

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B. Tech II Year II Semester Regular Examinations July 2021

DISCRETE MATHEMATICS

(CSE)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

- 1 a) Explain the connectives and their truth tables L2 6M
b) Prove that $(\exists x)(P(x) \wedge Q(x)) \Rightarrow (\exists x)P(x) \wedge (\exists x)Q(x)$ L3 6M

OR

- 2 a) Show that $((P \rightarrow Q) \rightarrow Q) \Rightarrow P \vee Q$ without constructing truth table. L2 6M
b) Explain the Universal Quantifier and Existential quantifier with examples L3 6M

UNIT-II

- 3 a) Define an equivalence relation. If R is a relation on the set of integers Z defined by $R = \{(x, y) : x \in Z, y \in Z, (x - y) \text{ is divisible by } 6\}$, then prove that R is an equivalence relation. L3 6M
b) If $f: R \rightarrow R$ such that $f(x, y) = 2x + 1$ and $g: R \rightarrow R$ such that $g(x) = \frac{x}{3}$ then verify that $(gof)^{-1} = f^{-1}og^{-1}$. L5 6M

OR

- 4 a) Define function and write the types of functions L3 6M
b) Show that the set of all positive rational numbers forms an abelian group under the composition defined by $a * b = \frac{ab}{2}, \forall a, b \in Q^+$ L5 6M

UNIT-III

- 5 a) In how many ways can the letters of the word COMPUTER be arranged? How many of them begin with C and end with R? How many of them do not begin with C but end with R? L4 6M
b) What is the co-efficient of (i) $x^3 y^7$ in $(x + y)^{10}$ (ii) $x^2 y^4$ in $(x - 2y)^6$ L5 6M

OR

- 6 a) Out of 9 girls and 15 boys, how many different committees can be formed each consisting of 6 boys and 4 girls? L4 6M
b) Applying pigeon hole principle show that if any 14 integers are selected from the set $S = \{1, 2, 3, \dots, 25\}$ there are at least two whose sum is 26. Also write a statement that generalizes this result L5 6M

UNIT-IV

- 7 a) Solve $a_n - 7a_{n-1} + 10a_{n-2} = 4^n$ L4 6M
b) Solve the following $y_{n+2} - y_{n+1} - 2y_n = n^2$ L1 6M

OR

- 8 a) Solve $a_n = a_{n-1} + 2a_{n-2}, n > 2$ with initial conditions $a_0 = 0, a_1 = 1$ L4 6M
b) Solve the recurrence relation using generating functions $a_n - 9a_{n-1} + 20a_{n-2} = 0$ for $n \geq 2$ and $a_0 = -3, a_1 = -10$ L1 6M

UNIT-V

- 9 a) Define isomorphism. Explain Isomorphism of graphs with a suitable example L5 6M

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b) In any graph, show that the number of vertices of odd degree is even. L6 6M

OR

10 a) Give an example of a graph which is Hamiltonian but not Eulerian and vice versa. L5 6M

b) Define Spanning tree and explain the algorithm for Depth First Search (DFS) traversal of a graph with suitable example. L6 6M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year II Semester Regular Examinations July/ Aug 2021

ELECTRONIC CIRCUIT ANALYSIS

(ECE)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

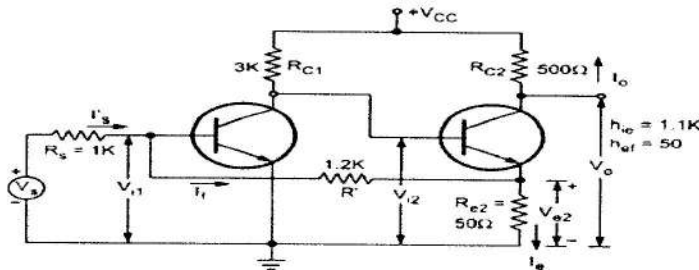
- 1 a) Derive the expression for the hybrid π parameters g_m , g_b^{1e} , g_b^{1c} , r_{bb}^{1} and g_{ce} . L4 6M
b) Explain various coupling methods used for multistage amplifiers with their frequency response. L2 6M

OR

- 2 a) Derive the expressions for voltage gain, current gain, input and output resistances of a Cascade amplifier with suitable diagram. L4 8M
b) If the overall lower and higher cutoff frequencies of a two identical amplifier cascade are 600 Hz and 18 kHz respectively, compute the values of individual cutoff frequencies of both the amplifier stages. L3 4M

UNIT-II

- 3 a) Explain the concept of feedback in amplifier with suitable diagram. L2 6M
b) Compute R_m and R_{mf} using feedback principle for the circuit shown in figure. Assume $h_{fe} = 50$ and $h_{ie} = 1.1 \text{ K}\Omega$ L3 6M



OR

- 4 a) Compare various types of feedback amplifiers. L4 6M
b) A voltage series negative feedback amplifier has a voltage gain without feedback of $A = 500$, input resistance $R_i = 3 \text{ k}\Omega$, output resistance $R_o = 20 \text{ k}\Omega$ and feedback ratio $\beta = 0.01$. Calculate the voltage gain A_f , input resistance R_{if} , and output resistance R_{of} of the amplifier. L3 6M

UNIT-III

- 5 a) Design a RC phase shift oscillator to generate 5 KHz sine wave with 20V peak to peak amplitude and draw the designed circuit. Assume $h_{fe} = 150$. L6 6M
b) Derive the condition for sustained oscillations for Hartley oscillator with suitable equations. L3 6M

