

FOUR YEAR BACHELOR OF ENGINEERING (B. E.) DEGREE COURSE
SEMESTER: FIFTH
BRANCH: COMPUTER ENGINEERING

Sr. No.	Subject Code	Subjects	Workload				Credit				Marks				
			L	P	T	Total Hrs/Week	L	P	T	Total	Theory		Practical		Total Marks
											Sess.	Univ.	Sess.	Univ.	
1	BECME501T	Theory of Computation	4	-	1	5	4	-	1	5	20	80	-	-	100
2	BECME502T	Computer Architecture Organization	4	-	1	5	4	-	1	5	20	80	-	-	100
3	BECME503T	TCP/IP and Internet	4	-	1	5	4	-	1	5	20	80	-	-	100
4	BECME503P	TCP/IP and Internet Lab	-	2	-	2	-	1	-	1	-	-	25	25	50
5	BECME504T	Computer Graphics	4	-	1	5	4	-	1	5	20	80	-	-	100
6	BECME504P	Computer Graphics Lab	-	2	-	2	-	1	-	1	-	-	25	25	50
7	BECME505T	Industrial Economics and Entrepreneurship Development	4	-	-	4	4	-	-	4	20	80	-	-	100
8	BECME506P	Computer Lab -III	-	2	-	2	-	2	-	2	-	-	25	25	50
		Total	20	6	4	30	20	4	4	28	100	400	75	75	650

FOUR YEAR BACHELOR OF ENGINEERING (B. E.) DEGREE COURSE
SEMESTER: SIXTH
BRANCH: COMPUTER ENGINEERING

Sr. No.	Subject Code	Subjects	Workload				Credit				Marks				
			L	P	T	Total Hrs/W week	L	P	T	Total	Theory		Practical		Total Marks
											Sess.	Univ.	Sess.	Univ.	
1	BECME601T	System Software	4	-	1	5	4	-	1	5	20	80	-	-	100
2	BECME602T	Design and Analysis of Algorithms	4	-	1	5	4	-	1	5	20	80	-	-	100
3	BECME602P	Design and Analysis of Algorithms Lab	-	2	-	2	-	1	-	1	-	-	25	25	50
4	BECME603T	Database Management System	4	-	1	5	4	-	1	5	20	80	-	-	100
5	BECME603P	Database Management System Lab	-	2	-	2	-	1	-	1	-	-	25	25	50
6	BECME604T	Software Engineering & Project Management	3	-	1	4	3	-	1	4	20	80	-	-	100
7	BECME604P	Software Engineering & Project Management Lab	-	2	-	2	-	1	-	1	-	-	25	25	50
8	BECME605T	Functional English	2	-	1	3	2	-	1	3	10	40	-	-	50
9	BECME606P	Mini Project & Industrial Visit	-	2	-	2	-	2	-	2	-	-	25	25	50
		Total	17	8	5	30	17	5	5	27	90	360	100	100	650

Syllabus of FIFTH SEMESTER
B.E. (Computer Engineering)
R. T. M. Nagpur University Nagpur

FOUR YEAR BACHELOR OF ENGINEERING (B. E.) DEGREE COURSE
SEMESTER: FIFTH
BRANCH: COMPUTER ENGINEERING

Sr. No.	Subject Code	Subjects	Workload				Credit				Marks				
			L	P	T	Total Hrs/Week	L	P	T	Total	Theory		Practical		Total Marks
											Sess.	Univ.	Sess.	Univ.	
1	BECME501T	Theory of Computation	4	-	1	5	4	-	1	5	20	80	-	-	100
2	BECME502T	Computer Architecture Organization	4	-	1	5	4	-	1	5	20	80	-	-	100
3	BECME503T	TCP/IP and Internet	4	-	1	5	4	-	1	5	20	80	-	-	100
4	BECME503P	TCP/IP and Internet Lab	-	2	-	2	-	1	-	1	-	-	25	25	50
5	BECME504T	Computer Graphics	4	-	1	5	4	-	1	5	20	80	-	-	100
6	BECME504P	Computer Graphics Lab	-	2	-	2	-	1	-	1	-	-	25	25	50
7	BECME505T	Industrial Economics and Entrepreneurship Development	4	-	-	4	4	-	-	4	20	80	-	-	100
8	BECME506P	Computer Lab -III	-	2	-	2	-	2	-	2	-	-	25	25	50
		Total	20	6	4	30	20	4	4	28	100	400	75	75	650

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Syllabus of B. E 5th Semester Computer Engineering

BECME501T Theory of Computation

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Theory		Practical		Total Marks
											Sessional	University	Sessional	University	
1	BECME501T	Theory of Computation	4	-	1	5	4	-	1	5	20	80	-	-	100

Syllabus:

Unit I:

Strings, Alphabet, Language operations, Finite state machine definitions, Finite automation model, Acceptance of strings and language, Non deterministic finite automation, Deterministic finite automation, Equivalence between NFA and DFA, Conversion of NFA into DFA, Minimization of FSM, Equivalence between two FSM's Moore and Mealy machines

Unit II:

Regular sets, Regular expressions, Identity rules, Manipulation rules, Manipulation of regular expressions, Equivalence between RE and FA, Inter conversion, Pumping lemma, Closure properties of regular sets, Chomsky hierarchy of languages, Regular grammars, Right linear and left linear grammars, Equivalence between regular linear programming and FA, Inter conversion between RE and RG.

