## SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
### (AUTONOMOUS)
**B.Tech. III Year I Semester Supplementary Examinations June-2025**
### DESIGN AND ANALYSIS OF ALGORITHMS
(Common to CSIT & CSE)

**Time: 3 Hours**                                    **Max. Marks: 60**

(Answer all Five Units **5 x 12 = 60** Marks)

### UNIT-I

| | | | | |
|---|---|---|---|---|
| 1 | Describe about the performance analysis in detail with Example. | CO1 | L2 | 12M |

**OR**

| | | | | |
|---|---|---|---|---|
| 2 | Define Disjoint sets. Explain different types of disjoint sets operations with examples. | CO1 | L2 | 12M |

### UNIT-II

| | | | | |
|---|---|---|---|---|
| 3 | Write about Binary Search algorithm with Example and find Time complexity. | CO2 | L1 | 12M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 4 | a | Explain the general Greedy method with an algorithm. | CO2 | L2 | 6M |
| | b | Explain the general divide-and-conquer method with an algorithm. | CO2 | L2 | 6M |

### UNIT-III

| | | | | |
|---|---|---|---|---|
| 5 | Explain travelling sales man problem with an example by using dynamic programming. | CO3 | L2 | 12M |

**OR**

| | | | | |
|---|---|---|---|---|
| 6 | Describe in detail 8-queens problem using back tracking. | CO3 | L5 | 12M |

### UNIT-IV

| | | | | | |
|---|---|---|---|---|---|
| 7 | a | Explain the properties of LC-search. | CO4 | L2 | 6M |
| | b | Explain control abstraction of LC-branch and bound. | CO4 | L2 | 6M |

**OR**

| | | | | |
|---|---|---|---|---|
| 8 | Apply the branch-and- bound technique in solving the travelling salesman problem. | CO4 | L3 | 12M |

### UNIT-V

| | | | | |
|---|---|---|---|---|
| 9 | Distinguish between deterministic and non-deterministic algorithms. | CO5 | L4 | 12M |

**OR**

| | | | | |
|---|---|---|---|---|
| 10 | State and explain cook's theorem. | CO5 | L5 | 12M |

*** END ***

## SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
### (AUTONOMOUS)
**B.Tech. III Year I Semester Supplementary Examinations June-2025**
### DATA WAREHOUSING AND DATA MINING
(Computer Science & Information Technology)

Time: 3 hours                                                                 Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

### UNIT-I

| | | | |
|---|---|---|---|
| 1 | a | What is KDD? Explain about data mining as a step in the process of knowledge discovery. | L1 | 8M |
| | b | How to classify data mining systems? Discuss. | L2 | 4M |

**OR**

| 2 | Explain in detail about Data mining functionalities. | L2 | 12M |

### UNIT-II

| 3 | a | What are steps in designing the data warehouse? Explain. | L1 | 6M |
| | b | Compare OLTP and OLAP. | L2 | 6M |

**OR**

| 4 | a | Briefly explain the German super market EDEKA's Data warehouse. | L2 | 6M |
| | b | Write about case study of Data Warehousing in the Tamilnadu Government. | L2 | 6M |

### UNIT-III

| 5 | What are the various Constraints in Constraint based Association rule mining? Explain. | L1 | 12M |

**OR**

| 6 | Explain about the Mining Multilevel Association rules with example. | L2 | 12M |

### UNIT-IV

| 7 | a | What is Bayes theorem? Explain. | L1 | 6M |
| | b | Discuss about Naïve Bayesian Classification. | L2 | 6M |

**OR**

| 8 | a | What is prediction? Explain about Linear regression method. | L1 | 6M |
| | b | Discuss about Accuracy and Error measures. | L2 | 6M |

### UNIT-V

| 9 | a | Differentiate between AGNES and DIANA algorithms. | L2 | 6M |
| | b | What is outlier detection? Explain distance based outlier detection. | L1 | 6M |

**OR**

| 10 | Define Clustering? Explain about Types of Data in Cluster Analysis? | L1 | 12M |

**\*\*\* END \*\*\***

# SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
## (AUTONOMOUS)
### B.Tech. III Year I Semester Supplementary Examinations June-2025
### COMPUTER NETWORKS
#### (Computer Science & Information Technology)

Time: 3 Hours        Max. Marks: 60

(Answer all Five Units 5 x 12 = 60 Marks)

### UNIT-I

| | | | | | |
|---|---|---|---|---|---|
| 1 | a | Compare Connection oriented and connectionless service. | CO1 | L3 | 6M |
| | b | Explain the functions and protocols and services of each layer. | CO1 | L5 | 6M |

OR

| | | | | |
|---|---|---|---|---|
| 2 | Discuss various types of networks topologies in computer network. | CO1 | L6 | 12M |

### UNIT-II

| | | | | |
|---|---|---|---|---|
| 3 | Explain the operation of the bit-oriented protocol HDLC with the required frames. | CO2 | L2 | 12M |

OR

| | | | | |
|---|---|---|---|---|
| 4 | Explain MAC sub layer protocol and frame structure of IEEE 802.11. | CO2 | L5 | 12M |

### UNIT-III

| | | | | |
|---|---|---|---|---|
| 5 | Explain about the Routing algorithms. | CO3 | L2 | 12M |

OR

| | | | | |
|---|---|---|---|---|
| 6 | Explain the function of ARP & RARP. | CO3 | L5 | 12M |

### UNIT-IV

| | | | | | |
|---|---|---|---|---|---|
| 7 | a | Explain the duties of transport layer. | CO4 | L2 | 6M |
| | b | Write short notes on performance issues of transport layer. | CO4 | L1 | 6M |

OR

| | | | | |
|---|---|---|---|---|
| 8 | Explain the operation of TCP with neat sketch. | CO4 | L5 | 12M |

### UNIT-V

| | | | | |
|---|---|---|---|---|
| 9 | Explain how security is provided in interact operations in detail. | CO5 | L2 | 12M |

OR

| | | | | | |
|---|---|---|---|---|---|
| 10 | a | Discuss the features of HTTP and also discuss how HTTP works. | CO5 | L6 | 6M |
| | b | Illustrate about Application layer and its services in detail. | CO5 | L2 | 6M |

*** END ***

# SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
## (AUTONOMOUS)
### B.Tech. IV Year I Semester Supplementary Examinations June-2025
## WEB TECHNOLOGIES
### (Computer Science & Information Technology)

Time: 3 hours

Max. Marks: 60

**(Answer all Five Units 5 x 12 = 60 Marks)**

## UNIT-I

| | | | | |
|---|---|---|---|---|
| 1 | a | What is html? Explain the various html tags to develop web pages. | L1 | 6M |
| | b | Define frame. Create a HTML page that displays multiple frames in a window. | L6 | 6M |

