SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE
(AUTONOMOUS)

(Approved by AICTE, New Delhi, Affiliated to JNTUK, Kakinada)

Accredited by NAAC with 'A+' Grade

Recognised as Scientific and Industrial Research Organisation

SRKR MARG, CHINA AMIRAM, BHIMAVARAM – 534204 W.G.Dt., A.P., INDIA

Regulation: R23	

INFORMATION TECHNOLOGY (Minors)

(Applicable for CE, ECE, EEE & ME)

COURSE STRUCTURE

(With effect from 2023-24 admitted Batch onwards)

Course Code	Course Name	Year/ Sem	Cr	L	T	P	C.I.E	S.E.E	Total Marks
B23ITM101	Introduction to Information Technology	II-II	3	3	0	0	30	70	100
B23ITM201	Object Oriented Programming through C++	III-I	3	3	0	0	30	70	100
B23ITM301	Computer networks & Operating Systems	III-II	3	3	0	0	30	70	100
B23ITM401	Database Management Systems	IV-I	3	3	0	0	30	70	100
B23ITM501	*MOOCS-I	II-II to IV-I	3	--	--	--	--	--	100
B23ITM601	*MOOCS-II	II-II to IV-I	3	--	--	--	--	--	100
		TOTAL	**18**	**12**	**0**	**0**	**120**	**280**	**600**

*Two MOOCS courses of any **INFORMATION TECHNOLOGY** related Program Core Courses from NPTEL/SWAYAM with a minimum duration of12 weeks (3 Credits) courses other than the courses offered need to be takenby prior information to the concern. These courses should be completed between II Year II Semester to IV Year I Semester.

Course Code	Category	L	T	P	C	I.M	E.M	Exam
B23ITM101	Minors	3	0	0	3	30	70	100

INTRODUCTION TO INFORMATION TECHNOLOGY

(Minor Degree course in IT)

Course Objectives:

1.	Understand the foundational concepts of Information Technology and various information systems.
2.	Explore the evolution and impact of Information and Communication Technologies (ICT), identify the causes and consequences of the digital divide.
3.	Gain knowledge of E-Commerce, E-Governance applications & Secure Online Payment Systems.
4.	Understand the process of information system development and analyze key national-level IT projects implemented in India.
5.	Familiarize with modern computing technologies, including embedded systems, Human-Computer Interaction (HCI) interfaces, and the fundamentals of computer vision.

Course Outcomes: At the end of the course Students will be able

S. No	Outcome	Knowledge Level
1.	Understand the core concepts of Information Technology including data, information, knowledge, types of information systems, and quality parameters.	K2
2.	Analyze the evolution and impact of ICT, the concept of the digital divide, and identify strategies to bridge the divide in various sectors.	K3
3.	Explain and apply E-Commerce and E-Governance principles, secure payment systems, and ICT applications in education and healthcare.	K3
4.	Demonstrate understanding of information system development, Management Information Systems (MIS), and major ICT projects in India.	K3
5.	Describe and evaluate the structure and applications of embedded systems, Human-Computer Interaction (HCI), and computer vision technologies.	K3

SYLLABUS

UNIT-I (10 Hrs)	Attributes of Information Technology: Introduction, Data, Information, Knowledge and Wisdom, Data Vs Information, Information Vs Knowledge, Types of Information, Sources of Information, Quality of Information, Value of Information, Storage of Information, Information Effectiveness Parameters, Types of Information Systems ICT and Digital Divide: Evolution of ICT, Meaning of ICT, Benefits of ICT, Concept of Digital Divide, Reasons for the Existence of the Divide, Dimensions of the Divide, Impact of Digital Divide, Measures to Bridge the Divide Cyberspace and Cyber-crime: Introduction, Real Space Vs Cyberspace, Digital Identity: An Overview Verifying Vs. Revealing an Identity, Cyber and Computer Crimes: Architecture of Cyberspace, Preventing Crimes, Implications of Choosing the Link System, Road to Implementation.

