



**NITTE**  
EDUCATION TRUST

**NMAM INSTITUTE  
OF TECHNOLOGY**

(An Autonomous Institution affiliated to Visvesvaraya Technological University, Belagavi)

**Nitte - 574110, Karnataka, India**

ISO 9001: 2015 Certified, Accredited by NAAC with 'A' Grade



**III & IV SEMESTER**

**Department of**

**Information Science & Engineering**



**College Calendar 2020-21**

मातेव रक्षति पितेव हिते नियुङ्क्ते  
कान्तेव चापि रमयत्यपनीय खेदम् ।  
लक्ष्मीं तनोति वितनोति च दिक्षु कीर्तिं  
किं किं न साधयति कल्पलतेव विद्या ॥

ಮಾತೇವ ರಕ್ಷತಿ ಪಿತೇವ ಹಿತೇ ನಿಯುಂಕ್ತೇ  
ಕಾಂತೇವ ಚಾಪಿ ರಮಯತ್ಯಪನೀಯ ಖೇದಮ್ ।  
ಲಕ್ಷ್ಮೀಂ ತನೋತಿ ವಿತನೋತಿ ಚ ದಿಕ್ಷು ಕೀರ್ತಿಂ  
ಕಿಂ ಕಿಂ ನ ಸಾಧಯತಿ ಕಲ್ಪಲತೇವ ವಿದ್ಯಾ ॥

ತಾಯಿಯಂತೆ ರಕ್ಷಣೆಯನ್ನಿತ್ತು, ತಂದೆಯಂತೆ ಸನ್ಮಾರ್ಗದಲ್ಲಿ ತೊಡಗಿಸಿ ಪತ್ನಿಯಂತೆ ದುಃಖವನ್ನು ದೂರಮಾಡಿ ಮನಕ್ಕೆ ಮುದಕೊಡುತ್ತಾ, ಸಂಪತ್ತನ್ನು ವರ್ಧಿಸಿ ದಶದಿಕ್ಕುಗಳಲ್ಲಿ ಕೀರ್ತಿಯನ್ನು ಪಸರಿಸುವ 'ವಿದ್ಯೆ', ಕಲ್ಪಲತೆಯಂತೆ ನಾವು ಬಯಸಿದ್ದನ್ನು ಕೊಡುತ್ತಾಳೆ.

विद्या माता की तरह पालन करती है, बाप के तरह हितकर मार्ग में ही ले लेता है। पत्नी की तरह हमारा दुःख दूर करता है। मन को संतोष देता है, धन देती है, दिशाओं में कीर्ति फैलाती है। कल्पवल्ली की तरह वह सब कामनाये पूरी करती है।

Do you know in how many ways the 'Knowledge' serves his master? Like mother it protects, like father it teaches and guides, like wife, provides all kinds of happiness after destroying all sorrows, it brings wealth from every corner and spreads the fame in all direction. Like 'Kalpalatha' knowledge offers everything to human being whatever he wishes.

(An Autonomous Institution affiliated to VTU,Belgavi)  
NITTE-574110, Karkala Taluk, Udupi District, Karnataka, India  
ISO 9001:2015 Certified, Accredited by NAAC with “A” Grade

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# COLLEGE CALENDAR

## 2020-21

(III & IV Semester)

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(An Autonomous Institution affiliated to VTU,Belgavi)  
NITTE-574110, Karkala Taluk, Udupi District, Karnataka, India  
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## **Vision Statement**

Pursuing Excellence, Empowering people, Partnering in  
Community Development

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## **Mission Statement**

To develop N.M.A.M. Institute of Technology, Nitte, as Centre of Excellence  
by imparting Quality Education to generate competent,  
Skilled and Humane Manpower to face emerging Scientific, Technological,  
Managerial and Social Challenges  
with Credibility, Integrity, Ethics and Social Concern.

**In Memorium**



**Late Nitte Mahalinga Adyanthaya**



## **Our Founder**



**Late Justice K. S. Hegde**  
1909-1990



**SRI N. VINAYA HEGDE**

President, Nitte Education Trust  
Chancellor, Nitte (Deemed to be University), Mangaluru



**NITTE**  
EDUCATION TRUST

**NMAM INSTITUTE  
OF TECHNOLOGY**

Sl.No.	Name of the Faculty	Designation
1.	Dr. Niranjan N. Chiplunkar	Principal
2.	Mr. Yogeesh Hegde	Registrar/Chief Warden
3.	Dr. Shrinivasa Rao B. R.	Vice Principal/Controller of Examinations / Professor
4.	Dr. I. Ramesh Mithanthaya	Vice Principal / Dean (Academics)/ Professor
5.	Dr. Sudesh Bekal	Dean (R&D)/Professor
6.	Dr. Rajesh Shetty K.	Dean (Admissions & Alumni Affairs)/ Professor
7.	Dr. Muralidhara	PG Coordinator/Professor
8.	Prof. Shalini K. Sharma	Head, Counseling, Welfare, Training & Placement
9.	Dr. Srinath Shetty K.	Resident Engineer/Professor

#### **HEADS OF DEPARTMENTS**

1.	Dr. Arun Kumar Bhat	Civil Engg.
2.	Dr. Udayakumar Reddy	Computer Science & Engg.
3.	Dr. Karthik Pai B. H.	Information Science & Engg.
4.	Dr. C. Vaman Rao	Biotechnology Engg.
5.	Dr. Shashikanth Karinka	Mechanical Engg.
6.	Dr. Rekha Bhandarkar	Electronics & Communication Engg.
7.	Dr. Nagesh Prabhu	Electrical & Electronics Engg.
8.	Dr. Kumudakshi	Mathematics
9.	Dr. Shobha R. Prabhu	Physics
10.	Dr. Shivaprasad Shetty M.	Chemistry
11.	Dr. Surendra Shetty	MCA
12.	Mrs. Rashmi D. Hegde	Humanities
13.	Prof. Vinaya B. R.	1 <sup>st</sup> year Coordinator
14.	Dr. Divakara Bhat	Senior Grade Librarian
15.	Dr. Gururaj Upadhyaya	Asso. Prof./Workshop Supdt.
16.	Dr. Udaya Kumar Shenoy	In charge of BE in CCE
17.	Dr. Jyothi Shetty	In Charge of BE, AI & MLE



### **SPORTS DEPARTMENT**

- |                              |                   |
|------------------------------|-------------------|
| 1. Sri. Shyam Sundar M.      | P.E.D             |
| 2. Sri. Ganesh Poojary       | P.E.D             |
| 3. Ms. Sowjanya M.           | P.E.I             |
| 4. Mr. Ravi Prakash C. Anpur | Basket Ball Coach |

### **STUDENT WELFARE CELL**

- |                            |                         |
|----------------------------|-------------------------|
| 1. Dr. Subrahmanya Bhat K. | Dean - Student Welfare  |
| 2. Sri. Shekar Poojari     | Student Welfare Officer |

