LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAACwith'A' Grade& NBA (Under Tier - I)
An ISO 21001:2018,14001:2015,50001:2018 Certified Institution
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.
http://lbrce.ac.in/csit/index.php,hodit@lbrce.ac.in , Phone: 08659-222933, Fax: 08659-222931
DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor : B. SARATH CHANDRA
Course Name & Code : Advanced Java (23IT04) R23
L-T-P Structure : 3-0-0 **Credits**: 3
Program/Sem/Sec : B.Tech., IT., V-Sem. A Secion, **A.Y** : 2026-27

PRE-REQUISITE: Object Oriented Programming through JAVA

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course develops programming ability of students to create dynamic web applications using server-side technology with Java Database Connectivity. Students can learn networking and remote method invocation using Java API and different Java frameworks like Spring will increase ability of students in web application development.

COURSE OUTCOMES (COs): At the end of the course, students are able to

CO 1	Understand the architecture and components of JDBC and implement database-driven applications using JDBC. (Understand - L2)
CO 2	Describe J2EE architecture and design structured web applications using J2EE containers and web components. (Understand - L2)
CO 3	Develop web applications using Servlets by managing sessions, filters, and event handling. (Apply - L3)
CO 4	Create dynamic web pages using Java Server Pages (JSP) with scripting elements, JSTL, and expression language. (Apply - L3)
CO 5	Design and build scalable web applications using Spring Framework modules such as Spring MVC, Spring AOP, and Spring DAO. (Apply - L3)

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1											3		
CO2	2	1	1										3	3	3
CO3	1		3										3	3	3
CO4	2	2											3	3	3
CO5	3	2											2	3	3

Note: Enter Correlation Levels **1** or **2** or **3.** If there is no correlation, **put '-'**
1- Slight (Low), **2 –** Moderate (Medium), **3 -** Substantial (High).

TEXT BOOKS:

T1 Black Book "Java server programming" J2EE, 1st ed., Dream Tech Publishers, 2008.
T2 Complete Reference J2EE, James Keogh, McGraw Hill publication.
T3 Professional Java Server Programming, Subrahmanyam Allamaraju, Cedric Buest, Wiley Publication.
T4 Spring in Action, 3rd edition, Craig walls, Manning Publication.

REFERENCE BOOKS:

R1	Core Java, Volume II: Advanced Features, Cay Horstmann, Gary Cornell Pearson Publication
R2	JDBC™ API Tutorial and Reference, Third Edition, Maydene Fisher, Jon Ellis, Jonathan Bruce, Addison Wesley
R3	Beginning JSP, JSF and Tomcat, Giulio Zambon, Apress

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: JDBC Programming

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	JDBC Architecture, Types of JDBC Drivers	2	01/07/2026 02/07/2026		TLM1	
2.	Introduction to major JDBC Classes and Interface	2	03/07/2026 04/07/2026		TLM1	
3.	Creating simple JDBC Application	2	08/07/2026 09/07/2026		TLM1, TLM4	
4.	Types of Statement (Statement Interface, PreparedStatement, CallableStatement)	2	10/07/2026 15/07/2026		TLM1, TLM4	
5.	Exploring ResultSet Operations	2	16/07/2026 17/07/2026		TLM1, TLM4	
6.	Batch Updates in JDBC	2	18/07/2026 22/07/2026		TLM1	
7.	Creating CRUD Application	2	23/07/2026 24-07-2026		TLM4	
8.	Using Rowsets Objects	2	25-07-2026 29-07-2026		TLM1	
9.	Managing Database Transaction	1	30-07-2026		TLM1	
No. of classes required to complete UNIT-I: 17				No. of classes taken:		

UNIT-II: J2EE and Web Development

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
10.	J2EE Architecture Types, J2EE Containers	1	31-07-2026		TLM1	
11.	Types of Servers in J2EE Application	2	01-08-2026 05-08-2026		TLM1	
12.	HTTP Protocols and API	1	06-08-2026		TLM1	
13.	Request Processing in Web Application	2	07-08-2026 12-08-2026		TLM1	
14.	Web Application Structure	2	13-08-2026 14-08-2026		TLM4	
15.	Web Containers and Web	2	19-08-2026		TLM1	

	Architecture Models		20-08-2026			
No. of classes required to complete UNIT-II: 10				No. of classes taken:		

UNIT-III: Servlet API and Overview

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
16.	Servlet Introduction, Servlet Life Cycle(SLC), Types of Servlet	1	21-08-2026		TLM1	
17.	Servlet Configuration with Deployment Descriptor	1	22-08-2026		TLM1	
18.	Working with ServletContext and ServletConfig Object	1	02-09-2026		TLM1, TLM4	
19.	Attributes in Servlet	1	03-09-2026		TLM1	
20.	Response and Redirection using Request Dispatcher and sendRedirect Method	1	05-09-2026		TLM1, TLM4	
21.	Filter API, Manipulating Responses using Filter API	2	09-09-2026 10-09-2026		TLM1, TLM5	
22.	Session Tracking using Cookies, HTTPSession, Hidden Form Fields and URL Rewriting	2	11-09-2026 16-09-2026		TLM1, TLM4	
23.	Types of Servlet Event: ContextLevel and SessionLevel	1	17-09-2026		TLM1	
No. of classes required to complete UNIT-III: 10				No. of classes taken:		

UNIT-IV : Java Server Pages (JSP)

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
24	Introduction to JSP, Comparison with Servlet	1	18-09-2026		TLM1	
25.	JSP Architecture, JSP Life Cycle	1	23-09-2026		TLM1	
26.	Scripting Elements, Directives, Action Tags, Implicit Objects	2	24-09-2026 25-09-2026		TLM1, TLM4	
27.	Expression Language (EL), JSP Standard Tag Libraries (JSTL)	2	26-09-2026 30-09-2026		TLM1	
28.	Custom Tag, Session Management, Exception Handling	2	01-10-2026 03-10-2026		TLM1, TLM4	
29.	CRUD Application using JSP	2	07-10-2026 08-10-2026		TLM1, TLM4	
No. of classes required to complete UNIT-IV: 10				No. of classes taken:		

UNIT-V : Java Web Frameworks: Spring MVC

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
30.	Spring Introduction, Architecture, Spring MVC Module	2	09-10-2026 14-10-2026		TLM1	
31.	Life Cycle of Bean Factory	1	15-10-2026		TLM1	
32.	Constructor Injection, Dependency Injection, Inner Beans, Aliases in Bean	1	16-10-2025		TLM1	
33.	Bean Scopes, Spring Annotations	2	17-10-2025 28-10-2025		TLM1	
34.	Spring AOP Module, Spring DAO	2	29-10-2026		TLM1	
35.	Database Transaction Management	1	30-10-2026		TLM1	
36.	CRUD Operation using DAO and Spring API	1	31-10-2026		TLM1	
No. of classes required to complete UNIT-V: 10				No. of classes taken:		

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for

	sustainable development.
PO 8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Organize, Analyze and Interpret the data to extract meaningful conclusions.
PSO 2	Design, Implement and Evaluate a computer-based system to meet desired needs.
PSO 3	Develop IT application services with the help of different current engineering tools.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	Mr.B.SARATH CHANDRA	Mr.B.SARATH CHANDRA	Dr. B. Srinivasa Rao	Dr. D. Ratna Kishore
Signature				

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DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr.Cheruku Poorna Venkata Srinivasa Rao
Course Name & Code : COMPUTER NETWORKS -23CS07
L-T-P Structure : 3-0-0
Program/Sem/Sec : B.Tech/V-SEM /A **Credits:** 3
Regulations : R23 **A.Y.:** 2026-27

PREREQUISITE: Communication systems

COURSE EDUCATIONAL OBJECTIVES (CEOs): The main objective of the course is to

- To provide insight about networks, topologies, and the key concepts.
- To gain comprehensive knowledge about the layered communication architectures (OSI and TCP/IP) and its functionalities.
- To understand the principles, key protocols, design issues, and significance of each layer in ISO and TCP/IP.
- To know the basic concepts of network services and various network applications.

COURSE OUTCOMES (COs): At the end of the course, student will be able to

CO1	Understand various network types, topologies, reference models, and transmission media. **(Understand-L2)**
CO2	Examine data link layer design issues, framing techniques, error control, and flow control mechanisms. **(Analyze-L4)**
CO3	Apply multiple media access control techniques and evaluate Ethernet standards for network communication. **(Apply-L3)**
CO4	Implement routing algorithms, congestion control techniques, and IP addressing schemes for efficient network communication. **(Apply-L3)**
CO5	Utilize transport layer protocols (UDP & TCP) and application layer services (HTTP, DNS, Email) to enable secure and reliable data communication. **(Apply-L3)**

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2										1	2		
CO2	3	3		2								1	3		
CO3	2	2	3	2									3	2	
CO4	3	3	3	3								1	3	3	
CO5	3	3	2	2								1	3	3	
1 - Low						**2** –Medium						**3** - High			

TEXTBOOKS:

T1	Computer Networks, Andrew S Tanenbaum, Fifth Edition. Pearson Education/PHI
T2	Data Communications and Networks, Behrouz A. Forouzan, Fifth Edition TMH.

REFERENCE BOOKS:

R1	Data Communications and Networks- Achut S Godbole, AtulKahate Computer Networks, Mayank Dave, CENGAGE
R2	DouglasComer,InternetworkingwithTCP/IP,PrenticeHallofIndia,Volume1,6thEdition, 2009.
R3	RichardStevens,"TCP/IPIllustrated",Addison-Wesley,Volume1,2001.
R4	http://www.cse.iitk.ac.in/users/dheeraj/cs425/.
R5	http://www.tcpipguide.com/free/t_OSIReferenceModelLayers.htm

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction & Physical Layer

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Discussion of Cos and CEOs of the course	1	29-06-2026		TLM1/TLM2	
2.	Introduction to Data Communication and Computer Networks	1	30-06-2026		TLM1	
3.	Network Types, LAN, MAN, WAN	1	02-07-2026		TLM2	
4.	Various Network Connection Topology s	1	04-07-2026		TLM1/TLM2	
5.	OSI model	3	06-07-2026 & 09-07-2026		TLM1,TLM2	
6.	TCP/IP Reference Model	1	11-07-2026		TLM2	
7.	Comparison of the OSIand TCP/IP Reference Models	1	13-07-2026		TLM2	
8.	**Physical Layer:** Introduction to Guided Media Twisted-pair cable	1	14-07-2026		TLM1/TLM2	
9.	Co axial cable, and Fiber optic cable	1	16-07-2026		TLM2	
10.	Introduction about unguided media.	1	18-07-2026		TLM2	
11.	**TUTORIAL / Assignment or Quiz**	1	20-07-2026		TLM3/TLM6	
No. of classes required to complete UNIT-I: 13				**No. of classes taken:**		

UNIT-II: Data Link Layer

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
12.	Introduction to DLL, Data link layer design issues	1	21-07-2026		TLM2	
13.	**Framing:** fixed size	1	23-07-2026		TLM2	

	framing, variable size framing, flow control					
14.	Error control, error detection and correction codes	1	25-07-2026		TLM2/TLM4	
15.	CRC	1	27-07-2026		TLM2/TLM4	
16.	Checksum: idea, one's complement internet checksum	1	28-07-2026		TLM2/TLM4	
17.	Services provided to Network Layer	1	30-07-2026		TLM2	
18.	**Elementary Data Link Layer protocols:** simplex protocol	1	01-08-2026		TLM2	
19.	Simplex stop and wait, Simplex protocol for Noisy Channel	1	03-08-2026		TLM2	
20.	**Sliding window protocol:** One bit, Go back N	1	04-08-2026		TLM2/TLM4	
21.	Selective repeat-Stop and wait protocol	1	06-08-2026		TLM2/TLM4	
22.	**TUTORIAL / Assignment orQuiz**	1	08-08-2026		TLM3/TLM6	
No. of classes required to complete UNIT-II: 11				**No. of classes taken:**		