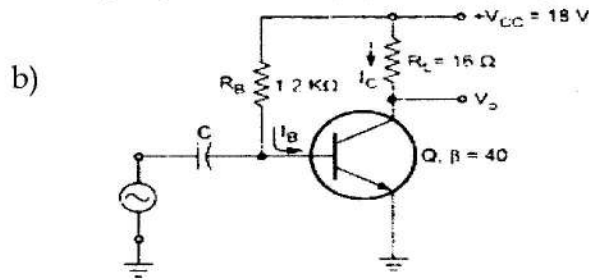
OR

- 6 Design a Colpitts oscillator with $C_1 = 100 \text{ pF}$, and $C_2 = 7500 \text{ pF}$. Determine L3 6M
a) the range of inductance values, if the frequency of oscillation is to vary between 950 KHz to 2050 KHz.
b) Explain in detail the concept of stability in Oscillators. L2 6M

UNIT-IV

- 7 a) Explain the operation of a single tuned capacitive coupled amplifier with necessary circuit diagrams and derive the expression for its centre frequency. L4 6M

A series fed Class A amplifier shown in the Fig, operates from dc source and applied sinusoidal input signal generates peak base current of 9mA. Determine (i) Quiescent current I_{CQ} , (ii) Quiescent voltage V_{CEQ} , (iii) DC input power P_{DC} , (iv) AC output power P_{AC} and (v) Efficiency. L3 6M

**OR**

- 8 a) Explain briefly Double Tuned Amplifier with a suitable diagram L4 6M
- b) A Class B push pull amplifier drives a load of 16Ω , connected to the secondary of ideal transformer. The V_{cc} is 25V, if number of turns on primary is 200 and secondary is 50. Determine maximum power output, DC power input and efficiency. L3 6M

UNIT-V

- 9 a) Derive the expression for time period, T in Astable multivibrator L3 6M
Calculate the component values of a Monostable multivibrator L4 6M
- b) developing an output pulse of $140\mu s$ duration. Assume $h_{FEmin} = 20$, $I_{c(sat)} = 6\text{ mA}$, $V_{CC} = 6\text{ V}$, $V_{BB} = -1.5\text{ V}$.

OR

- 10 a) Explain briefly the operation of Bistable multivibrator with neat circuit diagram. L2 6M
- b) Design a collector coupled Bistable multivibrator to operate from $V_{cc} = +5\text{ V}$, $V_{BB} = -5\text{ V}$ supply with $I_{c(sat)} = 2\text{ mA}$ and $h_{fe} = 70$. L6 6M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B. Tech II Year II Semester Regular Examinations July 2021
NUMERICAL METHODS, PROBABILITY & STATISTICS
(CE & ME)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

- 1 a) Estimate a real root of the equation $xe^x - \cos x = 0$ using Newton's iterative method L2 6M
- b) Apply Newton's forward interpolation formula evaluate the value of $f(x)$ at $x = 1.4$ from the following data L3 6M

x	1.1	1.3	1.5	1.7	1.9
$f(x)$	0.21	0.69	1.25	1.89	2.61

OR

- 2 a) Predict a real root of the equation $xe^x = 2$ by using the Regula- falsi method. L2 6M
- b) Use Newton's backward interpolation formula, find $f(32)$ from the data $f(25) = 0.2707, f(30) = 0.3027, f(35) = 0.3386, f(40) = 0.3794$. L3 6M

UNIT-II

- 3 a) Solve $y' = x + y$ with $y(0) = 1$ for $y(0.1)$ and $y(0.2)$ by applying Taylor's series method L3 6M
- b) Evaluate $y(0.1)$ by solving $\frac{dy}{dx} = 1 + xy, y(0) = 0$ with Runge-Kutta method of 4th order L5 6M

OR

- 4 a) Solve $y' = y^2 + x$ with $y(0) = 1$ to find $y(0.1)$ and $y(0.2)$ by using Euler's method L3 6M
- b) Evaluate $\int_0^1 \frac{1}{1+x} dx$ by Simpson's $\left(\frac{3}{8}\right)$ th rule by considering 6 sub intervals L5 6M

UNIT-III

- 5 a) Calculate the median of the following data L4 6M

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

- b) The probability of the students A, B, C & D to solve the problem are $\frac{1}{3}, \frac{2}{5}, \frac{1}{5}$ & $\frac{1}{4}$ respectively. If all of them try to solve the problem, what is the probability that the problem is solved. L5 6M

OR

- 6 a) Calculate the mode of the following data L4 6M

x	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40
f	5	7	10	18	20	12	8	2

- b) In a certain college 25% of boys and 10% of girls are studying mathematics. The girls constitute 60% of the students in the college. 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 boy?

UNIT-IV

- 7 a) Determine (i). k , (ii). mean and (iii). variance of discrete random variable X L4 6M
with the following probability function.

