DEPARTMENT OF TECHNOLOGY,
SHIVAJI UNIVERSITY KOLHAPUR
SECOND YEAR B.TECH

Scheme of Teaching and Examination:Semester- III**(Computer Science and Technology)**

Subject Code	Subject	Teaching Scheme with Credits (Hours / Week)				Examination Scheme (Marks)					
						Theory			Practical		
		L	T	P	Total Credits	Scheme	Max. marks	Min. Passing	Scheme	Max. marks	Min. Passing
MA211	Engineering Mathematics-III	3	1	-	04	CIE	50	20	IOE	50	20
						SEE	50	20	-	-	-
CS211	Discrete Mathematical Structure	3	1	-	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
CS212	Digital System and Microprocessor	4	-	-	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
CS213	Data Structures with C	3	1	-	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
CS214	Data Communication	3	1	-	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
CS212L	Digital System and Microprocessor Lab	-	-	2	01	--------	--------	--------	IPE	50	20
									EPE	50	20
CS213L	Data Structures Lab	-	-	4	02	--------	--------	--------	IPE	50	20
									EPE	50	20
CS215L	Unix And Shell Programming	1	-	2	02	--------	--------	--------	EOE	50	20
	Total	**17**	**4**	**8**	**25**		**500**			**300**	

HS211	Environmental Studies	**02**	-	-	-	Project* Theory*	30 70	40	-	-	-

Audit Course I											
HS212	Introduction to Performing Arts	**02**	-	-	-	Institute Level	-	-	-	-	-

Total contact hours per week: **29+2+2=33**

***** indicates Environmental Studies project evaluation and the theory examination will be at the end of the year i.e. along with Semester IV End Examination.

Note: Tutorials and Practical to be conducted in batches with batch strength not exceeding 15 students.

CIE: Continuous Internal Evaluation
IPE: Internal Practical Evaluation
IOE: Internal Oral Evaluation
SEE: Semester End Examination
EPE: External Practical Examination
EOE: External Oral Examination

DEPARTMENT OF TECHNOLOGY,
SHIVAJI UNIVERSITY KOLHAPUR
SECOND YEAR B.TECH

Scheme of Teaching and Examination:Semester- IV **(Computer Science and Technology)**

Subject Code	Subject	Teaching Scheme with Credits (Hours / Week)				Examination Scheme (Marks)					
						Theory			Practical		
		L	T	P	Total Credits	Scheme	Max. marks	Min. Passing	Scheme	Max. marks	Min. Passing
CS221	Theory of Computation	3	1	-	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
CS222	Advanced Microprocessor	3	1	-	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
CS223	Computer Organization	4	-	-	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
CS224	Computer Networks	3	1	-	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
CS225	Computational Mathematics	3	1	-	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
CS222L	Advanced Microprocessor Lab	-	-	2	01	--------	--------	--------	IPE	50	20
									EPE	50	20
CS225L	Computer Networks Lab	-	-	2	01	--------	--------	--------	IPE	50	20
									EPE	50	20
CS226L	Object Oriented Lab	2	-	2	03	--------	--------	--------	IPE	50	20
									EPE	50	20
	Total	**18**	**4**	**06**	**25**		**500**			**300**	

HS221	Environmental Studies Project Work	**02**	-	-	-	Project Theory	30 70	40	-	-	-

Audit Course II											
HS222	Soft Skills Development	**02**	-	-	-	Institute Level	-	-	-	-	-

Total contact hours per week: **28+2+2=32**

Note: Tutorials and Practical to be conducted in batches with batch strength not exceeding 15 students

CIE: Continuous Internal Evaluation SEE: Semester End Examination
IPE: Internal Practical Evaluation EPE: External Practical Examination
IOE: Internal Oral Evaluation EOE: External Oral Examination

DEPARTMENT OF TECHNOLOGY,
SHIVAJI UNIVERSITY KOLHAPUR
SECOND YEAR B.TECH

Scheme of Teaching and Examination:Semester- III**(Computer Science and Technology)**

Subject Code	Subject	Teaching Scheme with Credits (Hours / Week)			
		L	**T**	**P**	**Total Credits**
MA211	Engineering Mathematics-III	3	1	-	04
CS211	Discrete Mathematical Structure	3	1	-	04
CS212	Digital System and Microprocessor	4	-	-	04
CS213	Data Structures with C	3	1	-	04
CS214	Data Communication	3	1	-	04
CS212L	Digital System and Microprocessor Lab	-	-	2	01
CS213L	Data Structures Lab	-	-	4	02
CS215L	Unix And Shell Programming	1	-	2	02
	Total	**17**	**4**	**8**	**25**

HS211	Environmental Studies	**02**	-	-	-	Project* Theory*

HS212	Introduction to Performing Arts	**02**	-	-	-	Institute Level

Total contact hours per week: **29+2+2=33**

***** indicates Environmental Studies project evaluation and the theory examination will be at the end of the year i.e. along with Semester IV End Examination.

Note: Tutorials and Practical to be conducted in batches with batch strength not exceeding 15 students.

CIE: Continuous Internal Evaluation
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IOE: Internal Oral Evaluation
SEE: Semester End Examination
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DEPARTMENT OF TECHNOLOGY,
SHIVAJI UNIVERSITY KOLHAPUR
SECOND YEAR B.TECH

Scheme of Teaching and Examination:Semester- IV **(Computer Science and Technology)**

Subject Code	Subject	Teaching Scheme with Credits (Hours / Week)			
		L	**T**	**P**	**Total Credits**
CS221	Theory of Computation	3	1	-	04
CS222	Advanced Microprocessor	3	1	-	04
CS223	Computer Organization	4	-	-	04
CS224	Computer Networks	3	1	-	04
CS225	Computational Mathematics	3	1	-	04
CS222L	Advanced Microprocessor Lab	-	-	2	01
CS225L	Computer Networks Lab	-	-	2	01
CS226L	Object Oriented Lab	2	-	2	03
	Total	**18**	**4**	**06**	**25**

HS221	Environmental Studies Project Work	**02**	-	-	-	Project Theory

HS222	Soft Skills Development	**02**	-	-	-	Institute Level

Total contact hours per week: **28+2+2=32**

Note: Tutorials and Practical to be conducted in batches with batch strength not exceeding 15 students

CIE: Continuous Internal Evaluation SEE: Semester End Examination
IPE: Internal Practical Evaluation EPE: External Practical Examination
IOE: Internal Oral Evaluation EOE: External Oral Examination

Detailed Evaluation and Examination Scheme

1. Out of total 100 theory marks, 50 marks are assigned for Continuous Internal Evaluation (CIE). In CIE, obtaining minimum 20 marks is essential. It is similar to term work, the completion of which is mandatory to become eligible to appear for the Semester End Examination (SEE). Failing to complete the term in a particular course i.e. not obtaining 20 marks in CIE out of 50 shall be treated as term not granted in that course and it is on the part of the course teacher to officially inform the particular case through the respective Program Coordinator and the Director to the University Examination Section. The section will take a kind note of the same and it will not issue the hall ticket of the particular students for the SEE in the particular course/s.
2. CIE (50 marks) includes :
    - Internal Test - I, of 20 marks in 5^{th} week on 1^{st} & 2^{nd} unit
    - Internal Test - II, of 20 marks in 10^{th} week on 3^{rd} & 4^{th} unit
    - Activities for the students: 10 marks. It is at the course owners' discretion to get the assignments of varied nature completed by the students. However, the course teacher will plan to cover those course objectives that suit course learning outcomes and program outcomes that may not be covered in the internal tests.
3. For the Semester End Examination (SEE), 100 marks (3 hours) paper will be set and finally it will be converted to 50 marks. The students must secure minimum 40 % i.e. 20 marks in SEE as the University examination passing head.
4. Final theory marks (out of 100) will be the addition of CIE (out of 50 marks) and SEE (out of 50 marks).
5. Internal Practical/Oral Evaluation (IPE/IOE) will be on the basis of Internal Oral/ Practical/Tutorials/Seminar in which students must secure minimum 40% i.e. 20 marks. It is similar to the term work the completion of which is mandatory to be eligible to appear for the Semester End Examination (SEE).
6. External Practical/Oral Evaluation (EPE/EOE) will be conducted under the supervision by some external course expert. The minimum score 40% i.e. 20 marks is required to be secured as the University's passing head in EPE/EOE.
7. *Semester End Examination duration will be 4 hrs.

8. Equivalence for the Course: As elaborated at the end of this whole curriculum document.

Academic Autonomy:

1. Flexibility in deciding Structure and Contents of Curriculum with reasonable frequency for changes in the same.
2. Continuous Assessment of Students performance with newly adopted - Credit System based on award of grade.
3. Credits are simply a means of attaching relative values to courses of different components. These are a currency of learning and in general regarded as a measure of the time typically required to achieve a given curricular outcome.
4. All courses (Courses) under each Program/Discipline are unitized.

Credit system:

Education at the Institute is organized around the semester-based credit system of study. The prominent features of the credit system are a process of continuous evaluation of a student's performance/progress and flexibility to allow him/her to progress at an optimum pace suited to his/her ability or convenience. Each course by every student needs to fulfill minimum requirements of credits for continuation.

A student's performance/progress is measured by the number of credits that he/she has earned, i.e. completed satisfactorily. Based on the course credits and grades obtained by the student, grade point average is calculated. A minimum grade point average is required to be maintained for satisfactory progress and continuation in the Program. Also a minimum number of earned credits and a minimum grade point average should be acquired in order to qualify for the degree. All Programs are defined by the total credit requirement and a pattern of credit distribution over courses of different categories.

Course credits assignment:

Each course, except a few special courses, has a certain number of credits assigned to it depending upon its lecture, tutorial and laboratory contact hours in a week. This weightage is also indicative of the academic expectation that includes in-class contact and self-study outside of class hours.

Lectures and Tutorials: One lecture or tutorial hour per week per semester is assigned one credit.

Practical/Laboratory: One laboratory hour per week per semester is assigned half credit.

Example: Course: Digital System and Microprocessor: 5 credits (4-0-2)

The credits indicated for this course are computed as follows:

4 hours/week lectures = 4 credits

0 hours/week tutorial = 0 credit

2 hours/week practical = 2 *x* 0.5 = 1 credit

The contact hours in this case of **5** credits course is 6 hours per week. (**4** h Lectures + **0** h Tutorial + **2** h Practical=6 hours per week.)

For each lecture or tutorial credit, the self study component is 1 hour/week and 2 hours/week. In the above example, the student is expected to devote 3 + 1 = 4 hours per week on self study for this course, in addition to class contact of 5 hours per week.

Earning credits:

At the end of every course, a letter grade is awarded in each course for which a student had registered. On obtaining a pass grade, the student accumulates the course credits as earned credits. A student's performance is measured by the number of credits that he/she has earned and by the weighted grade point average.

The credit system enables continuous evaluation of a student's performance and allows the students to progress at an optimum pace suited to individual ability and convenience.

Features of Credit System at Shivaji University, Kolhapur:

Every course is allotted credits based on its academic importance/weightage.

1. All Courses may not have same credits.
2. There will be 23 to 28 Credits / Semester.
3. Absolute Grading System with 7 Passing Grades viz. AA, AB, BB, BC, CC, CD, DD and FF for failure.
4. Getting FF grade in 4 heads in one academic year, he/she is considered as failed.
5. Continuous Evaluation: Unit Test I i.e. T_1 [20 marks], and Unit Test II i.e. T_2 [20 marks]. Activities will be for 10 marks and the course owner/in charge will have discretion to decide the nature of activities.
6. Standardization of courses: Each course is unitized in 6 numbers. Unit Test I on units I and II while Unit Test II on units III & IV, SEE will be based on all the units of the course curriculum.
7. Unit Test I & Unit Test II will be supervised and evaluated by internal course teachers while SEE will be evaluated mostly by external and internal teachers as joint examiner ships.
8. Any request for re-test will not be entertained after internal test.
9. For both the semesters' failure courses, re-examination will be only after the even Semester End Examination. No re-examination will be conducted for odd semester courses in even semester or vice-versa.

