University School of Information, Communication & Technology
Guru Gobind Singh Indraprastha University
Sector -16 C, Dwarka, New Delhi-110078
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F.No. GGSIPU/USIC&T/2023-24/2072 Dated 06.09.2023

Advertisement for the Guest Faculty (Assistant Professor)

USICT invites adequately qualified and motivated candidates at the Assistant Professor level to appear in upcoming walk-in-interview to be scheduled on **14th & 15th September 2023** 10:30 AM till 04:00 PM in **the Committee Room EFC-315 E -Block of USICT** Guru Gobind Singh Indraprastha University Dwarka Campus. The details of the fields of studies and tentative positions are as below :

Code	Paper	Load (Hrs)
ICT601/ICT691	Distributed and Cloud Computing + Lab	12
ICT517/ICT565	Advanced Electromagnetic Engineering + Lab	6
RA513/RA557	Control Systems and Applications + Lab	6
RA605	Optimization Methods in Engg.	4
IT711	Block chain Technology	4
IT715	Cloud Computing	4
ICT105	Engineering Mechanics	15
ICT153	Engineering Graphics-I	16
ICT101	Programming for Problem Solving + Lab	21
ICT103	Electrical Science + Lab	21
ICT225	Engineering Electromagnetics	4
EC401	Satellite Communications	4
ICT217/ICT263	Computational Method	8

Number of Positions : 05

*** The detailed Syllabus is enclosed with advertisement .**

Eligibility Conditions / Qualifications : As per University Norms (AICTE/UGC Regulations as applicable according to the course)

Age Limit : As per AICTE/ UGC regulations.

Mode: Walk-in Interviews in offline mode (Committee Room EFC-315 E-Block of USICT Guru Gobind Singh Indraprastha University New Delhi-110078

Date & Time: 14th & 15 September 2023 10:30 AM till 04:00 PM

General Instructions and Guidelines :

1. No TA / DA Shall be paid for attending the interview.
2. The candidate shall bring all relevant document documents in original and one set of photocopies. The candidature of the applicant shall be subjected to the verification of testimonials.
3. The numbers of vacancies may change at the discretion of the University.The University reserves the right not to fill some or all the vacancies advertised if the circumstances so warrant. The University reserves the right to withdraw advertised posts at any time without assigning any reason. Any Consequential vacancies arising at the time of the interview may also be filled up by the available candidates.
4. Guest/ Visiting employment in the University shall be governed by the rules and regulations as notified by the University.
5. Canvassing in any form shall be treated as disqualification.
6. Any dispute, if any will be subject to the Courts /Tribunals having jurisdiction over Delhi.

(Pravin Chandra)
Professor & Dean, USIC&T

1. UITS, to upload the same on University's Web site

Paper ID: Code: ICT 601	Paper: Distributed and Cloud Computing	L	T	P
		4	0	4

INSTRUCTIONS TO PAPER SETTERS:

Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks

Course Outcomes:

CO 1	Ability of students to understand the meaning and purpose of Distributed & Cloud Computing.
CO 2	Ability of students to understand Web Services, Mashups, SOAP
CO3	Ability of students to understand concept of Big Tables, File System and Map Reduce Model
CO4	Ability of students to understand QoS, Inter Cloud Issues and Security.

CO vs PO:

	PO1	PO2	PO3	PO4
CO 1	2	2	2	1
CO 2	1	1	1	1
CO3	1	2	2	-
CO4	1	2	1	1

UNIT - I

Introduction to Distributed computing models, Clock synchronization, Distributed System Model, Request/Reply Protocols - RPC - RMI - Logical Clocks and Casual Ordering of Events, Election Algorithm, Distributed Mutual Exclusion, Distributed Deadlock Detection Algorithms.

UNIT - II

Introduction to Cloud Computing, Definition, Characteristics, Components, Cloud provider, SAAS, PAAS, IAAS and Others, Organizational scenarios of clouds, Administering &Monitoring cloud services, benefits and limitations, Deploy application over cloud, Comparison among SAAS, PAAS, IAAS, Cloud computing platforms: Infrastructure as service: Amazon AWS, Platform as Service: Google App Engine, Microsoft Azure.

UNIT - III

Introduction to Cloud Technologies, Study of Hypervisors, SOAP, REST, Compare SOAP and REST, Webservices, AJAX and mashups: user interface services, Virtual machine technology, virtualization applications in enterprises, Pitfalls of virtualization, Multi-entity support, Multi-schema approach, Multi-tenance using cloud data stores, Data access control for enterprise applications, Databases in the cloud, Cloud file systems: GFS and HDFS, BigTable, HBase and Dynamo, Map-Reduce and extensions: Parallel computing, The map-Reduce model, Parallel efficiency of Map-Reduce, Relational operations using Map-Reduce

UNIT - IV

Cloud security fundamentals, Vulnerability assessment tool for cloud, Privacy and Security in cloud, Cloud computing security architecture, Cloud computing security challenges, Issues in cloud computing, Implementing real time application over cloud platform, Issues in Intercloud environments, QoS Issues in Cloud, Dependability, data migration, streaming in Cloud. Quality of Service (QoS) monitoring in a Cloud computing environment, Inter Cloud issues, load balancing, resource optimization.

Textbooks:

1. Ajay D. Kshemkalyani, Mukesh Singhal, "Distributed Computing: Principles, Algorithms, and Systems", Cambridge University Press; South Asian edition, 2010
2.Antohy T Velte, et.al , "Cloud Computing : A Practical Approach", McGraw Hill, 2009
3.Judith Hurwitz, R.Bloor, M.Kanfman, F.Halper ,"Cloud Computing for Dummies", Wiley India Edition, 2009
4. Tim Malhar, S.Kumaraswammy, S.Latif ,"Cloud Security & Privacy ", SPD,O'REILLY, 2009

References:

1. Barrie Sosinsky, "Cloud Computing Bible", Wiley India, 2011
2. George Reese, "Cloud Applications", O'Reily Media Inc., 2009
3. Ronald Krutz and Russell Dean Vines, "Cloud Security", Wiley-India, 2010

Third Semester					
Group	**Code**	**Paper**	**L**	**T/P**	**C**
Theory Papers					
PC	ICT601	Distributed and Cloud Computing	4		4
EA		Emerging Area Elective – 3 (EA3)			4
EA		Emerging Area Elective – 4 (EA4)			4
EA		Emerging Area Elective – 5 (EA5)			4
OA		Open Elective			4
PC	ICT603	Human Values and Ethics *	2		2
Practical/Viva Voce					
PC	ICT691	Lab.-8 (DCC)	-	2	1
PC	ICT693	Major Research Project Part – I**	-	-	4
Total					**27**

*NUES: The evaluation shall be conducted by the concerned teacher as continuous assessment. The marks shall be awarded out of 100 (maximum marks).