### **ENTREPRENEURSHIP DEVELOPMENT CELL**

- |                           |                         |
|---------------------------|-------------------------|
| 1. Dr. Narasimha Bailkeri | Professor/EDC- Incharge |
| 2. Mrs. Geetha Poojarthi  | Co-ordinator            |

### **OFFICE SECTION HEADS**

- |                            |   |
|----------------------------|---|
| 1. Mr. Keshava Mugeraya    | Sr. Supdt., Academic Section/<br>Purchase In-Charge |
| 2. Mrs. Suneetha R. Shetty | Sr. Supdt., Administrative<br>Section               |
| 3. Mr. Suresh Achar        | Sr. Supdt., Stores                                  |
| 4. Mrs. Jayashree          | Sr. Programmer                                      |
| 5. Mrs. Shailaja V. Shetty | Supdt., Accounts Section                            |

### **DEPARTMENT OF TRAINING & PLACEMENT**

- |                         |                 |
|-------------------------|-----------------|
| 1. Mr. Bharath G. Kumar | Lead Placements |
|-------------------------|-----------------|

### **DEPARTMENT OF MATHEMATICS**

- |                           |                        |
|---------------------------|------------------------|
| 1. Dr. Shashirekha B. Rai | Professor              |
| 2. Dr. P. Shankaran       | Professor              |
| 3. Dr. Kumudakshi         | Asso. Professor/ HoD   |
| 4. Dr. Sharad M. Hegde    | Asst. Professor Gd III |
| 5. Mrs. Ambika N.         | Asst. Professor Gd I   |

6.	Mrs. Vinaya Acharya	Asst. Professor Gd I
7.	Mrs. Anitha D. Bayar	Asst. Professor
8.	Mrs. Bhavya K.	Asst. Professor
9.	Ms. Chaithra K.	Asst. Professor
10.	Mrs. Bhavya. D.	Asst. Professor
11.	Mrs. Sharmila	Asst. Professor
12.	Mrs. Anjana Pai	Asst. Professor
13.	Mrs. Soumya	Asst. Professor
14.	Mrs. Smitha G. V.	Asst. Professor

### **DEPARTMENT OF PHYSICS**

1.	Dr. Manjunath K. B.	Asst. Professor Gd III
2.	Dr. Shobha R. Prabhu	Asst. Professor Gd III/ HoD
3.	Dr. Nagaraja B. S.	Asst. Professor Gd III
4.	Dr. Raghavendra Bairy	Asst. Professor
5.	Dr. Shyam Prasad K.	Asst. Professor

### **DEPARTMENT OF CHEMISTRY**

1.	Dr. Janardhana Nayak	Professor
2.	Dr. Ramesh Bhat	Asso. Professor
3.	Dr. Shivaprasad Shetty M.	Asst. Professor Gd III/HoD
4.	Dr. Aarti S. Bhat	Asst. Professor Gd III
5.	Dr. Subrahmanya Ishwar Bhat	Asst. Professor Gd III

### **DEPARTMENT OF HUMANITIES**

1.	Dr. Ramakrishna B.	Asso. Professor
2.	Mrs. Rashmi D. Hegde	Asso. Professor/HoD
3.	Mr. Vishwanatha	Asst. Professor Gd III
4.	Dr. Joy Elvine Martis	Asst. Professor Gd III
5.	Ms. Sonia Lobo	Asst. Professor Gd I
6.	Mr. Sandeep Kharvi	Asst. Professor
7.	Mr. Srinivas Nekkar	Asst. Professor
8.	Mrs. Sudeeksha S. Pai	Asst. Professor

**PUBLIC RELATIONS OFFICER**

1. Mr. Krishnaraja Joisa

**HOSTEL SUPERINTENDENT / MANAGER**

- |                          |                                |
|--------------------------|--------------------------------|
| 1. Mr. John D'Souza      | Sr. Manager, Gents Main Hostel |
| 2. Mr. Manjunath Suvarna | Manager, Gents PG Hostel       |
| 3. Mrs. Gayathri Kamath  | Supdt. Ladies PG Hostel        |
| 4. Mrs. Chethana Sharma  | Supdt. Ladies Main Hostel      |
| 5. Mrs. Hema S. Hegde    | Supdt., Hostel Office          |

**SECURITY DEPARTMENT**

- |                         |                     |
|-------------------------|---------------------|
| 1. Mr. Hirianna Suvarna | Security Supervisor |
|-------------------------|---------------------|

# **REGULATIONS**

**2020-21**

(Applicable for admission batch 2018-19 onwards)

**COMMON TO ALL B.E.(CREDIT SYSTEM)**

**DEGREE PROGRAMMES**



**NITTE**  
EDUCATION TRUST

**NMAM INSTITUTE  
OF TECHNOLOGY**

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**REGULATIONS COMMON TO ALL B.E. (CREDIT SYSTEM) DEGREE  
PROGRAMMES OF  
NMAM INSTITUTE OF TECHNOLOGY, NITTE  
Karkala, Udupi Dist., Karnataka**

**1. INTRODUCTION**

- 1.1 The general regulations are common to all B.E. (Credit System) Degree Programmes conducted at the NMAMIT, Nitte Campus and shall be called "NMAMIT Regulations".
- 1.2 The provisions contained in this set of regulations govern the policies and procedures on the Registration of students, imparting Instructions of course, conduct of the examination and evaluation and certification of student's performance and all amendments related to the said Degree programme(s).
- 1.3 This set of Regulations, on approval by the Academic Council and Governing Council, shall supersede all the corresponding earlier sets of regulations of the BE Degree program (of VTU) along with all the amendments thereto, and shall be binding on all students undergoing the Graduate Degree Programme(s) (Credit System) conducted at the NMAMIT, Nitte with effect from its date of approval. **This set of Regulations, may evolve and get modified or changed through appropriate approvals from the Academic Council / Governing Council from time to time, and shall be binding on all stake holders (The Students, Faculty, Staff of Departments of NMAMIT, Nitte). The decision of the Academic Council/ Governing Council shall be final and binding.**
- 1.4 In order to guarantee fairness and justice to the parties concerned in view of the periodic evolutionary refinements, any specific issues or matters of concern shall be addressed separately, by the appropriate authorities, as and when found necessary.
- 1.5 The Academic Council may consider any issues or matters of Concern relating to any or all the academic activities of NMAMIT courses for appropriate action, irrespective of whether a reference is made here in this set of Regulations or otherwise.
- 1.6 The course shall be called **Bachelor of Engineering** course abbreviated as B.E. (Subject of specialization) – Credit System.
- 1.7 **DURATION OF THE COURSE**
  - (a) The course shall extend over a period of total duration of 4 years.