Attendance rule:

All students must attend every lecture, tutorial and practical class. However, to account for late registration, sickness or other such conditions, the attendance requirement will be a minimum of 75 % of the classes actually held. A student with less than 75 % attendance in a course during the semester, in lectures, tutorials and practical taken together (as applicable), will be awarded the 'F' grade in that course irrespective of his/her performance in the tests.

Taking into account the consolidated attendance record for the whole semester, the course in charge in consultation with the Program Coordinator will award 'XX' grade to the student who is deficient in attendance. For the purpose of attendance calculation, every scheduled practical class will be counted as one unit irrespective of the number of contact hours.

Attendance record will be maintained based upon roll calls (or any equivalent operation) in every scheduled lecture, tutorial and practical class. The course owner will maintain and consolidate attendance record for the course (lectures, tutorials and practical together, as applicable).

Evaluation system:

1. Semester Grade Point Average (SGPA) =

$$\frac{\sum (\text{course credits in passed courses X earned grade points})}{\sum (\text{Course credits in registered courses})}$$

2. Cumulative Grade Point Average (CGPA) =

$$\frac{\sum (\text{course credits in passed courses X earned grade points) of all Semesters}}{\sum (\text{Course credits in registered courses) of all Semesters}}$$

3. At the end of B. Tech Program, student will be placed in any one of the divisions as detailed below:

   Ist Division with distinction: CGPA $\geq$ 8.25 and above

   Ist Division : CGPA $\geq$ 6.75 and < 8.25

   IInd Division : CGPA $\geq$ 6.25 and < 6.75

As per AICTE Handbook (2011-12), gradation is as follows:

Grade Points	Equivalent Percentage Range
6.25	55
6.75	60
7.25	65
7.75	70
8.25	75

Conversion of CGPA to corresponding equivalent percentage marks for CGPA>5.0 may be obtained using the following equation:

Equivalent Percentage marks = (Respective CGPA x 10) – 7.5

An example of these calculations is given below:

Typical academic performance calculations - I semester

Course no.	**Course credits**	**Grade awarded**	**Earned credits**	**Grade points**	**Points Secured**
Col 1	Col 2	Col 3	Col 4	Col 5	Col 6 (Col 4* Col 5)
MALXXX	5	CC	5	6	30
CSLXXX	4	CD	4	5	20
PHLXXX	4	AA	4	10	40
PHPXXX	2	BB	2	8	16
MELXXX	4	FF	0	0	0
TTNXXX	2	AB	2	9	18
Total	21		17	38	124

1. Semester Grade Point Average (SGPA) =

$$\frac{(124)}{(21)} = 5.90$$

2. Cumulative Grade Point Average (CGPA) =

Cumulative points earned in all passed courses = 124 (past semesters) + 124 (this sem.) = 248 Cumulative earned credits = 23 (past semesters) + 21 (this sem.) = 44

$$\frac{\sum (124 + 124)}{\sum (23 + 21)} = 5.63$$

Chart for marks range and its corresponding grade and grade points

Marks Range	Grade Points	Grade	Description of Performance
91-100	10	AA	Outstanding
86-90	09	AB	Excellent
76-85	08	BB	Very Good
66-75	07	BC	Good
56-65	06	CC	Fair
46-55	05	CD	Average
40-45	04	DD	Poor
Below 40	00	FF	Fail
--	--	$	Passed in first attempt
--	--	PP	Passed (Audit Course)
--	--	NP	Not Passed (Audit Course)
--	--	** 2^{nd} *** 3^{rd} **** 4^{th}	One grade punishment for 2^{nd} ,3^{rd}, 4^{th}, …attempt,

Audit Courses:

Additional courses shall be included as audit courses from the third semester onwards. While the performance of the student in audited courses shall be included in the Grade Card, these grades do not contribute to SGPA or CGPA of the concerned student.

Award of Degree:

Following rules prevail for the award of degree:

1. A Student has registered and passed all the prescribed courses under the general institutional and departmental requirements.
2. A student has obtained CGPA$\geq$ 4.5.
3. A student has paid all the institute dues and satisfied all the requirements prescribed.
4. A student has no case of indiscipline pending against him/her.
5. Institute authorities shall recommend the award of B.Tech degree to a student who is declared to be eligible and qualified for above norms.

CGPA Improvement Policy for award of degree:

An opportunity shall be given to a student who has earned all the credits required by the respective program with CGPA greater than or equal to 4.00 but less than 4.50, to improve his/her grade by allowing him/her to appear for 100% examinations of maximum two theory courses of seventh and eighth semester. However, CGPA shall be limited to 4.5 even though the performance of a student as calculated through modified CGPA becomes greater than 4.5.

Computer Science and Technology
Program Educational Objectives (PEOs), Program Outcomes (POs) and Program Specific Outcomes (PSOs) of the Program:

Program Educational Objectives (PEOs):	
PEO1	To create graduates with sound learning of basics of Computer Science and Technology who can contribute towards propelling Science and Technology .
PEO2	To create graduates with adequate abilities in Computer Science and Technology who can progress towards becoming developers,researchers and designeres to fulfill the nessecities of Computer Industries.
PEO3	To develop among students capacity to figure,formulate ,analyse and solve real life problems comfronted in Software Enterprises.
PEO4	Graduate will exibhit professionalism ,ethical attitude,communication ability,collaboration in their profession and adapt to current trends by engaging in life long learning.
Program Outcomes (POs)	
PO1	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10	**Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.**
PO11	**Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.**
PO12	**Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.**
Program Specific Outcomes(PSOs)	
PSO1	**Provide effective and effiicient knowledge of technology and free open source software (FOSS)through IIT Bombay Spoken Tutorial Project**
PSO2	**To create the awareness of foreign language among students to meet global needs and look for oppetunities in multinational companies.**
PSO3	**Provide platform to students to develop a new and innovative project which will improve local industry needs .**

Class & Semester	:	**S. Y. B.Tech (Computer Science &Technology) Part II, Sem III**						
Course Title	:	**Engineering Mathematics-III**				*Course Code*:	:	**MA211**
Teaching Scheme (Hours)	:	**3 hours/weeks=3x 13 weeks= 39hrs minimum** **Tutorial= 1 hours/week** **Practical=NA**				*Total Credits*	:	***03+1=4***
Evaluation Scheme (Marks)	:	CIE = 50 SEE = 50	IPE IOE EPE/EOE	: :50 :	= 150	*Duration of SEE*	*:*	3hrs
Revision:	:	**Second**				*Month*	:	*December 2016*

Pre-requisites	**:**	
The prerequisite for this course is basic knowledge of Engineering Mathematics-I and Engineering Mathematics-II.		
Type of Course	**:**	Theory
Course Domain	**:**	**Applied Science(Numerical analysis,Statistics, Probability)**
Skills Imbibed	**:**	**Cognitive**

Course Assessment Methods:

Student is evaluated during Continuous Internal Evaluation (Internal Test I & Internal Test II) and Semester End Examination.

Course Objectives:

1. To understand LinearDifferential Equations.
2. To understand Numerical Analysis.
3. To analyze engineering problems based on proability.

4. To solve engineering problems using Mathematical Programming.
5. To solve engineering problems using Artificial Variables Techniques.
6. Analyze and solve engineering problems using Assignment problems.

Course Outcomes:

Students will be able to

1. Apply the fundamental concepts of Linear Differential Equations and the basic numerical methods for their resolution.
2. Solve the problems choosing the most suitable method.
3. Understand the difficulty of solving problems analytically and the need to use numerical approximations for their resolution.
4. Use computational tools to solve problems and applications of Differential Equations .
5. Formulate and solve different problems in the field of Industrial Organisation using mathematical programming and assignment problems.
6. Use an adequate scientific language to formulate the basic concepts of the course.

Curriculum Content	Hours
Unit:I Linear Differential Equations: Linear Differential Equations with constant coefficients, Homogeneous Linear differential equations, Applications of LDE with constant coefficients to Electrical systems.	7
Unit:II Numerical Analysis: Zeroes of transcendental and polynomial equation using Bisection method, Secant method, Regula-falsi method and Newton-Raphson method, Rate of convergence of above methods. Interpolation: Newton's forward and backward interpolation, Lagrange's and Newton's divided difference formula for unequal intervals. Numerical Integration:Trapezoidal Rule, Simpson's 1/3 rd rule, Simpson's 3/8 th rule	7
Unit:III Proability: Random variable. Binomial, Poisson, and Normal distributions. Mean, median, mode and standard deviation. Conditional probability and Bayes theorem.	6
Unit:IV Mathematical Programming: Linear Optimization problems, Standard and Canonical forms, basic solutions and feasible solutions, optimal solutions by simplex method	6
Unit :V Artificial Variables Techniques: Artificial Variables, Big M-method, Relation between Primal and Dual L.P.P., Dual simplex method, Solution of Primal L. P. P. using Dual L. P. P.	7
Unit : VI Assignment Problems: Definition, Balanced and Unbalanced assignment problems, Hungarian method of solving assignment problems. Travelling salesmen problem.	6

Suggested list of Tutorials/Assignments-

1. To find solution of LDE with constant coeffents
2. To find solution of Homogeneous LDE
3. Zeroes of transcendental equations
4. Interpolation and Numerical integration
5. Statistical Distributions
6. Simplex method
7. Big M-method
8. Assignment Problems

General Instructions:

1. Batch wise tutorials are to be conducted. The number of students per batch should be as per the practical batches.
2. Students must be encouraged to solve engineering mathematics problems using different software's in tutorial class only.

Each Student has to write at least 6 assignments on entire syllabus.

Text Books	**:**	
		1. A text book of Applied Mathematics: Vol. I, II and III by J. N. Wartikar& P. N. Wartikar , VidyarthiGrihaPrakashan, Pune.
Reference Books	**:**	

1. Higher Engineering Mathematics by Dr. B. S. Grewal.
2. Advanced Engineering Mathematics by Erwin Kreyszig.
3. Operations Research by S. D. Sharma
4. Operations Research by T. A. Taha.
5. Numerical method for Engineers - S.C. Chapra, R.P. Canale (Tata McGraw Hill Publications)
6. Numerical Methods – Dr. B.S. Grewal (Khanna Publications)

Class & Semester	:	**S. Y. B.Tech (Computer Science & Technology) Part II, Sem III**						
Course Title	:	**Discrete Mathematical Structure**				*Course Code*:	:	**CS 211**
Teaching Scheme (Hours)	:	**3 hours/weeks=3x 13 weeks= 39 hrs minimum** **Tutorial= 1 hour/week** **Practical=NA**				*Total Credits*	:	***03+ 1 =4***
Evaluation Scheme (Marks)	:	CIE = 50 SEE = 50	IPE IOE EPE/EOE	: : :	= 100	*Duration of SEE*	*:*	3hrs
Revision:	:	**Second**				*Month*	:	*December 2016*

Pre-requisites	**:**	
The prerequisite for this course is knowledge of basic Mathematics and logic.		
Type of Course	**:**	Theory
Course Domain	**:**	**Core (Mathematical Logic,Boolean algebra,Set theory,Graph Theory)**
Skills Imbibed	**:**	**Cognitive**

Course Assessment Methods:

Student is evaluated during Continuous Internal Evaluation (Internal Test I & Internal Test II) and Semester End Examination.

Course Objectives:

1. To introduce most of the basic terminologies used in computer science courses and application of ideas to solve practicalproblems.
2. To learn basic mathematical logic and Set theory.
3. To learn and understand core ideas in graph theory.
4. To extend student's Logical and Mathematical ability to deal with abstraction
5. Be exposed to concepts and properties of algebraic structures such as semi groups, monoids and groups.

6. To understand relations and functions.

Course Outcomes:

Students will be able to

1. Interpret the knowledge of Theory of Numbers
2. Understand the basic principles of sets and operations in sets.
3. Demonstrate an understanding of relations and functions and be able to determine their properties.
4. Demonstrate different traversal methods for trees and graphs &Solving problems in Computer Science using graphs and trees.
5. Write an argument using logical notation and determine if the argument is or is not valid.
6. Model problems in Computer Science using graphs and trees.

