Maulana Abdul Kalam Azad University of Technology, West Bengal
(*Formerly West Bengal University of Technology*)
Syllabus for B. Tech in Computer Science and Engineering (Internet of Things)
(Applicable from the academic session 2022-2023)

Sl No		Type of Course	Code	Course Title	Hours per week			Credits
					L	T	P	
1	Theory	Professional Elective Course	PECICB801 (A/B/C)	Security Assessment and Risk Analysis/Mobile Applications and Services/Deep Learning	3	0	0	3
2		Open Elective Course	OECICB801 (A/B/C)	Operations Research/Remote Sensing and GIS/Digital Signal Processing	3	0	0	3
3		Open Elective Course	OECICB802 (A/B/C)	Numerical Methods/Multimedia Technology/Introduction to Arts and Aesthetics	3	0	0	3
4		Sessional-1	PROJICB881	Project III	0	0	12	6
5		Sessional - 2		Grand Viva				3
Total Credits								18

Subject: Security Assessment and Risk Analysis

Course Code: PECICB801A	**Semester: VIII**
Duration: 36 Hrs.	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	**End Semester Exam: 70**
Tutorial: 0	**Attendance: 5**
Practical:0	**Continuous Assessment: 25**
Credit: 3	**Professional Elective Course**

Aim:

Sl. No.	
1.	Identify potential vulnerabilities: Security assessment and risk analysis aim to identify potential vulnerabilities in a system or process. This helps to prevent security breaches and reduces risk exposure.
2.	Minimize risk: The assessments aims to minimize risk by identifying gaps in security controls so that steps can be taken to reduce the likelihood of security incidents occurring.
3.	Prioritize security threats: Security assessment and risk analysis helps to prioritize security threats based on how likely they are to occur and the potential impact they may have on an organization.
4.	Improve security posture: By conducting regular security assessments and risk analyses, an organization can improve its overall security posture. This ensures that security measures are up-to-date and effective, reducing risk exposure to the business.

Objective:

Sl. No.	
1.	To identify potential risks and vulnerabilities
2.	To evaluating the likelihood and impact of risks
3.	To implementing proper security controls
4.	To comply with regulatory requirements

Pre-Requisite:

Sl. No.	
1.	Cyber security fundamentals

Contents		**3 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	Introduction, what is risk and risk management, risk assessment, monitoring and review, cyberspace, cyber system.	**2**	**5**
02	What is cyber security, how does cyber security relate to information security, how does cyber security relate to critical infrastructure protection, how does cyber security relate to safety, What is cyber risk, communication and consultation of cyber risk, cyber risk assessment, monitoring and review of cyber risk	**4**	**10**
03	Context establishment, context, goals and objectives, target of assessment, interface to cyberspace and attack surface, scope, focus and assumption, assets, scale and risk evaluation criteria,	**2**	**5**
04	Risk identification techniques, malicious risks, non-malicious risks, risk analysis, threat analysis, vulnerability analysis, likelihood of incidents, consequences of incidents	**4**	**10**
05	Risk evaluation, consolidation of risk analysis results, evaluation of risk level, risk aggregation, risk grouping, risk treatment identification, risk acceptance	**3**	**10**
06	Two-factor measure, three-factor measure, many-factor measure, which measure to use for cyber risk?, classification of scales, qualitative versus quantitative risk assessment, scale for likelihood, scale for consequence, what scale to use for cyber risk	**3**	**5**
07	Defining information security metrics	**6**	**10**
08	Risk analysis techniques	**5**	**10**

09	Automating metric calculations and tools	**5**	**5**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

List of Books **Text Books:**			
Name of Author	**Title of the Book**	**Edition/ISSN/ISBN**	**Name of the Publisher**
Bjȼrnar Solhaug and Ketil Stȼlen	Cyber-Risk Management by Atle Refsdal		Springer
Reference Books:			
Marty M. Weiss and Michael G. Solomon	Auditing IT Infrastructures for Compliance		Jones & Bartlett Learning
Terje Aven	Quantitative Risk Assessment: The Scientific Platform		Cambridge University Press
Mark Talabis and Jason Martin	Information Security Risk Assessment Toolkit		Elsevier
Raymond Pompon	IT Security Risk Control Management – An Audit Preparation Plan		Apress

Expected Course Outcomes

- CO-1 Design information security risk management framework and methodologies
- CO-2 Identify and modeling information security risks
- CO-3 Judge the difference between qualitative and quantitative risk assessment methods
- CO-4 Articulate information security risks as business consequences

Mapping of Course Outcomes and Program Outcomes:

