

**ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABUS**

R24

Bachelor of Computer Applications (Honours)

B.C.A/B.C.A (H)

Four Years U.G. Programme

(Applicable for the batches admitted from the A.Y. 2024-2025)



SWARNANDHRA

**COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)**

SEETHARAMAPURAM, NARSAPUR-534 280, W.G.DT., A.P.

ACADEMIC REGULATIONS R24

ACADEMIC REGULATIONS R24 FOR BCA / B.C.A.,(Hons.) PROGRAMME

Applicable for the students of B.C.A./B.C.A.,(Hons.)(Regular) Programme admitted from the Academic Year 2024-25 and onwards

The B.C.A./B.C.A.,(Hons.)Degree shall be conferred on candidates who are admitted to the program and who fulfil all the requirements for the award of the Degree.

1.0 ELIGIBILITY FOR ADMISSIONS

Admission to the above program shall be made subject to eligibility, qualification and specialization as prescribed by the University from time to time.

Admissions shall be made on the basis of merit rank obtained by the candidates at entrance examination concerned or the qualifying Entrance Test conducted by the University or on the basis of any other order of merit as approved by the University, subject to reservations as laid down by the Govt. of Andhra Pradesh from time to time.

2.0 AWARD OF B.C.A. DEGREE

2.1 A student shall be declared eligible for the award of the B.C.A., Degree, if he pursues a course of study and completes it successfully in not less than THREE academic years and not more than SIX academic years

2.2 The student shall register for all 120 credits and secure all the 120 credits.

2.3 The minimum instruction days in each semester are 90.

2.4 A Student, who fails to fulfil all the academic requirements for the award of the degree within SIX academic years from the year of their admission, shall forfeit his seat in B.C.A., course

2.5 After successful completion of First three-year academic requirements a student can opt to REGISTER for B.C.A. (Hons) Degree by completing 40 more credits in the FOURTH YEAR.

3.0 ATTENDANCE REQUIREMENTS:

- i) A student shall be eligible to appear for the University external examinations if he/she acquires a minimum of 75% of attendance in aggregate of all the subjects. Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee.
- ii) Shortage of Attendance below 65% in aggregate shall in NO CASE be condoned.
- iii) A stipulated fee of Rs 500/- shall be payable towards condonation of shortage of attendance to the University.
- iv) Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled.
- v) A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester. They may seek readmission for that semester from the date of commencement of class work.
- vi) If any candidate fulfils the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.
- vii) If the learning is carried out in blended mode (both offline & online), then the total attendance of the student shall be calculated considering the offline and online attendance of the student.

a. Promotion Rules:

The following academic requirements must be satisfied in addition to the attendance requirements mentioned in the above.

- i) A student shall be promoted from first year to second year if he/she fulfils the minimum attendance requirement as per university norms.
- ii) A student will be promoted from II to III year if he/she fulfils the academic requirement of securing 40% of the credits (any *decimal* fraction should be *rounded off* to **higher** digit) up to in the subjects that have been studied up to III or IV semester.
- iii) A student shall be promoted from III year to IV year (*for B.C.A. (Hons)*) if he/she fulfils the academic requirements in the subjects that have been studied up to V or VI semester.
 And in case a student is detained for want of credits for a particular academic year by ii) above, the student may make up the credits through supplementary examinations and only after securing the required credits he/she shall be permitted to join in the V semester-
 When a student is detained due to lack of credits/shortage of attendance he/she may be re-admitted when the semester is offered after fulfilment of academic regulations.

4.0 EVALUATION

The performance of a student in each semester shall be evaluated subject wise with a maximum of 100 marks for theory and 100 marks for practical subject. Summer Internships, Minor Project with Seminar shall be evaluated for 50 marks, Research Project / Dissertation work in VIII semester (BCA (Hons.)) shall be evaluated for 200 marks, mandatory courses with no credits shall be evaluated for 30 mid semester marks.

A student has to secure not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the mid semester and end examination marks taken together for the theory, practical or project etc. In case of a mandatory course, he/she should secure 40% of the total marks.

Theory Courses

Assessment Method	Marks
Continuous Internal Assessment	30
Semester End Examination	70
Total	100

- i) For theory subject, the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End-Examination.
- ii) For practical subject, the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End- Examination.
- iii) If any subject is having both theory and practical components, they will be evaluated separately as theory subject and practical subject. However, they will be given same subject code with an extension of ‘T’ for theory subject and ‘L’ for practical subject.

a) Continuous Internal Evaluation

i) For theory subjects, during the semester, there shall be two midterm examinations. Each midterm examination shall be evaluated for 30 marks of which 10 marks for objective paper (20 minutes’ duration), 15 marks for subjective paper (90 minutes’ duration) and 5 marks for assignment. ii) Objective paper shall contain for 05 short answer questions with 2 marks each or maximum of 20 bits for 10 marks. Subjective paper shall contain 3 either or type questions (totally six questions from 1 to 6) of which student has to answer one from each either-or type of questions. Each question carries 10 marks. The marks obtained in the subjective paper are condensed to 15 marks.

Note:

- The objective paper shall be prepared in line with the quality of competitive examinations questions.

- The subjective paper shall contain 3 either or type questions of equal weightage of 10 marks. Any fraction shall be rounded off to the next higher mark.
 - The objective paper shall be conducted by the respective institution on the day of subjective paper test
 - Assignments shall be in the form of problems, mini projects, design problems, slip tests, quizzes etc., depending on the course content. It should be continuous assessment throughout the semester and the average marks shall be considered.
- iii) If the student is absent for the mid semester examination, no re-exam shall be conducted and mid semester marks for that examination shall be considered as zero.
- iv) First midterm examination shall be conducted for I, II units of syllabus with one either or type question from each unit and third either or type question from both the units. The second midterm examination shall be conducted for III, IV and V units with one either or type question from each unit.
- v) Final mid semester marks shall be arrived at by considering the marks secured by the student in both the mid examinations with 80% weightage given to the better mid exam and 20% to the other.

For Example:

Marks obtained in first mid: 25

Marks obtained in second mid: 20

Final mid semester Marks: $(25 \times 0.8) + (20 \times 0.2) = 24$

If the student is absent for any one midterm examination, the final mid semester marks shall be arrived at by considering 80% weightage to the marks secured by the student in the appeared examination and zero to the other. For Example:

Marks obtained in first mid: Absent

Marks obtained in second mid: 25

Final mid semester Marks: $(25 \times 0.8) + (0 \times 0.2) = 20$

b) End Examination Evaluation:

End examination of theory subjects shall have the following pattern:

The **end semester** examination will be conducted for 70 marks which covers full syllabus. In end examination pattern, **Part–A** consists of five short questions from all units for 10 marks. **Part – B** has **5 questions** with internal choice from each unit and valued for 60marks.

Practical Courses

Assessment Method	Marks
Continuous Internal Assessment	30
Semester End Examination	70
Total	100

- a) For practical courses, there shall be a continuous evaluation during the semester for 30 sessional marks and end examination shall be for 70 marks.
- b) Day-to-day work in the laboratory shall be evaluated for 15 marks by the concerned laboratory teacher based on the record/viva and 15 marks for the internal test.
- c) The end examination shall be evaluated for 70 marks, conducted by the concerned laboratory teacher and outside external subject expert.
- i. Procedure: 20 marks

- ii. Experimental work & Results: 30 marks
 - iii. Viva voce: 20 marks.
- d) There shall be no external examination for mandatory courses with zero credits. However, attendance shall be considered while calculating aggregate attendance and student shall be declared to have passed the mandatory course only when he/she secures 40% or more in the internal examinations. In case, the student fails, a re-examination shall be conducted for failed candidates for 30 marks satisfying the conditions mentioned in item 1 & 2 of the regulations.
- e) The laboratory records and mid semester test papers shall be preserved for a minimum of 3 years in the respective institutions as per the University norms and shall be produced to the Committees of the University as and when the same are asked for.
- 4.1 There shall be an internship, one need to complete during year break (*i.e., IV sem to V Sem*) and will be evaluated for 50 marks internally at the end of V Semester by the departmental committee. A candidate has to secure a minimum 50% of marks to be declared successful (*for 2 credits*).
- 4.2 There shall be a mini project, during VI Sem and will be evaluated for 50 marks internally at the end of VI Semester by the departmental committee. A candidate has to secure a minimum 50% of marks to be declared successful (*for 2 credits*).
- 4.3 There shall be a **Research project/ Dissertation** for B.C.A. (Hons) students, during VIII Sem. (*for 12 credits*).
- 4.4 For audit courses, attendance is mandatory and a candidate has to get a satisfactory report for successful completion
- 4.5 A candidate shall be allowed to submit the Research Project / Dissertation work only after fulfilling the attendance requirements of all the semesters. The viva-voce examination shall be conducted at the end of the course work for **B.C.A. (Hons.)** (VIII semester).

MOOCs Courses:

1. Massive Open Online Courses (MOOCs):

A Student has to pursue and complete one course compulsorily through MOOCs approved by the University. A student can pursue courses other than core through MOOCs and it is mandatory to complete one course successfully through MOOCs for awarding the degree. A student is not permitted to register and pursue core courses through MOOCs.

A student shall register for the course (Minimum of either 8 weeks or 12 weeks) offered through MOOCs with the approval of Head of the Department. The Head of the Department shall appoint one mentor to monitor the student's progression. The student needs to earn a certificate by passing the exam. The student shall be awarded the credits assigned in the curriculum only by submission of the certificate. Examination fee, if any, will be borne by the student.

Students who have qualified in the proctored examinations conducted through MOOCs platform can apply for credit transfer as specified and are exempted from appearing internal as well as external examination (for the specified equivalent credit course only) conducted by the university.

Necessary amendments in rules and regulations regarding adoption of MOOC courses would be proposed from time to time.

2. Credit Transfer Policy

Adoption of MOOCs is mandatory, to enable Blended model of teaching-learning as also envisaged in the NEP 2020. As per University Grants Commission (Credit Framework for Online Learning Courses through SWAYAM) Regulation, 2016, the University shall allow up to a maximum of 20% of the total courses being

offered in a particular programme i.e., maximum of 32 credits through MOOCs platform.