Curriculum Content	Hours
Unit:I Logic & Proofs: Introduction, statements and Notation, Connectives - negation, conjunction, disjunction, Conditional, biconditional, statement formulas and truth tables, well formed formulas, Tautologies, Equivalence of formulas, Duality law, Tautological implications, functionally complete sets of connectives, other connectives, Normal & Principle normal forms.	9
Unit:II Set Theory: Basic concepts of set theory, types of operations on sets, ordered pairs, Cartesianproduct, representation of discrete structures, relation, properties of binary relations, matrix and graph representation, partition and covering of set, equivalence relation, composition, POSET and Hasse diagram, Function – types, composition of functions, Inverse function.	10
Unit:III Algebraic Systems: Semigroups and Monoids, properties and examples.	4
Unit:IV Groups: Definition and examples, subgroups and homomorphism, Group codes, communication model, Generation of codes using checksum, error recovery in group codes.	5
Unit :V Lattices and Boolean Algebra: Lattice as POSETs , definition , examples and properties, Lattice as algebraic systems, Special lattices, Boolean algebra definition and examples, Boolean functions, representation and minimization of Boolean functions	8
Unit : VI Graph Theory: Basic concepts of graph theory, Storage representation and manipulation of graphs, Fault detection in combinational switching circuits – Faults in combinational circuits, Notions of Fault detection, Algorithm for fault matrix, PERT and related techniques.	8

Text Books	**:**	
		1. *"Elements of Discrete Mathematics",* C. L. LIU, Tata McGraw-Hill, 2nd Edition, 2002, ISBN 0- 07-043476-X. 2. *"Discrete Mathematics and Its Applications",* Kenneth H. Rosen, Tata McGraw-Hill, 5th Edition, 2003, ISBN 0-07-053047-5. 3. *"Discrete mathematical structures with applications to computer science",* J. P. Tremblay & R. Manohar, MGH International.
Reference Books	**:**	

1. *"Theory and problems in Abstract algebra",*Schaums outline series, MGH.
2. *"Discrete Mathematics",*Lipschutz, Lipson, Tata McGraw-Hill, 2nd Edition, 1999, ISBN 0-07-463710--X.
3. *"Graph Theory",* V. K. Balakrishnan, TMH (Recommended for Graph) ISBN 0-07-058718-3
4. *"Discrete Mathematical Structures",* B. Kolman, R. Busby and S. Ross, Pearson Education, 4th Edition, 2002, ISBN 81-7808-556-9

Class & Semester	:	**S. Y. B.Tech (Computer Science &Technology) Part II, Sem III**						
Course Title	:	**Digital Systems and Microprocessor**				*Course Code*:	:	**CS 212**
Teaching Scheme (Hours)	:	**4 hours/weeks=4x 13 weeks= 52hrs minimum** **Tutorial= NA**				*Total Credits*	:	***04+ 00 =4***
Evaluation Scheme (Marks)	:	CIE = 50 SEE = 50	IPE IOE EPE/EOE	: : :	= 100	*Duration of SEE*	:	3hrs
Revision:	:	**Second**				*Month*	:	*December 2016*

Pre-requisites	**:**	

The prerequisite for this course is basic knowledge of digital logic and computer hardware basics.

Type of Course	**:**	Theory
Course Domain	**:**	**Core (Logic gates,Booleanalgebra,Microprocessors)**
Skills Imbibed	**:**	**Cognitive**

Course Assessment Methods:

Student is evaluated during Continuous Internal Evaluation (Internal Test I & Internal Test II) and Semester End Examination.

Course Objectives:

1. To introduce the analysis and design of digital systems and microprocessors.
2. To review combinatorial analysis and design.
3. Computer aided design and programming of digital electronic circuits through the application of several modern software packages.
4. Analysis and design of synchronous finite state machines and register transfer level systems.

5. To study microprocessor devices, their architecture and instruction sets, Hardware aspects of instruction execution, Assembly language programming.
6. To study input/output, bus interfacing, interrupts and co-design of digital hardware and microprocessor systems.

Course Outcomes:

Students will be able to

1. Understand the logical behaviour of digital circuits
2. Design combinational logic using Karnaugh maps
3. Design sequential logic using ASM charts
4. Analyse combinational and sequential digital circuits
5. Explain the architecture, pin configuration of various microprocessors
6. Perform various microprocessor based programs and apply the concepts of 8085 programming , interrupts, stacks & subroutines

Curriculum Content	Hours
Unit:I Fundamentals Concepts: Logic Families, TTL, TTL sub families, Characteristics of TTL gates, Axioms and laws of Boolean algebra, Practical examples with logic gates IC's.	3
Unit:II Combinational Logic Design: Boolean algebra, min and max terms, K-maps and quine –McClusky methods, Solution using K-maps, SOP & POS representation of digital logic and their reduction using K-map, BCD to 7-segment converter, Multiplexer and demultiplexer, encoder, decoder ,Half and Full adder design using gates.	8
Unit:III Sequential Logic Design: Various flip flops (R-S, D, J-K, T) using gates, counter using J-K flip-flops, shift Register using flip-flops, study of different ICs (7490, 7495, 74LS138, 7447) Timer IC (555), IEEE / ANSI symbols **Analog Electronics:** OP-AMP (741), Basics of OP-AMP, Characteristics, Adder, Substractor,Integrator, Differentiator, Comparator using OP-amp	8
Unit:IV 8085 Microprocessor Introduction: Introduction to Microprocessor, Features of 8085, 8085-CPU architecture, Demultiplexing of address and data bus, Instruction fetching and execution operation of microprocessor.	4
Unit :V 8085 Instruction Set: Instruction formats, Addressing modes, Op-code formats, Classification of Instruction set, Programming technique, Instruction timings, WAIT state, Single step and single cycle execution.	8
Unit : VI Interrupt and DMA Transfer: Types of Memory, Memory organizations Mapping of I/O 8085 Interrupts RST5.5,RST6.5,RST7.5, TRAP & INTR. Designing hardware for INTR , Interrupt	

priorities, SIM and RIM instruction, DMA transfer, HOLD and HLDA pins for DMA transfer. **I/O Operation and interfacing:** Devices, IN & OUT Instruction with timing diagrams study of 8255 PPI, Interfacing Keyboards, Interfacing Thumbwheel switches, 8253.	8

Text Books	**:**	
		1. *"Modern Digital Electronics",* R.P. Jain, TMH **2.** *"Microprocessor Architecture Programming & Application",* Ramesh Gaonkar, Willey Estern. **3.** *"Digital Systems-Principals and Application*", Tocci, Widmer, Moss, (Pearson Education) **4.** *"Design with operational amplifier",* Sergio Franko And book by RamakantGaiekwad
Reference Books	**:**	

1. *"Fundamentals of digital circuits"*, B.Anandkumar
2. *"Digital Systems & Microprocessor",* Douglas Hall MGH
3. *"Digital Computer Electronics",* Malvino PHI.
4. *"Digital design",* Morris Mano PHI

Class & Semester	:	**S. Y. B.Tech (Computer Science &Technology) Part II, Sem III**					
Course Title	:	**Data Structures with C**			*Course Code*:	:	**CS 213**
Teaching Scheme (Hours)	:	**3 hours/weeks=3x 13 weeks= 39 hrs minimum** **Tutorial= 1hr/week**			*Total Credits*	:	***03+1=4***
Evaluation Scheme (Marks)	:	CIE = 50 SEE = 50	IPE IOE EPE/EOE	: : :	= 100	*Duration of SEE*	: 3 hrs
Revision:	:	Second				*Month*	: *December 2016*

Pre-requisites	**:**	
Basic understanding of C programming language and basic mathematics.		
Type of Course	**:**	Theory
Course Domain	**:**	**Core (Data Structure)**
Skills Imbibed	**:**	**Cognitive**

Course Assessment Methods:

Student is evaluated during the Continuous Internal Evaluation (Internal Test I & Internal Test II) and Semester End Examination.

Course Objectives:

1. To introduce the fundamental concept and importance of data structures in developing and implementing efficient algorithms.
2. Master the implementation of linked data structures such as arrays, stacks and queues.
3. To understand the data structures such as linked lists, hash tables.
4. To understand conceptually searching and sorting techniques operations with examples.

5. To understand the concepts of trees and graph with operation.
6. To understand the basic concept of graph theory

Course Outcomes:

Students will be able to

1. To analyze the concepts of data structure and data type.
2. Develop knowledge of basic data structures for storage and retrieval of ordered or unordered data.
3. Implement linked list data structure to solve various problems.
4. Understand and apply various data structure such as stacks, queues, trees and graphs to solve various computing problems using C-language.
5. Develop knowledge of applications of data structures including the ability to implement algorithms for the creation, insertion, deletion, searching, and sorting of each data structure.
6. Understand the concepts of graph theory.

Curriculum Content	Hours
Unit:I Fundamentals stack and queue as ADT, Representation and Implementation of stack and queue using sequential and linked organization, circular queue: representation and implementation, Application of stack for expression evaluation and for expression conversion, Recursion, Priority queue, Doubly Ended Queue.	**7**
Unit:II **Search:** Importance of searching, Sequential, Binary, Fibonacci search algorithms **Sorting:** Quick sort, two-way merge sort, heap sort, shell sort, Radix sort.	**9**
Unit:III Concept of linked organization, Singly linked list, doubly linked list and dynamic storage management, circular linked list, Operations such as Insertion, deletion, inversion, concatenation, Computation of length, traversal on linked list, Representation &anipulations of polynomials using linked lists.	**7**
Unit:IV Definition, Hash functions, Overflow, Collision, Open Hashing, closed hashing, Rehashing Techniques.	**6**
Unit:V Basic Technology, Binary Tree, Traversal methods, Binary search tree, B tree, B+ tree, Heaps -operations and their applications.	**8**
Unit:VI Basic concepts of graph theory, storage representation and manipulation of	

graphs, Introduction to Sparse matrix, representation of sparse matrix using linked list.		**7**
Text Books	**:**	
		1. Data Structure using C -- A. M. Tanenbaum, Y. Langsam, M. J. Augenstein (PHI).
Reference Books	**:**	
1.Data structures and Algorithms -- Alfred V. Aho, John E. Hopcroft, J. D. Ullman (Addision- Wesely Series) 2. Data structures -- Seymour Lipschutz (MGH) Schaum's Outlines. 3. Introduction to Data Structures in C – Ashok N. Kamthane (Pearson Education).		

Class & Semester	:	**S. Y. B.Tech (Computer Science &Technology) Part II, Sem III**				
Course Title	:	**Data Communication**		*Course Code*:	:	**CS 214**
Teaching Scheme (Hours)	:	**3 hours/weeks=3x 13 weeks= 39hrs minimum** **Tutorial= 1 hour/week** **Practical=NA**		*Total Credits*	:	***03+ 01 =4***
Evaluation Scheme (Marks)	:	CIE = 50 SEE = 50	IPE IOE EPE/EOE : : : = 100	*Duration of SEE*	*:*	3hrs
Revision:	:	**Second**		*Month*	:	*December 2016*

Pre-requisites	**:**	
The prerequisite for this course is basic knowledge of communication,networking and computer fundamentals.		
Type of Course	**:**	Theory
Course Domain	**:**	**Core (Networking)**
Skills Imbibed	**:**	**Cognitive**

Course Assessment Methods:

Student is evaluated during Continuous Internal Evaluation (Internal Test I & Internal Test II) and Semester End Examination.

Course Objectives:

1. Build an understanding of the fundamental concepts of computer networking.
2. Familiarize the student with the basic taxonomy and terminology of the computer networking area.
3. Introduce the student to networking concepts, preparing the student for advanced courses in computer networking.
4. Allow the student to gain expertise in some specific areas of networking such as the

design and maintenance of individual networks.
5. Understand the different types of network topologies and protocols.
6. Understand fundamental concepts of computer networks.