Unit III:

Context free grammar, Derivation trees, Chomsky normal form, Greibach normal form, Push down automata, Definition, Model acceptance of CFL, Equivalence of CFL and PDA, Inter conversion, Closure properties of CFL(Proofs omitted),Pumping Lemma of CFL, Introduction of DCFLL and DPDA

Unit IV:

Turing Machine: Definition, Model of TM, Design of TM, Universal Turing Machine, Computable function, Recursive enumerable language, Types of TM's, Linear bounded automata and Context sensitive language, Counter machine

Unit V:

Decidability and Undecidability of problems, Properties of recursive & recursively enumerable languages, Halting problems, Post correspondence problem, Ackerman function, and Church's hypothesis.

Unit VI:

Recursive Function: Basic functions and operations on them, Bounded Minimalization, Primitive recursive function, μ -recursive function, Primitive recursive predicates, Mod and Div functions, Unbounded Minimalization, Equivalence of Turing Computable function and μ -recursive function.

Text Books:

1. Introduction to Theory of Computation 2nd Edition, by Sipser, Cengage publications
2. Introduction to Automata Theory, Languages and Computation by J. E. Hopcraft,R. Motwani, J. D Ullman, second Edition, Pearson Education, Aisa

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2. An Introduction to Formal Languages and Automata by Peter Linz
3. Introduction to Languages and the theory of Automata by John Martin, Third Edition(TMH)

Reference Books:

1. Theory of Computer Science, Automata, Languages and Computation by K. L. P. Mishra and N. Chandrasekaran, Third Edition, PHI Learning.
2. Elements of Theory of Computation by Lewis H.P and Papadimition C.H.

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BECME502T Computer Architecture Organization

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Theory		Practical		Total Marks
											Sessional	University	Sessional	University	
1	BECME502T	Computer Architecture Organization	4	-	1	5	4	-	1	5	20	80	-	-	100

Syllabus:

Unit I: Computer Evaluation and Arithmetic

A Brief History of computers, Designing for Performance, Von Neumann Architecture, Computer Components, Interconnection Structures, Bus Interconnection, Scalar Data Types, Fixed and Floating point numbers, Signed numbers, Integer Arithmetic, 2's Complement method for multiplication, Booths Algorithm, Hardware Implementation, Division, Restoring and Non Restoring algorithms, Floating point representations, IEEE standards, Floating point arithmetic.

Unit II: Processor Design

Machine Instruction characteristics, types of operands, types of operations, Addressing, Instruction formats, Processor organization, Register Organization, Instruction cycles, Instruction pipelining, ALU – Combinational ALUs and Sequential ALUs, RISC Architecture.

Unit III: Control Design

Single Bus Organization, Control Unit Operations: Instruction sequencing, Micro operations and Register Transfer. Hardwired Control : Design methods – State table and classical method, Design Examples - Multiplier CU. Micro-programmed Control: Basic concepts, Microinstructions and micro- program sequencing

Unit IV: Memory Organization

Characteristics of memory systems, Internal and External Memory, Types of memories: ROM, PROM, EPROM, EEPROM, RAM, SRAM, DRAM, SDRAM, RDRAM High-Speed Memories: Cache Memory, Organization and Mapping Techniques, Virtual Memory: Main Memory allocation, Segmentation, Paging, Address Translation. Secondary Storage: RAID, Optical memory, CDROM, DVD,USB-1.1,2.0 and 3.0.

Unit V: I/O Organization

Input/Output Systems, Programmed I/O, Interrupt Driven I/O, I/O channels, Direct Memory Access (DMA), Buses and standard Interfaces: Synchronous, Asynchronous, Parallel, Serial, PCI, SCSI, USB Ports Working mechanisms of Peripherals: Keyboard, Mouse, Scanners, Video Displays, Touch Screen panel, Dot Matrix, Desk-jet and Laser Printers.

Unit VI: Parallel Organizations

Superscalar Processors, Multiple Processor Organizations, Symmetric Multiprocessors, Clusters, Non-uniform Memory Access , Vector Computations, Bus allocation Schemes. RISC: Instruction execution characteristics, use of large register file, compiler based register optimization, RISC architecture, pipelining. RISC vs. CISC

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Text Books:

1. W. Stallings, "Computer Organization and Architecture: Designing for performance", 6th Edition, Prentice Hall of India, 2003, ISBN 81 – 203 – 2103 – 0
2. J. P. Hays, "Computer Architecture and Organization", 2nd Edition, McGraw-Hill, 1988 ISBN 0 – 07 – 100479 – 3
3. C. Hamacher, V. Zvonko, S. Zaky, "Computer Organization", McGraw Hill.

Reference Books:

1. William Stallings, "Computer Organization and Architecture: principles of structure and function", 2nd Ed, Maxwell Macmillan Editions, 1990 ISBN 0 – 02 – 946297 – 5 (Chapter: 2,3,4,5,7,8,9,10,11,12,13,14).
2. A. Tanenbaum, "Structured Computer Organization", 4th Ed, Prentice Hall of India, 1991 ISBN 81 – 203 – 1553 – 7 (Chapter: 1,4,5,6,8).
3. G. George, "Computer Organization: Hardware and Software", 2nd Edition, Prentice Hall of India, 1986 (Chapter: 3,4,5).
4. D. Paterson, J. Hennesy, "Computer Organization and Design: The Hardware Software Interface", 2nd edition, Morgan Kauffman, 2000 ISBN 981 – 4033 – 588.

