 20,000 |
- (i) Calculate PV Ratio. (ii) Find out the firm's BEP
(iii) How much should the company produce and sell to earn profit of Rs.40,000?

OR

4. a) Evaluate the Cobb Douglas production function. L4 6M
b) Explain the significance of BEP. L2 6M

UNIT-III

5. a) Define market and explain features of monopoly. L1 6M
b) What is meant by perfect competition? Explain its features. L2 6M

OR

6. a) Write short notes on new economic environment. L2 6M
b) Evaluate LPG. L4 6M

UNIT-IV

7. The cost of a project is Rs.50,000 which has an expected life of 5 years. L5 12M
The cash inflows for next 5 years are Rs.24,000; Rs.26,000; Rs.20,000; Rs.17,000 and Rs.16,000 respectively. Determine the Payback period.

OR

8. a) What is the importance of Capital budgeting and what are its limitations? L1 6M
b) What is meant by working capital and working capital cycle? L2 6M

UNIT-V

9. Journalize the following transactions in the books of Ragavan. L5 12M
- | | |
|-------------|--|
| 2012, Jan 1 | Ragavan commenced business with cash Rs.2,00,000 |
| 2 | Purchased goods for cash Rs.10,000 |
| 3 | Purchased goods from Mohan Rs.6,000 |
| 7 | Paid into bank Rs.5,000 |
| 10 | Purchased furniture Rs.2,000 |
| 20 | Sold goods to Suresh on credit Rs.5,000 |
| 25 | Cash sales Rs. 3,500 |
| 26 | Paid to Mohan on account Rs.3,000 |
| 31 | Paid salaries Rs.2,800 |

OR

10. a) Write about various types of accounts and their rules governing each account. L2 6M
b) Write a short note on the following i) Liquidity ratio ii) Inventory turnover ratio. L2 6M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY; PUTTUR

(AUTONOMOUS)

B.Tech II Year I Semester Regular & Supplementary Examinations December 2023

PROBABILITY, NUMERICAL METHODS AND TRANSFORMS

(EEE)

Time: 3 Hours

Max. Marks: 60

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

1. a) A class consists of 6 girls and 10 boys. If a committee of 3 is chosen at random from the class, find the Probability that (i) 3 boys are selected (ii) Exactly 2 girls are selected. L3 6M
- b) Two cards are selected at random from 10 cards numbered 1 to 10. Find the probability that the sum is even if.

UNIT-I

(i) The two cards are drawn together.

(ii) The two cards drawn one after other with replacement.

OR

2. a) State Baye's theorem. L1 2M
- b) In a bolt factory machines A, B, C manufacture 20%, 30% and 50% of the total of their output and 6%, 3% and 2% are defective. A bolt is drawn at random and found to be defective. Find the probabilities that it is manufactured from (i) Machine A (ii) Machine B (iii) Machine C. L2 10M

UNIT-II

3. Find a positive root of $x^3 - x - 1 = 0$ correct to two decimal places, by Bisection Method. L3 12M

OR

4. a) Using Newton's forward interpolation formula and the given table of values, obtain the value of $f(x)$ when $x=1.4$. L3 6M

x	-1	1.3	1.5	1.7	1.9
$f(x)$	0.21	0.69	1.25	1.89	2.61

- b) Use Newton's backward interpolation formula to find $f(32)$ given $f(25)=0.2707, f(30)=0.3027, f(35)=0.3386, f(40)=0.3794$. L2 6M

UNIT-III

5. a) Write general approximation formula for Taylor's series. L1 2M
- b) Tabulate $y(0.1), y(0.2)$ using Taylor's series method, given that $y' = y^2 + x$ and $y(0) = 1$. L5 10M

OR

6. Evaluate $\int_0^1 \frac{1}{1+x} dx$ (i) by Trapezoidal rule and Simpson's $\frac{1}{3}$ rule. L5 12M

(ii) Using Simpson's $\frac{3}{8}$ rule and compare the result with actual value.**UNIT-IV**

7. a) Find the Laplace transform of $f(t) = \frac{1 - \cos at}{t}$. L3 6M

- b) Find the Laplace transform of $e^{-3t}(\cos 4t + 3\sin 4t)$. L3 6M

OR

8. a) Find $L^{-1}\left\{\frac{3s-2}{s^2-4s+20}\right\}$ by using first shifting theorem. L3 6M

- b) Using Convolution theorem, Find $L^{-1}\left\{\frac{1}{(s^2+5)^2}\right\}$. L3 6M

UNIT-V

9. Apply Laplace transform method to solve $y'' + 7y' + 10y = 4e^{-3t}$, where $y(0) = 0, y'(0) = -1$. L3 12M

OR

10. a) Define Z-Transform. L2 2M

Determine the value of

- b) $Z(\cos nt)$ $Z(\sin nt)$ and hence find (i) $Z(n \cos nt)$ (ii) $Z(n \sin nt)$. L3 10M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year I Semester Regular & Supplementary Examinations December-2023
NUMERICAL METHODS AND TRANSFORMS
(ECE)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

1. a) Define Algebraic equation and Transcendental equation. L1 4M
b) Find a positive root of the equation $x^3 - x - 1 = 0$ by Bisection method. L3 8M

OR

2. a) Describe the formula for square root of a number by Newton - Raphson formula. L2 2M
b) Find out the square root of 25 given $x_0 = 2.0$, $x_1 = 7.0$ using Bisection method. L3 10M

UNIT-II

3. Evaluate $\int_0^1 \frac{1}{1+x} dx$ by L5 12M

(i) By Trapezoidal rule and Simpson's $\frac{1}{3}$ rule.

(ii) Using Simpson's $\frac{3}{8}$ rule and compare the result with actual value.

OR

4. a) Solve $y' = x + y$, given $y(1) = 0$ find $y(1.1)$ and $y(1.2)$ by Taylor's series method. L3 6M
b) Solve by Euler's method $\frac{dy}{dx} = \frac{2y}{x}$ given $y(1) = 2$ and find $y(2)$. L3 6M

UNIT-III

5. a) Find the Laplace transform of $t^2 e^{2t} \sin 3t$. L3 6M
b) Find the Laplace transform of $\frac{1 - \cos at}{t}$. L3 6M

OR

6. a) Find $L^{-1} \left\{ \frac{s^2}{(s^2 + 4)(s^2 + 25)} \right\}$ using Convolution theorem. L3 6M
b) Find the Inverse Laplace transform of $\frac{1}{s(s^2 + a^2)}$. L3 6M

UNIT-IV

7. Expand the function $f(x) = |x|$ in $-\pi < x < \pi$ as a Fourier series and deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \frac{1}{7^2} + \dots = \frac{\pi^2}{8}$. L2 12M

OR

8. a) Using Laplace transform method to solve $y' - y = t$, $y(0) = 1$. L2 6M
b) Solve the D.E. $\frac{d^2 x}{dt^2} + 2 \frac{dx}{dt} + x = 3te^{-t}$ using Laplace Transform given that $x(0) = 4$, $\frac{dx}{dt} = 0$ at $t = 0$. L3 6M

UNIT-V

9. a) Prove that $F[x^n f(x)] = (-1)^n \frac{d^n}{dp^n} [F(p)]$ L5 6M
b) Prove that $F_s\{x f(x)\} = -\frac{d}{dp} [F_c(p)]$ L5 6M

