Semester VI

Jabalpur Engineering College, Jabalpur

Credit Based Grading System (CBGS) w.e.f. July 2017

Scheme of Examination

Bachelor of Engineering B.E. (Computer Science & Engineering)

Subject wise distribution of marks and corresponding credits

Scheme of Examination w.e.f. July-2017 (Academic Session-2017-18)

S. No.	Subject Code	Subject Name & Title	Maximum Marks Allotted						Hours / week.			Total Credits	Total Marks
			Theory			Practical		Total Marks					
			End Sem	Mid Sem. MST	Quiz, Assign ment	End Sem.	Lab Work		L	T	P		
1	**CS6001**	Artificial Intelligence	70	20	10	-	-	100	3	1	-	4	
2	**CS6002**	Computer Graphics & Multimedia	70	20	10	30	20	150	3	1	2	6	
3	**CS6003**	Wireless and Sensor Network	70	20	10	30	20	150	3	1	2	6	
4	**CS6004**	Software Engineering	70	20	10	30	20	150	3	1	2	6	
5	**CS6005**	Elective-II	70	20	10	-	-	100	3	1	-	4	
6	**CS6006**	Departmental Lab-III (Departmental Choice) Minor Project	-	-	-	30	20	50	-	-	2	2	
7	**CS6007**	Creativity and Entrepreneurship Development (Internal Assessment)	-	-	-	-	50	50	-	-	2	2	
8	**CS6008**	Startup / Industrial Lectures (Internal Assessment)	-	-	-	-	50	50	-	-	2	2	
			350	**100**	**50**	**120**	**180**	**800**	**15**	**5**	**12**	**32**	**800**

MST: Minimum of two mid semester tests to be conducted.

L: Lecture T: Tutorial P: Practical

- **Students have to go for Industrial Training /Internship of 4 weeks at the end of VI Semester.**

Department Elective-II (Four Subjects)	
Subject Code	**Subject Name**
CS6005A	IPR (Intellectual Property Right)
CS6005B	Introduction to Parallel and Distributed Programming
CS6005C	Internet and Web Technologies
CS6005D	Image Processing

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B.E. (CBGS) VI SEMESTER
COMPUTER SCIENCE & ENGINERRING
ARTIFICIAL INTELLIGENCE

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS)	Artificial Intelligence	CS6001	Min. "D"	Min. "D"	5.0

Unit I:

Meaning and definition of artificial intelligence, various types of production systems, Characteristics of production systems.

Unit II:

Knowledge Representation, Problems in representing knowledge, knowledge representation using propositional and predicate logic, comparison of propositional and predicate logic, Resolution, refutation, deduction, theorem proving, inferencing, monotonic and non-monotonic reasoning.

Unit III:

Probabilistic reasoning, Baye's theorem, semantic networks, scripts, schemas, frames, conceptual dependency, fuzzy logic, forward and backward reasoning.

Unit IV:

Game playing techniques like minimax procedure, alpha-beta cut-offs etc, planning, Study of the block world problem in robotics, Introduction to understanding and natural languages processing.

Unit V:

Introduction to learning, Various techniques used in learning, introduction to neural networks, applications of neural networks, common sense, reasoning, some example of expert systems.

Books Reference Books:

1. Rich E and Knight K, "Artificial Intelligence", TMH, New Delhi.
2. Nelsson N.J., "Principles of Artificial Intelligence", Springer Verlag, Berlin

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Subject: Artificial Intelligence (CS6001)

Course Outcomes: after completion of course student will be able to:

CO1. Explain Neural Network Techniques and various techniques used in the Learning.
CO2. Apply Propositional Logic, Predicate Logic and Fuzzy Logic.
CO3. Contrast min-max algorithms of Games Playing and compress the Alpha-Beta Cut-Offs.
CO4. Evaluate problems based on AI's such that Water-Jug Problems, 8-Puzzle Problems, Chess Problems and Tower of Hanoi.

B.E. (CBGS) VI SEMESTER
COMPUTER SCIENCE & ENGINERRING
COMPUTER GRAPHICS & MULTIMEDIA

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS)	Computer Graphics & Multimedia	CS6002	Min. "D"	Min. "D"	5.0

Unit-I:

Introduction to raster scan displays, Pixels, Frame buffer, Vector & Character generation, Random scan systems, Graphics Primitives, Display devices, Display file structure, Scan Conversion techniques, Line drawing: simple DDA, Bresenham's Algorithm, Circle Drawing Algorithms. Scan line polygon fill algorithm, Boundary-fill and Flood-fill algorithms

Unit-II:

2D transformation: Translation, Rotation, Scaling, Shearing, Reflection. Inverse Transformation, Homogenous Coordinate System, Matrices Transformation, Composite Transformation. Windowing & Clipping: World Coordinate System ,Viewing Transformation, Line Clipping, Cohen Sutherland, Midpoint Line clipping algorithms, Polygon Clipping: Sutherland –Hodgeman, Weiler-Atherton algorithms.