Course Outcomes:

Students will be able to

1. Understand basic computer network technology.
2. Understand and explain Data Communications System and its components.
3. Identify the different types of network topologies and protocols.
4. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
5. Identify the different types of network devices and their functions within a network
6. Understand the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

Curriculum Content	Hours
Unit:I Data Communication Fundamentals: Data transmission concepts and terminology, Theoretical basis for data communication, Analog and Digital data transmission, Transmission impairments. **Transmission Media:** Guided transmission media and wireless transmission physical description, applications and transmission characteristics. Data transmission using telephone & cable network.	7
Unit:II Data Encoding: Digital data – digital signals, digital data – analog signals, Analog data – digital signals, analog data analog signals, spread spectrum.	5
Unit:III Data Communication Interface: Asynchronous and synchronous transmission, Line configuration, interfacing**.**	3
Unit:IV Multiplexing and Switching Methods: Frequency & Wavelength division multiplexing, Synchronous & Statistical Time division multiplexing; Circuit switching-Circuit switching Networks & Concepts (Routing), Virtual Circuit Switching Networks, Principles of Message & packet switching.	4
Unit :V Computer Network Fundamentals: Introduction to Computer Networks, Types of Network, Physical & Logical Topology , Uses of Computer Networks, Hardware Required for LAN- NIC card ,Cables,Hub,etc.. Details of Internetworking, Internet, Hardware required for Internetworking- Bridges(all types),Switch(all types),Routers(all types), Introduction to Network operating System, Introduction to Internet, Reference models, OSI, TCP, ATM, Example networks, IEEE standards, Example: data communication services.	12
Unit : VI Data Link Layer: Framing:	8

Error detection & Correction-Introduction, Hamming Code ,CRC ,Checksum, Framing –Fixed ,Variable error control, Flow control, Simplest Protocols, Stop & Wait Protocols, GO Back N & Selective Repeat Sliding window protocols, HDLC & other DLC Protocol.		
Text Books	**:**	
		1. *"Data and Computer Communications",* William Stallings, PHI, 6th Edition.(Module 1,2,3,4,5) **2.** *"Data communication and Networking",* Behrouz A. Forouzan, TMGH, 4th Edition. (Module 5,6) **3.** *"Local Area Networks",* Behrouz A. Forouzan, TMGH.(Module 5)
Reference Books	**:**	
*1. "Computer Networks",*A. S. Tanenbaum, PHI, 3rd Edition.		

Class & Semester	:	**S. Y. B.Tech (Computer Science &Technology) Part II, Sem III**								
Course Title	:	**Digital Systems and Microprocessor Lab**						*Course Code*:	:	**CS 212L**
Teaching Scheme (Hours)	:	**2 hr /week=2x13= 26 hrs**						*Credits*	:	**1**
Evaluation Scheme (Marks)	:	IPE IOE	:50 :	50	EPE EOE	:50 :	50+50= 100	*Duration of Exam (in case of External Evaluation)*	:	**3 hours**
Revision:	:	Second						*Month*	:	*December 2016*

Pre-requisites	**:**	
The prerequisite for this course is basic knowledge of digital system and microprocessors theory.		
Type of Course	**:**	Practical
Course Domain	**:**	**Core (Logic gates,Booleanalgebra,Microprocessors)**
Skills Imbibed	**:**	**Cognitive**

Course Assessment Methods:

Student is evaluated during Internal Oral Examination and External Oral Examination.

Course Objectives:

1. Introduction to the analysis and design of digital systems and microprocessors.
2. Review of combinational analysis and design.
3. Computer aided design and programming of digital electronic circuits through the application of several modern software packages.
4. Analysis and design of synchronous finite state machines and register transfer level systems.
5. Microprocessor devices, their architecture and instruction sets, Hardware aspects of instruction execution, Assembly language programming.
6. Input/output, bus interfacing, interrupts. Co-design of digital hardware and microprocessor systems.

Course Outcomes:.

1. Understand the logical behaviour of digital circuits
2. Design combinational logic using Karnaugh maps
3. Analyse combinational and sequential digital circuits
4. Design combinational and sequential digital circuits
5. Explain the architecture, pin configuration of various microprocessors
6. Apply the concepts of 8085 programming , interrupts, stacks & subroutines

Practical covered	**:**	

1. Study of Basic gates.
2. Study of Universal gates.
3. Study of Boolean algebra & De Morgan's theorem using gates.
4. Study of MUX/DEMUX.
5. Study of 74138.
6. Study of R-S and J-K flip-flops.
7. Study of counters.
8. Interfacing of counters to seven segment display.
9. Realization of 4/5 variable K-maps.
10. Study of 8085.
11. Assembly language programming for 8085 (Arithmetic, Logical and data transfer- Minimum 8 programs).
12. Writing subroutine to perform delay operation of 10 ms.
13. Designing & implementing hardware for INTR.
14. Study of 8255. Interfacing using 8255.
15. Study of 8253 interfacing.

Class & Semester	:	**S. Y. B.Tech (Computer Science &Technology) Part II, Sem III**								
Course Title	:	**Data Structures Lab**						*Course Code*:	:	**CS 213L**
Teaching Scheme (Hours)	:	**4 hr /week=4x13= 52 hrs**						*Credits*	:	**2**
Evaluation Scheme (Marks)	:	IPE IOE	: 50 :	50	EPE EOE	: 50 :	50+50= **100**	*Duration of Exam (in case of External Evaluation)*	:	**03 hours**
Revision:	:	Second						*Month*	:	*December 2016*

Pre-requisites	**:**	
Knowledge of Programming Methodology, 'C' language, Control Statements, Functions, Arrays, Pointers, Structures and Union and File Handling concepts.		
Type of Course	**:**	Practical
Course Domain	**:**	**Core (Data Structures)**
Skills Imbibed	**:**	**Cognitive**

Course Assessment Methods:

Practical Journal Assessment, Internal Oral Examination and External Practical Examination

Course Objectives:

1. To design and analyze simple linear and non linear data structures.
2. Understand how several fundamental algorithms work particularly those concerned with various Sorting algorithms.
3. To identify and apply the suitable data structure for the given problem.
4. To design and evaluate ADTs, nonlinear temporary and persistent data structures and also related algorithms.
5. To improve the logical ability.
6. To Gain knowledge in practical applications of data structures.

Course Outcomes:

Students will be able to

1. understand the importance of data structure and abstract data type, and their basic usability in different applications through different programming languages.
2. analyze and differentiate different algorithms based on their time complexity.
3. do the implementation of linked data structures and various kinds of searching and sorting techniques, and its uses both in linear and non-linear data structure.
4. Design new algorithms or modify existing ones for new applications and able to analyze the space & time efficiency of most algorithms.
5. Have practical knowledge on the application of data structures.
6. Be familiar with various data structure such as stacks, queues, trees, graphs, etc. to solve various computing problems.

Practical covered	:	

1. Write a program for matrix Manipulation using array.[Applying]
2. Implement Tower of Hanoi problem using recursion. [Applying]
3. Implement different operations on string without using library function.[Applying]
4. Implementation of palindrome string.[Applying]
5. Implement different operation on file.[Applying]
6. Implement stack as an ADT. Perform push() and pop() operations on it.[Applying]
7. Implementation of queue using array.[Applying]
8. Implement circular queue and double ended queue using arrays. [Applying]
9. Write a program for sequential search and linear search.[Applying]
10. Apply following searching techniques on list or array:
11. Binary ii) Fibonacci [Applying]
12. Implement following sorting techniques on list or array:
13. Quick sort ii) Merge sort.[Applying]
14. Write a program to create linked list and perform operation such as insert, delete, update, reverse.[Applying]
15. To implement of binary tree traversal.[Applying]
16. To study hashing techniques.[Remembering]
17. To study graph traversal method.[Remembering]

Class & Semester	:	**S. Y. B.Tech (Computer Science &Technology) Part II, Sem III**							
Course Title	:	**UNIX and Shell Programming**					*Course Code*:	:	**CS 215L**
Teaching Scheme (Hours)	:	Theory:**1hr/week=1x13=13hrs** Practical:**2 hr /week=2x13= 26 hrs**					*Credits*	:	**2**
Evaluation Scheme (Marks)	:	IPE IOE	: :	**NIL** **NIL**	EPE EOE	: :50	**NIL** **50**	*Duration of Exam (in case of External Evaluation)*	:	**03 hours**
Revision:	:	Second					*Month*	:	*December 2016*

Pre-requisites	**:**	

A theoretical and practical knowledge of the UNIX operating system and shell programming. Knowledge of Shell commands and utilities, UNIX file system, UNIX shells, UNIX graphical user interfaces, and shell programming.

Type of Course	**:**	Practical
Course Domain	**:**	**Core(Operating System)**
Skills Imbibed	**:**	**Cognitive**

Course Assessment Methods:

Practical Journal Assessment, Internal Oral Examination and External Practical Examination

Course Objectives:

1. To familiarize students with the UNIX environment
2. To learn the fundamentals of shell scripting/programming
3. To familiarize students with basic UNIX administration.
4. To perform simple concurrent programs that are free of problems.
5. To Use the Vi editor at an introductory level of proficiency.
6. Write and use moderately complex regular expressions.

Course Outcomes:.

1. After completion of the course students will be able to
2. Work confidently in Unix/Linux environment.
3. Write shell scripts to automate various tasks.
4. Master the basics of UNIX administration.
5. Graduates will acquire the concepts of UNIX shell as a beginner user.
6. Student will get the practical knowledge of UNIX/Linux Operating System commands and Vi.
7. Graduates will acquire fair knowledge about programming features of UNIX shells sh and csh.

Course Content :

Unit 1 (2 Hrs)

The Unix Operating System, The UNIX architecture and Command Usage, The File System

Unit 2 (2 Hrs)

Basic File Attributes, the vi Editor

Unit 3 (2Hrs)

The Shell, The Process, Customizing the environment

Unit 4 **(**2Hrs)

More file attributes, Simple filters

Unit 5 (3 Hrs)

Filters using regular expressions,

Unit 6 (3 Hrs)

Essential Shell Programming, awk – An Advanced Filter

Practical covered :

1. Basic Shell Commands

Shell Programs:

2. Fibonacci Series
3. Designing Calculator
4. File Operations
5. Base conversion
6. Usage of cut and grep commands
7. Usage of user defined functions

Administration

8. Managing User Accounts

9. User Quota Management
10. Installation of RPM software and Zipping,tar
11. Configuring RAID
12. Configuring Web server

Class & Semester	:	**S. Y. B.Tech (Computer Science and Technology) ,Part II, Semester III**					
Course Title	:	**Environmental Studies**				*Course Code*:	: **HS211**
Teaching Scheme (Hours)	:	**Lectures 2 hours/weeks = 2 x 13 weeks= 26 hours** **Tutorial= 00 hour/week** **Practical= 00 hours/week**				*Total Credits*	: **Nil**
Evaluation Scheme (Marks)	:	**CIE = 00** **SEE = 70**	**IPE=30**	:	**Grand Total=100**	*Duration of SEE*	: **2 hours** (SEE at the yearend)
Revision:	:	**Third**				*Month*	: **December 2016**

Pre-requisites	**:**	Engineering Chemistry
Type of Course	**:**	Theory and field work
Course Domain	**:**	Humanities and Applied Science
Skills Imbibed	**:**	Affective : Awareness, Respond, Value, Organize Psychomotor: Imitation, manipulation, articulation, naturalization

Course Assessment Methods:

1. Project / Field work
2. Semester End Examination.

Course Objectives:

1. To recall fundamental physical and biological principles those govern natural processes.
2. To understand the importance of ecological balance for sustainable development.
3. To Understanding the impacts of developmental activities and mitigation measures and to further understand the environmental policies and regulations.
4. To identify the complex relationships between scientific approaches to environmental issues and political, social, economic, and ethical perspectives on the environment.
5. To collect and interpret scientific data in both field and laboratory settings.
6. To integrate and apply perspectives from across the natural sciences, social sciences, and the humanities in the context of complex environmental problems.
7. To communicate scientific information to both professional and lay audiences.