OR

10. a) State Fourier integral theorem. L1 2M
b) Using Fourier integral theorem. L3 10M

Show that $e^{-ax} - e^{-bx} = \frac{2(b^2 - a^2)}{\pi} \int_0^\infty \frac{\lambda \sin \lambda x d\lambda}{(\lambda^2 + a^2)(\lambda^2 + b^2)}$, $a, b > 0$

Time: 3 Hours

Max. Marks: 60

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

- Find a positive root of the equation $x^3 - x - 1 = 0$ by Bisection method. L1 12M
UNIT-I
- Find a real root of the equation $x \tan x + 1 = 0$ using Newton - Raphson method. L1 6M
 - Use Newton's backward interpolation formula to find $f(32)$ given $f(25)=0.2707, f(30)=0.3027, f(35)=0.3386, f(40)=0.3794$. L3 6M
- Tabulate $y(0.1), y(0.2)$ and $y(0.3)$ using Taylor's series method given that $y^1 = y^2 + x$ and $y(0) = 1$. L3 12M
UNIT-II

OR

- Evaluate $\int_0^1 \frac{dx}{1+x}$ by using (i) Trapezoidal rule (ii) Simpson's 1/3rd rule and (iii) Simpson's 3/8th rule and compare the result with actual value. L3 12M

UNIT-III

- Find arithmetic mean to the following data. L1 6M
- | | | | | | |
|---|---|---|----|----|---|
| x | 1 | 2 | 3 | 4 | 5 |
| f | 5 | 8 | 10 | 12 | 6 |
- Find the median to the following data. L1 6M

Class	40-50	50-60	60-70	70-80	80-90
frequency	5	12	23	8	2

OR

- In a certain college 25% of boys and 10% of girls are studying mathematics. The girls constitute 60% of the student body.
 - What is the probability that mathematics is being studied?
 - If a student is selected at random and is found to be studying mathematics, find the probability that the student is a girl?
- Two dice are thrown. Let X assign to each point (a, b) in S the maximum of its numbers i.e, $X(a, b) = \max(a, b)$. Find the probability distribution of X, which is a random variable with $X(s) = [1, 2, 3, 4, 5, 6]$. Also find the mean and variance of the distribution. L1 12M
UNIT-IV

OR

- The probability density function of a continuous random variable X is given by $f(x) = \begin{cases} \frac{1}{2} \sin x, 0 \leq x \leq \pi \\ 0, elsewhere \end{cases}$. L1 12M
Find the mean, median and mode of the distribution and also compute the probability that X takes the values between 0 and $\frac{\pi}{2}$.
- In a sample of 1000 cases, the mean of certain test is 14 and standard deviation is 2.5. Assuming the distribution to be normal find
 - How many students score between 12 and 15?
 - How many students score above 18?
 - How many students score below 18?

UNIT-V

OR

- Find two regression equations from the following data: L1 12M

X	10	25	34	42	37	35	36	45
Y	56	64	63	58	73	75	82	77

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
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B. Tech II Year I Semester Regular & Supplementary Examinations December 2023

COMPUTER ORGANIZATION & ARCHITECTURE

(CSE, CSM, CAD & CIA)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

- | | | | |
|----|---|----|----|
| 1. | a) Explain the functional units of the Computer? | L2 | 8M |
| | b) What are the uses of PC, IR and General-Purpose Registers? | L1 | 4M |

OR

- | | | | |
|----|---|-------|----|
| 2. | a) Define addressing mode and briefly explain different addressing modes? | L1,L2 | 6M |
| | b) Assume that R1 = 400,270 in 400 address, 600 in 500 address location and 890 in 600 location. What is the data in the accumulator after the execution of the instructions? | L4 | 6M |

(i) MOV A, R1

(ii) MOV A, @ R1

UNIT-II

- | | | | |
|----|---|----|-----|
| 3. | Discuss the multiplication algorithm with shift and add method with suitable flowchart. Multiply the binary numbers (01011) and (01101) using shift and add method? | L6 | 12M |
|----|---|----|-----|

OR

- | | | | |
|----|---|-------|----|
| 4. | a) List and explain different types of signed number representations? | L1,L2 | 6M |
| | b) Subtract 1101 and -1001 using 2's complement subtractions? | L5 | 6M |

UNIT-III

- | | | | |
|----|--|----|----|
| 5. | a) Explain bus line with three state buffers? | L2 | 6M |
| | b) Discuss the any four arithmetic micro operations? | L6 | 6M |

OR

- | | | | |
|----|--|-------|----|
| 6. | a) What is hardwired control? Explain in detail with a neat diagram? | L1,L2 | 8M |
| | b) Compare and contrast hardwired control with micro-programmed control? | L5 | 4M |

UNIT-IV

- | | | | |
|----|---|----|-----|
| 7. | Write and explain about DMA transfers in computer system with neat Diagram? | L2 | 12M |
|----|---|----|-----|

OR

- | | | | |
|----|---|-------|----|
| 8. | a) List and explain different mapping techniques in cache memory? | L1,L2 | 6M |
| | b) Explain 128*8 RAM with block diagram and function table? | L4 | 6M |

UNIT-V

- | | | | |
|----|---|----|-----|
| 9. | Categorize and discuss various forms of parallel processing based on Flynn's taxonomy with a neat sketch? | L4 | 12M |
|----|---|----|-----|

OR

- | | | | |
|-----|---|----|----|
| 10. | a) Explain the concept of 4 stage pipelining with neat diagram? | L2 | 6M |
| | b) Sketch the flowchart for floating point addition and subtraction in arithmetic pipeline? | L4 | 6M |

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
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B.Tech II Year I Semester Regular & Supplementary Examinations December 2023

ANALOG ELECTRONIC CIRCUITS

(EEE)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

- 1 Summarize the expressions of Gain, input and output resistances for a Current Series feedback amplifier with necessary derivations. L2 12M

OR

- 2 a) Interpret voltage series and current series amplifier topologies with necessary diagrams. L2 6M
b) An amplifier has open loop gain 1000 and feedback ratio of 0.04, if the open loop gain changes by 10% due to temperature; find the percentage change in the gain of the amplifier feedback. L2 6M

UNIT-II

- 3 a) Explain in detail about the crystal oscillator and mention the expression for its frequency of oscillation. L2 6M
b) Summarize the difference between LC and Crystal oscillator. L2 6M

OR

- 4 a) Explain the concept of stability in Oscillators in detail. L2 6M
b) Compare piezoelectric effect and inverse piezoelectric effect with a neat diagram. L2 6M

UNIT-III

- 5 a) Draw the equivalent circuit diagram of Op-amp and list out the ideal characteristics of an operational amplifier. L1 6M
b) For an Non-inverting amplifier, $R_1=5k\Omega$, $R_f=20 k\Omega$ with input voltage $V_i=1V$ and a load resistance of $R_L=5 k\Omega$ is connected to the output terminal. Calculate i) V_o ii) A_{CL} iii) I_L and iv) load current I_o indicating proper direction of flow. L2 6M