**OR**

| | | | | |
|---|---|---|---|---|
| 2 | a | Explain about Creating Editable Content. | L2 | 6M |
| | b | Illustrate the structure of HTML5 document with neat example. | L2 | 6M |

## UNIT-II

| | | | | |
|---|---|---|---|---|
| 3 | | List and explain in detail the various selector strings with example. | L4 | 12M |

**OR**

| | | | | |
|---|---|---|---|---|
| 4 | a | Write programs to illustrate Popup Boxes in JavaScript. | L1 | 6M |
| | b | What is JQuery? Explain JQuery Selectors? | L1 | 6M |

## UNIT-III

| | | | | |
|---|---|---|---|---|
| 5 | a | Write a program to find average of first ten natural numbers using for loop. | L1 | 6M |
| | b | Write a note on various library functions available in PHP. | L1 | 6M |

**OR**

| | | | | |
|---|---|---|---|---|
| 6 | | What is RDBMS? How to create a connection between PHP and My SQL? | L5 | 12M |

## UNIT-IV

| | | | | |
|---|---|---|---|---|
| 7 | a | Write the program to print the hello world. | L1 | 6M |
| | b | List different conditional statements in python with appropriate examples. | L4 | 6M |

**OR**

| | | | | |
|---|---|---|---|---|
| 8 | | How to create a module and use it in a python program? Explain with an example. | L1 | 12M |

## UNIT-V

| | | | | |
|---|---|---|---|---|
| 9 | a | What is a Document Type Definition (DTD)? | L1 | 6M |
| | b | How XML is changing the Web? | L1 | 6M |

**OR**

| | | | | |
|---|---|---|---|---|
| 10 | | What is AJAX? When can we use AJAX? Explain with an example. | L1 | 12M |

**\*\*\* END \*\*\***

# SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
## (AUTONOMOUS)
### B.Tech. III Year I Semester Supplementary Examinations June-2025
### PYTHON & R PROGRAMMING
(Computer Science & Information Technology)

Time: 3 hours                                                                 Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

### UNIT-I

| | | | |
|---|---|---|---|
| 1 | Explain in detail about keywords along with examples. | L1 | 12M |

**OR**

| | | | |
|---|---|---|---|
| 2 | a | Justify the need of python programming. | L4 | 6M |
| | b | Explain the applications of python programming. | L2 | 6M |

### UNIT-II

| | | | |
|---|---|---|---|
| 3 | Explain about Lists and its methods. | L2 | 12M |

**OR**

| | | | |
|---|---|---|---|
| 4 | Explain about calling functions with suitable example. | L2 | 12M |

### UNIT-III

| | | | |
|---|---|---|---|
| 5 | a | Discuss about 'try' except block. | L3 | 6M |
| | b | Discuss about user defined Exceptions. | L3 | 6M |

**OR**

| | | | |
|---|---|---|---|
| 6 | a | Differentiate between error and exception. | L3 | 6M |
| | b | Write about self-argument with suitable example. | L2 | 6M |

### UNIT-IV

| | | | |
|---|---|---|---|
| 7 | a | Write installation steps of R-software. | L3 | 6M |
| | b | Describe about command packages. | L3 | 6M |

**OR**

| | | | |
|---|---|---|---|
| 8 | Explain how to save the data in R. | L2 | 12M |

### UNIT-V

| | | | |
|---|---|---|---|
| 9 | Explain in detail about Descriptive Analysis. | L2 | 12M |

**OR**

| | | | |
|---|---|---|---|
| 10 | a | Write briefly about Line Charts. | L2 | 6M |
| | b | Describe about Bar Charts. | L3 | 6M |

*** END ***

# SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
## (AUTONOMOUS)
### B.Tech. IV Year I Semester Supplementary Examinations June-2025
### INTERNETWORKING WITH TCP/IP
(Computer Science & Information Technology)

**Time: 3 Hours**  **Max. Marks: 60**

(Answer all Five Units **5 x 12 = 60** Marks)

## UNIT-I

| | | | | | |
|---|---|---|---|---|---|
| 1 | a | Compare between OSI and TCP/IP protocol suite. | CO1 | L4 | 6M |
| | b | Discuss about Logical and Physical addresses. | CO1 | L2 | 6M |
| | | **OR** | | | |
| 2 | a | Illustrate the significance of sub-network mask. | CO1 | L2 | 6M |
| | b | Explain how classless addressing address the problem of address depletion. | CO1 | L3 | 6M |

## UNIT-II

| | | | | | |
|---|---|---|---|---|---|
| 3 | | Discuss in detail about ARP Protocol. | CO2 | L2 | 12M |
| | | **OR** | | | |
| 4 | a | Illustrate the Packet Format of ICMP. | CO2 | L2 | 6M |
| | b | Explain in detail about Debugging tools. | CO2 | L3 | 6M |

## UNIT-III

| | | | | | |
|---|---|---|---|---|---|
| 5 | a | Describe the types of links defined in OSPF. | CO3 | L2 | 6M |
| | b | Discuss in detail about BGP. | CO3 | L2 | 6M |
| | | **OR** | | | |
| 6 | a | With an example explain distance vector routing algorithm. | CO3 | L3 | 6M |
| | b | Explain in detail about path vector routing. | CO3 | L3 | 6M |

## UNIT-IV

| | | | | | |
|---|---|---|---|---|---|
| 7 | | What is UDP? Explain UDP Packet in detail. | CO4 | L3 | 12M |
| | | **OR** | | | |
| 8 | a | Discuss TCP features in detail. | CO4 | L2 | 6M |
| | b | Explain connection establishment in TCP using three-way handshaking. | CO4 | L3 | 6M |

## UNIT-V

| | | | | | |
|---|---|---|---|---|---|
| 9 | a | What is Error control in TCP? Explain. | CO5 | L2 | 6M |
| | b | Discuss Congestion control mechanisms. | CO5 | L3 | 6M |
| | | **OR** | | | |
| 10 | a | Explain ICMPV6 error-reporting messages. | CO5 | L3 | 6M |
| | b | Discuss error messages in ICMPV6 and compare and contrast them with the error messages in ICMPV4. | CO5 | L2 | 6M |

*** END ***

## SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
### (AUTONOMOUS)
**B.Tech IV Year I Semester (R16) Supplementary Examinations June-2025**
### INFORMATION SECURITY
### (Computer Science & Information Technology)