UNIT-III: Media Access Control: Random Access

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
23.	ALOHA	1	10-08-2026		TLM2	
24.	Carrier sense multiple access (CSMA), CSMA with Collision Detection.	1	11-08-2026		TLM2/TLM1	
25.	CSMA with Collision Avoidance	1	13-08-2026		TLM2	
26.	**Channelization:** frequency division multiple Access (FDMA)	1	17-08-2026		TLM2	
27.	Time division multiple access(TDMA)	1	18-08-2026		TLM2/TLM1	
28.	code division multiple access(CDMA)	1	20-08-2026		TLM2	
29.	Wired LANs: Ethernet, Ethernet Protocol	1	22-08-2026		TLM2/TLM1	
30.	Standard Ethernet, Fast Ethernet (100 Mbps), Gigabit Ethernet, 10 Gigabit Ethernet.	1	31-08-2026		TLM2/TLM1	
31.	**TUTORIAL / Assignment or Quiz**	1	01-09-2026		TLM3/TLM6	
No. of classes required to complete UNIT-III: 09				**No. of classes taken:**		

UNIT-IV: The Network Layer Design Issues

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
32.	Store and Forward Packet Switching-Services Provided to the Transport layer	1	02-09-2026		TLM2/TLM1	
33.	Implementation of Connectionless Service	1	05-09-2026		TLM2	
34.	Implementation of Connection Oriented Service	1	07-09-2026		TLM2/TLM1	
35.	Comparison of Virtual Circuit and Datagram Networks	1	08-09-2026		TLM2	
36.	Routing Algorithms-The Optimality principle	1	10-09-2026		TLM2/TLM4	
37.	Shortest path, Flooding	1	12-09-2026		TLM2	
38.	Distance vector, Link state	1	15-09-2026		TLM2/TLM4	
39.	Distance vector, Link state	1	17-09-2026		TLM2/TLM4	
40.	Hierarchical	1	19-09-2026		TLM2	
41.	Congestion Control algorithms-General principles of congestion control	1	21-09-2026		TLM2	
42.	Congestion prevention polices	1	22-09-2026		TLM2	
43.	Traffic Control Algorithm-Leaky bucket & Token bucket.	1	24-09-2026		TLM2	
44.	**Internet Working:** Network layer in the internet	1	26-09-2026		TLM2	
45.	IP protocols-IP Version 4 protocol-IPV4Header Format	1	28-09-2026		TLM2/TLM4	
46.	IP addresses	1	29-09-2026		TLM2/TLM1	
47.	Class full Addressing, CIDR	1	01-10-2026		TLM2/TLM4	
48.	Subnets-IPVersion6- The main IPV6 header	1	03-10-2026		TLM2/TLM1	
49.	Transition from IPV4 to IPV6	1	05-10-2026		TLM2	
50.	Comparison of IPV4 & IPV6	1	06-10-2026		TLM2	
51.	**TUTORIAL / Assignment or Quiz**	1	08-10-2026		TLM3/TLM6	
No. of classes required to complete UNIT-IV: 20				**No. of classes taken:**		

UNIT-V: The Transport Layer

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
52.	Transport layer protocols: Introduction-services, port number	1	10-10-2026		TLM2	
53.	User data gram protocol-User datagram-UDP Services	1	12-10-2026		TLM2/TLM1	
54.	Transmission control protocol: TCP services	1	13-10-2026		TLM2	
55.	TCP features-Segment- A TCP connection	1	15-10-2026		TLM2/TLM1	
56.	**Application Layer** – World Wide Web: HTTP, Electronic mail-Architecture	1	17-10-2026		TLM2/TLM1	
57.	web based mail-email security, TELENET-local versus remote Logging	1	26-10-2026		TLM2	
58.	Domain Name System.	1	27-10-2026		TLM2	
59.	**TUTORIAL / Assignment or Quiz**	1	29-10-2026		TLM3/TLM6	
No. of classes required to complete UNIT-V: 08				**No. of classes taken:**		

Contents beyond the Syllabus

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	DDNS,N/W Layer Design Issues	1	31-10-2026		TLM2	

Teaching Learning Methods

TLM1	Chalk and Talk	**TLM4**	Demonstration(Lab/ Field Visit)
TLM2	PPT	**TLM5**	ICT(NPTEL/ Swayam Prabha/ MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/ Project

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II)	A1=5
I-Descriptive Examination (Units-I, II)	M1=15

I-Quiz Examination (Units-I, II)	Q1=10
Assignment-II (Unit-III, IV & V)	A2=5
II- Descriptive Examination (Unit-III, IV & V)	M2=15
II-Quiz Examination (Unit-III, IV & V)	Q2=10
Mid Marks =80% of Max (M1+Q1+A1),(M2+Q2+A2))+20% of Min((M1+Q1+A1), (M2+Q2+A2))	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

ACADEMIC CALENDAR:

Description	From	To	Weeks
Commencement of Class Work	29-06-2026		
I Phase of Instructions	29-06-2026	22-08-2026	8W
I Mid Examinations	**24-08-2026**	**29-08-2026**	**1W**
II Phase of Instructions	31-08-2026	17-10-2026	7W
Dussehra Holidays	19-10-2026	24-10-2025	1W
II Phase of Instructions Contd...	26-10-2026	31-10-2026	1W
II Mid Examinations	**02-11-2026**	**07-11-2026**	**1W**
Preparation and Practical's	09-11-2026	14-11-2026	1W
Semester End Examinations	**16-11-2026**	**28-11-2026**	**2W**

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
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PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and sustainability**: Understand the impact of the professional

	engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO1	Organize, Analyze and Interpret the data to extract meaningful conclusions.
PSO2	Design, Implement and Evaluate a computer-based system to meet desired needs.
PSO3	Develop IT application services with the help of different current engineering tools.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	Mr. Ch.Poorna Venkata Srinivasa Rao	Dr. B. Siva Rama Krishna	Dr. G. Rajendra	Dr. D. Ratna Kishore
Signature				

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DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. Ch. Malathi
Course Name & Code **:** Automata Theory & Compiler Design, **23CS12**
L-T-P Structure **: 3-0-0** **Credits:** 03
Program/Sem/Sec : B.Tech-IT / V SEM/A-Sec
A.Y. **:** 2026-27

PRE-REQUISITE: Discrete Mathematics, Programming Basics, Data Structures, Algorithms

1. Understand fundamental concepts of automata, formal languages, and computation.
2. Design finite automata, pushdown automata, and Turing machines.
3. Apply regular expressions and grammars for language processing.
4. Learn the structure and functioning of a compiler.
5. Implement lexical analysis, parsing, and intermediate code generation.

CO1	Understand and apply concepts of formal languages, alphabets, strings, and finite automata for modelling simple computational problems. **(Understand-L2)**
CO2	Construct and analyze regular expressions and context-free grammars for language definition and pattern matching. **(Analyze-L4)**
CO3	Design pushdown automata and Turing machines and evaluate problems of decidability and language classification. **(Create-L6)**
CO4	Explain the phases of compilation and implement lexical and syntax analysis techniques using tools and algorithms. **(Understand-L2)**
CO5	Apply syntax-directed translation and generate intermediate code with memory management for a target machine. **(Apply-L3)**

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

CO	Program Outcomes (POs)												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	2	2								3	2	3
CO2	3	3	3	2	2								3	3	
CO3	3	3	3	3	2								3	3	
CO4	3	3	3	2	3					2			3	3	2
CO5	3	3	3	2	3					2			3	3	3

Note: Enter Correlation Levels **1** or **2** or **3.** If there is no correlation, **put '-'**
1- Slight (Low), **2 –** Moderate (Medium), **3 -** Substantial (High).

TEXTBOOKS:

1. Introduction to Automata Theory, Languages, and Computation, 3nd Edition, John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Pearson Education.
2. Compilers: Principles, Techniques and Tools, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman, 2nd Edition, Pearson.
3. Theory of Computer Science – Automata languages and computation, Mishra and Chandra shekaran, 2nd Edition, PHI.

REFERENCE BOOKS:

1. Introduction to Formal languages Automata Theory and Computation, Kamala Krithivasan, Rama R, Pearson.
2. Introduction to Languages and The Theory of Computation, John C Martin, TMH.
3. lex & yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly
4. Compiler Construction, Kenneth C. Louden, Thomson. Course Technology.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):
UNIT-I: Introduction to Finite Automata

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcomes	HOD Sign Weekly
1	Structural Representations, Automata and Complexity	1	30-06-2026		**TLM1**	CO1	
2	Central Concepts of Automata Theory – Alphabets, Strings, Languages, Problems	3	02-07-2026 03-07-2026 04-07-2026		**TLM1** **TLM2** **TLM2**	CO1	
3	Formal Definition, an application	1	07-07-2026		**TLM1**	CO1	
4	Deterministic Finite Automata (DFA),	1	09-07-2026		**TLM1**	CO1	
5	How A DFA Process Strings	1	10-07-2026		**TLM2**	CO1	
6	The language of DFA	1	11-07-2026		**TLM1**	CO1	
7	Nondeterministic Finite Automata	1	14-07-2026		**TLM1**	CO1	
8	Nondeterministic Finite Automata problems	2	16-07-2026 17-07-2026		**TLM3** **TLM1**	CO1	

9	Finite Automata with Epsilon-Transitions	2	18-07-2026 21-07-2026		**TLM1** **TLM1**	CO1	
10	Conversion of NFA to DFA	2	23-07-2026 24-07-2026		**TLM1** **TLM2**	CO1	
11	Conversion of NFA with €-transitions to NFA without €-transitions	2	25-07-2026 28-07-2026		**TLM1** **TLM3**	CO1	
No. of classes required to complete UNIT-I		17	No. of classes taken:				

UNIT-II: Regular Expression

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcomes	HOD Sign Weekly
12	Finite Automata and Regular Expressions	1	30-07-2026		**TLM1**	CO2	
13	Applications of Regular Expressions	1	31-07-2026		**TLM1**	CO2	
14	Algebraic Laws for Regular Expressions	1	01-07-2026		**TLM1**	CO2	
15	Conversion of Finite Automata to Regular Expressions	2	04-08-2026 06-08-2026		**TLM1** **TLM2**	CO2	
16	Pumping Lemma for Regular Languages	1	07-08-2026		**TLM2**	CO2	
17	Statement of the pumping lemma, Applications of the Pumping Lemma	1	08-08-2026		**TLM6**	CO2	
18	Context free languages: context free grammars(CFG),	2	11-08-2026 13-08-2026		**TLM1**	CO2	
19	Derivations Using a Grammar	2	14-08-2026 18-08-2026		**TLM1** **TLM2**	CO2	
20	the Language of a Grammar	1	20-08-2026		**TLM1**	CO2	
21	Parse Trees	1	21-08-2026		**TLM2**	CO2	
22	Ambiguity in Grammars and Languages	1	22-08-2026		**TLM1**	CO2	
No. of classes required to complete UNIT-2		14	No. of classes taken:				

UNIT – III: Pushdown Automata

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcomes	HOD Sign Weekly
23	Definition of the Pushdown Automaton	1	01-09-2026		**TLM2**	CO3	
24	the Languages of a PDA Grammar	1	03-09-2026		**TLM1**	CO3	
25	Equivalence of PDA's and CFG's	2	05-09-2026 08-09-2026		**TLM1** **TLM3**	CO3	
26	Acceptance by final state Turing Machines	1	10-09-2026		**TLM1**	CO3	
27	Introduction to Turing Machine, Formal Description, Instantaneous description	1	11-09-2026		**TLM2**	CO3	
28	The language of a Turing machine Undecidability:	1	12-09-2026		**TLM1**	CO3	
29	Undecidability, A Language that is Not Recursively Enumerable,	1	15-09-2026		**TLM1**	CO3	
30	An Undecidable Problem That is RE	1	17-09-2026		**TLM1**	CO3	
31	Undecidable Problems about Turing Machines	1	18-09-2026		**TLM1**	CO3	
No. of classes required to complete UNIT-3		10	No. of classes taken:				