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BECME503T TCP/IP and Internet

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Theory		Practical		Total Marks
											Sessional	University	Sessional	University	
1	BECME503T	TCP/IP and Internet	4	-	1	5	4	-	1	5	20	80	-	-	

Syllabus:

Unit 1:

Introduction & Overview: Comparison of OSI & TCP/IP model, Internetworking concepts & architecture model, NAP, ISP, RFC, Internet standards, Internet Backbone, Underlying Technologies: Wired LAN, Wireless LAN'S, Point-to-point WAN'S, Switched WAN'S.

Unit 2:

Internet Protocols: IPV4 Address: Classful, Classless, CIDR, Special address, NAT, Delivery & forwarding of IP Packets, IP Datagram, Fragmentation, ARP, RARP. IPV6 Address: Addressing, Packet Format, Transition from IPV4 to IPV6.

Unit 3:

Internet Control Message Protocols: ICMPv4, ICMPV6. **Routing Protocols:** RIP, OSPF & BGP.

Unit 4:

Mobile IP: Addressing, agents, phases, problems in Mobile IP, Multicasting & multicast routing protocols: IGMP, MOSPF, DVMRP and CBT.

Unit 5:

Transport Layer Protocol Services: UDP: Services, Congestion control, Encapsulation & De-capsulation, Multicasting & De-multicasting, and Application. TCP: Services, Features, Segment Format, TCP Connection State Transition Diagram, Windows in TCP, Flow control, Error control, Congestion Control, TCP timer's option, SCTP. Socket concepts and Socket programming.

Unit 6:

Auto Configuration & Applications: DHCP, DNS, Telnet, SSH, FTP, TFTP, HTTP and Electronic Mail: SMTP, POP3, MIME, and IMAP.

Text Book:

1. TCP/IP & Protocol Suite, 4th Edition by Behrouz A. Forouzan, TMH Publication.
2. Computer Networking Essential, Debra LittleJohn Shinder, Cisco Press.

Reference Books:

1. Internetworking with TCP/IP principles, Protocol & Architecture by Douglas E. Comer, PHI Publication
2. An Engineering approach to Computer Networking by Srinivasan. Keshav, Pearson education
3. Design and Analysis of Communication Networks By V. Ahuja , McGraw Hill Publication
4. Cisco TCP/IP Routing Professional Reference Third Edition, by Chris Lewis, Cisco Press

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Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Theory		Practical		Total Marks
											Sessional	University	Sessional	University	
1	BECME503P	TCP/IP and Internet Lab	-	2	-	2	-	1	-	1	-	-	25	25	50

BECME503P TCP/IP and Internet Lab

Syllabus:

Practicals Based on Syllabus of **BECME503T**

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BECME504T Computer Graphics

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Theory		Practical		Total Marks
											Sessional	University	Sessional	University	
1	BECME504T	Computer Graphics	4	-	1	5	4	-	1	5	20	80	-	-	100

Syllabus:

Unit I:

Geometry and line generation: points, lines, planes, pixels and frames buffers, types of display devices and its architecture DDA and Bresenham's algorithms for line generation, Bresenham's algorithm for circle, ellips generation, aliasing, anti-aliasing and its techniques.

Unit II:

Graphics primitives: Display files, algorithms for polygon generation, polygon filling algorithms: Simple ordered Edge list, Edge fill, Fence fill, Edge flag, Seed fill, Scan line Seed fill, NDC (normalized device co-ordinates).

Unit III:

Segment tables: operations on segments, data structures for segments and display files, Windowing and clipping: window, viewport, viewing transformations, clipping line : Cohen-Sutherland, Cyrus-Beck, Mid-point subdivision and Polygon clipping(Sutherland- Hodgeman)

Unit IV:

2D transformations: scaling, rotation, translation, rotation about arbitrary point, reflections, shearing. 3D

Graphics: 3D Transformation, parallel, perspective and isometric projections, 3D Transformations.

Unit V:

Hidden surfaces and line removal: Painter's, Z-buffer, Warnock's, Back-face Removal algorithm, Curves and surfaces: Methods of interpolation, Bezier and B-splines, surface rendering methods: Gouraud Shading, Phong Shading, Constant Intensity Shading, Fast Shading.

Unit VI:

Color Models and Color Application: Properties of light, standard primaries, chromaticity Diagram, Intuitive color concept RGB, YIQ CMY, HSK, color models & their conversion, color selection & applications. Animation: Design of Animation sequences, animation Function, Raster animation, animation language, Key-Frame System, motion Specification.

Text Books:

1. Procedural elements for computer graphics by David F. Rogers, Mc-Graw Hill.
2. Computer Graphics 'C' Version, Second Edition By Donald Hearn & M.Pauline Baker. Pearson publication
3. Mathematical elements for computer graphics by David Rogers and J. Alan Adams. Tata Mcgraw Hill Education Private Limited
4. Computer graphics principles and practice by Foley, Vandam, Feiner & Huges Addison Wesley
5. Principles of interactive computer graphics by Newman & Sproul.