**(b)** Each year shall have the following schedule with **5 ½** days a week.

Suggested Break down of Academic Year into Semesters

<p>1. No. of Semesters / Year Three; Two being Main semesters (odd, even) and one being a supplementary semester; after 2 main semesters.</p> <p>(Note: Supplementary semester is primarily to assist weak and/ or failed students through make up courses. However, Autonomous Colleges may use this semester to arrange Add-On courses for other students and/ or for deputing them for practical training elsewhere.)</p>	
2. Semester Duration	<p>Main semester (odd, even) each 19 Weeks;</p> <p>Supplementary Semester 8 Weeks</p>
3. Academic Activities	Main Semester
(Weeks):	<p>Registration of Courses &amp; Course Work (16.0)</p> <p>Examination Preparation and Examination (3.0)</p> <p>Total (19)</p> <p>Supplementary Semester</p> <p>Registration of Courses &amp; Course Work (5.0)</p> <p>Examination Preparation and Examination (3.0)</p> <p>Total (8)</p> <p>Declaration of results: 2 weeks from the date of last examination</p> <p>Inter- Semester Recess:</p> <p>After each Main Semester (2)</p> <p>Total Vacation: 10 weeks (for those who do not register for supplementary semester) and 4 weeks (for those who register for supplementary semester)</p>

(Note: In each semester, there will be provision for students for Registration of courses at the beginning, dropping of courses in the middle and withdrawal from courses towards the end, under the advice of faculty member. These facilities are expected to enhance the learning capabilities of students, minimizing their chances of failure in courses registered and also ensure their better monitoring by Faculty Advisors).

**A candidate shall be allowed a maximum duration of eight years from the first semester of admission to become eligible for the award of Bachelor Degree.**

The calendar of events in respect of the course shall be fixed by the Senate from time to time, but preferably in line with the academic calendar of the VTU.

## **2. DEGREE PROGRAMMES**

2.1 Undergraduate B.E. Degree Programmes are offered in the following disciplines by the respective programme hosting departments listed below:

- |       |  |       |
|-------|--|-------|
| i)    | Biotechnology Engineering                    | (BT)  |
| ii)   | Civil Engineering                            | (CV)  |
| iii)  | Computer Science & Engineering               | (CS)  |
| iv)   | Electronics & Communications Engineering     | (EC)  |
| v)    | Electrical & Electronics Engineering         | (EE)  |
| vi)   | Information Science & Engineering            | (IS)  |
| vii)  | Mechanical Engineering                       | (ME)  |
| viii) | Artificial Intelligence and Machine Learning | (AM)* |
| ix)   | Computer and communication Engineering       | (CC)* |

Other teaching departments are –

- |      |  |      |
|------|--|------|
| i)   | Mathematics                                | (MA) |
| ii)  | Physics                                    | (PH) |
| iii) | Chemistry                                  | (CY) |
| iv)  | Humanities, Social Sciences and Management | (HU) |

2.2 The provisions of these Regulations shall be applicable to any new discipline\* that may be introduced from time to time and appended to the above list.

## **3. REGISTRATION**

3.1 Every student after consulting his Faculty Advisor in parent department shall register approved courses (core and elective) to earn credits for meeting the requirements of degree program at the commencement of each Semester on the days fixed for such registration and notified in the academic calendar. Students who fail to register on or before the specified date will have to pay a late fee. Such courses together with their grade and credits earned will be included in the grade card issued by the college at the end of each semester,

like odd, even, supplementary and it forms the basis for determining the student's performance in that semester.

### 3.2 **Lower and Upper Limits for Course Credits Registered in a Semester Course Credit Assignment**

All courses comprise of specific Lecture/Tutorial/Practical (L-T-P) schedule. The course credits are fixed based on the following norms.

Lecture / Tutorials / Practical:

- i) One hour Lecture per week is assigned one Credit.
- ii) 2-hour Tutorial session per week is assigned 1.0 Credit.
- iii) 2-hour Lab. session per week is assigned 1.0 credit.

For example, a theory course with L-T-P schedule of 3-2-0 hours will be assigned 4.0 credits.

A laboratory practical course with L-T-P schedule of 0-0-2 hours will be assigned 1.0 credit.

Calculation of Contact Hours / Week – A Typical Example

<b>Typical Course Load per Semester</b>			
<b>No. of Courses</b>	<b>Credits / Course</b>	<b>Total Credits</b>	<b>Contact Hours per Week</b>
2 Lecture Courses	3:0:0	6	6
2 Lec. cum Lab Courses	3:0:1	8	10
2 Lec. cum Tut. Courses	3:1:0	8	10
1 Lec. Tut. cum Lab Courses	1:1:1	3	5
<b>Total</b>	<b>10:2:2</b>	<b>25</b>	<b>31</b>

A student must register, as advised by Faculty Advisor, between a minimum of 16 credits and up to a Maximum of 28 credits.

### 3.3 **Mandatory Pre-Registration for higher semester**

In order to facilitate proper planning of the academic activities of the Semester, it is necessary for the students to declare their intention to register for courses of higher semesters (3<sup>rd</sup> and above) at least two weeks before the end of the current semester choosing the courses offered by each

department in the next higher semester which is displayed on the Department Notice Board at least 4 weeks prior to the last working day of the semester.

Registration to a higher semester is allowed only if the student fulfills the following conditions -

- i) satisfied all the academic requirements to continue with the programme of studies without termination
- ii) cleared all Institute, hostel and library dues and fines, if any, of the previous semester
- iii) paid all required advance payments of the Institute and the hostel for the current semester
- iv) has not been debarred from registering on any specific grounds by the Institute.

#### **4. ADD / DROP / AUDIT options**

##### **4.1 Registration of courses**

Each student shall have to register for course work at the beginning of a semester within 2 to 3 days of commencement after discussing with subject teacher and under faculty advice. The permissible course load to be either average credits (=22) or to be within the limits of minimum (=16) and maximum (=28) credits.

##### **4.2 DROP-option**

During a specified period at the middle of a semester student's performance in CIE is reviewed by the faculty advisor. Following poor performance by a student he/she can be facilitated to drop identified course(s) (up to the minimum credits specified for the semester). Such course(s) will not be mentioned in the Grade card. Such courses to be re-registered by these students and taken up for study at a later time.

##### **4.3 Withdrawal from courses**

During a specific period specified towards the end of the semester, student's performance in CIE is reviewed by the Faculty advisors. Following poor performance by a student in identified course (s) he/she is advised to withdraw from such course(s) (up to the minimum credits specified for the semester) with mention in the Grade card (Grade 'W'). Such courses to be re-registered by these students and taken up for study at a later time.

##### **4.4 AUDIT-option**

A student can register for courses for audit only, with a view to supplement

his/her knowledge and/or skills. The student's grades in such course(s) will have to be reflected in the grade card. However, CORE courses shall not be made available for audit. But these shall not be taken into account in determining the student's academic performance in the semester. 'U' grade is awarded to such courses on satisfying the attendance requirements and CIE requirements. The candidate need not appear for SEE in such courses.