UNIT-II (10 Hrs)	E-Commerce: Definition, Commerce and Internet, Advantages and Limitations of E-Commerce, Business Operations: Consumer Oriented E-Commerce Applications, Benefits from Various Points of View, Types of E-Commerce Storage of Information. Systems of Payments: Methods of Implementing Systems of Payments over the Web. Security Issues: Digital Signatures and Certificates, Secure Socket Layer (SSL), PCI, SET, Firewalls and Kerberos, Transactions, ATM and Online Banking: Online Banking Safety Checks, Online Purchase of Railway Tickets. E-Governance: Government, Governance and Democracy, E-Governance: An Introduction, Origins in India, E-Governance Projects in India, Measures to be considered before going for E-Governance, Work plan and Infrastructure. Educational System: Role of ICT in Education, E-Learning: An Introduction, Benefits of E-Learning, Technologies Used for E-Learning, Online Examinations, E-Learning Standards, Teleconferencing, EDUSAT, Medical Systems.
UNIT-III (10 Hrs)	Development of Information Systems: Development Steps of a Typical Information System, Tools for Development of Information Systems, Maintenance of Information Systems, Updating Information Systems, Management Information System: MIS: A Three Letter Acronym, Functions of Management, Purpose of Information System, Types of Information System, Definitions of MIS, Why Management Information System? Different Components of MIS, MIS: An Integrated Application, Developing MIS: Do's and Don'ts, Forces Which Makes MIS Strong & Successful, Stumbling Blocks, Limitations of MIS, Steps for Avoiding Pitfall. IT projects in India: Introduction, NICNET AGMARKNET, Community Information Centers, Court Information System DACNET, Examination Results Portal LRIS NHWIS IT Training Video Conferencing ERNET Ongoing Projects Broadband Projects using Broadband Multistate Projects SWAN Assam State Data Centre RGCLP.
UNIT-IV (10 Hrs)	Fundamental of Embedded Systems: An Introduction, Components of an Embedded System, Block Diagram and Characteristics of an Embedded System, Classification of an Embedded System, Characteristics of an Embedded Operating System, Requirements and Specification in Embedded System, Programming Languages for Embedded System and Classification, Hardware Languages, VHDL V/s Verilog, Selected Embedded System applications, Washing Machine, Digital Sound Recorder.
UNIT-V (10 Hrs)	Advanced Methods of communication with computer: Human Computer Interface: Different Perspectives, Interacting with Computers, Input Devices, Output Devices, Controls, HCI Development and its Applications, Universal Access to Large and Complex Distributed Information, Virtual Machines, Command Line Interface, Hypertext, Hypermedia, Graphical User Interface, Voice User Interface, Other User Interfaces, Future/Advance Methods of Communication with a Computer. Computer Vision - What is Computer Vision, Basic Terminology, Goals of Computer Vision, Technical Challenges, Applications of Computer Vision, Advantages of Computer Vision, Examples
Text Books:	
1.	Rajaraman, V. (2018). INTRODUCTION TO INFORMATION TECHNOLOGY. India: PHI

	Learning Pvt. Ltd..
2.	E-Governance. Sharma Pankaj Published by A.P.H. Publishing Corporation, 2004 ISBN 10: 8176484792 / ISBN 13: 9788176484794
Reference Books:	
1.	Embedded System Design: A Unified Hardware / Software Introduction, Frank Vahid, Tony D. Givargis Edition illustrated, Publisher John Wiley & Sons, 2001, ISBN 0471386782, 9780471386780
2.	Dix, A., Finlay, J. and Abowd, G.D. (2011) Human-Computer Interaction. Pearson, London.
e-resources :	
1	https://nptel.ac.in/courses/106105136
2	https://www.digitalindia.gov.in
3	https://en.unesco.org/themes/ict-education