UNIT-IV Introduction:

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcomes	HOD Sign Weekly
32	The structure of a compiler	1	19-09-2026		**TLM1**	CO4	
33	Lexical Analysis: The Role of the Lexical Analyzer,Input Buffering,	1	22-09-2026		**TLM1**	CO4	
34	Recognition of Tokens,	1	24-09-2026		**TLM1**	CO4	
35	The Lexical- Analyzer Generator Lex,	1	25-09-2026		**TLM1**	CO4	

36	Syntax Analysis: Introduction, Context-Free Grammars	1	26-09-2026		**TLM1**	CO4	
37	Writing a Grammar, Top-Down Parsing,	2	29-09-2029 01-10-2026		**TLM1** **TLM6**	CO4	
38	Bottom- Up Parsing, Introduction to LR Parsing	2	03-10-2026 06-10-2026		**TLM1** **TLM1**	CO4	
39	Simple LR	1	08-10-2026		**TLM1**	CO4	
40	More Powerful LR Parsers	1	09-10-2026		**TLM1**	CO4	
No. of classes required to complete UNIT-4		12	No. of classes taken:				

UNIT-V: Syntax-Directed Translation

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcomes	HOD Sign Weekly
41	Syntax-Directed Definitions, Evaluation Orders for SDD'	1	10-10-2026		**TLM1**	CO5	
42	Syntax Directed Translation Schemes	1	13-10-2026		**TLM6**	CO5	
43	Implementing L-Attributed SDD's.	1	15-10-2026		**TLM1**	CO5	
44	Intermediate-Code Generation: Variants of Syntax Trees	1	16-10-2026		**TLM1**	CO5	
45	Three-Address Code Run-Time Environments:	1	17-10-2026		**TLM1**	CO5	
46	Stack Allocation of Space	1	27-10-2026		**TLM1**	CO5	
47	Access to Nonlocal Data on the Stack,.	1	29-10-2026		**TLM1**	CO5	
48	Heap Management	2	30-10-2026 31-10-2026		**TLM2**	CO5	
No. of classes required to complete UNIT-5		9	No. of classes taken:				

TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/SWAYAM/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

EVALUATION PROCESS:

Evaluation Task	**Marks**
Assignment-I (Units-I, II & UNIT-III (Half of the Syllabus))	A1=5
I-Descriptive Examination (Units-I, II & UNIT-III (Half of the Syllabus))	M1=15
I-Quiz Examination (Units-I, II & UNIT-III (Half of the Syllabus))	Q1=10
Assignment-II (Unit-III (Remaining Half of the Syllabus), IV & V)	A2=5
II- Descriptive Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	M2=15
II-Quiz Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineer**ing and management principles and apply these to one's own work, as a member and** leader in a team, to manage projects and in multidisciplinary environments
PO 12	**Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Organize, Analyze and Interpret the data to extract meaningful conclusions.
PSO 2	Design, Implement and Evaluate a computer-based system to meet desired needs.
PSO 3	Develop IT application services with the help of different current engineering tools.

	Course Instructor	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	Dr. Ch. Malathi	Dr. D. Veeraiah	Mr. G Rajendra	Dr. D. Ratna Kishore
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAAC with 'A' Grade & NBA (Under Tier - I)
An ISO 21001:2018,14001:2015,50001:2018 Certified Institution
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
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DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor : *Dr.S.Naganjaneyulu*
Course Name & Code : **23AD02-ARTIFICIAL INTELLIGENCE**
L-T-P Structure : *3-0-0* *Credits: 3*
Program/Sem/Sec : *B.Tech/V Sem/A&B Sec* **A.Y.:** *2026-27*

PREREQUISITE: Basic Engineering and Mathematics knowledge

COURSE EDUCATIONAL OBJECTIVES (CEOs):

1. *The student should be made to study the concepts of Artificial Intelligence.*
2. *The student should be made to learn the methods of solving problems using Artificial Intelligence.*
3. *The student should be made to introduce the concepts of Expert Systems.*
4. *To understand the applications of AI, namely game playing, theorem proving, and machine learning.*
5. *To learn different knowledge representation techniques.*

COURSE OUTCOMES (COs): *At the end of the course, student will be able to*

CO1	*Enumerate the history & Foundation of AI* **(Understand-L2)**
CO2	*Apply the Searching algorithms for AI in problem solving* **(Apply-L3)**
CO3	*Choose the appropriate representation of knowledge* **(Apply-L3)**
CO4	*Choose the appropriate logic concepts* **(Apply-L3)**
CO5	*Understand the Expert systems techniques in AI* **(Understand-L2)**

COURSE ARTICULATION MATRIX *(Correlation between COs, POs & PSOs):*

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	-	-	-	-	-	-	-	-	-	2	-	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	3	2	3	-
CO3	3	3	2	-	-	-	-	-	-	-	-	1	2	3	-
CO4	3	3	2	-	-	-	-	-	-	-	-	1	2	3	-
CO5	2	2	-	-	-	-	-	-	-	-	-	1	1	1	-
1 - *Low* **2 –***Medium* **3 -** *High*															

TEXTBOOKS:

T1	*S. Russel and P. Norvig "Artificial Intelligence–A Modern Approach", Second Edition, Pearson Education.*
T2	*Kevin Night and Elaine Rich, Nair B. "Artificial Intelligence (SIE)", Mc Graw Hill*

REFERENCE BOOKS:

R1	*David Poole, Alan Mack worth, Randy Goebel, "Computational Intelligence: a logical approach", Oxford University Press.*
R2	*G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", Fourth Edition, Pearson Education.*
R3	*J.Nilsson,"ArtificialIntelligence:AnewSynthesis",ElsevierPublishers.*
R4	*Artificial Intelligence, Saroj Kaushik, CENGAGE Learning.*

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	**Introduction:** *AI problems*	1	29/06/2026		*TLM1,2*	
2.	*Foundation of AI and history of AI*	1	30/06/2026		*TLM1,2*	
3.	*Intelligent Agents : Agents*	1	01/07/2026		*TLM1,2*	
4.	*Types of Agents*	1	04/07/2026		*TLM1,2*	
5.	*Environments, Concept of rationality*	1	06/07/2026		*TLM1,2*	
6.	*Nature of environments*	1	07/07/2026		*TLM1,2*	
7.	*Structure of agents*	1	08/07/2026		*TLM1,2*	
8.	*Problem solving agents*	1	11/07/2026		*TLM1,2*	
9.	*Problem formulation*	1	13/07/2026		*TLM1,2*	
10.	*AI's Impact on Jobs and Economy (Group Discussion)*	1	14/07/2026		*TLM6*	
No. of classes required to complete UNIT-I: 10				**No. of classes taken:**		

UNIT-II: Searching

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
11.	*Searching for solutions*	1	15/07/2026		*TLM1,2*	
12.	*uniformed search strategies*	1	18/07/2026		*TLM1,2*	
13.	*Breadth first search, depth first Search.*	1	20/07/2026		*TLM1,2*	
14.	*Search with partial information(Heuristic search)*	1	21/07/2026		*TLM1,2*	
15.	*Hill climbing*	1	22/07/2026		*TLM1,2*	
16.	*A* Algorithm*	1	25/07/2026		*TLM1,2*	
17.	*AO* Algorithm, Problem reduction*	1	27/07/2026		*TLM1,2*	
18.	*Game Playing-Adversial search*	1	28/07/2026		*TLM1,2*	
19.	*Games, mini-max algorithm*	1	29/07/2026		*TLM1,2*	
20.	*optimal decisions in multiplayer games, Problem in Game playing*	1	01/08/2026		*TLM1,2*	
21.	*Alpha-Beta pruning, Evaluation functions*	1	03/08/2026		*TLM1,2*	
22.	*Types of Deep Neural Networks*	1	04/08/2026		*TLM1,2*	
23.	*Tutorial*	1	08/08/2026		*TLM 3*	
No. of classes required to complete UNIT-II: 13				**No. of classes taken:**		

UNIT-III: Representation of Knowledge

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
24.	*Knowledge Representation and issues*	1	10/08/2026		*TLM1,2*	
25.	*Predicate logic- logic programming*	2	11/08/2026 12/08/2026		*TLM1,2*	
26.	*Semantic nets- frames and inheritance,*	2	17/08/2026 18/08/2026		*TLM1,2*	
27.	*Constraint propagation*	1	19/08/2026		*TLM1,2*	
28.	*Representing knowledge using Rules*	1	22/08/2026		*TLM1,2*	
29.	*Rules based deduction systems*	1	31/08/2026		*TLM1,2*	
30.	*Reasoning under uncertainty and review of probability*	1	01/09/2026		*TLM1,2*	
31.	*Bayes' probabilistic interferences*	1	02/09/2026		*TLM1,2*	
32.	*Dempster shafer theory*	1	05/09/2026		*TLM1,2*	
No. of classes required to complete UNIT-III: 11				**No. of classes taken:**		

UNIT-IV: Logic Concepts

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
33.	*First order logic. Inference in first order logic*	*1*	*07/09/2026*		*TLM1,2*	
34.	*Propositional vs. first order*	*1*	*08/09/2026*		*TLM1,2*	
35.	*Inference*	*1*	*09/09/2026*		*TLM1,2*	
36.	*Unification & lifts forward chaining*	*1*	*15/09/2026*		*TLM1,2*	
37.	*Backward chaining, Resolution*	*1*	*16/09/2026*		*TLM1,2*	
38.	*Learning from observation Inductive learning*	*1*	*19/09/2026*		*TLM1,2*	
39.	*Decision trees, Explanation based learning,*	*2*	*21/09/2026* *22/09/2026*		*TLM1,2*	
40.	*Statistical Learning methods Reinforcement Learning.*	*2*	*23/09/2026* *26/09/2026*		*TLM1,2*	
No. of classes required to complete UNIT-IV: 10				**No. of classes taken:**		

UNIT-V: Expert Systems

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
41.	*Architecture of expert systems*	*2*	*28/09/2026* *29/09/2026*		*TLM1,2*	
42.	*Knowledge Acquisition Meta knowledge Heuristics.*	*2*	*30/09/2026* *03/10/2026*		*TLM1,2*	
43.	*Typical expert systems*	*1*	*05/10/2026*		*TLM1,2*	
44.	*MYCIN*	*2*	*06/10/2026* *07/10/2026*		*TLM1,2*	
45.	*DART*	*2*	*12/10/2026* *13/10/2026*		*TLM1,2*	
46.	*XCON: Expert systems*	*2*	*17/10/2026* *26/10/2026*		*TLM1,2*	

	shells.					
47.	*Tutorial*	*1*	*27/10/2026*		*TLM3*	
No. of classes required to complete UNIT-V: 12				**No. of classes taken:**		

Contents beyond the Syllabus

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
48.	*Generative AI*	*1*	*31/10/2026*		*TLM1,2*	

Teaching Learning Methods			
TLM1	*Chalk and Talk*	**TLM4**	*Demonstration (Lab/Field Visit)*
TLM2	*PPT*	**TLM5**	*ICT (NPTEL/Swayam Prabha/MOOCS)*
TLM3	*Tutorial*	**TLM6**	*Group Discussion/Project*

ACADEMIC CALENDAR:

Description	From	To	Weeks
Commencement of Class Work	*29-06-2026*		
I Phase of Instructions	*29-06-2026*	*22-08-2026*	*8W*
I Mid Examinations	**24-08-2026**	**29-08-2026**	**1W**
II Phase of Instructions	*31-08-2026*	*17-10-2026*	*7W*
Dussehra Holidays	*19-10-2026*	*24-10-2026*	*1W*
II Phase of Instructions Contd…	*26-10-2026*	*31-10-2026*	*1W*
II Mid Examinations	**02-11-2026**	**07-11-2026**	**1W**
Preparation and Practical's	*09-11-2026*	*14-11-2026*	*1W*
Semester End Examinations	**16-11-2026**	**28-11-2026**	**2W**

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II	*A1=5*
I-Descriptive Examination (Units-I, II)	*M1=15*
I-Quiz Examination (Units-I, II)	*Q1=10*
Assignment-II (Unit-III, IV & V)	*A2=5*
II- Descriptive Examination (UNIT-III, IV & V)	*M2=15*
II-Quiz Examination (UNIT-III ,IV & V)	*Q2=10*
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	*M=30*
Cumulative Internal Examination (CIE): M	*30*
Semester End Examination (SEE)	*70*
Total Marks = CIE + SEE	*100*

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	**Organize, Analyze and Interpret the data to extract meaningful conclusions.**
PSO 2	**Design, Implement and Evaluate a computer-based system to meet desired needs.**
PSO 3	**Develop IT application services with the help of different current engineering tools.**

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	**Dr.S.Naganjaneyulu**	**Dr.N.V MahaLakshmi**	**Dr.G.Rajendra**	**Dr. D. Ratna Kishore**
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
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http://lbrce.ac.in/csit/index.php,hodit@lbrce.ac.in , Phone: 08659-222933, Fax: 08659-222931
DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr. PHANEENDRA KANAKAMEDALA

Course Name & Code : CYBER SECURITY - 201T05

L-T-P Structure : 3-0-0 **Credits: 03**

Program/Sem/Sec : **B.Tech-CSIT – A&B / V SEM**

A.Y. : 2026-27

PRE-REQUISITE: Understanding of digital logic, operating system concepts, Computer hardware knowledge.

COURSE EDUCATIONAL OBJECTIVES (CEOs):

- Identify security risks and take preventive steps
- Understand the forensics fundamentals
- Understand the evidence capturing process
- Understand the preservation of digital evidence

CO1	Understand various cybercrimes and cyber security. **(Understand- L2)**
CO2	Understand the key tools, techniques, and methods employed in cybercrime **(Understand- L2)**
CO3	Apply cybercrime investigation techniques and tools to investigate cybercrime incidents. **(Apply - L3)**
CO4	Apply computer forensic tools and investigation procedures to acquire and analyze digital evidence. **(Apply - L3)**
CO5	Understand the legal provisions, challenges, and amendments related to cybercrime under the Indian Act. **(Understand - L2)**

Course Articulation Matrix (Correlation between COs &POs, PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**1**	**1**	1	1		-	-	-	-	-	-	1		1	1
CO2	1	**1**	2	1	1	-	-	-	-	-	-	2	1	2	1
CO3	2	**2**	2	2	2	-	-	-	-	-	-	2	2	1	1
CO4	1	**1**	1	1	2	-	-	-	-	-	-	2	1	2	2
CO5			1			2	-	-	-	-	-	1	1		**1**
1 - *Low*						**2** –*Medium*							**3** - *High*		

TEXT BOOKS:

1. Sunit Belapure Nina Godbole "Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", WILEY,2011
2. Nelson Phillips and Enfinger Steuart, "Computer Forensics and Investigations", Cengage Learning, New Delhi, 2009.

REFERENCE BOOKS:

1. Michael Simpson, Kent Blackman and James e. Corley, "Hands on Ethical Hacking and Network Defense", Cengage, 2019
2. Computer Forensics, Computer Crime Investigation by John R.Vacca, Firewall Media, New Delhi
3. Alfred Basta, Nadine Basta, Mary Brown and Ravindra Kumar "Cyber Security and Cyber Laws", Cengage, 2018

E-Resources:

1. CERT-In Guidelines- http://www.cert-in.org.in/
2. https://www.coursera.org/learn/introduction-cybersecurity-cyber-attacks [Online Course]
3. https://computersecurity.stanford.edu/free-online-videos [Free Online Videos]
4. Nickolai Zeldovich. 6.858 Computer Systems Security. Fall 2014. Massachusetts Institute of Technology: MIT Open Course Ware, https://ocw.mit.edu License: Creative Commons BY-NC- SA.

Part-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction to Cybercrime

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcomes	HOD Sign Weekly
1	Introduction to CO-PO-PSO, Introduction to CS	1	29-06-2026		**TLM2**	CO1	
2	Cybercrime definition and origins of the word	1	30-06-2026		**TLM2**	CO1	
3	Cybercrime and Information Security	1	01-07-2026		**TLM2**	CO1	
4	Cybercriminals	1	04-07-2026		**TLM2**	CO1	
5	Classifications of Cybercrime	1	06-07-2026		**TLM2**	CO1	
6	Cyberstalking Cybercafé and Cybercrime	2	07-07-2026 08-07-2026		**TLM2**	CO1	
7	Botnets Security Challenges Posed by Mobile	1	13-07-2026		**TLM2**	CO1	
8	Attacks on Mobile/Cell Phones	1	14-07-2026		**TLM2**	CO1	
9	Network and Computer Attacks	1	15-07-2026		**TLM2**	CO1	
No. of classes required to complete		10	No. of classes taken:				

UNIT-I		

UNIT-II: Tools and Methods

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcomes	HOD Sign Weekly
10	Proxy Servers and Anonymizers	1	20-07-2026		**TLM2**	CO2	
11	Phishing, Password Cracking	2	21-07-2026 22-07-2026		**TLM2**	CO2	
12	Key loggers and Spywares Virus and Worms	2	25-07-2026 27-07-2026		**TLM2**	CO2	
13	Trojan Horses and Backdoors Steganography	2	28-07-2026 29-07-2026		**TLM2**	CO2	
14	Sniffers, Spoofing, session Hijacking Buffer Overflow Identity Theft	2	01-08-2026 03-08-2026		**TLM2**	CO2	
15	Dos and DDos Attacks SQL Injection, Port Scanning	2	04-08-2026 05-08-2026		**TLM2**	CO2	
16	Activity	1	10-08-2026		**TLM2,4**	CO2	
No. of classes required to complete UNIT-2		12	No. of classes taken:				

UNIT – III: Cyber Crime Investigation

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcomes	HOD Sign Weekly
17	Introduction, Investigation Tools, eDiscovery,	1	11-08-2026		**TLM2**	CO3	
18	Digital Evidence Collection, Evidence Preservation	2	12-08-2026 17-08-2026		**TLM2**	CO3	
19	E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery	2	18-08-2026 19-08-2026		**TLM2**	CO3	
20	Hands on Case Studies. Encryption and Decryption Methods	2	22-08-2026 31-08-2026		**TLM2**	CO3	
21	Search and Seizure of Computers	2	01-09-2026 02-09-2026		**TLM2**	CO3	

22	Recovering Deleted Evidences,	1	05-09-2026		**TLM2**	CO3	
23	Password Cracking.	1	07-09-2026		**TLM2**	CO3	
24	Activity	1	08-09-2026		**TLM2,4**	CO3	
No. of classes required to complete UNIT-3		12	No. of classes taken:				

UNIT-IV: Computer Forensics and Investigations

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcomes	HOD Sign Weekly
25	Understanding Computer Forensics, Preparing for Computer Investigations.	2	09-09-2026 15-09-2026		**TLM2**	CO4	
26	Current Computer Forensics Tools: Evaluating Computer Forensics Tools, Computer Forensics Software Tools, Computer Forensics Hardware Tools,	2	16-09-2025 19-07-2026		**TLM2**	CO4	
27	Validating and Testing Forensics Software,	1	21-09-2026		**TLM2**	CO4	
28	Face, Iris and Fingerprint Recognition,	1	22-09-2026		**TLM2**	CO4	
29	Audio Video Analysis,	1	23-09-2026		**TLM2**	CO4	
30	Windows System Forensics, Linux System Forensics	1	26-09-2026		**TLM2**	CO4	
31	Graphics and Network Forensics	1	28-09-2026		**TLM2**	CO4	
32	E-mail Investigations, Cell Phone and Mobile Device Forensics	1	29-09-2026		**TLM2**	CO4	
33	Activity	1	30-09-2026		**TLM2,4**	CO4	
No. of classes required to complete UNIT-4		11	No. of classes taken:				

UNIT-V: Cyber Crime Legal Perspectives

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcomes	HOD Sign Weekly
34	Introduction, Cybercrime and the Legal Landscape around the World	1	03-10-2026		**TLM2**	CO5	
35	The Indian IT Act,	1	05-10-2026		**TLM2**	CO5	
36	Challenges to Indian Law and Cybercrime Scenario in India	1	06-10-2026		**TLM2**	CO5	
37	Consequences of not Addressing the Weakness in Information Technology Act Digital Signatures and the Indian IT Act,	2	07-10-2026 12-10-2026		**TLM2**	CO5	
38	Amendments to the Indian IT Act, Cybercrime and Punishment	2	13-10-2026 14-10-2026		**TLM2**	CO5	
39	Cyber law, Technology and Students: Indian Scenario.	1	17-10-2026 26-10-2026		**TLM2**	CO5	
40	Activity	2	27-10-2026 28-10-2026		**TLM2,4**	CO5	
No. of classes required to complete UNIT-5		9	No. of classes taken:				

Contents beyond the Syllabus

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign
1.	Using AI/ML to Analyze Cyber Threats	1	18-07-2026		TLM2	
2.	Cloud Security	1	31-10-2026		TLM2	

TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion / Project

Part – C

EVALUATION PROCESS:

Evaluation Task	Marks
Assignment-I (Units-I, II & UNIT-III (Half of the Syllabus))	A1=5
I-Descriptive Examination (Units-I, II & UNIT-III (Half of the Syllabus))	M1=15
I-Quiz Examination (Units-I, II & UNIT-III (Half of the Syllabus))	Q1=10
Assignment-II (Unit-III (Remaining Half of the Syllabus), IV & V)	A2=5
II- Descriptive Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	M2=15
II-Quiz Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

ACADEMIC CALENDAR:

Description	From	To	Weeks
Commencement of Class Work	29-06-2026		
I Phase of Instructions	29-06-2026	22-08-2026	8W
I Mid Examinations	24-08-2026	29-08-2026	1W
II Phase of Instructions	31-08-2026	17-10-2026	7W
II Phase of Instructions Cont..	26-10-2026	31-10-2026	1W
II MID Examinations	02-11-2026	07-11-2026	1W
Preparation and Practical's	09-11-2026	14-11-2026	1W
Semester End Examinations	16-11-2026	28-11-2026	2W

PART-D

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO 1	Pursue a successful career in the area of Information Technology or its allied fields.
PEO 2	Exhibit sound knowledge in the fundamentals of Information Technology and apply practical experience with programming techniques to solve real world problems.
PEO 3	Able to demonstrate self-learning, life-long learning and work in teams on multidisciplinary projects.
PEO 4	Able to understand the professional code of ethics and demonstrate ethical behavior, effective communication and team work and leadership skills in their job.

PROGRAMME OUTCOMES (POs):

PO1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability**: Understand the impact of the professional engineering solution sin societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and

norms of the engineering practice.

PO9 **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1 Organize, Analyze and Interpret the data to extract meaningful conclusions.

PSO2 Design, Implement and Evaluate a computer-based system to meet desired needs.