## 5. COURSE STRUCTURE:

### 5.1 Typical Breakdown for the B.E. Degree Curriculum:

No.	Course Category	Credit Range
1.	Basic Sciences (BSC)	24-30
2.	Engineering Sciences (ESC)	15 -20
3.	Humanities, Social Sciences and Management	7- 10
4.	Professional Courses (PCC) – core	70 - 90
5.	Professional Courses (PEC) – elective	18
6.	Open Elective Courses (OE)	06
7.	Project Work (PROJ)	15
	Seminar on Current Topic	(VII-3,VIII-12) 01
8.	Internship	03
9.	Mandatory Learning courses	Non-Credit
Note: <b>Student can register between 16 to 28 credits per semester</b> <b>Total Credits to be earned : 175</b>		

5.2 The Department Undergraduate Committee (DUGC) will discuss and recommend the exact credits offered for the programme for the above components 'a' to 'g', the semester wise distribution among them, as well as the syllabi of all undergraduate courses offered by the department from time to time before sending the same to the Board of Studies(BOS). The BOS will consider the proposals from the departments and make recommendations to the senate for consideration and approval.

### 5.3 **The earned Credit Requirement for the B.E. Degree is 175.**

Degree is awarded by prescribing the total number of credits to be earned, rather than by using the program duration, giving flexibility to student to plan their career.

### 5.4 **Mandatory Learning Courses**

These are courses that must be completed by the student at appropriate time or at his convenience. The 'PP' grade is awarded for a Pass in the course and 'NP' grade is awarded for a Fail in the course. In case 'NP' grade is awarded, the student has to re- register for the same course wherein he has no alternative options. However, he/she can opt for other courses if he/she has been provided with multiple options.

The 'PP' and 'NP' grades do not carry grade points and hence not included in the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA) computations. However such non-credit mandatory courses are required to be included in the students' performance record (transcript) with Pass or Fail (PP or NP).

Courses that come under this category are the following.

Moral and Ethical Values, Communication skills, Entrepreneurship Development Programme, Environmental issues, Constitution of India, Proficiency in a Language etc.

Such courses will not carry any credits for the award of degree, but a pass in each of such course during the programme shall be a necessary requirement for the student to qualify for degree award.

### 5.5 **PROJECT**

- i) Project work at 8<sup>th</sup> semester shall be completed batch wise. The batch shall consist of a maximum of 4 students.
- ii) Project viva-voce examination shall be conducted individually.

### 5.6 **ELECTIVES**

- i) A candidate shall take electives in each semester from groups of electives, commencing from 5<sup>th</sup> semester.
- ii) The minimum number of students to be registered for any Elective offered shall not be less than ten.
- iii) A candidate shall opt for his/her choice of electives and register for the same if pre-registration is not done, at the beginning of each of 5<sup>th</sup>, 6<sup>th</sup>, 7<sup>th</sup> and 8<sup>th</sup> semesters. The candidate is permitted to opt for change of



elective within 15 days from the date of commencement of the semester as per the academic calendar of the college.

## **6. ATTENDANCE REQUIREMENT:**

- 6.1 Each semester is considered as a unit and the candidate has to put in a minimum attendance of 85% in each subject with a provision of condoning 10% of the attendance by Principal for reasons such as medical grounds, participation in University level sports, cultural activities, seminars, workshops and paper presentation.
- 6.2 The basis for the calculation of the attendance shall be the period of term prescribed by the College by its calendar of events. For the first semester students, the same is reckoned from the date of admission to the course (as per CET/COMED-K or Management allotment).
- 6.3 The students shall be informed about their attendance position in the first week of every month by the College so that the students shall be cautioned to make up the shortage.
- 6.4 A candidate having shortage of attendance (<75%) in any course(s) registered shall not be allowed to appear for SEE of such course(s). Such students will be awarded 'NE' grade in these courses.  
He/she shall have to repeat those course(s). Such students shall re-register for the same course(s) core or elective, as the case may be when the particular course is offered next either in a main (odd/even) or supplementary semester.
- 6.5 **Attendance in CIE and SEE:** Attendance at all examinations both CIE and SEE of each course registered shall be compulsory and there shall not be any provision for re-examinations. Any student against whom any disciplinary action is pending shall not be permitted to attend any SEE in that semester.

## **7. WITHDRAWAL FROM THE PROGRAMME**

### **7.1 Temporary Withdrawal**

- a) A student who has been admitted to a degree programme of the college may be permitted once during the course to withdraw temporarily, for a period of one semester, on the grounds of prolonged illness or grave calamity in the family etc., provided –
  - i) The student applies to the College within 6 weeks of the commencement of the college stating fully the reasons for withdrawal together with supporting documents and endorsement from his parent/guardian.

- ii) The College is satisfied about the genuineness of the case and that even by taking into account the expected period of withdrawal, the student has the possibility to complete the programme requirements (175 credits) within the time limits specified by the university.
- iii) The student does not have any dues or demands at the College / University including tuition and other fees as well as library material.
- iv) A student availing of temporary withdrawal shall be required to pay such fees and/or charges as may be fixed by the college until such time as his/her name appears on the Student's roll list. The fees/charges once paid shall not be refunded.
- v) A student will be entitled to avail the temporary withdrawal facility only once during his/her studentship. However, any other concession for the concerned student shall have to be approved by the academic council.

## 7.2 **Permanent Withdrawal**

Any student who withdraws admission before the closing date of admission for the Academic Session is eligible for the refund of the deposits only. Fees once paid will not be refunded on any account.

Once the admission for the year is closed, the following conditions govern withdrawal of admissions.

- (a) A student who wants to leave the College for good, will be permitted to do so (and take Transfer Certificate from the College, if needed), only after remitting the Tuition fees as applicable for all the remaining semesters and clearing all other dues if any.
- (b) Those students who have received any scholarship, stipend or other forms of assistance from the College shall repay all such amounts.
- (c) The decision of the Principal of the College regarding withdrawal of a student is final and binding.

## 8. **EVALUATION SYSTEM**

- 8.1 The Academic Performance Evaluation of a student shall be according to a Letter Grading System, based on the Class Performance Distribution.
- 8.2 The Letter grades S, A, B, C, D, E, F indicate the level of academic achievement, assessed on a decimal (0-10) scale.

- 8.3 The Letter grade awarded to a student in a course, for which he has registered shall be based on his performance in quizzes, tutorials, assignments etc., as applicable, in addition to two mid- semester examinations and one semester end examination. The distribution of weightage among these components may be as follows.

