KURUKSHETRA UNIVERSITY
KURUKSHETRA

Syllabus for

Under-Graduate Programme

(Programme: Bachelor of Science (B.Sc.)

(Hons.) (Information Technology)

7^{th} & 8^{th} Semester
(Scheme-C)

Under Multiple Entry-Exit, Internship and CBCS-LOCF in accordance to NEP-2020 w.e.f. 2025-26

Session: 2025-26			
Part A - Introduction			
Name of the Programme	**Bachelor of Science (B.Sc.) (Hons) (Information Technology)**		
Subject	Information Technology		
Semester	SEVENTH		
Name of the Course	Artificial Intelligence & Machine learning		
Course Code	B23-HIT-701		
Course Type: (CC/MCC/MDC/CC-M/ DSEC/VOC/DSE/PC/AEC/VAC)	CC-H1		
Level of the course	400-499		
Pre-requisite for the course (if any)	Familiarity with basic concepts of programming and the ability to write program algorithms in a language of your choice (e.g. C++) in a windows environment		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: CLO1. Learn the basics and applications of artificial intelligence CLO2. Analyze basic and advanced search techniques CLO3 Learn and design intelligent agents for concrete computational problems. CLO4. Understand the basics of Machine Learning		
Credits	**Theory**	**Practical**	**Total**
	4	-	4
Contact Hours	60	-	60
Max. Marks: 100 Internal Assessment Marks: 30 End Term Exam Marks:70		Exam Time: 3 Hours	

Part B- Contents of the Course

Instructions for Paper- Setter

1. Nine questions will be set in all. All questions will carry equal marks.
1. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 compulsory and four more questions selecting one question from each unit.

Unit	Topics	Contact Hours
I	AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.	12
II	Search Strategies: Solving problems by searching, Search- Issues in The Design of Search Programs, Un-Informed Search- BFS, DFS; Heuristic Search Techniques:	16

	Generate-And Test, Hill Climbing, Best-First Search, A* Algorithm, Alpha beta search algorithm, Problem Reduction, AO*Algorithm, Constraint Satisfaction, Means-Ends Analysis	
III	Introduction to ML: Machine Learning basics, Applications of ML, Data Mining Vs Machine Learning vs Big Data Analytics. Supervised Learning- Naïve Base Classifier, Classifying with k-Nearest Neighbour classifier, Decision Tree classifier, Naive Bayes classifier. Unsupervised Learning - Grouping unlabeled items using k-means clustering, Association analysis with the Apriori algorithm Introduction to reinforcement learning	16
IV	Forecasting and Learning Theory : Non-linear regression, Logistic regression, Random forest, Baysian Belief networks, Bias/variance tradeoff, Tuning Model Complexity, Model Selection Dilemma Clustering : Expectation-Maximization Algorithm, Hierarchical Clustering, Supervised Learning after Clustering, Choosing the number of clusters, Learning using ANN	16

Suggested Evaluation Methods

Internal Assessment: ➢ **Theory 30 Marks** • Class Participation: **5 Marks** • Seminar/presentation/assignment/quiz/classtestetc.:**10 Marks** • Mid-Term Exam: **15 Marks**	**End Term Examination:** 70 Marks

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. S. Russel and P. Norvig, "Artificial Intelligence – A Modern Approach", Second Edition, Pearson Education
2. David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence : a logical approach", Oxford University Press.
3. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", Fourth Edition, Pearson Education.
4. B Joshi, Machine Learning and Artificial Intelligence, Springer, 2020.

Session: 2025-26			
Part A - Introduction			
Name of the Programme	**Bachelor of Science (B.Sc.) (Hons) (Information Technology**		
Subject	Information Technology		
Semester	SEVENTH		
Name of the Course	Software Engineering		
Course Code	B23-HIT-702		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-H2		
Level of the course	400-499		
Pre-requisite for the course (if any)	Basics of the Computer Fundamentals and Programming		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: CLO-1: Apply principles of software development and evolution CLO-2: Define abstract, verify and validate solutions to large-size problems. CLO-3: Understand the concept of Design Software CLO-4: learn the testing fundamentals		
Credits	**Theory**	**Practical**	**Total**
	4	-	4
Contact Hours	60	-	60
Max. Marks: 100 Internal Assessment Marks: 30 End Term Exam Marks:70		Exam Time: 3 Hours	

Part B- Contents of the Course

Instructions for Paper- Setter

1. Nine questions will be set in all. All questions will carry equal marks.
2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 compulsory and four more questions selecting one question from each unit.