**Time: 3 Hours**  **Max. Marks: 60**

(Answer all Five Units **5 x 12 = 60** Marks)

### UNIT-I

| | | | | | |
|---|---|---|---|---|---|
| 1 | a | Discuss in detail about various types of Security attacks with neat diagrams | CO1 | L6 | 6M |
| | b | What is symmetric key cryptography? Discuss its advantages and limitations? | CO1 | L6 | 6M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 2 | | Explain the encryption and decryption of AES With neat Diagram. | CO1 | L2 | 12M |

### UNIT-II

| | | | | | |
|---|---|---|---|---|---|
| 3 | | Explain RSA algorithm with suitable examples. | CO2 | L2 | 12M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 4 | a | What are the requirements and applications of public key cryptography? | CO2 | L1 | 6M |
| | b | Discuss about Euler's theorem. | CO2 | L6 | 6M |

### UNIT-III

| | | | | | |
|---|---|---|---|---|---|
| 5 | a | List out applications of cryptographic hash functions. | CO3 | L1 | 6M |
| | b | Explain the characteristics are needed in secure hash function? | CO3 | L2 | 6M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 6 | a | Compare different types of SHA algorithms with parameters. | CO3 | L2 | 6M |
| | b | Discuss about the objectives of HMAC and its security features. | CO3 | L2 | 6M |

### UNIT-IV

| | | | | | |
|---|---|---|---|---|---|
| 7 | | What is secret key distribution? Explain secret key distribution with confidentiality and authentication. | CO4 | L1 | 12M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 8 | a | What is Public Key certificate? Explain its usage with X.509 certificates. | CO4 | L1 | 6M |
| | b | What is Radix 64 format? What is its use in PGP? | CO4 | L3 | 6M |

### UNIT-V

| | | | | | |
|---|---|---|---|---|---|
| 9 | | What is the use of SSL protocol? Explain SSL record protocol operation with SSL record format. | CO5 | L1 | 12M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 10 | a | What are the different types of viruses? How do they get into the systems? | CO5 | L1 | 6M |
| | b | Explain Intrusion detection in detail. | CO5 | L2 | 6M |

*** END ***

# SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
## (AUTONOMOUS)
### B.Tech IV Year I Semester Supplementary Examinations June-2025
### DIGITAL SIGNAL PROCESSING
#### (Electrical & Electronics Engineering)

Time: 3 hours  Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

### UNIT-I

| | | | | |
|---|---|---|---|---|
| 1 | a | Summarize the power signal and Energy signal. | L2 | 6M |
| | b | Describe the relation between i) DFT to Z- transform ii) DFT to Fourier Series. | L2 | 6M |

**OR**

| | | | |
|---|---|---|---|
| 2 | State and prove following properties of DFT <br> i) Circular shifting ii) Time reversal iii) Complex conjugate <br> iv) Linearity     v) Circular convolution | L5 | 12M |

### UNIT-II

| | | | | |
|---|---|---|---|---|
| 3 | a | Explain divide and conquer approach to computation of the DFT. | L2 | 6M |
| | b | Construct the decimation in time FFT algorithm with butterfly diagram. | L3 | 6M |

**OR**

| | | | | |
|---|---|---|---|---|
| 4 | a | Determine 8-point DFT of the sequence x(n)= {1,2,1,2,1,2,2,1} using radix-2 DIF-FFT Algorithm. | L5 | 8M |
| | b | Discuss Quantization errors in the direct computation of DFT. | L2 | 4M |

### UNIT-III

| | | | |
|---|---|---|---|
| 5 | Determine the realization for IIR system with following difference equation <br> y(n) = (3/4) y(n-1) – (1/8) y(n-2) + x(n) + (1/3) x(n-1) <br> (i) Direct form-I (ii) Direct form-II | L3 | 12M |

**OR**

| | | | | |
|---|---|---|---|---|
| 6 | a | Explain briefly about Signal flow graph & transposed structures with an example. | L2 | 6M |
| | b | Determine the direct form realization for the following linear phase filters h(n) =[1,2,-4,2,3,1,2]. | L3 | 6M |

### UNIT-IV

| | | | | |
|---|---|---|---|---|
| 7 | a | Express the frequency transformation in analog domain. | L2 | 6M |
| | b | Design a high pass filter for the given specifications $\alpha p$=3dB; $\alpha s$=15dB; $\Omega p$=1000rad/sec and $\Omega s$=500rad/sec. | L3 | 6M |

**OR**

| | | | | |
|---|---|---|---|---|
| 8 | a | Explain the design steps of a digital filter using Impulse Invariance method. | L2 | 5M |
| | b | For the analog transfer function H(s)=2/(s+1) (s+2) determine H(s) using impulse invariance method. Assume T=1 sec. | L3 | 6M |

### UNIT-V

| | | | | |
|---|---|---|---|---|
| 9 | a | Describe the design of symmetric and asymmetric FIR filters. | L2 | 6M |
| | b | Compare features of different windowing functions. | L4 | 6M |

**OR**

| | | | |
|---|---|---|---|
| 10 | Design a filter with $H_d(e^{j\omega}) = e^{-j3\omega}$ , $-\pi/4 \leq \omega \leq \pi/4$ <br> = 0,    $\pi/4 \leq \omega \leq \pi$ <br> Using Hamming window with N = 7. | L5 | 12M |

\*\*\* END \*\*\*

### UNIT-I

| | | | | | |
|---|---|---|---|---|---|
| 1 | a | Explain basic elements in metal cutting with a neat sketch. | CO1 | L1 | 6M |
| | b | Discuss about machining of metals. | CO1 | L2 | 6M |

**OR**

| | | | | |
|---|---|---|---|---|
| 2 | Explain the formation of chip. Discuss the types of chips with neat sketches. | CO1 | L2 | 12M |

### UNIT-II

| | | | | |
|---|---|---|---|---|
| 3 | Draw a Merchant's circle diagram and derive expressions to show relationships among the different forces acting on the cutting tool and coefficient of friction. | CO2 | L3 | 12M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 4 | a | Explain the stress and strain acting on a chip. | CO2 | L2 | 6M |
| | b | In an orthogonal turning operation, cutting speed is 86Mm/min, cutting force 25kg, feed force 9kg, rake angle 10°, feed 0.3mm/rev and chip thickness 0.3mm. Determine the shear angle, workdone in shear and shear strain. | CO2 | L3 | 6M |

### UNIT-III

| | | | | |
|---|---|---|---|---|
| 5 | Explain lathe machine accessories with neat sketches. | CO3 | L2 | 12M |