X	0	1	2	3	4	5	6	7
$P(X)$	0	k	$2k$	$2k$	$3k$	k^2	$2k^2$	$7k^2 + k$

- b) Find $P(1 < x < 3)$ & $P(x > 0.5)$ from the probability density function L1 6M
given as $f(x) = \begin{cases} 2xe^{-2x}, & x > 0 \\ 0, & x \geq 0 \end{cases}$

OR

- 8 a) Determine (i). k , (ii). mean and (iii). variance of the continuous probability L4 6M
function $f(x) = \begin{cases} kx^2e^{-x}, & x \geq 0 \\ 0, & \text{elsewhere} \end{cases}$

- b) Find the mean and variance of the uniform probability distribution given L1 6M
by $p(X) = \frac{1}{n}$, for $X = 1, 2, \dots, n$

UNIT-V

- 9 a) Derive the mean and variance of binomial distribution. L5 6M
b) Calculate the coefficient of correlation to the data given below L6 6M

x	10	15	12	17	13	16	24	14	22	20
y	30	42	45	46	33	34	40	35	39	38

OR

- 10 a) In a sample of 1000 students, the mean and S.D of a test marks is 14 and L5 6M
2.5 respectively. Assuming the distribution to be normal, how many
students will be there with marks (a). Between 12 & 15, (b). Above 18, (c).
Below 18
- b) Construct two regression lines equations to the data given below L6 6M

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
(AUTONOMOUS)
B.Tech II Year II Semester Regular Examinations July / Aug 2021
ELECTROMAGNETIC THEORY AND TRANSMISSION LINES
(ECE)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

- 1 a) Point Charges $Q_1=4\mu\text{C}$, $Q_2=-5\mu\text{C}$ and $Q_3=2\mu\text{C}$ are located at (0,0,1), (-6,8,0) and (0,4,-3) respectively find D at the origin. 6M
- b) Classify Maxwell equations for electrostatic fields in both differential and integral form. 6M

OR

- 2 a) Define the Electric Flux Density. Determine the Electric flux density at a point P due to infinite line of uniform Charge density ρ_L C/m. 6M
- b) A charge of 5×10^{-8} C is distributed uniformly on the surface of a sphere of radius 1 cm. Calculate the electric flux density. 6M

UNIT-II

- 3 a) Explain Biot-Savart's Law. 6M
- b) Determine the Magnetic Field Intensity due to a infinite sheet current. 6M

OR

- 4 a) Determine the Magnetic Flux Density due to Infinite Sheet of Current. 6M
- b) Explain about magnetic scalar and vector potential for Magneto-statics. 6M

UNIT-III

- 5 a) Explain Faraday's laws in Electromagnetic induction. 6M
- b) Determine the Transformer EMF for the time varying fields. 6M

OR

- 6 a) Explain the motional EMF and derive the expression for the maxwell equation. 6M
- b) Discuss Maxwell's equation in both differential and integral in final form 6M

UNIT-IV

- 7 a) Determine the expression for intrinsic impedance and propagation constant in a good conductor 6M
- b) Evaluate the wave characteristics of a uniform plane wave in free space. 6M

OR

- 8 a) Evaluate the wave equation in lossy dielectric medium for sinusoidal time variations. 6M
- b) In lossless medium $\epsilon_r = 40\pi$, $\mu_r = 1$, $H=2 \cos(\omega t - z) \hat{a}_x + 5 \sin(\omega t - z) \hat{a}_y$. Find ϵ_r , ω , E for the medium. 6M

UNIT-V

- 9 a) Discuss about Transmission line Parameters. 6M
- b) Evaluate the equation for Characteristic Impedance of a Transmission line. 6M

OR

- 10 a) Relate SWR and reflection coefficient. 6M
- b) Explain the applications of transmission lines. 6M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year II Semester Regular Examinations July / Aug 2021

OPERATING SYSTEMS

(CSE)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

- | | | | |
|----------|---|----|----|
| 1 | a) Discuss Operating System Structures. | L6 | 6M |
| | b) Explain System Programs. | L5 | 6M |

OR

- | | | | |
|----------|---|----|-----|
| 2 | List the different functions of an operating system and discuss the various services provided by an operating system. | L4 | 12M |
|----------|---|----|-----|

UNIT-II

- | | | | |
|----------|--|----|----|
| 3 | a) Define Process? Describe process State diagram. | L1 | 6M |
| | b) Explain about process schedulers. | L2 | 6M |

OR

- | | | | |
|----------|--|----|------|
| 4 | Examine in detail about Inter Process Communication. | L4 | 12 M |
|----------|--|----|------|

UNIT-III

- | | | | |
|----------|---|----|-----|
| 5 | What is Semaphore? Describe producer consumer problem using semaphore | L2 | 12M |
|----------|---|----|-----|

OR

- | | | | |
|----------|--|----|----|
| 6 | a) List various methods for handling deadlock. | L4 | 6M |
| | b) Write about deadlock and starvation. | L3 | 6M |

UNIT-IV

- | | | | |
|----------|---|----|-----|
| 7 | Discuss about any two page replacement algorithms with examples | L6 | 12M |
|----------|---|----|-----|

OR

- | | | | |
|----------|---|----|----|
| 8 | a) What is virtual memory? Discuss the benefits of virtual memory techniques. | L1 | 6M |
| | b) Write a short note on Disk management. | L3 | 6M |

UNIT-V

- | | | | |
|----------|--|----|----|
| 9 | a) Illustrate the concept of file with Examples. | L2 | 6M |
| | b) Explain about access method with Examples. | L2 | 6M |

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 II Semester Regular Examinations July/ Aug 2021