Course Outcome	Program Outcomes												Program Specific Outcome		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	3	2	2	2	2	2	2	2	2	2	2	3	1	2
2	2	3	3	2	2	2	2	2	2	2	2	2	3	2	3
3	3	2	3	2	2	1	1	2	3	2	2	2	3	2	1
4	2	2	2	1	-	1	-	1	3	3	1	2	2	2	2
5	2	2	2	-	1	-	-	1	2	3	1	2	2	1	2
Average	2	3	3	2	2	2	2	2	2	2	2	2	3	2	3

Subject: Mobile Applications and Services			
Course Code: PECICB801		**Semester: VIII**	
Duration: 36 Hrs.		**Maximum Marks: 100**	
Teaching Scheme		**Examination Scheme**	
Theory: 3hrs./week		**End Semester Exam: 70**	
Tutorial:		**Attendance : 5**	
Practical: 0		**Continuous Assessment: 25**	
Credit:3			
Aim:			
Sl. No.			
1.	The aim of a Mobile Applications and Services course is to provide students with a comprehensive understanding of mobile application development, design, and deployment.		
2.	To equip students with the skills necessary to develop innovative and user-friendly mobile applications and services that meet the needs of end-users.		
Objective:			
Sl. No.	Learn to setup Android application development environment		
1.	Illustrate user interfaces for interacting with apps and triggering actions		
2.	Interpret tasks used in handling multiple activities		
3.	Identify options to save persistent application data		
4.	Appraise the role of security and performance in Android applications		
Prerequisites: JAVA, Advanced JAVA			
Contents		**3 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	Get started, Build your first app, Activities, Testing, debugging and using support libraries	**7**	**12**
02	User Interaction, Delightful user experience, Testing your UI	**7**	**14**

03	Background Tasks, Triggering, scheduling and optimizing background tasks	**7**	**16**
04	All about data, Preferences and Settings, Storing data using SQLite, Sharing data with content providers, Loading data using Loaders	**7**	**12**
05	Permissions, Performance and Security, Firebase and AdMob, Publish	**8**	**16**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

List of Books

Text Books:

1. Erik Hellman, "Android Programming – Pushing the Li mits", 1 st Edition, Wiley India Pvt Ltd, 2014.
2. Dawn Griffiths and David Griffiths, "Head First And roid Development", 1 st Edition, O'Reilly SPD Publishers, 2015.

Reference Books:

1. J F DiMarzio, "Beginning Android Programming with A ndroid Studio", 4 th Edition, Wiley India Pvt Ltd, 2016. ISBN-13: 978-8126565580
2. Anubhav Pradhan, Anil V Deshpande, " Composing Mobi le Apps" using Android, Wiley 2014, ISBN: 978-81-265-4660-2

Course Outcomes:

- Create, test and debug Android application by setting up Android development environment
- Implement adaptive, responsive user interfaces that work across a wide range of devices.
- Demonstrate methods in storing, sharing and retrieving data in Android applications
- Analyze performance of android applications and understand the role of permissions and security
- Describe the steps involved in publishing Android application to share with the world

Mapping of Course Outcomes and Program Outcomes:

Course Outcome	**Program Outcomes**												**Program Specific Outcome**		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	3	2	2	2	2	2	2	2	2	2	2	3	1	2
2	2	3	3	2	2	2	2	2	2	2	2	2	3	2	3
3	3	2	3	2	2	1	1	2	3	2	2	2	3	2	1
4	2	2	2	1	-	1	-	1	3	3	1	2	2	2	2
5	2	2	2	-	1	-	-	1	2	3	1	2	2	1	2
Average	2	3	3	2	2	2	2	2	2	2	2	2	3	2	3

Subject: Deep Learning			
Course Code: PECICB801C		**Semester: VIII**	
Duration: 36 Hrs.		**Maximum Marks: 100**	
Teaching Scheme		**Examination Scheme**	
Theory: 3hrs./week		**End Semester Exam: 70**	
Tutorial:		**Attendance : 5**	
Practical: 0		**Continuous Assessment: 25**	
Credit:3			
Aim:			
Sl. No.			
1.	The aim of a Mobile Applications and Services course is to provide students with a comprehensive understanding of mobile application development, design, and deployment.		
2.	To equip students with the skills necessary to develop innovative and user-friendly mobile applications and services that meet the needs of end-users.		
Objective:			
Sl. No.	Learn to setup Android application development environment		
1.	Illustrate user interfaces for interacting with apps and triggering actions		
2.	Interpret tasks used in handling multiple activities		
3.	Identify options to save persistent application data		
4.	Appraise the role of security and performance in Android applications		
Prerequisites: JAVA, Advanced JAVA			
Contents		**3 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	Introduction: Various paradigms of earning problems, Perspectives and Issues in deep learning framework, review of fundamental learning techniques.	**7**	**12**
02	Feed forward neural network: Artificial Neural Network, activation function, multi-layer neural network.cardinality, operations, and properties of fuzzy relations.	**7**	**14**
03	Training Neural Network: Risk minimization, loss function, backpropagation, regularization, model selection, and optimization.	**7**	**16**
04	Conditional Random Fields: Linear chain, partition function, Markov network, Belief propagation, Training CRFs, Hidden Markov Model, Entropy.	**7**	**12**
05	Deep Learning: Deep Feed Forward network, regularizations, training deep models, dropouts, Convolutional Neural Network, Recurrent Neural Network, Deep Belief Network.	**8**	**16**
06	Deep Learning research: Object recognition, sparse coding, computer vision, natural language		
	Sub Total:	**36**	**70**