**OR**

| | | | | |
|---|---|---|---|---|
| 6 | What are the differences between a Turret and a Capstan lathe? | CO3 | L2 | 12M |

### UNIT-IV

| | | | | |
|---|---|---|---|---|
| 7 | Explain with neat sketches any one of the following i) Radial drilling machine, ii) Sensitive drilling machine iii) Gang drilling machine. | CO4 | L2 | 12M |

**OR**

| | | | | |
|---|---|---|---|---|
| 8 | Draw the block diagram of a shaper machine and explain briefly its various parts and operations performed. | CO4 | L2 | 12M |

### UNIT-V

| | | | | |
|---|---|---|---|---|
| 9 | With a neat sketch, explain construction and working of tool and cutter grinding machine. | CO5 | L2 | 12M |

**OR**

| | | | | |
|---|---|---|---|---|
| 10 | Explain with the help of neat sketch 3-2-1 principle of location. | CO4 | L2 | 12M |

*** END ***

# SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
## (AUTONOMOUS)
### B.Tech IV Year I Semester Supplementary Examinations June-2025
### METROLOGY &MEASUREMENTS
### (Mechanical Engineering)

**Time: 3 Hours**                                       **Max. Marks: 60**

(Answer all Five Units **5 x 12** = 60 Marks)

## UNIT-I

| | | | | | |
|---|---|---|---|---|---|
| 1 | | What are the types of fits between mating parts and explain with neat sketch? | CO1 | L1 | 12M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 2 | a | Distinguish between 'Hole basis system' and 'Shaft basis system' of fits | CO1 | L2 | 6M |
| | b | Define deviations. Explain types of deviations with the help of sketches. | CO1 | L2 | 6M |

## UNIT-II

| | | | | | |
|---|---|---|---|---|---|
| 3 | a | State the principle of a micrometer. Explain with neat Sketch an outside micrometer. | CO2 | L3 | 6M |
| | b | Estimate possible sources of errors in micrometers. | CO2 | L3 | 6M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 4 | a | Briefly describe the construction, principle and operation of Talysurf with a neat sketch. | CO2 | L3 | 6M |
| | b | Define the terms (i) Primary texture (ii) Secondary texture | CO2 | L1 | 6M |

## UNIT-III

| | | | | | |
|---|---|---|---|---|---|
| 5 | a | Evaluate (i) Outer diameter.    (ii) Effective diameter. (iii) Core diameter.    (iv) Pitch diameter | CO3 | L3 | 6M |
| | b | Describe measurement of effective diameter with two wire method with neat sketch. | CO3 | L3 | 6M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 6 | a | With the help of an illustration, explain any four alignment tests on lathe. | CO3 | L3 | 6M |
| | b | Discuss the factors influenced working accuracy of the machine tool. | CO3 | L3 | 6M |

## UNIT-IV

| | | | | | |
|---|---|---|---|---|---|
| 7 | a | List out classification of tachometers? Elaborate DC tachometer generator with neat sketch. | CO4 | L3 | 6M |
| | b | Explain working of Photo-electric tachometer. | CO4 | L2 | 6M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 8 | a | The most popular is the vibration seismic accelerator justify with Principle of seismic instrument with neat sketch. | CO4 | L3 | 6M |
| | b | Explain working Principle of Accelerometer with neat sketch. | CO4 | L2 | 6M |

## UNIT-V

| | | | | | |
|---|---|---|---|---|---|
| 9 | a | Define pyrometer? With neat sketch elaborate total radiation pyrometer | CO5 | L2 | 6M |
| | b | What is formula for dead weight tester? Discuss the Dead Weight gauge in detail. | CO5 | L2 | 6M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 10 | a | Discuss the U- tube Differential Manometer in detail. derive the expression for pressure difference. | CO5 | L3 | 6M |
| | b | List out very high pressure measuring instruments and draw with neat sketch C type Bourdon tube. | CO5 | L3 | 6M |

*** END ***

# SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
## (AUTONOMOUS)
### B.Tech. IV Year I Semester Supplementary Examinations June-2025
## METAL FORMING PROCESS
### (Mechanical Engineering)

**Time: 3 Hours**  **Max. Marks: 60**

(Answer all Five Units **5 x 12 = 60** Marks)

## UNIT-I

| | | | | |
|---|---|---|---|---|
| 1 | Discuss in detail about recovery, recrystallisation and grain growth. | CO1 | L6 | 12M |

**OR**

| | | | | |
|---|---|---|---|---|
| 2 | Develop an expression for three dimensional stress analysis. | CO1 | L6 | 12M |

## UNIT-II

| | | | | |
|---|---|---|---|---|
| 3 | Explain the principle and theory of rolling process with a schematic diagram. | CO2 | L2 | 12M |

**OR**

| | | | | |
|---|---|---|---|---|
| 4 | Explain various types of Rolling defects that occur in rolling operation in detail. | CO2 | L3 | 12M |

## UNIT-III

| | | | | |
|---|---|---|---|---|
| 5 | Classify the extrusion process. Explain the mechanism of hot and cold extrusion processes. | CO3 | L4 | 12M |

**OR**

| | | | | |
|---|---|---|---|---|
| 6 | Outline the working principle of forward and backward extrusion process with the proper sketches. | CO3 | L2 | 12M |

## UNIT-IV

| | | | | |
|---|---|---|---|---|
| 7 | Define drawing and explain cup and tube drawing process with proper sketches. | CO4 | L1 | 12M |

**OR**

| | | | | |
|---|---|---|---|---|
| 8 | Explain the mechanism of shearing in sheet metal operation with neat sketch. | CO4 | L2 | 12M |

## UNIT-V

| | | | | |
|---|---|---|---|---|
| 9 | Explain the injection moulding process in detail with suitable sketch. Mention its applications and limitations. | CO5 | L2 | 12M |

**OR**

| | | | | |
|---|---|---|---|---|
| 10 | Discuss any two high energy rate forming methods with the proper sketches. | CO5 | L6 | 12M |

*** END ***

## SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
### (AUTONOMOUS)
**B.Tech IV Year I Semester Supplementary Examinations June-2025**
**Refrigeration & Air Conditioning**
**(Mechanical Engineering)**

Time: 3 Hours                                                                     Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

### UNIT-I

| | | | | | |
|---|---|---|---|---|---|
| 1 | a | Define the following terms. <br> i).Refrigeration ii).Heat Engine | CO1 | L1 | 6M |
| | b | Explain the working of Bell-Coleman cycle air refrigeration with P-v and T-S diagrams. | CO2 | L2 | 6M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 2 | a | What is the Necessity of refrigeration | CO3 | L1 | 6M |
| | b | Describe with a neat sketch a Reduced ambient air refrigeration system | CO1 | L1 | 6M |

