


Government of Karnataka
Department of Technical Education
Bengaluru

	Course Title: MOBILE COMPUTING		
	Scheme (L:T:P) : 4:0:0	Total Contact Hours: 52	Course Code: 15CS63C
	Type of Course: Lectures, Self Study & Student Activity	Credit :04	Core/ Elective Elective
CIE- 25 Marks		SEE- 100 Marks	

Prerequisites

Knowledge of basic concepts of computer networks.

Course Objectives

1. To study the basics of wireless, cellular technology and the working of Mobile IP, ad hoc network, features of mobile operating systems.
2. To know J2ME, SDK, android that helps the mobile application development.
3. To understand the use of M-Commerce application.

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

Course outcome		CL	Linked PO	Teaching Hours
CO1	Recognize and explain wireless and Mobile Communication system and Bluetooth technology.	R,U	1,2,4,9,10	06
CO2	Describe and Differentiate Mobile Computing vs Wireless Networking, GSM,GPRS,UMTS and SDR	U,A	1,2,3,4,9,10	16
CO3	Explain the working of Mobile IP and Mobile Ad Hoc Networks, Vehicular Ad Hoc Network.	U,A	2,3,4,8,9,10	12
CO4	Describe the constraints and survey of commercial mobile Operating Systems.	U	2,10	06
CO5	Discuss and explain Mobile Application Development.	U,A	2,3,4,9,10	08
CO6	Explain different Mobile Commerce applications.	A	2,7,9,10	04
Total				52

Legends: R = Remember U= Understand; A= Apply and above levels (Bloom's revised taxonomy)

Course-PO Attainment Matrix

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
MOBILE COMPUTING	3	3	2	2	-	-	1	1	3	3

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

If $\geq 40\%$ of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3

If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2

If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1

If $< 5\%$ of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

Course Content and Blue Print of Marks for SEE

Unit No	Unit Name	Hour	Questions to be set for SEE			Marks Weightage	Marks Weightage (%)
			R	U	A		
I	Basics of Communication Technologies	06	05	10	05	20	13.79
II	Introduction to Mobile Computing and Wireless Networking	16	05	25	10	40	27.60
III	Mobile IP and Mobile Ad Hoc Networks	12	05	25	05	35	24.14
IV	Operating Systems for Mobile Computing	06	05	10	05	20	13.79
V	Mobile Application Development and Protocols	08	-	10	10	20	13.79
VI	Mobile Commerce	04	-	05	05	10	6.89
Total		52	20	85	40	145	100

UNIT I: Basics of Communication Technologies

06 Hrs

Mobile handsets, Wireless Communications and Server Applications, Cell phone System, Types of Telecommunication Networks, Components of wireless communication system, Architecture of mobile telecommunication system, wireless networking standards,

Wireless LANs, Wireless LAN Architecture, Applications of WLANs, Advantages of WLANs over wired LANs, Bluetooth Technology, Protocol stack of Bluetooth.

UNIT II: Introduction to Mobile Computing and Wireless Networking

16 Hrs

Define Mobile Computing, Mobile Computing vs. Wireless Networking, Mobile Computing Application, Characteristics of Mobile Computing, Structure of Mobile Computing Application, Cellular Mobile Communication, Generation of Cellular Communication

2

Technologies, Global System for Mobile communications(GSM),GSM Services, System Architecture of GSM,GSM security, General Packet Radio Service(GPRS),GPRS Services, GPRS Architecture Universal Mobile Telecommunication System (UMTS),UMTS Network Architecture, SDR, Mobile phone and human body.

UNIT III: Mobile IP and Mobile Ad Hoc Networks(MANET) 12 Hrs

Mobile IP, Packet Delivery, Desirable features of Mobile IP,Key mechanism used in Mobile IP, Route Optimization, Dynamic Host Configuration Protocol(DHCP),significance of DHCP.A Few Basics concepts-How is an Ad Hoc Network setup without the infrastructure Support?, Why is Routing in a MANET a Complex Task?, Characteristics of Mobile Ad Hoc Networks(MANETs)-MANET Operational Constraints, Applications of MANETs, MANET Design issues, Routing ,Vehicular Ad Hoc Networks(VANETs), MANET vs VANET, Security issues in a MANET.

UNIT IV: Operating Systems for Mobile Computing 06 Hrs

A Few Basic Concepts, Special Constraints and Requirements of Mobile OS,A Survey of Commercial Mobile Operating Systems,Windows Mobile, Palm OS, Symbian OS, iOS, Android, Blackberry OS,A Comparative study of Mobile OS,OS for sensor Network.