	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

List of Books

Text Books:

1. Goodfellow, I., Bengio,Y., and Courville, A., Deep Learning, MIT Press, 2016.

Reference Books:

1. Bishop, C. ,M., Pattern Recognition and Machine Learning, Springer, 2006.
2. Yegnanarayana, B., Artificial Neural Networks PHI Learning Pvt. Ltd, 2009.
3. Golub, G.,H., and Van Loan,C.,F., Matrix Computations, JHU Press,2013.
4. Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw-Hill Education, 2004.
5. Rajiv Chopra, Deep Learning, Khanna Publishing House, 2018.

Course Outcomes:

- Create, test and debug Android application by setting up Android development environment
- Implement adaptive, responsive user interfaces that work across a wide range of devices.
- Demonstrate methods in storing, sharing and retrieving data in Android applications
- Analyze performance of android applications and understand the role of permissions and security
- Describe the steps involved in publishing Android application to share with the world

Mapping of Course Outcomes and Program Outcomes:

Course Outcome	**Program Outcomes**												**Program Specific Outcome**		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	3	2	2	2	2	2	2	2	2	2	2	3	1	2
2	2	3	3	2	2	2	2	2	2	2	2	2	3	2	3
3	3	2	3	2	2	1	1	2	3	2	2	2	3	2	1
4	2	2	2	1	-	1	-	1	3	3	1	2	2	2	2
5	2	2	2	-	1	-	-	1	2	3	1	2	2	1	2
Average	2	3	3	2	2	2	2	2	2	2	2	2	3	2	3

Subject: Operations Research			
Course Code: OECICB801A		**Semester: VIII**	
Duration: 36 Hrs.		**Maximum Marks: 100**	
Teaching Scheme		**Examination Scheme**	
Theory: 3hrs./week		**End Semester Exam: 70**	
Tutorial:		**Attendance : 5**	
Practical: 0		**Continuous Assessment: 25**	
Credit:3			
Objective:			
Sl. No.	Learn to setup Android application development environment		
1.	To study the various Operations Research tools,		
2.	To study to apply an appropriate model to the given situation.		
3.	To formulate the problem.		
4.	To solve and analyze the problems on Operations Research.		
Prerequisites: NIL			
Contents		**3 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Introduction to Operations Research:** Introduction, Historical Background, Scope of Operations Research, Features of Operations Research, Phases of Operations Research, Types of Operations Research Models, Operations Research Methodology, Operations Research Techniques and Tools, Structure of the Mathematical Model, Limitations of Operations Research	**2**	**3**
02	**Linear Programming:** Introduction, Linear Programming Problem, Requirements of LPP, Mathematical Formulation of LPP, Case Studies of LPP, Graphical Methods to Solve Linear Programming Problems, Applications, Advantages, Limitations. Graphical Analysis of Linear Programming Problems: Introduction, Graphical Analysis, Some Basic Definitions, Graphical Methods to Solve LPP, Some Exceptional Cases, Important Geometric Properties of LPP. Simplex Method: Introduction, Standard Form of LPP, Fundamental theorem of LPP, Solution of LPP -Simplex Method, The Simplex Algorithm, Penalty Cost Method or Big M-method, Two Phase Method, Solved Problems on Minimisation. Duality in Linear Programming Problem: Introduction, Importance of Duality Concepts, Formulation of Dual Problem, Economic Interpretation of Duality, Sensitivity Analysis.	**8**	**12**
03	**Transportation Problem:** Introduction, Formulation of Transportation Problem (TP), Transportation Algorithm (MODI Method), the Initial Basic Feasible Solution, Moving Towards Optimality.	**3**	**6**
04	**Assignment Problem:** Introduction, Mathematical Formulation of the Problem, Hungarian Method Algorithm, Travelling Salesman Problem	**3**	**6**