- i) The University shall offer credit mobility for MOOCs and give the equivalent credit weightage to the students for the credits earned through online learning courses.
- ii) Student registration for the MOOCs shall be only through the respective department of the institution, it is mandatory for the student to share necessary information with the department. ***Student can register ONE Semester in advance and obtain required credits, i.e. e.g., V Sem courses can be register while studying IV Sem itself and can obtain credits.***
- iii) The concerned department shall identify the courses permitted for credit transfer.
- iv) The University/institution shall notify at the beginning of semester the list of the online learning courses eligible for credit transfer.
- v) The institution shall designate a faculty member as a Mentor for each course to guide the students from registration till completion of the credit course.
- vi) The university shall ensure no overlap of MOOC exams with that of the university examination schedule. In case of delay in results, the university will reissue the marks sheet for such students. vii) Student pursuing courses under MOOCs shall acquire the required credits only after successful completion of the course and submitting a certificate issued by the competent authority along with the percentage of marks and grades. viii) The institution shall submit the following to the examination section of the university:
 - a) List of students who have passed MOOC courses in the current semester along with the certificate of completion.
 - b) Undertaking form filled by the students for credit transfer.
- ix) The universities shall resolve any issues that may arise in the implementation of this policy from time to time and shall review its credit transfer policy in the light of periodic changes brought by UGC, SWAYAM, NPTEL and state government.

Note: Students shall be permitted to register for MOOCs offered through online platforms approved by the University from time to time.

5. Grading:

1. As a measure of the student's performance, a 10-point Absolute Grading System using the following Letter Grades and corresponding percentage of marks shall be followed:

After each course is evaluated for 100 marks, the marks obtained in each course will be converted to a corresponding letter grade as given below, depending on the range in which the marks obtained by the student fall.

Structure of Grading of Academic Performance

Range in which the marks in the subject fall	Grade	Grade points
		Assigned
90 & above	S (Superior)	10
80 to 89	A(Excellent)	9
70 to 79	B(Very Good)	8
60 to 69	C(Good)	7
50 to 59	D(Average)	6
40 to 49	E(Pass)	5
< 40	F (Fail)	0
Absent	Ab(Absent)	0

- i) A student obtaining Grade ‘F’ or Grade ‘Ab’ in a subject shall be considered failed and will be required to reappear for that subject when it is offered the next supplementary examination.
- ii) For non-credit audit courses, “Satisfactory” or “Unsatisfactory” shall be indicated instead of the letter grade and this will not be counted for computation of SGPA/CGPA/Percentage.

Computation of Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

The Semester Grade Point Average (SGPA) is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.,

$$SGPA = \frac{\sum(C_i \times G_i)}{\sum C_i}$$

where, C_i is the number of credits of the i^{th} subject and G_i is the grade points scored by the student in the i^{th} course.

The Cumulative Grade Point Average (CGPA) will be computed in the same manner considering all the courses undergone by a student overall the semesters of a program, i.e.,

$$CGPA = \frac{\sum(C_i \times S_i)}{\sum C_i}$$

where “ S_i ” is the SGPA of the i^{th} semester and C_i is the total number of credits up to that semester.

Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts. While computing the SGPA the subjects in which the student is awarded Zero grade points will also be included.

Grade Point: It is a numerical weight allotted to each letter grade on a 10-point scale. Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by the letters S, A, B, C, D, E and F.

2. Award of Class:

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of the Degree, he/she shall be placed in one of the following four classes:

Class Awarded	CGPA Secured
First Class with Distinction	≥ 7.5
First Class	$\geq 6.5 < 7.5$
Second Class	$\geq 5.5 < 6.5$
Pass Class	$\geq 5.0 < 5.5$

CGPA to Percentage Conversion Formula – $(CGPA - 0.5) \times 10$

3. With-holding of Results

If the candidate has any dues not paid to the university or if any case of indiscipline or malpractice is pending against him/her, the result of the candidate shall be withheld in such cases.

4. Multiple Entry / Exit Option

(a) Exit Policy:

The students can choose to exit the three/four-year programme at the end of first/second/third year, as the

case may be.

- If a student wants to exit after obtaining 45 credits, he/she may be awarded with UG **Certificate in Computer Applications**
- If a student wants to exit after obtaining **85** credits, he/she may be awarded with UG **Diploma in Computer Applications**

(b) Entry Policy:

Modalities on multiple entry by the student into the B.C.A /B.C.A.(Hons) programme will be provided in due course of time.

Note: The Universities shall resolve any issues that may arise in the implementation of Multiple Entry and Exit policies from time to time and shall review the policies in the light of periodic changes brought by UGC, AICTE and State government.

5. Gap Year Concept:

Gap year concept for Student Entrepreneur in Residence is introduced and outstanding students who wish to pursue entrepreneurship / become entrepreneur are allowed to take a break of one year at any time after I year to pursue full-time entrepreneurship programme/to establish startups. *This period may be extended to two years at the most and these two years would not be counted for the time for the maximum time for graduation.* The principal of the respective college shall forward such proposals submitted by the students to the University. An evaluation committee constituted by the University shall evaluate the proposal submitted by the student and the committee shall decide whether to permit the student(s) to avail the Gap Year or not

6. Transitory Regulations

Discontinued, detained, or failed candidates are eligible for readmission as and when the semester is offered after fulfilment of academic regulations. Candidates who have been detained for want of attendance or not fulfilled academic requirements or who have failed after having undergone the course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered, subject to Section 2 and they will follow the academic regulations into which they are readmitted.

Candidates who are permitted to avail Gap Year shall be eligible for re-joining into the succeeding year of their B.CA from the date of commencement of class work, subject to Section 2 and they will follow the academic regulations into which they are readmitted.

7. Minimum Instruction Days for a Semester:

The minimum instruction days including exams for each semester shall be 90 days.

8. Medium of Instruction:

The medium of instruction of the entire B.C.A. / B.C.A. (Hons) programme will be in English only.

9. Student Transfers:

Student transfers shall be as per the guidelines issued by the Government of Andhra Pradesh and the Universities from time to time.

10. General Instructions:

- i. The academic regulations should be read as a whole for purpose of any interpretation.
- ii. Malpractices rules-nature and punishments are appended.
- iii. Where the words “he”, “him”, “his”, occur in the regulations, they also include “she”, “her”, “hers”, respectively. iv. In the case of any doubt or ambiguity in the interpretation of the

above rules, the decision of the Vice-Chancellor is final.

- v. The Institution may change or amend the academic regulations or syllabi at any time and the changes or amendments shall be made applicable to all the students on rolls with effect from the dates notified by the Institution.
- vi. In the case of any doubt or ambiguity in the interpretation of the guidelines given, the decision of the Principal / Academics Council is final.

MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper conduct	Punishment
	<i>If the candidate:</i>	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the

		imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already

	outside the examination hall.	appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.	

Malpractices identified by squad or special invigilators

1. Punishments to the candidates as per the above guidelines.
2. Punishment for institutions: (if the squad reports that the college is also involved in encouraging malpractices)
 - (i) A show cause notice shall be issued to the college.
 - (ii) Impose a suitable fine on the college.
 - (iii) Shifting the examination centre from the college to another college for a specific period of not less than one year.

* * * * *

Structure of the Undergraduate Programme

All courses offered for the undergraduate program (B.C.A / B.C.A (Hons.)) are broadly classified as follows:

S.No.	Category	Breakup of Credits (Total 120)	Breakup of Credits (Total 160)	Statutory Body Recommendation	
				Breakup of Credits (Total 120)	Breakup of Credits (Total 160)
1	Major (Core)			60	80
2	Minor (Stream)			24	32
3	Multidisciplinary (MD)	12.5	12.5	9	9
4	Ability Enhancement Courses (AEC)	8.5	8.5	9	9
5	Skill Enhancement Courses (SEC)			8	8
6	Value Added Courses (VAC)			6-8	6-8
7	Summer Internship	2	2	2-4	2-4
8	Research / Dissertation	2	12	-	12

COURSE STRUCTURE

I SEMESTER										
S.No	Category	Code	Courses	L	T	P	C	IM	EM	TM
1	AEC-1	24BC1T01	Communicative English	3	0	0	3	30	70	100
2	VAC	24BC1T02	Computer Fundamentals	3	0	0	3	30	70	100
3	MD	24BC1T03	Fundamentals of Commerce	2	0	0	2	30	70	100
4	CORE	24BC1T04	Digital Logic Design	3	0	0	3	30	70	100
5	CORE	24BC1T05	Programming in C	3	0	0	3	30	70	100
6	MD	24BC1T06	Numerical and Statistical Methods	3	0	0	3	30	70	100
7	AEC-2	24BC1L01	Communication Skills Lab	0	0	3	1.5	30	70	100
8	VAC	24BC1L02	Office Automation Tools Lab	0	0	3	1.5	30	70	100
9	CORE	24BC1L03	Programming in C Lab	0	0	3	1.5	30	70	100
10	MD	24BC1L04	Statistics using R Lab	0	0	3	1.5	30	70	100
Total				17	0	12	23	300	700	1000

II SEMESTER										
S.No	Category	Code	Courses	L	T	P	C	IM	EM	TM
1	MD	24BC2T01	Discrete Mathematics	3	0	0	3	30	70	100
2	VAC	24BC2T02	Environmental Science	2	0	0	2	30	70	100
3	MD	24BC2T03	Business Organization	3	0	0	3	30	70	100
4	CORE	24BC2T04	Computer Organization	3	0	0	3	30	70	100
5	CORE	24BC2T05	Data Structures	3	0	0	3	30	70	100
6	CORE	24BC2T06	OOPs through C++	3	0	0	3	30	70	100
7	CORE	24BC2L01	Data Structures through C Lab	0	0	3	1.5	30	70	100
8	CORE	24BC2L02	OOPs through C++ Lab	0	0	3	1.5	30	70	100
9	VAC	24BC2T07	Indian Constitution	2	0	0	2	30	70	100
Total				19	0	6	22	270	630	900

I Semester	L	T	P	C
	3	0	0	3
24BC1T01 - COMMUNICATIVE ENGLISH				

Course Objectives:

The main objective of introducing this course, Communicative English, is to facilitate effective listening, Reading, Speaking and Writing skills among the students. It enhances the same in their comprehending abilities, oral presentations, reporting useful information and providing knowledge of grammatical structures and vocabulary. This course helps the students to make them effective in speaking and writing skills and to make them industry ready.