PSO3 Develop IT application services with the help of different current engineering tools.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	**Dr. K. Phaneendra**	**Dr. K. Phaneendra**	**Dr. G. Rajendra**	**Dr. D. Ratna Kishore**
Signature				

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DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

COURSE HANDOUT
PART - A

PROGRAM : **B.Tech. - V-Sem. – A & B Sec - Information Technology**
ACADEMIC YEAR : 2026-27
COURSE NAME & CODE : **INTRODUCTION TO INDUSTRIAL ROBOTICS – 23ME82**
L-T-P STRUCTURE : 3-0-0
COURSE CREDITS : 3
COURSE INSTRUCTOR : **Dr. CH. Siva Sankara Babu, Associate Professor in Mechanical Engineering**
COURSE COORDINATOR : **Mr. J. Subba Reddy, Associate Professor in Mechanical Engineering**
PER-REQUISITE :

COURSE EDUCATIONAL OBJECTIVES:

This course introduces students to the fundamental components and applications of industrial robotic systems. It covers various types of actuators, robot kinematics, and control programming principles. Additionally, students will explore the role of image processing and machine vision in enhancing robotic functionality.

COURSE OUTCOMES: At the end of the course, the student will be able to

- **CO1:** Comprehend the anatomy of a robot and identify the components, configurations, and industrial applications of robotic systems. **(Understanding – L2)**
- **CO2:** Describe the types, characteristics, and selection criteria of actuators and sensors used in robotic systems. **(Understanding – L2)**
- **CO3:** Apply D-H parameters to solve forward and inverse kinematics of robotic manipulators. **(Applying – L3)**
- **CO4:** Demonstrate the principles of trajectory planning, learn robot programming, and utilize programming languages for robot control. **(Applying – L3)**
- **CO5:** Describe the principles and applications of image processing and machine vision in robotics. **(Understanding – L2)**

COURSE ARTICULATION MATRIX (Correlation between COs & POs, PSOs):

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3					2						2		2	3
CO2	3	3	2									2		2	3
CO3	3	3	2									2		2	3
CO4	3	2	1				2					2		2	2
CO5	2					3	3					1	2	2	2

Note: Enter Correlation Levels **1** or **2** or **3.** If there is no correlation, **put '-'**
1- Slight (Low), **2 -** Moderate (Medium), **3 -** Substantial (High).

TEXT BOOKS

1. Saeed B.Niku, Introduction to robotics- analysis, systems &application, Second Edition, Willy India Private Limited, New Delhi,2011.
2. R.K.Mittal and IJ Nagrath, Robotics and Control, Tata McGraw–Hill Publishing company Limited, New Delhi, 2003.

REFERENCES

1. Mikell P.Groover, Mitchell Weiss, Roger N. Nagel and Nicholas G. Odrey,Ashish Dutta, Industrial Robotics, Second Edition McGraw- Hill Education (India) PrivateLimited,2012
2. Robert J.Schilling, Fundamentals of robotics analysis & control, PHI learning private Limited, New Delhi,4thEdition 2002
3. John.JCriag, Introduction to Robotics-Mechanics and Control, Third Edition, Pearson Education,Inc., 2008.

SYLLABUS:

UNIT I: INTRODUCTION TO ROBOTICS AND ROBOT ANATOMY

INTRODUCTION: Overview of Robotics in the context of Automation, CAD/CAM, and Industry 4.0 – Evolution of Robotics – Present and emerging applications in smart manufacturing, healthcare, logistics, and AI-driven systems – Classification of robots based on coordinate and control systems.

ROBOT ANATOMY & STRUCTURE: Components of a robotic system – Robot structure, degrees of freedom, workspace – Robot drive systems and kinematic chains – Block diagram and signal flow representation – Types of arms and their configuration – End-effectors: types, design challenges, and selection criteria.

UNIT II: ACTUATION AND SENSOR SYSTEMS FOR ROBOTICS

ACTUATORS: Working principles and control of pneumatic, hydraulic, and electrical actuators – Stepper and servo motors – Comparison of actuation methods with respect to cost, performance, and integration with embedded systems.

SENSORS AND FEEDBACK COMPONENTS: Role of sensors in robotic perception and control – Position sensors (potentiometers, encoders, resolvers), velocity sensors – Feedback mechanisms in robotic systems – Integration with microcontrollers and data acquisition systems.

UNIT III: ROBOT KINEMATICS AND TRANSFORMATIONS

MOTION ANALYSIS: Coordinate transformations – Homogeneous transformations for rotation and translation in 2D/3D space – Transformation matrices.

MANIPULATOR KINEMATICS: Denavit–Hartenberg (D-H) parameters – Forward and inverse kinematics for articulated manipulators – Joint space vs task space – Solving kinematics using programming approaches (Python/Matlab/ROS).

UNIT IV: PATH PLANNING AND ROBOT PROGRAMMING

TRAJECTORY PLANNING: Basics of trajectory generation – Obstacle avoidance strategies – Motion interpolation (joint, linear, and circular paths) – Skew motion and joint-integrated motion.

PROGRAMMING AND SIMULATION: Introduction to robot programming languages (e.g., Python, RAPID, URScript) – Overview of simulation platforms such as RoboDK, ROS, and Gazebo – Basics of software stacks for robot control and path execution.

UNIT V: MACHINE VISION AND IMAGE PROCESSING FOR ROBOTICS

MACHINE VISION SYSTEMS: Concepts of sensing and digitization – Vision system architecture – Image preprocessing, feature extraction, and object recognition.

ROBOTIC APPLICATIONS: Applications of machine vision in navigation, inspection, pick-and-place, quality control, and autonomous systems – Introduction to Open CV and AI models in vision tasks – Training vision systems using supervised and unsupervised learning techniques.

COURSE DELIVERY PLAN (LESSON PLAN): INTRODUCTION TO INDUSTRIAL ROBOTICS (23ME82)

PART - B

UNIT-I: INTRODUCTION TO ROBOTICS AND ROBOT ANATOMY

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Textbook followed	HOD Sign Weekly
1.	**Introduction to Industrial Robotics,** CEOs, Course Outcomes, POs and PSOs	1	29-06-2026		**TLM2**	CO1	T1, T2, R1, R2	
2.	**INTRODUCTION:** Overview of Robotics in the context of Automation, CAD/CAM, and Industry 4.0	1	03-07-2026		**TLM2**	CO1	T1, T2, R1, R2	
3.	Evolution of Robotics – Present and emerging applications in smart manufacturing, healthcare, logistics, and AI-driven systems, Classification of robots based on coordinate systems and control systems	1	04-07-2026		**TLM10, TLM2**	CO1	T1, T2, R1, R2	
4.	**ROBOT ANATOMY & STRUCTURE**: Components of a robotic system – Robot structure, Degrees of freedom, workspace	1	06-07-2026		**TLM2, TLM8**	CO1	T1, T2, R1, R2	
5.	Robot drive systems and kinematic chains – Block diagram and signal flow representation, Types of arms and their configuration	1	10-07-2026		**TLM2**	CO1	T1, T2, R1, R2	
6.	Types of End Effectors – Mechanical Grippers, Vacuum Cups, Magnetic Grippers, Adhesive Grippers and others	1	11-07-2026		**TLM2** TLM9	CO1	T1, T2, R1, R2	
7.	Robot / End effectors interface, Design challenges of end effectors and selection criteria	1	13-07-2026		**TLM2**	CO1	T1, T2, R1, R2	
8.	Case Studies, Numericals, **Tutorial**	1	17-07-2026		**TLM2**	CO1	T1, T2, R1, R2	
9.	Numericals	1	18-07-2026		**TLM3**	CO1	T1, T2, R1, R2	
Number of classes required to complete UNIT-I:		**09**			**No. of classes taken:**			

UNIT-II: ACTUATION AND SENSOR SYSTEMS FOR ROBOTICS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Textbook followed	HOD Sign Weekly
10.	**ACTUATORS:** Introduction to Actuators, Characteristics of the Actuating System	1	20-07-2026		**TLM2, TLM13**	CO2	T1,R1	
11.	Working principles and control of pneumatic actuators	1	24-07-2026		**TLM2, TLM9**	CO2	T1,R1	
12.	Working principles and control of hydraulic actuators	1	25-07-2026		**TLM2**	CO2	T1,R1	
13.	Working principles and control of electrical actuators: Stepper and Servo motors	1	27-07-2026		**TLM2, TLM13**	CO2	T1,R1	
14.	Comparison of actuation methods with respect to cost, performance, and integration with embedded systems.	1	31-07-2026		**TLM2**	CO2	T1,R1	
15.	**SENSORS AND FEEDBACK COMPONENTS:** Introduction to Sensors, Sensor characteristics, Role of sensors in robotic perception and control	1	01-08-2026		**TLM3, TLM9**	CO2	T1,R1	
16.	Position sensors (potentiometers, encoders, resolvers), velocity sensors	1	03-08-2026		**TLM1,TLM 9**	CO2	T1,R1	
17.	Feedback mechanisms in robotic systems, Integration with microcontrollers and data acquisition systems.	1	07-08-2026		**TLM1**	CO2	T1,R1	
18.	Industrial Applications, **Tutorial,** Case Studies	1	08-08-2026		**TLM1**	CO2	T1,R1	
Number of classes required to complete UNIT-II		**09**		**No. of classes taken:**				

UNIT III: ROBOT KINEMATICS AND TRANSFORMATIONS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Textbook followed	HOD Sign Weekly
19.	**MOTION ANALY**SIS: Introduction to Manipulator Kinematics, Coordinate Frames, Description of Objects in Space	1	10-08-2026		**TLM2**	CO3	T1,R1	
20.	Coordinate transformations – Homogeneous transformations for rotation and translation in 2D/3D space	1	14-08-2026		**TLM2, TLM7**	CO3	T1,R1	
21.	Transformation matrices, Numericals, Fundamental Rotation Matrices, Numericals	1	17-08-2026		**TLM2**	CO3	T1,R1	
22.	Inverting a Homogeneous Transform, **Tutorial**	1	21-08-2026		**TLM2**	CO3	T1,R1	
23.	Representation of Robotic Configurations in HTM form, Numericals	1	22-08-2026		**TLM2**	CO3	T1,R1	
	I Mid Examinations	06	**24-08-2026 to 29-08-2026**		**TLM6**	CO1 to CO3	T1,R1	
24.	**MANIPULATOR KINEMATICS:** Denavit–Hartenberg (D-H) parameters – Forward and inverse kinematics for articulated manipulators	1	31-08-2026		**TLM2**	CO3	T1,R1	
25.	D-H representation for 2D/3D Robotic configurations, Numericals	1	05-09-2026		**TLM2, TLM14**	CO3	T1,R1	
26.	Problems on Forward Kinematics, Tutorial	1	07-09-2026		**TLM2**	CO3	T1,R1	
27.	Joint space vs task space – Solving kinematics using programming approaches (Python/MATLAB/ROS), Numericals	1	11-09-2026		**TLM2**	CO3	T1,R1	
28.	**Problem-Based Learning (PBL)**	1	12-09-2026		**TLM2,TLM15**	CO3	T1,R1	
Number of classes required to complete UNIT-III		**10**			**No. of classes taken:**			

UNIT IV: PATH PLANNING AND ROBOT PROGRAMMING

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Textbook followed	HOD Sign Weekly
29.	**TRAJECTORY PLANNING:** Basics of trajectory generation – Obstacle avoidance strategies	1	18-09-2026		**TLM2**	CO4	T1,R1	
30.	Motion interpolation (joint, linear, and circular paths), Numericals, **Tutorial**	1	19-09-2026		**TLM2**	CO4	T1,R1	
31.	Skew motion and joint-integrated motion, Numericals	1	21-09-2026		**TLM2**	CO4	T1,R1	
32.	**PROGRAMMING AND SIMULATION:** Introduction to robot programming languages (e.g., Python, RAPID, URScript)	1	25-09-2026		**TLM2 TLM14**	CO4	T1,R1	
33.	Overview of simulation platforms such as RoboDK, ROS, and Gazebo	1	26-09-2026		**TLM2**	CO4	T1,R1	
34.	Basics of software stacks for robot control and path execution.	1	28-09-2026		**TLM2**	CO4	T1,R1	
35.	Case Studies, **Capstone/Mini Project Component**	1	02-10-2026		**TLM2,11&13**	CO4	T1,R1	
No. of classes required to complete UNIT-IV		**07**			**No. of classes taken:**			