OR

- 6 a) For an inverting amplifier, $R_1=10k\Omega$, $R_f=100 k\Omega$ with input voltage $V_i=1V$ and a load resistance of $R_L=25 k\Omega$ is connected to the output terminal. Calculate i) I_i ii) V_o iii) I_L and iv) load current i_o into the output pin. L3 6M
b) Explain the basic information and pin configuration of an op-amp. L2 6M

UNIT-IV

- 7 a) Design and explain the operation of inverting summing amplifier. L4 6M
b) Design an inverting adder circuit using an op-amp to get the output expression as $V_o=-(0.1V_1+V_2+10V_3)$, Where V_1, V_2 and V_3 are the inputs. L4 6M

OR

- 8 a) Design and explain the operation of non-inverting summing amplifier. L4 6M
b) The op-amp non-inverting summing circuit has the following parameters. $V_{CC} = +15 V$, $V_{EE} = -15V$, $R = R_1 = 1 k\Omega$, $R_f = 2 k\Omega$, $V_1 = +2 V$, $V_2 = -3 V$, $V_3 = +4 V$. Determine the output voltage V_o . L4 6M

UNIT-V

- 9 Design a low pass filter at a cut-of frequency of 15.9kHz with pass band gain of 1.5 and draw the frequency response. L4 12M

OR

- 10 a) Draw the circuit diagram of inverted R-2R DAC and explain its operation. L2 6M
b) Design an inverted R-2R ladder DAC for digital input word 001. L4 6M

UNIT-I

1. a) Discuss the effect of temperature on V-I characteristics of a PN junction Diode. L2 6M
 b) The reverse saturation current of a silicon PN junction Diode is $10\mu A$. L3 6M
 Calculate the diode current for the forward bias voltage of $0.6V$ at $25^\circ C$.
2. a) A PN junction germanium diode has a reverse saturation current of $10\mu A$ L2 6M
 at the room temperature of $27^\circ C$. It is observed to be $30\mu A$, when the room L3 6M
 temperature is increased. Calculate the new room temperature.
- b) Discuss about the forward and reverse resistances of a PN junction diode. L2 6M

OR

3. a) Define a Rectifier, draw the circuit diagram of a Half Wave Rectifier and L1 6M
 explain its operation with the help of waveforms.
- b) Derive the expressions for Average DC Voltage, RMS Value of voltage, DC L3 6M
 Output Power and AC input Power for a Half Wave Rectifier.

OR

4. a) With neat circuit diagram and waveforms, explain the operation of Full Wave L2 6M
 Rectifier with Capacitor filter and derive the expression for its ripple factor.
- b) Draw the circuit symbol of Varactor diode, give its characteristics, and list L1 6M
 its applications

UNIT-III

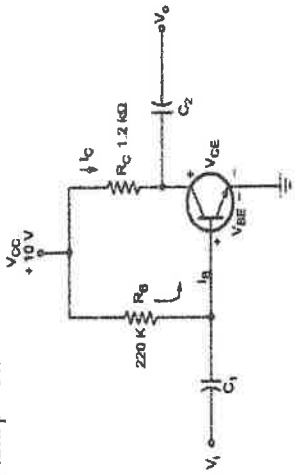
5. a) Explain the construction of NPN transistor with a neat diagram. L5 6M
 b) Evaluate the relation between α and β of a Transistor. L6 6M

OR

6. a) With neat diagram, explain the Input and Output characteristics of a BJT in L5 6M
 CB Configuration. Explain Early effect.
- b) Define the following terms: i) Emitter efficiency ii) Transport factor iii) L2 6M
 Large signal current gain.

UNIT-IV

7. a) Define transistor biasing and explain the need for biasing, Derive the L4 6M
 expression for Stability Factor, S_I from Collector current equation.
- b) For the circuit shown in the Figure, solve I_B , I_C , V_{CE} , V_B , V_C and V_{BE} . L3 6M
 Assume that $V_{BE} = 0$ and $\beta = 50$.



OR

8. a) Illustrate Thermistor Compensation Technique for stabilization against L2 6M
 variations in Q -point.
- b) Calculate the values of Resistors in a fixed bias circuit using the following L3 6M
 specifications: $I_{CQ}=9.2mA$, $V_{CEQ}=4.4V$, $h_{fe}=1115$, $V_{BE}=0.7V$ & $V_{CC}=9V$.

UNIT-V

9. a) Define h-parameters and draw the generalized h-parameter model of a L2 5M
 Transistor. Why hybrid model is used for the analysis of BJT amplifier at
 low frequencies?
- b) Draw the hybrid model for a transistor in CE configuration and derive its L4 7M
 hybrid parameters.

OR

10. a) With neat diagram, summarize the parameters of CE amplifier using L3 6M
 approximate analysis.
- b) Examine the expressions for current gain, voltage gain, input impedance L3 6M
 and output impedance of CB amplifier using simplified hybrid model.

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
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B.Tech II Year I Semester Regular & Supplementary Examinations December 2023

FLUID MECHANICS & HYDRAULIC MACHINERY

(MECH)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

1. a) Define fluid, density and specific gravity of a fluid. L1 6M
 b) A plate 0.025mm at a distance from a fixed plate moves at 60 cm/sec and requires a force of 2 N/m². Determine viscosity between the plates. L3 6M

OR

2. a) State Pascal's law. What do you understand by the terms Gauge pressure & Vacuum pressure? L1 6M
 b) What is the gauge pressure at a point 3m below the free surface of a liquid having a density $1.53 \times 10^3 \text{ kg/m}^3$, if the atmospheric pressure is equivalent to 750 mm of mercury, the Specific gravity of mercury is 13.6 and density of water = 1000 kg/m³? L3 6M

UNIT-II

3. Define the terms: Stream line, streak line and path line. L1 6M
 Define rate of flow and derive continuity equation for one dimensional flow. L1 6M

OR

4. a) Define momentum equation and impulse momentum equation L1 4M
 b) Water is flowing through a pipe has diameter 300 mm and 200 mm at the bottom and upper end respectively. The intensity of pressure at the bottom end is 24.525 N/cm² and the pressure at the upper end is 9.81 N/cm². Determine the difference in datum head if the rate of flow through pipe is 40 lit/s. L3 8M

UNIT-III

5. An oil of specific gravity 0.8 is flowing through a Venturi meter having inlet diameter of 20 cm and throat diameter 10 cm. The oil-mercury differential manometer shows a reading of 25 cm. Calculate the discharge of oil through a horizontal venturimeter. Take $C_d = 0.98$. L3 12M

OR

6. Derive an expression for the loss of head in pipes due to friction. L3 12M

UNIT-IV

7. a) Derive an expression for the force exerted by a jet of water on an inclined fixed plate in the direction of the jet. L3 6M
 b) A jet of water of diameter 50 mm moving with a velocity of 40 m/s, strikes a curved fixed symmetrical plate at the center. Find the force extracted by Jet of water in the direction of the jet, if the jet is deflected through an angle of 120° at the outlet of the curved plate. L3 6M

OR

8. a) Obtain an expression for the hydraulic efficiency when a liquid jet strikes a single fixed curved vane. L3 6M
 b) A jet of 50 mm diameter delivers a stream of water at 20 m/s perpendicular to a plate that moves away from the jet 5 m/s. Find the force on the plate, work done and efficiency of jet. L3 6M
9. Explain the working principle of a Pelton wheel with neat sketch and derive the equation for hydraulic efficiency. L2 12M