					Course Code: B23ITM101
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R23**
		II B.Tech. II Semester MODEL QUESTION PAPER			
		INTRODUCTION TO INFORMATION TECHNOLOGY			
		(Minor Degree course in IT)			
Time: 3 Hrs.					**Max. Marks: 70 M**
		Answer Question No.1 compulsorily			
		Answer **ONE Question** from **EACH UNIT**			
		Assume suitable data if necessary			
					10 x 2 = 20 Marks
			CO	**KL**	**M**
1.	**a).**	Define data and information	**1**	**2**	**2**
	b).	What is the digital divide?	**1**	**2**	**2**
	c).	Differentiate between cyberspace and real space.	**2**	**2**	**2**
	d).	Mention any two advantages of E-commerce.	**2**	**2**	**2**
	e).	What is a digital signature?	**3**	**2**	**2**
	f).	Define E-Governance.	**3**	**2**	**2**
	g).	Mention two tools used in the development of information systems	**4**	**2**	**2**
	h).	Write any two limitations of MIS.	**4**	**2**	**2**
	i).	What is an embedded system?	**5**	**2**	**2**
	j).	Give an example of Human-Computer Interface.	**5**	**2**	**2**
					5 x 10 = 50 Marks
		UNIT-1	**CO**	**KL**	**M**
2.	**a).**	Explain the difference between data, information, knowledge, and wisdom with examples.	**1**	**2**	**5**
	b).	Discuss the types and sources of information.	**1**	**2**	**5**
		OR			
3.	**a).**	Explain the evolution and benefits of ICT.	**1**	**2**	**5**
	b).	Discuss the architecture of cyberspace in the context of cyber-crime.	**1**	**2**	**5**
		UNIT-2			
4.	**a).**	Differentiate between government, governance, and E-governance.	**2**	**3**	**5**
	b).	Describe any three methods of implementing payment systems over the web.	**2**	**2**	**5**
		OR			
5.	**a).**	What are digital certificates? How do they enhance security?	**2**	**2**	**5**
	b).	Describe the technologies used in E-learning and their benefits.	**2**	**2**	**5**
		UNIT-3			
6.	**a).**	Explain the purpose and importance of Management Information System	**3**	**2**	**5**

		(MIS).			
	b).	Explain common stumbling blocks in implementing a successful MIS.	**3**	**3**	**5**
		OR			
7.	**a).**	Describe the development steps of a typical information system.	**3**	**2**	**5**
	b).	What are the components of MIS? Explain with a diagram.	**3**	**2**	**5**
		UNIT-4			
8.	**a)**	Define embedded systems. List out key characteristics?	**4**	**2**	**5**
	b)	Explain the classification of embedded systems with examples.	**4**	**2**	**5**
		OR			
9.	**a).**	Distinguish VHDL and Verilog hardware languages.	**4**	**3**	**5**
	b).	Explain the working of any one embedded system application (e.g., washing machine).	**4**	**3**	**5**
		UNIT-5			
10.	**a)**	What is HCI? Mention its importance in designing user interfaces.	**5**	**2**	**5**
	b)	Define computer vision. List out key technical challenges?	**5**	**2**	**5**
		OR			
11.	**a).**	Explain the concept of virtual machines and hypermedia.	**5**	**2**	**5**
	b).	Discuss real-life applications of computer vision and their advantages.	**5**	**3**	**5**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE : Questions can be given as A,B splits or as a single Question for 10 marks

Course Code	Category	L	T	P	C	I.M	E.M	Exam
B23ITM201	**Minors**	**3**	**0**	**0**	**3**	**30**	**70**	**100**

OBJECT ORIENTED PROGRAMMING THROUGH C++

(Minor Degree course in IT)

Course Objectives:

1.	Understand the syntax and principles of Object Oriented Programming.
2.	Design and development of secure and extendable C++ applications.
3.	Describe the concept of function overloading, operator overloading, virtual functions and polymorphism.
4.	Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming.
5.	Demonstrate the use of various OOP's concepts with the help of programs.

Course Outcomes: At the end of the course Students will be able

S. No	Outcome	Knowledge Level
1.	Illustrate the process of Object Oriented Paradigm.	K2
2.	Demonstrate classes, member functions, constructors and their importance in developing real world applications.	K3
3.	Apply C++ features such as Inheritance, operator overloading to make programs reusable.	K3
4.	Understand Dynamic Memory Management techniques using pointers.	K2
5.	Apply the concept of Generic Programming and Exception handling to build an efficient and error free code.	K3

SYLLABUS

UNIT-I (10 Hrs)	Introduction to C++: Difference between C and C++, Evolution of C++, The Object Oriented Technology, Disadvantage of Conventional Programming, Key Concepts of Object-Oriented Programming, Advantages of OOP's, Object Oriented Language.
UNIT-II (10 Hrs)	Classes and Objects: Classes in C++, Declaring Objects, Access Specifiers and their Scope, Defining Member Function, Overloading Member Function, Nested class. Constructors and Destructors: Introduction, Constructors and Destructor, Characteristics of Constructor and Destructor, Application with Constructor, Constructor with Arguments, Parameterized Constructor, Destructors, Anonymous Objects
UNIT-III (10 Hrs)	Operator Overloading, Type Conversion and Inheritance: The Keyword Operator, Overloading Unary Operator, Operator Return Type, Overloading Assignment Operator (=), Rules for Overloading Operators, Inheritance, Reusability, Types of Inheritance, Virtual Base Classes, Object as a Class Member, Abstract Classes, Advantages of Inheritance, Disadvantages of Inheritance.