Semester End Examination (SEE) : 50% (50 marks)

Continuous Internal Evaluation (CIE) : 50% (50 marks)

- i) Quizzes, Tutorials, Assignments,  
Seminars, mini projects, tutorials etc. : 10 marks
- ii) Mid-semester Examination : 40 marks

Any variation, other than the above distribution, requires the approval of the pertinent DUGC and Academic Council.

- 8.4 The letter grade awarded to a student in a 0-0-P (Practical) course, is based on an appropriate continuous evaluation scheme that the course instructor shall evolve, with the approval of the pertinent DUGC and the performance in SEE held on specified period in a semester.

- 8.5 The course Instructor shall announce in the class and/or display at the Faculty door/website the details of the Evaluation Scheme, including the distribution of the weightage for each of the components and method of conversion from the raw scores to the letter-grades within the first week of the semester in which the course is offered, so that there are no ambiguities in communicating the same to all the students concerned.

## 8.6 **Passing standards**

Evaluation Method	Passing Standard
Sessional (CIE)	Score: $\geq 40\%$ ( $\geq 20$ marks)
Terminal (SEE)	Score: $\geq 40\%$ ( $\geq 20$ marks)

- i) Project work evaluation: The evaluation of CIE of the project work shall be based on the progress of the student in the work assigned by the project supervisor, periodically evaluated by him/her together with a Department committee constituted for this purpose. Seminar presentation, project report and final oral examination conducted by project evaluation committee at the department level shall form the SEE of the project work.
- iii) In the case of other requirements, such as, seminar, industrial internship,

field work, comprehensive viva voce, if any, the assessment shall be made as laid down by the Academic council.

iii) **There shall be no re-examination for any course in the credit system.**

However, students

- who have abstained from attending CIE or SEE without valid reasons ('NE' grade), or
- who have failed ('F' grade) to meet the minimum passing standards prescribed for CIE and/or SEE, or
- who have been detained for want of attendance, or
- who have withdrawn ('W' grade),
- who have dropped any course

shall be required to re-register for such course(s) and go through CIE and SEE again and obtain a grade equal to or better than E in each case. While such students should re-register for same course(s) if core, they can re-register for alternative course(s) from among the elective courses, as the case may be. The re-registration shall be possible when the particular course is offered again either in a main (Odd/Even) or a supplementary semester.

8.7 **i) Grade point scale for absolute grading**

Level	Out Standing	Excellent	Very Good	Good	Average	Poor	Fail
Grade	S	A	B	C	D	E	F
Grade Points	10	09	08	07	06	04	00
Score (Marks) Range (%)	≥ 90	< 90 - ≥80	< 80- ≥70	< 70- ≥60	< 60 - ≥50	< 50 - ≥40	< 40

ii) The grade points given above help in the evaluation of credit points earned by the student in a course as the credit points are equal to the number of credits assigned to the course multiplied by the grade points awarded to the student in that course. This shall be used in arriving at the credit index of the student for that semester, as it is the sum total of all the credit points earned by the student for all the courses registered in that semester.

## 8.8 Earning of Credits

A student shall be considered to have completed a course successfully and earned the credits if he/she secures an acceptable letter grade in the range S-E. Letter grade 'F' in any course implies failure of the student in that course and no credits earned.

8.9 The Transitional Grades 'I', 'W' and 'X' would be awarded by the teachers in the following cases. These would be converted into one or the other of the letter grades (S-F) after the student completes the course requirements.

- ◆ Grade 'I': To a student having satisfactory attendance at classes and meeting the passing standard at CIE, but remained absent from SEE for valid & convincing reasons acceptable to the College, like:
  - i) Illness or accident, which disabled him/her from attending SEE;
  - ii) A calamity in the family at the time of SEE, which required the student to be away from the College;
- ◆ Students who remain absent for Semester End Examinations due to valid reasons and those who are absent due to health reasons are required to submit the necessary documents along with their request to the Controller of Examinations to write Make up Examinations within 2 working days of that particular examination for which he or she is absent, failing which they will not be given permission. This is admissible only for students who have more than 45 CIE marks.
- ◆ Grade 'W': To a student having satisfactory attendance at classes, but withdrawing from that course before the prescribed date in a semester under Faculty Advice
- ◆ Grade 'X': To a student having attendance  $\geq 85\%$  and CIE rating (90%), in a course but SEE performance observed to be poor, which could result in a F grade in the course. **(No 'F' grade awarded in this case but student's performance record maintained separately).**

**8.10 Grade Card:** Each student shall be issued a Grade Card (or Transcript) at the end of each semester. This will have a list of all the courses registered by a student in the semester, together with their credits, the letter grades with grade points awarded. Only those courses registered for credit and having grade points shall be included in the computation of the students performance like SGPA and CGPA and the courses taken for audit will not form part of this computation. The results of mandatory courses, which are of the non-credit type shall also be reflected in the Grade card as PP (for Passed) or NP (for not passed). **Each UG student shall have to obtain**

**the grade PP in each mandatory course to qualify for the Degree awarded by the university.**

### **8.11 The Make Up Examination**

The Make Up Examination facility would be available to students who may have missed to attend the SEE of one or more course(s) in a semester for valid reasons and given the 'I' grade; Also, students having the 'X' grade shall be eligible to take advantage of this facility. The makeup examination would be held as per dates notified in the Academic Calendar. However, it would be possible to hold a makeup examination at any other time in the semester with the permission of the Academic Council of the College. In all these cases, the standard of makeup examinations shall be same as the regular SEE for the course(s).

- a) In the event of a student in the final semester failing in a Laboratory course and/or in CIE of a course, he/she could be given 'I' grade for the course. In such a case the concerned course instructor would have the possibility to grant the student extra time not exceeding 12 weeks for completing the course, with the concurrence of the Department/College. If no such extra time is sought/granted, the concerned student would have to re-register for the course in a succeeding semester and take steps to fulfill the requirements of the Degree.
- b) All the 'I' and 'X' grades awarded to the students would be converted to appropriate letter grades after the make-up examinations. Any outstanding 'I' and 'X' grades after the last scheduled make-up examinations shall be automatically converted to 'F' grade.
- c) All the 'W' grades awarded to the students would be eligible for conversion to the appropriate letter grades only after the concerned students re-register for these courses in a main/ supplementary semester and fulfill the passing standards for their CIE and (CIE+SEE).

## **9. EVALUATION OF PERFORMANCE**

The overall performance of a student will be indicated by two indices: SGPA; which is the Semester Grade Point Average, and CGPA which is the Cumulative Grade Point Average.

