Jabalpur Engineering College, Jabalpur
(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)
(AICTE Model Curriculum Based Scheme)
Bachelor of Technology (B.Tech.) VI Semester (Computer Science & Engg.)

w.e.f. July 2017-18 batch

S.No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours Per Week			Total Credits
				Theory			Practical						
				End. Sem.	Mid Sem. Exam.	Quiz/ Assignment	End Sem.	Lab Work		L	T	P	
1	CS601	PEC	Professional Elective - I	70	20	10	-	-	100	3	1	-	4
2	CS602	OEC	Open Elective-II	70	20	10	-	-	100	3	-	-	3
3	CS603	PCC	Software Engineering	70	20	10	30	20	150	3	-	2	4
4	CS604	PCC	Machine Learning	70	20	10	30	20	150	3	-	2	4
5	CS605	PCC	Computer Networks	70	20	10	30	20	150	3	-	2	4
6	CS606	PI	Minor Project	-	-	-	60	40	100	-	-	2	1
7	CS607	MC	Summer Industrial Training	Minimum Four Weeks Duration (With Project Report). Evaluation will be done in 7th semester									
			Total	350	100	50	150	100	750	15	1	8	20
8	CS608	DLC	Self-Learning Presentation (SWAYAM/NPTEL/MOOC)	-	-	-	-	-	-	-	-	-	4
NSS/NCC/Swachhata Abhiyan/Rural Outreach				Qualifier									
Additional Course for Honours or Minor Specialization				Permitted to opt for maximum two additional courses in subject code CS608 for the award of Honours (Minor Specialization).									

Note:1 Departmental BOS will decide list of three optional subjects those are available in MOOC as well for PEC.

2 Summer Industrial training should be apart from laboratory work undertaken in the college rather it should have industrial orientation and practical aspects/field work. Report to be submitted at the beginning of 7th semester and students have to give a presentation in the departement. Evaluation will be done in 7th semester.

Professional Elective-I				List of Open Elective Course - II		
S.No.	Subject Code	Subject Name		S.No.	Subject Code	Subject Name
1	CS601A	Image Processing		1	CS602A	Wireless Sensor Networks
2	CS601B	Parallel Computing		2	CS602B	Mobile Computing
3	CS601C	Robotics		3	CS602C	Microprocessor

PEC: Professional Elective (Branch Specific), OEC: Open Elective Course (Interdisciplinary), PCC: Professional Core Course, DLC/PI: Digital Learning Courses/Project and Internship, MC: Mandatory Courses

1 hour lecture (L) = 1 credit	1 hour Tutorial (T) = 1 credit	2 hour Practical (P) = 1 credit

MOOC/DLC Courses	MOOC subjects shall be taken with permission of HOD/Coordinator

DEAN
Academic
JEC, Jabalpur (M.P.)

Principal
Jabalpur Engineering College

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CS 601 (Professional Elective - I)

Subject code	Subject Name & Title	Maximum Marks Allotted						Hours/Week			Total Credits
		Theory			Practical			L	T	P	
		End Sem	Mid Sem Exam	Quiz, Assign ment	End Sem	Lab Work	Total Marks				
CS 601A	Image Processing	70	20	10	—	—	100	3	1	0	4

Module I: Digital Image Fundamentals:
Elements of visual perception, image sensing and acquisition, image sampling and quantization, basic relationships between pixels – neighborhood, adjacency, connectivity, distance measures

Module II: Intensity transformation and filtering:
Gray level transformations, histogram equalization and specifications, pixel-domain smoothing filters – linear and order-statistics, pixel-domainsharpening filters – first and second derivative, two-dimensional DFT and its inverse, frequency, domain filters – low-pass and high-pass.

Module III: Color Image Processing:
Color Image Processing-Color models–RGB, YUV, HSI; Color transformations– formulation, color complements, color slicing, tone and color corrections; Color image smoothing and sharpening; Color Segmentation.

Module IV: 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.

Module V: Mathematical morphology:
Erosion,Dilation,Duality,Openingandclosing,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.

Suggested books:
1. Rafael C. Gonzalez, Richard E. Woods "Digital Image Processing" Pearson.
2. Milan Sonka and Vaclav Hlavac and Roger Boyle "Image Processing, Analysis and Machine Vision" Springer-Science.
3. Anil Kumar Jain "Fundamental of Digital Image Processing" pearson education.
4. Rafael C. Gonzalez, Richard E. Woods , "Digital Image Processing Using MATLAB", Mc Graw Hill India.