05	**Project Management Using CPM-PERT:** Project Scheduling and PERT-CPM: Introduction, Basic Difference between PERT and CPM, PERT/CPM Network Components and Precedence Relationship, Project Management – PERT, Float calculation and its importance. Cost reduction by Crashing of activity	**5**	**15**
06	**Queuing Theory:** Basis of Queuing theory, elements of queuing theory, Operating characteristics of a queuing system, Queue discipline, Service Mechanism, Classification of Queuing models, [M/M/1]:{//FCFS} Queue System, numerical	**3**	**6**
07	**Inventory Management:** Inventory classification, Different costs associated to Inventory, Inventory models with deterministic demands (EOQ, EPQ and price discount models), inventory classification systems	**4**	**8**
08	**Job Sequencing:** Introduction to sequencing and scheduling models: n job two machines problem, n job 3 machines problem	**2**	**3**
09	**Decision Theory:** Introduction, Decision under certainty, Decision under risk, Decision under uncertainty: Laplace criterion, MaxiMin criterion, MiniMax criterion, savage MiniMax regret criterion, Hurwicz criterion, Decision tree	**3**	**6**
10	**Replacement Theory:** Introduction, Replacement of capital equipment which depreciated with time, replacement by alternative equipment, Group and individual replacement policy	**3**	**5**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

List of Books

Text Books:

1. F.S. Hillier, G.J. Lieberman, B. Nag and P. Basu, Introduction to Operation Research, 10th Edition, McGraw Hill, 2017.
2. C. Mohan and K. Deep, Optimization Techniques, New Age, 2009.

Reference Books:

1. N.D. Vohra, Quantitative Techniques in Management, 5th Edition, McGraw-Hill.
2. K.V. Mittal and C. Mohan, Optimization Methods in Operations Research and Systems Analysis, New Age, 2003.
3. H.A. Taha, Operations Research - An Introduction, 7th Edition, Prentice Hall, 2002.
4. A. Ravindran, D.T. Phillips and J.J. Solberg, Operations Research: Principles and Practice, 2nd Edition, John Willey and Sons, 2009.
5. K. Bedi, Production and Operations Management, Oxford University Press, 2004.
6. S.J. Chandra and A. Mehra, Numerical Optimization with Applications, Narosa, 2009.

7. J.K. Sharma, Operation Research: Theory and Applications, 5th Edition, Macmillan Pub., 2013.
8. L.W. Wayne, Operations Research Applications and Algorithms, 4th Edition, Brooks/Cole, USA.
9. J F DiMarzio, "Beginning Android Programming with A ndroid Studio", 4th Edition, Wiley India Pvt Ltd, 2016. ISBN-13: 978-8126565580
10. Anubhav Pradhan, Anil V Deshpande, " Composing Mobile Apps" using Android, Wiley 2014, ISBN: 978-81-265-4660-2

Course Objectives:

At the end of this course students will be able to

1. Apply forecasting methods for predicting demands.
2. Make decisions under certainty, uncertainty and conflicting situations.
3. Apply linear programming tools for optimal utilization of resources in various types of industries.
4. Solve transportation problems to minimize cost and understand the principles of assignment.

Mapping of Course Outcomes and Program Outcomes:

Course Outcome	Program Outcomes												Program Specific Outcome		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	3	2	2	2	2	2	2	2	2	2	2	3	1	2
2	2	3	3	2	2	2	2	2	2	2	2	2	3	2	3
3	3	2	3	2	2	1	1	2	3	2	2	2	3	2	1
4	2	2	2	1	-	1	-	1	3	3	1	2	2	2	2
Average	2	3	3	2	2	2	2	2	2	2	2	2	3	2	3

Subject: Remote Sensing & GIS			
Course Code: OECICB801B		**Semester: VIII**	
Duration: 36 Hrs.		**Maximum Marks: 100**	
Teaching Scheme		**Examination Scheme**	
Theory: 3hrs./week		**End Semester Exam: 70**	
Tutorial:		**Attendance : 5**	
Practical: 0		**Continuous Assessment: 25**	
Credit:3			
Objective:			
Sl. No.			
1.	To introduce the student to the physical principles of Remote Sensing and image interpretation as a tool for mapping.		
2.	To provide exposure to fundamental data models and data structures in GIS		
3.	To introduced principle of GPS , It's components, signal structure, and working procedure.		
Prerequisites: NIL			
Contents		**3 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Unit -I (Fundamental of Remote Sensing)** Concept and foundations of remote sensing: Basics of Remote sensing, remote sensing Art or Science process. Energy: Sources of energy, Energy radiation principle, Energy interaction in the atmosphere , Energy interactions with earth surface feature, Recording energy by sensor transmission, Reception processing, Interpretation & Analysis.	**8**	**18**
02	**Unit -II (Fundamental of Image interpretation)** Satellite imagery interpretation, Elements of image interpretation, image interpretation strategies, interpretation keys, temporal aspect of image interpretation, interpretation techniques, methods of search in image interpretation.Steps of Image interpretation.	**8**	**18**
03	**Unit -III (Fundamental of G.I.S)** Evolution of Geographical Information system, Concept of Geographic information systems: Introduction, Definition of GIS, Key components of GIS, Data Conceptual model of spatial information: Spatial Information and data models conceptual models of spatial information-raster and models vector data models, advantages and disadvantages of raster and vector data models.	**10**	**18**
04	**Unit -IV (Fundamental of GPS)** Global positioning system (GPS): Concept of Global positioning system (GPS) and its architecture. Working procedure of GPS, Different types of Errors in GPS, Kinds of GPS, application of GPS in different applications.	**10**	16
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