Course Outcomes(Cos): At the end of the course, student will able to

CO No.	Course Outcome	Knowledge Level (K)#
CO1	Identify and recall specific pieces of information through listening and reading texts.	K1
CO2	Demonstrate the ability to communicate ideas and concepts effectively through speaking and writing.	K2
CO3	Apply knowledge of grammatical structures and vocabulary in forming coherent sentences and paragraphs.	K3
CO4	Analyze and interpret texts by identifying key elements, context clues, and supporting ideas.	K4
CO5	Create structured essays, summaries, and formal presentations on specific topics using proper grammar.	K6

UNIT I**Lesson: HUMAN VALUES: Gift of Magi (Short Story)**

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.

Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.

Reading: Skimming to get the main idea of a text; scanning to look for specific pieces of information.

Writing: Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.

Grammar: Parts of Speech, Basic Sentence Structures-forming questions

Vocabulary: Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words

UNIT II**Lesson: NATURE: The Brook by Alfred Tennyson (Poem)**

Listening: Answering a series of questions about main ideas and supporting ideas after listening to audio texts.

Speaking: Discussion in pairs/small groups on specific topics followed by short structure talks.

Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

Writing: Structure of a paragraph - Paragraph writing (specific topics)

Grammar: Cohesive devices - linkers, use of articles and zero article; prepositions.

Vocabulary: Homonyms, Homophones, Homographs.

UNIT III

Lesson: BIOGRAPHY: Elon Musk

Listening: Listening for global comprehension and summarizing what is listened to.

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed.

Reading: Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.

Writing: Summarizing, Note-making, paraphrasing

Grammar: Verbs - tenses; subject-verb agreement; Compound words, Collocations

Vocabulary: Compound words, Collocations

UNIT IV

Lesson: INSPIRATION: The Toys of Peace by Saki

Listening: Making predictions while listening to conversations/transactional dialogues without video; listening with video.

Speaking: Role plays for practice of conversational English in academic contexts(formal and informal) - asking for and giving information/directions.

Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.

Writing: Letter Writing: Official Letters, Resumes

Grammar: Reporting verbs, Direct & Indirect speech, Active & Passive Voice

Vocabulary: Words often confused, Jargons

UNIT V

Lesson: MOTIVATION: The Power of Intrapersonal Communication (An Essay)

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.

Speaking: Formal oral presentations on topics from academic contexts

Reading: Reading comprehension.

Writing: Writing structured essays on specific topics.

Grammar: Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

Vocabulary: Technical Jargons

Textbooks:

1. Pathfinder: Communicative English for Undergraduate Students, 1st Edition, Orient Black Swan,2023 (Units 1,2 & 3)
2. Empowering with Language by Cengage Publications, 2023 (Units 4 & 5)

Reference Books:

1. Dubey, Sham Ji & Co. English for Engineers, Vikas Publishers, 2020

2. Bailey, Stephen. Academic writing: A Handbook for International Students. Routledge, 2014.
3. Murphy, Raymond. English Press, 2019. Grammar in Use, Fourth Edition, Cambridge University
4. Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary. Anchor, 2014.

Web Resources:

GRAMMAR:

1. www.bbc.co.uk/learningenglish
2. <https://dictionary.cambridge.org/grammar/british-grammar/>
3. www.eslpod.com/index.html
4. <https://www.learngrammar.net/>
5. <https://english4today.com/english-grammar-online-with-quizzes/>
6. <https://www.talkenglish.com/grammar/grammar.aspx>

VOCABULARY

1. <https://www.youtube.com/c/DailyVideoVocabulary/videos>
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

I Semester	L	T	P	C
	3	0	0	3
24BC1T02 - COMPUTER FUNDAMENTALS				

Course Objectives:

The main objective of this course is to introduce the fundamentals of computing devices and the Internet. It focuses on computer literacy that prepares students for life-long learning of computer concepts and skills.

Course Outcomes(Cos): At the end of the course, student will able to

CO No.	Course Outcome	Knowledge Level (K)#
CO1	Identify the components of a computer system, types of software, and the basics of hardware and software.	K1
CO2	Explain the basic operations of a GUI-based operating system and commonly used software applications.	K2
CO3	Demonstrate the ability to operate MS Office tools (Word, Excel, PowerPoint) for various tasks.	K3
CO4	Analyze the concepts of the Internet, web browsers, computer networks, and their functions.	K4
CO5	Evaluate and apply knowledge of Google tools, Internet security, and electronic payment systems.	K5

Unit I:

Knowing computer: computer definition, applications of computer, components of a computer system, Central Processing Unit(CPU), Video Display Unit, Keyboard and Mouse, Optical Storage devices, basics of hard drive, concepts of hardware and software, concept of computing, data and information, applications of information electronics and communication technology, connecting keyboard, mouse, monitor and printer to CPU and checking power supply. **Computer software & its types:** System software, application software, types of operating system, role of operating system, utility programs, packages, communication software, commonly used application software

Unit II:

Operating computer using GUI based operating system: operating systems basics, basics of popular operating systems, the user interface, basics of operating system setup, common utilities

MS Windows Operating System: definition and functions, basic components of Windows, Icons, Desktop, Taskbar, Notification area, files and folders, start menu operations, my computer, network neighborhood, recycle bin, windows explorer, setting wall paper, creating, copying, moving and deleting files, changing the mouse pointer, paint, notepad, setting date and time, screen saver, using mouse: using right mouse button moving icons on the screen, use of common icons, status bar, using menu and menu selections, running an application, viewing of files, folder sand directories, creating and renaming of files and folders, opening and closing of different windows, using help, crating shortcuts, using Windows accessories.

Unit III:

MS-Word: introduction, Windows interface, document views, creating & editing documents, selecting, deleting, replacing text, copying text to another file, formatting text, paragraphs, fonts, paragraph formatting using bullets and numbering, dialog box, checking spellings, line spacing, margins, space before and after paragraph, mail merge, macros, printing documents, print preview.

MS Excel: introduction, workbook, worksheet, formatting, formulas, charts

MS Power point: Introduction, creating presentation with all options, slide show, animations and designs

Unit IV:

Introduction to Internet, WWW, Web browsers Basics of computer networks, LAN, WAN, concept of Internet, web browsing software, search engines, understanding URLs, domain name, IP address, Basics of electronic mail, getting and email account, sending and receiving mails, documentcollaboration

Unit V:

Useful Google tools such as drive, sheet, doc, meet etc., Firewall, computer virus, Anti-virus software, Internet security and privacy, Basics of Electronic Data Interchange, Electronic Payment systems, Types of payment systems, digital cash, electronic cheque, smart card, introduction to digital signatures.

Text Books:

1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
2. Computer Fundamentals, A. Goel, 2010, Pearson Education.
3. Fundamentals of Computers, P. K.Sinha& P. Sinha, 2007, BPB Publishers.
4. Fundamentals of Information Technology: Alexis Leon & Mathews Leon, Vikas Publishing House, NewDelhi.
5. IT Tools, R.K. Jain, Khanna Publishing House.
6. Introduction to Information Technology, Satish Jain, AmbrishRai&Shashi Singh, Paperback Edition, BPB Publications, 2014

Web Resources:

1. <https://edu.gcfglobal.org/en/computerbasics/>
2. <https://edu.gcfglobal.org/en/subjects/office/>
3. https://onlinecourses.swayam2.ac.in/nou20_cs03/
4. https://tutorialpoint.com/computer_fundamentals/index.htm
5. <https://nptel.ac.in/courses/106/103/106103068/>

I Semester	L	T	P	C
	2	0	0	2
24BC1T03 - FUNDAMENTALS OF COMMERCE				

Course Objectives:

The objective of this paper is to help students to acquire conceptual knowledge of the Commerce, Economy and Role of Commerce in Economic Development. To acquire Knowledge on Accounting and Taxation.

Course Outcomes (Cos): At the end of the course, student will able to

CO No.	Course Outcome	Knowledge Level (K)#
CO1	Define the basic concepts of commerce and explain its role in economic and societal development.	K1
CO2	Understand and apply key economic theories, including macro and microeconomics, demand, supply, and market structures.	K2
CO3	Demonstrate knowledge of accounting principles, branches of accounting, and the accounting cycle.	K3
CO4	Analyze different types of taxes, tax systems, and the role of taxation authorities like CBDT and CBIC.	K4
CO5	Evaluate the use of digital marketing, SEO, and data analytics in modern commerce and web development.	K5

Unit I:

Introduction: Definition of Commerce, Role of Commerce in Economic Development, Role Commerce in Societal Development. Imports and Exports, Balance of Payments. World Trade Organization.

Unit II:

Economic Theory: Macro Economics, Meaning, Definition, Measurements of National Income, Concepts of National Income. Micro Economics, Demand and Supply. Elasticity of Demand and Supply. Classification of Markets, Perfect Competition, Characteristics, Equilibrium Price, Marginal Utility.

Unit III:

Accounting Principles: Meaning and Objectives Accounting, Accounting Cycle, Branches of Accounting, Financial Accounting, Cost Accounting, Management Accounting. Concepts and Conventions of Accounting – GAAP.

Unit IV:

Taxation: Meaning of Tax, Taxation, Types of Tax, Income Tax, Corporate Taxation, GST, Customs & Exercise. Differences between Direct and Indirect Tax, Objectives of Tax, Concerned authorities, Central Board of Direct Taxes (CBDT) and Central Board of Excise and Customs (CBIC).

Unit V:

Computer Essentials: Web Design, Word Press Basics, Developing a Simple Website. Digital Marketing, Social Media Marketing, Content Marketing, Search Engine Optimization(SEO), E-mail Marketing. Data Analytics, Prediction of customer behavior, customized suggestions.

Reference Books:

1. S.P. Jain & K.L Narang, Accountancy - I Kalyani Publishers.
2. R.L. Gupta & V.K. Gupta, Principles and Practice of Accounting, Sultan Chand
3. Business Economics -S.Sankaran, Margham Publications, Chennai.
4. Business Economics - Kalyani Publications.
5. Dr. Vinod K. Singhania: Direct Taxes – Law and Practice, Taxmann Publications.
6. Dr. Mehrotra and Dr. Goyal: Direct Taxes – Law and Practice, Sahitya Bhavan Publications

I Semester	L	T	P	C
	3	0	0	3
24BC1T04 - DIGITAL LOGIC DESIGN				

Course Objectives:

The main objectives of the course are to

- Understand different methods used for the simplification of Boolean functions and binary arithmetic.
- Design and implement combinational circuits, synchronous & asynchronous sequential circuits.