Unit-III:

3D transformations: Translation, Rotation, Scaling. Parallel & Perspective Projection,Types of Parallel & Perspective Projection. Hidden Surface elimination: Depth comparison, Back Face detection algorithm, Painters algorithm, Z-buffer algorithm. Curve generation, Bezier and B-spline methods.

Unit-IV:

Basic Illumination Model, Diffuse reflection, Specular reflection, Phong Shading Gourand shading, Ray Tracing, Color Models like RGB, YIQ, CMY, HSV.

Unit –V:

Multimedia System: An Introduction, Multimedia hardware, Multimedia System Architecture. Data & File Format Standards. i.e RTF, TIFF, MIDI, JPEG, DIB, MPEG.Audio: digital audio, MIDI, processing sound, sampling, compression. Video: Avi, 3GP,MOV, MPEG , Compression standards, Compression through Spatial and Temporal Redundancy. Multimedia Authoring .

Books Reference:

1. Donald Hearn and M.P. Becker "Computer Graphics" Pearson Pub.
2. Rogers, "Procedural Elements of Computer Graphics", Tata McGraw Hill
3. Folay Vandam, Feiner, Hughes "Computer Graphics Principle & Practice" , Pearson Pub.
4. Sinha and Udai , "Computer Graphics", Tata McGraw Hill
5. Parekh "Principles of Multimedia" Tata McGraw Hill
6. Prabhat k Andleigh, Kiran Thakral , "Multimedia System Design " PHI Pub.
7. Shuman "Multimedia in Action", Cengage Learning

COMPUTER GRAPHICS & MULTIMEDIA LAB

List of Experiment:

1. To study basic graphic functions.
2. Write a program to draw a line using DDA Algorithm
3. Write a program to draw a circle using Bresenham's Algorithm.
4. Write a program to draw a line using Bresenham's Algorithm
5. Write a program to draw a circle using mid point circle algorithm.
6. Write a program to scale a triangle
7. Write a program to translate a triangle
8. Write a program to rotate a triangle.

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Subject: Computer Graphics and Multimedia (CS6002)

Course Outcomes: after completion of course student will be able to:

CO1. Describe fundamental concepts of Draw line, circle, rectangle using different method and understand about various graphics design in computer

CO2. Explain the various methods for drawing different shapes such as line, circle, rectangle

CO3. Apply translation, rotation, scaling, shearing, and reflection of object in various position using 2D transformation and 3D transformation.

CO4. Create programs/algorithms for drawing objects such as line, circle, rectangle.

B.E. (CBGS) VI SEMESTER
COMPUTER SCIENCE & ENGINERRING
WIRELESS AND SENSOR NETWORKS

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS)	Wireless and Sensor Networks	CS6003	Min. "D"	Min. "D"	5.0

Unit - I:

Overview of Wireless Sensor Networks Challenges for Wireless Sensor Networks, Enabling Technologies For Wireless Sensor Networks.

Unit - II:

Architectures Single-Node Architecture – Hardware Components, Energy Consumption of Sensor Nodes , Operating Systems and Execution Environments, Network Architecture –Sensor Network Scenarios, Optimization Goals and Figures of Merit, Gateway Concepts.

Unit - III:

Networking Sensors Physical Layer and Transceiver Design Considerations, MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts – S-MAC , The Mediation Device Protocol, Wakeup Radio Concepts, Address and Name Management, Assignment of MAC Addresses, Routing Protocols- Energy-Efficient Routing, Geographic Routing.

Unit -IV:

Infrastructure Establishment Topology Control, Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and Control.

Unit -V:

Sensor Network Platforms And Tools Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node-level Simulators, State-centric programming.