List of Books

Text Books:

1. Remote Sensing and Image interpretation: Thomas Lille sand & R.W. Keifer, John Wiley and Sons

Reference Books:

1. Manual of Remote Sensing, Vol. 1, American Society of Photogrammetry.
2. Remote Sensing: Principles and Interpretation: F. Sabins, Freeman Publication.
3. Remote Sensing of the Environment by J.R. Jensen, Pearson Publication.

Course outcomes: At the end of the course students will be able to

1. Understand the basic principles and components of remote sensing and GIS technology.
2. Analyze different types of remote sensing data, such as aerial photos and satellite images, and interpret their information.
3. Preprocess remote sensing data and convert it into a format suitable for use in GIS software.
4. Use different GIS software applications to perform spatial analyses, create maps and visualize data.
5. Develop skills in handling different types of spatial data, such as point, line, and polygon data.

Mapping of Course Outcomes and Program Outcomes:

Course Outcome	**Program Outcomes**												**Program Specific Outcome**		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	3	2	2	2	2	2	2	2	2	2	2	3	1	2
2	2	3	3	2	2	2	2	2	2	2	2	2	3	2	3
3	3	2	3	2	2	1	1	2	3	2	2	2	3	2	1
4	2	2	2	1	-	1	-	1	3	3	1	2	2	2	2
Average	2	3	3	2	2	2	2	2	2	2	2	2	3	2	3

Subject: Digital Signal Processing			
Course Code: OECICB801C		**Semester: VIII**	
Duration: 36 Hrs.		**Maximum Marks: 100**	
Teaching Scheme		**Examination Scheme**	
Theory: 3hrs./week		**End Semester Exam: 70**	
Tutorial:		**Attendance : 5**	
Practical: 0		**Continuous Assessment: 25**	
Credit:3			
Objective:			
Sl. No.			
1.	To understand sampling and reconstruction of signal		
2.	To understand the method of Z-transform and inverse Z- transformof signal and its properties.		
3.	To understand Discrete Fourier Transform		
4.	To understand methods of design of Digital filters		
5.	To understand applications of Digital signal processing		
6.	o solve numerical problems on the topics studied		
Prerequisites: Electric circuit theory, Control system			
Contents		**3 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Discrete-time signals and systems:** Discrete time signals and systems: Sequences; representation of signals on orthogonal basis; Representation of discrete systems using difference equations, Sampling and reconstruction of signals - aliasing; Sampling theorem and Nyquist rate.	**6**	**10**
02	**Z-transform:** z-Transform, Region of convergence, Analysis of Linear Shift Invariant systems using z-transform, Properties of z-transform for causal signals, Interpretation of stability in z-domain, Inverse z-transforms.	**6**	**10**
03	**Discrete Fourier Transform:** Frequency Domain Analysis, Discrete Fourier Transform (DFT), Properties of DFT, Convolution of signals, Fast Fourier Transform Algorithm, Parseval's Identity, Implementation of Discrete Time Systems	**8**	**16**
04	**Design of Digital filters:** Design of FIR Digital filters: Window method, Park-McClellan's method. Design of IIRDigital Filters: Butterworth, Chebyshev and Elliptic	**8**	16
05	**Applications of Digital Signal Processing:** Correlation, Functions and Power Spectra, Stationary Processes, Optimal filtering using ARMA Model, Linear Mean-Square Estimation, Wiener Filter.	**12**	18
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

List of Books

Text Books:

1. Digital Signal Processing-A computer based approach, S. Mitra, TMH

Reference Books:

1. Digital Signal Processing: Principles, Algorithms & Application, J.C. Proakis & M.G. Manslakis, PHI
2. Fundamental of Digital Signal Processing using MATLAB , Robert J. Schilling, S.L. Harris, Cengage Learning.

Course Outcome:

After completion of this course, the learners will be able to

1. represent signals mathematically in continuous and discrete-time and in the frequency domain.
2. analyse discrete-time systems using z-transform.
3. explain the Discrete-Fourier Transform (DFT) and the FFT algorithms.
4. design digital filters for various applications.
5. apply digital signal processing for the analysis of real-life signals.