Unit	Topics	Contact Hours
I	**Introduction:** Introduction to software engineering, Importance of software, evolving role of software, Software Characteristics, Software Components, Software Applications, Software Crisis, Software engineering problems, Software Development Life Cycle, Software Process. Software Requirement Specification: Analysis, Principles, Water Fall Model, The Incremental Model, Prototyping,	15

II	Spiral Model, Role of management in software development, Role of matrices and Measurement, Problem Analysis, Requirement specification, Monitoring and Control., Software Requirements Analysis and Specification: Software Requirements, Problem Analysis, Requirements Specification. Validation, Metrics	15
III	Software Design – Design principles, Module-level concepts, Structure Chart and Structured Design methodology,, verification, metrics : network metrics, information flow metrics. Coding – Programming Principles and Guidelines, Verification- code inspections, static analysis.	15
IV	Software Testing – testing fundamentals, Black Box Testing : Equivalence class partitioning, Boundary value analysis, cause-effect graphing; White Box Testing : Control flow and Data flow based testing, mutation testing; levels of testing, test plan, test case specification, test case execution and analysis, Software maintenance – Categories of maintenance. Software Reliability – Definition, uses of reliability studies	15

Suggested Evaluation Methods

Internal Assessment: ➢ **Theory 30Marks** • Class Participation: **5 Marks** • Seminar/presentation/assignment/quiz/classtestetc.:**10Marks** • Mid-Term Exam: **15Marks**	**End Term Examination:** 70 Marks

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. An Integrated approach to Software Engineering, Third Edition 2005, Pankaj Jalote, Narosa Publications.
2. Software Engineering, Revised Second Edition, K.K. Aggarwal, Yogesh Singh, New Age International Publishers.
3. Software Engineering – A Practitioner's Approach, Fifth Edition, Roger. S. Pressman, McGraw Hill

Session: 2025-26			
Part A - Introduction			
Name of the Programme	**Bachelor of Science (B.Sc.) (Hons) (Information Technology**		
Subject	Information Technology		
Semester	SEVENTH		
Name of the Course	Satellite Communication		
Course Code	B23-HIT-703		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-H3		
Level of the course	400-499		
Pre-requisite for the course (if any)	Knowledge on Digital Communication		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: **CLO-1 :** Define Satellite and its historical background, outline the basic concepts of Satellite communications, placements of satellite in geostationary orbit **CLO-2:** understand the concept of various satellite subsystems **CLO-3:** Learn the propagation effects **CLO -4:** Understand about various satellite technologies		
Credits	**Theory**	**Practical**	**Total**
	4	-	4
Contact Hours	60	-	60
Max. Marks: 100 Internal Assessment Marks: 30 End Term Exam Marks:70		Exam Time: 3 Hours	

Part B- Contents of the Course

Instructions for Paper- Setter

1. Nine questions will be set in all. All questions will carry equal marks.
2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 compulsory and four more questions selecting one question from each unit.

Unit	Topics	Contact Hours
I	**Communication Satellite:** Orbit and Description: A brief History of Satellite Communication, Satellite Frequency bands, Satellite Systems, Applications, Orbital Period and Velocity, Effects of Orbital inclination, Azimuth and Elevation, Coverage and Slant range, Eclipse, Orbital perturbations , Placement of a Satellite in a Geo-Stationary Orbit.	**15**

II	**Satellite Sub-Systems**: Altitude and orbit control system, TT&C Sub-System, Altitude control Sub-System, Power Systems, Communication Subsystems, Satellite antenna Equipment. Satellite Link: Basic transmission theory, system noise temperature and G/T ratio, Basic Link Analysis, Interference Analysis, Design of satellite links for specified C/N, (with and without frequency Re-use), Link Budget.	**15**
III	**Propagation effects:** Introduction, Atmospheric Absorption, Cloud Attenuation, Tropospheric and Ionospheric Scintillation and Low angle fading, Rain Induced attenuation, rain induced cross polarization interference. Multiple Access: Frequency Division Multiple Access(FDMA), Intermodulation, Calculation of C/N. Time Division Multiple Access(TDMA), Frame structure, Burst structure, Satellite Switched TDMA Onboard processing, CDMA	**15**
IV	**Earth Station Technology**: Transmitters, Receivers, Antennas, Tracking systems, Terrestrial Interface, Power Test methods, Lower Orbit Considerations. Satellite Navigation & Global Positioning Systems: Radio and Satellite Navigation, GPS Position Location principles, GPS Receivers, GPS C/A code accuracy, Differential GPS.	**15**