Course Outcomes:

1. Develop an understanding of different natural resources including renewable resources.
2. Realize the importance of ecosystem and biodiversity for maintaining ecological balance.
3. Aware of important acts and laws in respect of environment.
4. Demonstrate critical thinking skills in relation to environmental affairs
5. Develop an understanding of environmental pollutions and hazards due to engineering/technological activities and general measures to control them.

6. Demonstrate knowledge and application of communication skills and the ability to write effectively in a variety of environmental contexts.
7. Demonstrate an ability to integrate the many disciplines and fields that intersect with environmental concerns.
8. Demonstrate an appreciation for need for sustainable development and role of science.

Curriculum Content	Hours
UNIT I: Significance of environmental studies Multidisciplinary nature of environmental studies Need for public awareness. a) Forest resources: Use and over-exploitation, deforestation, Timber extraction, mining, dams and their effects on forests and tribal people. b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. c) Mineral resources: Usage and exploitation, environmental effects of extracting and using mineral resources. d) Food resources: World food problem, changes caused by agriculture effects of modern agriculture, fertilizer-pesticide problems. e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. g) Role of an individual in conservation of natural resources. h) Equitable use of resources for sustainable lifestyle.	**04**
UNIT II: Ecosystems Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids. Introduction, types, characteristics features, structure and function of the following Ecosystem: - a) Forest ecosystem, b) Grassland ecosystem, c) Desert ecosystem, d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)	**04**
UNIT III: Biodiversity and its Conservation Introduction – Definition: genetic, species and ecosystem diversity, Biogeographical classification of India, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.; Biodiversity at global, National and local levels.; India as a mega-diversity nation; Western Ghats as a bio-diversity region; Hot-spots of biodiversity; Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; Endangered and endemic species of India; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.	**04**
UNIT IV: Environmental Pollution Definition: Causes, effects and control measures of: a) Air pollution, b) Water pollution, c) Soil pollution, d) Marine pollution, e) Noise pollution, f) Thermal pollution, g) Nuclear hazards • Solid waste Management: Causes, effects and control measures of urban and industrial wastes. • Role of an individual in prevention of pollution.• Pollution case studies• Disaster management: Floods, earthquake, cyclone and landslides. Tsunami	**04**
UNIT V: Social Issues and the Environment From Unsustainable to Sustainable development; Urban problems related to energy; Water conservation, rain water harvesting, watershed management; Resettlement and rehabilitation of people; its problems and concerns; Environmental ethics: Issue and possible solutions; Climate change, Global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust; Wasteland reclamation; Consumerism and waste products.	**05**
UNIT VI: Environmental Protection Environment Protection Act.; Air (Prevention and Control of Pollution) Act.; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act; Population Growth and Human Health, Human Rights. ;Field Work--Visit to a local area to document environmental assets river/forest/grassland/hill/mountain or Visit to a local polluted site –urban/rural/Industrial/Agricultural or Study of common plants, insects, birds or Study of simple ecosystems-ponds, river, hill slopes, etc.	**05**

Text Books	:	

1. Agarwal, K. C. 2001, Environmental Biology, Nidi Publ. Ltd., Bikaner.
2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad, 380013, India, Email:mapin@icenet.net (R)
3. Brunner R. C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p

Reference Books	:	

1. Clark R. S., Marine Pollution, Clanderson Press Oxford (TB) Pg No. 6
2. Cunningham, W. P. Cooper, T. H. Gorhani, E. & Hepworth, M. T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
3. De A. K., Environmental Chemistry, Wiley Eastern Ltd.
4. Down to Earth, Centre for Science and Environment (R)
5. Gleick, H., 1993, Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute. Oxford Univ. Press 473p
6. Hawkins R. e., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
7. Heywood, V. H. & Watson, R. T. 1995, Global Biodiversity Assessment, Cambridge Univ. Press 1140p.
8. Jadhav, H. & Bhosale, V. M. 1995, Environmental Protection and Laws, Himalaya Pub. House, Delhi 284p.
9. Mckinney, M. L. & Schocl. R. M. 1996, Environmental Science Systems & Solutions, Web enhanced edition
10. Mhskar A. K., Matter Hazardous, Techno-Science Publications (TB)
11. Miller T. G. Jr., Environmental Science, Wadsworth Publishing Co. (TB)
12. Odum, E. P. 1971, Fundamentals of Ecology, W. B. Saunders Co. USA, 574p.
13. Rao M. N. & Datta, A. K. 1987, Waste Water Treatment, Oxford & IBH Publ. Co. Pvt. Ltd.,
14. Sharma B. K., 2001, Environmental Chemistry, Goel Publ. House, Meerut
15. Survey of the Environment, The Hindu (M)
16. Townsend C., Harper, J. and Michael Begon, Essentials of Ecology, Blackwell Science (TB)
17. Trivedi R. K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media (R)
18. Trivedi R. K. and P. K. Goel, Introduction to air pollution Techno-Science Publications (TB)
19. Wagner K. D., 1998, Environmental Management, W. B. Saunders Co. Philadelphia, USA.

(M) Magazine
(R) Reference
(TB) Textbook

20. Paryavaram Swhastra – Gholap T. N.
21. Paryavaram Shastra - Gharapure.
22. Paryavaran Vighyan - V. R. Ahirrao - Nirali Prakashan, Pune.
23. Paryavaram Shastra Parichay - Jay Kumar Magar Vidya Prakashan, Nagpur.
24. Desh Ka Paryavaran - Anupam Misra, Ganolai santi Pratisthan. New Delhi.

Class & Semester	:	**S. Y. B.Tech (Computer Science and Technology), Part II, Semester III**									
Course Title	:	**Introduction to Performing Arts**						*Course Code*:	:	**HS 212**	
Teaching Scheme (Hours)	:	**2 hr /week= 2 x13= 26 hours**						*Credits*	:	**Nil**	
Evaluation Scheme (Marks)	:	**Assignments** **Viva voce**	: :	**50** **25**	**Written Test** **Grand Total**	: :	**25** **100**	*Duration of Exam*	:	**Not Applicable**	
Revision:	:	**Third**						*Month*	:	**December 2016**	

Pre-requisites	**:**	In order to conduct the course successfully, student's involvement and interest in the classroom is the pre- requisite.
Type of Course	**:**	Audit Course at institute level
Course Domain	**:**	Humanity and Fine Arts
Skills Imbibed	**:**	Cognitive: Understand, Apply Affective : Awareness, Respond, Value, Organize Psychomotor: Perceive, Imitate, Manipulate, Articulate, Adapt

Course Assessment Methods:

The students will be given five assignments each for 10 marks. At the end of the course, there will be a written test of 25 marks and a viva voce of 25 marks. There will be assessment for a total of 100 marks. Based on the marks obtained, they will be awarded with a grade similar to other credit courses. Though it is an audit course, obtaining passing grade is essential.

Course Objectives:

1. To understand the history of arts.
2. To cultivate and enhance the interest in Music and other performing arts.
3. To highlight that these arts are not only the medium of entertainment but also a medium for proper channelization of emotions as this plays a vital role in determining the quality of life.
4. To form and defend value judgments about music.
5. To acquire audience skills such as listening and viewing responsibly.
6. To understand & develop skills to become lifelong learners in the musical art, both as participants and as audience members.

Course Outcomes:

1. Students will be able to learn Fundamentals and types of Music and other allied arts.
2. Students will be able to analyze, appreciate, and interpret significant works of art.
3. Students will demonstrate critical thinking through analysis and evaluation of works of art.
4. Students will develop good listening and viewing skills.
5. Students will be able to understand the '*Gharana'* system in Music.
6. Students will understand the classification of Musical instruments.
7. Students will demonstrate mastery of their designated area of concentration.
8. Students will demonstrate comprehension of global perspectives in visual culture.

Curriculum Content	**Hours**

Unit I: Introduction to Music, Dance & Drama, History of Indian Music, Various Forms of Vocal Music.	**04**
Unit II: History and introduction of Drama, Bharat muni natya shastra, street play, Sanskrit natya, Marathi sangit rangbhumi	**04**
Unit III: Dance, its type, greek and roman theatres,	**04**
Unit IV: Concept of *Raga*, Concept of *Taal*.	**04**
Unit V: Notation System, Study of *Gharana* system in Music, Classification of Indian Instruments, Instrumental Music.	**05**
Unit VI: Contribution of Great Musicians, Appreciation of Music. Performance of a Music Concert.	**05**

Reference Books :

1. ‘Sangeet Visharad’, Vasant, Sangeet Karyalaya, Hatras Prakashan.
2. Suchita Bidkar, ‘Sangeet Shastra Vigyan’, Sanskar Prakashan.
3. Sudhir Mainkar, ‘Sangeet Kala Aani Shikshan’, Sanskar Prakashan.
4. Bhaskar Chandavarkar, ‘Vadyavedh’, Sanskar Prakashan.
5. Arvind Mulgaonkar, ‘Tabla’, Popular Prakashan.
6. Chris Hogget ,’All about theatre-Off stage’.
7. Mrinalini Sarabhai,’Understanding of Bharat Natyam’.
8. Joan Borysenko ,’Minding the body and mending the mind’,.
9. V.K.Subbanna ,’Ragadalli Antrang’.

Class & Semester	:	**S. Y. B.Tech (Computer Science & Technology) Part II, Sem IV**					
Course Title	:	**Theory of Computation**			*Course Code*:	:	**CS 221**
Teaching Scheme (Hours)	:	**3 hours/weeks=3x 13 weeks= 39hrs minimum** **Tutorial= 1hr/week** **Practical=NA**			*Total Credits*	:	***03+ 01 =4***
Evaluation Scheme (Marks)	:	CIE = 50 SEE = 50	IPE IOE EPE/EOE	: : :	= 100	*Duration of SEE*	*:*	3hrs
Revision:	:	**Second**				*Month*	:	*December 2016*

Pre-requisites	**:**	
The prerequisite for this course is basic knowledge of language theory , algebra and automatatheory.		
Type of Course	**:**	Theory
Course Domain	**:**	**Core (Thoery of Computation)**
Skills Imbibed	**:**	**Cognitive**

Course Assessment Methods:

Student is evaluated during Continuous Internal Evaluation (Internal Test I & Internal Test II) and Semester End Examination.

Course Objectives:

1. To develop ability to understand and conduct mathematical proofs for computation and algorithms.
2. To introduce students to the mathematical foundations of computation including automata theory.
3. To design DFA and NFA for solution to engineering problems.
4. To understand the theory of formal languages and grammars.

5. To study the PDA and normal forms of grammer.
6. Study and analyze different types of Turing Machines.

Course Outcomes:

Students will be able to

1. Design deterministic and nondeterministic automata to recognize specified regular languages.
2. Analyse and design finite automata, pushdown automata, formal languages, and grammars.
3. Convert among equivalently powerful notations for a language, including among DFAs, NFAs, and regular expressions, and between PDAs and CFGs.
4. Analyse and design Turing Machine.
5. Understanding of key notions, such as algorithm, computability, decidability, and complexity through problem solving.
6. Solve engineering problems using various types of turing machines and DFA, NFA, PDA.

Curriculum Content	Hours
Unit1 **Proofs and Regular Languages:** Types of Proofs, Mathematical Induction and Recursive definitions with examples. Regular expressions & corresponding regular languages, examples and applications, unions, intersection & complements of regular languages.	6
Unit2 **Finite State Machines:** Deterministic finite automata definition and representation, Non-deterministic F.A., NFA with ^ transitions, Equivalence of DFAs, NFAs and NFA-^s. Kleene's theorem - part I & II statements & proofs, minimum state FA for a regular language, minimizing number of states in an FA.	10
Unit3 **Grammars & Languages:** Definition and types of grammars and languages, derivation trees and ambiguity, CFL's & Non CFL's., Union, Concatenation and Kleene's operations, Intersection and complements of CFLs, Pumping Lemma & examples.	6
Unit4 **Push Down Automata:** Definition, deterministic PDA, types of acceptance and conversions to each other, CFGs & PDAs., Top-Down, & Bottom-up parsing.	6
Unit5 **Chomsky Normal Form:** BNF and CNF notations, Eliminating ^ production and unit productions from a CFG, Eliminating useless variables from a Context Free Grammar.	3

Unit6 **Turing Machines:** Models of computation, definition of TM as Language Acceptors, Combining Turing machines, computing a function with a TM. Variations in TM, TMs with doubly-infinite tapes, more than one tape, Non-deterministic TM and Universal TM.	8

Text Books	:	
		1. "Introduction to Languages & Theory of Computation", John C. Martin, TMH. 2. "Discrete Mathematical Structures with Applications to Computer Science", J.P.Tremblay&R.Manohar (TMH)
Reference Books	:	

1. "Introduction to Automata Theory, Languages and Computations", John E. Hopcraft, Rajeev Motwani, Jeffrey D. Ullman (Pearson Edition).
2. "Introduction to Theory of Computations", Michael Sipser, Thomson Brooks/Cole.