OR

10. a) A centrifugal pump delivers water against a net head of 14.5m and a design speed of 1000 r.p.m. The vanes of curved back to an angle of 30° with the periphery. The impeller diameter is 300mm and outlet width is 50mm. Determine the discharge of the pump if manometric efficiency is 95%. L3 7M
 b) Describe pumps in series and parallel. L2 5M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)
B.Tech II Year I SEM Regular & Supplementary Examinations December-2023.
DATABASE MANAGEMENT SYSTEMS
(CSE, CSM, CAD & CIA)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

1. Classify Database languages with examples. L4 12M
- OR**
2. a) Outline the Data Abstraction and discuss levels of Abstraction. L2 6M
b) Construct ER Diagram for Banking system. L6 6M

UNIT-II

3. a) Compare Selection and Projection. L5 6M
b) Evaluate Order by, Group by and Having Clauses with example. L5 6M
- OR**
4. a) Distinguish different types of aggregate operators with examples in SQL. L5 6M
b) Define trigger. Differentiate row level and statement level triggers. L3 6M

UNIT-III

5. a) Explain about Functional Dependency. L2 6M
b) Compare Trivial and Non – Trivial Functional Dependencies with example. L4 6M
- OR**
6. a) Illustrate the types of anomalies with example. L3 6M
b) Compare 3NF and BCNF with example. L4 6M

UNIT-IV

7. Explain ACID properties and illustrate them through examples. L2 12M
- OR**
8. a) List out the types of Schedules with a neat sketch. L1 6M
b) Discuss View Serializability, Conflict Serializability. L2 6M

UNIT-V

9. Identify the two phase locking protocol and strict two phase locking protocols? L3 12M
- OR**
10. a) Describe the deadlock prevention schemes. L2 6M
b) What are the advantages and disadvantages of RAID system? L1 6M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year I Semester Regular & Supplementary Examinations December 2023

ELECTRICAL MACHINES-I

(EEE)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

- 1 a) Explain the uses of compensating winding. L3 6M
 b) A 400V 1000A lap wound dc machines has 10 poles and 860 armatures conductors. Calculate the number of conductors in the pole face to give full compensation if the pole face covers 70% pole span. L3 6M

OR

- 2 a) Distinguish between Lap and Wave windings? L2 6M
 b) A 8 pole dc shunt generator with 778 wave connected armature conductors and running at 500 rpm supplies a load of 12.5 ohm resistance at terminal voltage of 50v. The armature resistance is 0.24 ohm and the field resistance is 250 ohm. Find the armature current, the induced e.m.f and the flux per pole. L3 6M

UNIT-II

- 3 Explain the external characteristics of DC generator with neat sketch. L3 12M

OR

- 4 Two 240 V dc generators each having linear external characteristic operation in parallel. One machine has a terminal voltage of 300 V on no load and 240 at a load current of 30A while the other has a voltage of 300V at no load and 22V at 50A. Calculate the output current of each machine and the bus bar voltage when the total load is 60A. What is the kW output of each machine under this condition? L3 12M

UNIT-III

- 5 A dc motor takes an armature current of 110A at 480V. The armature circuit resistant is 0.2ohm. The machine has 6 poles and the armature is lap connected with 864 conductors. The flux per pole is 0.05Wb. Calculate the speed and gross torque developed by the armature. L4 12M

OR

- 6 a) What is the significance of Back E.M.F. L2 6M
 b) Derive the equation for the torque Developed by a D.C. motor? L3 6M

UNIT-IV

- 7 Explain 4 point starter in detail. L3 12M

OR

- 8 a) Explain retardation test for DC machine in detail. L3 6M
 b) In retardation test on a separately excited motor the induced e.m.f. in the armature falls from 220V to 190V in 30 seconds on disconnecting the armature from the supply. The same fall takes place in 20 seconds if immediately after disconnection, armature is connected to a resistance which takes 10A during this fall. Find stray losses of the motor. L3 6M

UNIT-V

- 9 Explain construction and working principles of Switched Reluctance Motor (SRM). L2 12M

OR

- 10 a) Explain the construction and operation of universal motor. L3 6M
 b) Draw the speed / load characteristics of universal motor. L3 6M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year I Semester Regular & Supplementary Examinations December 2023

SWITCHING THEORY AND LOGIC DESIGN

(ECE)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

1. a) Prove De Morgan's theorems using Perfect Induction Method. L3 6M
 b) Simplify the given Boolean expression to a sum of 3 terms. $A'C'D' + AC' + BCD + A'CD' + A'BC + ABC'$. L4 6M

OR

2. a) Express the following functions in Sum of Minterms and Product of Maxterms. i) $F1(A,B,C,D) = B'D + A'D + BD$. L2 6M
 ii) $F2(x,y,z) = (xy + z)(xz+y)$.
 b) Express the following Boolean functions into Canonical form. L2 6M
 i) $F1=AB+BC+CA$. ii) $F2= XY+Z+YZ+XYZ$.

UNIT-II

3. Simplify the Boolean function using Five Variable K-Map. L4 12M
 $F = \sum m(0, 1, 2, 4, 7, 8, 12, 14, 15, 16, 17, 18, 20, 24, 28, 30, 31)$.

OR

4. Simplify the following Boolean function by using Tabulation method. L4 12M
 $F = \Sigma (0, 1, 2, 8, 10, 11, 14, 15)$.

UNIT-III

5. a) Define Combinational Circuit and Explain the analysis procedure of a combinational logic circuit using suitable example. L2 6M
 b) Explain the procedure of designing a combinational logic circuit with an example. L2 6M

OR

6. a) Explain a 2-bit Magnitude comparator and write down its design procedure. L2 6M
 b) Design & implement Full Adder using Decoder. L3 6M

UNIT-IV

7. Design a 4 bit Decade counter. L4 12M

OR

8. a) Derive the characteristic equations for D & T Flip-Flops. L3 6M
 b) Convert SR flip flop into JK Flip-Flop. Draw and explain its logic diagram. L2 6M

UNIT-V

9. Illustrate PLA for the following Boolean function. L3 12M
 $F1(A,B,C) = \sum m(3,5,7)$. $F2(A,B,C) = \sum m(4,5, 7)$.

OR

10. Explain the following related to sequential circuits with suitable examples. L2 12M
 i) State diagram.
 ii) State table.
 iii) State assignment.

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

1. A tensile test was conducted on a mild steel bar. The following data was obtained from the test: (i) Diameter of the steel bar = 3 cm (ii) Gauge length of the bar = 20 cm (iii) Load at elastic limit = 250 kN (iv) Extension at a load of 150 kN = 0.21 mm (v) Maximum load = 380 kN (vi) Total extension = 60 mm (vii) Diameter of the rod at the failure = 2.25 cm.