Suggested Evaluation Methods

Internal Assessment: ➢ **Theory : 30Marks** • Class Participation: **5 Marks** • Seminar/presentation/assignment/quiz/class test etc.:**10Marks** • Mid-Term Exam: **15Marks**	**End Term Examination:** 70 Marks

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Satellite communications, 2nd edition, by T.Pratt, C. W.Bostian, J.E. Allnut,Publisher: John Willey and sons.
2. Satellite Communications Systems: systems, techniques and technology, 5th edition, by G. Maral, M.Bousquet, Z.Sun, Publisher: John Willy and sons.
3. Satellite Communications- Dennis Roddy, 2nd Edition, 1996, McGraw Hill. 2. Satellite Communications: Design Principles- M. Richharia, 2nd Edition,BS Publications, 2003.
4. Digital Satellite Communications-Tri. T.Ha, 2nd Edition, 1990, Mc. Graw Hill.

Session: 2025-26			
Part A - Introduction			
Name of the Programme	**Bachelor of Science (B.Sc.) (Hons) (Information Technology**		
Subject	Information Technology		
Semester	SEVENTH		
Name of the Course	Introduction to VHDL		
Course Code	B23-HIT-704		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	DSE-H1		
Level of the course	400-499		
Pre-requisite for the course (if any)	Basic knowledge of Digital Electronics and Computer Architecture		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: **CLO-1 :** understand the basic concept of the VHDL **CLO-2:** learn the concept of the Behavioural modelling in VHDL **CLO-3:** learn the concept of the Data Flow modelling in VHDL **CLO -4:** understand the Concept of Overloading		
Credits	**Theory**	**Practical**	**Total**
	4	-	4
Contact Hours	60	-	60
Max. Marks: 100 Internal Assessment Marks: 30 End Term Exam Marks:70		Exam Time: 3 Hours	

Part B- Contents of the Course

Instructions for Paper- Setter

3. Nine questions will be set in all. All questions will carry equal marks.

4. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 compulsory and four more questions selecting one question from each unit.

Unit	Topics	Contact Hours
I	VHDL Introduction, Basic Terminology , Entity Declaration, Architecture Body, Structural Style of Modeling , Dataflow Style of Modeling, Behavioral Style of Modeling , Mixed Style of Modeling	**15**

	,Configuration Declaration , Package Declaration. Package Body , Model Analysis, Simulation	
II	**Basic Language Elements:** Identifiers, Data Objects ,Data Types, Operators, **Behavioral Modeling:** Entity Declaration, Architecture Body, Process Statement, Variable Assignment Statement, Signal Assignment Statement. Wait Statement, If Statement, Case Statement, Null Statement,. Loop Statement, .Exit Statement,. Next Statement. Assertion Statement	**15**
III	**Dataflow Modeling:** Concurrent Signal Assignment Statement, Concurrent versus Sequential Signal Assignment,. Delta Delay Revisited,. Multiple Drivers, Conditional Signal Assignment Statement,. Selected Signal Assignment Statement, Block Statement , Concurrent Assertion Statement Structural Modeling **:.**Component Declaration, Component Instantiation , Examples, Resolving Signal Values	**15**
IV	Generics and Configurations, Subprograms and Overloading: Functions, Procedures and Declaration , Sub program Overloading, Operator Overloading, Packages and Libraries, Hardware Modeling Examples	**15**

Suggested Evaluation Methods

Internal Assessment: ➢ **Theory 30Marks** • Class Participation: **5 Marks** • Seminar/presentation/assignment/quiz/class test etc.: **10Marks** • Mid-Term Exam: **15 Marks**	**End Term Examination:** 70Marks

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. J.Bhaskar, "A VHDL Primer", Prentice Hall of India Limited. 3rd edition 2004
2. "VHDL: Programming by Example" Douglas L. Perry McGraw-Hill
3. Stephen Brown & Zvonko Vranesic, *Fundamentals of Digital Logic with VHDL Design*, McGraw Hill

Session: 2025-26			
Part A - Introduction			
Name of the Programme	**Bachelor of Science (B.Sc.) (Hons) (Information Technology**		
Subject	Information Technology		
Semester	SEVENTH		
Name of the Course	CLOUD COMPUTING		
Course Code	B23-HIT-705		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	DSE-H1		
Level of the course	400-499		
Pre-requisite for the course (if any)	Basics of Computer fundamentals		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: **CLO-1 :** Understanding Cloud and its Architecture **CLO-2:** Understanding Cloud Architecture and Interface **CLO-3:** Understanding concept of Virtualization **CLO -4:** Setting up Cloud platform step by step		
Credits	**Theory**	**Practical**	**Total**
	4	-	4
Contact Hours	60	-	60
Max. Marks: 100 Internal Assessment Marks: 30 End Term Exam Marks:70		Exam Time: 3 Hours	

Part B- Contents of the Course

Instructions for Paper- Setter

1. Nine questions will be set in all. All questions will carry equal marks.
2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV.