Course Outcomes (Cos): At the end of the course, student will able to

CO No.	Course Outcome	Knowledge Level (K)#
CO1	Identify and recall the fundamentals of binary systems, number conversions, binary codes, and logic gates.	K1
CO2	Apply Boolean algebra theorems and simplification techniques to minimize Boolean functions using K-Maps and tabulation methods.	K3
CO3	Analyze and design combinational circuits like adders, subtractors, multiplexers, and comparators.	K4
CO4	Demonstrate the working of synchronous sequential circuits, including flip-flops, state reduction, and clocked circuits.	K3
CO5	Design and evaluate asynchronous sequential circuits and counters, including registers and latches.	K5

UNIT I:

Binary Systems: Digital Systems, Binary Numbers, Number Base Conversions, Octal and Hexadecimal Numbers, Complements, Signed Binary Numbers, Binary Codes, Binary Storage and Registers, Binary Logic.

Boolean Algebra and Logic Gates: Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Digital Logic Gates.

UNIT II:

Minimization: K-Map Method – Tabulation Method, POS - SOP, Don't Care Conditions, NAND, NOR Implementation.

Combinational Logic: Combinational Circuits, Analysis and Design Procedure, Binary Adder, Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers.

UNIT III:

Synchronous Sequential Logic: Sequential Circuits - Latches, Flip-Flops, An analysis of Clocked Sequential Circuits, State Reduction and Assignment Design Procedure.

UNIT IV:

Registers and Counters: Registers, Shift Registers, Ripple Counters, Synchronous Counters, Ring Counters-Johnson Counter.

UNIT V:

Asynchronous Sequential Circuit: Introduction, Analysis Procedure, Circuits with Latches, Design Procedure.

Text Books:

1. M. Morris Mano, “Digital Design”, 3rd edition, Pearson Education, Delhi, 2007.
2. Carl Hamacher, Z. Vranesic, S. Zaky: Computer Organization, 5/e (TMH).

Reference Books:

1. Donald P Leech, Albert Paul Malvino and GoutamSaha, “Digital Principles and Applications”, Tata McGraw Hill, 2007.

Web Resources:

1. <https://nptel.ac.in/courses/117105080>
2. Digital Logic Design: Theory (CS226) + Lab (CS254) (iitb.ac.in)
3. Free Course: Digital Logic and Circuits Simulations from Banaras Hindu University | Class Central

I Semester	L	T	P	C
	3	0	0	3
24BC1T05 - PROGRAMMING IN C				

Course Objectives:

The main objectives of the course is to

- Introduce students to the fundamentals of computer programming.
- Provide hands-on experience with coding and debugging.
- Foster logical thinking and problem-solving skills using programming.
- Familiarize students with programming concepts such as data types, control structures, functions, and arrays. Encourage collaborative learning and teamwork in coding projects.

Course Outcomes (Cos): At the end of the course, student will able to

CO No.	Course Outcome	Knowledge Level (K)#
CO1	Understand the fundamentals of computer programming, including algorithms, flowcharts, and basic data types.	K2
CO2	Apply control structures like conditional statements, loops, and unconditional statements to solve programming problems.	K3
CO3	Implement programs using arrays and strings for efficient data handling and manipulation.	K3
CO4	Analyze the use of pointers and user-defined data types like structures and unions in complex programs.	K4
CO5	Develop programs using functions, recursion, and file handling techniques to solve real-world problems.	K5

UNIT I:

Introduction to Programming and Problem Solving: History of Computers, Basic organization of a computer: ALU, input-output units, memory, program counter, Introduction to Programming Languages, Basics of a Computer Program- Algorithms, flowcharts (Using Dia Tool), pseudo code. Introduction to Compilation and Execution, Primitive Data Types, Variables, and Constants, Basic Input and Output, Operations, Type Conversion, and Casting. Problem solving techniques: Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.

UNIT II :

Control Structures: Simple sequential programs Conditional Statements (if, if-else, switch), Loops (for, while, do-while) and Unconditional statements: goto, Break and Continue.

UNIT III:

Arrays and Strings: Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Introduction to Strings and string Operations

UNIT IV:

Pointers & User Defined Data types: Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, User-defined data types-Structures and

Unions.

UNIT V:

Functions & File Handling: Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters, Recursive functions. Scope and Lifetime of Variables, Basics of File Handling

Text Books:

1. E. Balagurusamy, "Programming in ANSI C", 4/e, TMH
2. Dr N B Venlateswarlu, "C Programming", S Chand Publications
3. Yashwant Kanetkar, "Let Us C: Authentic guide to C programming language", 19th Edition, BPB publications
4. B. Kernighan & Dennis Ritchie, "The C Programming Language", 2/e PHI

Reference Books:

1. Paul Deitel, Harvey Deitel, "C: How to Program", 8/e, Prentice Hall.
2. Schaum's Outline of Education, 1996 Programming with C, Byron S Gottfried, McGraw-Hill

Web Resources:

1. Introduction to Programming in C - Course (nptel.ac.in)
2. Lecture Notes | Practical Programming in C | Electrical Engineering and Computer Science | MIT OpenCourseWare
3. <https://nptel.ac.in/courses/106105171>
4. <http://cslibrary.stanford.edu/>

I Semester	L	T	P	C
	3	0	0	3
24BC1T06 - NUMERICAL AND STATISTICAL METHODS				

Course Objectives:

The main objectives of the course are:

- To learn how to perform error analysis for arithmetic operations.
- To demonstrate working of various numerical methods.
- To provide a basic understanding of the derivation and use of methods of interpolation and numerical integration.
- To impart knowledge of various statistical techniques.
- To develop students understanding through laboratory activities to solve problems related to above stated concepts.

Course Outcomes (Cos): At the end of the course, student will able to

CO No.	Course Outcome	Knowledge Level (K)#
CO1	Apply methods like Secant, Regula-Falsi, Newton-Raphson, and Fixed Point Iteration to solve equations and perform error analysis.	K3
CO2	Solve systems of linear equations using methods like Gauss Elimination, Gauss-Jordan, Gauss-Seidel, and LU-Decomposition, and compute Eigenvalues and Eigenvectors.	K3
CO3	Apply interpolation techniques (Newton's and Lagrange's methods) and numerical methods like Trapezoidal and Simpson's for differentiation and integration.	K3
CO4	Analyze data using statistical measures like mean, median, mode, standard deviation, skewness, kurtosis, and correlation coefficients.	K4
CO5	Understand and apply theorems of probability, including Bayes' Theorem and conditional probability, to solve problems.	K3

UNIT I:

Solution of equations (polynomial and transcendental equations) interval having methods, secant, Regula – Falsi, Newton – Raphson methods, Fixed point Iteration method.

UNIT II:

Solution of system of linear equations: Gauss – Elimination method, Gauss – Jordan, Gauss – Siedel iteration method, LU- Decomposition method, Eigen values and Eigen vectors of a square matrix.

UNIT III:

Interpolation: Forward and backward differences, Newton's forward and backward formula, Lagrange's interpolation and Lagrange's inverse interpolation formula. Numerical differentiation, integration: Numerical differentiation forward and backward formula, Trapezoidal and Simpsons formulas.

UNIT IV:

Basic concepts and definition of statistics : Mean, Median, Mode, standard deviation, coefficient of variation, skewness and kurtosis ,Karl Pearson Correlation coefficient , Rank Correlation and illustrated examples.

UNIT V:

Probability: Basic concepts and definition of probability, Probability axioms, Conditional probability, Addition and Multiplication theorem of probability (Based on set theory concepts), Bayes theorem, problems and applications.

Text Books:

1. Sunil S .Patil Numerical and Statistical Methods EBPB.
2. S.S.Shastry Introductory methods of Numerical Analysis PHI (New Delhi).

Reference Books:

1. Gupta S.C & Kapuram VK Fundamentals of Mathematical Statistics.

I Semester	L	T	P	C
	0	0	3	1.5
24BC1L01 - COMMUNICATION SKILLS LAB				

Course Objectives:

The main objective of introducing this course, Communicative English Laboratory, is to expose the students to a variety of self-instructional, learner friendly modes of language learning. The students will get trained in basic communication skills and also make them ready to face job interviews.

Course Outcomes (Cos): At the end of the course, student will able to

CO No.	Course Outcome	Knowledge Level (K)#
CO1	Understand the basics of vowels, consonants, and neutralization/accents rules to improve pronunciation and articulation.	K2
CO2	Apply effective communication skills, including JAM (Just A Minute) sessions and conversational practice for fluency in English.	K3
CO3	Develop professional writing skills through e-mail writing, resume creation, cover letter drafting, and writing a Statement of Purpose (SOP)	K4
CO4	Engage in group discussions and debates by applying various methods, enhancing critical thinking and argumentation skills.	K4
CO5	Demonstrate interview and presentation skills through role-play, poster/PPT presentations, and practicing interview techniques.	K3

List of Topics:

1. Vowels & Consonants
2. Neutralization/Accent Rules
3. Communication Skills & JAM
4. Role Play or Conversational Practice
5. E-mail Writing
6. Resume Writing, Cover letter, SOP
7. Group Discussions-methods & practice
8. Debates - Methods & Practice
9. PPT Presentations/ Poster Presentation
10. Interviews Skills

Suggested Software:

- Walden Infotech
- Young India Films

Reference Books:

1. Raman Meenakshi, Sangeeta-Sharma. Technical Communication. Oxford Press. 2018.
2. Taylor Grant: English Conversation Practice, Tata McGraw-Hill Education India, 2016
3. Hewing's, Martin. Cambridge Academic English (B2). CUP, 2012.
4. J. Sethi & P.V. Dhamija. A Course in Phonetics and Spoken English, (2nd Ed) , Kindle, 2013

Web Resources:

Spoken English:

1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. <https://www.britishcouncil.in/english/online>
5. <http://www.letstalkpodcast.com/>
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. <https://www.youtube.com/c/ArnelsEverydayEnglish/featured>
8. <https://www.youtube.com/c/engvidAdam/featured><https://www.youtube.com/c/EnglishClass101/featured>
9. <https://www.youtube.com/c/EnglishClass101/featured>
10. <https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists>
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

Voice & Accent:

1. <https://www.youtube.com/user/letstalkaccent/videos>
2. <https://www.youtube.com/c/EngLanguageClub/featured>
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

I Semester	L	T	P	C
	0	0	3	1.5
24BC1L02 - OFFICE AUTOMATION TOOLS LAB				

Course Objectives:

- To introduce the environment of GUI in Ms-Word and its features.
- To introduce the fundamental concepts using Ms-Word and its features to make it more useful.
- To provide hands-on use of Word, Excel and PowerPoint.