UNIT-IV (10 Hrs)	Pointers: Pointer, Features of Pointers, Pointer Declaration, Pointer to Class, Pointer Object, This Pointer, Pointer to Derived Classes and Base Class. Binding Polymorphisms and Virtual Functions: Introduction, Binding in C++, Virtual Functions, Rules for Virtual Function, Virtual Destructor.
UNIT-V (10 Hrs)	Generic Programming with Templates & Exception Handling: Definition of class Templates, Normal Function Templates, Over Loading of Template Function, Bubble Sort Using Function Templates, Difference between Templates and Macros, Linked Lists with Templates, Exception Handling, Principles of Exception Handling, and The Keywords- try throw and catch, Multiple Catch Statements, Specifying Exceptions.
Text Books:	
1.	A First Book of C++, 4th Edition, Gary Bronson, Cengage Learning.
2.	The Complete Reference, C++, 5th Edition, Herbert Schildt, McGraw-Hill Education.
Reference Books:	
1.	Object Oriented Programming C++, Joyce Farrell, Cengage Learning.

				Course Code: B23ITM201	
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R23**
III B.Tech. I Semester MODEL QUESTION PAPER					
OBJECT ORIENTED PROGRAMMING THROUGH C++					
(Minor Degree course in IT)					
Time: 3 Hrs.					**Max. Marks: 70 M**
Answer Question No.1 compulsorily					
Answer **ONE Question** from **EACH UNIT**					
Assume suitable data if necessary					
					10 x 2 = 20 Marks
			CO	**KL**	**M**
1.	**a).**	Differentiate between C and C++ in terms of paradigm and memory management.	**1**	**2**	**2**
	b).	Define Encapsulation. Why is it important in OOP?	**1**	**2**	**2**
	c).	Differentiate between constructor and destructor.	**2**	**2**	**2**
	d).	List the types of inheritance supported in C++.	**2**	**2**	**2**
	e).	What is operator overloading? Give a simple example syntax.	**3**	**2**	**2**
	f).	What is the purpose of the this pointer in C++?	**3**	**2**	**2**
	g).	Write two differences between early binding and late binding.	**4**	**2**	**2**
	h).	What is a virtual function? Why is it used?	**4**	**2**	**2**
	i).	What are class templates? Mention their significance.	**5**	**2**	**2**
	j).	Write the use of try, catch, and throw keywords in C++ exception handling.	**5**	**2**	**2**
					5 x 10 = 50 Marks
		UNIT-1	**CO**	**KL**	**M**
2.	**a).**	Explain key concepts of Object Oriented Programming with examples.	**1**	**3**	**7**
	b).	Describe the disadvantages of conventional programming paradigms.	**1**	**2**	**3**
		OR			
3.		Write a C++ program to define a class Book with members title, author, and price. Include a constructor to initialize data, and a function to display the book details. Demonstrate creation of objects.	**1**	**3**	**10**
		UNIT-2			
4.	**a).**	Explain the concept of access specifiers in C++ with examples.	**2**	**3**	**6**
	b).	What are nested classes? Write a program to demonstrate nested class.	**2**	**2**	**4**
		OR			
5.		Define constructors and destructors. Explain parameterized constructors and anonymous objects with example code.	**2**	**3**	**10**
		UNIT-3			