### UNIT-II

| | | | | | |
|---|---|---|---|---|---|
| 3 | a | What are the advantages of vapour compression refrigeration system over air refrigeration system? | CO3 | L1 | 6M |
| | b | With a neat sketch, explain the working principle of vapour compression refrigeration system. | CO1 | L5 | 6M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 4 | | A Vapour compression refrigerator works between the pressure limits of 60 bar and 25 bar. The working fluid is just dry at the end of compression and there is no under cooling of the liquid before the expansion valve. Determine (i). C.O.P of the cycle (ii). Capacity of the refrigerator if the fluid flow is at the rate of 5 kg/min. | CO1 | L5 | 12M |

| Pressure (Bar) | Temperature °C | Enthalpy(kj / kg) | | Entropy(Kj / kgK) | |
|---|---|---|---|---|---|
| | | Liquid | Vapour | Liquid | Vapour |
| 60 | 295 | 151.96 | 293.29 | 0.554 | 1.0332 |
| 25 | 261 | 56.32 | 322.58 | 0.226 | 1.2464 |

### UNIT-III

| | | | | | |
|---|---|---|---|---|---|
| 5 | a | Advantages of vapour absorption refrigeration system over vapour compression refrigeration system. | CO2 | L5 | 6M |
| | b | Define the terms nozzle efficiency and entrainment efficiency in steam jet refrigeration system. | CO1 | L1 | 6M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 6 | | Differentiate between vapour absorption and vapour compression refrigeration systems. | CO3 | L4 | 12M |

### UNIT-IV

| | | | | | |
|---|---|---|---|---|---|
| 7 | a | What do you understand by the term psychrometry? | CO1 | L1 | 6M |
| | b | Define the following (i).Specific humidity (ii).Absolute Humidity | CO2 | L1 | 6M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 8 | a | Define relative humidity, absolute humidity | CO2 | L1 | 6M |
| | b | Define saturated air, degree of saturation | CO1 | L1 | 6M |

9  a  Explain year round air conditioning system with sketch      CO1   L2   12M

**OR**

10 a  Why the ducts are used in an air conditioning system.      CO5   L1   6M

   b  Which material is commonly used for making ducts in air conditioning systems?      CO3   L1   6M

**\*\*\* END \*\*\***

## SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
### (AUTONOMOUS)
**B.Tech. IV Year I Semester Supplementary Examinations June-2025**
### OPERATIONS RESEARCH
(Mechanical Engineering)

**Time: 3 Hours**  **Max. Marks: 60**

(Answer all Five Units **5 x 12 = 60** Marks)

### UNIT-I

| | | | |
|---|---|---|---|
| 1 | Solve the following LPP Maximize Z=3X1+5X2+4X3 , Subjected To: 2X1+3X2 $\leq$ 8 , 2X2+5X3 $\leq$ 10, 3X1+2X2+4X3$\leq$15 and X1,X2,X3 $\geq$ 0 | CO1 L3 | 12M |

**OR**

| | | | |
|---|---|---|---|
| 2 | Solve the following by using Big-M method Maximize Z = 2X1+3X2+4X3 , Subjected to 3X1+X2+4X3 < 600 , 2X1+4X2+2X3 > 480 , 2X1+3X2+3X3 = 540 and X1 , X2 ,X3 > 0 | CO1 L3 | 12M |

### UNIT-II

3  Determine the basic Feasible solution to the following Transportation problem using NWC,VCM and VAM.  **CO2 L5 12M**

| | A | B | C | D | E | SUPPLY |
|---|---|---|---|---|---|---|
| P | 2 | 11 | 10 | 3 | 7 | 4 |
| Q | 1 | 4 | 7 | 2 | 1 | 8 |
| R | 3 | 9 | 4 | 8 | 12 | 9 |
| DEMAND | 3 | 3 | 4 | 5 | 6 | |

**OR**

4  Solve the following transportation problem.  **CO2 L5 12M**

| | A | B | C | D | AVAILABLE |
|---|---|---|---|---|---|
| P | 4 | 6 | 8 | 13 | 50 |
| Q | 13 | 11 | 10 | 8 | 70 |
| R | 14 | 4 | 10 | 13 | 30 |
| S | 9 | 11 | 13 | 8 | 50 |
| REQUIRED | 25 | 35 | 105 | 20 | |

Determine the Shipping scheme by the Northwest corner Rule and Test the above solution for Optimality.

### UNIT-III

5  Solve the following GAME, using the Dominance Principle  **CO3 L3 12M**

| Firm A | Firm B | | | | |
|---|---|---|---|---|---|
| | 4 | 6 | 5 | 10 | 6 |
| | 7 | 8 | 5 | 9 | 10 |
| | 8 | 9 | 11 | 10 | 9 |
| | 6 | 4 | 10 | 6 | 4 |

**OR**

6  Consider a self-service store with one cashier. Assume Poisson arrivals and exponential service times. Suppose that 9 customers arrive on the average every 5 minutes and the cashier can serve 10 in 5 minutes, Find  **CO3 L3 12M**
**a)** Average number of customers queuing for service
**b)** Probability of having more than 10 customers in the system.
**c)** Probability that a customer hasto queue for more than 2 minutes

### UNIT-IV

7   Determine the sequence for the jobs and the total elapsed time.    CO4   L5   12M

| | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|
| Machine1 | 4 | 7 | 6 | 11 | 8 | 10 | 9 | 7 | 6 |
| Machine2 | 8 | 10 | 9 | 6 | 5 | 11 | 5 | 10 | 13 |

**OR**

8   A project has the following schedule. Construct PERT network and compute   CO4   L6   12M
the total float for each activity. Find critical path and its duration .Also
calculate Total Float, Free Float

| Activity | 1-2 | 1-3 | 2-4 | 3-4 | 3-5 | 4-9 | 5-6 |
|---|---|---|---|---|---|---|---|
| Time in weeks | 4 | 1 | 1 | 1 | 6 | 5 | 4 |
| Activity | 5-7 | 6-8 | 7-8 | 8-9 | 8-10 | 9-10 | |
| Time in weeks | 8 | 1 | 2 | 1 | 8 | 7 | |

**UNIT-V**

9   Bright Metals limited is considering two different investment proposals A   CO5   L6   12M
&B . The details are as listed below. Suggest the best proposal on basis of
NPV method .considering the future discounted at 12%.Also find out IRR of
two proposals.

| | | Proposal A | Proposal B |
|---|---|---|---|
| Investment Cost | | Rs. 9500 | Rs.20000 |
| Estimated Income | Year 1 | 4000 | 8000 |
| | Year 2 | 4000 | 8000 |
| | Year 3 | 4500 | 12000 |

**OR**

10   a   Explain the Bellman's principle of optimality    CO5   L2   6M
    b   Describe the various types of replacement situations and Explain about   CO5   L1   6M
     group replacement.