JAVA PROGRAMMING

(Common to Civil & ECE)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

1 What is an Operator? Explain type of operators in Java with example programs. L2 12M

OR

- 2 a) Write a Java program to use Bit-wise operators. L3 6M
 b) What is Byte Code? Interpret the different states of Java Program execution? L5 6M

UNIT-II

3 Recall Inheritance? Illustrate the types of inheritances. L2 6M

OR

- 4 a) Discuss in detail about Abstract Classes in Java L6 6M
 b) What is an interface? List the rules to create an interface in java with example L1 6M

UNIT-III

5 Write a java program to create own exception for Negative Value Exception if the user enter negative value. L6 6M

OR

6 Inspect about multiple clauses with an example of arithmetic exception. L4 12M

UNIT-IV

- 7 a) Tell what is synchronization? Give its types and explain. L1 6M
 b) Write a java program to implement inter thread communication. L6 6M

OR

- 8 a) Write the difference between String and StringBuffer classes. L4 6M
 b) Create a java program to sort the given names into ascending order. L6 6M

UNIT-V

- 9 a) Difference between AWT and Swings? L4 6M
 b) Create a java swing program implement Border Layout. L6 6M

OR

10 Write a java swing program to find the factorial of the given number L3 12M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year II Semester Regular Examinations July/ Aug 2021

FUNDAMENTALS OF URBAN PLANNING

(EEE, MECH, ECE, CSE)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

- 1 a) Explain in detail on how town are originated L2 6M
b) Elucidate the necessity for town planning in detail. L1 6M

OR

- 2 a) Draw a neat sketch of Nandyavarta type of town planning by L1 6M
mentioning the location of various places on it
b) Give a brief note on a) Basic village b) Rural town and c) Service town L1 6M

UNIT-II

- 3 a) Describe Territorial survey and Vital Survey L2 8M
b) Define and explain zoning. L1 4M

OR

- 4 a) Write a brief note on Urban Planning and International Planning? L1 6M
b) Explain about functional survey? L2 6M

UNIT-III

- 5 a) What are the various housing problems in India? Explain them in L2 6M
detail.
b) Explain in detail about various effects of slum formation. L2 6M

OR

- 6 a) Write a short note on Slum clearance and re-housing. L1 6M
b) Illustrate various process involved in prevention of slum formation. L1 6M

UNIT-IV

- 7 a) Discuss the factors to be examined at the time of site selection for L1 6M
public buildings.
b) Mention the categories in which the public buildings are generally L1 6M
groups.

OR

- 8 a) Explain various responsibility of a building owner L2 6M
b) What are the applicability of Bye-law to gasoline cum service station L1 6M

UNIT-V

- 9 a) What are the various classification of urban roads. L1 6M
b) What are the chief uses of the traffic surveys? L2 6M
- OR
- 10 a) List the causes for road accidents. L1 6M
b) State the measures to be taken for the safety of pedestrians on roads. L2 6M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)
B.Tech II Year II Semester Regular Examinations July/ Aug 2021

ELEMENTS OF EMBEDDED SYSTEMS
(CSE)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

- 1 a) Explain in detail about characteristics and applications of embedded systems. [L2] 6M
b) List out and explain different tools for embedded system design? [L4] 6M

OR

- 2 a) Contrast of embedded system architecture. [L2] 6M
b) Explain the major application areas of embedded systems. [L5] 6M

UNIT-II

- 3 a) Compare difference between general purpose and domain specific processors? [L4] 6M
b) Define digital signal processing (DSP)? Explain the role of DSP in embedded system design? [L1] 6M

OR

- 4 a) Define sensor? Explain its role in embedded system design? [L1] 6M
b) Explain in brief about the architecture of microprocessor based system. [L5] 6M

UNIT-III

- 5 a) Explain about I2C communication interface. What are the advantage and disadvantages of it? [L2] 6M
b) Define communication protocol? What are the types of it? [L1] 6M

OR

- 6 a) Discuss in detail about RS232 communication interface. [L2] 6M
b) Summarize How do you communicate over RS485? Explain in detail. [L2] 6M

UNIT-IV

- 7 a) Explain in brief about what is Arduino platform? [L5] 6M
b) What are the advantages of Arduino in comparison with the existing microcontrollers? [L2] 6M

OR

- 8 a) Draw and explain the internal architecture of ATmega328. [L2] 6M
b) List out key features of Arduino boards? Explain in detail. [L4] 6M

UNIT-V

- 9 a) How the word IoT can be defined? What is the importance of it? [L1] 6M
b) Discuss the characteristics and applications of IoT. [L6] 6M

OR

- 10 a) Outline the various challenges in IoT? [L2] 6M
b) Explain about the top 3 application areas of IoT. [L1] 6M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year II Semester Regular Examinations July 2021