** The research project guideline shall be issued separately by the school with the approval of the Dean, USICT

Fourth Semester					
Group	**Code**	**Paper**	**L**	**T/P**	**C**
Practical/Viva Voce					
PC	ICT652 ICT654	Major Research Project Part – II** Or Internship**	-	-	22
Total					**22**

** The research project and internship guideline shall be issued separately by the school with the approval of the Dean, USICT

Total: 104 Credits

Paper ID:		L	T	P
Code:	ICT517 Paper: Advanced Electromagnetic Engineering	4	0	4

INSTRUCTIONS TO PAPER SETTERS:

Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks

Course Outcome:

CO 1	*Understand and apply Maxwell's equations and be able to explain their consequences under different assumptions*
CO 2	*Solve problems and do calculations related to electromagnetic radiation, motion of charged particles*
CO 3	*Derive and analyse models for electromagnetic fields and wave-propagation*
CO 4	*Know applications of radiation, scattering and bio electromagnetism.*

CO vs PO:

	PO1	PO2	PO3	PO4
CO 1	3	-	3	-
CO 2	3	-	3	-
CO3	3	-	3	-
CO4	3	-	3	-

UNIT-I

Review of Maxwell equations, The Source Concept, Duality, Uniqueness, Image Theory, The Equivalence Principal, Fields in Half-space, The Induction Theorem, Reciprocity, Green's Function

UNIT-II

The Wave Function, Plane Waves, The Rectangular Waveguide, The Rectangular Cavity, Partially Filled Waveguide, The Dielectric-Slab Waveguide, Surface-Guided Waves, Modal Expansion of Fields, Current in Waveguides

UNIT-III

The Cylindrical and Spherical Wave Function, Inhomogeneous Field Waveguides, Discontinuity and Excitation of waveguides, The Circular Cavity and Other Guided Waves, Scattering.

UNIT-IV

Radiation from simple sources and apertures, Antenna Theory: Receiving antennas and various types of Antennas, Antenna pattern synthesis, Periodic structure, Floquet's Theorem, Other resonators: split-ring resonator, Spiral Resonator, fishnet structures. Introduction to bio-electromagnetism

Text Books:

[T1] C.A. Balmain, "Advanced Engineering Electromagnetics", Wiley India, 2005
[T2] Electromagnetic wave theory for boundary-value problems: an advanced course on analytical methods by HyoJ. Eom, 1 ed, Springer 2004
[T3] Introduction to Electrodynamics By David J. Griffith, John Wiley & Sons,3rd Edition.

Reference Books:

[R1] Time Harmonic Electromagnetic Fields By R.F Harrington, McGraw Hill, 1961.
[R2] Electromagnetic Wave Propagation, Radiation and Scattering, A. Ishimaru , Prentice Hall , 1991
[R3] Electromagnetic Waves and Radiating Systems By Jordan and Balmain, Pretice Hall,2nd Editi

First Semester					
Group	**Code**	**Paper**	**L**	**T/P**	**Credits**
Theory Papers					
PC	ICT515	Analog Integrated Circuit Design	4		4
PC	ICT513	Wireless Sensor Networks	4		4
PC	ICT505	Soft Computing	3		3
PC	ICT517	Advanced Electromagnetic Engineering	4		4
PC	ICT509	Advances in Data & Computer Communications	4		4
PC	ICT511	Scientific Writing**	2		2
Practical/Viva Voce					
PC	ICT563	Lab.-1 (AICD)	-	2	1
PC	ICT561	Lab.-2(WSN)	-	2	1
PC	ICT565	Lab.-3 (AE)	-	2	1
PC	ICT557	Lab.-4 (ADCC)	-	2	1
PC	ICT567	Soft Computing Lab.	-	2	1
PC	ICT559	Term Paper – 1*			2
Total			**21**	**10**	**28**

*NUES: The evaluation shall be conducted by a duly constituted committee of teachers by the APC of the school / department /institution. The marks shall be awarded out of 100 (maximum marks).

**NUES: The evaluation shall be conducted by the concerned teacher as continuous assessment. The marks shall be awarded out of 100 (maximum marks).

Second Semester					
Group	**Code**	**Paper**	**L**	**T/P**	**Credits**
Theory Papers					
PC	ICT514	Digital Integrated Circuit Design	4		4
PC	ICT510	Advanced Signal Processing	4		4
PC	ICT512	Information Theory and Coding	4		4
EA		Emerging Area Elective – 1 (EA1)			4
EA		Emerging Area Elective – 2 (EA2)			4
PC	ICT508	Research Methodology**	2		2
Practical/Viva Voce					
PC	ICT694	Lab.-5 (DICD)	-	2	1
PC	ICT590	Lab.-6 (ASP)	-	2	1
PC	ICT592	Lab.-7 (ITC)	-	2	1
PC	ICT588	Term Paper – 2*			2
Total			**14**	**6**	**27**

*NUES: The evaluation shall be conducted by a duly constituted committee of teachers by the APC of the school / department /institution. The marks shall be awarded out of 100 (maximum marks).
**NUES: The evaluation shall be conducted by the concerned teacher as continuous assessment. The marks shall be awarded out of 100 (maximum marks).

Paper Code: RA513	Paper: Control system and application	L	T/P	C
Paper ID:		3	-	3

INSTRUCTIONS TO PAPER SETTERS:

Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks

Course Outcomes (CO):	
CO1:	Ability to solve and design the open and closed loop system.
CO2:	Ability to understand conventional and digital control systems
CO3:	Ability to understand the concept of controllability and observability
CO4:	Ability to learn the functionality of different motors for control systems

	PO1	PO2	PO3	PO4
CO1	3	-	3	-
CO2	3	-	3	-
CO3	3	-	3	-
CO4	3	-	3	-

Unit I

Elements of Control System - Open loop and Closed loop systems - Differential equation - Transfer function, Modelling of Electric and Mechanical systems, Translational and rotational mechanical systems, Block diagram reduction Techniques, Signal flow graph, P,PI,PD and PID Compensation, concept of Stability, Routh-Hurwitz Criterion.

Unit II

Digital control: Introduction to Discrete Time Systems, Necessary for Digital Control System, Spectrum Analysis of Sampling Process, Signal Reconstruction, Difference Equations, Z transforms, and the Inverse Z transform, Pulse Transfer Function, Time Response of Sampled Data Systems.

Unit III

State variable Analysis: Concepts of state, state variable, state model, state models for linear continuous time functions, diagonalization of transfer function, solution of state equations, concept of controllability & observability. Introduction to Optimal control & Nonlinear control, Optimal Control problem, Regulator problem, Output regulator, tracking problem, Nonlinear system - Basic concepts.

Unit IV

Control Systems for Automation: Working principle of synchronous, Asynchronous & stepper motors, Difference between Induction and servo motors, Torque v/s speed characteristics, Power v/s. Speed characteristics, Industrials Drives: DC and AC motors operation and selection, Selection of feedback system. Introduction to Embedded Systems, Architecture and system Model, Embedded Hardware Building Block, embedded system on chip (SOC).