SGPA for a semester is computed as follows.

$$\text{SGPA} = \frac{\sum [(\text{course credit}) \times (\text{Grade point})] \text{ (for all courses in that semester)}}{\sum [(\text{course credits})]}$$



CGPA is computed as follows:

$$\text{CGPA} = \frac{\sum [( \text{course credits}) \times ( \text{Grade points})] \text{ (for all courses excluding those with F grades until that semester)}}{\sum (\text{course credits}) \text{ (for all courses excluding those with F grades until that semester)}}$$

## 10. **COMMUNICATION OF GRADES**

The SGPA and CGPA respectively, facilitate the declaration of academic performance of a student at the end of a semester and at the end of successive semesters. Both of them would be normally calculated to the second decimal position, so that the CGPA, in particular, can be made use of in rank ordering the students' performance at a College. If two students get the same CGPA, the tie could be resolved by considering the number of times a student has obtained higher SGPA; But, if it is still not resolved, the number of times a student has obtained higher grades like S,A,B etc. could be taken into account.

## 11. **VERTICAL PROGRESSION (PROMOTION / ELIGIBILITY TO HIGHER SEMESTERS)**

11.1 There shall be no restriction for promotion from an odd semester to the next even semester, provided the student has fulfilled the attendance requirement.

### 11.2 **A Student shall be declared fail if he / she**

- (i) Has not satisfied the CIE requirements of any Course/s.
- (ii) Has not registered for the SEE even after satisfying the attendance and CIE requirements.

### 11.3 **(A) Vertical Progression in case of students admitted to First year:**

- (a) Students having not more than four F grades in the two semesters of first year of the Programme shall be eligible to move to second year.
- (a.1) Students having not more than four F grades in the four semesters of I and II year shall be eligible to move to III year.
- (a.2) Students who have earned all the prescribed credits of I year, and having not more than four F grades in the four semesters of II and III year shall be eligible to move to IV year.

### **(B) Vertical Progression in case of Diploma students admitted to Second year (lateral entry):**

- (a) Students having not more than four F grades (excluding the Fail or pass status of Additional Mathematics I and II) in the two semesters of II year of the Programme shall be eligible to move to III Year.
- (a.1) Students having not more than four F grades (excluding the Fail or pass

status of Additional Mathematics I and II, if any) in the four semesters of II and III year shall be eligible to move to IV year.

- (b) The mandatory non-credit Courses Additional Mathematics I and II prescribed at III and IV semesters respectively, to lateral entry Diploma holders admitted to III semester of B.E/B.Tech. Programmes shall attend the classes during the respective semesters to satisfy attendance and CIE requirements and to appear for the University examinations.
- (b.1) In case, any student fails to satisfy the attendance requirement of the Courses Additional Mathematics I and II, he/she shall not be eligible to appear for the Semester End Examinations of that semester and shall not be permitted to take admission to next higher semester. The candidate shall be required to repeat that semester during the subsequent year.
- (b.2) Students who have satisfied the attendance requirement but not the CIE requirements of the Courses Additional Mathematics I and II shall be permitted to register afresh and appear for SEE after satisfying the CIE requirements in the same Course/s (with or without satisfying the attendance requirement) when offered during subsequent semester/s.
- (c) Completion of Additional Mathematics I and II shall be mandatory for the award of degree.

**(C) Vertical Progression in case of B.Sc students admitted to Second year (Lateral entry):**

- (a) Students having not more than four F grades (excluding the Fail or pass status of Engineering Graphics and Elements of Civil Engineering and Mechanics of First Year Engineering Programme) in the two semesters of II year of the Programme shall be eligible to move to III year.
- (a.1) Students having not more than four F grades (excluding the Fail or pass status of Engineering Graphics and Elements of Civil Engineering and Mechanics of First Year Engineering Programme, if any) in the four semesters of II and III year shall be eligible to move to IV year.
- (b) The prescribed mandatory non-credit Courses Engineering Graphics and Elements of Civil Engineering and Mechanics of First Year Engineering Programme to lateral entry B. Sc holders admitted to III semester of B.E/B. Tech Programmes, shall attend the classes during the respective semesters to complete CIE and attendance requirements and to appear for the University examinations.
- (b.1) In case, any student fails to satisfy the attendance requirement of the above said Courses; he/she shall not be eligible to appear for the Semester End Examinations of that semester and shall not be permitted to take admission to next higher semester. The candidate shall be required to repeat that semester during the subsequent year.

(b.2) Students who have satisfied the attendance requirement but not the CIE requirements of the above said Courses, shall be permitted to register afresh and appear for SEE after satisfying the CIE requirements in the same Course/s (with or without satisfying the attendance requirement) when offered during subsequent semester/s.

(c) Completion of Engineering Graphics and Elements of Civil Engineering and Mechanics shall be mandatory for the award of degree.

The Principal of each college shall make suitable arrangements in the timetable to facilitate the B. Sc students to attend the above mentioned courses to satisfy the CIE and attendance requirements and to appear for the University examinations.

#### **11.4 Termination from the programme**

A student shall be required to withdraw (discontinue) from the programme and leave the college on the following grounds.

- i) Failure to secure a CGPA = 5.0 on three consecutive occasions.**
- ii) Failure to earn a credit of 175 (135 for lateral entry students) in 8 years (6 years for lateral entry students) of duration from the year of admission including the duration of temporary withdrawal (leave of absence).**
- iii) Absence from classes for more than six weeks at a time** in a semester without leave of absence being granted by competent authorities.
- iv) Failure to meet the standards of discipline as prescribed by the college from time to time.**

#### **12. AWARD OF CLASS**

Sometimes, it would be necessary to provide equivalence of these averages, viz., SGPA and CGPA with the percentages and/or Class awarded as in the conventional system of declaring the results of University examinations. This can be done by prescribing certain specific thresholds in these averages for Distinction, First Class and Second Class. This can be seen from the following Table.

**Percentage Equivalence of Grade Points (For a 10-Point Scale)**

Grade Point	Percentage of Marks
5.75	50 (second class)
6.25	55
6.75	60 (First class)
7.25	65
7.75	70 (Distinction)

8.25	75
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$$\text{Percentage} = (\text{GPA} - 0.75) \times 10$$

### **13. APPEAL FOR REVIEW OF GRADES**

- a. The entire process of evaluation shall be made transparent and the course instructor shall explain to a student why he/she gets whatever grade he/she is awarded, if and when required. A mechanism for review of grade is incorporated in the evaluation system. However, before appealing for such review, a student shall first approach the concerned course Instructor and then the concerned DUGC, with the request to do the needful; and only in situations where satisfactory remedial measures have not been taken, the student may then appeal to the Department Academic Appeals Boards (DAAB) before the date specified in Academic Calendar, by paying the prescribed fees.
- b. The fee for such an appeal will be decided by the Senate from time to time. If the appeal is upheld by DAAB, then the fee amount will be refunded to the student.