**\*\*\* END \*\*\***

## SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
### (AUTONOMOUS)
**B.Tech. III Year I Semester  Supplementary Examinations June-2025**
### DESIGN OF MACHINE ELEMENTS-I
(Mechanical Engineering)

**Time: 3 Hours**  **Max. Marks: 60**

(Answer all Five Units **5 x 12  = 60** Marks)

### UNIT-I

| | | | | | |
|---|---|---|---|---|---|
| 1 | a | How do you classify the machine design? Explain. | CO1 | L1 | 6M |
| | b | Explain the general design procedure while designing a machine element. | CO1 | L2 | 6M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 2 | a | Derive an expression for the impact stress induced due to a falling load | CO1 | L3 | 6M |
| | b | An unknown weight falls through 10 mm on a collar rigidly attached to the lower end of a vertical bar 3 m long and 600 mm$^2$ in section. If the maximum instantaneous extension is known to be 2 mm, what is the corresponding stress and the value of unknown weight? Take E = 200 kN/mm$^2$. | CO1 | L3 | 6M |

### UNIT-II

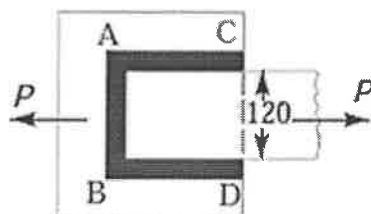| | | | | |
|---|---|---|---|---|
| 3 | Explain stress concentration in detail and various methods to reduce stress concentration in machine members. | CO2 | L2 | 12M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 4 | a | Explain the following terms (i)Theoretical stress concentration factor, (ii) fatigue  stress concentration factor, (iii) Notch sensitivity. | CO2 | L2 | 6M |
| | b | A machine component is subjected to a fluctuating stress that varies from 40 N/mm$^2$ to 100 N/mm$^2$. The corrected endurance limit of the machine component is 270 N/mm$^2$. The ultimate stress and yield point stress of the material are 600 and 400 N/mm$^2$ respectively. Find the factor of safety using: (i) Gerber formula. (ii) Solderberg line. (iii) Goodman line. | CO2 | L3 | 6M |

### UNIT-III

| | | | | | |
|---|---|---|---|---|---|
| 5 | a | Explain briefly the method of riveting. | CO3 | L2 | 6M |
| | b | Double riveted double cover butt joint in plates 20 mm thick is made with25 mm diameter rivets at 100 mm pitch. The permissible stresses are :σt = 120 MPa; τ = 100 MPa; σc= 150 MPa Find the efficiency of joint, taking the strength of the rivet in double shear as twice than that of single shear. | CO3 | L3 | 6M |

**OR**

| | | | | |
|---|---|---|---|---|
| 6 | Determine the length of the weld run for a plate of size 120 mm wide and 15 mm thick to be welded to another plate by means of i). A single transverse weld; ii). Double parallel fillet welds when the joint is subjected to variable loads. | CO3 | L3 | 12M |

| | | | | | |
|---|---|---|---|---|---|
| 7 | a | What are the applications of a cotter joint? | CO4 | L2 | 6M |
| | b | Design a knuckle joint for a tie rod of a circular section to sustain a maximum pull of 70 kN. The ultimate strength of the material of the rod against tearing is 420 MPa. The ultimate tensile and shearing strength of the pin material are 510 MPa and 396 MPa respectively.Determine the tie rod section and pin section. Take factor of safety = 6. | CO4 | L3 | 6M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 8 | a | How the shaft is designed when it is subjected to twisting moment only? | CO4 | L3 | 6M |
| | b | A shaft made of mild steel is required to transmit 100 kW at 300 r.p.m. The supported length of the shaft is 3 meters. It carries two pulleys each weighing 1500 N supported at a distance of 1metre from the ends espectively. Assuming the safe value of stress, determine the diameter of the shaft. | CO4 | L3 | 6M |

UNIT-V

| | | | | | |
|---|---|---|---|---|---|
| 9 | a | What is a key? State its function with neat sketch. | CO5 | L2 | 6M |
| | b | A 45 mm diameter shaft is made of steel with yield strength of 400 MPa. A parallel key of size 14 mm wide and 9 mm thick made of steel with yield strength of 340 MPa is to be used. Find the required length of key, if the shaft is loaded to transmit the maximum permissible torque. Use maximum shear stress theory and assume a factor of safety of 2. | CO5 | L3 | 6M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 10 | | Design a bushed-pin type of flexible coupling to connect a pump shaft to a motor shaft transmitting 32 kW at 960 r.p.m. The overall torque is 20 percent more than mean torque. <br> The material properties are as follows : <br> (a) The allowable shear and crushing stress for shaft and key material is 40 MPa and 80 MPa respectively. <br> (b) The allowable shear stress for cast iron is 15 MPa. <br> (c) The allowable bearing pressure for rubber bush is 0.8 N/mm2. <br> (d) The material of the pin is same as that of shaft and key. <br> Draw neat sketch of the coupling. | CO5 | L3 | 12M |

**\*\*\* END \*\*\***

## SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
### (AUTONOMOUS)
B.Tech II Year I Semester Supplementary Examinations June-2025
### BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to AGE, CSE, CSIT)

**Time: 3 Hours**    **Max. Marks: 60**

*Note: Answer PART-A from pages 2 to 20 and PART-B from 21 to 39.