Books Reference:

1. Wireless Sensor Networks by S. Anandamurugan. Satya Prakasha, New Delhi..
2. Fundamentals of Wireless Sensor Networks , wiley India publications.
3. Anna Hac, "Wireless Sensor Network Designs," John Wiley & Sons.
4. Edgar H. Callaway, Jr. and Edgar H. Callaway, "Wireless Sensor Networks: Architectures and Protocols," CRC Press

WIRELESS AND SENSOR NETWORKS LAB

List of Experiments:

1. Study of network simulators used for wireless Sensor Networks.
2. Study of TCL scripting: demonstration of one small network simulation script.
3. Study of various trace file formats of network simulators.
4. Study of WSN programming using any WSN Simulator.
5. Study of MAC Protocol for wireless sensor network.
6. Study of design considerations for selecting a network topology.
7. Study of the advantage of hierarchical network over multihop network in terms of energy conservation.

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Subject: Wireless Sensor Networks (CS6003)

Course Outcomes: after completion of course student will be able to:

CO1. Explain the Concepts of Wireless Sensor Networks, various challenges and applications of Ad-hoc Network, Network Architecture, the unique issues in ad-hoc/sensor networks, Optimization Goals.

CO2. Describe topology control techniques, algorithms of Time Synchronization, Localization and Positioning.

CO3. Apply Sensor Network on various sensor network Platforms, tools and Applications.

CO4. Analyze the protocol design issues of Ad-hoc Networks and challenges in designing MAC, routing and transport protocols for wireless ad-hoc/sensor networks.

B.E. (CBGS) VI SEMESTER
COMPUTER SCIENCE & ENGINERRING
SOFTWARE ENGINEERING

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS)	Software Engineering	CS6004	Min. "D"	Min. "D"	5.0

Unit I:

Introduction: Phases in Software development, Software Development Life Cycle (SDLC), software development process models Software process models (Linear Sequential Model, Prototyping Model, RAD Model, Incremental Model, Spiral Model, and Rational Unified Process), Agile process.

Unit II:

Software Requirement specification (SRS): Role of SRS, Requirements gathering and problem analysis, requirement specification, validation of SRS document. Use cases: Use case modeling, Use case diagram and use case documents/specifications.

Unit III:

Object-Oriented Modeling (UML and OCL), Analysis Modeling, Developing Class Diagram, Sequence Diagram, Class Collaboration Diagram, Activity Diagram, State Transition Diagram. System and Subsystem Design, Design goals, Design Patterns.

Unit IV:

Software Testing, Unit testing, Integration testing, System testing, Regression testing, Black-box and White-box techniques, Static Techniques like code inspections, static analysis and dynamic analysis.

Unit V:

Software Project Planning, Cost Estimation, Scheduling, Risk Management, Quality Management, Software Change Management, Software Configuration Management, Re-engineering, Reverse Engineering, Project Plan.

Reference books:

1. R S. Pressman ,"Software Engineering: A Practitioner's Approach", Sixth edition 2006, McGraw-Hill.
2. Rajib Mall, "Fundamentals of Software Engineering" Second Edition, PHI Learning.
3. Sommerville,"Software Enginerring",Pearson Education.
4. Grady Booch, Robart A. Maksimchuk, Michael W. Engle, Bobbij Young, Jim Conallen, and Kellia Houston. Object Oriented Analysis & Design with Applications 3rd Edition. Pearson Education India, 2010.
5. Pankaj Jalote. "An Integrated Approach to Software Engineering", 3rd Edition, Narosa, 2005.
6. Bernd Bruegge, Allen Dutoit: "Object-Oriented Software Engineering: Using UML, Patterns, and Java", Prentice Hall, 2003.
7. Blaha and Rumbaugh. "Object-Oriented Analysis and Modeling using UML, 2nd Edition, TMH 2005.

SOFTWARE ENGINEERING LAB

List of Experiments:

1. Comparative study of software process model (like: linear sequential model, prototype model, RAPID application model, incremental model).
2. Write SRS (software requirement specification) of the given problem in IEEE format.
3. Identify the actors & use cases & draw use case diagram of the given problem- Course Registration System.
4. Draw class diagram of the same given problem.
5. Draw sequence diagram of the same given problem.
6. Draw state transition diagram of the same given problem.
7. Draw activity diagram of the same given problem.
8. Draw class collaboration diagram of the same given problem.
9. Write test case for the same given problem.
10. Develop a prototype software for the same given problem.

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Subject: Software Engineering (CS 6004)

Course Outcomes (COs): After success completion of the course, the students will be able to:

CO 1) Explain fundamental concepts of software engineering
CO 2) Apply UML technique to generate the design model of a software
CO 3) Analyse the SRS/uses case models to develop analysis model of the system
CO 4) Design test cases for a given software problem

B.E. (CBGS) VI SEMESTER
COMPUTER SCIENCE & ENGINERRING
(ELECTIVE -II)INTELLECTUAL PROPERTY RIGHTS

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS)	(Elective- II) Intellectual Property Rights	CS6005A	Min. "D"	Min. "D"	5.0

Unit - I:

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

Unit - II:

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

Unit - III:

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

Unit - IV:

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade screte litigation.