UNIT V: Mobile Application Development and Protocols 08 Hrs

Mobile Devices as Web Clients ,HDML(Handheld Markup Language) ,WAP, J2ME - J2ME Configuration, Android Application Development - Software Development Kit(SDK), Features of SDK, Android Application Components, Android Software stack Structure, Advantages of Android.

UNIT VI: Mobile Commerce 04 Hrs

Application of M-Commerce,Business to Consumer(B2C) Applications, Business to Business (B2B) Applications,. Structure of M-Commerce, Pros and Cons of M-Commerce, Mobile Payment System,Mobile Payment Schemes, Desirable properties of a Mobile Payment system, Mobile Payment solutions, Process of Mobile Payment, Security Issues.

Text books

1. Fundamentals of Mobile Computing, Prasant Kumar Pattanaik, Rajib Mall, Second Edition, PHI, ISBN: 978-81-203-5181-3

References

1. Mobile Computing, ASOKE TALUKDER HASAN AHMED ROOPA R YAVAGAL,Second Edition.Mc GrawHill

Suggested student activities

Note: the following activities or similar activities for assessing CIE (IA) for 5 marks (Any one)

Student activity like mini-project, surveys, quizzes, etc. should be done in group of 3-5 students.

1. Each group should do any one of the following type activity or any other similar activity related to the course and before conduction, get it approved from concerned course coordinator and programme coordinator.
2. Each group should conduct different activity and no repeating should occur

1	Give a presentation on call setup between two mobile phones.
2	Prepare a report and demonstrate Bluetooth technology.
3	Prepare a report on the working of GSM and GPRS
4	List and prepare a report any one application used by MANET.
5	With a real world example prepare a report on different mobile payment solutions for different payment schemes.
6	Prepare a report on procedure for working of software in shopping mall.

Course Delivery

The course will be delivered through lectures and Power point presentations/ Video

Course Assessment and Evaluation Scheme

Method	What		To whom	When/Where (Frequency in the course)	Max Marks	Evidence collected	Course outcomes
Direct Assessment	CIE	IA	Students	Three IA tests (Average of three tests will be computed)	20	Blue books	1 to 6
		Student activities		05	Report	1 to 6	
	Total	25					
	SEE	End Exam		End of the course	100	Answer scripts at BTE	1 to 6
Indirect Assessment	Student Feedback on course		Students	Middle of the course		Feedback forms	1,2,3 Delivery of course
	End of Course Survey			End of the course		Questionnaires	1 to 6 Effectiveness of Delivery of instructions & Assessment Methods

Note: I.A. test shall be conducted for 20 marks. Average marks of three tests shall be rounded off to the next higher digit.

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's taxonomy) such as:

Sl. No	Bloom's Category	%
1	Remembrance	10
2	Understanding	45
3	Application	45

Note to IA verifier: The following documents to be verified by CIE verifier at the end of semester

1. Blue books (20 marks)
2. Student suggested activities report for 5 marks
3. Student feedback on course regarding Effectiveness of Delivery of instructions & Assessment Methods.

FORMAT OF IA TEST QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks			
Ex: I test/6 th week of sem 10-11 AM	VI SEM		20			
	Year: 2017-18					
Name of Course coordinator :						
Units: __ CO's: ____						
Question no	Question	MARKS	CL	CO	PO	
1						
2						
3						
4						

Note: Internal choice may be given in each CO at the same cognitive level (CL).

MODEL QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks		
Ex: I test/6 th week of sem 10-11 AM	VI SEM	MOBILE COMPUTING	20		
	Year: 2016-17	Course code:15CS63C			
Name of Course coordinator :					
Units:1,2 Co: 1,2					
Note: Answer all questions					
Question no	Question		CL	CO	PO
1	List the types of telecommunication networks and Distinguish between data and voice networks. (5)		R	1	1,2
2	Define mobile computing. Mention at least three applications of mobile computing (5)		R	2	1,2
3	Interpret the necessary of using standard in networking (5)		U	1	1,2
4	List the advantages of GPRS. (5)		U	2	1,2

Note: Internal Choice may be given in each CO at the same cognitive level (CL).