The candidate will be required to attempt question No. 1 compulsory and four more questions selecting one question from each unit.

Unit	Topics	Contact Hours
I	**Introduction to Cloud Computing :** Overview of Cloud Computing, Evolution of Cloud Computing, Characteristics of Cloud Computing, Types of cloud and its Cloud services, Benefits and challenges of cloud computing, Applications cloud	**15**

	computing, Cloud Storage, Cloud services requirements,, cloud and dynamic infrastructure, Cloud adoption	
II	**Cloud Computing Architecture:** Cloud reference model, Platform as service, Software as a service, Infrastructure as service, Cloud deployment models, Public clouds, Private clouds, Community cloud Hybrid clouds, Cloud design and implementation using SOA, security, trust and privacy	**15**
III	**Cloud Virtualization technology:** Introduction to Cloud Virtualization concepts, Types of Virtualization & its benefits, Introduction to Various Virtualization OS, HA/DR using Virtualization, Moving VMs, Cloud Fundamentals, Cloud Building Blocks, Understanding Public & Private cloud environments, Private Cloud Environment, Public Cloud Environment, Managing Hybrid Cloud environment.	**15**
IV	The Cloud Setup : Setting up your own Cloud: Build private cloud using open source tools, Understanding various cloud plugins, Setting up your own cloud environment, Auto-provisioning, Custom images, Integrating tools like Nagios, Integration of Public and Private cloud. Micro services using Docker	**15**

Suggested Evaluation Methods

Internal Assessment: ➢ **Theory 30Marks** • Class Participation: **5 Marks** • Seminar/presentation/assignment/quiz/class test etc.:**10 Marks** • Mid-Term Exam: **15Marks**	**End Term Examination:** 70 Marks

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Biron, J., & Follett, J. (2016). Foundational elements of an iot solution. O'Reilly Media, Incorporate
2. Buyya, R., Broberg, J., & Goscinski, A. M. (Eds.). (2010). Cloud computing: Principles and paradigms (Vol. 87). John Wiley & Sons. •
3. "Hwang, K., Dongarra, J., & Fox, G. C. (2013). Distributed and cloud computing: from parallel processing to the internet of things. Morgan Kaufmann
4. Saurabh, K. (2011). Cloud Computing — Insights into New -Era Infrastructure, Wiley India.

Session: 2024-25			
Part A - Introduction			
Subject	INFORMATION TECHNOLOGY		
Semester	SEVENTH		
Contact Hours	Practical Based on B23-HIT-701 to 704/705		
Course Code	B23-HIT-706		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	PC-H1		
Level of the course	400-499		
Pre-requisite for the course(if any)			
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: CLO- Get the handson experience based on the concepts learnt in B23-HIT-701 to 704/705		
Credits	**Theory**	**Practical**	**Total**
	-	4	4
Contact Hours	-	60	60
Max. Marks: 100 Internal Assessment Marks: 30 End Term Exam Marks:70		Exam Time: 6 Hours	
Part B-Contents of the Course			
Instructions for Performing the Experiments Note: Perform ten practicals selecting at least one from Practicals Based on B23-HIT-701 to 704/705			

1. Write a Program to Implement Breadth First Search.
2. Write a Program to Implement Depth First Search
3. Write a program to implement Hill Climbing Algorithm
4. Write a program to implement A* Algorithm
5. Write a program to implement AO* Algorithm
6. Write a program to implement Tic-Tac-Toe game
7. Implementation of Find S Algorithm
8. Implementation of Candidate elimination Algorithm
9. Write a program to implement simple Linear Regression and Plot the graph
10. Design of the combinational circuits using PLAs
11. Design of the combinational/sequential circuits using PLDs.
12. VHDL program on Full Adder Data Flow Modeling
13. VHDL Program for 8:1 MUX/1:8 DEMUX
14. VHDL Program for Priority Encoder (8:3)
15. . Simple project (Any topic related to the scope of the Practical course)
16. Visit the cloud service provider (cloud industries) nearby you and prepare a report based on organizational structure and technology implemented consulting with your subject teacher.
17. Install Virtual Box / Vmware Workstation with different flavors of Linux or Windows OS on top of Windows 7 or 8.
18. Install a C compiler in the virtual machine created using virtual box and execute simple programs
19. Install Google App Engine. Create hello world app and other simple web applications using Python/Java.