6.	**a).**	Describe overloading of unary operators in C++ with a program.	**3**	**2**	**5**
	b).	Explain how object of a class can be a data member of another class.	**3**	**2**	**5**
		OR			
7.		Write a C++ program to overload the assignment operator (=) for a class Time that stores hours and minutes.	**3**	**3**	**10**
		UNIT-4			
8.	**a).**	Explain static and dynamic binding in C++ with suitable examples.	**4**	**2**	**6**
	b).	Write a program to demonstrate use of virtual functions and virtual destructors.	**4**	**2**	**4**
		OR			
9.		Define abstract class. Write a program to illustrate abstract classes and function overriding in C++.	**4**	**2**	**10**
		UNIT-5			
10	**a).**	Explain class and function templates in C++. Write a template function for swapping values.	**5**	**2**	**7**
	b).	Describe exception handling in C++ with syntax and example using multiple catch blocks.	**5**	**2**	**3**
		OR			
11	**a).**	Write a program using class templates to implement a stack.	**5**	**3**	**6**
	b).	Explain how exception specifications (i.e., using throw clause) help in exception handling in C++. Illustrate with a simple example.	**5**	**2**	**5**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE : Questions can be given as A,B splits or as a single Question for 10 marks

Course Code	Category	L	T	P	C	C.I.E.	S.E.E.	Exam
B23ITM301	Minors	3	--	--	3	30	70	3 Hrs.

COMPUTER NETWORKS AND OPERATING SYSTEMS

(Minor Degree course in IT)

Course Objectives:

1.	To understand the different types of networks.
2.	To discuss the software and hardware components of a network.
3.	To develop an understanding of the principles of computer networks including IP, TCP and HTTP
4.	To understand the internal operation of modern operating systems
5.	Define, explain, processes and threads, mutual exclusion, CPU scheduling.
6.	Translate user requirements into the overall architecture and implementation of new systems and Manage Project and coordinate with the Client

Course Outcomes

S.No	Outcome	Knowledge Level
1.	Explain protocol layering, Networking Devices	**K2**
2.	Explain transmission media, switching, IP addressing, TCP, HTTP	**K2**
3.	Understand the basic concepts and functions of operating systems. Analyse the structure of OS and basic architectural components involved in OS design	**K2**
4.	Analyze various process management concepts, Apply Various Process Scheduling Algorithms.	**K4**
5.	Illustrate the basic concepts of HTML and CSS & apply those concepts to design static web page.	**K2**

SYLLABUS

UNIT-I (10Hrs)	Introduction: Data communications, Networks, Network Types, Standards and administration; Protocol Layering, TCP/IP Protocol suite, OSI Model. Networking devices: Basics of networking devices such as cables, hubs and switches, routers, servers and clients.
UNIT-II (10 Hrs)	Transmission Media: Introduction, Guided media, Un-guided media. Switching: Introduction, Circuit-Switched networks, Packet switching. Data Link Layer: Introduction, Link-layer addressing. Error Detection and Correction: Types of errors. IPV4 Addressing (Class full), IP Packet, IPV4 header. Routing: Basics of routing, TCP header, UDP header, HTTP, DNS

UNIT-III (10 Hrs)	Operating Systems Overview: Operating system functions, Operating system structure, Operating systems operations, Computing environments, Open-Source Operating Systems. System Structures: Operating System Services, User and Operating-System Interface, systems call, Types of System Calls, system programs, operating system structure.
UNIT-IV (10 Hrs)	Process Concept: Process Concept , Operations on processes, Inter-process communication, Communication in client server systems. Multithreaded Programming: Multithreading models, Thread libraries, Threading issues. Process Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple processor scheduling.
UNIT-V (10 Hrs)	Introduction To Html: Basic Syntax, Standard HTML Document Structure, Basic Text Markup, Html styles, Elements, Attributes, Heading, Layouts, Html media, Iframes Images, Hypertext Links, Lists, Tables, Forms, GET and POST method. CSS: Cascading style sheets, Levels of Style Sheets, Style Specification Formats, Selector Forms, The Box Model.
Textbooks:	
1.	Behrouz A. Forouzan, Data Communications and Networking, 5th Edition, McGraw Hill Publication, 2017.
2.	Andrew Tanenbaum, FeamsterWetherall, Computer Networks, 6th Edition, Global Edition
Reference Books:	
1.	James F. Kurose, Keith W. Ross, "Computer Networking: A Top-Down Approach", 6th edition, Pearson, 2019.
2.	Youlu Zheng, ShakilAkthar, "Networks for Computer Scientists and Engineers", Oxford Publishers, 2016.
3.	Computer Networks and Internets, Douglas E Corner, fourth Edition, Pearson Education.
4.	Stallings W, Operating Systems -Internals and Design Principles, 6th edition, Pearson Education, 2009
5.	Web Technologies, HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book, 1st Edition, Dream Tech,2009.