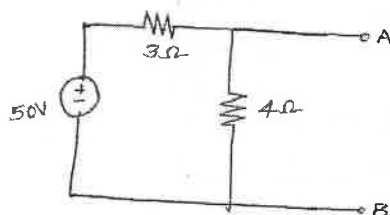(Answer all Six Units 6 X 10 = 60 Marks)
### PART-A
### UNIT-I

| | | | | |
|---|---|---|---|---|
| 1 | a | State and explain Ohm's law. | CO1 | L2 | 5M |
| | b | Explain in detail about passive elements. | CO1 | L2 | 5M |

**OR**

| | | | | |
|---|---|---|---|---|
| 2 | a | Explain about basic circuit components in detail. | CO1 | L2 | 5M |
| | b | Explain about KVL. | CO1 | L2 | 5M |

### UNIT-II

| | | | | |
|---|---|---|---|---|
| 3 | a | State Thevenins theorem. | CO2 | L2 | 2M |
| | b | Find Thevinins equivalent circuit across AB for the circuit shown in below | CO2 | L3 | 8M |



**OR**

| | | | | |
|---|---|---|---|---|
| 4 | The given ABCD parameters are A=2, B=0.9, C=1.2, D=0.5. Find Y parameters. | CO2 | L3 | 10M |

### UNIT-III

| | | | | |
|---|---|---|---|---|
| 5 | a | Discuss about the principle of operation of DC motors | CO3 | L2 | 5M |
| | b | Calculate the value of torque established by the armature of a 4-pole DC motor having 774 conductors, 2 paths in parallel, 24mwb flux per pole when the total armature current is 50A. | CO3 | L3 | 5M |

**OR**

| | | | | |
|---|---|---|---|---|
| 6 | a | Explain principle of operation of transformer. | CO3 | L2 | 5M |
| | b | Derive EMF equation of a transformer. | CO3 | L3 | 5M |

## PART-B

### UNIT-IV

| | | | | | |
|---|---|---|---|---|---|
| 7 | a | Distinguish between conductors, semiconductors and insulators. | CO4 | L2 | 5M |
| | b | What is Doping? Describe P-and N-type semiconductors? | CO4 | L1 | 5M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 8 | a | With neat diagram, explain the working principle of Full Wave Rectifier. Draw its input and Output waveforms. | CO4 | L3 | 5M |
| | b | Discuss Zener Diode breakdown mechanism. Draw the Zener diode in its reverse bias and explain its Volt-Ampere characteristics. | CO4 | L2 | 5M |

### UNIT-V

| | | | | | |
|---|---|---|---|---|---|
| 9 | a | Describe in detail the working of an NPN bipolar junction transistor. Why it is called Bipolar? | CO5 | L1 | 5M |
| | b | Explain with the help of diagrams various types of circuit configurations, which can be obtained from a bipolar junction transistor. | CO5 | L2 | 5M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 10 | a | Describe the voltage divider bias network of BJT with a diagram and equations. | CO5 | L1 | 5M |
| | b | Explain in detail the theory of operation of n-channel JFET. | | L2 | 5M |

### UNIT-VI

| | | | | | |
|---|---|---|---|---|---|
| 11 | a | What is an oscillator and how the oscillators are classified? Write Barkhausen criteria for oscillator operation. | CO6 | L1 | 5M |
| | b | With neat diagram, explain the operation of LC tuned transistor oscillator. | CO6 | L2 | 5M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 12 | a | Discuss the Characteritics of an ideal operational amplifier. | CO6 | L2 | 5M |
| | b | Draw an inverting amplifier of operational amplifier and derive its closed loop gain. | CO6 | L1 | 5M |

**\*\*\* END \*\*\***

## SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
### (AUTONOMOUS)
**B.Tech. II Year I Semester Supplementary Examinations June-2025**
**ENGINEERING MATHEMATICS-III**
(Common to all)

**Time: 3 Hours**      **Max. Marks: 60**

(Answer all Five Units **5 x 12 = 60** Marks)

### UNIT-I

**1** **a** Determine 'p' such that the function $f(z) = \frac{1}{2}\log(x^2 + y^2) + i\tan^{-1}\left(\frac{px}{y}\right)$ be an analytic function.    CO1 L3 6M

**b** Evaluate $\int_c \frac{\log z\, dz}{(z-1)^3}$ where $c : |z-1| = \frac{1}{2}$ using cauchy's integral formula.    CO1 L5 6M

**OR**

**2** Evaluate $\int_0^{1+i}(x^2 - iy)dz$ along the paths $(i)\, y = x\, (ii)\, y = x^2$.    CO1 L5 12M

### UNIT-II

**3** **a** Determine the poles of the function $f(z) = \frac{z^2}{(z-1)^2(z+2)}$ and the residues at each pole.    CO2 L3 6M

**b** Find the bilinear transformation that maps the points $(\infty, i, 0)$ into the points $(0, i, \infty)$    CO2 L3 6M

**OR**

**4** Evaluate $\int_0^\pi \frac{1}{a + b\cos\theta}d\theta = \frac{\pi}{\sqrt{a^2 - b^2}}, a > b > 0.$    CO2 L5 12M

### UNIT-III

**5** Find a real root of the equation $xe^x - \cos x = 0$ using Newton –Raphson Method.    CO3 L3 12M

**OR**

**6** From the following table values of $x$ and $y = \tan x$ interpolate values of $y$ when $x=0.12$ and $x=0.28$.    CO3 L3 12M

| $x$ | 0.10 | 0.15 | 0.20 | 0.25 | 0.30 |
|-----|------|------|------|------|------|
| $y$ | 0.1003 | 0.1511 | 0.2027 | 0.2553 | 0.3093 |

### UNIT-IV

**7** Fit a second degree polynomial to the following data by the method of least squares.    CO4 L4 12M

| $x$ | 0 | 1 | 2 | 3 | 4 |
|-----|---|---|---|---|---|
| $y$ | 1 | 1.8 | 1.3 | 2.5 | 6.3 |

**OR**

**8** Evaluate $\int_0^1 \frac{1}{1+x}dx$    CO4 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.

9   Using Taylor's series method find an approximate value of $y$     CO5   L3   12M
at x=0.2 for the D.E $y^1 - 2y = 3e^x, y(0) = 0.$
compare the numerical solution obtained with exact solution.

**OR**

10   Using R-K method of 4$^{th}$ order find $y(0.1)$ and $y(0.2)$ given that    CO5   L3   12M
$\dfrac{dy}{dx} = 1 + xy, y(0) = 2.$

**\*\*\* END \*\*\***

## SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
### (AUTONOMOUS)
**B.Tech. I Year I Semester Supplementary Examinations June-2025**
### ENGINEERING MATHEMATICS-I
(Common to all)

**Time: 3 Hours**             **Max. Marks: 60**

(Answer all Five Units **5 x 12 = 60** Marks)

### UNIT-I

| | | | | | |
|---|---|---|---|---|---|
| 1 | a | Solve $(1 - x^2)\frac{dy}{dx} + xy = a.x$ . | CO1 | L1 | 6M |
| | b | Solve $(D^3 - 1)y = e^x + \sin 3x + 2$. | CO1 | L2 | 6M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 2 | a | Find the orthogonal trajectories of the family of curves $r^n = a^n \cos n\theta$. | CO1 | L4 | 6M |
| | b | A body is originally at $80^0c$ and cools down to $60^0c$ in 20 min. If the temperature of the air is $40^0c$, then find the temperature of the body after 40 min. | CO1 | L3 | 6M |