Textbooks:

3. *K. Ogata, "Modern control engineering", Pearson 2002.*
4. *Control System Engineering, J. Nagrath and M. Gopal, New Age International publishers,5th Edition, 2007.*
5. *Sigurd Skogestad and Ian Postlethwaite, Multivariable Feedback Control Analysis and Design - John Wiley & Sons Ltd., 2nd Edition, 2005*
6. *Digital control systems by K.Ogata*
7. *Embedded Systems- Architecture, Programming and Design, Raj Kamal, Tata McGraw Hill Education.*
8. *Process Control Instrumentation Technology, Johnson Curties, Prentice hall of India, 8th edition.*

References:

7. *Donald Eckman, "Automatic Process Control", Wiley Eastern Limited.*
8. *Thomas E Marlin "Process Control- Designing processes and Control Systems for Dynamic Performance", McGraw-Hill International Editions.*
9. *F. G. Shinskey, "Process control Systems", TMH.*
10. *Krishna Kant, "Computer Based Industrial Control", PHI.*
11. *Chi-Tsong Chen, "Linear System Theory and Design", Oxford University Press.*
12. *B. C. Kuo, "Automatic Control System", Prentice Hall of India, 7th edition 2001*

M.Tech (Robotics & Automation)

First Semester					
Group	**Code**	**Paper**	**L**	**T/P**	**Credits**
Theory Papers					
PC	RA501	Computational Techniques using MATLAB	4		4
PC	RA503	Robotics Engineering	4		4
PC	RA505	Mechatronics Systems and Applications	4		4
PC	RA507 RA509	Introduction to Manufacturing Systems *(For CSE/IT/ECE/ICE background students)* or Introduction to Electrical and Electronics Systems *(For MAE/Mechanical/Production/Industrial Engineering background students)*	4		4
PC	RA513	Control Systems and Applications	4		4
HS	ICT511	Scientific Writing**	2		2
Practical/Viva Voce					
PC	RA551	Lab.-1 (Computational Techniques Lab)	-	2	1
PC	RA553	Lab.-2 (Robotics Engineering Lab)	-	2	1
PC	RA555	Lab.-3 (Mechatronics Lab)	-	2	1
PC	RA557	Lab.-4 (Control System lab)	-	2	1
PC	ICT559	Term Paper – 1*			2
Total			**22**	**8**	**28**

*NUES: The evaluation shall be conducted by a duly constituted committee of teachers by the APC of the school / department /institution. The marks shall be awarded out of 100 (maximum marks).
**NUES: The evaluation shall be conducted by the concerned teacher as continuous assessment. The marks shall be awarded out of 100 (maximum marks).

Second Semester					
Group	**Code**	**Paper**	**L**	**T/P**	**Credits**
Theory Papers					
PC	RA502	Mobile Robots	4		4
PC	RA504	CAD/CAM	4		4
PC	RA506	Artificial Intelligence in Industrial Automation	4		4
EA	RA512	Embedded systems and Internet of Things	4		4
EA	RA510	Image Processing and Computer Vision	4		4
PC	ICT508	Research Methodology**	2		2
Practical/Viva Voce					
PC	RA552	Lab.-5 (CAD/CAM Lab)	-	2	1
PC	RA554	Lab.-6 (AI lab)	-	2	1
PC	RA556	Lab.-7 (Image Processing and Computer Vision Lab)	-	2	1
PC	RA558	Lab.-8 (Embedded systems and Internet of Things Lab)	-	2	1
PC	ICT558	Term Paper – 2*			2
Total			**22**	**6**	**28**

*NUES: The evaluation shall be conducted by a duly constituted committee of teachers by the APC of the school / department /institution. The marks shall be awarded out of 100 (maximum marks).
**NUES: The evaluation shall be conducted by the concerned teacher as continuous assessment. The marks shall be awarded out of 100 (maximum marks).

Paper Code: RA605	Paper: Optimization Methods in Engineering	L	T/P	C
Paper ID:		4	-	4

INSTRUCTIONS TO PAPER SETTERS:

Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks

Course Outcomes (CO):

CO1:	Ability to understand the concept of optimization and classical optimization techniques.
CO2:	Ability to understand linear programming and one-dimensional non-linear programming.
CO3:	Ability to understand the constrained and unconstrained non-linear programming.
CO4:	Ability to know the evolutionary algorithms and their application in engineering problems.

	PO1	PO2	PO3	PO4
CO1	3	-	2	-
CO2	3	-	2	-
CO3	3	-	2	-
CO4	3	-	2	-

Unit I

Introduction to Optimization: Historical Development, Engineering applications of Optimization, Design vector and constraints, Constraint surface, Objective function, Classification of Optimization Problems.

Classical Optimization Techniques: Single variable optimization, Constrained and unconstrained multi-variable optimization, Direct substitution method, Lagrange's method of multipliers, Karush-Kuhn-Tucker conditions.

Unit II

Linear Programming: Statement of an LP problem, Graphical Solution of an LP problem, Simplex method, Dual simplex method.

Non-linear Programming (One-dimensional minimization method): Unimodal function, Unrestricted search, Exhaustive search, Dichotomous search, Interval halving method, Fibonacci method, Direct root method.

Unit III

Non-linear Programming (Unconstrained Optimization Techniques)

Direct Search Methods: Random search methods, Grid search method, Univariate method, Hookes and Jeeves' method, Powell's method.

Indirect Search Methods: Steepest descent method, Newton's method.

Non-linear Programming (Constrained Optimization Techniques)

Direct Methods: Random search method, Sequential linear programming.

Indirect methods: Transformation techniques, Exterior penalty function method, Interior penalty function method.

Unit IV

Evolutionary Algorithms: An overview of evolutionary algorithms, Simulated annealing algorithm, Genetic algorithm, Particle swarm optimization, Ant colony optimization.

Case studies on application of Evolutionary algorithms on Engineering problems.

Textbooks:

1. *Engineering Optimization: Theory and Practice* by S.S.Rao, John Wiley and Sons 2009.
2. *Nonlinear Programming, Theory and Algorithms* by Bazaaraa, Hanif D. Shirali and M.C.Shetty, John Wiley & Sons, New York 2004.
3. *Optimization for Engineering Design: Algorithms and Examples* by Kalyanmoy Deb, PHI 2012.
4. *Multi-objective Optimization using Evolutionary Algorithms* by Kalyanmoy Deb, Wiley 2010.

References:

1. *Engineering Optimization: Methods and Applications* by G. V. Reklaitis, A. Ravindran, K. M. Ragsdell, Wiley 2006.
2. *Nonlinear optimization with engineering applications* by Michael C. Bartholomew-Biggs, Springer 2008.

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APPLICABLE FROM A.S. 2020-21

Paper ID: 44711 | **L** 4 | **T/P** 0 | **C** 4

Code: IT711 **Paper: BlockChainTechnology**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks

Course Outcomes:

CO 1	Ability of students to understand the concepts of BlockChain Technology
CO 2	Ability of students to analyse basics of Cryptography and Digital Signatures
CO 3	Ability of students to understand the concepts of Ethereum Virtual Machine and Hyperledger
CO 4	Ability of students to understand concept of Public vs. Private Blockchains

Course Outcomes -Program Outcomes Matrix

Filled on a scale of 1 to 3 (3=High; 2=Moderate; 1=Low; '-'for no correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	3	3	3	3	3	3	2	2	2	2	1
CO 2	3	3	3	2	3	2	3	1	-	-	1	1
CO 3	3	3	2	2	2	3	3	2	2	1	-	-
CO 4	3	3	2	3	2	3	2	1	1	-	-	1

UNIT 1

Definition of BlockChain. Blocks Subdirectory. Data Storage in the Blockchain. Participants of the Blockchain. Description of Bitcoin Blockchain. Advantages and Disadvantages of using Blockchains. Introduction to MHRD's Virtual Lab.

UNIT 2

Physical and Digital Money. Defining E-Money : A Brief History of Money—Dispelling the Myths. Modalities of Interbank Payments. E-Money Wallets. Cryptography; Encryption and Decryption; Hashes; Digital Signatures; Digital Tokens. Tracking of Physical Objects; Notable Cryptocurrencies and Tokens. BLAST Algorithm.