Suggested Evaluation Methods

Internal Assessment:30 Marks • Class Participation: 10Marks • File Preparation: 5 Marks • Viva/Seminar/ Quiz/Assignments: 15 Marks	**End Term Examination:** 70 Marks

Session: 2024-25			
Part A - Introduction			
Subject	INFORMATION TECHNOLOGY		
Semester	EIGHT		
Name of the Course	SIGNALS & SYSTEMS		
Course Code	B23-HIT-801		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-H4		
Level of the course	400-499		
Pre-requisite for the course(if any)			
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: CLO-1: understand the basics of signals and system CLO-2: learn about Fourier transform and concept of sampling CLO-3: understand the concept of various system types CLO-4 learn about z-transforms		
Credits	Theory	Practical	Total
	4	-	4
Contact Hours	60	-	60
Max. Marks: 100 Internal Assessment Marks: 30 End Term Exam Marks:70		Exam Time: 3 Hours	

Part B-Contents of the Course

Instructions for Paper-Setter

1. Nine questions will be set in all. All questions will carry equal marks.
2. Question No.1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit.

Unit	Topics	Contact Hours
I	**Signals** – Signals and their representation, classification of signals, singularity functions – Impulse, step, ramp functions, representation of signals with singularity functions, exponential functions. **Systems**: Definition, Classification of Systems, Convolution integral, graphical convolution **Signal Approximation** – Approximation of a function by a set of mutually orthogonal functions, mean square error, complete set of orthogonal functions orthogonality in complex functions, Trigonometric and exponential	**15**
II	Fourier series, representation of periodic functions by Fourier series, complex Fourier spectrum. **FOURIER TRANSFORMS**: Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Properties of Fourier transforms. **SAMPLING**: Sampling theorem – Graphical and analytical proof for Band Limited Signals, impulse sampling, Natural and	**15**

	Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling – Aliasing.	
III	**SIGNAL TRANSMISSION THROUGH LINEAR SYSTEMS**: Introduction to Systems, Classification of Systems, Linear Time Invariant (LTI) systems, system, impulse response, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, System bandwidth, Ideal LPF, HPF and BPF characteristics.	**15**
IV	**Z-Transforms**: ROC, properties of Z-Transforms Inverse Z-Transforms, Causality and stability. Realization of Discrete Systems: Structural realization of discrete systems – Direct form – I, Direct form-II, Cascade and parallel forms	**15**

Suggested Evaluation Methods

Internal Assessment: ➢ **Theory 30Marks** • Class Participation: **5 Marks** • Seminar/presentation/assignment/quiz/class test etc.:**10Marks** • Mid-Term Exam: **15Marks**	**End Term Examination:** 70 Marks

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Signals, Systems & Communications - B.P. Lathi, BS Publications, 2003.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn.
3. Signals and Systems – A. Anand Kumar, PHI Publications, 3rd edition.
4. Signals & Circuits" - Simon & Haykin — John Willey

Session: 2024-25			
Part A - Introduction			
Subject	INFORMATION TECHNOLOGY		
Semester	EIGHT		
Name of the Course	COMPUTER GRAPHICS		
Course Code	B23-HIT-802		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-H5		
Level of the course	400-499		
Pre-requisite for the course(if any)			
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: **CLO-1**: understand the basics of computer graphics **CLO-2**: implementation of learn and implement point, line, and circle drawing algorithms. \ **CLO-3**: acquire knowledge of two-dimensional transformations and inverse transformations **CLO-4.** Implementation of 2-D and 3-D graphics concepts		
Credits	Theory	Practical	Total
	4	-	4
Contact Hours	60	-	60
Max. Marks: 100 Internal Assessment Marks: 30 End Term Exam Marks:70		Exam Time: 3 Hours	

Part B-Contents of the Course

Instructions for Paper-Setter

1. Nine questions will be set in all. All questions will carry equal marks.
2. Question No.1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit.