Determine:

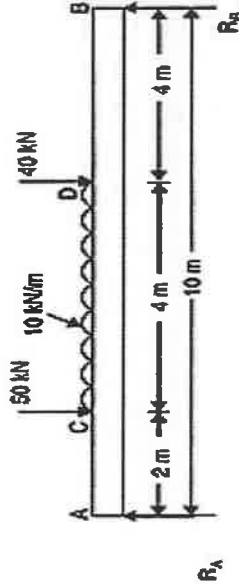
- (a) The Young's modulus,
- (b) The stress at elastic limit,
- (c) The percentage elongation, and
- (d) The percentage decrease in area

OR

2. a) Define stress and strain and explain their types.
b) Explain maximum principal strain theory.

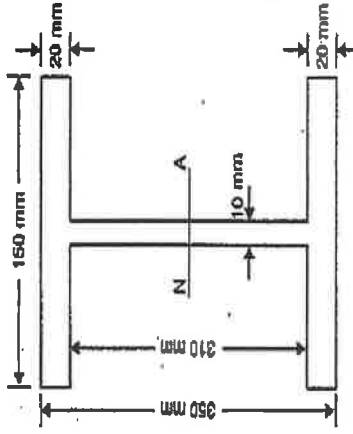
UNIT-II

3. A simply supported beam of length 10m carries the UDL and two-point loads as shown in fig. Draw S.F. and B.M. diagram for the beam shown in figure. Also calculate the maximum bending moment.



OR

4. a) Derive section modulus for rectangular section.
b) Derive the simple bending equation.
5. a) Draw the shear stress distribution across: (i) Rectangular section and (ii) Triangular section
b) An I-section beam 350 mm x 150 mm has a web thickness of 10 mm and a flange thickness of 20 mm. If the shear force acting on the section is 40 kN, find the maximum shear stress developed in the I-section.



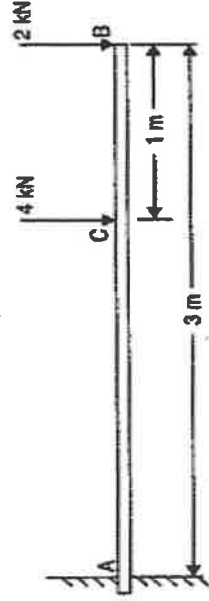
OR

6. Derive shear stress distribution formula for circular section with a neat sketch.
7. Derive the relation between slope, deflection and radius of curvature.
8. A cantilever of length 3 m carries two-point loads of 2 kN at the free end and 4 kN at a distance of 1 m from the free end. Find the deflection at the free end. Take $E = 2 \times 10^5 \text{ N/mm}^2$ and $I = 108 \text{ mm}^4$.

UNIT-IV

OR

9. A cylindrical shell 90 mm long 20 cm internal diameter having thickness of a metal as 8 mm is filled with a fluid at atmospheric pressure. If an additional 20 cm³ of fluid is pumped into the cylinder, Take $E = 2 \times 10^5 \text{ N/mm}^2$ and Poisson's ratio is 0.3. Find (i) The pressure exerted by the fluid on the cylinder and (ii) The hoop stress induced.
10. A steel cylinder of 300 mm external diameter is to be shrunk to another steel cylinder of 150 mm internal diameter. After shrinking, the diameter at the junction is 250 mm and radial pressure at the common junction is 28 N/mm². Find the original difference in radii at the junction. Take $E = 2 \times 10^5 \text{ N/mm}^2$.



UNIT-V

9. A cylindrical shell 90 mm long 20 cm internal diameter having thickness of a metal as 8 mm is filled with a fluid at atmospheric pressure. If an additional 20 cm³ of fluid is pumped into the cylinder, Take $E = 2 \times 10^5 \text{ N/mm}^2$ and Poisson's ratio is 0.3. Find (i) The pressure exerted by the fluid on the cylinder and (ii) The hoop stress induced.
10. A steel cylinder of 300 mm external diameter is to be shrunk to another steel cylinder of 150 mm internal diameter. After shrinking, the diameter at the junction is 250 mm and radial pressure at the common junction is 28 N/mm². Find the original difference in radii at the junction. Take $E = 2 \times 10^5 \text{ N/mm}^2$.

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year I Semester Regular & Supplementary Examinations December 2023

PYTHON PROGRAMMING

(CSM, CAD, CIA)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

1. What is data type? List out the data types with example. L1 12M
OR
2. a) Explain the variable and keywords with suitable example. L2 6M
b) What is Dictionary? Explain the Methods available in Dictionary. L1 6M

UNIT-II

3. Illustrate different Conditional statements in python with appropriate examples. i) if ii) if-else iii) i) if-elif-else iv) nested if. L2 12M
OR
4. a) What are the different loop control statements available in Python? Explain with suitable examples L1 6M
b) Develop a Python program to Swapping of two numbers with and without using temporary variable. L6 6M

UNIT-III

5. a) Describe about default arguments with suitable program. L2 6M
b) Illustrate lambda function with example. L3 6M
OR
6. a) Define Class and Object with example code. L1 6M
b) Demonstrate implementation of hierarchical inheritance in Python, with a program. L2 6M

UNIT-IV

7. Explain Python Built-in Exceptions. L5 12M
OR
8. a) Describe the types of namespaces in Python? L2 6M
b) Explain the from import statement in modules. L5 6M

UNIT-V

9. Explain about Functional Programming. L4 12M
OR
10. a) Illustrate the Command line arguments. L3 6M
b) Explain the reading and writing files in python. L2 6M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year I Semester Regular & Supplementary Examinations Decemeber 2023

OBJECT ORIENTED PROGRAMMING THROUGH JAVA

(CSE)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

- 1 a) What is Byte Code? Analyze the different states of Java Program execution? L4 6M
b) Explain History and Evolution of Java? L2 6M

OR

- 2 a) Create a java program to find the greatest of three numbers and give the procedure for compilation and run the same. L6 6M
b) Describe command line arguments? Develop a Java program to add two numbers using command line arguments. L6 6M

UNIT-II

- 3 a) Distinguish Method Overriding and Method Overloading. L5 6M
b) Describe about the super keyword in java with example. L2 6M

OR

- 4 a) Illustrate Garbage Collector in Java and explain the behaviour when used. L3 6M
b) Give the differences between Abstract class and Interface. L4 6M

UNIT-III

- 5 a) Illustrate creating of Thread in Java. L3 6M
b) Write a Java program that creates three threads. First thread displays –Good Morning, every one second, the second thread displays Hello, every two seconds and the third thread displays Welcome every three seconds. L6 6M

OR

- 6 a) Define String? Write the difference between String and String Buffer classes. L4 6M
b) Create a java program to check the given string is palindrome or not. L6 6M

UNIT-IV

- 7 a) List and describe about collection class in java. L2 6M
b) Implement the following concepts with java programs. L6 6M
a) Array list b) TreeSet c) LinkedHashMap

OR

- 8 Create program illustrating following framework. L5 12M
a)Vector b)Array List c)Hash Table d)Stack

UNIT-V

- 9 a) State the features of swing in java. L1 6M
b) Difference between AWT and SWING? L4 6M

OR

- 10 a) Interpret the usage of Date and Time API with an example program. L3 6M
b) Discuss in detail the operations on Streams. L2 6M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year I Semester Regular & Supplementary Examinations December 2023
BUILDING TECHNOLOGY

(CIVIL)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

1. What are the causes of the failure of foundations? What measures are to be taken to prevent such failure? L1 12M

OR

2. a) What are the defects in brick masonry? L1 6M
b) What are the points to be observed while supervising the brickwork? L1 6M