Mapping of Course Outcomes and Program Outcomes:

Course Outcome	Program Outcomes												Program Specific Outcome		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	3	2	2	2	2	2	2	2	2	2	2	3	1	2
2	2	3	3	2	2	2	2	2	2	2	2	2	3	2	3
3	3	2	3	2	2	1	1	2	3	2	2	2	3	2	1
4	2	2	2	1	-	1	-	1	3	3	1	2	2	2	2
Average	2	3	3	2	2	2	2	2	2	2	2	2	3	2	3

Subject: Numerical Methods			
Course Code: OECICB802A		**Semester: VIII**	
Duration: 36 Hrs.		**Maximum Marks: 100**	
Teaching Scheme		**Examination Scheme**	
Theory: 3hrs./week		**End Semester Exam: 70**	
Tutorial:		**Attendance : 5**	
Practical: 0		**Continuous Assessment: 25**	
Credit:3			
Objective:			
Sl. No.			
1.	This course is an introduction to a broad range of numerical methods for solving mathematical problems that arise in Science and Engineering.		
2.	The goal is to provide a basic understanding of the derivation, analysis and use of these numerical methods along with a rudimentary understanding of finite precision arithmetic.		
3.	This will help you choose and apply the appropriate numerical techniques for your problem, interpret the results and assess accuracy.		
4.	This course is an introduction to a broad range of numerical methods for solving mathematical problems that arise in Science and Engineering.		
Prerequisites: Discrete Mathematics			
Contents		**3 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	Approximation in numerical computation: Truncation and rounding errors, Fixed and floating point arithmetic, Propagation of errors.	**3**	**8**
02	Interpolation: Newton forward/backward interpolation, Lagrange's and Newton's divided difference Interpolation.	**10**	**16**
03	Numerical integration: Trapezoidal rule, Simpson's 1/3 rule, Expression for corresponding error terms.	**3**	**8**
04	Numerical solution of a system of linear equations: Gauss elimination method, Matrix inversion, LU Factorization method, Gauss-Seidel iterative method.	**8**	1**6**
05	Numerical solution of Algebraic equation: Bisection method, Regula-Falsi method, Newton-Raphson method.	**8**	**14**
06	Numerical solution of ordinary differential equation: Euler's method, Runge-Kutta methods, Predictor-Corrector methods and Finite Difference method.	**4**	**8**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

List of Books

Text Books:

1. R.S. Salaria: Computer Oriented Numerical Methods, Khanna Publishing House

Reference Books:

1. C.Xavier: C Language and Numerical Methods.
2. Dutta & Jana: Introductory Numerical Analysis.
3. J.B.Scarborough: Numerical Mathematical Analysis.
4. Jain, Iyengar , & Jain: Numerical Methods (Problems and Solution).
5. Balagurusamy: Numerical Methods, Scitech.
6. Baburam: Numerical Methods, Pearson Education.
7. N. Dutta: Computer Programming & Numerical Analysis, Universities Press.

Course Outcome:

After completion of this course, the learners will be able to

1. Calculate different type of errors & establish the relationship of different operators
2. Find interpolation, differentiation, integration and solve a differential equation using an appropriate numerical method
3. Solve a linear system of equations using an appropriate numerical method
4. Find roots of non-linear equations using an appropriate numerical method
5. Construct central tendency of science/engineering data & interpret the role of such data and employ appropriate regression models to determine statistical relationships
6. Apply basic statistical inference techniques, including confidence intervals, hypothesis testing and analysis of variance, to science/engineering problems.

Mapping of Course Outcomes and Program Outcomes:

Course Outcome	Program Outcomes												Program Specific Outcome		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	3	2	2	2	2	2	2	2	2	2	2	3	1	2
2	2	3	3	2	2	2	2	2	2	2	2	2	3	2	3
3	3	2	3	2	2	1	1	2	3	2	2	2	3	2	1
4	2	2	2	1	-	1	-	1	3	3	1	2	2	2	2
5	2	3	3	2	2	2	2	2	2	2	2	2	3	2	3
6	3	2	3	2	2	1	1	2	3	2	2	2	3	2	1
Average	2	3	3	2	2	2	2	2	2	2	2	2	3	2	3