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BECME504P Computer Graphics Lab

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Theory		Practical		Total Marks
											Sessional	University	Sessional	University	
1	BECME504P	Computer Graphics Lab	-	2	-	2	-	1	-	1	-	-	25	25	50

Syllabus:

Practical based on Syllabus of BECME504T

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BECME505T Industrial Economics and Entrepreneurship Development

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Theory		Practical		Total Marks
											Sessional	University	Sessional	University	
1	BECME505T	Industrial Economics and Entrepreneurship Development	4	-	-	4	4	-	-	4	20	80	-	-	100

Syllabus:

Unit I :

Industrial economics, Types of Business structures, top and bottom line of the organization, economic analysis of business, economics of operations, economic prudence in business.

Unit II:

Market structures- Monopoly, Oligopoly, and Monopolistic competition. Pricing strategies, business integration-forward backward integration, economies of scale, diseconomies of scale, liberalization, privatization and globalization. Business cycles, optimum size of firm.

Unit III:

The functions of central bank and commercial banks, Foreign Direct Investment, Free trade vs. Protectionism, Capital formation, Inflation, Recession and stagnation, Inclusive growth, Public-Private partnership for development, Multiplier effect, Accelerator effect.

Unit IV:

Entrepreneurship meaning, Major Motives Influencing an Entrepreneur, Factors Affecting Entrepreneurial Growth. Project Formulation, Product development, Market Survey and Research, Demand forecasting techniques, Techno Economic Feasibility Assessment – Preparation of Preliminary Project Reports – Project Appraisal – Sources of Information – Classification of Needs and Agencies.

Unit V:

Need – Sources of Finance, Term Loans, Capital Structure, venture capital. Angel funding, Financial Institution, management of working Capital, Costing, Break Even Analysis, Network Analysis Techniques of PERT/CPM – Taxation – Direct, Indirect Taxes.

Unit VI:

Sickness in small business, Major problems faced by SSIs, Foreign Direct Investments and threat to SSI, Technical consultancy organizations, safeguard measures against variation in currency value, Government Policy for Small Scale Enterprises, tax holidays, and incentives to SSIs.

TEXT BOOKS

1. Industrial Economics. By, Ranjana Seth, Ane Book Pvt Ltd.

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2. Modern Economic Theory By, K.K. Dewett. S.Chand.
3. Industrial Economics. By, Jagdish Sheth, Pearson Publication.
4. “Entrepreneurial Development” By, S.S.Khanka S.Chand & Co. Ltd. Ram Nagar New Delhi, 1999.
5. Hisrich R D and Peters M P, “Entrepreneurship” 5th Edition Tata McGraw-Hill, 2002.
6. Management of Entrepreneurship. By, N.V.R. Naidu, I.K. International Pvt Ltd.
7. Entrepreneurial Development. By, S.Anil Kumar. New Age International.
8. Small- Scale Industries and Entrepreneurship, By, Dr. Vasant Desai, Himalaya Publication.

REFERENCE BOOKS:

1. Business Economics. By, K.Rajgopalchar. Atalantic Publishers.
2. Microeconomics. By, Robert Pindyk
3. Business Economics. By, H.L. Ahuja,H. L. Ahuja,Louis Prof. De Broglie. S.Chand.
4. Rabindra N. Kanungo “Entrepreneurship and innovation”, Sage Publications, New Delhi, 1998.
5. Financing Small Scale Industries in India, By, K.C.Reddy.Himalaya Publication.

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BECME506P Computer Lab -III

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Theory		Practical		Total Marks
											Sessional	University	Sessional	University	
1	BECME506P	Computer Lab -III	-	2	-	2	-	1	-	1	-	-	25	25	50

Syllabus

Practicals should be performed based on **Core and Advance Java**. Sample List is provided.

1. A) Write a program to sort 'n' numbers pass through command line. Use user defined array to store command line argument and print sorted data.
1. B) Write a program to multiply two matrices which are auto-initialized in class, print the resultant matrix in matrix form.
2. A) Write a program to perform multiplication of TWO Matrices using interactive input.
2. B) Write a Program to calculate the trace of a matrix using interactive input.
3. A) Create a class Stack and implement all stack related operations such as push (), pop (), peep (), change ().
3. B) Write a program to implement all operations related with circular queue.
4. Design a class College with data members name, year, branches and method cprint(). Derive a class Employee from College having data members e_id,e_name,e_add and basic_pay, and methods getData(), eprint() and calSalary() to calculate salary of employee. Design an Employee Array to demonstrate the use of above classes for 5 employees.
5. Write a program to implement Abstract class Shape with one abstract method area() and one non static method show(). Create class Triangle, Rectangle and Circle extending abstract class Shape to calculate its area.
6. Design an interface Shape with abstract methods area() and volume(). Create class Cube and Sphere implementing interface Shape to calculate area and volume of cube and sphere.
7. Create package Comp containing Complex class having proper Complex Constructor. Create another package ComplexCal with CompC class extending the features of Complex class which contain suitable methods for performing addition and subtraction of TWO Complex Objects. Similarly create Dist package with Distance class having proper constructor. Create another package DistanceCal with DistD class extending the features of Distance class to perform addition and subtraction of TWO Complex objects. Design class CompDistDemo to demonstrate the use of all above classes and packages.
8. Write a Database application that allows user to Insert, Update, Delete values in a Table and manages appropriate exception Handling when wrong values are entered.
9. Design class StringT with methods getString() & putString(). Derive class String manipulator with methods countchar, countvowel & Encrypt.Encrypt will apply Caesar cipher using circular shift. Demonstrate all above classes & object in class stringDemo.
10. Write an HTML page which inputs the below mentioned fields and invoke the java servlet program which enters the fields in the database table Fields: Roll_ no ,Name , Department , Email_ id, Mobile_no.
11. Write an **Applet program** to draw a ball at the center of Applet window of **size 40*40** and **configure** the color of the ball through the parameters passed from the **HTML file**.
12. Write a program that implements a simple client/server application. The client sends data to a server the server receives the data,uses it to produce a result and then sends the result back to the client.The client