UNIT 3

From Bitcoin to Ethereum; Enter the EthereumBlockchain; Ethereum Smart Contracts. Ethereum Virtual Machine and Code Execution; Ethereum Ecosystem. Ownership Structure in other Blockchains and Application. Hyperledger, Enterprise Ethereum, Quorum, Corda: Examples of Enterprise Blockchain Platforms

UNIT 4

Blockchain Application Development; Blockchain Application Development using REMIX/SOLIDITY; Interacting with the Bitcoin Blockchain; Interacting Programmatically with Ethereum—Sending Transactions; Interacting Programmatically with Ethereum—Creating a Smart Contract; Public vs. Private Blockchains; Decentralized Application Architecture

Text Books:

1. Lewis, Antony, "The basics of bitcoins and blockchains: an introduction to cryptocurrencies and the technology that powers them", Mango Media Inc., 2018.
2. Mahankali, Srinivas., "Blockchain: The Untold Story: From birth of Internet to future of Blockchain", BPB Publications, 2019.

References Books:

1. Singhal, Bikramaditya, GautamDhameja, and PriyansuSekhar Panda, "Beginning Blockchain: A Beginner's Guide to Building Blockchain Solutions", Apress, 2018.
2. Wattenhofer, Roger, "The science of the blockchain", CreateSpace Independent Publishing Platform, 2016.

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APPLICABLE FROM A.S. 2020-21

Paper ID: 44715 | **L** | **T/P** | **C**
Code: IT715 **Paper: Cloud Computing** | **4** | **0** | **4**

INSTRUCTIONS TO PAPER SETTERS: Maximum Marks: 75
Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks

Employability, Entrepreneurship & Skill Development

Course Outcomes:

CO 1	Ability of students to understand the concepts of SAAS, PAAS, IAAS
CO 2	Ability of students to analyze basics of SOAP,REST and Multi-Tenancy Approach
CO 3	Ability of students to understand the concepts of MICEF Computing
CO 4	Ability of students to understand concept of Privacy and Security in cloud.

Course Outcomes -Program Outcomes Matrix

Filled on a scale of 1 to 3 (3=High; 2=Moderate; 1=Low; '-'for no correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	2	3	3	3	3	3	2	2	3	2	1
CO 2	3	2	3	3	3	2	3	2	3	2	2	1
CO 3	3	3	3	2	2	3	3	2	3	3	2	1
CO 4	3	3	3	2	3	3	3	2	3	4	2	1

UNIT 1

Introduction to Cloud Computing, Definition, Characteristics, Components, Cloud provider, SAAS, PAAS,IAAS and Others, Organizational scenarios of clouds, Administering &Monitoring cloud services, benefits and limitations, Comparison among SAAS, PAAS, IAAS, Cloud computing platforms: Infrastructure as service: Amazon EC2,Platform as Service: Google App Engine, Microsoft Azure.

UNIT 2

IntroductiontoCloudTechnologies,StudyofHypervisors,SOAP,REST,Comparison ofSOAPand REST, Webservices, mashups-Web services, Mashups: user interface services, Virtualmachinetechnology,virtualizationapplicationsinenterprises,Pitfallsofvirtualization, Multi-entity support, Multi-schema approach, Multi-tenance using cloud data stores.

UNIT 3

Datainthecloud:Relationaldatabases,Cloudfilesystems:GFSandHDFS,BigTable,HBaseand Dynamo, Map-Reduce and extensions: Parallel computing, The map-Reduce model. MICEF Computing(Mist, IOT, Cloud, Edge and FOG Computing): Concept and Application

UNIT 4

Cloud security fundamentals, Vulnerability assessment tool for cloud, Privacy and Security in cloud, Cloudcomputing security architecture, Issues in cloudcomputing,IssuesinIntercloud environments,QoSIssuesinCloud, StreaminginCloud.Quality of Service (QoS) monitoring in a Cloud computing environment, Inter Cloud issues, load balancing, resourceoptimization.

Text Books:

1. Sosinsky Barrie "Cloud Computing Bible", Wiley India, 2011
2. Buyya, Rajkumar, James Broberg, and Andrzej M. Goscinski, eds.," Cloud computing: Principles and paradigms". Vol. 87. John Wiley & Sons, 2010.
3. Jayaswal, Kailash. "Cloud Computing Black Book". John Wiley & Sons, 2014.

References Books:

1. Velte, Anthony T., Toby J. Velte, and Robert Elsenpeter. "Cloud Computing: A Practical Approach." McGraw-Hill, Inc. 2019
2. Gerardus Blokdyk , "Cloud Computing : A Complete Guide",5 Starcooks, 2019.

PaperCode: ICT105	Paper: Engineering Mechanics	L		T/P	C
PaperID: 164105		3		-	3

Marking Scheme:

1. Teachers Continuous Evaluation: 25 marks
2. Term end Theory Examinations: 75 marks

Instruction for paper setter:

1. There should be 9 questions in the term end examinations question paper.
2. The first (1st) question should be compulsory and cover the entire syllabus.This question should be objective, single line answers or short answer type question of total 15 marks.
3. Apart from question 1 which is compulsory, rest of the paper shall consist of 4 units as per the syllabus. Every unit shall have two questions covering the corresponding unit of the syllabus However, the student shall be asked to attempt only one of the two questions in the unit. Individual questions may contain upto 5 sub-parts / sub-questions. Each Unit shall have a marks weightage of 15.
4. The questions are to be framed keeping in view the learning outcomes of the course / paper. The standard / level of the questions to be asked should be at the level of the prescribed textbook.
5. The requirement of (scientific) calculators / log-tables / data – tables may be specified if required.

Course Objectives:

1:	To impart knowledge to solve problems pertaining to force systems, equilibrium and distributed systems.
2:	To impart knowledge to solve problems of friction and engineering trusses.
3:	To impart knowledge to deal with the problems of kinematics and kinetics of particle
4:	To impart knowledge to deal with the problems of kinematics and kinetics of rigid bodies.

Course Outcomes (CO):

CO1:	Ability to solve problems pertaining to force systems, equilibrium and distributed systems.
CO2:	Ability to solve problems of friction and engineering trusses.
CO3:	Ability to deal with the problems of kinematics and kinetics of particle
CO4:	Ability to deal with the problems of kinematics and kinetics of rigid bodies.

Course Outcomes (CO) to Programme Outcomes (PO) Mapping (scale 1: low, 2: Medium, 3: High)

CO/PO	PO01	PO02	PO03	PO04	PO05	PO06	PO07	PO08	PO09	PO10		PO11	PO12
CO1	3	3	3	3	2	-	-	-	1	1		1	2
CO2	3	3	3	3	2	-	-	-	1	1		1	2
CO3	3	3	3	3	2	-	-	-	1	1		1	2
CO4	3	3	3	3	2	-	-	-	1	1		1	2

Unit I

Force System: Introduction, force, principle of transmissibility of force, resultant of a force system, resolution of a force, moment of force about a line, Varigon's theorem, couple, resolution of force into force and a couple, properties of couple and their application to engineering problems.

Equilibrium: Force body diagram, equations of equilibrium and their applications to engineering problems, equilibrium of two force and three force members.

Distributed Forces: Determination of center of gravity, center of mass and centroid by direct integration and by the method of composite bodies, mass moment of inertia and area moment of inertia by direct integration and composite bodies method, radius of gyration, parallel axis theorem, polar moment of inertial.[10Hrs]

Unit II

Structure: Plane truss, perfect and imperfect truss, assumption in the truss analysis, analysis of perfect plane trusses by the method of joints, method of section and graphical method.