Course Outcomes (Cos): At the end of the course, student will able to

CO No.	Course Outcome	Knowledge Level (K)#
CO1	Understand the basic components and peripherals of a computer, including the CPU, and perform tasks such as assembling/disassembling a PC and installing operating systems.	K2
CO2	Apply knowledge of basic office tools such as Microsoft Word, Excel, and PowerPoint to create and format professional documents, spreadsheets, and presentations.	K3
CO3	Develop skills in advanced document handling techniques such as mail merge, document formatting, and the use of tables for various professional purposes.	K4
CO4	Analyze and manage data in spreadsheets using formulas, sorting, filtering, and chart generation for effective data presentation and decision-making.	K4
CO5	Demonstrate effective presentation skills by creating presentations with transitions, animations, custom layouts, and the use of graphical elements to enhance content delivery.	K3

Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition.

Experience the following:

Binary Arithmetic (<https://scratch.mit.edu/projects/613350058>)

Full adder circuit (<https://logic.ly/demo/> and <https://logic.ly/demo/samples>)

This app is to test unsigned binary numbers to decimal number conversion skill of the students.

<https://scratch.mit.edu/projects/621571989>

Task 3: Installation of MS windows on the personal computer.

Task 4: Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

Task 5: Creation of Gmail account, accessing Google Drive including Google Docs

Task 6: Create a document to write a letter to the DM&HO of the district complaining about Hygienic conditions in your area. (*Similar Letters)

Task 7: Create a document to share your experience of your recent vacation with family.

Task 8: Create a document to send a holiday intimation to all the parents at time about Dasara Vacation.
(using mail merge)

Task 9: Create a document to create Time Table of you class using tables.

Task 10: Create a table with following columns and display the result in separate cells for the following

- Emp Name, Basic pay, DA, HRA, Total salary.
- Sort all the employees in ascending order with the name as the key
- Calculate the total salary of the employee
- Calculate the Grand total salary of the employee

Task 11: Create two pages of curriculum vitae of a graduate with the following specifications

- Table to show qualifications with proper headings
- Appropriate left and right margins
- Format ½pageusingtwo-columnapproachabout yourself
- Name on each page at the top right side
- Page no. in the footer on the right side

Task 12: Create a letter as the main document and create 10 records for the 10 persons. Use mail merge to create letter for selected persons among 10.

Task 13: Create a worksheet with you class marks displaying total, average, top marks in the class and least marks in the class.

Task 14: Create a Worksheet with employee no, name, job, salaries of 10 employees, calculate DA,TA,HRA ,Gross Salary and Net Salary.

- I. Find the sum of HRA's of Total employees.
- II. Find the average DA
- III. Display the Maximum salary of the employee.

Task 15: Prepare a chart with height and weights of you class mates in at least 3 types of charts.

Task 16: Demonstrate the use of Filter with the attendance data of your class.

Task 17: Prepare a presentation with your achievements and experiences in College.

Task 18: Create a Presentation of your organization with pictures, clip arts and animations

Task 19: Create a presentation using templates.

Task 20: Create a Custom layout or Slide Master for professional presentation.

Task 21: Create a presentation with slide transitions and animation effects.

Task 22: Create a table in PPT and apply graphical representation

Text Books:

1. Computer Fundamentals–Pradeep .K. Sinha: BPB Publications.
2. Joy of Computing: ABC of bits, trits, qubits, bytes, trytes, qutrits, quids for kids to Teachers, N B V Venkateswarlu, 2022
3. Fundamentals of Computers –ReemaThareja, Oxford University Press India

Web Resources:

1. https://onlinecourses.swayam2.ac.in/cec21_cs15/preview
2. <https://edu.gcfglobal.org/en/computerbasics/>
3. <https://www.computerhope.com/jargon/m/microsoft-word.htm>
4. <https://www.coursera.org/courses?query=office%20automation>

I Semester	L	T	P	C
	0	0	3	1.5

24BC1L03 - PROGRAMMING in C LAB

Course Objectives:

The course aims to give students hands on experience and train them on the concepts of the C-programming language.

Course Outcomes (Cos): At the end of the course, student will able to

Suggested Experiments/Activities**WEEK 1: Lab1:** Familiarization with programming environment

- i) Basic Linux environment and its editors like Vi, Vim & Emacs etc.
- ii) Exposure to Turbo C, gcc
- iii) Writing simple programs using using input and Output Statements
- iv) Simple Arithmetic Operations

WEEK 2: Lab2: Converting algorithms/flow charts into C Source code.

Developing the algorithms/flowcharts for the following sample programs

- i) Simple statistics Operations- Sum and average etc
- ii) Conversion of Fahrenheit to Celsius and vice versa
- iii) Simple and Compound Interest calculation

WEEK 3: Lab 3: Simple computational problems using arithmetic expressions.

- i) Finding the square root of a given number
- ii) Finding compound interest
- iii) Area of a triangle using heron's formulae
- iv) Distance travelled by an object

WEEK 4: Lab 4: Simple computational problems using the operator precedence and associativity

- i) Evaluate the following expressions.
 - a. $A+B*C+(D*E) + F*G$
 - b. $A/B*C-B+A*D/3$
 - c. $A+++B---A$
 - d. $J= (i++) + (++i)$
- ii) Find the maximum of three numbers using conditional operator

WEEK 5: Lab 5: Problems involving if-then-else structures.

- i) Find the max and min of four numbers using if-else.
- ii) Generate electricity bill.
- iii) Find the roots of the quadratic equation.
- iv) Simulate a calculator using switch case.
- v) Find the given year is a leap year or not etc

WEEK 6: Lab 6: Iterative problems e.g., series and sequences

- i) Find the factorial of given number using any loop.
- ii) Find the given number is a prime or not.
- iii) Checking a number is palindrome or not

WEEK 7: Lab 7: 1D Array manipulation, linear search

- i) Find the min and max of a 1-D integer array.
- ii) Perform linear search on 1D array.
- iii) The reverse of a 1D integer array

WEEK 8: Lab 8: Matrix problems, String operations

- i) Addition of two matrices
- ii) Multiplication two matrices
- iii) Sort array elements
- iv) Concatenate two strings without built-in functions
- v) Reverse a string using built-in and without built-in string functions

WEEK 9: Lab 9: Pointers and structures, memory dereference.

- i) Write a C program to find the sum of a 1D array using malloc()
- ii) Write a C program to find the total, average of n students using structures
- iii) Enter n students data using calloc() and display failed students list

WEEK 10: Lab 10 :

- i) Demonstrate the differences between structures and unions using a C program.
- ii) Write a C program to copy one structure variable to another structure of the same type.

WEEK 11: Lab 11: Write a C program to swap two numbers (Use call by value and call by reference)

WEEK 12: Lab 12: Recursive functions

- i) Generate Fibonacci series.
- ii) Find the LCM of two numbers.
- iii) Find the factorial of a number.

WEEK 13: Lab 13: File operations

- i) Write and read text into a file.
- ii) Write and read text into a binary file
- iii) Copy the contents of one file to another file.
- iv) Find no. of lines, words and characters in a file

Text Books:

1. Ajay Mittal, Programming in C: A practical approach, Pearson.
2. Byron Gottfried, Schaum's Outline of Programming with C, McGraw Hill
3. Dr N B Venlateswarlu, "C Programming", S Chand Publications

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice- Hall of India
2. C Programming, A Problem-Solving Approach, Forouzan,

Web Resources:

1. Department of Computer Science and Technology – Course pages 2021–22: Programming in C and C++ – Course materials (cam.ac.uk)
2. Practical Programming in C | Electrical Engineering and Computer Science | MIT OpenCourseWare
3. Lab 1: Introduction to C | Systems, Networks, and Concurrency (anu.edu.au)
4. <https://ps-iiith.vlabs.ac.in/>
5. <https://www.learn-c.org/>

I Semester	L	T	P	C
	0	0	3	1.5
24BC1L04 - STATISTICS USING R LAB				

Course Outcomes (Cos): At the end of the course, student will able to

CO No.	Course Outcome	Knowledge Level (K)#
CO1	Understand and use basic R programming constructs such as variables, data types, arithmetic operations, and input/output.	K2
CO2	Apply functions, vectors, matrices, and data frames in R for data manipulation and basic operations	K3
CO3	Analyze and implement object-oriented programming in R using S3, S4, and reference classes.	K4
CO4	Utilize R for statistical analysis, including calculating descriptive statistics and visualizing data using various types of plots (box plots, scatter plots, bar plots).	K4
CO5	Develop R programs to work with probability distributions, perform correlation analysis, and use R for basic statistical modeling.	K4

Exercise 0:

- a) Installing R and R Studio Basic functionality of R

Exercise 1:

- a) Write an R program to print Hello World
- b) Write a program to demonstrate the basic Arithmetic in R
- c) Write a program to demonstrate the Variable assignment in R

Exercise 2:

- a) Write a program to demonstrate the data types in R
- b) Write a program to demonstrate the creating and naming a vector in R
- c) Write a program to demonstrate the create a matrix and naming matrix in R

Exercise 3:

- a) Write a program to demonstrate the Add column and Add a Row in Matrix in R
- b) Write a program to demonstrate the selection of elements in Matrixes in R
- c) Write a program to demonstrate the Performing Arithmetic of Matrices

Exercise 4:

- a) Write a program to demonstrate the Factors in R
- b) Implement the Factor in R
- c) Write a program to illustrate Ordered Factors in R

Exercise 5:

- a) Write an R program to take input from the user.
- b) Write an R program to Check if a Number is Odd or Even
- c) Write an R program to check if the given number is a Prime Number

Exercise 6:

- a) Write an R program to Find the Factorial of a Number
- b) Write an R program to Find the Factors of a Number
- c) Write an R program to Find the Fibonacci sequence Using Recursive Function

Exercise 7:

- a) Write an R program to make a Simple Calculator
- b) Write an R program to Find L.C.M of two numbers
- c) Write an R program to create a Vector and to access elements in a vector

Exercise 8:

- a) Write an R program to create a Matrix and access rows and columns using functions colnames() and rownames() .
- b) Write an R Program to create a Matrix using cbind() and rbind() functions

Exercise 9:

- a) Write an R Program to create a Matrix from a Vector using the dim() function.
- b) Write an R Program to create a List and modify its components.
- c) Write an R Program to create a Data Frame.