Class & Semester	:	**S.Y. B.Tech (Computer Science & Technology) Part II, Sem IV**					
Course Title	:	**Advanced Microprocessor**			*Course Code*:	:	**CS 222**
Teaching Scheme (Hours)	:	**3 hours/weeks=3x 13 weeks= 39 hrs minimum** **Tutorial= 1hr/week**			*Total Credits*	:	***03+1=4***
Evaluation Scheme (Marks)	:	CIE = 50 SEE = 50	IPE IOE EPE/EOE	: : :	= 100	*Duration of SEE*	:	3hrs
Revision:	:	**Second**				*Month*	:	*December 2016*

Pre-requisites	**:**	
Basic knowledge of microprocessor ,TASM & MASM		
Type of Course	**:**	Theory
Course Domain	**:**	**Core (Microporcessor)**
Skills Imbibed	**:**	**Cognitive**

Course Assessment Methods:

Student is evaluated during the Continuous Internal Evaluation (Internal Test I & Internal Test II) and Semester End Examination.

Course Objectives:

1. To understand and analyze the architecture, instruction set and operations of microprocessors 8086 and contemporary peripherals.
2. To understand the single and multi-processor mode of 8086 processor.
3. To understand and developing assembly level programs for microprocessor and microcontroller.
4. To understand and analyze 80386 microprocessor and PIC microcontroller.
5. To understand and analyze I/O Interfacing and Interrupt handling concept and to

implement these concepts with Intel 8086 Assembly Language.

6. To understand the operation of microprocessors and microcontrollers, machine language programming and interfacing techniques.

Course Outcomes:

Students will be able to

1. Get complete knowledge of architecture, instruction sets and operations of microprocessors 8086.
2. Develop various assembly language programs and understands the various addressing modes required for assembly language programming.
3. Understand 80386 microprocessor and PIC microcontroller.
4. Develop enough confidence to take up the challenges in building useful microprocessor based applications.
5. Analyze instruction sets, applying programming and gain hands-on experience of 8086 & 80386 microprocessor and microcontroller.
6. Outline the architecture of ARM processor and PIC microcontroller.

Curriculum Content	Hours
Unit:I 8086 CPU Architecture, EU & BIU activities, Segmentation and address transition, 8086 pin description, 8284 clock generation 8286, 8282, configuration of 8086. Accessing even and add address memory with byte/ word. Software and Hardware interrupts.	**8**
Unit:II Addressing modes, data Transfer, arithmetic logical string, i/o instruction, control group ofinstruction, writing programs using assembler directive and in different module and linking, BIOS /DOS interrupts for Printer, VDU, serial, FDC, Add on cards interface.	**8**
Unit:III Multifunction pins of 8086, 8088-Bus controller, IOB mode of 8288, Minimum & Maximum mode Configuration diagram. Study of 8087 NDP	**3**
Unit:IV Linking and relocation, Stacks, procedures, interrupt and interrupt routines, macros, program design, program design examples..	**4**
Unit :V Salient features of 80386DX, Architecture and signal description, Register organization, addressing modes, data types, Real address mode, protected mode, Segmentation, Paging.	**5**

Unit : VI PIC Microcontroller 8 bit Microcontroller, architecture, Addressing Modes, Timers, Counters, Interrupts, Serial Communication, Programming Concepts, design of embedded systems with microcontrollers.Data warehousing, OLAP and data mining, web warehousing, schema integration and data Cleaning, deduplication, data marts: multidimensional databases (OLAP) Advanced topics ETL, integrating OLAP and mining, online aggregation, recap, future and visions	**11**

Text Books	:	
		1. *"Design with PIC Microcontrollers",* John B. Peatman, Pearson Education.
Reference Books	:	

1. *"8086/8088 Family design programming and interfacing",* John Uffenbeck, PHI.
2. *"The INTEL Microprocessor".*
3. *"An introduction to 8086/8088 assembly language programming for beginners",* N. M. Morris.

Class & Semester	:	**S.Y. B.Tech (Computer Science & Technology) Part II, Sem IV**					
Course Title	:	**Computer Organisation**			*Course Code*:	:	**CS223**
Teaching Scheme (Hours)	:	**4 hours/weeks=4x 13 weeks= 52 hrs minimum** **Tutorial= NA** **Practical= NA**			*Total Credits*	:	***04+ 00=4***
Evaluation Scheme (Marks)	:	CIE = 50 SEE = 50	IPE IOE EPE/EOE	: : :	=100	*Duration of SEE*	:	3 hrs
Revision:	:	**Second**				*Month*	:	*December 2016*

Pre-requisites	**:**	
An introduction to the theory and fundamentals of computer architecture and data communications.		
Type of Course	**:**	Theory
Course Domain	**:**	**Core (Computer Architecture)**
Skills Imbibed	**:**	**Cognitive**

Course Assessment Methods:

Student is evaluated during Continuous Internal Evaluation (Internal Test I & Internal Test II) and Semester End Examination.

Course Objectives:

1. To conceptualize the basics of organizational and architectural issues of computer.
2. To analyze performance issues in processor and memory design of a computer.
3. To understand various data transfer techniques in computer.
4. To analyze processor performance improvement using instruction level parallelism.
5. To provide the knowledge on Instruction Level Parallelism.
6. To understand and analyze Memory Organization.

Course Outcomes:

Students will be able to

1. Ability to understand basic structure of computer.
2. Ability to perform computer arithmetic operations.
3. Ability to understand control unit operations.
4. Ability to design memory organization that uses banks for different word size operations.
5. Ability to understand the concept of cache mapping techniques.
6. Ability to understand the concept of I/O organization.
7. Ability to conceptualize instruction level parallelism.

Curriculum Content	Hours
Unit 1 Basic Computer Organization: Evolution of computers - Mechanical era, Electronic computers, Generations, VLSI era, CPU organization , communications, user and supervisor modes, accumulator based CPU, System bus, instruction cycle, types of instruction(zero, one, two and three address machines), IO interface, RISC & CISC, definition, comparison and examples.	**6**
Unit 2 CPU design: Specifications, (memory, speed, frequency etc.) with example, Instruction fetching, decoding, executing, Case Study (architecture, block diagram, instruction sets etc.), Pentium 4 processor, AMD processor.	**4**
Unit 3 Computer Arithmetic: Data Representation, basic formats, storage order, fixed point numbers, binary, signed, decimal, hexadecimal, Floating point numbers, basic formats, normalization, biasing, IEEE754 format, Fixed point arithmetic - Addition and subtraction, overflow, high speed adders, adder expansion, Fixed point multiplication - Two's complement multiplier, Booth's algorithm, Combinational array multiplier, Fixed point division - Restoring, Non restoring algorithm, Combinational array divider, Division by repeated multiplication, Floating point arithmetic - Basic operations, Difficulties, Floating point units, Addition, subtraction, multiplication, division.	**12**
Unit 4 Control Design: Introduction, multi cycle operation, implementation methods, Hardwired control, design methods, state tables, GCD processor, Classical method, one hot method, Design example- twos complement multiplier control, CPU control unit design.	**8**
Unit 5 Micro programmed control: Basic concepts, control unit organization, parallelism in microinstructions,	**8**

Microinstruction addressing, timing, Control unit organization, Design example- twos complement, multiplier control, Control field encoding, encoding by function, multiple microinstruction formats. **Unit 6 Memory Organization:** Types of memory, Memory systems, multilevel, address translation, memory allocation, Caches, Associative memory, direct mapping, set associative addressing.	**12**

Text Books	**:**	
		1. Computer Architecture and Organization - John P Hayes (MGH) 3rd Edition. 2. Computer Systems Organization & Architecture – John D. Carpinelli (Pearson Education)
Reference Books	**:**	

1. Computer Organization - HamacherZaky (MGH).

2. http://cse.stanford.edu/class/sophomore-college/projects-00/risc/risccisc/ (RISC vs CISC)

3. http://www.cpu-world.com/sspec/

4. http://www.intel.com/technology/itj/q12001/pdf/art_2.pdf (The Micro architecture of the Pentium 4 Processor)

5.http://www.amd.com/usen/assets/content_type/white_papers_and_tech_docs/30579_AMD_Processor_Evaluation_Guide3.1.pdf (AMD Processor Performance Evaluation Guide).

Class & Semester	:	**Second Year B.Tech (Computer Science &Technology) Part II, Sem IV**					
Course Title	:	**Computer Networks**			*Course Code*:	:	**CS 224**
Teaching Scheme (Hours)	:	**3 hours/weeks=3x 13 weeks= 39hrs minimum** **Tutorial= 1Hr/week** **Practical=2Hr/week**			*Total Credits*	:	***03+ 1 =4***
Evaluation Scheme (Marks)	:	CIE = 50 SEE = 50	IPE IOE EPE/EOE	: : :	=100	*Duration of SEE*	:	3hrs
Revision:	:	**Second**				*Month*	:	*December 2016*

Pre-requisites	**:**	
Fundamentals of Data communication		
Type of Course	**:**	Theory
Course Domain	**:**	**Core(Networking)**
Skills Imbibed	**:**	**Cognitive**

Course Assessment Methods:

Student is evaluated during Continuous Internal Evaluation (Internal Test I & Internal Test II) and Semester End Examination.

Course Objectives:

1. To understand the fundamental concepts of computer networking.
2. Familiarize the student with the basic taxonomy and terminology of the computer networking area.
3. Give an overview of the main types of media used in local area networks
4. Explain the following terms: computer network, LAN, WAN, MAN, internet, protocol, topology,media, peer-to-peer network, server based network.
5. Describe how the different devices used to communicate through a network work and in whatn circumstances they are used.

6. To understand the terminology and concepts of the OSI reference model and the TCP-IP reference model.

Course Outcomes:

Students will be able to

1. Understand basic computer network technology.
2. Understand and explain Data Communications System and its components.
3. Identify the different types of network topologies and protocols.
4. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
5. Identify the different types of network devices and their functions within a network
6. Understand and building the skills of subnetting and routing mechanisms.

Curriculum Content	Hours
Unit 1 Data link layer: Random Access- CSMA, CSMA/CD, CSMA/CA, Controlled Access-Reservation, Polling, Token Passing, Channelization.-FDMA, TDMA, CDMA	4
Unit 2 Networking Concepts: Ethernet, Standard Ethernet, Changes in Standards, FAST & GIGABIT Ethernet, Connecting LANS, Backbone Networks & Virtual LANS, Adhoc Networks.	4
Unit 3 Wireless LANs: IEEE 802.11-Architecture, MAC Sub layer, Addressing, Bluetooth, - Architecture ,Blue Tooth & Radio& Base Band Layer, Wireless WANs –Cellular Telephone-Principal, Transmitting, Receiving, Roaming, First& Second & Third Generation. Satellite Network-Orbits, Footprint, categories, GEO, MEO, LEO Satellites.	4
Unit 4 Network Layer: IPV4-AddressSpace, Notation, Classful, Classless Addressing, Datagram, Fragmentation, Checksum, Options. IPV6 –Structure, Address Space, Packet Format, Extension, Advantages. Address Mapping, Multicasting, Network Layer –Delivery, Forwarding-Techniques& process & Unicasting & Multi Casting routing Protocols.	8
Unit 5 Transport Layer: Process to Process Delivery- Client/Server Concept, MUX/DEMUX, Connection oriented or connection less .TCP-Frame Format, Services, Features, Connection, Flow & Error Control. UDP-Frame Format, operation, User datagram, Checksum ,Congestion control & Quality of Service – data traffic ,Congestion ,Congestion Control ,Examples, quality Of Service ,Improve Q0s , Integrated & Differentiated . Socket Programming using TCP, UDP.	12
Unit 6 Application Layer: DNS- Name Space, label, Domain Name, Domain, Distribution of Name Space. Remote Login- TELNET, E-Mail- Architecture, POP, IMAP, SMTP. File transfer-FTP, Autonomous FTP, WWW –Architecture ,Web Documents, HTTP	7

Text Books	:	

		1. "Data communication and Networking", Behrouz A. Forouzan, TMGH, 4th Edition. 2. "Unix network programming", Richard Steven (PHI) for Socket Programming (Second Edition.) 3. "Local Area Networks", Behrouz A. Forouzan, (TMGH)
Reference Books	**:**	

1. *"Computer Networks",* A.S. Tanenbaum, PHI, 3rd Edition.
2. *"TCP/IP protocol suite",* Behrouz A. Forouzan, TMGH.