Unfair competitiion: Misappropriation right of publicity, False advertising.

Unit - V:

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

Books References:

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, prabuddha ganguli, Tata Mc Graw Hill Publishing Company Ltd.

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B.E. (CBGS) VI SEMESTER
COMPUTER SCIENCE & ENGINERRING
(ELECTIVE -II)INTRODUCTION TO PARALLEL AND DISTRIBUTED PROGRAMMING

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS)	(Elective -II) Introduction to Parallel and Distributed Programming	CS6005B	Min. "D"	Min. "D"	5.0

Unit -I:

Introduction to Concurrency, Processes and Threads , Effects of Latency, Bandwidth on performance; Caches; Flynn's Classification, Models of Computation

Unit -II:

Mutual exclusion, Deadlock-freedom, Starvation-freedom , Linearizability, Sequential Consistency

Unit -III:

Introduction to OpenMP , Introduction to MPI, Pt-to-Pt Communication ,Matching rules, Collective communication ,Implementation of collective communication ,Collective communication (Cont.), Process topologies ,Cannon's matrix multiplication - 1 ,Cannon's matrix multiplication - 2 ,Row and column matrix multiplication in MPI

Unit - IV:

Hybrid MPI+ OpenMP programming: Graph coloring problem ,

Unit - V:

Introduction to GPUs : GPUs, Nvidia's Fermi architecture basics ,CUDA C Basics , Parallel Sum Cuda Code - Case study

Books References:

1. An Introduction to Parallel Computing by Peter Pacheco , Morgan Kaufmann Publication
2. Introduction to Parallel Algorithms by C. Xavier , S.S. Iyengar , John Willey & Sons.
3. Introduction to Parallel & distributed algorithms by Carl Burch , Hendrix College.
4. Distributed Programming : Theory and Practice Hardcover- by A. Udaya Shankar (Author)

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B.E. (CBGS) VI SEMESTER
COMPUTER SCIENCE & ENGINERRING
(ELECTIVE-II)INTERNET AND WEB TECHNOLOGY

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS)	(Elective - II) Internet and Web Technology	CS6005C	Min. "D"	Min. "D"	5.0

Unit-I :

An Introduction to Web Engineering, History of web Development, Time line, Motivation, Categories of Web Applications, Characteristics of Web Applications. Evolution and Need for Web Engineering, Web Engineering Models, Software Engineering v/s Web Engineering. Introduction to Browser and search engines, Search fundamentals, Search strategies, Directories search engines and Meta search engines, Working of the search engines, Miscellaneous Web Browser details.

Unit-II :

Introduction to Web Servers: Features of web servers, caching, case study-IIS, Apache, Configuring web servers.

Unit-III :

Technologies for Web Applications: HTML and DHTML, HTML Basic Concepts, Static and dynamic HTML, Structure of HTML documents, HTML Elements, Linking in HTML, Anchor Attributes, Image Maps, Meta Information, Image Preliminaries, Layouts, Backgrounds, Colors and Text, Fonts, Tables, Frames and layers.Database integration, CSS, Positioning with Style sheets. Introduction to JAVA SCRIPT, Cookies Creating and Reading Cookies Technologies for Web Applications: Introduction of XML, Validation of XML documents, DTD, Ways to use XML, XML for data files, HTML Vs XML, Embedding XML into HTML documents, Converting XML to HTML for Display, Displaying XML using CSS and XSL, Rewriting HTML as XML.

Unit-IV :

Creating Cohesive Websites: Conceptual Overview of website Development, Website Design issues, Conceptual Design, High-Level Design, Indexing the Right Stuff, Grouping Content. Architectural Page Mockups, Design Sketches, Navigation Systems. Searching Systems Good & bad web design, Process of Web Publishing. Phases of Web Site development, enhancing your web-site, submission of website to search engines. Web security issues, security audit of websites, Web effort estimation, Productivity, Measurement, Quality usability and reliability.