Friction: Static and Kinetic friction, laws of dry friction, co-efficient of friction, angle of friction, angle of repose, cone of friction, frictional lock, friction in flat pivot and collar bearing, friction in flat belts. [10Hrs]

Unit III

Kinematics of Particles: Rectilinear motion, plane curvilinear motion, rectangular coordinates, normal and tangential coordinates.

Kinetics of Particles: Equation of motion, rectilinear motion and curvilinear motion, work-energy equation, conservation of energy, concept of impulse and momentum, conservation of momentum, impact of bodies, co-efficient of restitution, loss of energy during impact. [10Hrs]

Unit IV

Kinematics of Rigid Bodies: Concept of rigid body, types of rigid body motion, absolute motion, introduction to relative velocity, relative acceleration (Corioli's component excluded) and instantaneous center of zero velocity, Velocity and acceleration.

Kinetics of Rigid Bodies: Equation of motion, translatory motion and fixed axis rotation, application of work energy principles to rigid bodies conservation of energy.

Beam: Introduction, types of loading, methods for the reactions of a beam, space diagram, types of end supports, beams subjected to couple. [10Hrs]

Textbooks:

1.*Engineering Mechanics* by A.K.Tayal, Umesh Publications.

References:

1. *'Engineering Mechanics' by K. L. Kumar, Tata Mc-Graw Hill*
2. *'Engineering Mechanics' by S. Timoshenko, D. H. Young, J. V. Rao, Tata Mc-Graw Hill*
3. *'Engineering Mechanics-Statics and Dynamics' by Irwing H. Shames, PHI.*
4. *'Engineering Mechanics' by Basudev Bhattacharya, Oxford Higher Education.*

PaperCode: ICT153	Paper: Engineering Graphics-I	L	P	C
PaperID: 164153		-	2	1

Marking Scheme:

1. Teachers Continuous Evaluation: 40 marks
2. Term end Theory Examinations: 60 marks

Course Objectives:

1:	The students will learn the introduction of Engineering graphics, various equipment used, various scales, dimensions and BIS codes used while making drawings for various streams of engineering disciplines.
2:	The students will learn theory of projections and projection of points.
3:	The students will learn projection of lines and projection of planes.
4:	The students will learn the projection of solid and development of surfaces

Course Outcomes (CO):

CO1:	To understand the theory of projections and projection of points.
CO2:	Ability to do line projections.
CO3:	Ability to do plane projections.
CO4:	Ability to do solid projections and development of surfaces

Course Outcomes (CO to Programme Outcomes (PO) Mapping (scale 1: low, 2: Medium, 3: High

CO/PO	PO01	PO02	PO03	PO04	PO05	PO06	PO07	PO08	PO09	PO10	PO11	PO12
CO1	3	3	3	3	2	-	-	-	1	2	1	2
CO2	3	3	3	3	2	-	-	-	1	2	1	2
CO3	3	3	3	3	2	-	-	-	1	2	1	2
CO4	3	3	3	3	2	-	-	-	1	2	1	2

Unit I

Introduction: Engineering Graphics/Technical Drawing, Introduction to drawing equipments and use of instruments, Conventions in drawing practice. Types of lines and their uses, BIS codes for lines, technical lettering as per BIS codes, Introduction to dimensioning, Types, Concepts of scale drawing, Types of scales

Theory of Projections: Theory of projections, Perspective, Orthographic, System of orthographic projection: in reference to quadrants, Projection of Points, Projection in different quadrants, Projection of point on auxiliary planes. Distance between two points, Illustration through simple problems.

Unit II

Projection of Lines: Line Parallel to both H.P. and V.P., Parallel to one and inclined to other, Other typical cases: three view projection of straight lines, true length and angle orientation of straight line: rotation method, Trapezoidal method and auxiliary plane method, traces of line.

Unit III

Projection of Planes: Projection of Planes Parallel to one and perpendicular to other, Perpendicular to one and inclined to other, Inclined to both reference planes, Plane oblique to reference planes, traces of planes.

Planes Other than the Reference Planes: Introduction of other planes (perpendicular and oblique), their traces, inclinations etc., projections of points and lines lying in the planes, conversion of oblique plane into auxiliary plane and solution of related problems.

Unit IV

Projection of Solids: Projection of solids in first or third quadrant, Axis parallel to one and perpendicular to other, Axis parallel to one inclined to other, Axis inclined to both the principal plane, Axis perpendicular to profile plane and parallel to both H.P. and V.P., Visible and invisible details in the projection, Use of rotation and auxiliary plane method.

Development of Surface: Purpose of development, Parallel line, radial line and triangulation method, Development of prism, cylinder, cone and pyramid surface for both right angled and oblique solids, Development of surface.

Note: The sheets to be created shall be notified by the concerned teacher in the first week of teaching.

Textbooks:

1. *Engineering Drawing* by N.D. Bhatt, 53rd Ed., Charotar Publishing House Pvt. Ltd., Gujarat,2017.

References:

1. *Engineering Drawing* by P.S. Gill, S.K Kataria & Sons, New Delhi, 2013.
2. *Technical Drawing with Engineering Graphics* by Frederick E. Giesecke, Shawna Lockhart, Marla Goodman, and Cindy M. Johnson, 15th Ed., Prentice Hall, USA, 2016
3. *Engineering Drawing* by M.B. Shah and B.C. Rana, 3rd Ed., Pearson Education, New Delhi, 2009.

PaperCode: ICT101	Paper: Programming for Problem Solving	L	T/P	C
PaperID: 164101		3	-	3

Marking Scheme:

1. Teachers Continuous Evaluation: 25 marks
2. Term end Theory Examinations: 75 marks

Instruction for paper setter:

1. There should be 9 questions in the term end examinations question paper.
2. The first (1st) question should be compulsory and cover the entire syllabus.This question should be objective, single line answers or short answer type question of total 15 marks.
3. Apart from question 1 which is compulsory, rest of the paper shall consist of 4 units as per the syllabus. Every unit shall have two questions covering the corresponding unit of the syllabus. However, the student shall be asked to attempt only one of the two questions in the unit. Individual questions may contain upto 5 sub-parts / sub-questions. Each Unit shall have a marks weightage of 15.
4. The questions are to be framed keeping in view the learning outcomes of the course / paper. The standard / level of the questions to be asked should be at the level of the prescribed textbook.
5. The requirement of (scientific) calculators / log-tables / data – tables may be specified if required.

Course Objectives:

1:	To impart basic knowledge about simple algorithms for arithmetic and logical problems so that students can understand how to write a program, syntax and logical errors in 'C'.
2:	To impart knowledge about how to implement conditional branching, iteration and recursion in 'C'.
3:	To impart knowledge about using arrays, pointers, files, union and structures to develop algorithms and programs in 'C'.
4:	To impart knowledge about how to approach for dividing a problem into sub-problems and solve the problem in 'C'.

Course Outcomes (CO):

CO1:	Ability to develop simple algorithms for arithmetic and logical problems and implement them in 'C'.
CO2:	Ability to implement conditional branching, iteration and recursion and functions in 'C'
CO3:	Ability to use arrays, pointers, union and structures to develop algorithms and programs in 'C'.
CO4:	Ability to decompose a problem into functions and synthesize a complete program using divide and conquer approach in 'C'.