Class & Semester	:	**S.Y. B.Tech (Computer Science & Technology) Part II, Sem IV**					
Course Title	:	**Computational Mathematics**			*Course Code*:	:	**CS 225**
Teaching Scheme (Hours)	:	**3 hours/weeks=3x 13 weeks= 39 hrs minimum** **Tutorial= 1Hr/week** **Practical= NA**			*Total Credits*	:	***03+ 01 =4***
Evaluation Scheme (Marks)	:	CIE = 50 SEE = 50	IPE IOE EPE/EOE	: : :	=100	*Duration of SEE*	:	3 hrs
Revision:	:	**Second**				*Month*	:	*December 2016*

Pre-requisites	**:**	
Fundamentals of Engineering Mathematics		
Type of Course	**:**	Theory
Course Domain	**:**	**Applied Science**
Skills Imbibed	**:**	**Cognitive**

Course Assessment Methods:

Student is evaluated during Continuous Internal Evaluation (Internal Test I & Internal Test II) and Semester End Examination.

Course Objectives:

1. To solve standard forms of partial differential equations.
2. To visualize relationship between Fourier And Laplace Transform**.**
3. To understandproperties of z-transform to solutions of difference equations.
4. To understand and solve problems on Random variables and expectation.
5. To understand the Test of Hypotheses and Significance.

6. To solve Transportation Problem.

Course Outcomes:

Student will be able to

1. Solve nonlinear equations using various numerical methods such as bisection method, Newton's method, secant method and fixed point iteration method
2. Solve large systems of linear equations using Gaussian elimination, factorization methods.
3. Approximate functions and data using polynomial and rational interpolation or polynomial and rational least squares approximation and explain the concept of error estimation.
4. Solve a system of ordinary differential equations using various numerical methods.
5. Evaluate definite integrals using numerical quadrature such as Gaussian quadrature, Newton-Cotes methods.
6. Numerically determine eigenvalues and eigenvectors for very large matrices using a variety of methods.

Curriculum Content	Hours
Unit 1 Partial Differential Equations Four standard forms of partial differential equations of first order	4
Unit 2 Fourier And Laplace Transform **Fourier Transform:** Definition, properties & theorem, Laplace transform Fourier sine & cosine integrals, inverse Fourier transform, applications of Fourier transform in sampling signals, discrete Fourier transform & its properties. **Laplace Transform**: Definitions, properties & theorems, Laplace transform of standard functions, unit step function, unit impulse functions, inverse Laplace transform, and application to solutions of linear differential equations (electric circuit problems).	8
Unit 3 Z-Transform: Definition properties of z-transform, z-transform of standard sequences, inverse z-transform, relationship of z-transform with Fourier, applications of z-transform to solutions of difference equations.	6
Unit 4 Random variables and expectation: Discrete random vectors, independent random variables, the Exponential distribution ,some important distributions ,functions of a random variables ,jointly distributed random variables, order statistics, distributions of sums .Moments, Exception of functions of more than one random variable, introduction of conditional distribution & exception, mixture distribution, conditional expectations.	6
Unit 5 Test of Hypotheses and Significance: Statistical Decisions, statistical hypothesis, Null hypothesis, Tests of hypothesis and	8

significance,Type1 and Type 2 Errors ,Level of Significance, Tests involving the normal Distributions ,One -Tailed and Two-tailed tests, P value , special tests of Significance for large Samples& small Samples ,Relationships Between Estimation theory and Hypothesis testing, Operating characteristics curves, Power of tests ,Quality control charts, Fitting Theoretical Distributions to Sample frequency Distributions ,The Chi-Square Test for goodness of Fit, Contingency Tables, Yates‟ Correction for continuity ,Coefficient of contingency. **Unit 6 Transportation Problem** Introduction, Mathematical formulation, Method for obtaining initial basic feasible solution, North –West corner method, Low cost entry method, Vogel′s approximation method, Method to obtain optimal solution (MODI Method)	6

Text Books	**:**	
		1. *"A Text Book of Applied Mathematics Vol –I, Vol- II",* J.N. & P.M. WartikarVidyrthiGrihaPrakashan, Pune.(Module 2, 4). 2. *"Operation Research",* S. D .Sharma.(Module 5,6). 3. *"Fundamental Statistics",* Gupta Kapoor. (Module 1) 4. *"Introduction to Numerical Analysis",* S.S. Sastry (Module 3) 5. Advanced Engineering Mathematics (7th edition) by Erwin Kreyszig, Wiley easten Ltd. Bombay. 6.Higher Engineering Mathematics. by B.S. Grewal, Khanna Publication, New Delhi. 7.Kishor S. Trivedi, Probability and Statistics with reliability, Queuing, and Computer Science Applications, PHI, ISBN: 81-203-0508-6.
Reference Books	**:**	

1. *"Higher Engineering Mathematics",* B.S. Grewal. Khanna Publications.
2. *"Operation Research",* KantiSwaroop, P.N. Gupta Man Mohan.
3. Advanced Engineering Mathematics by C.R. Wiley, McGraw Hill Publications, New Delhi
4. Advanced Engineering Mathematics (5th edition) by peter V.O. Neil, Thomson Brooks / Cole, Singapore.
5. Papoulis, Pillai, Probability, Random Variables and Stochastic Processes, 4th Edition ,TMH, ISBN: 0-07-048658-1

Class & Semester	:	**S.Y. B.Tech (Computer Science & Technology) Part II, Sem IV**								
Course Title	:	**Advanced Microprocessor Lab**						*Course Code*:	:	**CS 222L**
Teaching Scheme (Hours)	:	**2 hr /week=2x13= 26 hrs**						*Credits*	:	**1**
Evaluation Scheme (Marks)	:	IPE IOE	: :	**50** **NIL**	EPE EOE	: :	**50** **NIL**	*Duration of Exam (in case of External Evaluation)*	:	**02 hours**
Revision:	:	**Second**						*Month*	:	*December 2016*

Pre-requisites	**:**	
Study of 8085, Assembly language programming for 8085, Writing subroutine, Designing & implementing hardware for INTR and Study of interfacing.		
Type of Course	**:**	Practical
Course Domain	**:**	**Core**
Skills Imbibed	**:**	**Cognitive**

Course Assessment Methods:

Practical Journal Assessment, Internal Oral Examination and External Practical Examination

Course Objectives:

1. Understand 8086 microprocessor, knowledge of 8086 instruction set and ability to utilize it in assembly language programming.
2. To learn the Assembly language programming using MASM (Micro Assembler).
3. To develop the conceptual understanding of 8086 ALP and conduct experiments on data processing.
4. To learn assembly language programming using 8051 microcontroller.
5. To develop ability in programming using microprocessors and microcontrollers.
6. Understand real mode Memory addressing and ability to interface various devices to the microprocessor.

Course Outcomes:

Students will be able to

1. apply the knowledge of the fundamentals of assembly level programming of microprocessors and microcontroller.
2. learn MASM assembler programming.
3. understand an ALP in 8086 and its interfacing circuits.
4. Develop ability in designing a microprocessor and microcontroller systems.
5. Provide practical hands-on experience with microprocessor applications and interfacing techniques.
6. understand and familiarizing with the assembly level programming and microprocessor and microcontroller.

Practical covered	**:**	

1. 8086 Architecture: To understand 8086 Architecture in details.
2. Implement 8086 program for addition and subtraction of two 16 bit numbers.[Applying]
3. Implement 8086 program for signed and unsigned multiplication [Applying]
4. Implement 8086 program for signed and unsigned division [Applying]
5. Implement 8086 program to check number is even or odd.[Applying]
6. Implement 8086 program for check number is positive or negative [Applying]
7. Implement a program:
    a) To find largest number from array [Applying]
    b) To find smallest number from array [Applying]
8. Implement program for password matching [Applying]
9. Implement a program to display a string and to do case conversion [Applying]
10. Implement a program to string reverse and string copy [Applying]
11. Implement a program:
    a) To sort numbers in ascending order [Applying]
    b) To sort numbers in descending order [Applying]
12. Implement a program for counting 1’s and 0’s [Applying]
13. Write NDP architecture in detail with diagram [Remembering]

Class & Semester	:	**S. Y. B.Tech (Computer science & Engineering) Part II, Sem IV**								
Course Title	:	**Computer Networks Lab**						*Course Code*:	:	**CS 225L**
Teaching Scheme (Hours)	:	**2 hr /week=2x13= 26 hrs**						*Credits*	:	**1**
Evaluation Scheme (Marks)	:	IPE IOE	: **50** :	**50**	EPE EOE	: **50** :	**50+50** **=100**	*Duration of Exam (in case of External Evaluation)*	:	**03 hours**
Revision:	:	**Second**						*Month*	:	*December 2016*

Pre-requisites	**:**	
Knowledge of Programming Methodology, 'C' language, Control Statements, Functions, Arrays, Pointers, Structures and Union and File Handling concepts.		
Type of Course	**:**	Practical
Course Domain	**:**	**Core**
Skills Imbibed	**:**	**Cognitive**

Course Assessment Methods:

Practical Journal Assessment, Internal Oral Examination and External Practical Examination

Course Objectives:

1. Build an understanding of the fundamental concepts of computer networking.
2. Familiarize the student with the basic taxonomy and terminology of the computer Networking area.
3. Introduce the student to advanced networking concepts
4. Preparing the student for entry Advanced courses in computer networking.
5. Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks
6. To implement important computer networking protocols in a high – level programming language.

Course Outcomes:

Students will be able to

1. Independently understand basic computer network technology.
2. Understand and explain Data Communications System and its components.
3. Identify the different types of network topologies and protocols.
4. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
5. Identify the different types of network devices and their functions within a network
6. Understand and building the skills of sub netting and routing mechanisms.

Practical covered	:	

1. File transfer using Stop & Wait Protocol / Go back n / Selective Repeat Protocol
2. Implementation of Hamming code / CRC for error detection / recovery.
3. Implementation of Shortest Path algorithm.
4. Analysis of FTP & TELNET using Simulator Packet Capturing.
5. Case study of campus-wide network
6. Socket Programming using TCP.
7. Web page design.
8. TFTP implementation with socket (UDP)
9. DNS client utilities with Nslookup and Dig
10. Write a program to fetch given URL.