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displays the result on the console. For ex the data send from the client is a numbers and the result produce by the server is the addition of that number.

13. Develop an application of online songs library through which user can make search of a song by different category like movie name, singer name, actor, actress, year etc... Make suitable assumption in design with brief description .Develop using JSP.
14. Create a Java Bean to store information about person. The details of person (person name, person age, person height, etc.) are stored in person database table. After the person is authenticated, his/her personal details are transferred from the database table (person) to Java Bean (Person) and the details are displayed in proper format using this Person Java Bean. The Java Bean is stored in session scope. Use MVC architecture for this purpose.
15. Develop an application using JSP and JDBC to receive user name and password from client and validate it using the data from the data base.

Syllabus of SIXTH SEMESTER
B.E. (Computer Engineering)
R. T. M. Nagpur University Nagpur

FOUR YEAR BACHELOR OF ENGINEERING (B. E.) DEGREE COURSE
SEMESTER: SIXTH
BRANCH: COMPUTER ENGINEERING

Sr. No.	Subject Code	Subjects	Workload				Credit				Marks				
			L	P	T	Total Hrs/W week	L	P	T	Total	Theory		Practical		Total Marks
											Sess.	Univ.	Sess.	Univ.	
1	BECME601T	System Software	4	-	1	5	4	-	1	5	20	80	-	-	100
2	BECME602T	Design and Analysis of Algorithms	4	-	1	5	4	-	1	5	20	80	-	-	100
3	BECME602P	Design and Analysis of Algorithms Lab	-	2	-	2	-	1	-	1	-	-	25	25	50
4	BECME603T	Database Management System	4	-	1	5	4	-	1	5	20	80	-	-	100
5	BECME603P	Database Management System Lab	-	2	-	2	-	1	-	1	-	-	25	25	50
6	BECME604T	Software Engineering & Project Management	3	-	1	4	3	-	1	4	20	80	-	-	100
7	BECME604P	Software Engineering & Project Management Lab	-	2	-	2	-	1	-	1	-	-	25	25	50
8	BECME605T	Functional English	2	-	1	3	2	-	1	3	10	40	-	-	50
9	BECME606P	Mini Project & Industrial Visit	-	2	-	2	-	2	-	2	-	-	25	25	50
		Total	17	8	5	30	17	5	5	27	90	360	100	100	650

R.T.M.N.U Nagpur
Syllabus of B.E 6th Semester Computer Engineering

BECME601T System Software

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Theory		Practical		Total Marks
											Sessional	University	Sessional	University	
1	BECME601T	System Software	4	-	1	5	4	-	1	5	20	80	-	-	100

Syllabus:

UNIT I: System Software and Assemblers:

Definition, Components of system software, Evolution of system software, Language translators, Machine Structure, Machine Language, And Assembly Language instructions, Assemblers ,Structure of an assembler, Design of two pass assembler and Single Pass assembler Table\of incomplete instruction, back patching. Data structures used for design of assembler, Design and Implementation of two pass assembler, Error handling and Symbol Table management , Handling constants, literals, labels and Procedures, One pass assembler design and comparison with two pass assembler design, Cross assembler.

UNIT II: Macro processor

Macro language and macro processor, macro instructions, features of macro facility, macro instruction arguments, conditional macro expansion, macro call within macros, macros instructions defining macros, Implementation.

UNIT III: Linkers and Loaders:

Basic Loader functions, Loader schemes, “Complier and go” Loaders, general Loader scheme, absolute loaders, subroutine linkages, relocating loaders, direct linking loaders, other loader schemes Binders, linking loaders, Overlays, Dynamic Binders, Design of an absolute Loaders, Design of a Direct – Linking loaders.

UNIT IV: Compiler:

Basic Compiler Function Compiler phases - Lexical Analysis – NFA and DFA, Syntax analysis Grammars, Introduction to Top down v/s bottom up parsing, Semantic Analysis and SDT and dependency trees Intermediate code generation –three address code intermediate code forms, Compiler-Compilers. Compiler generation tools – LEX and YACC. Interpreters.

UNIT V: Unix Device Drivers:

Definition, Anatomy and types, Device Programming, Installation and Incorporation of driver routines, Basic device driver operation, Implementation with Line printer, Comparative study between device drivers for Unix and Windows.