Course Outcomes (CO) to Programme Outcomes (PO) Mapping (scale 1: low, 2: Medium, 3: High)

CO/PO	PO01	PO02	PO03	PO04	PO05	PO06	PO07	PO08	PO09	PO10	PO11	PO12
CO1	3	3	2	1	1	-	-	-	2	1	1	3
CO2	3	3	2	1	1	-	-	-	2	1	1	3
CO3	3	3	3	1	1	-	-	-	2	1	1	3
CO4	3	3	3	1	1	-	-	-	2	1	1	3

Unit I

Introduction to Programming: Computer system, components of a computer system, computing environments, computer languages, creating and running programs, Preprocessor, Compilation process, role of linker, idea of invocation and execution of a programme. Algorithms: Representation using flowcharts, pseudocode.

Introduction to C language: History of C, basic structure of C programs, process of compiling and running a C program, C tokens, keywords, identifiers, constants, strings, special symbols, variables, data types, I/O statements. Interconversion of variables.

Operators and expressions: Operators, arithmetic, relational and logical, assignment operators, increment and decrement operators, bitwise and conditional operators, special operators, operator precedence and associativity, evaluation of expressions, type conversions in expressions. [10Hrs]

Unit II

Control structures: Decision statements; if and switch statement; Loop control statements: while, for and do while loops, jump statements, break, continue, goto statements.

Arrays: Concepts, One dimensional array, declaration and initialization of one dimensional arrays, two dimensional arrays, initialization and accessing, multi dimensional arrays.

Functions: User defined and built-in Functions, storage classes, Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference, Recursion.

Strings: Arrays of characters, variable length character strings, inputting character strings, character library functions, string handling functions. [10Hrs]

Unit III

Pointers: Pointer basics, pointer arithmetic, pointers to pointers, generic pointers, array of pointers, functions returning pointers, Dynamic memory allocation. Pointers to functions. Pointers and Strings

Structures and unions: Structure definition, initialization, accessing structures, nested structures, arrays of structures, structures and functions, self referential structures, unions, typedef, enumerations.

File handling: command line arguments, File modes, basic file operations read, write and append.
Scope and life of variables, multi-file programming.
C99 extensions. 'C' Standard Libraries: stdio.h, stdlib.h, assert.h, math.h, time.h, ctype.h, setjmp.h, string.h, stdarg.h, unistd.h [10Hrs]

Unit IV

Basic Algorithms: Finding Factorial, Fibonacci series, Searching, Basic Sorting Algorithms- Bubble sort, Insertion sort and Selection sort. Find the square root of a number, array order reversal, reversal of a string, two-way merge sort, stacks, queues, single –link linked list, Binary search tree. [10Hrs]

Textbooks:

1. *How to solve it by Computer* by R. G. Dromey, Prentice-Hall India EEE Series, 1982.
2. *The C programming language* by B W Kernighan and D M Ritchie, Pearson Education, 1988.

References:

1. *Programming Logic & Design* by Tony Gaddis, Pearson, 2nd Ed. 2016.
2. *Programming Logic and Design* by Joyce Farrell, Cengage Learning, 2015.
3. *Engineering Problem Solving With C* by Delores M. Etter, Pearson, 2013.
4. *Problem Solving and Program Design in C* by Jeri R. Hanly and Elliot B. Koffman, Pearson, 2016.
5. *Structure and Interpretation of Computer Programs* by Harold Abelson and Gerald Sussman with Julie Sussman, MIT Press, 1985.
6. *How to Design Programs* by Matthias Felleisen, Robert Bruce Findler, Matthew Flatt, and Shriram Krishnamurthi, MIT Press, 2018.
7. *ANSI/ISO 9899-1990, American National Standard for Programming Languages 'C'* by American National Standards Institute, Information Technology Industry Council, 1990 (C89).
8. *ISO/IEC 9899:1999. International Standard for Programming Languages – C (ISO/IEC 9899)* by American National Standards Institute, Information Technology Industry Council, 2000 (C99).
9. *INCITS/ISO/IEC 9899-2011.American National Standard for Programming Languages 'C'*by American National Standards Institute, Information Technology Industry Council, 2012 (C11).

PaperCode: ICT103	Paper: Electrical Science	L	T/P	C
PaperID: 164103		3	-	3

Marking Scheme:

1. Teachers Continuous Evaluation: 25 marks
2. Term end Theory Examinations: 75 marks

Instruction for paper setter:

1. There should be 9 questions in the term end examinations question paper.
2. The first (1st) question should be compulsory and cover the entire syllabus.This question should be objective, single line answers or short answer type question of total 15 marks.
3. Apart from question 1 which is compulsory, rest of the paper shall consist of 4 units as per the syllabus. Every unit shall have two questions covering the corresponding unit of the syllabus. However, the student shall be asked to attempt only one of the two questions in the unit. Individual questions may contain upto 5 sub-parts / sub-questions. Each Unit shall have a marks weightage of 15.
4. The questions are to be framed keeping in view the learning outcomes of the course / paper. The standard / level of the questions to be asked should be at the level of the prescribed textbook.
5. The requirement of (scientific) calculators / log-tables / data – tables may be specified if required.

Course Objectives:

1:	To impart knowledge of the basics electrical engineering.
2:	To impart knowledge of the working of RLC circuits.
3:	To impart basic knowledge about filters and magnetic circuits.
4:	To impart basic knowledge about electrical machines.

Course Outcomes (CO):

CO1:	Ability to understand and use Kirchpff's Laws to solve resistive circuit problems.
CO2:	Ability to analyse resistive, inductive and capacitive circuits for transient and steady state sinusoidal solutions.
CO3:	Understand the first order filters and magnetic circuits.
CO4:	Understand the design of electrical machines.

Course Outcomes (CO to Programme Outcomes (PO) Mapping (scale 1: low, 2: Medium, 3: High

CO/PO	PO01	PO02	PO03	PO04	PO05	PO06	PO07	PO08	PO09	PO10	PO11	PO12
CO1	3	3	3	3	3	-	-	-	1	1	1	2
CO2	3	3	3	3	3	-	-	-	1	1	1	2
CO3	3	3	3	3	3	-	-	-	1	1	1	2
CO4	3	3	3	3	3	-	-	-	1	1	1	2

Unit - I

DC Circuits: Passive circuit components, Basic laws of Electrical Engineering, Temperature Resistance Coefficients. voltage and current sources, Series and parallel circuits, power and energy, Kirchhoff's Laws, Nodal & Mesh Analysis, delta-star transformation, superposition theorem, Thevenin's theorem, Norton's theorem, maximum power transfer theorem. Time domain analysis of first Order RC & LC circuits.[10Hrs]

Unit – II

AC Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three phase balanced circuits, voltage and current relations in star and delta connections. [10Hrs]

Unit - III

D. C. Generators & Motors: Principle of operation of Generators & Motors, Speed Control of shunt motors, Flux control, Rheostatic control, voltage control, Speed control of series motors.