					Course Code: B23ITM301
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R23**
		III B.Tech. II Semester MODEL QUESTION PAPER			
		COMPUTER NETWORKS AND OPERATING SYSTEMS			
		(Minor Degree course in IT)			
Time: 3 Hrs.					**Max. Marks: 70 M**
		Answer Question No.1 compulsorily			
		Answer **ONE Question** from **EACH UNIT**			
		Assume suitable data if necessary			
					10 x 2 = 20 Marks
			CO	**KL**	**M**
1.	**a).**	Define network type.	**1**	**1**	**2**
	b).	List OSI layers.	**1**	**1**	**2**
	c).	What is packet switching?	**2**	**1**	**2**
	d).	Define routing.	**2**	**1**	**2**
	e).	What is a system call?	**3**	**1**	**2**
	f).	Define OS.	**3**	**1**	**2**
	g).	List thread libraries.	**4**	**1**	**2**
	h).	What is the convoy effect?	**4**	**1**	**2**
	i).	Define CSS.	**5**	**1**	**2**
	j).	What is the difference between GET and POST methods?	**5**	**1**	**2**
					5 x 10 = 50 Marks
		UNIT-1	**CO**	**KL**	**M**
2.	**a).**	Explain briefly about the TCP/IP Model	**1**	**2**	**5**
	b).	Explain different types of networks.	**1**	**3**	**5**
		OR			
3.	**a).**	Explain briefly about the ISO-OSI Model.	**1**	**2**	**5**
	b).	Discuss about Analog signals and digital signals.	**1**	**2**	**5**
		UNIT-2			
4.	**a).**	Differentiate guided media and unguided media.	**2**	**3**	**5**
	b).	Interpret error detection with an example.	**2**	**2**	**5**
		OR			
5.	**a).**	Illustrate IPV4 header.	**2**	**2**	**5**
	b).	Discuss a) Packet Switching b) Circuit Switching.	**2**	**2**	**5**
		UNIT-3			
6.	**a).**	Explain OS functions.	**3**	**2**	**5**
	b).	Illustrate computing environments with examples.	**3**	**2**	**5**
		OR			

<table>
<tr><td>7.</td><td>a).</td><td>Interpret different system calls.</td><td>3</td><td>2</td><td>5</td></tr>
<tr><td></td><td>b).</td><td>Differentiate monolithic structure and layered structure.</td><td>3</td><td>3</td><td>5</td></tr>
<tr><td></td><td></td><td>UNIT-4</td><td></td><td></td><td></td></tr>
<tr><td>8.</td><td>a).</td><td>Explain message passing and shared memory.</td><td>4</td><td>2</td><td>5</td></tr>
<tr><td></td><td>b).</td><td>Explain thread models.</td><td>4</td><td>2</td><td>5</td></tr>
<tr><td></td><td></td><td>OR</td><td></td><td></td><td></td></tr>
<tr><td>9.</td><td>a).</td><td>Consider the following table of arrival time and burst time for three processes P1, P2 and P3.
<table><tr><th>Process</th><th>Burst Time</th><th>Arrival Time</th></tr><tr><td>P1</td><td>6 ms</td><td>0 ms</td></tr><tr><td>P2</td><td>8 ms</td><td>2 ms</td></tr><tr><td>P3</td><td>3 ms</td><td>4 ms</td></tr></table>Calculate average waiting time using SJF algorithm.</td><td>4</td><td>3</td><td>5</td></tr>
<tr><td></td><td>b).</td><td>Consider the following table of arrival time and burst time for three processes P1, P2 and P3 and given Time Quantum = 2 ms
<table><tr><th>Process</th><th>Burst Time</th><th>Arrival Time</th></tr><tr><td>P1</td><td>4 ms</td><td>0 ms</td></tr><tr><td>P2</td><td>5 ms</td><td>0 ms</td></tr><tr><td>P3</td><td>3 ms</td><td>0 ms</td></tr></table>Calculate average turn around time using Round Robin Algorithm.</td><td>4</td><td>3</td><td>5</td></tr>
<tr><td></td><td></td><td>UNIT-5</td><td></td><td></td><td></td></tr>
<tr><td>10.</td><td>a).</td><td>Explain Standard HTML Document Structure.</td><td>5</td><td>2</td><td>5</td></tr>
<tr><td></td><td>b).</td><td>Explain Iframes Images.</td><td>5</td><td>2</td><td>5</td></tr>
<tr><td></td><td></td><td>OR</td><td></td><td></td><td></td></tr>
<tr><td>11.</td><td>a).</td><td>Explain Levels of Style Sheets.</td><td>5</td><td>2</td><td>5</td></tr>
<tr><td></td><td>b).</td><td>Interpret The Box Model.</td><td>5</td><td>2</td><td>5</td></tr>
</table>