Unit	Topics	Contact Hours
I	Introduction to Computer Graphics: History of Computer Graphics (CG), Applications of Computer Graphics, Components of interactive graphics systems Display devices: Refresh CRT, Color CRT, Plasma Panel displays LCD Panels, Raster-scan System, Random scan System, Graphic software, Input/output Devices, Lookup Table, Interactive Input Devices, Display Processor, General Purpose Graphics Software, Coordinate Representations	**15**

II	Point-Plotting Techniques: Scan Conversion, Scan-Converting a Straight Line: The Symmetrical DDA, The Simple DDA, Bresenham's Line Algorithm; Scan-Converting a Circle: Circle drawing using Polar Coordinates, Bresenham's Circle Algorithm, Scan-Converting an Ellipse: Polynomial Method, Trigonometric Method; Polygon Area Filling: Scan-line Fill and Flood Fill Algorithms;	**15**
III	Two-Dimensional Graphics Transformation: Basic Transformations: Translation, Rotation, Scaling; Matrix Representations and Homogeneous Coordinates; Other Transformations: Reflection, Shearing; Coordinate Transformations; Composite Transformations; Inverse Transformation; Affine Transformations; Raster Transformation; Graphical Input: Pointing and Positioning Devices and Techniques	**15**
IV	Two-Dimensional Viewing: Window and Viewport, 2-D Viewing Transformation Clipping: Point Clipping; Line Clipping: Cohen-Sutherland Line Clipping Algorithm, Mid-Point Subdivision Line Clipping Algorithm; Polygon Clipping: Sutherland-Hodgman Polygon Clipping Algorithm; Three-Dimensional Graphics: Three-Dimensional Display Methods; 3-D Transformations: Translation, Rotation, Scaling; Composite Transformations;	**15**

Suggested Evaluation Methods

Internal Assessment: ➢ **Theory 30Marks** • Class Participation: **5 Marks** • Seminar/presentation/assignment/quiz/classtestetc.:**10Marks** • Mid-Term Exam: **15Marks**	**End Term Examination:**70 Marks

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Donald Hearn, M. Pauline Baker, "Computer Graphics", PHI
2. Apurva A. Desai, "Computer Graphics", PHI, 2010
3. Newmann & Sproull,"Principles of Interactive Computer Graphics", McGraw Hill.
4. Foley, "Computer Graphics Principles & Practice", Addison Wesley.
5. Rogers, "Procedural Elements of Computer Graphics", McGraw Hill.
6. Zhigang Xiang, Roy Plastock, "Computer Graphics", Tata McGraw Hill.
7. D.P. Mukherjee, "Fundamentals of Computer Graphics and Multimedia", PHI.

Session: 2024-25			
Part A - Introduction			
Subject	INFORMATION TECHNOLOGY		
Semester	EIGHT		
Name of the Course	OPTICAL FIBER COMMUNICATION		
Course Code	B23-HIT-803		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-H6		
Level of the course	400-499		
Pre-requisite for the course(if any)	Basics of Communication systems		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: CLO-1: explain the basic optical communication system CLO-2: understand the concept of various parameters in optical fiber communication. CLO-3: To evaluate efficiency of lasers and LEDs. CLO-4: To explain the modulation and demodulation of Optical fiber systems		
Credits	Theory	Practical	Total
	4	-	4
Contact Hours	60	-	60
Max. Marks: 100 Internal Assessment Marks: 30 End Term Exam Marks:70		Exam Time: 3 Hours	

Part B-Contents of the Course

Instructions for Paper-Setter

1. Nine questions will be set in all. All questions will carry equal marks.
2. Question No.1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit.

Unit	Topics	Contact Hours
I	Optical communication, Introduction, the measurement of information & capacity of a telecommunication channel, communication system architecture, the basic communication system, Optical communication system, the economic merits, optical fibers digital telecommunication system, analogue system, application & future developments, optical satellite communication.	**15**

II	Elementary discussion of propagation in Fibers, Propagation a ray model, signal degradation in optical fibers, Material dispersion, the combined effect of material dispersion & multipath dispersion, RMS pulse widths &frequency response, attenuation in optical fibers, attenuation mechanisms, assessment of silica fibers & cables, power launching and coupling, fiber connectors, splices & couples.	**15**
III	Semiconductor lasers for optical communication, the development of stripe geometry lasers ,direct modulation of Semiconductor lasers, optical & electrical characterization of stripe geometry & buried hetero structure lasers ,sources for longer wavelength LED's efficiency of DHLED.LED structures, characteristics, reliability, modulation (AM,FM & pulse modulation).	**15**
IV	Optical fiber systems, intensity modulation/direct detection, the optical transmitter circuit, the optical receiver circuit, system design consideration, digital systems, coherent optical fiber system, detection principles, practical constraints, optical fiber communication application & future developments (Public, Military, Industrial &Computer) application, local area networks.	**15**

Suggested Evaluation Methods

Internal Assessment: ➢ **Theory 30Marks** • Class Participation: **5 Marks** • Seminar/presentation/assignment/quiz/classtestetc.:**10Marks** • Mid-Term Exam: **15Marks**	**End Term Examination:**70 Marks

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Optical fiber communications (Principle and Practice) 2nd edition-JohnM.Senior(Prentice HallIndia Pvt.Ltd, New Delhi).
2. Optical Communication Systems Second edition-John Gowar (Prentice Hall IndiaPvt.Ltd,NewDelhi).
3. Optical Fiber Communications- Gerd Keiser(McGrawHillInternationaleditions, Singapore).
4. Fundamental of optical fiber communication, second edition-Michael K. Barnoski (Academic Press, Orlando).
5. Fiber Optic Communication Systems-Govind P. Agarwal (John Wiley & Sons, Singapore).