SWITCHING THEORY & LOGIC DESIGN

(EEE)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

1 Explain about Logic gates. with symbols and truth tables. L1 12M

OR

2 Convert the following to Decimal and then to Octal L2 12M

(a) 1234_{16} (b) $12EF_{16}$ (c) 10110011_2 (d) 10001111_2 (e) 352_{10}

UNIT-II

3 Simplify the following Boolean expressions using K-map and Implement the same using Logic gates. L3 12M

$$F(W,X,Y,Z) = XZ + W'XY' + WXY + W'YZ + WY'Z$$

OR

4 a) Simplify the following expression using the K-map for the 3-variable. L3 6M

$$Y = AB'C + A'BC + A'B'C + A'B'C' + AB'C'$$

b) Simplify the following Boolean expressions using K-map. L3 6M

$$F(A, B, C, D) = \sum m(1,3,7,11,15) + \sum d(0,2,5)$$

UNIT-III

5 What is parallel adder? Design and explain 4 bit parallel adder by using full adder. L3 12M

OR

6 What is Encoder? Design the circuit for Octal to Binary encoder with truth table. L1 12M

UNIT-IV

7 a) Draw the logic diagram for D Flip Flop by using SR Flip Flop Explain the operation with truth table. L1 6M

b) Write the differences between combinational and sequential circuits. L2 6M

OR

8 Design MOD-10 Asynchronous counter by using T-Flip flop. L3 12M

UNIT-V

9 Given the 8-bit data word 01011011, generate the 12-bit composite word for the hamming code that corrects and detects single errors. L1 12M

OR

10 a) What is FSM? Give the applications of FSM. L3 6M

b) Explain about Memory decoding. L3 6M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year II Semester Regular Examinations July/Aug 2021

Python Programming

(MECH)

Time: 3 hours

Max.Marks: 60

(Answer all five units, 5 x 10 =50 Marks)

UNIT - I

1. Describe the list and its methods with example L2 12M

OR

2. (a) List features and applications of Python L2 6M

(b) What is Indentation? Explain with example L1 6M

UNIT - II

3. Classify various types of operators in Python and write any 4 types of operators L4 12M

OR

4. a Discuss the Membership and Identity operators with example L2 6M

b Write a Python program to find maximum among three numbers L3 6M

UNIT - III

5. Summarize the ways of passing function arguments with example L5 12M

OR

6. (a) Compare method overloading and overriding L2 6M

(b) Narrate scope of a variable in a function L3 6M

UNIT - IV

7. a What are packages? Give an example of package creation in Python. L3 12M

b What is an Raising Exception with an example? L1

OR

8. Describe about Handling Exceptions in detail with examples. L2 12M

UNIT - V

9. (a) Explain about Data Compression L3 6M

(b) Write about Dates and Times. L3 6M

OR

10. Explain about Functional Programming L4 12M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year II Semester Regular Examinations July 2021
FLUID MECHANICS

(Civil Engineering)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

- 1 a) Define about total pressure and center of pressure. L2 6M
- b) The space b/w two square parallel plates filled with oil. Each side of the plate is 60 cm. The thickness of oil film is 12.5. The upper plate which moves at 2.5m/sec requires a force 98.1 N to maintain the speed. Determine kinetic viscosity of the oil. If the specific gravity of the oil 0.95 and dynamic viscosity of oil. L3 6M

OR

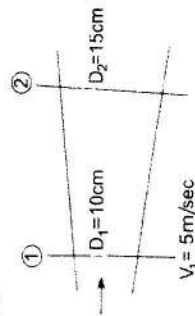
- 2 a) A rectangular plane surface is 2m wide and 3m deep it lies in vertical plane in water. Determine the total pressure and position of centre of pressure on the plane surface when its appear edge is horizontal and Coincides with water surface. L2 6M
- b) A rectangular plane surface is 2m wide and 3m deep it lies in vertical plane in water. Determine the total pressure and position of centre of pressure on the plane surface when its appear edge is horizontal and 2.5 m below the free surface. L2 6M

UNIT-II

- 3 a) Distinguish Between rotational flow and irrotational flow. Give one example of each. L2 6M
- b) The velocity vector in a fluid flow is given $V = 4x^2i - 10x^2yj + 2tk$. Find the velocity of a fluid particle at (2, 1, 3) at time $t = 1$. L2 6M

OR

- 4 a) Explain the continuity equation for One-dimensional flow in terms of Rate of flow. L3 6M
- b) The diameters of a pipe at the sections 1 and 2 are 10 cm and 15 cm respectively. Find the discharge through the pipe if the velocity of water flowing through the pipe at section 1 is 5 m/s. Determine also the velocity at section 2. L3 6M



UNIT-III

- 5 a) Water flows over a rectangular weir 1m wide and at a depth of 150mm and afterwards passes through a triangular right-angled weir. Take C_d for the

rectangular and triangular weir as 0.62 and 0.59 respectively. Find the depth over the triangular weir.

- b) Water flows through right angled weir first and then over a rectangular weir of width 1m. The discharge coefficients of the triangular and rectangular weirs are 0.6 and 0.7. If the depth of water over triangular weir is 360mm. Find the depth of water of rectangular weir. L2 6M
- OR
- 6 a) A pipe line carrying oil of specific gravity of 0.87, changes in diameter from 200mm diameter at a position A to 500mm diameter at a position B which is 4m at a higher level. If the pressure at A & B are 9.81 N/cm^2 and 5.886 N/cm^2 respectively and the discharge is 200 lit/ sec. Determine the loss of head and the direction of flow. L2 6M
 - b) A vertical wall of 8m in height. A jet of water is carrying out from a nozzle with a velocity of 20 m/s. The nozzle is situated at a distance of 20m from the vertical wall. Find the angle of projection of the nozzle to the horizontal so that the jet of water just clears the top of wall. L3 6M