UNIT-II

3. What is the purpose of flooring and the materials used for construction? L1 12M

OR

4. a) Define Plastering. What are the objectives or requirements of Plastering? L1 6M
b) Write short notes on types of mortars for plastering. L1 6M

UNIT-III

5. a) State briefly the requirements of a good staircase. L1 6M
b) Classify types of stairs and Explain L2 6M
i) Quarter Turn Staircase
ii) Half-turn staircase

OR

6. a) Explain briefly about the Dog-legged staircase with a neat sketch. L2 6M
b) Plan a dog-legged stair for a building in which the vertical distance between the floors is 3.6m. The stair hall measures 2.5m x 5m. L3 6M

UNIT-IV

7. Summarize the Natural and Mechanical ventilation with neat sketches. L2 12M

OR

8. a) Describe briefly various types of Noise. L1 6M
b) What factors depend on the acceptable noise levels and list-out the acceptable noise levels in various buildings. L1 6M

UNIT-V

9. An office block with 20 stories above the ground floor having unified starting and stopping times is to have a floor area above the ground floor of 8000 m² and a floor pitch of 3 m. A group of four lifts, each car having a capacity of 20 persons and a car speed of 2.5 m/s, are specified. The clear door width is 1.1 m, and the doors are to open at a speed of 0.4 m/s. Estimate the interval for the group. L4 12M

OR

10. a) Write the special provisions for firefighting lifts and building regulations. L3 6M
b) An escalator inclined at 35 degrees, operating with one person per 400mm step at a speed of 0.65 m/s, calculate the number of persons moved per hour. L4 6M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year I Semester Regular & Supplementary Examinations December 2023

GENERATION OF ELECTRICAL POWER

(EEE)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

1. Explain the important components of a steam power station. L2 12M
- OR**
2. a) State the advantages and disadvantages of hydro power plant. L2 6M
b) What are the factors considered, while selecting the site for a Hydro power station? L1 6M

UNIT-II

3. Draw the schematic diagram of a nuclear reactor and discuss its operation. L3 12M
- OR**
4. a) Explain shielding and safety precautions in nuclear power plants. L2 6M
b) State the advantages and disadvantages of Nuclear power plant. L2 6M

UNIT-III

5. a) What is the role and potential of wind energy? Explain in detail. L5 6M
b) Describe the different types of wind mills. L5 6M
- OR**
6. a) Explain Pitch and Yaw control in wind turbine. L2 6M
b) What are the merits and demerits wind power systems. L1 6M

UNIT-IV

7. What is Geo thermal energy? How can geothermal energy be converted into electrical energy? L1 12M
- OR**
8. a) Explain the factors affecting bio-digestion of gas? L2 6M
b) Write some applications of biogas. L2 6M

UNIT-V

9. a) What is load factor? What is the importance of Load factor. L1 6M
b) A generating plant has a maximum capacity of 100 kW and costs Rs1,60,000. The annual fixed charges are 12% consisting of 5% interest, 5% depreciation and 2% taxes. Find the fixed charges per kWh if the load factor is (i) 100% and (ii) 50%. L2 6M
- OR**
10. a) What is Tariff? What are the Desirable Characteristics of a Tariff? L1 6M
Consumer has a maximum demand of 200 kW at 40% load factor. If the L2 6M
b) tariff is Rs. 100 per kW of maximum demand plus 10 paise per kWh, find the overall cost per kWh.

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year I Semester Regular & Supplementary Examinations December 2023
SIGNALS, SYSTEMS AND RANDOM PROCESSES
(ECE)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

1. a) Differentiate between energy and power signals, deterministic and non-deterministic signals L2 6M
b) Find whether the following signals are periodic or not and if periodic, find the fundamental period A) $\cos(8\pi t)$ B) $e^{j4\pi t}$ L3 6M

OR

2. With the help of examples, explain the classification of systems. L3 12M

UNIT-II

3. a) What is Fourier Series? List the properties of Fourier Series. L1 4M
b) Derive the coefficients of Trigonometric Fourier Series. L3 8M

OR

4. Find the inverse Fourier transform of the following signals. L3 12M
A) $X(\omega) = (4(j\omega) + 6) / ((j\omega)^2 + 6(j\omega) + 8)$
B) $X(\omega) = (1 + 3(j\omega)) / (j\omega + 3)^2$

UNIT-III

5. a) With the help of neat sketches, explain the filter characteristics of linear systems. L2 6M
b) Derive the Transfer function of LTI System. L3 6M

OR

6. a) What is Cross correlation? List the properties of Cross correlation L2 6M
b) State and prove following properties of Auto correlation function. L2 6M
A) $R_{xx}(-\tau) = R_{xx}(\tau)$ B) $R_{xx}(0) = E[X^2(t)]$

UNIT-IV

7. a) Derive the relation between Laplace Transform and Fourier Transform of a signal. L3 4M
b) Determine the Laplace transform of the following signals using properties. A) $x(t) = t e^{-t} u(t)$ B) $x(t) = t e^{-2t} \sin 2t u(t)$ L2 8M

OR

8. a) Explain the Probability distribution and density function. List their properties L2 6M
b) Explain the concept of conditional probability L2 6M

UNIT-V

9. a) Describe the first order, second order, wide-sense and strict sense stationary process. L2 6M
b) Show that the autocorrelation function of a stationary random process is an even function of τ . L3 6M

OR

10. a) Explain the concept of cross power density spectrum. List the properties of cross power spectral density. L2 6M
b) If the Power Spectral Density of $x(t)$ is $S_{xx}(\omega)$, then find the Power Spectral Density of $dx(t)/dt$. L3 6M

Time: 3 Hours

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

UNIT-I

1. Discuss the practical applications of inversions of the double slider crank chain? Explain their with neat sketches. L3 12M
2. a) Define the following terms L3 6M
(i) Lower and Higher pairs (ii) Degree of freedom
b) What is pantograph? Show that it generates a path similar to the path traced by a point on the mechanism. L2 6M

OR

UNIT-II

3. With neat sketch, explain the Ackerman steering gear of an automobile. L3 12M
4. a) With neat sketch, explain the working of any two of approximate straight-line mechanisms. L2 6M
b) List out various applications of single and double Hooke's joint. L2 6M

UNIT-III

5. The dimensions of the mechanism, as shown in Fig. 7.30, are as follows: AB = 0.45 m; BD = 1.5 m; EC = CE = 0.9 m. The crank AB turns uniformly at 180 r.p.m. in the clockwise direction and the blocks at D and E are working in frictionless guides. Draw the velocity diagram for the mechanism and find the velocities of the sliders D and E in their guides. Also determine the turning moment: at A if a force of 500 N acts on D in the direction of arrow X and a force of 750 N acts on E in the direction of arrow Y. L5 12M

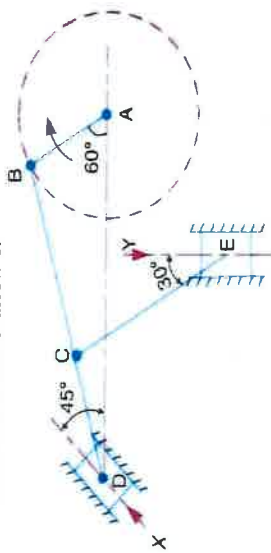


Fig. 7.30

OR

6. a) Explain how the velocities of a slider and the connecting rod are obtained in a slider crank mechanism. L5 6M
b) What do you understand by the instantaneous centre of rotation in kinematic of machines? Answer briefly. L2 6M

UNIT-IV

7. A cam is to give the following motion to a knife-edged follower : L1 12M
1. Outstroke during 60° of cam rotation;
2. Dwell for the next 30° of cam rotation;
3. Return stroke during next 60° of cam rotation, and
4. Dwell for the remaining 210° of cam rotation.
The stroke of the follower is 40 mm and the minimum radius of the cam is 50 mm. The follower moves with uniform velocity during both the outstroke and return strokes. Draw the profile of the cam when

- (a) The axis of the follower passes through the axis of the cam shaft, and
- (b) The axis of the follower is offset by 20 mm from the axis of the cam shaft.