Session: 2024-25			
Part A – Introduction			
Subject	INFORMATION TECHNOLOGY		
Semester	EIGHT		
Name of the Course	Mobile App Development		
Course Code	B23-HIT-804		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	DSE-H2		
Level of the course	400-499		
Pre-requisite for the course(if any)			
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: CLO-1: understand the basics of mobile app development CLO-2: learn the concept of various linking activities CLO-3: know about different view types and Fragments CLO-4: learn the use of various Web services		
Credits	Theory	Practical	Total
	4	-	4
Contact Hours	60	-	60
Max. Marks: 100 Internal Assessment Marks: 30 End Term Exam Marks:70		Exam Time: 3 Hours	

Part B-Contents of the Course

Instructions for Paper-Setter

1. Nine questions will be set in all. All questions will carry equal marks.
2. Question No.1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit.

Unit	Topics	Contact Hours
I	Mobile Application Development - Mobile Applications and Device Platforms - Alternatives for Building Mobile Apps - Comparing Native vs. Hybrid Applications -The Mobile Application Development Lifecycle-The Mobile Application Front-End-The Mobile Application Back-End Key, Mobile Application Services-What is Android-Android version history-Obtaining the	**15**

	Required Tools- Launching Your First Android Application-Exploring the IDE-Debugging Your Application-Publishing Your Application	
II	Understanding Activities-Linking Activities Using Intents-Fragments-Displaying Notifications Understanding the Components of a Screen-Adapting to Display Orientation-Managing Changes to Screen Orientation- Utilizing the Action Bar-Creating the User Interface Programmatically Listening for UI Notifications	**15**
III	Using Basic Views-Using Picker Views -Using List Views to Display Long Lists-Understanding Specialized Fragments - Using Image Views to Display Pictures -Using Menus with Views, Using Web View- Saving and Loading User Preferences-Persisting Data to Files-Creating and Using Databases.	**15**
IV	Sharing Data in Android-Creating Your Own Content Providers - Using the Content Provider, SMS Messaging -Sending Email-Displaying Maps- Getting Location Data- Monitoring a Location. Consuming Web Services Using HTTP-Consuming JSON Services- Creating Your Own Services - Binding Activities to Services -Understanding Threading.	**15**

Suggested Evaluation Methods

Internal Assessment: ➢ **Theory 30Marks** • Class Participation: **5 Marks** • Seminar/presentation/assignment/quiz/classtestetc.:**10Marks** • Mid-Term Exam: **15Marks**	**End Term Examination:**70Marks

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Jerome DiMarzio, "Beginning Android Programming with Android Studio", 4th Edition
2. Dawn Griffiths, David Griffiths, "Head First Android Development: A Brain-Friendly Guide", 2017.
3. Neil Smyth , "Android Studio 3.0 Development Essentials: Android", 8th Edition.
4. Pradeep Kothari, "Android Application Development (With Kitkat Support)", Black Book 2014.

Session: 2024-25			
Part A - Introduction			
Subject	INFORMATION TECHNOLOGY		
Semester	EIGHT		
Name of the Course	INTERNET OF THINGS		
Course Code	B23-HIT-805		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	DSE-H2		
Level of the course	400-499		
Pre-requisite for the course(if any)			
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: CLO-1: Understand the various concepts, terminologies and architecture of IoT systems. CLO-2: Use sensors and actuators for design of IoT. CLO-3: . Understand and apply various protocols for design of IoT systems CLO-4: understand the various applications of IoT		
Credits	Theory	Practical	Total
	4	-	4
Contact Hours	60	-	60
Max. Marks: 100 Internal Assessment Marks: 30 End Term Exam Marks:70		Exam Time: 3 Hours	

Part B-Contents of the Course

Instructions for Paper-Setter

1. Nine questions will be set in all. All questions will carry equal marks.
2. Question No.1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit.