UNIT VI: Case study of Intel®64 and IA-32 Processors

Basic architecture, notational conventions, brief history of Intel® 64 and IA-32 Architecture, Intel NetBurst® Micro-architecture, specific advances. Basic execution environment: Modes of operation, overview of the basic execution environment, memory organization, basic program execution registers, instruction pointer, operand-size and address-size attributes, operand addressing.

Text Books:-

1. System Programming by John J. Donovan, TATA McGRAW-HILL Edition.
2. System Programming by Leland Beck, Pearson Ed.
3. D. M. Dhamdere : “Systems programming and operating system”, Tata McGraw Hill
4. Unix device drives by George Pajani, Pearson Education.

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Reference Books: -

1. Device Drives for Windows by Norton, Add Wesley.
2. Intel®64 and IA-32 Architectures Software Developer's Manual Volume1: Basic Architecture.
3. The Intel Microprocessors 8086 / 8088, 80186 / 80188, 80286,80386,80486, Pentium and Pentium PRO Processor by Barry B. Brey, 4th Edition, Prentice- Hall.

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BECME602T Design and Analysis of Algorithms

	Subject Code	Subject	Workload				Credit				Marks				
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Theory		Practical		Total Marks
											Sessional	University	Sessional	University	
1	BECME602T	Design and Analysis of Algorithms	4	-	1	5	4	-	1	5	20	80	-	-	100

Syllabus:

Unit I:

Introduction to Iteration, Design Issues, Use of Loops, Efficiency of Algorithms, Estimating & Specifying Execution Times, Order Notations, Algorithm Strategies, Mathematical foundations, summation of arithmetic and geometric series, bound summations using integration, Design using Recursion.

Unit II:

Asymptotic notations of analysis of algorithms, analyzing control structures, worst case and average case analysis, amortized analysis, sorting algorithms such as selection sort, insertion sort, bubble sort, heap sort, External Sorting, lower bound proof, elementary and advanced data structures with operations on them and their time complexity.

Unit III:

Greedy method – Basic strategy, application to job sequencing with deadlines problem, minimum cost spanning trees, single source shortest path.

Divide and conquer - Basic strategy, binary search, Quick sort, Merge sort, Fast Fourier Transform.

Unit IV:

Dynamic Programming - Basic strategy, multistage graphs, all pair shortest path, single source shortest paths, optimal binary search trees, traveling salesman problem.

Unit V:

Basic Traversal and Search Techniques, breadth first search, connected components, Backtracking basic strategy, 8 – Queen’s problem, Graph coloring, Hamiltonian cycles.

Unit VI:

NP-hard and NP -complete problems, basic concepts, non deterministic algorithms, NP-hard and NP complete, Cook’s Theorem, decision and optimization problems, polynomial reduction.

TEXT BOOKS

1. “Fundamentals of Computer Algorithms”, Horowitz, Sahani, Rajsekharan, Galgotia Publications.

REFERENCE BOOKS

1. “Introduction to Algorithms”, Thomas H. Cormen , 3rd Edition, Prentice Hall of India.
2. “Fundamentals of Algorithms”, Brassard and Bratley, Prentice Hall.
3. “Analysis and Design of Computer Algorithms”, A.V. Aho, J. E. Hopcroft, J.D. Ullman, Addison Wesley.
4. “Foundations of Algorithms”, Shailesh R Sathe, Penram.
5. “Design and Analysis of Algorithms”, Dave and Dave, Pearson Education.

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BECME602P Design and Analysis of Algorithms Lab

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Theory		Practical		Total Marks
											Sessional	University	Sessional	University	
1	BECME602P	Design and Analysis of Algorithms Lab	-	2	-	2	-	1	-	1	-	-	25	25	50

Syllabus:

Practical Based on Syllabus of BECME602T

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BECME603T Database Management System

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Theory		Practical		Total Marks
											Sessional	University	Sessional	University	
1	BECME603T	Database Management System	4	-	1	5	4	-	1	5	20	80	-	-	100

Syllabus:

UNIT I: Introduction to Database Systems

Database Systems: Significance and advantages, Types of Databases, Limitations of File processing system, the DBMS Environment, Data Abstraction, Data Independence, DBMS Architecture, Functions of DBMS, Formal relational query languages: Relational Algebra, Tuple Relational calculus, Domain Relational Calculus.

UNIT II: Relational Database Manipulation

Introduction to SQL: SQL Data Definition, Basic Structure of SQL Queries, Set Operations, Null values, Aggregate functions, Nested Sub-queries, Modifications of the Databases Intermediate SQL: Join Expressions, Views, Integrity Constraints, SQL Data types and Schemas, Authorization. Advanced SQL: Dynamic SQL and Embedded SQL, PL/SQL Functions and Procedures,. QUEL: data definition, data manipulation, embedded data manipulation language. QBE: Basic data retrieval, aggregation, categorization, updates.

UNIT III: Data Models and Relational Database Design

Evolution of Data Models, Entity Relationship Model, Development of ER Diagrams, Extended Entity Relationship Model. Relational model: Logical View of Data, Keys, Integrity Rules, Relational set operators, Data Dictionary and System Catalog, Indexes, Codd's Relational Database Rules. Normalization of Database Tables: Need and Significance, the normal forms - 1NF, 2NF, 3NF, BCNF, 4NF, 5NF, normalization & database design, renormalization.