Exercise 10:

- a) Write an R Program to access a Data Frame like a List.
- b) Write an R Program to access a Data Frame like a Matrix.
- c) Write an R Program to create a Factor.

Exercise 11:

- a) Write an R Program to Access and Modify Components of a Factor.
- b) Write an R Program to create an S3 Class and S3 Objects.
- c) Write an R Program to write an own generic function in S3 Class.

Exercise 12:

- a) Write an R Program to create an S4 Class and S4 Objects.
- b) Write an R Program to write an own generic function in S4 Class.
- c) Write an R Program to create a reference class and modify its methods.

Exercise 13:

- a) Write an R program to create a scatter plot for the data frame columns.
- b) Write an R program to create a bar plot for the data frame columns.
- c) Write an R program to create a box plot for the data frame columns.

Exercise 14:

- a) Write an R program to add the legend to the plot.
- b) Write an R program to change the width and height of the plot layout
- c) Write an R program to calculate mean, mode, median and standard deviation
- d) Implement R Script to create a Pie chart, Bar Chart, scatter plot and Histogram.

Exercise 15:

- a) Implement R Script to perform Normal, Binomial distributions.
- b) Implement R Script to perform correlation

References:

1. R Cookbook Paperback – 2011 by Teetor Paul O Reilly Publications
2. Beginning R: The Statistical Programming Language by Dr. Mark Gardener, Wiley Publications
3. R Programming For Dummies by JorisMeysAndrie de Vries, Wiley Publications
4. Hands-On Programming with R by Grolemond, O Reilly Publications
5. Statistical Programming in R by KG Srinivas G.M. Siddesh, ChetanShetty&Sowmya B.J. - 2017 edition

6. R Fundamentals and Programming Techniques, Thomas Lumely.
7. R for Everyone Advanced Series Analytics and Graphics, Jared P. Lander- Addison Wesley
8. The Art of R Programming, Norman Matloff, Cengage Learning

Web Links:

1. URL: <https://cran.r-project.org/doc/manuals/r-release/R-intro.pdf>
2. <http://nptel.ac.in/courses/106104135/48>
3. <http://nptel.ac.in/courses/110106064/>

Software Requirements:

1. The R statistical software program. Available from: <https://www.r-project.org/>
2. RStudio an Integrated Development Environment (IDE) for R. Available from: <https://www.rstudio.com/>

II Semester	L	T	P	C
	3	0	0	3
24BC2T01 - DISCRETE MATHEMATICS				

Course Objectives:

- To learn the mathematical foundations for Computer Science.
- Topics covered essential for understanding various courses

Course Outcomes (Cos): At the end of the course, student will able to

CO No.	Course Outcome	Knowledge Level (K)#
CO1	Understand and apply propositional and predicate calculus, including logical connectives, truth tables, and inference rules.	K2
CO2	Understand and apply basic set theory concepts, including relations, functions, and the principle of inclusion and exclusion.	K2
CO3	Apply combinatorial techniques (permutations, combinations) and solve recurrence relations using generating functions.	K3
CO4	Understand and apply fundamental graph theory concepts, including graph representations, connectivity, and traversal algorithms.	K3
CO5	Understand and apply finite state machines, including DFA, NFA, and the pumping lemma for regular languages.	K2

Unit-I:

Mathematical Logic: Propositional Calculus: Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus, Consistency of Premises, Indirect Method of Proof, Predicate Calculus: Predicates, Predicative Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus.

Unit-II:

Sets and Functions: Sets, Relations, Functions, Closures of Equivalence Relations, Partial ordering well ordering, Lattice, Sum of products and product of sums principle of Inclusions and Exclusions

Unit III:

Combinatory: Permutations, Combinations, Pigeonhole principle
Recurrence Relation: Linear and Non-linear Recurrence Relations, Solving Recurrence Relation using Generating Functions.

Unit IV:

Graphs: Introduction to graphs, graphs terminologies, Representation of graphs, Isomorphism
Connectivity & Paths: Connectivity, Euler and Hamiltonian Paths, Introduction to tree, tree traversals, spanning tree and tree searches: Breadth first search, Depth first search, cut-set, cut-vertex.

Unit-V:

Modeling Computation: Finite State Machine, Deterministic Finite Automata (DFA), Non- Deterministic Finite Automata Lemma for Regular Language.(NFA), Grammars and Language, Application of Pumping

Text Books:

1. Discrete Mathematics and its Applications with Combinatory and Graph Theory, 7th edition by Kenneth H. Rosen.
2. Discrete Mathematical Structures with Applications to Computer Science, J. P Tremblay, R. Manohar, TMH, 1997.
3. Elements of Discrete Mathematics -A Computer Oriented Approach, C. L. Liu P. Mohapatra, 3rd Edition, Tata McGraw Hill.
4. Discrete Mathematics, An open Introduction, Oscar Levin, 3rd edition.

Reference Books:

1. Elements of Discrete Mathematics by C. L. Liu and D.P. Mohapatra, TMH, 2012.
2. A Modern Approach to Discrete Mathematics and Structure by J. K. Mantri& T. KTripathy,Laxmi Publication.

Web Resources:

1. https://onlinecourses.nptel.ac.in/noc22_cs123/preview
2. <https://discrete.openmathbooks.org/preview/>
3. <https://mathworld.wolfram.com/topics/DiscreteMathematics.html>
4. <https://www.csie.ntu.edu.tw/~sylee/courses/dm/resources.htm>

II Semester	L	T	P	C
	2	0	0	2
24BC2T02 - ENVIRONMENTAL SCIENCE				

Course Objectives:

- To make the students to get awareness on environment
- To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life
- To save earth from the inventions by the engineers.

Course Outcomes (Cos): At the end of the course, student will able to

CO No.	Course Outcome	Knowledge Level (K)#
CO1	Understand and analyze the scope, importance, and associated problems of natural resources, including renewable and non-renewable resources, and their impact on the environment.	K2
CO2	Understand the structure and function of different ecosystems and the importance of biodiversity, including conservation strategies and threats to biodiversity.	K2
CO3	Identify and evaluate the causes, effects, and control measures of various types of environmental pollution and solid waste management.	K3
CO4	Analyze social issues related to environmental sustainability, including urban problems, climate change, and the enforcement of environmental legislation.	K4
CO5	Understand the impact of human population dynamics on the environment and health, and explore the role of technology in addressing these issues.	K3

UNIT-I

Multidisciplinary Nature Of Environmental Studies: Definition, Scope and Importance, Need for Public Awareness. Natural Resources: Renewable and non-renewable resources, Natural resources and associated problems, Forest resources, Use and over, exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people, Water resources, Use and over utilization of surface and ground water, Floods, drought, conflicts over water, dams–benefits and problems, Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies: Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies: Energy resources.

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, characteristic features, structure and function of the following ecosystem:

- Forest ecosystem.
- Grassl and ecosystem
- Desert ecosystem
- Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity And Its Conservation: Introduction Definition: genetic, species and ecosystem diversity– Bio-geographical 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, 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.

UNIT–III

Environmental Pollution: Definition, Cause, 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.

UNIT–IV

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. Case studies: Environmental ethics: Issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies: Wastel and reclamation. Consumerism and waste products. Environment Protection Act, Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act, Wild life Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness.

UNIT–V

Human Population And The Environment: Population growth, variation among nations. Population explosion, Family Welfare Programmes. Environment and human health, Human Rights, Value Education, HIV/AIDS, Women and Child Welfare, Role of information Technology in Environment and human health–Case studies. Field Work: Visit to a local area to document environmental assets River/ forest grassland/ hill/ mountain, Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds– river, hills lopes, etc.

Text books:

1. Text book of Environmental Studies for Undergraduate Courses ErachBharucha for University Grants Commission ,Universities Press.
2. Palaniswamy, “Environmental Studies”, Pearson education
3. S. AzeemUnnisa,“ Environmental Studies” Academic Publishing Company
4. K. RaghavanNambiar,“ Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus”, Scitech Publications (India), Pvt. Ltd.

Reference Books:

- 1 Deeksha Dave and E. Sai Baba Reddy, “Text book of Environmental Science”, Cengage Publications.
- 2 M. Anji Reddy, “Text book of Environmental Sciences and Technology”, B S Publication.
- 3 J.P.Sharma, Comprehensive Environmental studies, Laxmi publications.
- 4 J.Glynn Henry and Gary W. Heinke, “Environmental Sciences and Engineering”,Prentice Hall of India Private limited
- 5 G.R.Chatwal, “A Text Book of Environmental Studies ”Himalaya Publishing House.
- 6 Gilbert M. Masters and Wendell P.Ela, “Introduction to Environmental Engineering and Science,Prentice

II Semester	L	T	P	C
	3	0	0	3
24BC2T03 - BUSINESS ORGANIZATION				

Course Objectives:

The course aims to acquire conceptual knowledge of business, formation various business organizations. To provide the knowledge on deciding plant location, plan layout and business combinations.

Course Outcomes (Cos): At the end of the course, student will able to

CO No.	Course Outcome	Knowledge Level (K)#
CO1	Understand the fundamental concepts of business, including its features, stages of development, and classification of business activities, as well as differentiate between industry, commerce, business, and profession.	K2
CO2	Analyze the considerations for establishing a new business, understand the qualities of a successful businessman, and evaluate the different forms of business organization, including their merits and demerits.	K4
CO3	Evaluate the factors affecting plant location and layout, understand the objectives and types of plant layouts, and assess the criteria and factors influencing the size of a business unit and its optimal size.	K4
CO4	Understand the concepts of business combination and rationalization, including their characteristics, objectives, causes, forms, and differences between rationalization and nationalization.	K4
CO5	Understand the concepts of business combination and rationalization, including their characteristics, objectives, causes, forms, and differences between rationalization and nationalization.	K4

Unit I:

Business: Concept, Meaning, Features, Stages of development of business and importance of business. Classification of Business Activities. Meaning, Characteristics, Importance and Objectives of Business Organization. Difference between Industry & Commerce and Business & Profession, Modern Business and their Characteristics.

Unit II:

Promotion of Business: Considerations in Establishing New Business. Qualities of a Successful Businessman. Forms of Business Organization - Sole Proprietorship, Partnership, Joint Stock Companies & Co-operatives and their Characteristics, relative merits and demerits, Difference between Private and Public, Concept of One Person Company.

Unit III:

Plant Location and Layout: Meaning, Importance, Factors affecting Plant Location. Plant Layout - Meaning, Objectives, Importance, Types of Layout. Factors affecting Layout. Size of Business Unit - Criteria for Measuring the Size and Factors affecting the Size. Optimum Size and factors determining the Optimum Size.