A. C. Generators & Motors: Principle of operation, Revolving Magnetic field, Squirrel cage and phase wound rotor, Starting of Induction motors, Direct on line and Star Delta starters, Synchronous machines. [10Hrs]

Unit - IV:

Transformers: Construction and principle of operation, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

Measuring Instruments: Electromagnetism, Different Torques in Indicating instruments, Moving Iron Instruments: Construction & Principle, Attraction and Repulsion type; Moving Coil instruments: Permanent Magnet type; Dynamometer type Instruments. [10Hrs]

Textbooks:

1. *Electrical Engineering Fundamentals* by Vincent Del Toro, PHI (India), 1989

References:

1. *An Introduction to Electrical Science* by Adrian Waygood, Routledge, 2nd Ed. 2019.
2. *Electrical Circuit Theory and Technology* by John Bird, Elsevier, 2007.
3. *Principles and Applications of Electrical Engineering* by Giorgio Rizzoni, MacGraw-Hill 2007.

4. *Electrical Engineering* by Allan R. Hambley, Prentice-Hall, 2011.
5. *Hughes Electical & Electronic Technology* by Edward Hughes revised by Hohn Wiley, Keith Brown and Ian McKenzie Smith, Pearson, 2016.
6. *Electrical and Electronics Technology* by E. Hughes, Pearson, 2010.
7. Basic Electrical Engineering by D.C. Kulshrestha, McGraw-Hill, 2009.
8. Basic Electrical Engineering by D. P. Kothai and I.J. Nagrath, McGraw-Hill, 2010.

Paper Code: ICT225	Paper: Engineering Electromagnetics	L	T/P	C
Paper ID:164225		4	0	4

Prerequisite Paper: None

Marking Scheme:
1. Teacher's Continuous Evaluation: 25 Marks
2. Term End Theory Examination: 75 Marks

Instruction for paper setter:

1. There should be 9 questions in the term end examinations question paper.
2. The first question should be compulsory and cover the entire syllabus. This question should be objective, single line answers or short answer type questions of total 15 marks.
3. Apart from question 1 which is compulsory, rest of the paper shall consist of 4 units as per the syllabus. Every unit shall have two questions covering the corresponding unit of the syllabus. However, the student shall be asked to attempt only one of the two questions in the unit. Individual questions may contain up to five sub-parts/sub-questions. Each unit will have a marks weightage of 15.
4. The questions are to be framed keeping in view the learning outcomes of the course/paper. The standard/level of questions to asked should be at the level of the prescribed textbook.
5. The requirements of (scientific) calculators/ log-tables/ data- tables may be specified if required.

Course Objectives:

1.	To impart the knowledge of the basic laws of electromagnetism
2.	To impart the knowledge of solution to real life plane wave problems for various boundary conditions and analyze the field equations for the wave propagation in special cases
3.	To impart the knowledge of the characteristics and Carryout impedance transformation on high frequency transmission lines
4.	To impart the knowledge of the wave propagation on metallic waveguides

Course Outcome (CO):

1.	To understand the basic laws of electromagnetism
2.	To Provide solution to real life plane wave problems for various boundary conditions and analyze the field equations for the wave propagation in special cases
3.	Understand the characteristics and Carryout impedance transformation on high frequency transmission lines
4.	Analyze wave propagation on metallic waveguides in modal form

Course Outcomes (CO) to Programme Outcomes (PO) Mapping (Scale - 1: Low, 2: medium, 3: High)

CO/PO	PO01	PO02	PO03	PO04	PO05	PO06	PO07	PO08	PO09	PO10	PO11	PO12
CO01	3	3	3	3	2	1	1	-	2	1	-	2
CO02	3	3	3	3	2	1	1	-	2	1	-	2
CO03	3	3	3	3	2	1	1	-	2	1	-	2
CO04	3	3	3	3	2	1	1	-	2	1	-	2

UNIT – I

Vector algebra and vector calculus with significance of del operators- theorems and applications, Maxwell's equations(for static, time varying fields) in integral and differential forms, Continuity equation, boundary conditions for electric and magnetic fields, Programmatic solutions to Maxwell's equations using MATLAB, Poisson's and Laplace's equations

UNIT – II

Electromagnetic waves: wave generation and equations in free space, lossy and lossless dielectrics, conductors-skin depth – Plane wave reflection and refraction – Standing Wave –Applications. Wave propagation in lossless and conducting medium, phase and group velocity, Reflection by a perfect conductor, insulator, Brewster Angle, surface impedance. Guided waves and flow of power: Poynting vector and Poynting theorem, applications, power loss in a conductor.

UNIT – III

Transmission Lines: General solution of transmission lines - Equations of voltage and current, Standing waves and impedance transformation, Lossless and low-loss transmission lines, meaning of reflection coefficient – wavelength and velocity of propagation, distortion less transmission line, Impedance matching - quarter wave line, single stub matching, double stub matching, Power transfer, Microstrip transmission line, Smith chart.

UNIT – IV

Waveguides: Rectangular waveguide, characteristic of TE and TM waves- cutoff wavelength and phase velocity impossibility of TEM waves in waveguides- dominant mode, Surface currents, Attenuation, impedances. Circular wave guides- solution of field equations in cylindrical coordinates- TE and TM waves in circular guides – wave impedance and characteristic impedance, Microwave cavities: rectangular cavity resonators, circular cavity resonators- Q-factor.

Introduction to antenna: monopole, dipole antenna and microstrip antenna.

Textbook(s):

1. M. N.O. Sadiku, "Elements of Electromagnetics", Oxford Universit y Press.
2. W.H. Hayt, "Engineering Electromagnetics", Tata McGraw Hill.

References:

1. E.C. Jordan & K.G. Balmain, Electromagnetic waves & Radiating Systems, Prentice Hall, India.
2. G. S. Rao, "Electromagnetic Field Theory and Transmission lines" Wiley India.
3. David M. Pozar, "Microwave Engineering" John Wiley -2nd edition

Approved in the 31st Academic Council meeting held on 02-03-2012 vide agenda item 31.12 w.e.f. 2012

Paper Code EC 401 | **L** | **T** | **C**
Paper ID : 101401 | **3** | **1** | **4**

Paper : Satellite Communication

Prerequisites :
EC204 :Communication Systems II

Unit-1
Introduction:
Origin and brief history of satellite communications, an overview of satellite system engineering, satellite frequency bands for communication.
Orbital theory:
Orbital mechanics, locating the satellite in the orbit w.r.t. earth look angle determination. Azimuth & elevation calculations.[T1]

Unit-2
Spacecraft systems:
Attitude and orbit control system, telemetry, tracking and command (TT&C), communications subsystems, transponders, spacecraft antennas.
Satellite link design:
Basic transmission theory, noise figure and noise temperature, C/N ratio, satellite down link design, satellite uplink design.[T1 T2]

Unit-3
Modulation, Multiplexing, Multiple access Techniques:
Analog telephone transmission, Fm theory, FM Detector theory, analog TV transmission, S/N ratio Calculation for satellite TV linking, Digital transmission, base band and band pass transmission of digital data, BPSK, QPSK , FDM, TDM,
Access techniques: FDMA, TDMA, CDMA.[T1 R1]

Unit-4
Encoding & FEC for Digital satellite links:
Channel capacity, error detection coding, linear block, binary cyclic codes, and convolution codes.
Satellite Systems:
Satellite Earth station Technology, satellite mobile communication, VSAT technology, Direct Broadcast by satellite (DBS).[T1 T2]

Text Books:
T1. Timothy Pratt, Charles W. Bostian, "Satellite communication", John Wiley &sons Publication, 2003
T2. J.J. Spilker, "Digital Communication by satellite, PHI Publication, 1997