OR

8. a) Explain with sketches the different types of followers. L2 6M
b) Construct the displacement, velocity and acceleration diagrams for a follower when it moves with simple harmonic motion. L3 6M

UNIT-V

9. In an epicyclic gear train, an arm carries two gears A and B having 36 and 45 teeth respectively. If the arm rotates at 150 r.p.m. in the anticlockwise direction about the center of the gear A which is fixed, determine the speed of gear B. If the gear A instead of being fixed, makes 300 r.p.m. in the clockwise direction, what will be the speed of gear B? L3 12M

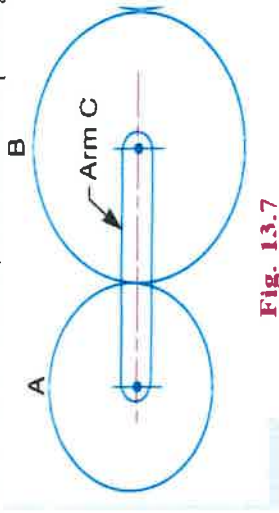


Fig. 13.7

OR

10. a) Explain the terms relates to spur gear : (i) Module, (ii) Pressure angle, and (iii) Addendum L3 6M
b) Explain the classification of gears with neat sketches L3 6M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year I Semester Regular & Supplementary Examinations December 2023

OPERATING SYSTEMS

(CSE, CSM, CAD & CIA)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

- 1 Define Operating System? Explain the various types of Operating Systems. L2 12M

OR

- 2 a) Examine about the dual mode operation in OS with a neat block diagram L4 6M
b) List different types of system calls with suitable example. L2 6M

UNIT-II

- 3 a) Explain about Scheduling Criteria. L2 6M
b) Evaluate FCFS CPU Scheduling algorithm for given Problem: L5 6M

Process	P1	P2	P3	P4
Process Time	24	3	5	6

OR

- 4 a) What is synchronization? List different synchronization mechanisms. L1 6M
b) Write about Threads. L3 6M

UNIT-III

- 5 Define process synchronization and explain Peterson solution algorithms. L2 12M

OR

- 6 Construct Dead lock detection (Banker's Algorithm) with Example. L3 12M

UNIT-IV

- 7 a) What is memory management? List various techniques for managing memory. L2 6M
b) Explain the following: L2 6M
i) Paging
ii) Segmentation

OR

- 8 Explain the following disk scheduling algorithm with proper diagram L2 12M
i) FCFS
ii) SSTF
iii) SCAN
iv) LOOK
v) C-SCAN.

UNIT-V

- 9 Determine file allocation methods in detail. L5 12M

OR

- 10 a) Illustrate protection mechanisms. L2 6M
b) Write a short note on Threats. L3 6M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)
B.Tech II Year I Semester Regular & Supplementary Examinations December 2023
FLUID MECHANICS
(CE)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

1. Define the physical properties of fluids and Write its units? L2 12M
- OR**
2. a) Explain the phenomenon of capillarity. Obtain an expression for capillary rise of a liquid. L2 6M
b) Explain briefly the working principle of piezometer and U-Tube manometer with a neat sketch. L2 6M

UNIT-II

3. Derive Continuity Equation in 3-Dimensional flow? L3 12M
- OR**
4. The velocity vector in a fluid flow is given as $V = 4x^3i - 10xy^2j + 2z^2k$. Find the velocity and acceleration of fluid particles at (2, 1, 3) at time $t = 1$. L3 12M

UNIT-III

5. Derive the Bernoulli's energy equation with assumptions. L3 12M
- OR**
6. a) Briefly explain about Forced vortex flow and free vortex flow. L2 6M
A rectangular notch 2m wide as a constant head of 500mm. Find the L3 6M
b) discharge over the notch ,if co-efficient of discharge for the notch is 0.62 and $g = 9.81$.?

UNIT-IV

7. Three pipes of lengths 800m, 500m & 400m & of dia 500mm, 400mm & 300mm respectively are connected in series. These pipes are replaced by a single pipe of length 1700m. Find the dia of the single pipe? L3 12M

OR

8. Briefly explain about Hardy cross method? L2 12M

UNIT-V

9. Derive the laminar flow through circular pipes. L3 12M
- OR**
10. Water is flowing through a rough pipe of 500mm diameter and length 4000m at the rate of 0.5 m³ /s. find the power required to maintain this flow. Take average height of roughness as $k = 0.4$ mm L3 12M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year I Semester Regular & Supplementary Examinations December 2023

ELECTROMAGNETIC FIELDS

(EEE)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

1. If $B = y a_x + (x+z) a_y$ and a point Q is located at (-2,6,3) express B in spherical coordinates. L3 12M

OR

2. a) Give the Cartesian coordinates of the Point whose cylindrical are $r=4$, $\phi=45^\circ$ & $Z=2$. L3 6M
b) The Three fields are given by $A=2a_x -a_z$, $B= 2 a_x-a_y+2a_z$, $C= 2a_x-3a_y +a_z$. L2 6M
Find the scalar and vector triple product.

UNIT-II

3. Given that $A= 30 e^{-r} a_r -2 z a_z$ in the cylindrical co-ordinates. Evaluate both sides of the divergence theorem for the volume enclosed by $r=2$, $z=0$ and $Z=5$. L3 12M

OR

4. a) State and prove Gauss's law and write limitations of Gauss's law? L2 6M
b) An electric potential is given by $V=(60 \sin\theta /r^2) v$. Find V and E at $P(3,60^\circ,25^\circ)$. L3 6M

UNIT-III

5. a) Derive the expression for parallel plate capacitor and capacitance of a coaxial cable? L4 6M
b) Determine whether or not the following potential fields satisfy the Laplace's equation $V=x^2-y^2+z^2$ & ii) $V= r \cos\phi +z$. L3 6M