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE : Questions can be given as A,B splits or as a single Question for 10 marks

Course Code	Category	L	T	P	C	I.M	E.M	Exam
B23ITM401	Minors	3	0	0	3	30	70	100

DATABASE MANAGEMENT SYSTEM

(Minor Degree course in IT)

Course Objectives:

1.	To introduce about database management systems.
2.	To give a good formal foundation on the relational model.
3.	To introduce the concepts of basic SQL as a universal Database language.
4.	To demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design and normalization.
5.	To explain Transaction management techniques.

Course Outcomes: At the end of the course Students will be able to:

S.No	Outcome	Knowledge Level
1.	Describe Fundamental Concepts Database Systems.	K2
2.	Apply E-R concepts for Conceptual Database Design.	K3
3.	Apply SQL to Create and Query a Relational Database.	K3
4.	Apply Normalization for Database Design.	K3
5.	Illustrate Transaction Management and Associated Techniques.	K2

SYLLABUS

UNIT-I(10Hrs)	Introduction: Database system, Characteristics (Database Vs File System), Various Types of Database Users, Advantages of Database Systems, Database Applications. Brief Introduction of Different Data Models; Concepts of Schema, Instance and Data Independence; Three Tier Schema Architecture for Data Independence; Database System Structure, Centralized and Client Server Architectures for the Database. [CO1] Entity Relationship Model: Introduction, Representation of Entities, Attributes, Entity Sets, Relationship Sets, Mapping Cardinalities and Participation Constraints, Generalization/Specialization, Aggregation. [CO2]
UNIT-II (8 Hrs)	Relational Model: Introduction to Relational Model, Concepts of Domain, Attribute, Tuple, Relation, Importance of Null Values, Integrity Constraints (Domain, Key Constraint, Unique, Not Null, Referential integrity, and Check Constraints). [CO3] BASIC SQL: Simple Database Schema, Data Types, Table Definitions using Integrity Constraints (Create, Alter), Different DML Operations (Insert, Delete, Update). [CO3]
UNIT-III (10 Hrs)	SQL: Basic SQL Querying Using Where Clause, Arithmetic & Logical Operations, SQL Functions (Date and Time, Numeric, String Conversion), Relational Set Operations, Nested Queries and Correlated Queries, Sub Queries, Grouping,

	Aggregation, Ordering, Implementation of Different Types of Joins, Views (Updatable and Non-Updatable). [CO3]
UNIT-IV (10 Hrs)	Schema Refinement (Normalization): Purpose of Normalization or Schema Refinement, Concept of Functional Dependency, Closure of Set of FDs and Set of Attributes, Normal Forms Based on Functional Dependencies (1NF, 2NF and 3NF), Concept of Surrogate Key, Boyce-Codd Normal Form (BCNF), Lossless Join and Dependency Preserving Decomposition, Fourth Normal Form(4NF) [CO4]
UNIT-V (10 Hrs)	Transaction Concept: Transaction State and Properties, Schedules, Serializability, Conflict Serializability, Recoverability, 2-Phase Locking Protocol and Time Stamp Based Protocols: Time Stamp Ordering Protocol and MultiVersion Concurrency Control. [CO5] Crash Recovery: Failure Classification, Write Ahead Log and Checkpointing, ARIES Recovery algorithm. [CO5]
Text Books:	
1.	Database System Concepts by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, 5th Edition, McGraw-Hill Education, 2019.
2.	Database Management Systems by Raghu Ramakrishnan, Johannes Gehrke, 3rd Edition., McGraw-Hill Education (India), 2014.
Reference Books:	
1.	Database Principles: Fundamentals of Design, Implementation, and Management by Steven Morris, Keeley Crockett, Carlos Coronel, Craig Blewett, Cengage, 2020.
2.	Fundamentals of Database Systems by RamezElmasri, Shamkant B. Navathe, 7th Edition, Pearson Education India, 2015.
3.	Introduction to Database Systems by C J Date, 8th Edition, Pearson Education, 2009.
e-Resources:	
1.	https://nptel.ac.in/courses/106/105/106105175/
2.	https://www.geeksforgeeks.org/introduction-to-nosql/