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CS 602 (opln Elective-II) **B. Tech. (AICTE) VI Sem. (Computer Science & Engineering)**

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		Theory			Practical			L	T	P	
		End Sem	Mid Sem Exam	Quiz, Assign ment	End Sem	Lab Work	Total Marks				
CS 602B	Mobile Computing	70	20	10	—	—	100	3	0	0	3

Module I: Signal propagation:
Propagation mechanism- reflection, refraction, diffraction and scattering, large scale signal propagation and lognormal shadowing. Fading channels-Multipath and small scale fading.
Capacity of flat and frequency selective channels. Antennas- Antennas for mobile terminal monopole antennas, PIFA, base station antennas and arrays

Module II: Multiple access schemes:
FDMA, TDMA, CDMA and SDMA. Modulation schemes- BPSK, QPSK and variants, QAM, MSK, multicarrier modulation, OFDM

Module III: Cellular concepts:
Cell structure, frequency reuse, cell splitting, channel assignment, handoff, interference, capacity, power control; Wireless Standards: Overview of 2G and 3G cellular standards, GSM, EDGE, GPRS, CDMA 2000 and WCDMA, 4G networks and LTE.

Module IV: Mobile layers:
Mobile network layer - Mobile IP – Goals – Packet Delivery – Strategies – Registration – Tunneling and Reverse Tunneling – Adhoc Networks – Routing Strategies
Mobile transport layer - Congestion Control – Implication of TCP Improvement – Mobility – Indirect – Snooping – Mobile – Transaction oriented TCP - TCP over wireless – Performance.
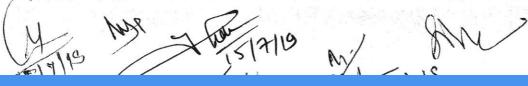
Module V: Mobile environment processing and personal area networks:
Personal Area Network: Bluetooth and ZigBee.
Mobile Databases and transaction, file system for mobile environment, Mobile agents, Security of mobile computing and transaction processing in mobile computing environment.

Suggested Books:
1. J. Schiller, "Mobile Communications", Pearson Education, Delhi.
2. Hansmann, Merk, Nicklous, Stober, "Principles of Mobile Computing", Springer.
3. PeiZheng, Lionel Ni, "Smart Phone and Next Generation Mobile Computing", (Morgan Kaufmann Series in Networking) , Elsevier.
4. Hansmann, LotharMerk, Martin Niclous, Stober, "Principles Of Mobile Computing", Dreamtech Press.
5. WCY Lee, "Mobile Communications Design Fundamentals", Prentice Hall.
6. AJ Viterbi, "CDMA: Principles of Spread Spectrum Communications", Addison Wesley.
7. VK Garg&JE Wilkes, "Wireless & Personal Communication Systems", Prentice Hall.
8. Paolo Bellavista and Antonio Corradi (Eds.), "Handbook of Mobile Middleware", Auerbach Publication.
9. Reza B'Far (Ed), "Mobile Computing Principles", Cambridge University Press.
10. ZhiNing Chen &Kwai-Man Luk, "Antennas for Base Stations in wireless communications", TMH.

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		End Sem	Mid Sem Exam	Quiz, Assign ment	End Sem	Lab Work	Total Marks				
CS 603	Software Engineering	70	20	10	30	20	150	3	0	2	4

Module 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.

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

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

Module 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.

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

Suggested books:
1. R S. Pressman ,"Software Engineering: A Practitioner's Approach", McGraw-Hill.
2. Rajib Mall, "Fundamentals of Software Engineering", 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" , Pearson Education India.
5. Pankaj Jalote. "An Integrated Approach to Software Engineering", Narosa.
6. Bernd Bruegge, Allen Dutoit: "Object-Oriented Software Engineering: Using UML, Patterns, and Java", Prentice Hall.
7. Blaha and Rumbaugh. "Object-Oriented Analysis and Modeling using UML",TMH.

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		End Sem	Mid Sem Exam	Quiz, Assign ment	End Sem	Lab Work	Total Marks				
CS 604	Machine Learning	70	20	10	30	20	150	3	0	2	4

Module I: Introduction:
Basic Concepts, Understand and Formalize the Learning Problem, Model and Parameters, Training, Validation and Test Data. Types of Learning: Supervised learning, Unsupervised Learning, Semi-Supervised Learning Reinforcement Learning and Deep Learning. Machine Learning Application Areas, Present and Future

Module II: Supervised Learning:
Classification, Linear Regression, Linear Regression of One Variable using Gradient Descent Algorithm, Linear Regressions of Multiple Variables using Gradient Descent Algorithm. Logistic Regression. Decision Trees, Ensemble Learning – Boosting – Bagging, Naive Bayes Classifier, k-Nearest Neighbors Classifier.