UNIT-V: MACHINE VISION AND IMAGE PROCESSING FOR ROBOTICS

36.	**MACHINE VISION SYSTEMS**: Concepts of sensing and digitization, Vision system architecture	1	05-10-2026		**TLM1**	CO4	T1,R1	
37.	Image preprocessing, feature extraction, and object recognition	1	09-10-2026		**TLM2**	CO4	T1,R1	
38.	**ROBOTIC APPLICATIONS**: Applications of machine vision in navigation, inspection	1	10-10-2026		**TLM1, TLM13**	CO4	T1,R1	
39.	Pick-and-place, quality control, and autonomous systems	1	12-10-2026		**TLM2**	CO4	T1,R1	

40.	Introduction to OpenCV and AI models in vision tasks	1	16-10-2026		**TLM10,TLM2**	CO4	T1,R1	
41.	Training vision systems using supervised and unsupervised learning techniques	1	17-10-2026		**TLM1**	CO4	T1,R1	
42.	Training vision systems using supervised learning techniques	1	26-10-2026		**TLM2**	CO4	T1,R1	
43.	Applications for Assembly and Inspection, Future Applications	1	30-10-2026		**TLM2**	CO4	T1,R1	
44.	Revision, Content beyond the syllabus	1	31-10-2026		**TLM2, TLM13**	CO4	T1,R1	
No. of classes required to complete UNIT-V		**09**			**No. of classes taken:**			
II Mid Examinations		**06**	**02-11-2026 to 07-11-2026**					

TEACHING LEARNING METHODS:

TLM1	Chalk and Talk	**TLM9**	Lab Taken to Class (LTTC)
TLM2	PPT	**TLM10**	Flipped Classroom
TLM3	Tutorial	**TLM11**	Mini/Capstone Project
TLM4	Demonstration (Lab/Field visit)	**TLM12**	Peer Learning & Student Seminar
TLM5	ICT (NPTEL/Swayam Prabha/MOOCS)	**TLM13**	Industry Case Study Analysis
TLM6	Group Discussion/ Project/Assignment/Quiz	**TLM14**	Simulation-Based Learning
TLM7	Activity Based Learning (ABL)	**TLM15**	Problem-Based Learning (PBL)
TLM8	Demonstration through Physical Models		

ACADEMIC CALENDAR:

Commencement of V Semester Classwork		**30-06-2025**	
I Phase of Instructions	**29-06-2026**	**22-08-2026**	**8 Weeks**
I Mid Examinations	**24-08-2026**	**29-08--2026**	**1 Week**
II Phase of Instructions	**31-08-2026**	**17-10-2025**	**7 Weeks**
Dussehra Holidays	**19-10-2026**	**24-10-2026**	**1 Week**
II Phase of Instructions Cont.	**26-10-2026**	**31-10-2026**	**1 Week**
II Mid Examinations	**02-11-2026**	**07-11-2026**	**1 Week**
Preparation and Practicals	**09-11-2026**	**14-11-2026**	**1 Week**
Semester End Examinations	**16-11-2026**	**28-11-2026**	**2 Weeks**

PART – C

EVALUATION PROCESS:

Evaluation Task	**COs**	**Marks**
Assignment/Quiz – 1	1	A1=05
Assignment/Quiz – 2	2	A2=05
I-Mid Examination	1, 2, 3 (1/2)	**B1=15**
I-Online Mid Examination	1, 2, 3	**C1=10**
Assignment/Quiz – 3	3	A3=05
Assignment/Quiz – 4	4	A4=05
Assignment/Quiz – 5	5	A5=05
II-Mid Examination	3(1/2), 4, 5	**B2=15**
II-Online Mid Examination	3(1/2), 4, 5	**C2=10**
Evaluation of Assignment/Quiz Marks: A =(A1+A2+A3+A4+A5)/5	1, 2, 3, 4, 5	**A=05**
Evaluation of Mid Marks: B=75% of Max(B1,B2) + 25% of Min(B1,B2)	1, 2, 3, 4, 5	**B=15**
Evaluation of Online Mid Marks: C=75% of Max(C1,C2) + 25% of Min(C1,C2)	1, 2, 3, 4, 5	**C=10**
Cumulative Internal Examination: A+B+C	**1, 2, 3, 4, 5**	**A+B+C=30**
Semester End Examinations: D	**1, 2, 3, 4, 5**	**D=70**
Total Marks: A+B+C+D	**1, 2, 3, 4, 5**	**100**

Capstone/Mini Project Component (Recommended)

Introduce one Capstone Project to be carried out during the semester.

Suggested Projects

1. Vision-Based Pick and Place Robot
2. Mobile Robot for Obstacle Avoidance
3. Gesture Controlled Robotic Arm
4. Warehouse Sorting Robot Simulation using ROS
5. Conveyor Inspection System using OpenCV
6. Smart Bin Segregation Robot
7. Path Planning using RoboDK
8. AI-Based Defect Detection System

PART – D

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO1: Pursue a successful career in the area of Information Technology or its allied fields.

PEO2: Exhibit sound knowledge in the fundamentals of Information Technology and apply practical experience with programming techniques to solve real-world problems.

PEO3: Demonstrate self-learning, life-long learning, and work in teams on multidisciplinary projects.

PEO4: Understand the professional code of ethics and demonstrate ethical behaviour, effective communication, teamwork, and leadership skills in their job.

PROGRAMME OUTCOMES (POs):

Engineering Graduates will be able to:

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO1: Organize, Analyze and Interpret the data to extract meaningful conclusions.

PSO2: Design, implement and evaluate a computer-based system to meet desired needs.

PSO3: Develop IT application services with the help of different current engineering tools.

Signatures				
Faculty Name	**Dr. Siva Sankara Babu Chinka**	**Mr. J.Subba Reddy**	**Mr. J.Subba Reddy**	**Dr. D. Ratna Kishore**
Designation	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Professor & HOD**

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DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr.V.V.Rama Krishna
Course Name & Code : Fundamentals of Satellite Communications-23EC85
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech, IT, V-Sem A&B A.Y : 2026-27
PRE-REQUISITE :Dynamics, Kinematics, Thermo dynamics.

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course provides the knowledge on laws associated with the motion of a satellite, launching a satellite into orbit with launch vehicles, subsystems, structures, spacecraft control and applications.

COURSE OUTCOMES (COs): At the end of the course, students are able to

CO 1	**Describe** the operational frequency bands, Space craft control mechanisms**,** sensors and navigational aids used in satellite systems **Understand-L2)**
CO 2	**Summarize** the functions of satellite space segment, earth segment, Multiple access techniques and satellite services. **(Understand-L2)**
CO 3	I **Illustrate** the operational principles of satellite power system and space craft Control mechanism. **(Understand-L2)**
CO 4	**Apply** the fundamental concepts oforbital mechanics&satellite communication and its application **(Apply-L3)**

COURSE ARTICULATION MATRIX(Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	-	3	2	-	-	-	-	1	1	-	-
CO2	1	1	1	-	-	2	1	-	-	-	-	1	2	-	-
CO3	1	1	1	-	-	2	1	-	-	-	-	1	2	-	-
CO4	1	1	1	-	-	2	1	-	-	-	-	1	2	-	-

Note: Enter Correlation Levels **1** or **2** or **3.** If there is no correlation, **put '-'**
1- Slight (Low), **2 –** Moderate (Medium), **3 -** Substantial (High).

TEXT BOOKS:

T1 Timothy Pratt, Charles Bostian, Jeremy Allnutt, "Satellite communications",
T John Wiley & Sons,2"[d] edition,2003.
2 Dennis Roddy, "Satellite communications", Tata McGraw Hills, 4th Edition, 2009.

REFERENCE BOOKS:

R1 M. Richharia, "Satellite Communications Systems: Design principles", BS Publications,2' [d] Edition, 2005.

R2 D.C Agarwal, "Satellite communications", Khanna Publications, 5*Edition,2006.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction to Satellite Systems

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Course Objectives	1	29-06-2026		TLM1	
2.	Brief introduction about the course and its importance.	1	03-07-2026		TLM1	
3.	Need of space communication,	1	04-07-2026		TLM1	
4.	General Structure of satellite Communication system- (Flipped Classroom)	1	06-07-2026		TLM2	
5.	Types of Spacecraft Orbits, Launch vehicles.	1	10-07-2026		TLM1	
6.	Satellite subsystems and their functions – structure.	1	11-07-2026		TLM2	
7.	Satellite subsystems and their functions – thermal mechanisms.	1	13-07-2026		TLM2	
8.	Satellite subsystems and their functions – power, propulsion.	1	17-07-2026		TLM2	
9.	Satellite subsystems and their functions – Guidance and control.	1	18-07-2026		TLM1	
10.	Satellite subsystems and their functions – bus electronics.	1	20-07-2026		TLM1	
11.	Communication bands- characteristics and applications.	1	24-07-2026		TLM2	
12.	Revision of I Unit		25-07-2026		TLM1	
No. of classes required to complete UNIT-I:12				No. of classes taken:		

UNIT-II: Orbital Mechanics and satellite launching

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Fundamentals of Orbital Dynamics – Kepler ’s laws.	1	27-07-2026		TLM1	
2.	Fundamentals of Orbital Dynamics – Kepler’s laws	1	31-07-2026		TLM1	
3.	Orbital parameters	1	01-08-2026		TLM2	
4.	Orbital parameters		03-08-2026		TLM2	
5.	Problems	1	07-08-2026		TLM1	
6.	Orbital Perturbations	1	08-08-2026		TLM2	
7.	Orbital Perturbations (Blended Learning)	1	10-08-2026		TLM2	
8.	Need for station keeping.	1	14-08-2026		TLM2	

9.	Orbital effect	1	15-08-2026		TLM1	
10.	Launch Vehicles		17-08-2026		TLM2	
11.	Reusable Launch Vehicles.	1	21-08-2026		TLM2	
No. of classes required to complete UNIT-II: 11				No. of classes taken:		

UNIT-III: Power System and Bus Electronics

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Solar Panels: Silicon and Ga-As Cells.	1	22-08-2026		TLM2	
2.	Power generation capacity, efficiency.	1	31-08-2026		TLM2	
3.	Space Battery System Battery Types	1	04-09-2026		TLM2	
4.	Characteristics efficiency Parameters	1	05-09-2026		TLM1	
5.	Power electronics.	1	07-09-2026		TLM2	
6.	Telemetry of satellite	1	11-09-2026		TLM2	
7.	Command Control	1	12-09-2026		TLM2	
8.	monitoring functions(Interactive Quizzes & Polls)	1	14-09-2026		TLM2	
9.	Control Functions	1	18-09-2026		TLM1	
No. of classes required to complete UNIT-III: 09				No. of classes taken:		

UNIT-IV : Spacecraft Control:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Control Requirements: Attitude Control	1	19-09-2026		TLM1	
2.	Station keeping functions,	1	21-09-2026		TLM1	
3.	Type of control maneuvers.	1	25-09-2026		TLM1	
4.	Stabilization Schemes: Spin stabilization.	1	26-09-2026		TLM2	
5.	Stabilization Schemes: gravity gradient method, 3 axis stabilization.	1	28-09-2026		TLM2	
6.	Control Systems: Mass expulsion systems.- Flipped Classroom	1	02-10-2026		TLM2	
7.	Control Systems: Momentum exchange systems.	1	03-10-2026		TLM1	

8.	Gyro and Magnetic Torque -sensors, Star and sun sensor, Earth sensor.	1	05-10-2026		TLM2	
9.	Magnetometers and Inertial Sensors.	1	09-10-2026		TLM2	
No. of classes required to complete UNIT-IV: 09				No. of classes taken:		