Class & Semester	:	**S.Y. B.Tech (Computer Science & Technology) Part II, Sem IV**								
Course Title	:	**Object Oriented Lab**						*Course Code*:	:	**CS 226L**
Teaching Scheme (Hours)	:	**Theory: 2 hrs /week=2x13= 26 hrs** **Practical:2 hrs /week=2x13= 26 hrs**						*Credits*	:	**3**
Evaluation Scheme (Marks)	:	IPE IOE	: :	**50** **NIL**	EPE EOE	:50 :	**50+50= 100**	*Duration of Exam (in case of External Evaluation)*	:	**03 hours**
Revision:	:	**Second**						*Month*	:	*December 2016*

Pre-requisites	**:**	
Knowledge of Programming Methodology, 'C' language, Control Statements, Functions, Arrays, Pointers, Structures and Union and File Handling concepts.		
Type of Course	**:**	Practical
Course Domain	**:**	**Core**
Skills Imbibed	**:**	**Cognitive**

Course Assessment Methods:

Practical Journal Assessment, Internal Oral Examination and External Practical Examination

Course Objectives:

1. To teach the basic concepts and techniques which form the object oriented programming paradigm.
2. To strengthen their problem solving ability by applying the characteristics of an object-oriented approach.
3. To introduce object oriented concepts in C++ .
4. Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
5. To implement the object oriented concepts to solve problems
6. To develop an application applying the object oriented concepts

Course Outcomes:

Students will be able to

1. Explain what constitutes an object-oriented approach to programming and identify potential benefits of object-oriented programming over other approaches.
2. Apply an object-oriented approach to developing applications of varying complexities
3. Take a problem and develop the structures to represent objects and the algorithms to perform operations.
4. Apply standards and principles to write truly readable code.
5. Test a program and, if necessary, find mistakes in the program and correct them.
6. to develop applications using object oriented concepts.

Course Content :

Unit 1 Fundamentals of C++: (2 Hrs)

The Origins of C++, Encapsulation, Polymorphism, Inheritance, Function Overloading, Operator Overloading, Constructors & Destructors, C++ key words.

Unit 2 Classes & Objects: (2Hrs)

Relation of Classes, Structures & Union, Friend Functions, Friend Classes, Inline Functions, Parameterized constructors, Static class members, Scope resolution operators, Passing objects to functions, nested classes, and local classes.

Unit 3 Arrays, Pointers, Dynamic Allocation Operators: (3 Hrs)

Arrays of objects, Pointers to objects, Type checking C++ Pointers, This Pointer, Pointers to derived types, Pointers to class members, Dynamic allocation operators- new & delete operators.

Unit 4 Function (6 Hrs)

Function: Reference arguments, overloaded functions, inline functions, default arguments, returning by reference, friend functions and static functions.
Virtual Functions: Accessing Normal and Virtual member functions, late binding, pure virtual functions, Abstract classes, Virtual base classes.

Unit 5 Operator Overloading & Inheritance: (6 Hrs)
Overloading unary and binary operators, Overloading extraction and insertion operators, data Conversion.
Inheritance: Derived class and base class, derived class constructors, over riding member functions, public and private inheritance, multiple inheritance.

Unit 6 File and Streams: (6 Hrs)

Streams, String I/O, Character I/O, Object I/O, I/O with multiple objects, File pointers and redirections.

Advanced C++ features:
Templates, Exception handling, Library organisation and containers.

Practical covered	**:**	

1. Write a program to demonstrate concept of class. For example: create class matrix, class string, class car, class date, class time, class person etc.
2. Write a program to demonstrate following Function concepts
    a. Function overloading
    b. Constructors of all types
    c. Default parameters, returning by reference
    d. Demonstration of friend function
    e. Demonstration of static function
3. Write a program to demonstrate
    a. Operator overloading –for unary as well as binary operation.
    b. Apply above concept on matrix and string classes created above.
4. Write a program to demonstrate C^{++} s capability of all types of inheritance
    a. Single, multiple, multivalued
    b. Virtual function.
    c. Abstract class
    d. Runtime polymorphism
5. Write a program for new and delete operators, pointers to objects.
6. Write a program for pointers to pointers, this pointer.
7. Write a program for Templates, Exception handling.
8. Write a program for Stack and Queue.
9. Write a program for the linked list,
10. Write a program for Binary tree, Traversal of a Binary tree.

Class & Semester	:	**S. Y. B.Tech (Computer Science and Technology), Part II, Semester IV**									
Course Title	:	**Environmental Studies Project Work**						*Course Code*:	:	**HS221**	
Teaching Scheme (Hours)	:	**2 hr /week= 2 x12= 24 hours**						*Credits*	:	**Nil**	
Evaluation Scheme (Marks)	:	**IPE** **IOE**	: :	**30** **Nil**	**EPE** **EOE**	: :	**Nil** **Nil**	*Duration of SEE for Theory part*	:	**2 hours** (SEE at the yearend)	
Revision	:	**Third**						*Month*	:	**December 2016**	

Pre-requisites	**:**	Knowledge of fundamentals of Physics and Chemistry
Type of Course	**:**	Filed work with necessary laboratory experimentation
Course Domain	**:**	Humanities and Applied Science
Skills Imbibed	**:**	Cognitive: Understand, Apply, Analyze, Evaluate, Create Psychomotor: Imitation, manipulation, articulation, naturalization
Course Assessment Methods: Students Project/ field work assessment. However, their overall response during entire semester is also considered for evaluation.		
Practical List	**:**	
Field work under the supervision of course coordinator.		
Lab Manual	**:**	
Institute's Laboratory Course Manual and equipment wise Standard Operating Procedure to follow in case of use of related apparatus, equipment.		

Class & Semester	:	**S. Y. B.Tech (Computer Science and Technology), Part II, Semester IV**								
Course Title	:	**Soft Skills Development**						*Course Code*:	:	**HS222**
Teaching Scheme (Hours)	:	**2 hr /week= 2 x13= 26 hours**						*Credits*	:	**Nil**
Evaluation Scheme (Marks)	:	**Assignments** **Viva voce**	: :	**50** **25**	**Written Test** **Grand Total**	: :	**25** **100**	*Duration of Exam*	:	**Not Applicable**
Revision:	:	**Third**						*Month*	:	**December 2016**

Pre-requisites	**:**	H.S.C level English Language Competency
Type of Course	**:**	Audit Course at institute level
Course Domain	**:**	Humanity and Arts
Skills Imbibed	**:**	Cognitive: Understand, Predicting Situation, Comprehend, Affective : Receive, Listen, Respond, Showing self reliance, Organize Psychomotor: Imitation, adaptation, articulation, origination

Course Assessment Methods:

The students will be given five assignments each for 10 marks. At the end of the course, there will be a written test of 25 marks and a viva voce of 25 marks. There will be assessment for a total of 100 marks. Based on the marks obtained, they will be awarded with a grade similar to other credit courses. Though it is an audit course, obtaining passing grade is essential.

Course Objectives:

1. To develop effective communication skills (spoken and written).
2. To develop effective presentation skills.
3. To compete successfully in the business environment.
4. To generate ability in the learners to put their domain knowledge into effective practice.
5. To make the students self-confident individuals by mastering inter-personal skills, team management skills, and leadership skills..
6. To prepare the learners to take part effectively in various selection procedures adopted by the recruiters and to increase employment opportunities

Course Outcomes:

1. Students are able to expertise in self development, effective communication skills and interview skills
2. Understand how to handle situation and take decision
3. Equip to any sort of interviews particularly job interviews
4. Acquaintance with documentation skills
5. Become self reliant and responsible
6. Team build up, its development and management

Curriculum Content	**Hours**
Unit I : Self Development	**02**

Self analysis, creativity, attitude, motivation, goal setting. Importance of career visioning and planning. **Unit II : Effective Communication Skills** Importance of communication, Communication process, Elements of communication, Communication Types- verbal and non verbal, objectives of communication. Business Communication, current English usage, debates, language games, situational dialogues, precise writing, essay writing, presentations. **Unit III : Behavioral Skills** **Psychological Tests:** Aptitude and personality assessment, suggestions for improvement, **Team Skills:** Team building and leadership, evolution of groups into teams, group dynamics, emergence of leadership, intra-group dynamics, inter-group dynamics, conflict management, inter dependency, assessment of team-based projects, **Time Management:** Pareto's Principle, Parkinson's Laws, Murphy's Laws, Law of Clutter, prioritization, goal setting, effective time management, **Interpersonal Skills:** Negotiations, listening skills, social skills, assertive skills, cross-cultural communications, **Leadership Skills:** Concepts of leadership, leadership styles, insights from great leaders. **Unit II : Documentation** Report writing-Formal report, study tour report, project report, Writing proposal-solicited proposals and unsolicited proposals. **Unit III: Emotional Intelligence** Emotional Brain, Nature of emotional intelligence, emotional intelligence applied windows of opportunity, emotional literacy. **Unit VI: Interview Skills** Importance of Interview Skills, Resume Building, Group discussion and personal interview, Psychometric Test, actual career planning.	**06** **08** **03** **04** **03**
Text Book :	
1. Soft Skills, 2015, Career Development Centre, Green Pearl Publications.	
Reference Books :	
1. "*Seven Habits of Highly Effective Teens"*, Covey Sean, , New York, Fireside Publishers, 1998. 2. "*How to win Friends and Influence People"*, Carnegie Dale, New York: Simon & Schuster, 1998. 3. "*I am ok, You are ok "*,Thomas A Harris, New York-Harper and Row, 1972 4. "*Emotional Intelligence"*, Daniel Goleman, Bantam Book, 2006 5. "Effective communication skill", MTD training & Ventus publishing ApS ISBN 978-87-7681-598-1.	

Equivalence of Second Year B.Tech (Computer Science and Technology) Semester III and IV

The above detailed syllabus is a revised version of the Second Year B.Tech(**Computer Science and Technology**) Program being conducted by the Shivaji University at the Technology Department of the University. This syllabus is to be implemented from June 2017, (Academic year 2017-18). The prime feature of this revision is the transformation of the existing curriculum into the Outcome based curriculum as specified in NBA rules and regulations.

The Equivalence for the subjects/coursesof**Computer Science and Technology** at Second Year B Tech Semester IIIand IV pre-revised Program under the faculty of Engineering and Technology is as follows.

Second Year B.Tech Semester III (Computer Science and Technology)

Sr.No	Second Year B.Tech(Computer Science and Technology) Semester III Pre-revised syllabus	Second Year B.Tech(Computer Science and Technology) Semester III Revised syllabus	Remark
1	Engineering Mathematics-III	Engineering Mathematics-III	No change in the subject content
2	Discrete Mathematical Structure	Discrete Mathematical Structure	No change in the subject content
3	Digital Systems and Microprocessor	Digital System and Microprocessor	No change in the subject content
4	Data Structure with C	Data Structure with C	No change in the subject content
5	Data Communication	Data Communication	No change in the subject content
6	Digital Systems and Microprocessor Lab	Digital Systems and Microprocessor Lab	No change in the subject content
7	Data Structure Lab	Data Structure Lab	No change in the subject content
8	Unix and Shell Programming	Unix and Shell Programming	No change in the subject content
9	Introduction to Performing Arts	Introduction to Performing Arts	No change in the Audit Subject content
10	Environmental Studies	Environmental Studies	No change in the Subject content

Second Year B.Tech Semester IV (Computer Science and Technology)

Sr.No	Second Year B.Tech(Computer Science and Technology) Semester IV Pre-revised syllabus	Second Year B.Tech(Computer Science and Technology) Semester IV Revised syllabus	Remark
1.	Theory of Computation	Theory of Computation	No change in the subject content
2.	Advanced Microprocessor	Advanced Microprocessor	No change in the subject content
3.	Computer Organization	Computer Organization	No change in the subject content
4.	Computer Networks	Computer Networks	No change in the subject content
5.	Computer Graphics and Multimedia Techniques	----------	Shifted to V semester
6.	Advanced Microprocessor Lab	Advanced Microprocessor Lab Lab	No change in the subject content

7.	Computer Graphics Lab	----------	Shifted to V semester
8.	Object Oriented Lab	Object Oriented Lab	No change in the subject content
9.	----------	Computational Mathematics	New subject introduced in Sem-IV
10.	Introduction to Foreign Languages	----------	Shifted to Semester -VI
11.	----------	Computer Network Lab	Added to Sem -IV
12.	-	Soft Skills Development	Audit Subject Presentation and Communication Skills taken from Sem-VI

Audit course have not been assigned any credits. The students will be evaluated for these courses by the concerned course in charge. There will be grade conferred to the student. The grade will be based on conversion of marks obtained out of 50. (Obtaining passing grade is essential). Please refer to chart in the detail examination scheme. The chart shows the marks range and the respective grade.