Unit	Topics	Contact Hours
I	**Fundamentals of IoT:** Introduction, Definitions & Characteristics of IoT, IoT Architectures, Physical & Logical Design of IoT, Enabling Technologies in IoT, History of IoT, About Things in IoT, The Identifiers in IoT, About the Internet in IoT, IoT frameworks, IoT and M2M.	**15**

II	**Sensors Networks :** Definition, Types of Sensors, Types of Actuators, Examples and Working, IoT Development Boards: Arduino IDE and Board Types, Raspberry Pi Development Kit, RFID Principles and components, Wireless Sensor Networks: History and Context, The node, Connecting nodes, Networking Nodes, WSN and IoT	**15**
III	**Wireless Technologies for IoT:** WPAN Technologies for IoT: IEEE 802.15.4, Zigbee, HART, NFC, Z-Wave, BLE, Bacnet, Modbus. IP Based Protocols for IoT IPv6, 6LowPAN, RPL, REST, AMPQ, CoAP, MQTT. Edge connectivity and protocol **Data Handling:** Introduction, Big data, Types of data, Characteristics of Big data, Data handling Technologies, Flow of data, Data acquisition, Data Storage, Introduction to Hadoop.	**15**
IV	**Analytics :** Introduction to data Analytics, Types of Data analytics, Local Analytics, Cloud analytics and applications **Applications of IoT:** Home Automation, Smart Cities, Energy, Retail Management, Logistics, Agriculture, Health and Lifestyle, Industrial IoT, Legal challenges, IoT design Ethics, IoT in Environmental Protection.	**15**

Suggested Evaluation Methods

Internal Assessment: ➢ **Theory 30Marks** • Class Participation: **5 Marks** • Seminar/presentation/assignment/quiz/classtestetc.:**10Marks** • Mid-Term Exam: **15Marks**	**End Term Examination:**70 Marks

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Hakima Chaouchi, ― "The Internet of Things Connecting Objects to the Web" ISBN : 978-1-84821-140-7, Wiley Publications.
2. Olivier Hersent, David Boswarthick, and Omar Elloumi, ― "The Internet of Things: Key Applications and Protocols", WileyPublications.
3. Vijay Madisetti and ArshdeepBahga, ― "Internet of Things (A Hands-on-Approach)", 1 st Edition, VPT, 2014.
4. J. Biron and J. Follett, "Foundational Elements of an IoT Solution", O'Reilly Media, 2016.
5. Keysight Technologies, "The Internet of Things: Enabling Technologies and Solutions for Design and Test", Application Note, 2016.

Session: 2024-25			
Part A - Introduction			
Subject	INFORMATION TECHNOLOGY		
Semester	EIGHTH		
Contact Hours	Practical Based on B23-HIT-801 to 804/805		
Course Code	B23-HIT-806		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	PC-H2		
Level of the course	400-499		
Pre-requisite for the course(if any)			
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: CLO-1 : Handson experience based on the theory covered in B23-HIT-801 to 804/805		
Credits	**Theory**	**Practical**	**Total**
	-	4	4
Contact Hours	-	60	60
Max. Marks: 100 Internal Assessment Marks: 30 End Term Exam Marks:70		Exam Time: 6 Hours	
Part B-Contents of the Course			
Instructions for Performing the Experiments Note: Perform ten practicals selecting at least one from Practicals Based on B23-HIT-801 to 804/805			

1. Implement DDA line drawing algorithm for all types of slope.
2. Implement Bresenham's line drawing algorithm for all types of slopes.
3. Implement Bresenham's Circle drawing algorithm.
4. Implement Bresenham's Ellipse drawing algorithm.
5. Implement various 2-D transformations on objects like lines, rectangles, etc.
6. Implement to clip a line using the Mid-Point subdivision algorithm
7. Implement 3-D transformations on object
8. Study of Frequency modulation and demodulation using Optical fiber.
9. Study of pulse width modulation and demodulation technique using Optical fiber
10. Study of I-V Characteristics of Fiber optic LED
11. IOT Based Heart Monitoring System Using ECG
12. IOT Water Pollution Monitor RC Boat
13. IOT Based Automatic Vehicle Accident Detection and Rescue System
14. Air and Noise Pollution Monitoring System Over IOT
15. IOT based Anti-theft Flooring System
16. Develop an application that uses GUI components, Font and Colours
17. Write an application that draws basic graphical primitives on the screen.
18. . Implement an application that creates an alert upon receiving a message
19. Develop a mobile application to send an email.
20. Develop a Mobile application for simple needs (Mini Project)

Suggested Evaluation Methods

Internal Assessment:30 Marks • Class Participation: 10Marks • File Preparation: 5 Marks • Viva/Seminar/ Quiz/Assignments: 15 Marks	**End Term Examination:** 70 Marks