OR

6. Explain the phenomenon of polarization when a dielectric slab is subjected to an electric field? L4 12M

UNIT-IV

7. Derive the expression for self-inductance of solenoid, toroid and coaxial cable. L4 12M

OR

8. a) A Point charge of $Q=-1.2$ C has a velocity $V=(5 a_x +2 a_y -3a_z)m/s$. Find the magnitude of the force exerted on the charge if i) $E= -18 a_x +5 a_y -10 a_z$ V/m and ii) $B=-4 a_x +4 a_y +3 a_z$ T. L4 6M
b) A magnetic field $B= 3.5 \cdot 10^{-2} a_z$ exerts a force on a 0.3 m long conductor along x axis. IF a current of 5 A flows in $-a_x$ direction, determine what force must be applied to hold conductor in position. L3 3M
c) Determine the force per meter length between two long parallel wires A and B separated by distance 5 cm in air and carrying currents of 40 A in the same direction. L3 3M

UNIT-V

9. Derive the equation of Continuity for time varying fields? L4 12M

OR

10. a) Define skin depth? L1 2M
b) Define displacement current? L1 2M
c) State Faraday's law of electromagnetic induction? L1 2M
d) Write Maxwell equations in time varying fields? L1 4M
e) Define pointing vector? L1 2M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year I Semester Regular & Supplementary Examinations December 2023

ANALOG COMMUNICATIONS

(ECE)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

1. a) Derive the expression for total transmitted power of AM wave and comment on the power wastage in AM. L3 6M
- b) An AM transmitter radiates 9kW of power when the carrier is unmodulated and 10.125kW of power when the carrier is sinusoidal modulated. Find the modulation index & Percentage modulation. Now if another sine wave corresponding to 40% modulation is transmitted simultaneously. Calculate total radiated power. L3 6M

OR

2. a) Discuss about square-law demodulation of an AM wave. L2 8M
- b) List the features and applications of AM. L1 4M

UNIT-II

3. a) Write the expression for total transmitted power of DSB-SC wave and indicate the names of various terms. L3 4M
- b) Prove that the Balanced Modulator produces an output consisting of sidebands only with carrier removed. L3 8M

OR

4. a) Calculate the percentage power saving for SSB signal if AM wave is modulated for a depth of (i) 100% (ii) 50% L2 6M
- b) List the applications of VSB and its features. L2 6M

UNIT-III

5. a) What are the differences between NBFM & WBFM? L1 6M
- b) Explain the generation of FM using direct method. L2 6M

OR

6. a) Demonstrate the working principle of PLL. L2 6M
- b) Draw the block diagram of FM transmitter and explain its working. L3 6M

UNIT-IV

7. a) What are the characteristics of radio receivers? L1 4M
- b) Write a short note on sensitivity, selectivity, fidelity & image frequency. L2 8M

OR

8. a) Describe about the thermal noise and white Gaussian noise. L2 6M
- b) Derive the expression for output SNR of DSB-SC system. L3 6M

UNIT-V

9. a) Define Analog pulse modulation and its classification. L2 6M
- b) Derive the transmission bandwidth of PAM signal. L3 6M

OR

10. a) An analog signal band limited to 10KHZ is quantized eight levels of a PCM system with probabilities 1/2, 1/4, 1/5, 1/5, 1/10, 1/10, 1/20, 1/20. Find Entropy & Rate of information. L3 6M
- b) Illustrate the concept of Shannon's encoding algorithm. L2 6M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year I Semester Regular & Supplementary Examinations December 2023

THERMAL ENGINEERING

(MECH)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

1. A two stage air compressor compresses air from 1 bar and 20°C to 42 bar. If the law of compression is $PV^{1.3} = \text{constant}$ and the inter cooling is perfect. Find per kg of air (i) The work done in compression. L3 12M

OR

2. a) Derive the relation for work done on single stage reciprocating compressor without Clearance. L3 6M
b) With the help of neat sketch explain the working principle of multi stage reciprocating air compressor with effect of intercooler. L2 6M

UNIT-II

3. Air enters the compressor of a gas turbine plant operating on Brayton cycle at 1 bar, 27°C. The pressure ratio in the cycle is 6. Calculate the maximum temperature in the cycle and the cycle efficiency. Assume the turbine work as 2.5 times the compressor work. Take $\gamma=1.4$ L4 12M

OR

4. Briefly explain the working of Brayton Cycle with the help of p-v diagram and T-s diagram. L2 12M

UNIT-III

5. a) Explain various types of nozzles with neat sketches. L2 6M
b) What are the effects of friction on flow through nozzle? L2 6M

OR

6. Dry saturated steam enters a frictionless adiabatic nozzle with negligible velocity at a temperature of 3000C. It is expanded to a pressure of 5000KPa. The mass flow rate is 1Kg/s. Calculate the exit velocity of steam. L3 12M

UNIT-IV

7. The following data refers to a single stage impulse turbine; Steam velocity = 800m/s; Blade speed=300m/s; Nozzle angle=200; Blade outlet angle=250. Neglecting effect of friction, calculate the power developed by the turbine for the steam flow rate of 25Kg/s. Also calculate the axial thrust on the bearings. L4 12M

OR

8. a) Draw and explain the velocity triangle of reaction turbine. L2 6M
b) Derive an expression for work done in reaction turbine. L3 6M

UNIT-V

9. The following readings were taken during the test of a single cylinder four stroke oil engine: Cylinder diameter=250mm, Stroke Length=400mm, M.E.P=7bar, Engine Speed=250rpm, Net Load on the brake=1080N, Effective diameter of the brake=1.5 metres, Fuel used per hour=10Kg, calorific value of fuel=44300Kj/Kg. Calculate (i) Indicated Power (ii) Brake Power (iii) Mechanical Efficiency (iv) Indicated thermal efficiency L3 12M

OR

10. a) Explain a brief note on heat balance sheet L2 6M
b) Compare 2-stroke engine with 4-stroke engine L2 6M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year I Semester Regular & Supplementary Examinations December 2023

HUMAN VALUES AND PROFESSIONAL ETHICS

(CSE, CSM, CAD, CIA)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

1. a) Define Morality and mention the features of moral values. L1 6M
b) Write a short note on Ethics. How it is related to other relations? L1 6M
- OR**
2. Explain the importance of following human values: L2 12M
(i) Caring (ii) Sharing (iii) Co-operation (iv) Commitment

UNIT-II

3. a) Write short notes on 'senses or dimensions of engineering ethics. L1 6M
b) What are the various varieties of moral issues? L1 6M
- OR**
4. a) Write a note on consensus and controversy. L1 6M
b) Justify relationship between autonomy and authority with an example. L3 6M

UNIT-III

5. a) What are the general features of morally responsible engineers? L1 6M
b) What are the requirements for engineers to act as responsible engineers within the context of engineering as social experimentation? L1 6M
- OR**
6. a) What are the problems associated with the laws in engineering? L1 6M
b) Enumerate the correct role of law in engineering? L3 6M

UNIT-IV

7. a) Briefly write about voluntary risk and controlled risk with examples? L1 6M
b) Explain in detail about the effect of why both low-risk and high-risk products are costly? L2 6M
- OR**
8. a) Define the terms confidentiality and confidential information? What are the external responsibilities of engineers? L1 6M
b) Explain the different types of conflicts of interest with suitable examples? L2 6M

UNIT-V

9. a) Write about Sentient-Centered ethics and IEEE code of Ethics? L1 6M
b) Write about Human-Centered environmental ethics? L1 6M
- OR**
10. a) Why do most of the engineers move into managerial roles? L1 6M
b) What are the two main responsibilities of engineer-managers? L1 6M