Format for Student Activity Assessment

DIMENSION	Unsatisfactory 1	Developing 2	Satisfactory 3	Good 4	Exemplary 5	Score
Collection of data	Does not collect any information relating to the topic	Collects very limited information; some relate to the topic	Collects some basic information; refer to the topic	Collects relevant information; concerned to the topic	Collects a great deal of information; all refer to the topic	3
Fulfill team's roles & duties	Does not perform any duties assigned to the team role	Performs very little duties	Performs nearly all duties	Performs all duties	Performs all duties of assigned team roles with presentation	4
Shares work equally	Always relies on others to do the work	Rarely does the assigned work; often needs reminding	Usually does the assigned work; rarely needs reminding	Does the assigned job without having to be reminded.	Always does the assigned work without having to be reminded and on given time frame	3
Listen to other Team mates	Is always talking; never allows anyone else to speak	Usually does most of the talking; rarely allows others to speak	Listens, but sometimes talk too much	Listens and contributes to the relevant topic	Listens and contributes precisely to the relevant topic and exhibit leadership qualities	3
TOTAL						13/4=3.25=4

Note: This is only an example. Appropriate rubrics/criteria may be devised by the concerned Course Coordinator for assessing the given activity

**Diploma in Computer Science & Engineering
VI- Semester****Course Title : Mobile Computing**Time: **3 Hours**Max Marks: **100****PART-A****Answer any SIX questions. Each carries 5 marks.****5X6=30 Marks**

1. Explain the advantages of wireless LANs.
2. Define mobile computing. Mention at least three applications of mobile computing.
3. Define MANET(Mobile Ad Hoc Network). Explain the schematic model of a MANET.
4. Comparison of features of various mobile OSs
5. Explain the components of Android application.
6. Explain different M-payment schemes (mechanisms) that exist at present.
7. Explain the characteristics of mobile computing.
8. Explain the desirable features of Mobile IP.
9. Define microkernel OS. Give some reasons to prefer microkernel for developing mobile OS.

PART-B**Answer any SEVEN full questions each carries 10 marks.****10X7=70 Marks**

1. Discuss the architecture of Mobile telecommunication system using schematic diagram.
2. Explain the various services provided by GSM.
3. Describe the Key mechanism used in Mobile IP.
4. Explain the operation of mobile IP with a help of a suitable schematic diagram(Sequence of steps involved in packet delivery to and from a mobile node)
5. Discuss architecture GPRS using schematic diagram.
6. Explain the special constraints of mobile OS.
7. Explain J2ME configuration.
8. Discuss the Pros and Cons of M-Commerce.
9. Explain WAP Protocol stack.
10. Explain the important design constraints(issues) on a MANET.



MODEL QUESTION BANK**Diploma in Computer Science & Engineering****VI Semester****Course Title: MOBILE COMPUTING**

CO	Question	CL	Marks
I	List the types of telecommunication networks and Distinguish between data and voice networks.	R	05
	List the components of wireless communication system and explain any two of them	R U	
	Interpret the necessary of using standard in networking.	U	
	List the IEEE 802.11 standard used in wireless LAN.	R	
	Identify and Explain the components of WLAN	U	
	Summarize the application of Wireless LANs.	U	
	Explain the advantages of wireless LANs.	U	
	Write a note on Bluetooth	U	
	Define piconet and scatternet.	R	10
	Explain the function cellular communication system.	U	
	Compare Data network and voice network and their relative advantages and services	A	
	Identify and overcome the main difficulties if digitalized voice signals are to be transmitted over a data network.	U A	
	Explain the components of wireless communication system.	U	
	Discuss the architecture of Mobile telecommunication system using schematic diagram.	U	
	Explain Architecture of Wireless LAN.(Infrastructure based IEEE 802.11 network).	U	
	Explain application and advantages of WLAN.	U	
With a neat diagram describe the Bluetooth protocol stack.	A	05	
II	Define mobile computing. Mention at least three applications of mobile computing		R, A
	Explain the characteristics of mobile computing.		R
	Explain the functions of each tier structure of mobile computing.		U
	Explain cellular mobile communication.		U
	Compare 2G and 3G cellular communication technology.		U
	Summarize the characteristics of cellular technologies.		U
	Summarize the transport technologies used various generations of cellular networks.		U
	Explain GSM Security.		U
	Describe the function of HLR and VLR in call routing and roaming.	U	