UNIT-IV

- 7 a) The difference in water surface levels in two tanks, which are connected by the pipes of the lengths 300m, 170m and 210m and of ϕ 300mm, 200mm and 400mm respectively. Determine the rate of flow of water if coefficient of friction is 0.005, 0.0052 & 0.0048 respectively. Neglecting minor losses. L2 6M
- b) The rate of flow water through a horizontal pipe of 0.25m m^3/s . The diameter of the pipe which is 200mm is suddenly enlarged to 400mm. the pressure intensity in the smaller pipe is 11.772 N/cm^2 . Determine i) Loss of head due to sudden enlargement. L2 6M

OR

- 8 a) Briefly explain about Hardy cross method L2 6M
- b) A crude oil of kinematic viscosity 0.4 stoke is flowing through a pipe of diameter 300mm at the rate of 300 lit/s. find the head lost due to friction for a length of 50m of the pipe. L2 6M

UNIT-V

- 9 a) What is dimensionless number? Explain any two types of numbers. L2 6M
 - b) Derive the expression for resistance of smooth pipes. L2 6M
- OR
- 10 a) Derive an expression for velocity distribution in turbulent flow. L2 6M
 - b) Calculate i) pressure gradient along flow ii) average velocity for an oil of viscosity 0.02 Ns/m^2 flowing between two stationary parallel plates 1.5m wide maintained 20mm apart. The velocity between plates is 1m/s Take average height of roughness as $k = 0.4\text{mm}$. L3 6M

SIDDARATHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year II Semester Regular Examinations July 2021

ENGINEERING THERMODYNAMICS
(MECH)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

- 1 a) Show that work is a path function and not a property.
b) What is meant by thermodynamic equilibrium? Explain its types briefly.

L1 6M
L2 6M

OR

- 2 a) Define Heat, Temperature and concept of thermal Equilibrium.
b) During a heating process, the temperature of a system rises by 10°C. Express this rise in temperature in K, °F, and R.

L2 6M
L3 6M**UNIT-II**

- 3 a) 12 kg of air per minute is delivered by a centrifugal air compressor. The inlet and outlet conditions of air are $C_1 = 12 \text{ m/s}$, $p_1 = 1 \text{ bar}$, $v_1 = 0.5 \text{ m}^3/\text{kg}$ and $C_2 = 90 \text{ m/s}$, $p_2 = 8 \text{ bar}$, $v_2 = 0.14 \text{ m}^3/\text{kg}$. The increase in enthalpy of air passing through the compressor is 150 kJ/kg and heat loss to the surroundings is 700 kJ/min . Find:

L3 6M

- (i) Motor power required to drive the compressor;
(ii) Ratio of inlet to outlet pipe diameter.

Assume that inlet and discharge lines are at the same level.

- b) What is Steady Flow Process? Derive Steady Flow Energy Equation (SFEE) for an open system.

L2 6M

OR

- 4 a) A heat pump is driven by a heat engine. The heat transfer from the heat engine and heat pump are used to heat the water circulating through the radiators of a building. The heat engine efficiency is 30% and COP of heat pump is 3.8. Evaluate the ratio of heat transfer to the circulating water to the heat transfer to the heat engine.

L3 6M

- b) One kg of ice at -5°C is exposed to the atmosphere which is at 20°C . The ice melts and comes into thermal equilibrium with the atmosphere. Determine the entropy increase of the universe.

L3 6M

UNIT-III

- 5 a) State and Explain Dalton law of partial pressure.

L2 6M

- b) Derive the equation for work done in a reversible adiabatic process.

L1 6M

OR

- 6 A gas of mass 0.35 kg pressure 1535 kN/m^2 and temperature of 335°C is expanded adiabatically to a pressure of 126 kN/m^2 . The gas is then heated at constant volume until it reaches 335°C when its pressure is found to be 275 kN/m^2 . Finally the gas is compressed isothermally until the original pressure of 1535 kN/m^2 obtained. Draw the P-V diagram and find out the following (i) the value of adiabatic index, (ii) Change in internal energy during adiabatic process, and (iii) heat transfer during constant volume process. Take $C_p = 1.005 \text{ kJ/kg K}$.

L3 12M

UNIT-IV

- 7 a) Develop the expression for air standard efficiency, work done of an Otto cycle.

L1 6M

- b) A Carnot engine working between 400°C and 40°C produce 130 kJ of work. Determine i) The thermal efficiency. ii) the heat added iii) The entropy changes during the heat rejection process.

L3 6M

OR

- 8 a) Show the phase equilibrium diagram for a pure substance H-S plot with relevant constant property line.

L2 6M

- b) A steam at 10 bar and 0.85 dry expands according to the law of $PV^{1.2} = \text{Constant}$ to final pressure of 1 bar find the final volume, final enthalpy and final entropy.

L3 6M

UNIT-V

- 9 a) A simple Rankine cycle works between pressures 28 bar and 0.06 bar , the initial condition of steam being dry saturated. Calculate the cycle efficiency, work ratio and specific steam consumption.

L3 6M

- b) What will be the effect of operating conditions on Rankine cycle efficiency?

L1 6M

OR

- 10 a) Mention the improvements made to increase the ideal efficiency of ranking cycle.

L2 6M

- b) In a regenerative cycle, the steam pressure at turbine inlet is 30 bar and the exhaust is at 0.04 bar . The steam is initially saturated. Enough steam is bled off at the optimum pressure of 3 bar to heat the feed water determine the cycle efficiency.