UNIT IV: Query Processing and Query Optimization

Overview of Query Processing, Measures of Query cost, Selection Operation, Sorting, Join Operation, Other Operations, and Evaluation of Expressions. Overview of Query Optimization, Transformation of Relational Expressions, Estimating Statistics of Expression results, Choice of Evaluation Plans, Materialized Views

Unit V: Transaction Management & Concurrency Control

Transactions: Concept, Transaction Model, Transaction atomicity and Durability, Transaction Isolation, Serializability, Transaction Isolation Levels and Implementations. Concurrency Controls: Lock Based Protocol, Deadlock Handling, Time-stamp Based Protocols, and Validation Based Protocols. Recovery : Failure Classification, Log Based Recovery, Advanced Recovery Techniques.

UNIT VI: Distributed Database

Introduction, data distribution, object naming, distributed query processing, consistency, concurrency control, distributed commitment and recovery, deadlocks, security and protection in DDBMS, homogenous and heterogeneous systems.

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Text Books:

1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan, Database System Concepts, 6th Edition, McGraw Hill (SIE), 2013.
2. Desai Bipin, Introduction to Database System, Galgotia Publications, 2003

Reference Books:

1. Alexis Leon and Mathews Leon, Database Management Systems, Vikas Publishing, 2008.
2. Ramez Elmasri and Shamkant Navathe, Database Systems - Models, Languages, Design and Application Programming, 6th Edition, Pearson Education, 2009.
3. Carlos Coronel, Steven Morris and Peter Rob, Database Principles – Fundamentals of Design Implementation and Management, 9th Edition, Cengage Learning, 2013.
4. Hector-Garcia Molina, Jeffrey Ullman and Jeniffer Widom, Database Systems – the Complete Book, 2nd Edition, Pearson Education, 2014.

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BECME603P Database Management System Lab

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Theory		Practical		Total Marks
											Sessional	University	Sessional	University	
1	BECME603P	Database Management System Lab	-	2	-	2	-	1	-	1	-	-	25	25	50

Syllabus

Practicals based on syllabus of **BECME603T**

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BECME604T Software Engineering & Project Management

Sr. No.	Subject Code	Subject	Workload				Credit				Marks					
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Theory		Practical		Total Marks	
											Sessional	University	Sessional	University		
1	BECME604T	Software Engineering & Project Management	3	-	1	4	3	-	1	4		20	80	-	-	100

Syllabus:

Unit I: Introduction to Software Engineering

Evolving role of software, software characteristics, software myths, Software Process, Software Engineering, Software process, software development phases, Process Models: Waterfall Model, Prototype model, RAD model, Evolutionary Models: Incremental model, Spiral Model, WINWIN spiral model, Concurrent, Agile Process models: Agile process, Extreme programming.

Unit II: Requirements Engineering

System Engineering: Hierarchy, Business Process and Product Engineering: Overview, Requirements Engineering, Initiating the process, Eliciting Requirements, Building the Requirements Model, Negotiating, Validating requirements, Requirements Analysis, Scenario-Based Analysis, Requirements Modeling strategies, Flow-Oriented Modeling, Class based modeling, SRS.

Unit III: Design Engineering

Design Process, Design Principles, and Concepts, Effective Modular design, The Design Model: Data, Architectural, and Interface Design.

Architectural Design: Software Architecture, Architectural Styles, Architectural Design, User Interface Design: Rules, User Interface Analysis and Design, Applying Interface Design Steps, Issues, Component- level Design.

Unit IV: Testing

Testing Tactics: Testing Fundamentals, White Box Testing: Basis Path Testing, Control Structure Testing, Black Box Testing.

Testing Strategies: A Strategic approach to Software Testing, Strategic Issues, Testing Strategy for Conventional Software: Unit Testing, Integration Testing, Validation Testing, Debugging.

Unit V: Project Management Concepts

Management Spectrum: people, product, process, project, Critical practices, Process and project

Metrics: Metrics in process and project domains, software measurement, metrics for software quality, Estimation for software project: project planning objectives, software scope and feasibility, resources, Decomposition Techniques, Empirical Estimation Models, Specialized Estimation techniques, Make by decision.

Unit VI: Project Planning

Risk Management: Reactive versus Proactive Software Risk, Risk Identification, Risk projection, Risk refinement, Risk mitigation, monitoring & management, The RMMM plan.

Project Scheduling: Task set for software project, defining a task network, scheduling, earned value analysis, Software Quality: Software Quality Factors, Software Quality Assurance (SQA) : SQA Activities, Software reviews, FTR, Software reliability, Software configuration management: software configuration management, the SCM Repository, SCM process.

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Text Books:

1. Pressman R., "Software Engineering, A Practitioners Approach", 5th Edition, Tata MCGraw Hill Publication.
2. Pressman R., "Software Engineering, A Practitioners Approach", 7th Edition, Tata MCGraw Hill Publication.