Module III: Unsupervised Learning:
Hierarchical Clustering, k-Means Clustering, Mixture Models, Density-Based Spatial Clustering of Applications with Noise (DBSCAN), Ordering Points to Identify the Clustering Structure (OPTICS)

Module IV: Introduction to Deep Learning:
Perceptrons, Basic Neural Network Structure, Simple Examples and Motivation for Deep Networks, Forward Propagation, Cost Functions, Error Backpropagation Algorithm, Training by Gradient Descent, Fundamental concepts of Kohonen and Grossberg Network, Convolution Neural Network, Recurrent Neural Networks, Long/Short Term Memory

Module V: Evaluation and Practical Issues in Machine Learning:
High Dimensionality, Importance of Good Features, Irrelevant and Relevant Features, Feature Pruning and Normalization, Evaluating Model Performance, Hypothesis Testing and Statistical Significance, Accuracy, Precision, Recall, Confusion Matrix, Bias Variance Ttradeoffs, Overfitting, Underfitting.

Suggested Books:
1. Stephen Marsland, "Machine Learning – An Algorithmic Perspective", CRC Press.
2. Chapman and Hall, " Machine Learning and Pattern Recognition Series", CRC Press.
3. Tom M Mitchell, "Machine Learning", McGraw Hill Education.
4. Peter Flach, "Machine Learning: The Art and Science of Algorithms that Make Sense of Data", Cambridge University Press.
5. Jason Bell, "Machine learning – Hands on for Developers and Technical Professionals", Wiley.
6. Ethem Alpaydin, "Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series)" , MIT Press.
7. Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning", MIT Press.

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		End Sem	Mid Sem Exam	Quiz, Assignment	End Sem	Lab Work	Total Marks				
CS 605	Computer Networks	70	20	10	30	20	150	3	-	2	4

Module-I: Computer Network:

Definitions, Goals, Components, Architecture, Classifications & Types. Layered Architecture: Protocol hierarchy, Design Issues, Interfaces and Services, Connection Oriented & Connectionless Services, Service primitives, Design issues & its functionality, ISO OSI Reference Model: Principle, Model, Descriptions of various layers and its comparison with TCP/IP. Network standardization. Queuing Models: Little's Theorem, Queuing System: $M/M/1$, $M/M/m$, $M/M/\infty$, $M/M/m/m$, $M/G/1$.

Module-II: Data Link Layer:

Need, Services Provided, Framing, Flow Control, Error control. Data Link Layer Protocol. Elementary & Sliding Window protocol: 1-bit, Go-Back-N, Selective Repeat, Hybrid ARQ. Bit oriented protocols: SDLC, HDLC, BISYNC, LAP and LAPB. Protocol verification: Finite State Machine Models & Petri net models.

Module-III: MAC Sub layer:

MAC Addressing, Binary Exponential Back-off (BEB) Algorithm, Distributed Random Access Schemes/Contention Schemes: for Data Services (ALOHA and Slotted ALOHA), for Local-Area Networks (CSMA, CSMA/CD, CSMA/CA), Collision Free Protocols: Basic Bit Map, BRAP, Binary Count Down, MLMA. Limited Contention Protocols: Adaptive Tree Walk, URN Protocol, High Speed LAN: Fast Ethernet, Gigabit Ethernet, FDDI, Performance Measuring Metrics. IEEE Standards 802 series & their variant.

Module-IV: Network Layer:8

Need, Services Provided , Design issues, Routing algorithms: Least Cost Routing algorithm, Dijkstra's algorithm, Bellman-ford algorithm, Hierarchical Routing, Broadcast Routing, Multicast Routing, Congestion Control Algorithms: General Principles of Congestion control, Prevention Policies, Congestion Control in Virtual-Circuit Subnets, Congestion Control in Datagram subnets. IP protocol, IP Addresses, Comparative study of IPv4 & IPv6, Mobile IP.

Module-V: Transport Layer:

Design Issues, UDP: Header Format, Per-Segment Checksum, Carrying Unicast/Multicast Real-Time Traffic, TCP: Connection Management, Reliability of Data Transfers, TCP Flow Control, TCP Congestion Control, TCP Header Format, TCP Timer Management. Session layer: Authentication, Authorization, Session layer protocol (PAP, SCP, H.245). **Presentation layer**: Data conversion, Character code translation, Compression, Encryption and Decryption, Presentation layer protocol (LPP, Telnet, X.25 packet Assembler/Disassembler). **Application Layer**: WWW and HTTP, FTP, SSH, Email (SMTP, MIME, IMAP), DNS, Network Management (SNMP). Study of internetworking devices and their configuration- Switches, Hubs, Bridges, Routers and Gateways etc.

Suggested Books:

1. Andrew S. Tanenbaum, David J. Wetherall, "Computer Networks" Pearson Education.
2. Kaveh Pahlavan, Prashant Krishnamurthy, "Networking Fundamentals", Wiley Publication.
3. Uyless Black, "Computer Networks", PHI Publication, Second Edition.
4. Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, "Computer Networks: An Open Source Approach", McGraw Hill.