Reference books
R1. J. Martin, "Communication satellite systems", PHI publication, 2001

Paper Code: ICT 204 / ICT 217	Paper: Computational Methods	L	T/P	C
Paper ID:		4	0	4

Prerequisite Paper: ICT

Marking Scheme :

1. Teacher's Continuous Evaluation : 25 marks
2. Term and Theory Examinations : 75 marks

Instructions for paper setter

1. There should be 9 questions in the term end examinations question paper.
2. The first (1st) question should be compulsory and cover the entire syllabus. This question should be objective, single line answers or short answer type questions of total 15 marks.
3. Apart from question one which is compulsory, rest of the paper shall consists of four units as per the syllabus. Every unit shall have two questions covering the corresponding unit of the syllabus. However, the student shall be asked to attempt only one of the two questions in the unit. Individual questions may contain up to 5 sub-parts/sub-questions. Each unit shall have a marks weightage of 15.
4. The questions are to be framed keeping in view the learning objectives of course/paper. The standard /level of the questions to be asked should be at the level of the prescribed text box.
5. The requirement of (scientific) calculators/log tables/data-tables may be specified if required.

Course Objectives :

1.	To understand numerical methods to find roots of functions and first order unconstrained minimization of functions.
2.	To introduce concept of interpolation methods and numerical integration.
3.	To understand numerical methods to solve systems of algebraic equations and curve fitting by splines.
4.	To understand numerical methods for the solution of Ordinary and partial differential equations.

Course Outcomes (CO)	
CO 1	Ability to develop mathematical models of low level engineering problems
CO 2	Ability to apply interpolation methods and numerical integration.
CO 3	Ability to solve simultaneous linear equations and curve fitting by splines
CO 4	Ability to numerically solve ordinary differential equations that are initial value or boundary value problems

Course Outcomes (CO) to Programme Outcomes (PO) mapping (scale 1: low, 2: Medium, 3: High)

	PO01	PO02	PO03	PO04	PO05	PO06	PO07	PO08	PO09	PO10	PO11	PO12
CO 1	3	2	2	2	2	-	-	-	2	2	2	3
CO 2	3	2	2	2	2	-	-	-	2	2	2	3
CO 3	3	3	3	3	2	-	-	-	2	2	2	3
CO 4	3	3	3	3	2	-	-	-	2	2	2	3

UNIT-I

Review of Taylor Series, Rolle 's Theorem and Mean Value Theorem, Approximations and Errors in numerical computations, Data representation and computer arithmetic , Loss of significance in computation Location of roots of equation: Bisection method (convergence analysis and implementation), Newton Method (convergence analysis and implementation), Secant Method (convergence analysis and implementation). Unconstrained one variable function minimization by Fibonacci search, Golden Section Search and Newton's method. Multivariate function minimization by the method of steepest descent, Nelder- Mead Algorithm.

UNIT-II

Interpolation: Assumptions for interpolation, errors in polynomial interpolation, Finite differences, Gregory-Newton's Forward Interpolation, Gregory-Newton's backward Interpolation , Lagrange's Interpolation, Newton's divided difference interpolation

Numerical Integration: Definite Integral, Newton-Cote's Quadrature formula, Trapezoidal Rule, Simpson's one-third rule, simpson's three-eight rule, Errors in quadrature formulae, Romberg's Algorithm, Gaussian Quadrature formula.

UNIT-III

System of Linear Algebraic Equations: Existence of solution, Gauss elimination method and its computational effort, concept of Pivoting, Gauss Jordan method and its computational effort, Triangular

Matrix factorization methods: Dolittle algorithm, Crout's Algorithm, Cholesky method, Eigen value problem: Power method
Approximation by Spline Function: First-Degree and second degree Splines, Natural Cubic Splines, B Splines, Interpolation and Approximation

UNIT - IV
Numerical solution of ordinary Differential Equations: Picard's method, Taylor series method, Euler's and Runge-Kutta's methods, Predictor-corrector methods: Euler's method, Adams-Bashforth method, Milne's method.
Numerical Solution of Partial Differential equations: Parabolic, Hyperbolic, and elliptic equations
Implementation to be done in C/C++

Textbook(s):
1. E. Ward Cheney & David R. Kincaid , "Numerical Mathematics and Computing" Cengage; 7th ed (2013).

References:
1. R. L. Burden and J. D. Faires, "Numerical Analysis", CENGAGE Learning Custom Publishing; 10th Edition (2015).
2. S. D. Conte and C. de Boor, "Elementary Numerical Analysis: An Algorithmic Approach", McGraw Hill, 3rd ed. (2005).
3. H. M. Antia, "Numerical Methods for Scientists & Engineers", Hindustan Book Agency, (2002).
4. 2. E Balagurusamy "Numerical Methods" McGraw Hill Education (2017).

Paper Code: ICT 251	Paper: Database Management lab		L	T/P	C
Paper ID:			-	2	1
Teacher's Continuous Evaluation :	40 Marks	Term End Examinations :		60 Marks	

Instructions :

1. The course objectives and course outcomes are identical to that of ICT 207 (Database Management Systems) as this is the practical component of the corresponding theory paper.
2. The practical list shall be notified by the teacher in the first week of the class commencement.

Paper Code: ICT 253	Paper: Object Oriented programming using C++ Lab		L	T/P	C
Paper ID:			-	2	1
Teacher's Continuous Evaluation :	40 Marks	Term End Examinations :		60 Marks	

Instructions :

1. The course objectives and course outcomes are identical to that of ICT 209 (Object Oriented programming using C++) as this is the practical component of the corresponding theory paper.
2. The practical list shall be notified by the teacher in the first week of the class commencement.

Paper Code: ICT 255	Paper: Data Structure Lab		L	T/P	C
Paper ID:			-	2	1
Teacher's Continuous Evaluation :	40 Marks	Term End Examinations :		60 Marks	

Instructions :

1. The course objectives and course outcomes are identical to that of ICT 211 (Data Structure) as this is the practical component of the corresponding theory paper.
2. The practical list shall be notified by the teacher in the first week of the class commencement.

Paper Code: ICT 257	Paper: Operating Systems Lab		L	T/P	C
Paper ID:			-	2	1
Teacher's Continuous Evaluation :	40 Marks	Term End Examinations :		60 Marks	

Instructions :

1. The course objectives and course outcomes are identical to that of ICT 203 (operating Systems) as this is the practical component of the corresponding theory paper.
2. The practical list shall be notified by the teacher in the first week of the class commencement.

Paper Code: ICT256 / ICT 263	Paper: Computational Methods Lab.		L	T/P	C
Paper ID:			-	2	1
Teacher's Continuous Evaluation:	40 Marks	Term End Examinations :		60 Marks	

Instructions :

1. The course objectives and course outcomes are identical to that of ICT 204 / ICT 217 (Computational Methods) as this is the practical component of the corresponding theory paper.
2. The practical list shall be notified by the teacher in the first week of the class commencement.

Paper Code: ICT 259	Paper: Digital Electronics Lab.		L	T/P	C
Paper ID:			-	2	1
Teacher's Continuous Evaluation :	40 Marks	Term End Examinations :		60 Marks	

Instructions :

1. The course objectives and course outcomes are identical to that of ICT 219 (Digital Electronics) as this is the practical component of the corresponding theory paper.
2. The practical list shall be notified by the teacher in the first week of the class commencement.