Subject: Multimedia Technology			
Course Code: OECICB802B		**Semester: VIII**	
Duration: 36 Hrs.		**Maximum Marks: 100**	
Teaching Scheme		**Examination Scheme**	
Theory: 3hrs./week		**End Semester Exam: 70**	
Tutorial:		**Attendance : 5**	
Practical: 0		**Continuous Assessment: 25**	
Credit:3			
Objective:			
Sl. No.			
1.	To enable graduates to excel in multimedia technology and information technology profession by adapting to rapid advances in newer technologies.		
2.	To provide graduates a proper foundation in mathematical, scientific, multimedia and engineering fundamentals to solve real world problems.		
3.	To train graduates with good scientific, multimedia technologies and solve real time problems.		
Prerequisites: NIL			
Contents		**3 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Introduction** Multimedia today, Impact of Multimedia, Multimedia Systems, Components and Its Applications	**2**	**4**
02	**Text and Audio** Text: Types of Text, Ways to Present Text, Aspects of Text Design, Character, Character Set, Codes, Unicode, Encryption; Audio: Basic Sound Concepts, Types of Sound, Digitizing Sound, Computer Representation of Sound (Sampling Rate, Sampling Size, Quantization), Audio Formats, Audio tools, MIDI	**6**	**12**
03	**Image and Video** Image: Formats, Image Color Scheme, Image Enhancement; Video: Analogue and Digital Video, Recording Formats and Standards (JPEG, MPEG, H.261) Transmission of Video Signals, Video Capture, and Computer based Animation.	**8**	**12**
04	**Synchronization** Temporal relationships, synchronization accuracy specification factors, quality of service	**4**	6
05	**Storage models and Access Techniques** Magnetic media, optical media, file systems (traditional, multimedia) Multimedia devices – Output devices, CD-ROM, DVD, Scanner, CCD	**4**	**6**
06	**Image and Video Database** Image representation, segmentation, similarity based retrieval, image retrieval by color, shape and texture; indexing- kd trees, R-trees, quad trees; Case studies- QBIC, Virage. Video Content, querying, video segmentation, indexing	**8**	**12**
07	**Document Architecture and Content Management** Content Design and Development, General Design Principles, Hypertext: Concept, Open Document Architecture (ODA), Multimedia	**9**	**12**

	and Hypermedia Coding Expert Group (MHEG), Standard Generalized Markup Language (SGML), Document Type Definition (DTD), Hypertext Markup Language (HTML) in Web Publishing. Case study of Applications		
08	**Multimedia Applications** Interactive television, Video-on-demand, Video Conferencing, Educational Applications, Industrial Applications, Multimedia archives and digital libraries, media editors.	**4**	**6**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

List of Books

Text Books:

1. Ralf Steinmetz and Klara Nahrstedt , Multimedia: Computing, Communications & Applications , Pearson Ed.

Reference Books:

1. Nalin K. Sharda , Multimedia Information System , PHI.
2. Fred Halsall , Multimedia Communications , Pearson Ed.
3. Koegel Buford , Multimedia Systems , Pearson Ed.
4. Fred Hoffstetter , Multimedia Literacy , McGraw Hill.
5. Ralf Steinmetz and Klara Nahrstedt , Multimedia Fundamentals: Vol. 1- Media Coding and Content Processing , PHI.
6. J. Jeffcoate , Multimedia in Practice: Technology and Application , PHI.
7. Prabhat K. Andleigh & Kiran Thakrar , Multimedia Systems Design , PHI.

Course Outcome:

After completion of this course, the learners will be able to

1. Understand the policy issues related to privacy, intellectual property rights, and establishing identity those are germane to electronic commerce along with the Internet and related technologies
2. Comprehend the underlying economic mechanisms and driving forces of E-Commerce
3. Analyse the impact that electronic commerce is facing and outlines the different digital transaction process and basic concepts of e-commerce
4. Identify the importance of digital library and specify the development of electronic commerce capabilities in a company
5. Appraise the opportunities and potential to apply and synthesize a variety of e Commerce concepts and solutions to create business value for organizations, customers, and business partners.
6. To gain knowledge of the ethical, social, and security issues of information systems.

Mapping of Course Outcomes and Program Outcomes:

Course Outcome	Program Outcomes												Program Specific Outcome		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	3	2	2	2	2	2	2	2	2	2	2	3	1	2
2	2	3	3	2	2	2	2	2	2	2	2	2	3	2	3
3	3	2	3	2	2	1	1	2	3	2	2	2	3	2	1
4	2	2	2	1	-	1	-	1	3	3	1	2	2	2	2
5	2	3	3	2	2	2	2	2	2	2	2	2	3	2	3
6	3	2	3	2	2	1	1	2	3	2	2	2	3	2	1
Average	2	3	3	2	2	2	2	2	2	2	2	2	3	2	3

Subject: Introduction to Arts and Aesthetics			
Course Code: OECICB802C		**Semester: VIII**	
Duration: 36 Hrs.		**Maximum Marks: 100**	
Teaching Scheme		**Examination Scheme**	
Theory: 3hrs./week		**End Semester Exam: 70**	
Tutorial:		**Attendance : 5**	
Practical: 0		**Continuous Assessment: 25**	
Credit:3			
Objective:			
Sl. No.			
1.	The objective of this course is to introduce the students to some of the basic issues pertaining to art through exposure to different art-media and art-works.		
2.	The emphasis will be on critical analysis of art-works and aesthetic ideas, with special reference to literature and music.		
3.	The arts and aesthetic related problems will be treated as central.		
Prerequisites: NIL			
Contents		**3 Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	Introduction to Art, Concepts of Imitation. Symbolization, Expression, Configuration.	**6**	**12**
02	Introduction to aesthetics, Theorizing about art and its relevance to creation, appreciation and criticism of art.	**8**	**16**
03	Art and life: (a) art and society (Marxist approach); (b) art and psyche (Freudian approach).	**8**	**16**
04	Art as an autonomous activity: art and form.	**8**	**16**
05	Aesthetic Response: Rasa-theory and emotionality; detached contemplation.	**6**	**10**
	Sub Total:	**36**	**70**