### **14. AWARD OF DEGREE**

#### **14.1 (1) B.E. Degree**

- a) Students shall be declared to have completed the Programme of B.E./B.Tech. degree and is eligible for the award of degree, provided the students have undergone the stipulated Course work of all the semesters under the Scheme of Teaching and Examinations and has earned the prescribed number of credits (175 credits for regular students registered for 4 year degree programmes & 135 for lateral entry students).
- b) For the award of degree, a CGPA  $\geq 5.00$  at the end of Programme shall be mandatory.
- c) Completion of Additional Mathematics I and II, shall be mandatory for the award of degree to lateral entry diploma students.
- d) Completion of Engineering Graphics and Elements of Civil Engineering and Mechanics of First Year Engineering Programme shall be mandatory for the award of degree to lateral entry B.Sc. graduates.
- e) (i) Over and above the academic credits, every Day College regular student admitted to the 4 years Degree Programme and every student entering 4 years Degree Programme through lateral entry, shall earn 100 and 75 Activity Points respectively through AICTE Activity Point Programme for the award of degree. Students transferred from other Universities/Autonomous colleges under VTU to fifth semester are required to earn 50 Activity Points from the

year of entry to VTU. The Activity Points earned shall be reflected on the student's eight semester Grade Card.

(ii) Activity Points (non-credit) have no effect on SGPA/CGPA and shall not be considered for vertical progression.

In case students fail to earn the prescribed activity Points before the commencement of 8<sup>th</sup> semester examinations, eighth semester Grade Card shall be issued only after earning the required activity Points. Students shall be admitted for the award of degree only after the release of the Eighth semester Grade Card.

## **(2) B.E. (Honors) Degree**

VTU, Belagavi has framed the guidelines for applying for the award of Bachelor of Engineering (Honors) degree.

**These Regulations are applicable for the following students:**

1. Admitted to **I semester** / I year from the academic year **2018-19** (i.e. USN XXX18XXXXX)
2. Admitted to **III semester** / II year from the academic year **2019-20** (i.e. USN XXX19XX4XX)
3. These Regulations are uniformly applicable to Affiliated, Autonomous and Constituent Colleges under VTU.

### **Eligibility criterion**

- (i) Students have to earn 18 or more additional credits through MOOCs.
- (ii) Students shall register for this course from fifth semester onwards.
- (iii) Students shall obtain a grade  $\geq$  D in all the courses in first attempt only in all the semesters till 5<sup>th</sup>.
- (iv) Students shall obtain CGPA of 8.5 and above at the end of fourth semester.
- (v) For Diploma students, they shall complete Additional Mathematics I and II during 3<sup>rd</sup> and 4<sup>th</sup> semesters in first attempt only.

### **Requirements:**

- (i) Students shall maintain a grade  $\geq$  D in all courses from 5<sup>th</sup> to 8<sup>th</sup> semester in 'first attempt' only.
- (ii) Students not having CGPA greater than or equal to 8.5 at the end of the B.E. programme shall not be eligible for the award of Honors degree, even if they have satisfied the requirement of additional credits.
- (iii) Students shall take up additional course work, other than the regular courses prescribed by the University from 5<sup>th</sup> to 8<sup>th</sup> semester from NPTEL

and other platforms notified by the University and complete the same in any number of attempts with a final score (online assignments: 25 % + Proctored examination: 75 %) leading to the following certificates – ELITE (60 to 75 %) or ELITE + SILVER (76 to 89 %) or ELITE + GOLD (  $\geq$  90 %) before closure of eighth semester as per the academic calendar.

- (iv) Students shall be permitted to drop the registered course work (s) and select alternative course work (s) in case they cannot give proctored examination.
- (v) Students have to take courses from the list of MOOCs approved by the University, which can be from NPTEL / SWAYAM / other platforms.
- (vi) Students shall select courses in consultation with their Class Advisor, such that the content / syllabus of them are not similar to that of the core courses, professional electives or open electives, which the students may chose in the program.
- (vii) Students shall earn the additional credits for these courses through MOOCs, by only appearing in person to the proctored examinations conducted by NPTEL / SWAYAM / other platform. The method of assessment shall be as per NPTEL online platform.
- (viii) The Credit equivalence shall be as follows - 4 weeks of online course duration – 1 credit, 8 weeks of online course duration – 2 credits and 12 weeks of online course duration – 3 credits.

#### **Registration:**

- (i) Any student meeting the eligibility criteria and interested to register for Honors degree qualification shall apply to the University through the Principal in the prescribed form along with the prescribed application fees within 15 working days after notification by the University.
- (ii) The Registrar shall notify the registration of the student and it will be notified to the student and the student shall pay a one-time, non-refundable registration fees as prescribed by the University to confirm the registration.

#### **Award of Honors Qualification:**

- (i) Students who successfully complete the MOOCs prescribed by the University and submit their E-certificates to the University through the Principal against the notification issued by the Registrar in time before the closure of eighth semester, as per the academic calendar shall be eligible for B.E. (Honors) degree. If a student does not submit the

certificates in time on or before the last date, their request shall not be considered, even if they have earned the requisite number of credits.

- (ii) The Honors degree shall be awarded only if the CGPA at the end of the B.E. programme is equal to or greater than 8.5.
- (iii) A student who has earned the requisite number of credits and who has submitted the certificates in time and has been accepted by the University will get B.E. degree with Honors suffixed indicating recognition of higher achievement by the student concerned.
- (iv) Further students fulfilling all the above requirements shall be entitled to receive their transcripts indicating both the achievement of the student concerned.
- (v) The award of the Honors degree shall be recommended by the Academic Senate and approved by the Executive Council of the University.

#### **14.2 (1) Noncompliance of CGPA $\geq$ 5.00 at the end of the Programme**

- (a) Students, who have completed all the courses of the Programme but not having a CGPA  $\geq$  5.00 at the end of the Programme, shall not be eligible for the award of the degree.
- (b) In the cases of 14.2 (1) a, students shall be permitted to appear again for SEE in course/s (other than Internship, Technical seminar, Project (Mini and Main), and Laboratories) of any Semester/s without the rejection of CIE marks for any number of times, subject to the provision of maximum duration of the Programme to make up the CGPA equal to or greater than 5.00 for the award of the Degree.
- (c) In case, the students earn improved grade/s in all the reappeared course/s, the CGPA shall be calculated considering the improved grade/s. If it is  $\geq$ 5.00, the students shall become eligible for the award of the degree. If CGPA  $<$ 5.00, the students shall follow the procedure laid in 14.2 (1) b
- (d) In case, the students earn improved grade/s in some course/s and the same or lesser than the previously earned pass grade/s in the other reappeared course/s, the CGPA shall be calculated considering the improved grade/s and the pass grades earned before the reappearance. If it is  $\geq$ 5.00, the students shall become eligible for the award of the degree. If CGPA  $<$ 5.00, the students shall follow the procedure laid in 14.2 (1) b
- (e) In case, the students earn improved grade/s in some courses and fail in the other reappeared course/s, the CGPA shall be calculated by considering the improved grade/s and the previously earned pass grade/s of the reappeared course/s in which the students have failed. If it is  $\geq$ 5.00, the students shall

become eligible for the award of the degree. If CGPA <5.00, the students shall follow the procedure laid in 14.2 (1) b

- (f) In case, the students fail (i.e., earns F grade) in all the reappeared course/s, pass grade/s of the course/s earned by the students before reappearance shall be retained. In such cases, the students shall follow the procedure laid in 14.2 (1) b
- (g) Students shall obtain written permission from the Registrar (Evaluation) to reappear in SEE to make up the CGPA equal to or greater than 5.00.