L3 6M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year II Semester Regular Examinations July 2021

ANALOG ELECTRONIC CIRCUITS

(EEE)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

- 1 a) List the types of Feedback amplifier topologies with necessary diagrams. L2 6M
b) Prove that bandwidth of an amplifier can be extended by using negative feedback amplifier. L3 6M

OR

- 2 a) Derive the expressions of Gain, input and output resistances for a voltage Series FBA. L3 6M
b) Determine the voltage gain ,input and output impedance with feedback for voltage series having $A=-100, R_i=10k\Omega, R_o=10k\Omega$ for feedback of $\beta=-0.1$ L3 6M

UNIT-II

- 3 a) Illustrate the condition for oscillations with suitable diagram . L3 6M
b) Explain the working principle of Wein-bridge oscillator using BJT and derive the expression for frequency of oscillations. L2 6M

OR

- 4 a) Determine the condition for sustained oscillations for an RC phase shift Oscillator with necessary circuit diagrams. L3 6M
b) Derive the expression for frequency of oscillations in Hartley oscillator with suitable diagram. L3 6M

UNIT-III

- 5 a) What is level translator? Explain the necessity of level translator stage in cascading differential amplifiers. L2 6M
b) Discuss the electrical characteristics of an OP-AMP in detail L4 6M

OR

- 6 a) Explain briefly i) virtual ground concept b) current mirror circuit L3 6M
b) What is voltage follower? What are its features and applications? L2 6M

UNIT-IV

- 7 Draw the circuit diagram of an integrator using Op-amp and explain input-output waveforms, also derive its output equation. L4 12M

OR

- 8 a) Explain the operation of triangular wave generator with neat circuit diagram and derive the equation for output frequency L3 8 M
b) Discuss the applications of Astable multivibrator L2 4M

UNIT-V

- 9 a) Draw the circuit diagram and explain first order low pass butter worth filter. L4 8M
b) List out different types of ADC and DAC. L3 4M

OR

- 10 a) Draw the circuit diagram of Dual Slope ADC and explain its working with neat sketches. L4 8M
b) Discuss flash type ADC. L2 4M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)
B.Tech II Year II Semester Regular Examinations July 2021
ANALOG COMMUNICATIONS
(ECE)

- 10 a) Define Channel capacity theorem and Explain Shannon's encoding algorithm. L1 6M
b) Explain the purpose multiplexing and illustrate the concept of FDM L2 6M

Time: 3 Hours

Max. Marks: 60

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

- 1 a) Define modulation and illustrate the need for modulation L1 6M
b) With the help of neat block diagram explain the functionality of communication system L2 6M
- 2 a) Elucidate how AM wave is generated by using SQUARE-LAW modulator with suitable diagram and perform analysis. L2 8M
b) Define Demodulation and list different types of AM demodulators L2 4M
- 3 a) Generate DSB SC wave by using the Ring Modulator and draw the wave form of DSBSC L2 6M
b) Illustrate VSB modulation? Mention the advantages and applications of VSB modulation. L2 6M
- 4 a) Summarize in brief the scheme for generation and demodulation of VSB modulated wave. L2 8M
b) List the Applications of SSB-SC waves in communication systems L1 4M
- 5 a) Briefly Explain the direct method of FM generation L2 6M
b) Discuss the non-linear effects that impact in FM system. L2 6M
- 6 a) A 107.76MHz carrier signal is frequency modulated by a 7KHz sine wave. The resultant FM signal has a frequency deviation of 50KHz. Determine carrier swing, highest & lowest frequencies of frequency modulated signal, and modulation index of FM wave. L1 7M
b) With the help of a neat block diagram explain the generation of FM waves by using indirect FM method. L1 5M
- 7 a) Define Noise sources and Review different Noise sources L1 6M
b) Estimate the noise figure for an SSB-SC system. L3 6M
- 8 a) Describe the need of Super heterodyne receiver? Write a brief note on advantages of super heterodyning. L3 6M
b) For a broadcast Super-heterodyne AM receiver having no RF amplifier, the loaded Quality factor of the antenna coupling circuit is 100. Now, if the intermediate frequency is 455kHz, determine the image frequency and its rejection ratio at an incoming frequency of 1000KHz. L4 6M
- 9 a) Explicate the generation of PAM with suitable circuit and mathematical analysis. L2 8M
b) Determine the sampling rate and sampling interval that would be appropriate for a television video channel with a maximum bandwidth of 4 MHz? L1 4M

OR

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year II Semester Regular Examinations July/ Aug 2021
FORMAL LANGUAGES AND AUTOMATA THEORY
(CSE)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

- 1 a) Consider the below finite automata and check whether the strings are accepted or not.

States (Q)	Input Alphabets	
→q0	0	1
q1	q1	q3
(q2)	q0	q2
q3	q3	q1
	q2	q0

- (i) 0001 (ii) 1010 (iii) 1001 (iv) 0101
b) Compare DFA and NFA.

OR

- 2 a) Define relations on sets and explain its properties with an example.
b) Design a Moore machine which determines the residue mod-3 for each binary string treated as binary integer.

UNIT-II

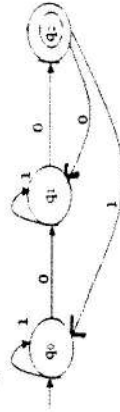
- 3 a) Convert the given RG to FA.