### UNIT-II

| | | | | | |
|---|---|---|---|---|---|
| 3 | a | Show that $\sin^{-1} x = x + \frac{x^3}{3!} + \frac{1^2.3^2}{5!}x^5 + \frac{1^2.3^2.5^2}{7!}x^7 + \dots$ | CO2 | L3 | 6M |
| | b | Show that $\log(1 + e^x) = \log 2 + \frac{x}{2} + \frac{x^2}{8} - \frac{x^4}{192} + \dots$ | CO2 | L4 | 6M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 4 | a | Find the radius of curvature at the origin of the curve $y^2 = \frac{x^2(a+x)}{a-x}$. | CO2 | L1 | 6M |
| | b | Find the radius of curvature at the origin for the curve $y^4 + x^3 + a(x^2 + y^2) - a^2 y = 0$. | CO2 | L2 | 6M |

### UNIT-III

| | | | | | |
|---|---|---|---|---|---|
| 5 | a | Evaluate $\int_0^1 \int_0^{x^2} e^{y/x} dy dx$. | CO3 | L1 | 6M |
| | b | Evaluate $\int_{-c}^{c} \int_{-b}^{b} \int_{-a}^{a} (x^2 + y^2 + z^2)\, dx\, dy\, dz$. | CO3 | L2 | 6M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 6 | a | Evaluate the integral by changing the order of integration $\int_0^1 \int_x^{\sqrt{2-x^2}} \frac{x}{\sqrt{x^2+y^2}} dy dx$. | CO3 | L3 | 6M |
| | b | Evaluate the following integral by changing to polar coordinates $\int_0^\infty \int_0^\infty e^{-(x^2+y^2)} dx dy$. | CO3 | L4 | 6M |

7  a   Find the Laplace transform of $\left(\sqrt{t} + \dfrac{1}{\sqrt{t}}\right)^3$ .

CO4    L1    6M

   b   State and prove first shifting theorem.

CO4    L2    6M

**OR**

8   Find Laplace Transform of periodic function $f(t)$ with period T, where

CO4    L4    12M

$$f(t) = \begin{cases} \dfrac{4Et}{T} - E & 0 \le t \le T/2 \\ 3E - \dfrac{4E}{T}t, & T/2 \le t \le T \end{cases}$$

9   a   Find the Inverse Laplace transform of $\dfrac{5s-2}{s^2(s+2)(s-1)}$ .

CO5    L1    6M

    b   Find $L^{-1}\left\{\dfrac{2s-5}{4s^2+25} + \dfrac{4s-18}{9-s^2}\right\}$ by using linear property.

CO5    L2    6M

**OR**

10   Using Laplace Transform solve $(D^2 + n^2)x = a\sin(nt + 2)$ when $x = Dx = 0$ at $t = 0$.

CO5    L4    12M

*** END ***

## SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
### B.Tech III Year I Semester Supplementary Examinations June-2025
### FORMAL LAUNGUAGES AND AUTOMATA THEORY
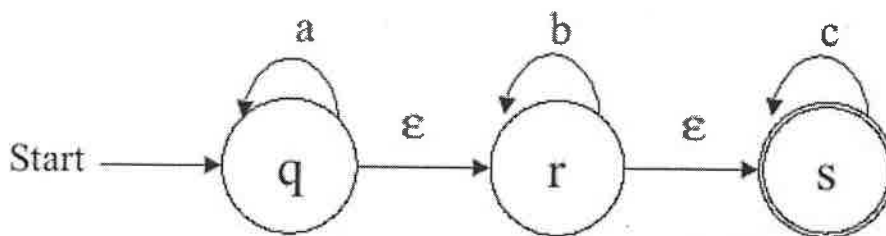(Common to CSE & CSIT)

**Time: 3 Hours**                                           **Max. Marks: 60**

(Answer all Five Units **5 x 12 = 60** Marks)

### UNIT-I

**1**                                                    CO1   L2   12M



Convert the following NFA with ε moves to DFA without ε moves.

**OR**

**2**  Convert the following Mealy machine into its equivalent Moore   CO1   L2   12M
machine.

| Present State | I/P=0 | | I/P=1 | |
|---|---|---|---|---|
| | Next State | O/P | Next State | O/P |
| → A | C | 0 | B | 0 |
| B | A | 1 | D | 0 |
| C | B | 1 | A | 1 |
| D | D | 1 | C | 0 |

### UNIT-II

**3**  **a** Construct an equivalent FA for the given regular expression   CO2   L1   6M
$(0+1)*(00+11)(0+1)*$

**b** State Arden's theorem and construct the regular expression for the   CO2   L1   6M
following FA using Arden's theorem.

**OR**

**4**  **a** List out the identities of Regular expression.   CO2   L1   6M
**b** From the identities of RE, prove that   CO2   L2   6M
i) $10+(1010)*[^+(1010)*]=10+(1010)*$
ii)$(0+011*)+(0+011*)(01+0100*)(01+0100*)*=01*(010*)*$

### UNIT-III

**5**  **a** Explain about derivation and parse trees? Construct the string   CO3   L2   6M
0100110 from the Leftmost and Rightmost derivation.
S->0S/1AA
A->0/1A/0B
B->1/0BB

**b** Find the parse tree for generating the string 11001010 from the given   CO3   L2   6M
grammar.
S->1B/0A
A->1/1S/0AA
B->0/0S/1BB

| | | | | |
|---|---|---|---|---|
| 6 | a | Explain Left recursion and Left factoring. | CO3 | L3 | 6M |
| | b | Perform left factor from the grammar A->abB/aB/cdg/cdeB/cdfB. | CO3 | L3 | 6M |

UNIT-IV

| | | | | |
|---|---|---|---|---|
| 7 | a | Construct a PDA which recognizes all strings that contain equal number of 0's and 1's. | CO4 | L2 | 6M |
| | b | A PDA is more powerful than a finite automaton. Justify this statement. | CO4 | L2 | 6M |

OR

| | | | |
|---|---|---|---|
| 8 | Construct PDA from the following Grammar<br>S->0BB<br>B->0S/1S/0<br>Show an ID for the string 010000 is generated for PDA. | CO4 | L2 | 12M |

UNIT-V

| | | | |
|---|---|---|---|
| 9 | Construct a Turing machine for Language L=anbn,where n>0. | CO5 | L2 | 12M |

OR

| | | | |
|---|---|---|---|
| 10 | Explain conversion of regular Expression to TM with example. | CO5 | L3 | 12M |

*** END ***