		Course Code: B23ITM401			
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R23**
		IV B.Tech. I Semester MODEL QUESTION PAPER			
		DATABASE MANAGEMENT SYSTEMS			
		(Minor Degree course in IT)			
Time: 3 Hrs.					**Max. Marks: 70 M**
		Answer Question No.1 compulsorily			
		Answer **ONE Question** from **EACH UNIT**			
		Assume suitable data if necessary			
					10 x 2 = 20 Marks
			CO	**KL**	**M**
1.	**a).**	Define schema and instance with an example.	**1**	**2**	**2**
	b).	What are the advantages of a database system over a file-based system	**1**	**2**	**2**
	c).	Define weak entity set and participation constraints.	**2**	**2**	**2**
	d).	Write SQL commands to create and alter a table.	**2**	**2**	**2**
	e).	What are set operations in SQL	**3**	**2**	**2**
	f).	Define correlated query with an example.	**3**	**2**	**2**
	g).	Define functional dependency with an example.	**4**	**2**	**2**
	h).	What is dependency preservation?	**4**	**2**	**2**
	i).	Define isolation in transaction processing.	**5**	**2**	**2**
	j).	Differentiate between primary and secondary indexing.	**5**	**2**	**2**
					5 x 10 = 50 Marks
		UNIT-1	**CO**	**KL**	**M**
2.	**a).**	Explain in detail the three-tier schema architecture with a neat diagram.	**1**	**2**	**5**
	b).	Compare database systems and file systems based on characteristics.	**1**	**2**	**5**
		OR			
3.	**a).**	Describe the roles of different users in a database environment.	**1**	**2**	**5**
	b).	Explain the various components of a database system architecture.	**1**	**2**	**5**
		UNIT-2			
4.	**a).**	Draw an ER diagram for a university database and explain all components.	**2**	**3**	**5**
	b).	Explain generalization, specialization, and aggregation with examples.	**2**	**3**	**5**
		OR			
5.	**a).**	Discuss domain, key, and referential integrity constraints with SQL examples.	**2**	**3**	**5**
	b).	Describe various data types in SQL and demonstrate simple table creation and manipulation.	**2**	**3**	**5**
		UNIT-3			

6.	**a).**	Explain nested queries and correlated queries with examples.	**3**	**3**	**5**
	b).	Describe the use of GROUP BY, HAVING, and ORDER BY clauses with examples.	**3**	**3**	**5**
		OR			
7.	**a).**	Discuss all types of joins in SQL with syntax and examples.	**3**	**3**	**5**
	b).	Explain the use of SQL functions (numeric, date, string) with examples.	**3**	**3**	**5**
		UNIT-4			
8.	**a)**	Describe 1NF, 2NF, and 3NF with examples.	**4**	**3**	**5**
	b)	Discuss the concept of BCNF and compare it with 3NF.	**4**	**3**	**5**
		OR			
9.	**a).**	Explain lossless join and dependency preservation properties.	**4**	**3**	**5**
	b).	Describe multivalued dependencies and 4NF with appropriate examples.	**4**	**3**	**5**
		UNIT-5			
10.	**a)**	Explain transaction states and ACID properties with examples.	**5**	**2**	**5**
	b)	Describe the concept of serializability and its testing methods.	**5**	**2**	**5**
		OR			
11.	**a).**	Explain the ARIES recovery algorithm with phases.	**5**	**2**	**5**
	b).	Discuss B+ tree structure with insert, delete, and search operations.	**5**	**2**	**5**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE : Questions can be given as A,B splits or as a single Question for 10 marks