$S \rightarrow aA/bB/a/b$
 $A \rightarrow aS/bB/b$
 $B \rightarrow aA/Bs$

- b) Construct an equivalent FA for the given regular expression.
 $10 + (0 + 11) 0^* 1$

OR

- 4 Explain about Ardon's theorem, for constructing the RE from a FA with an example.



UNIT-III

- 5 a) State Pumping lemma for Context-free language.
b) Show that $L = \{a^n b^n c^n, \text{ where } n \geq 1\}$ is not context free.

OR

- 6 a) Write the process adapted to convert the grammar into CNF?
b) Convert the following grammar into CNF.

$S \rightarrow bA/aB$
 $A \rightarrow bAA/aS/a$
 $B \rightarrow aBB/bS/a.$

- 7 a) Define Instantaneous description (ID) in PDA.
b) Define push down automata? Explain acceptance of PDA with final state.

L1 6M
L2 6M

- 8 Construct PDA from the following Grammar.

(i) $S \rightarrow aB$ $B \rightarrow bA/b$ $A \rightarrow aB$
(ii) $S \rightarrow 0BB$ $B \rightarrow 0S/1S/0$

L6 12M

UNIT-V

- 9 a) Discriminate Universal Turing machine.
b) Illustrate Linear Bounded Automata.

L5 6M
L2 6M

OR

- 10 Define Mathematical Definition of Turing Machine. Describe Recursive and Recursively Enumerable Languages.

L2 12M

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year II Semester Regular Examinations July 2021

ENGINEERING GEOLOGY

(Civil Engineering)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

- 1 a) What is weathering? Enumerate the various mechanisms of rock weathering? L2 6M
b) Distinguish between weathering and erosion. L4 6M

OR

- 2 a) Discuss the role of geological agents in weathering of rocks. L2 6M
b) Explain the significance of geological studies to solve civil engineering problems. L1 6M

UNIT-II

- 3 a) Define mineral and explain the various physical properties of minerals? L1 6M
b) Write physical properties of Garnet and Hematite minerals. L2 6M

OR

- 4 a) Write short notes on the following L2 6M
i. Moh's scale of hardness ii. Isomorphism
b) Define Hardness, Fracture, and Specific gravity. L1 6M

UNIT-III

- 5 a) Define term "rock". Describe the classification of rocks & their characteristics? L2 6M
b) Describe the following rocks? L2 6M
a) Granite b) Pegmatite c) Sand stone d) Marble

OR

- 6 a) Write short notes on L3 6M
a. Structures of igneous rocks b. Structures of metamorphic rocks
b) In what way the granite, limestone and marble are used on the basis of their civil engineering applications? Add their mechanical properties. L3 6M

UNIT-IV

- 7 a) What is a monocline? How is an isoclinal fold different from a monocline? L1 6M
b) What is a fold? Describe with the help of well labeled neat sketches & different parts of fold. L4 6M

OR

- 8 a) What are geophysical methods that help in knowing about subsurface features during civil engineering investigations? L2 6M
b) Explain in detail the principal, procedure and applicability of seismic methods for subsurface investigations. L2 6M

UNIT-V

- 9 a) What is a water table? What are types of ground water? Which occur in the zone of aeration and saturation? L1 6M
b) Explain the engineering significance of ground water. L2 6M

OR

- 10 a) How the geological structures are responsible for the failure of any tunnel alignment. L3 6M
b) Explain the sliding uplift and elastic rebound problems at a dam site. L2 6M

SIDDARTHIA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)
B.Tech II Year II Semester Regular Examinations July/Aug 2021
MANUFACTURING PROCESSES
(MECH)

Time: 3 Hours

Max. Marks: 60

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

UNIT-I

- 1 a) The casting shown in Fig. 1 is to be made in plain-carbon steel using a wooden pattern. Assuming the shrinkage allowance only, calculate the dimensions of the pattern. L3 6M

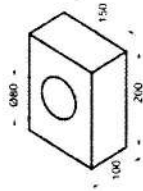


Fig.1 Casting to be made.

- b) Explain the centrifugal casting process. L2 6M

OR

- 2 a) Explain the shell moulding casting process. L2 6M
b) Explain the procedure to be followed for making a sand mould. L2 6M
- 3 a) Explain the common welding defects focusing on causes and remedies for them? L2 6M
b) Explain the working of spot welding process. L2 6M

OR

- 4 a) Classify the differences between the TIG and MIG welding processes. L2 6M
b) Explain Electron Beam Welding. Give its advantages and disadvantages. L2 6M
- 5 a) Explain the peen forming process. L2 6M
b) Explain the type of defects may occur in the product produced by rolling process? L2 6M

OR

- 6 a) Explain the wire drawing process mechanics and name different process variable in drawing process. L2 6M
b) Explain the super plastic forming process. L2 6M
- 7 a) Explain the drawing operation. L2 6M
b) What is powder metallurgy? Explain the advantages, Disadvantages and applications of powder metallurgy. L2 6M

OR

- 8 a) What is metal spinning? Explain with neat sketch. L2 6M
b) Explain the different processes involved in production of metallic powder metallurgy. L2 6M

UNIT-V

- 9 a) Explain the working principle of blow moulding process with applications. L2 6M
b) Explain the various methods of bonding of thermoplastics. L2 6M
- OR
- 10 a) Explain the working principles of transfer moulding process with applications. L2 6M
b) Explain the major considerations in the design of plastic parts? L2 6M