	Define GPRS and explain GPRS Services.	R	
	List the advantages of GPRS.	R	
	List the limitations of GPRS.	R	
	Define UMTS. Discuss the dissimilarities between UMTS and GSM.	U	
	Explain UMTS Network architecture.	U	
	List out the problems faced by human by using mobile phones.	A	
	With a neat diagram explain the structure of mobile computing application.	A	10
	Explain the various services provided by GSM.	U	
	With a neat diagram explain the functional architecture of GSM system.	U	
	Discuss architecture GPRS using schematic diagram.	U	
	Discuss the features and advantages of SDR.	U	
III	Define the following mobile IP terms a. Mobile Node b. Foreign Agent c. Foreign Network d. Home Network e. Home agent	R	05
	Write short notes on the following: a. Correspondent node b. Care-of-Address c. Agent Discovery d. Tunnelling and Encapsulation	R	
	Define tunnelling process .	R	
	Explain agent advertisement.	U	
	Explain agent solicitation.	U	
	Discuss the process of packet delivery by suitable example.	U	
	Explain the desirable features of Mobile IP.	U	
	Explain the Mobile IP mechanism of Discovering the COA.	U	
	Explain the Mobile IP mechanism of Registering the COA.	U	
	Explain the Mobile IP mechanism of Tunnelling the COA.	U	
	Give a brief account of route optimization in mobile IP.	U	
	Define binding. Explain the messages transmitted in Optimized mobile IP.	U	
	Explain DHCP.	U	
	Explain three important mechanisms for IP address allocation by DHCP.	U	
	State some applications of DHCP.	U	
Define MANET(Mobile Ad Hoc Network).Explain the schematic model of a MANET.	U		
Compare the MANET routing strategies with the routing strategies of traditional networks.	U		

	List the characteristics of MANETs.	R	
	List the MANET Operational constraints.	R	
	Describe the applications of MANETs.	A	
	Define routing. List out the problems arises in MANET by routing.	U	
	Explain VANET and few important applications of it.	A	
	Compare MANET and VANET.	U	
	Write a short note on characteristics of secure MANET.	U	
	Explain the characteristics of MANET that can be exploited to cause security vulnerabilities.	U	
	Explain the operation of mobile IP with a help of a suitable schematic diagram(Sequence of steps involved in packet delivery to and from a mobile node)	U	10
	Explain the agent discovery methods.	U	
	Describe the Key mechanism used in Mobile IP.	U	
	Explain the characteristics of MANETs.	U	
	Explain the important design constraints(issues)on a MANET.	U	
	Explain security issues in a MANET.	U	
IV	Explain the special features that an operating system for a mobile device needs to support compared to the features provided by a traditional operating system.	U A	05
	Define microkernel OS.Give some reasons to prefer microkernel for developing mobile OS.	U A	
	Write a short on the following commercial OS a. Windows Mobile b. Palm OS c. Symbian OS d. IOS e. Android f. Kernel g. Blackberry OS	U	
	Comparison of features of various mobile OS	U	
	Explain the important ways in which the operating system for a sensor network is different from a traditional operating system.	U	
	List and explain the special constraints of mobile OS	U	10
List and explain the special service requirements of mobile OS.	U		
V	Explain the problems arise by mobile devices used as a web client.	U	05
	Explain HDML.	U	
	Define WAP. Explain the traditional web access mechanism.	U	
	Explain the working of WAP based web access.	U	
	Define J2ME.List the applications of J2ME.	A	
	Difference between J2ME device and conventional computers.	U	
	Define Android and their applications.	A	

	Define Android SDK.Compare Java byte code with Android byte code	A	
	Explain the features of SDK.	U	
	Explain the components of Android application.	U	
	List out the Android APIs.	R	
	Summarize the advantages of Android	U	
	Explain WAP Protocol stack.	U	
	Explain J2ME configuration.	U	
	Explain J2ME functional architecture.	U	
	Explain the structure of Android software stack.	U	
VI	Define M-Commerce	R	05
	List the features required by a mobile device to potentiate M-Commerce.	A	
	Explain the Pros(Advantages) of M-Commerce	A	
	Discuss the Cons(Disadvantages) of M-Commerce	A	
	Define Mobile payment Systems.	U	
	Explain different M-payment mechanisms that exit at present	U	
	Discuss the different M-payment solution in a M-commerce.	U	
	List the characteristics of M-payment system.	R	
	Describe the security issues in M-commerce.	U	
	Explain B2B Commerce.	U	10
	Explain B2C Commerce.	U	
	List the application of M- Commerce and explain any one application.	A	
	Describe the architecture of a M-Commerce	U	
	Discuss the Pros and Cons of M-Commerce	U	
	Explain different M-payment schemes (mechanisms) that exist at present.	U	
Explain the properties (characteristics) of M-payment system.	U		
Discuss a model of M-payment process	U		