	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

List of Books

Text Books:

1. M. Rader (ed.), A Modern Book of Aesthetics: an anthology, Holt, Rinehart and Winston, 1973.

Reference Books:

1. J. Hospers (ed.), Introductory Readings in Aesthetics, Free Press, 1969.
2. R.B. Patankar, Aesthetics and Literary Criticism, Nachiketa Publications, 1969.
3. V. Raghavan, and Nagendra (eds.), An Introduction to Indian Poetics, Macmillan 1970.
4. H. Osborne, Aesthetics and Art Theory: an historical introduction, Dutton, 1970.

Course Outcome:

After completion of this course, the learners will be able to

1. Identify different forms of art and understand their historical and cultural significance.
2. Develop critical thinking skills to analyze and interpret art from different perspectives and understand the concepts of beauty, meaning, and value in art.
3. Develop a personal appreciation for the arts and cultivate their own creativity by engaging in hands-on activities and projects.
4. Articulate and communicate their interpretations and opinions about art, as well as engage in meaningful discussions and debates about the role of the arts in society.

Mapping of Course Outcomes and Program Outcomes:

Course Outcome	**Program Outcomes**												**Program Specific Outcome**		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	3	2	2	2	2	2	2	2	2	2	2	3	1	2
2	2	3	3	2	2	2	2	2	2	2	2	2	3	2	3
3	3	2	3	2	2	1	1	2	3	2	2	2	3	2	1
4	2	2	2	1	-	1	-	1	3	3	1	2	2	2	2
Average	2	3	3	2	2	2	2	2	2	2	2	2	3	2	3

Project III (PROJICB881)

The object of Project Work II is to enable the student to take up investigative study in the broad field of Electronics & Communication Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a Supervisor. This is expected to provide a good initiation for the student(s) in R&D work.

Course Objective:

The purpose of final year projects for computer science is to allow students to apply the knowledge and skills they have acquired during their studies to a real-world problem.

Course Outcomes: After completion of this course the students will be able to

1. Problem Identification: Ability to identify the unsolved problem in the selected domain indicates the literature survey done. (BT Level 1, 2)
2. Problem Analysis: Ability to analyze the nature of the problem with respect to its class reducibility. (BT Level 4)
3. Design solution: Ability to find the best possible solution with respect to time and space complexity & other parameters. (BT Level 3,4)
4. Regularity and contribution: The consistency of meeting the mentor and its other team members with interactive discussions. (BT Level 3)
5. Presentation & Communication Skill: The verbal and technical skills in presenting the ppt. along with active responses to the queries generated. (BT Level 1,5)

Project Work III & Dissertation:

The object of Project Work II & Dissertation is to enable the student to extend further the investigative study taken up under EC P1, either fully theoretical/practical or involving both theoretical and practical work, under the guidance of a Supervisor from the Department alone or jointly with a Supervisor drawn from R&D laboratory/Industry. This is expected to provide a good training for the student(s) in R&D work and technical leadership. The assignment to normally include:

1. In depth study of the topic assigned in the light of the Report prepared under EC P1;
2. Review and finalization of the Approach to the Problem relating to the assigned topic;
3. Preparing an Action Plan for conducting the investigation, including team work;
4. Detailed Analysis/Modelling/Simulation/Design/Problem Solving/Experiment as needed;

5. Final development of product/process, testing, results, conclusions and future directions;
6. Discussion of the paper published in Conference proceeding/Journals, if possible;
7. Preparing a Dissertation in the standard format for being evaluated by the Department.
8. Final Seminar Presentation before a Departmental Committee.

Mapping of Course Outcomes and Program Outcomes:

Course Outcome	**Program Outcomes**												**Program Specific Outcome**		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	3	2	2	2	2	2	2	2	2	2	2	3	1	2
2	2	3	3	2	2	2	2	2	2	2	2	2	3	2	3
3	3	2	3	2	2	1	1	2	3	2	2	2	3	2	1
4	2	2	2	1	-	1	-	1	3	3	1	2	2	2	2
5	2	2	2	-	1	-	-	1	2	3	1	2	2	1	2
Average	2	3	3	2	2	2	2	2	2	2	2	2	3	2	3