Unit IV:

Business Combination: Meaning, Characteristics, Objectives, Causes, Forms and Kinds of Business Combination. Rationalization: Meaning, Characteristics, Objectives, Principles, Merits and demerits, Difference between Rationalization and Nationalization.

Unit V:

Computer Essentials: Milestones of Computer Evolution – Computer, Block diagram, generations of computer. Internet Basics - Internet, history, Internet Service Providers, Types of Networks, IP, Domain Name Services, applications. Ethical and Social Implications - Network and security concepts- Information Assurance Fundamentals, Cryptography-Symmetric and Asymmetric Malware, Firewalls, Fraud Techniques, privacy and data protection.

Reference Books:

- 1 Gupta, C.B., “Business Organisation”, MayurPublication, (2014).
- 2 Singh,B.P.,Chhabra,T.N.,“An Introduction to Business Organisation & Management”, KitabMahal, (2014).
- 3 Sherlekar, S.A. &Sherlekar, V.S, “Modern Business Organization & Systems Approach Mumbai”, Himalaya Publishing House, (2000).
- 4 Bhusan Y. K., “Business Organization”, Sultan Chand & Sons.
- 5 Prakash, Jagdish, “Business Organistaton and Management”, KitabMahal Publishers (Hindi and English)
- 6 Fundamentals of Computers by V. Raja Raman
- 7 Cyber Security Essentials by James Graham, Richard Howard, Ryan Olson

II Semester	L	T	P	C
	3	0	0	3
24BC2T04 - COMPUTER ORGANIZATION				

Course Objectives:

The purpose of the course is to introduce principles of computer organization and the basic architectural concepts. It provides an in depth understanding of basic organization, design, programming of a simple digital computer, computer arithmetic, instruction set design, micro programmed control unit, pipelining and vector processing, memory organization and I/O systems

Course Outcomes (Cos): At the end of the course, student will able to

CO No.	Course Outcome	Knowledge Level (K)#
CO1	Understand the basic structure of computers, including types, functional units, bus structures, software, performance factors, and data representation methods such as fixed-point and floating-point.	K2
CO2	Apply register transfer language to describe micro-operations including arithmetic, logic, and shift operations, and understand instruction codes, computer registers, and instruction cycles.	K3
CO3	Understand micro programmed control mechanisms and the organization of the central processing unit, including instruction formats, addressing modes, and data manipulation.	K4
CO4	Analyze different types of memory organization, including memory hierarchy, main memory, cache memory, and virtual memory, and understand concepts related to shift registers and RAID.	K4
CO5	Understand the organization of input-output systems, including peripheral devices, interfaces, data transfer modes, priority interrupts, DMA, and serial communication.	K2

UNIT-I:

Basic Structure Of Computers: Computer Types, Functional unit, Basic Operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers. Data Representation. Fixed Point Representation. Floating – Point Representation.

UNIT-II:

Register Transfer Language And Micro-operations: Register Transfer language. Register Transfer Bus and memory transfers, Arithmetic Micro-operations, Logic micro operations, shift micro operations, Arithmetic logic shift unit. Instruction codes. Computer Registers, Computer instructions, Instruction cycle.

UNIT III:

Micro Programmed Control: Control memory, Address sequencing, micro program example, design of control unit.

Central Processing Unit: General Register Organization, Instruction Formats, Addressing modes, Data Transfer and Manipulation, Program Control.

UNIT IV:

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory, Cache memories performance considerations, Virtual memories Introduction to Shift registers and RAID

UNIT V:

Input–Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupts, DMA, Input Output Processor, Serial Communication.

Text Books:

1. Digital Logic and Computer Design, Moriss Mano, 11th Edition, Pearson Education.
2. Computer Organization, 5th ed., Hamacher, Vranesic and Zaky, TMH, 2002
3. Computer System Architecture, 3/e, Moris Mano, Pearson/PHI.

Reference Books:

1. Computer System Organization & Architecture, John D. Carpinelli, Pearson, 2008
2. Computer System Organization, Naresh Jotwani, TMH, 2009
3. Computer Organization & Architecture: Designing for Performance, 7th ed., William Stallings, PHI, 2006
4. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition, PHI/Pearson.

Web Resources:

1. <https://nptelvideos.com/course.php?id=396>
2. https://onlinecourses.nptel.ac.in/noc20_cs64/preview
3. <https://www.learncomputerscienceonline.com/computer-organization-and-architecture/>
4. <http://williamstallings.com/COA/COA8e-student/index.html>

II Semester	L	T	P	C
	3	0	0	3
24BC2T05 - DATA STRUCTURES				

Course Objectives:

- Solve problems using data structures such as linear lists, stacks, queues, hash tables
- Be familiar with advanced data structures such as binary search trees

Course Outcomes (Cos): At the end of the course, student will able to

CO No.	Course Outcome	Knowledge Level (K)#
CO1	Implement and analyze various search and sorting algorithms, and understand list ADTs including their implementations..	K4
CO2	Implement and apply stack and queue data structures using both arrays and linked lists, and understand their real-world applications.	K4
CO3	Apply hashing techniques and collision resolution strategies to efficiently manage and retrieve data.	K4
CO4	Implement heap operations and apply heaps in problem-solving, and understand the various types of tries.	K3
CO5	Implement and analyze binary trees and binary search trees, and understand basic graph concepts and algorithms for minimum cost spanning trees.	K3

UNIT- I:

Searching: Linear and Binary Search Methods. **Sorting:** Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Heap sort. Introduction to Data Structures: Abstract Data Types (ADTs), The List ADT: Simple Array Implementation of Lists, Simple Linked Lists, Doubly Linked Lists, Circularly Linked Lists.

UNIT-II:

The Stack ADT: The Stack Model, Implementation of Stacks, Applications of Stack.

The Queue ADT: Queue Model, Array Implementation of Queues, Application of Queues, Stacks and Queue. implementation of stacks and queues using linked list.

UNIT- III:

Hashing: Hash Function, Separate Chaining, Collision Resolution-Separate Chaining, Open Addressing: Linear Probing, quadratic probing, Double Hashing, rehashing, Extendible Hashing.

UNIT- IV:

Heap: Structure Property, Heap-Order Property, Basic Heap Operations. Applications: The Selection problem, Event Simulation. Tries, Standard Tries, Compressed Tries, Suffix Tries. (Examples only).

UNIT –V:

Trees: Binary Trees- traversals, Implementation, Expression Trees. Binary Search Trees- find, findMin and find Max, insert, delete operations.

Graphs-Basic Concepts , Storage Structures and Traversals, minimum cost spanning trees

Text Books:

1. Data Structures and Algorithm Analysis, 4th Edition, Mark Allen Weiss, Pearson.
2. Data Structures: A Pseudo Code Approach with C, 2nd Edition, Richard F.Gilberg, &Behrouz A. Forouzon, Cengage.

3. C and Data Structures:A Snap Shot Oriented Treatise Using Live Engineering Examples,N.B.Venkateswarulu,E.V.Prasad, S Chand &Co ,2009.

References Books:

1. Data Structures, Algorithms and Applications in java, 2/e, SartajSahni, University Press.
2. Data Structures using C, 2/e, ReemaThareja

Web Resources:

1. <https://archive.nptel.ac.in/courses/106/102/106102064/>
2. https://ocw.mit.edu/courses/6-006-introduction-to-algorithms-spring-2020/video_galleries/lecture-videos/
3. <https://www.cs.usfca.edu/~galles/visualization/Algorithms.html>
4. <https://visualgo.net/en>
5. <https://elearn.daffodilvarsity.edu.bd/course/view.php?id=11771>

II Semester	L	T	P	C
	3	0	0	3
24BC2T06 - OOPS THROUGH C++				

Course Objectives:

This course is designed to provide a comprehensive study of the C programming language.

- It stresses the strengths of C, which provide students with the means of writing efficient, maintainable and portable code.
- The nature of C language is emphasized in the wide variety of examples and applications.
- To know about some popular programming languages and how to choose Programming language for solving a problem.

Course Outcomes (Cos): At the end of the course, student will able to

CO No.	Course Outcome	Knowledge Level (K)#
CO1	Understand the evolution and fundamentals of C++ and OOP	K1-K2
CO2	Create classes, objects, and manage constructors/destructors	K3
CO3	Implement operator overloading and inheritance	K3-K4
CO4	Apply pointers and virtual functions for polymorphism	K4-K5
CO5	Utilize templates and handle exceptions effectively	K4-K5

UNIT I:

Introduction to C++: Difference between C and C++, Evolution of C++, The Object-Oriented Technology, Disadvantage of Conventional Programming, Key Concepts of Object-Oriented Programming, Advantage of OOP, Object Oriented Language.

UNIT II:

Classes and Objects & Constructors and Destructor: Classes in C++, Declaring Objects, Access Specifiers and their Scope, Defining Member Function, Overloading Member Function, Nested class, Constructors and Destructors, Introduction, Characteristics of Constructor and Destructor, Application with Constructor, Constructor with Arguments, parameterized Constructor, Destructors, Anonymous Objects.

UNIT III:

Operator Overloading and Type Conversion & Inheritance: The Keyword Operator, Overloading Unary Operator, Operator Return Type, Overloading Assignment Operator (=), Rules for Overloading Operators, Inheritance, Reusability, Types of Inheritance, Diamond Problem, Virtual Base Classes, Object as a Class Member, Abstract Classes, Inheritance, Advantages of Inheritance and Disadvantages of Inheritance.

UNIT IV:

Pointers & Binding Polymorphisms and Virtual Functions: Pointer, Features of Pointers, Pointer Declaration, Pointer to Class, Pointer Object, The this Pointer, Pointer to Derived Classes and Base Class, Binding Polymorphisms and Virtual Functions, Introduction, Binding in C++, Virtual Functions, Rules for Virtual Function, Virtual Destructor.