UNIT-V : Satellite services and applications

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Satellite services and applications	1	10-10-2026		TLM2	
2.	GPS location and principle.	1	12-10-2026		TLM2	
3.	Direct to Home, Home receiver- Interactive Quizzes	1	16-10-2026		TLM2	
4.	Satellite Mobile Services: VSAT, RADARSAT	1	17-10-2026		TLM2	
5.	IRNSS constellation.	1	26-10-2026		TLM2	
6.	Satellite structures and materials.	1	30-10-2026		TLM2	
No. of classes required to complete UNIT-V: 06				No. of classes taken:		

Contents beyond the Syllabus:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Information about NaviC & some recently launched satellites information.	1	31-10-2026		TLM2	

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

EVALUATION PROCESS (R23 Regulations):

Evaluation Task	Marks
Assignment-I (Units I & II)	**A1 = 5**
I-Descriptive Examination (Units I & II)	**M1 = 15**
I-Quiz Examination (Units I & II)	**Q1 = 10**
Assignment-II (Units III, IV & V)	**A2 = 5**
II-Descriptive Examination (Units III, IV & V)	**M2 = 15**

II-Quiz Examination (Units III, IV & V)	**Q2 = 10**
Mid Marks = 80% of Max (M1 + Q1 + A1), (M2 + Q2 + A2) + 20% of Min ((M1 + Q1 + A1), (M2 + Q2 + A2))	**M = 30**
Cumulative Internal Examination (CIE)	**30**
Semester End Examination (SEE)	**70**
Total Marks = CIE + SEE	**100**

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.**
PO 2	**Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.**
PO 3	**Design / Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.**
PO 4	**Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.**
PO 5	**Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.**
PO 6	**The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to professional engineering practice.**
PO 7	**Environment and Sustainability: Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for, sustainable development.**
PO 8	**Ethics: Apply ethical principles and commit to professional ethics, responsibilities, and norms of engineering practice.**
PO 9	**Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams and multidisciplinary settings.**
PO 10	**Communication: Communicate effectively on complex engineering activities with the engineering community and society at large by preparing effective reports, design documentation, making effective presentations, and giving and receiving clear instructions.**
PO 11	**Project Management and Finance: Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects in multidisciplinary environments.**

PO 12	**Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.**

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	**Communication:** Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.
PSO 2	**VLSI and Embedded Systems:** Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools
PSO 3	**Signal Processing:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Course Instructor	Course Coordinator	Module Coordinator	HOD
V V Ramakrishna	V V Ramakrishna	Dr.V.Ravi Sekhara Reddy	Dr.G.Srinivasulu

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DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor : B. SARATH CHANDRA
Course Name & Code : Advanced Java LAB (23IT54) R23
L-T-P Structure : 0-0-3 **Credits**: 3
Program/Sem/Sec : B.Tech., IT., V-Sem. A Secion, **A.Y** : 2026-27

PRE-REQUISITE: Object Oriented Programming through JAVA

COURSE EDUCATIONAL OBJECTIVES (CEOs): The objectives of this lab course are to introduce

- To make use of Servlet and JSP API in the process of enterprise application deployment.
- Implement components such as JSTL
- Distinguish Application Server, Web Container, JDBC
- Design and Development of web application having collaboration of Servlets, JSPs, Spring.

COURSE OUTCOMES (COs): At the end of the course, students are able to

CO 1	Implement database operations using JDBC with different types of statements and manage transactions effectively. (Apply - L3)
CO 2	Develop and deploy server-side programs using Servlets for handling client requests and session tracking. (Apply - L3)
CO 3	Create dynamic and interactive web pages using JSP and JSTL for data display and user interaction. (Apply - L3)
CO 4	Demonstrate the use of various JSTL tags including core, format, function, and SQL tags in JSP applications. (Apply - L3)
CO 5	Design and implement MVC-based web applications using the Spring Framework with database and transaction support. (Apply - L3)

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1				1								3		3
CO2	2				1								3	3	3
CO3	1				3								3	3	3
CO4	2				2								3	3	3
CO5	3				2								2	3	3

Note: Enter Correlation Levels **1** or **2** or **3.** If there is no correlation, **put '-'**
1- Slight (Low), **2 –** Moderate (Medium), **3 -** Substantial (High).

e-Resources :

1) https://infyspringboard.onwingspan.com/web/en/viewer/video/lex_auth_013843135610560512316 66_shared?

collectionType=Collection&collectionId=lex_auth_013843138889449472316 68_shared&pathId=

2) https://infyspringboard.onwingspan.com/web/en/viewer/video/lex_auth_013843302593060864352 41_shared?collectionType=Course&pathId=lex_auth_013843296507715584352 42_shared&collectionId=lex_auth_013843300350369792360 02_shared

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: JDBC Programming

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	JDBC Application using Statement object	3	29/06/2026		TLM4	
2.	JDBC Application using PreparedStatement object	3	06/07/2026		TLM4	
3.	JDBC Application for executing Store Procedures	3	13/07/2026		TLM4	
4.	JDBC Application for executing Store Procedures	3	20/07/2026		TLM4	
5.	JDBC application which will demonstrate Scrollable ResultSet & Updatable ResultSet functionality	3	27/07/2026		TLM4	
6.	Program for testing the action to Servlet and Servlet collaboration and study deployment descriptor.	3	03/08/2026		TLM4	
7.	Program for testing the action to Servlet and Servlet collaboration and study deployment descriptor.	3	10/08/2026		TLM4	
8.	login form and perform state management using Cookies, HttpSession and URL Rewriting.	3	17/08/2026		TLM4	
9.	Program in which input the two numbers in an html file and then display the addition in JSP file.	3	31/08/2026		TLM4	
10.	Perform Database Access through JSP	3	07/09/2026		TLM4	
11.	Program which demonstrates the core tag of JSTL, Format tag of JSTL.	3	21/09/2026		TLM4	
12.	Program which demonstrates the Function tag of JSTL SQL tag of JSTL.	3	28/09/2026		TLM4	

13.	Study and Implement MVC using Spring Framework	3	05/10/2026		TLM4	
14.	Using Spring Template manage Database and Transaction.	3	12/10/2026		TLM4	
15.	Internal Lab Exam	3	26/10/2026		TLM4	
No. of classes required to complete UNIT-I: 42				No. of classes taken:		

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO	Organize, Analyze and Interpret the data to extract meaningful conclusions.

1	
PSO 2	Design, Implement and Evaluate a computer-based system to meet desired needs.
PSO 3	Develop IT application services with the help of different current engineering tools.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	Mr.B.SARATH CHANDRA	Mr.B.SARATH CHANDRA	Dr. B. Srinivasa Rao	Dr. D. Ratna Kishore
Signature				

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http://lbrce.ac.in/csit/index.php,hodit@lbrce.ac.in , Phone: 08659-222933, Fax: 08659-222931
DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr. Cheruku Poorna Venkata Srinivasa Rao
Course Name & Code : COMPUTER NETWORKS LAB–23CS58
L-T-P Structure : 0-0-3
Program/Sem/Sec : B.Tech/V SEM /A **Credits:**1.5
Regulations : R23 **A.Y.:** 2026-27

PREREQUISITE: Python, C++

COURSE EDUCATIONAL OBJECTIVES (CEOs): Learn basic concepts of computer networking and acquire practical notions of protocols with the emphasis on TCP/IP. A lab provides a practical approach to Ethernet/Internet networking: networks are assembled, and experiments are made to understand the layered architecture and how do some important protocols work

COURSE OUTCOMES (COs): At the end of the course, student will be able to

CO1	Apply fundamental networking concepts by configuring network devices, analyzing protocols, and implementing data link layer techniques. (**Apply – L3**)
CO2	Implement various network algorithms, including error detection, congestion control, routing, and shortest path computation. (**Apply – L3**)
CO3	Analyze network traffic, security vulnerabilities, and performance metrics using tools like Wireshark, Nmap, and NS2 Simulator. (**Apply – L3**)
CO4	Improve individual / teamwork skills, communication & report writing skills with ethical values.

COURSE ARTICULATION MATRIX: (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	2	3							1	3	2	
CO2	3	3	3	3	2							1	3	3	
CO3	3	3	2	3	3							2	3	3	
CO4								2	2	2					
1 - Low								**2** –Medium				**3** - High			

TEXTBOOKS:

T1	Computer Networks, Andrew S Tanenbaum, Fifth Edition. Pearson Education/PHI
T2	Data Communications and Networks, Behrouz A. Forouzan, Fifth Edition TMH.

REFERENCE BOOKS:

R1	Data Communications and Networks- Achut S Godbole, AtulKahate Computer Networks, Mayank Dave, CENGAGE
R2	DouglasComer,InternetworkingwithTCP/IP,PrenticeHallofIndia,Volume1,6thEdition, 2009.

R3	RichardStevens,"TCP/IPIllustrated",Addison-Wesley,Volume1,2001.
R4	http://www.cse.iitk.ac.in/users/dheeraj/cs425/.
R5	http://www.tcpipguide.com/free/t_OSIReferenceModelLayers.htm

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Study of Network devices in detail and connect the computers in Local Area Network.	3	02-07-2026		TLM8/TLM5	
2.	Program to implement the data link layer farming methods such as i)Character stuffing ii)Bit stuffing.	3	09-07-2026		TLM8/TLM5	
3.	Program to implement data link layer farming method checksum.	3	16-07-2026		TLM8/TLM5/TLM4	
4.	Program for Hamming Code generation for error detection and correction.	6	23-07-2026		TLM8/TLM5/TLM4	
5.	Program to implement on a data set of characters the three CRC polynomials-CRC 12,CRC 16	3	30-07-2026		TLM8/TLM5/TLM4	
6.	Program to implement Sliding window protocol for Goback N.	3	06-08-2026		TLM8/TLM5	
7.	Program to implement Sliding window protocol for Selective repeat.	3	13-08-2026		TLM8/TLM5	
8.	Program to implement Stop and Wait Protocol.	3	20-08-2026		TLM8/TLM5	
9.	Program for congestion control using leaky bucket algorithm.	3	03-09-2026		TLM8/TLM5	
10.	Program to implement Distance	3	10-09-2026		TLM8/TLM5	

	vector routing algorithm by obtaining routing table at each node					
11.	Wireshark Packet Capture Using Wire shark Starting Wire shark Viewing Captured Traffic Analysis and Statistics & Filters.	3 + 3	17-09-2026 24-09-2026		TLM8/TLM5	
12.	Do the following using NS3 Simulator NS3 Simulator-Introduction Simulate to Find the Number of Packets Dropped Simulate to Find the Number of Packets Dropped by TCP/UDP Simulate to Find the Number of Packets Dropped due to Congestion Simulate to Compare Data Rate& Throughput	3 + 3	01-10-2026 08-10-2026		TLM8/TLM5	
13.	Internal Exam	03	29-10-2026			

Teaching Learning Methods

TLM1	Chalk and Talk	**TLM4**	Problem Solving	**TLM7**	Seminars or GD
TLM2	PPT	**TLM5**	Programming	**TLM8**	Lab Demo
TLM3	Tutorial	**TLM6**	Assignment or Quiz	**TLM9**	Case Study

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	**Marks**
Day to Day Work:	15
Internal Test1	15
Continuous Internal Assessment	30
Procedure	20
Execution & Results	30
Viva-voce	20
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

ACADEMIC CALENDAR:

Description	From	To	Weeks
Commencement of Class Work	29-06-2026		
I Phase of Instructions	29-06-2026	22-08-2026	8W
I Mid Examinations	**24-08-2026**	**29-08-2026**	**1W**
II Phase of Instructions	31-08-2026	17-10-2026	7W
Dussehra Holidays	19-10-2026	24-10-2025	1W
II Phase of Instructions Contd...	26-10-2026	31-10-2026	1W
II Mid Examinations	**02-11-2026**	**07-11-2026**	**1W**
Preparation and Practical's	09-11-2026	14-11-2026	1W
Semester End Examinations	**16-11-2026**	**28-11-2026**	**2W**