Reference Books:

1. Mall R., "Fundamentals of Software Engineering", Second Edition, Prentice Hall India, 2004, ISBN 81 -203-2445-5
2. Vliet H., "Software Engineering Principles and Practices", Second Edition, John Wiley and Sons, ISBN 9971-51-357-9
3. Sommerville "Software Engineering" 8th Edition, Person Education
4. Behfarooz A:, Hudson F., "Software Engineering Fundamentals", Oxford University Press, 2002, ISBN 0-19-510539-7

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BECME604P Software Engineering & Project Management Lab

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Theory		Practical		Total Marks
											Sessional University	Sessional University			
1	BECME604P	Software Engineering & Project Management Lab	-	2	-	2	-	1	-	1	-	-	25	25	50

Syllabus:

Practicals based on syllabus of **BECME604T**.

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BECME605T Functional English

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Theory		Practical		Total Marks
											Sessional	University	Sessional	University	
1	BECME605T	Functional English	2	-	1	3	2	-	1	3	10	40	-	-	50

Syllabus:

Unit 1. Functional Grammar: (4 Hours) (3+3+4=10)

Common errors, Transformation of Sentences, Phrases, Idioms & Proverbs. [50 sentences of common errors, 50 examples of Transformation of Sentences, (5 each type), 50 noun/prepositional phrases, 50 idioms/proverbs]

Unit II. English for Competitive Exams & Interview Techniques: (6 Hours) (3+3+4=10)

IPA (vowel & consonant phonemes), Word building [English words /phrases derived from other languages), Technical Jargons, Synonyms/Antonyms, Analogies, Give one word for, Types & Techniques of Interview Assignment :[25 Words for teaching IPA, 25 words/phrases of foreign origin, 25 technical jargons, 25 words for Synonyms/ Antonyms, 25 words for Analogies, 50 examples of give one word for]

Unit III

(A) Formal Correspondence (4 Hours) (5X2=10)

Business Letters, Technical Report Writing, Writing Resumes, e-mail etiquettes [Orders, Complaints, Enquiries, Job applications & Resume Writing, Writing Memoranda]

(B) Analytical comprehension: (4 Hours)

[Four fictional & four non-fictional unseen texts]

Unit IV. Technical & Scientific Writing: (4 Hours) (5X2=10)

Writing Reviews, Features of Technical Writing, Writing Scientific Projects, Writing Research papers. Assignment: (Any one project/review as assignment)

Total number of periods required = 22 for each Branch of Engineering

Reference Books:

1. Effective technical Communication by Barun K. Mitra, Oxford University Press,
2. *Technical Communication-Principles and Practice* by Meenakshi Raman & Sharma, Oxford University Press, 2011, ISBN-13-978-0-19-806529-
3. *The Cambridge Encyclopedia of the English Language* by David Crystal , Cambridge University Press
4. *Contemporary Business Communication* by Scot Ober , Published by Biztantra,
5. *BCOM- A South-Asian Perspective* by C.Lehman, D. DuFrene & M. Sinha, Cenage Learning Pvt. Ltd.2012
6. *Business English*, by Dept of English, University of Delhi, Published by Dorling Kindersley (India), Pvt .Ltd.,2009, ISBN 978 81 317 2077 6
7. *How to Prepare a Research Proposal: Guidelines for Funding and Dissertations in the Social and Behavioral Sciences* by Krathwohl & R David
8. *Technical Writing- Process and Product* by Sharon J. Gerson & Steven M. Gerson, 3rd edition, Pearson Education Asia, 2000
9. *Developing Communication skills* by Krishna Mohan & Meera Banerjee

EVALUATION PATTERN:

Internal Examination: Weightage = 10 marks

Written Examination: 05 marks

Project Seminar : 05 marks

External Examination: Weightage = 40 marks

Question pattern for end semester examination

Unit No	Q. No	Question type	No. of Questions	Weightage
Unit 1	1(A)	objective	3 out of 5	3+3+4=10
	1(B)	objective	3 out of 5	
	1(C)	objective	4 out of 6	
Unit 2	2 (A)	objective	3 out of 5	3+3+4=10
	2(B)	objective	3 out of 5	
	2(C)	subjective	1 (no choice)	
Unit 3 &	3 (A)	Subjective	1 set (out of 2 sets)	5
Unit4	3(B)	subjective	1(no choice)	5
Unit 5	4(A)	subjective	1 out of 2	5
	4(B)	subjective	1 out of 2	5

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BEIT606P

Mini Project & Industrial Visit

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Theory		Practical		Total Marks
											Sessional	University	Sessional	University	
1	BECME606P	Mini Project & Industrial Visit	-	2	-	2	-	2	-	2	-	-	25	25	50

Syllabus:

Course Objective:

1. To develop an understanding of applications in real life
2. To develop research skills of students
3. To help the students in exploring career opportunities in their areas of interest
4. To give an insight into the overall functioning of the organizations where students visited
5. To develop Industry Institute Interaction
6. To provide means to immerse students in actual supervised professional experiences

Constraints:

1. Students shall work in groups of 4-5 each and work on small application or research based / Industry Oriented real time problems.
2. Local Mentor and Industry mentor shall work in coordination
3. Industry visit should be planned to explore students about real time problems
4. Students shall work on providing solutions to identified problems
5. Detailed reports are expected to be submitted at the end using Standard Technical Writing Tool
6. Evaluation should be done based on feedback of Local and Industry Mentor

Expected Outcome:

1. Real Time Problem Identification
2. Requirement analysis and identification of relevant data sources
3. Literature survey / Industrial survey
4. Overall Project development as per the phases of SDLC