UNIT V:

Templates, Exception Handling: Generic Programming with Templates, Need for Templates, Definition of class Templates, Normal Function Templates, Over Loading of Template Function, Bubble Sort Using Function Templates, Difference Between Templates and Macros, Linked Lists with Templates, Exception Handling, Principles of Exception Handling, The Keywords try Exceptions. throw and catch, Multiple

Catch Statement, Specifying

Text Books:

1. E. Balaguruswamy, Object Oriented Programming with C++, 6/e, McGraw Hill, 2013.
2. A First Book of C++, Gary Bronson, Cengage Learning.
3. The Complete Reference C++, Herbert Schildt, TMH.
4. Programming in C++, Ashok N Kamthane, Pearson 2nd Edition

Reference Books:

1. Object Oriented Programming with C++ by ReemaThareja, OXFORD University Press
2. Object Oriented Programming C++, Joyce Farrell, Cengage.
3. C++ Programming: from problem analysis to program design, DS Malik, Cengage Learning

Web Resources:

1. https://onlinecourses.nptel.ac.in/noc22_cs103/preview
2. <https://ocw.mit.edu/courses/6-088-introduction-to-c-memory-management-and-c-object-oriented-programming-january-iap-2010/pages/lecture-notes/>
3. <https://see.stanford.edu/Course/CS106B>
4. <https://www.udemy.com/course/object-oriented-c-plus-plus-programming/>
5. <https://wiingy.com/learn/cpp/cpp-concepts/>

II Semester	L	T	P	C
	0	0	3	1.5
24BC2L01 - DATA STRUCTURES THROUGH C LAB				

Course Objectives:

From the course the student will

- Solve problems using data structures such as linear lists, stacks, queues, hash tables
- Be familiar with advanced data structures such as balanced search trees, AVL Trees, and B Trees.

Course Outcomes (Cos): At the end of the course, student will able to

CO No.	Course Outcome	Knowledge Level (K)#
CO1	Understand and implement basic linked list operations, including singly, doubly, and circular linked lists	K3
CO2	Develop algorithms to reverse, sort, merge, and remove duplicates in linked lists.	K4
CO3	Implement and perform stack and queue operations using linked lists, including infix to postfix conversion and expression evaluation.	K3
CO4	Apply recursive and non-recursive methods to implement Binary Search Trees and AVL Trees.	K4
CO5	Develop and implement sorting algorithms, including Selection, Insertion, Merge, Heap, and Quick Sort	K4

List of experiments:**Experiment 1:**

Write a C program to perform various operations on a single linked list.

Experiment 2:

Write a C program for the following:

- Reverse a linked list.
- Sort the data in a linked list

Experiment 3:

Write a C program for the following:

- Remove duplicates from a linked list.
- Merge two linked lists.

Experiment 4:

Write a C program to perform various operations on a doubly linked list.

Experiment 5:

Write a C program to perform various operations on a circular linked list.

Experiment 6:

Write a C program for performing various operations on a stack using a linked list.

Experiment 7:

Write a C program for performing various operations on a queue using a linked list.

Experiment 8:

Write a C program for the following using a stack:

- Infix to postfix conversion.

- b) Expression evaluation.
- c) Obtain the binary number for a given decimal number.

Experiment 9:

Write a C program to implement various operations on a Binary Search Tree using Recursive and Non-Recursive methods.

Experiment 10:

Write a C program to implement Selection Sort & Insertion Sort for given elements.

Experiment 11:

Write a C program to implement Merge & Heap Sort for given elements.

Experiment 12:

Write a C program to implement Quick Sort for given elements.

Experiment 13:

Write a C program to implement various operations on AVL trees.

Experiment 14:

Write a C program to perform the following operations:

- a) Insertion into a B-tree.
- b) Searching in a B-tree.

Experiment 15:

Write a C program for the implementation of recursive and non-recursive functions for Binary Tree Traversals.

Web Resources:

1. <https://ds1-iiith.vlabs.ac.in/>
2. https://profile.iiita.ac.in/bibhas.ghoshal/teaching_ds_lab.html
3. <https://moodle.sit.ac.in/blog/data-structures-laboratory/>
4. <https://dsalab.netlify.app/>
5. <https://www.vtuloop.com/data-structure-lab-programs-all/>

II Semester	L	T	P	C
	0	0	3	1.5
24BC2L02 - OOPS THROUGH C++ LAB				

Course Objectives:

- To strengthen their problem solving ability by applying the characteristics of an object- oriented approach.
- To introduce object oriented concepts in C++ and Java

Course Outcomes (Cos): At the end of the course, student will able to

CO No.	Course Outcome	Knowledge Level (K)#
CO1	Understand and implement basic concepts of C++ such as input/output, variables, control flow, and expressions.	K2
CO2	Apply C++ programming concepts to implement functions, classes, object-oriented principles, and memory management.	K3
CO3	Analyze and implement advanced OOP features like inheritance, polymorphism, operator overloading, and templates.	K4
CO4	Develop solutions to problems using STL (Standard Template Library) and demonstrate exception handling mechanisms in C++	K3
CO5	Demonstrate the ability to use inheritance and polymorphism for code reuse and runtime behavior customization.	K4

Exercise 1: (Basics)

Write a Simple Program on printing “Hello World” and “Hello Name” where name is the input from the user

- Convert any two programs that are written in C into C++.
- Write a description of using g++ (150 Words)

Exercise 2: (Expressions Control Flow)

- Write a Program that computes the simple interest and compound interest payable on principal amount (in Rs.) of loan borrowed by the customer from a bank for a given period of time (in years) at specific rate of interest. Further determine whether the bank will benefit by charging simple interest or compound interest.
- Write a Program to calculate the fare for the passenger starveling in a bus. When a Passenger enters the bus, the conductor asks “What distance will you travel?” On knowing distance from passenger (as an approximate integer), the conductor mentions the fare to the passenger according to following criteria.

Exercise 3: (Variables, Scope, Allocation)

- Write a program to implement call by value and call by reference using reference variable.
- Write a program to illustrate scope resolution, new and delete Operators. (Dynamic Memory Allocation)
- Write a program to illustrate Storage classes
- Write a program to illustrate Enumerations

Exercise 4: (Functions)

Write a program illustrating Inline Functions

- a) Write a program illustrates function overloading. Write 2 overloading functions for power.
- b) Write a program illustrates the use of default arguments for simple interest function.

Exercise 5: (Functions –Exercise Continue)

- a) Write a program to illustrate function overloading. Write 2 overloading functions for adding two numbers
- b) Write a program illustrate function template for power of a number.
- c) Write a program to illustrate function template for swapping of two numbers.

Exercise 6: (Classes Objects)

Create a Distance class with:

- feet and inches as data members
 - member function to input distance
 - member function to output distance
 - member function to add two distance objects
- a) Write a main function to create objects of DISTANCE class. Input two distances and output the sum.
 - b) Write a C++ Program to illustrate the use of Constructors and Destructors (use the above program.)
 - c) Write a program for illustrating function overloading in adding the distance between objects (use the above problem).
 - d) Write a C++ program demonstrating a Bank Account with necessary methods and variables

Exercise 7: (Access)

Write a program for illustrating Access Specifiers public, private, protected

- a) Write a program implementing Friend Function
- b) Write a program to illustrate this pointer
- c) Write a Program to illustrate pointer to a class

Exercise 8: (Operator Overloading)

- a) Write a program to Overload Unary, and Binary Operators as Member Function, and Non - Member Function.
 - i Unary operator as member function
 - ii Binary operator as nonmember function
- b) Write a C ++ program to implement the overloading assignment = operator

Exercise 9: (Inheritance)

- a) Write C++ Programs and incorporating various forms of Inheritance
- b) Single Inheritance ii) Hierarchical Inheritance iii) Multiple Inheritances

Exercise 10: (Inheritance –Continued)

- a) Write C++ Programs and incorporating various forms of Inheritance

- i. Multi-level inheritance ii) Hybrid inheritance
- b) Write a program to show Virtual Base Class

Exercise 11: (Inheritance –Continued)

- a) Write a Program in C++ to illustrate the order of execution of constructors and destructors in inheritance
- b) Write a Program to show how constructors are invoked in derived class.

Exercise 12: (Polymorphism)

- a) Write a program to illustrate runtime polymorphism
- b) Write a program to illustrate this pointer
- c) Write a program illustrates pure virtual function and calculate the area of different shapes by using abstract class.

Exercise 13: (Templates)

- a) Write a C++ Program to illustrate template class
- b) Write a Program to illustrate class templates with multiple parameters
- c) Write a Program to illustrate member function templates

Exercise 14: (Exception Handling)

- a) Write a Program for Exception Handling Divide by zero
- b) Write a Program to rethrow an Exception

Exercise 15: (STL)

- a) Write a Program to implement List and List Operations
- b) Write a Program to implement Vector and Vector Operations

Web Resources:

1. <https://eecs.wsu.edu/~nroy/courses/cpts122/labs/>
2. <https://www.coursera.org/learn/c-plus-plus-a>
3. <https://www.educative.io/courses/learn-object-oriented-programming-in-cpp>
4. <https://www.udemy.com/course/fundamentals-of-object-oriented-programming-cplusplus/>

II Semester	L	T	P	C
	2	0	0	2
24BC2T07 - INDIAN CONSTITUTION				

Course Objectives:

Students will be able to:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.

Course Outcomes (Cos): At the end of the course, student will able to

CO No.	Course Outcome	Knowledge Level (K)#
CO1	Understand the historical background and evolution of the Indian Constitution, including its drafting process and philosophical underpinnings.	K1
CO2	Analyze the Constitutional Rights and Duties, including fundamental rights, directive principles, and duties enshrined in the Indian Constitution.	K3
CO3	Comprehend the functioning and significance of the Election Commission and its role in upholding democratic processes, as well as the institutions focused on the welfare of marginalized groups.	K2
CO4	Evaluate the roles, powers, and responsibilities of the different organs of governance, including the Parliament, Executive, and Judiciary.	K4
CO5	Gain insight into the structure and functioning of local governance, including municipalities, panchayati raj, and their importance in grassroots democracy.	K3

UNIT – I:

History of Making of the Indian Constitution: History, Drafting Committee,(Composition & Working), Philosophy of the Indian Constitution: Preamble, Salient, Features.

UNIT – II:

Contours of Constitutional Rights & Duties: Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

UNIT – III:

Election Commission: Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.

UNIT – IV:

Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive: President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of

Judges, Qualifications, Powers and Functions.

UNIT – V:

Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative CEO of Municipal Corporation. Panchayati raj: Introduction, PRI: ZilaPanchayat. Elected officials and their roles, CEO ZilaPanchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.

Text Books:

1. The Constitution of India, 1950 (Bare Act), Government Publication
2. Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, Dr. S. N. Busi, 2015

Reference Books:

1. Indian Constitution Law, 7th Edition. M. P. Jain, Lexis Nexis, 2014.
2. Introduction