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
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PO 11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO1	Organize, Analyze and Interpret the data to extract meaningful conclusions.
PSO2	Design, Implement and Evaluate a computer-based system to meet desired needs.
PSO3	Develop IT application services with the help of different current engineering tools.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	Mr. Ch.Poorna Venkata Srinivasa Rao	Dr. B. Siva Rama Krishna	Dr. G. Rajendra	Dr. D. Ratna Kishore
Signature				

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DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor : *Dr.S.Naganjaneyulu*
Course Name & Code : **23ITS1-PYTHON WITH DJANGO**
L-T-P Structure : *0-1-2* *Credits: 2*
Program/Sem/Sec : *B.Tech(IT) / V Sem/A Sec* **A.Y.:** *2026-27*

PREREQUISITE : **Python , HTML,CSS, JS**

Course Objectives:

- *Design and build static as well as dynamic web pages and interactive web- based applications*
- *Web development using Django framework.*
- *Analyze and create functional website in Django and deploy Django Web Application on Cloud*

COURSE OUTCOMES (COs):

CO 1	*Apply Python libraries and web frameworks to design and develop dynamic and interactive web applications. .(***Apply - L3)**
CO 2	*Develop and integrate Django-based modules to implement user authentication, database operations, and UI components.* **.(Apply - L3)**
CO 3	*Deploy functional Django web applications to cloud platforms by applying standard deployment practices and tools.* **.(Apply - L3)**
CO 4	*Improve individual / teamwork skills, communication & report writing skills with ethical values.* **(Apply-L3)**

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	-	2	-	-	-	-	-	-	-	-	-	3
CO2	2	2	2	-	2	-	-	-	-	-	-	-	-	3	3
CO3	2	-	2		3	-	-	-	-	-	3	3	-	-	3
CO4	-	-	-	-	-	-	-	3	3	3	-	-	-	-	1
1 - Low						**2** –Medium							**3** - High		

Note: *Enter Correlation Levels* **1** *or* **2** *or* **3.** *If there is no correlation,* **put '-' 1-** *Slight (Low),* **2** *–Moderate (Medium),* **3** *- Substantial (High).*

BOS APPROVED TEXT BOOKS:

1. *Martin Brown, "Python: The Complete Reference Paper back", 4th Edition 2018, McGraw Hill Education.*
2. *Reema Thareja, "Python Programming: Using Problem Solving Approach", 3rd Edition 2017, Oxford.*
3. *Daniel Rubio, Apress, "Beginning Django Web Application Development and Deployment with Python", 2nd Edition 2017,Apress.*

BOS APPROVED REFERENCE BOOKS:

1. *Tom Aratyn, "Building Django 2.0 Web Applications: Create enterprise-grade, scalable Python web applications easily with Django 2.0",2nd Edition 2018, Pckt p*
2. *Harry Percival, "Test-Driven Development with Python: Obey the Testing Goat: Using Django, Selenium and JavaScript",2nd Edition 2019, Kindle Edition.*

Part-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion SEC_A	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
1.	*Unit-I: Collections-Container data types, Tkinter-GUI , applications , Requests-HTTP requests, Sample Programs,*	3	03-07-2026		TLM2,4	CO1	
2.	*BeautifulSoup4-web scraping, Scrapy, Zappa, Dash, CherryPy, Turbo Gears, Sample Programs,*	3	10-07-2026		TLM2,4	CO1	
3.	*Flask, Web2Py, Bottle, Falcon, Cubic Web, Quixote, Pyramid. , Sample Programs,*	3	17-07-2026		TLM2,4	CO1	
4.	*Unit-II: Understanding Django environment, Features of Django and Django architecture, MVC and MTV, Urls and Views, Mapping the views to URLs, , Sample Programs,*	3	24-07-2026		TLM2,4	CO1	
5.	*Django Template, Template inheritance Django Models, Creating model for site, , Sample Programs,*	3	31-07-2026		TLM2,4	CO1	
6.	*Converting the model into a table, Fields in Models, Integrating Bootstrap into Django, Creating tables, Creating grids, Creating carousels. , Sample Programs,*	3	07-08-2026		TLM2,4	CO1	
7.	*Unit-III :Introduction to Django Authentication System, Security Problem &Solution with Django Creating Registration Form using Django, , Sample Programs,*	3	14-08-2026		TLM2,4	CO2	
8.	*Adding Email Field in Forms, Configuring email settings, Sending emails with Django, Sample Programs,*	3	21-08-2026		TLM2,4	CO2	
9.	*Adding Grid Layout On Registration Page, Adding Page Restrictions, Login Functionality Test and Logout, Sample Programs,*	3	11-09-2026		TLM2,4	CO2	
10.	*Unit-IV: DatabaseMigrations, Fetch Data From Database, Displaying Data OnTemplates, Adding Condition On Data, Sending data from url to view , Sample Programs,*	3	18-09-2026		TLM2,4	CO2	

11.	*Sending data from view to template, Saving objects into database, Sorting objects, , Sample Programs, Filtering objects, Deleting objects, Difference between session and cookie, Creating sessions and cookies in Django, Sample Programs,*	3	25-09-2026		TLM2,4	CO2	
12.	*Unit-V: Creating a functional website in Django, Four Important Pillars to Deploy, registering on Heroku and GitHub, ,*	3	09-10-2026		TLM2,4	CO2	
13.	*Sample Programs, Push project from Local System to GitHub, working with Django Heroku, Working with StaticRoot, Handling WSGI with gunicorn, setting up Database & adding users*	3	16-10-2026		TLM2,4	CO3	
14.	**Programs Beyond Syllabus, Revision, Pending Etc/ Mini project**	3	20-10-2025		TLM6	CO3	
15.	**Lab Internal Examination**	3	30-10-2026				

Teaching Learning Methods			
TLM1	*Chalk and Talk*	**TLM4**	*Demonstration (Lab/Field Visit)*
TLM2	*PPT*	**TLM5**	*ICT (NPTEL/Swayam Prabha/MOOCS)*
TLM3	*Tutorial*	**TLM6**	*Group Discussion/Project*

ACADEMIC CALENDAR:

Description	**From**	**To**	**Weeks**
Commencement of Class Work	*29-06-2026*		
I Phase of Instructions	*29-06-2026*	*22-08-2026*	*8W*
I Mid Examinations	**24-08-2026**	**29-08-2026**	**1W**
II Phase of Instructions	*31-08-2026*	*17-10-2026*	*7W*
Dussehra Holidays	*19-10-2026*	*24-10-2026*	*1W*
II Phase of Instructions Contd…	*26-10-2026*	*31-10-2026*	*1W*
II Mid Examinations	**02-11-2026**	**07-11-2026**	**1W**
Preparation and Practical's	*09-11-2026*	*14-11-2026*	*1W*
Semester End Examinations	**16-11-2026**	**28-11-2026**	**2W**

PART-C

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Marks
Day to Day Work:	*15*
Internal Test	*15*
Continuous Internal Assessment	*30*
Procedure	*20*
Execution & Results	*30*
Viva-voce	*20*
Semester End Examination (SEE)	*70*
Total Marks = CIE + SEE	*100*

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
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PO 12	**Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	**Organize, Analyze and Interpret the data to extract meaningful conclusions.**
PSO 2	**Design, Implement and Evaluate a computer-based system to meet desired needs.**
PSO 3	**Develop IT application services with the help of different current engineering tools.**

	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Signature				
Name of the Faculty	**Dr.S.Naganjaneyulu**	**Dr.S.Naganjaneyulu**	**Dr.B.Srinivasa Rao**	**Dr.D.RatnaKishore**

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DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor : **Dr. B. SRINIVASA RAO**
Course Name & Code : **USER INTERFACE DESIGN USING FLUTTER & 23IT53**
L-T-P Structure : **0-0-2** *Credits* : **1**
Program/Semester/Section : **B.Tech.(CS & IT)/V/A** *A.Y.* : **2026-27**

Course Objectives:

- *Learns to Implement Flutter Widgets and Layouts*
- *Understands Responsive UI Design and with Navigation in Flutter*
- *Knowledge on Widgets and customize widgets for specific UI elements, Themes*
- *Understand to include animation apart from fetching data*

Course Outcomes: *At the end of this course, the student will be able to*

CO1: *Apply Flutter and Dart fundamentals to design and develop interactive user interfaces.* **(Apply-L3)**

CO2: *Implement UI layouts, navigation, state management, and responsive design principles for mobile applications.* **(Apply-L3)**

CO3: *Integrate animations, API data fetching, form validation, and debugging techniques to enhance application performance and usability.* **(Apply-L3)**

CO4: *Improve individual/teamwork skills, communication & report writing skills with ethical Value.*

COURSE ARTICULATION MATRIX (Correlation between Cos, POs & PSOs):

Cos	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	1	3	2	3								1	3	3
CO2	3	3	3	3	3								1	3	3
CO3	3	3	3	3	3								2	3	3
CO4								2	2	2					

Note: 1- *Slight (Low),* **2 -** *Moderate (Medium),* **3 -** *Substantial (High)*

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

S. No.	Topics to be covered	No. of Sessions Required	Tentative Date of Completion	Actual Date of Completion	HOD Sign
1.	*a) Install Flutter and Dart SDK* *b) Write a simple Dart program to understand the language basics.*	*1*	*01-07-2026*		
2.	*a) Explore various Flutter widgets (Text, Image, Container, etc.).* *b) Implement different layout structures using Row, Column, and Stack widgets*	*2*	*08-07-2026* *15-07-2026*		
3.	*a) Design a responsive UI that adapts to different screen sizes* *b) Implement media queries and breakpoints for responsiveness*	*1*	*22-07-2026*		
4.	*a) Set up navigation between different screens using Navigator.* *b) Implement navigation with named routes.*	*1*	*29-07-2026*		
5.	*a) Learn about stateful and stateless widgets.* *b) Implement state management using set State and Provider*	*1*	*05-08-2026*		
6.	*a) Create custom widgets for specific UI elements.* *b) Apply styling using themes and custom style*	*2*	*12-08-2026* *2-09-2026*		
7.	*a) Design a form with various input fields.* *b) Implement form validation and error handling.*	*2*	*9-09-2026* *16-09-2026*		
8.	*a) Add animations to Ul elements using Flutter's animation framework.* *b) Experiment with different types of animations (fade, slide, etc.).*	*2*	*23-09-2026* *30-09-2026*		
9.	*a) Fetch data from a REST API* *b) Display the fetched data in a meaningful way in the UL.*	*1*	*7-10-2026*		
10.	*a) Write unit tests for Ul components.* *b) Use Flutter's debugging tools to identify and fix issues.*	*1*	*14-10-2026*		
11.	*INTERNAL LAB EXAM*	*1*	*21-10-2026*		

PART-C

EVALUATION PROCESS (R23 Regulation)

Evaluation Task	Marks
Day to Day Work	*15*
Internal Test	*15*
Continuous Internal Assessment	*30*
Procedure	*20*
Execution & Results	*30*
Viva-voce	*20*
Semester End Examination (SEE)	*70*
Total Marks = CIE + SEE	*100*

PART-D

PROGRAMME OUTCOMES (POs):

PO1	**Engineering knowledge***: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.*
PO2	**Problem analysis***: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.*
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PO 11	**Project management and finance***: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member*

	and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning***: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change*

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	*Organize, Analyze and Interpret the data to extract meaningful conclusions.*
PSO 2	*Design, Implement and Evaluate a computer-based system to meet desired needs.*
PSO 3	*Develop IT application services with the help of different current engineering tools.*

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Dr. B. Srinivasa Rao**	**Dr. B. Srinivasa Rao**	**Dr. B. Srinivasa Rao**	**Dr. D. Ratna Kishore**
Signature				