Unit-V :

Requirements Engineering for Web Applications: Introduction, Fundamentals, Requirement Source, Type, Notations Tools. Principles Requirements Engineering Activities, Adapting RE Methods to Web Application. Introduction to http and https, http vs. https, Dynamic Web Content, Introduction of ASP.Net, PHP, Database connectivity (MySQL/Oracle)

Books References:

1. Roger S.Pressman, David Lowe, "Web Engineering", Tata Mcgraw Hill Publication, 2007
2. Achyut S Godbole and Atul Kahate, "Web Technologies", Tata McGraw Hill
3. Gopalan N P, Akilandeswari "Web Technology: A Developer s Perspective" , PHI
4. NEIL GRAY "Web server Programming" WIley
5. CHRIS BATES Web Programming: Building Internet applications Wiley
6. Moller, "An Introduction to XML and Web Technologies" , Pearson Education New Delhi, 2009
7. Beginning XML 4th Edition Hnter, Refter, Fawset Wiley India
8. Internet & World Wide Web How to Program, Pearson education, 3rd edition, by: H.M. Deitel, P.J. Deitel, A.B. Goldberg. 9. C. Xavier, "Web Technology & Design ", Tata McGraw Hill. 10 Ivan Bay Ross, "HTML, DHTML, Java script, Perl CGI", BPB

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B.E. (CBGS) VI SEMESTER
COMPUTER SCIENCE & ENGINERRING
(ELECTIVE – II)IMAGE PROCESSING

Course	Subject Title	Subject Code	Grade for End Sem.		CGPA at the end of every even semester
			T	P	
B.E. (CBGS)	(Elective –II) Image Processing	CS6005D	Min. "D"	Min. "D"	5.0

Unit-I:

Digital Image fundamentals: Applications of Image processing, Elements of visual perception, Image sensing and acquisition, Sampling and Quantization, Image Interpolation, Geometrical Transformation, Relationship between pixels, Mathematical Tools used in Digital Image processing.

Unit-II:

Intensity transformation and spatial filtering: Basic intensity transformation functions, Histogram based processing, Fundamental of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters, Combining Spatial Enhancement Methods, **Frequency Domain Filtering:** 2D Discrete Fourier Transform, Properties of 2D DFT, Filtering in Frequency Domain, Image Smoothing and Sharpening using frequency domain, Selective Filtering.

Unit-III:

Image Restoration and Reconstruction: Noise model, Restoration in the presence of noise only-Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear, Position-Invariant Degradations, Minimum Mean Square Error (Wiener) Filtering, Constrained Least Squares Filtering, Geometric Mean Filter.

Unit IV:

Color Image Processing: Color models, Pseudocolor Image Processing, Color Transformation, color slicing.

Image Compression: Fundamentals, Huffman Coding, Arithmetic Coding, LZW coding, Bit plane Coding, Symbol Based Coding, Block Transform Coding (walsh-Hadamard transform Discrete Cosine Transform), Wavelet Coding.

Unit-V:

Mathematical Morphology- Erosion, Dilation, Duality, Opening and closing, Hit-or-miss transformation, Boundary Extraction, Hole Filling, Extraction of Connected Components, convex Hull, Thinning, Thickening, Skeletons, Pruning.

Image Segmentation: Point, Line and Edge Detection, Thresholding, Region based Segmentation.

Reference book:

1. Rafael C. Gonzalez, Richard E. Woods "Digital Image Processing" Pearson second impression.
2. Milan Sonka and Vaclav Hlavac and Roger Boyle "Image Processing, Analysis and Machine Vision"
3. Anil Kumar Jain "Fundamental of Digital Image Processing" pearson
4. Rafael C. Gonzalez, Richard E. Woods , "Digital Image Processing Using MATLAB", Mc Graw Hill India; 2 edition

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Subject: Image Processing (CS6005 D)

Course Outcomes: after completion of course student will be able to:

CO1. Describe digital image fundamentals.
CO2. Apply image enhancement, filtering and restoration techniques.
CO3. Analyze image compression and segmentation Techniques.
CO4. Design/develop an implementation model based on various image features.

Subject: Creativity and Entrepreneurship Development (C6007)

Course Outcomes: On successful completion of the course, the students will be able to:

CO1. Demonstrate goals of entrepreneurship and exhibit different entrepreneurial traits.
CO2. Survey the market and discover the entrepreneurial motives.
CO3. Justify associated risks and benefits.
CO4. Design strategies for successful implementation of ideas

Subject: Startup (CS6008)

Course Outcomes: On successful completion of the course, the students will be able to:

CO 1. Understand the systematic process to select and screen a startup idea.
CO 2. Identify the problems with existing situations and areas of improvement.
CO 3. Estimate the capital investment, funding requirements and profitable income.
CO 4. Design/Develop an implementation model of their startup idea.