### **(2) Noncompliance of Mini-project**

- (a) The mini-project shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take-up/complete the mini-project shall be declared fail in that course and shall have to complete the same during subsequent University examinations after satisfying the Mini-project requirements. Also, mini-project shall be considered for eligibility to VII semester.

### **(3) Noncompliance of Internship**

- (a) All the students of B.E/B.Tech shall have to undergo mandatory internship of 4 weeks during the vacation. A University examination shall be conducted during VIII semester. Internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take-up/complete the internship shall be declared fail in that Course and shall have to complete the same during subsequent University examinations after satisfy the internship requirements.

**14.3** The maximum duration for a student for complying to the Degree requirements is 16 – semesters from the date of first registration for his first semester (8 years from the date of admission to first year, (12 semesters / 6 years from the date of admission for lateral entry student)).

## **15 GRADUATION REQUIREMENTS AND CONVOCATION**

15.1 A student shall be declared to be eligible for the award of the degree if he/she has

- a) Fulfilled "Award of Degree" Requirements
- b) No Dues to the College, Departments, Hostels, Library, Central Computer Centre and any other centres



c) No disciplinary action pending against him/her.

15.2 The award of the degree must be recommended by the Senate

### 15.3 **Convocation**

Degree will be awarded for the students who have graduated during the preceding academic year. Students are required to apply for the Convocation along with the prescribed fees, after having satisfactorily completed all the degree requirements (refer 'Award of Degree') within the specified date in order to arrange for the award of the degree during convocation.

## 16 **AWARD OF PRIZES, MEDALS, CLASS & RANKS**

For the award of Prizes and Medals, the conditions stipulated by the Donor may be considered as per the statutes framed by the College for such awards.

Sometimes, it would be necessary to provide equivalence of these averages, viz., SGPA and CGPA with the percentages and/or Class awarded as in the conventional system of declaring the results of University examinations. This can be done by prescribing certain specific thresholds in these averages for Distinction, First Class and Second Class as described in 12.

## 17 **CONDUCT AND DISCIPLINE**

17.1 Students shall conduct themselves within and outside the premises of the College in a manner befitting the students of an Institution of National Importance.

17.2 **As per the order of Honorable Supreme Court of India, ragging in any form is considered as a criminal offence and is banned. Any form of ragging will be severely dealt with.**

17.3 The following acts of omission/ or commission shall constitute gross violation of the Code of Conduct and are liable to invoke disciplinary measures:

a) Ragging.

b) Lack of courtesy and decorum; indecent behaviour anywhere within or outside the campus.

c) Willful damage or stealthy removal of any property/belongings of the College/Hostel or of fellow students/citizens.

- d) Possession, consumption or distribution of alcoholic drinks or any kind of hallucinogenic drugs.
- e) Mutilation or unauthorized possession of Library books.
- f) Noisy and unseemly behaviour, disturbing studies of fellow students.
- g) Hacking in computer systems (such as entering into other Person's area without prior permission, manipulation and/or Damage of computer hardware and software or any other Cyber crime etc.).
- h) Plagiarism of any nature.
- i) Any other act of gross indiscipline as decided by the Senate from time to time.
- j) Use of Mobile in the college Academic area.
- k) Smoking in College Campus and supari chewing.
- l) Unauthorized fund raising and promoting sales.

Commensurate with the gravity of offence the punishment may be: reprimand, expulsion from the hostel, debarring from an examination, disallowing the use of certain facilities of the College, rustication for a specified period or even outright expulsion from the College, or even handing over the case to appropriate law enforcement authorities or the judiciary, as required by the circumstances.

17.4 For an offence committed in (i) a hostel (ii) a department or in a class room and (iii) elsewhere, the Chief Warden, the Head of the Department and the Dean (Academics), respectively, shall have the authority to reprimand or impose fine.

17.5 All cases involving punishment other than reprimand shall be reported to the Principal.

17.6 Cases of adoption of unfair means and/or any malpractice in an examination shall be reported to the Controller of Examinations for taking appropriate action.

## **18. EARNING OF ACTIVITY POINTS FOR THE AWARD OF DEGREE**

18.1 As per VTU guidelines, every students entering 4 year degree programme should earn 100 activity points & every students entering 4 year degree programme through Lateral Entry should earn 75 activity points for the award of the


Engineering Degree.

- 18.2 The Activity Points earned will be reflected on the student's eighth semester Grade Card.
- 18.3 The activities can be spread over the years (duration of the programme) any time during the semester weekends and holidays, as per the interest & convenience of the students from the year of entry to the programme.
- 18.4 Activity Points (non-credit) have no effect on SGPA/CGPA point.
- 18.5 In case students fail to earn the prescribed Activity Points, Eighth semester Grade Card shall be issued only after earning the required Activity Points.

**Note: Students are required to be inside the examination hall, 20 minutes before the commencement of examination. This is applicable for all examinations (Semester end/Supplementary/makeup) henceforth. Students will not be allowed inside the examination hall after the commencement, under any circumstances.**

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## LIST OF MAJOR SCHOLARSHIPS

<b><i>Applicable to</i></b>	<b><i>Types of scholarship</i></b>	<b><i>Method</i></b>	<b><i>Website</i></b>
<b><i>For SC/ST Students</i></b>	<b><i>Income : Below Rs.2,50,000/-</i></b>	<b><i>Online application</i></b>	 <p style="text-align: center;"><b>Will be published in the Notice Board</b></p>
	<b><i>Income : Above Rs.2,50,000/- to Rs.10,00,000/-</i></b>	<b><i>Hardcopy</i></b>	
<b><i>For Others</i></b>	<b><i>Category I :</i></b>	<b><i>Online application</i></b>	
	<b><i>Category 2A, 3A, 3B,&amp; GM</i></b> <b><i>Income Below Rs.1,00,000/-</i></b>	<b><i>Online application</i></b>	
	<b><i>Minority students</i></b> <b><i>Income Below Rs.2,50,000/-</i></b>	<b><i>Online application</i></b>	
<b><i>Parents must have Beedi Id. Card</i></b>	<b><i>Beedi Scholarship</i></b>	<b><i>Online application</i></b>	<b><i>scholarships.gov.in or nsp.gov.in</i></b>
<b><i>1<sup>st</sup> year Students</i></b>	<b><i>Central Sector Scholarship (MHRD)</i></b>	<b><i>Online application</i></b>	<b><i>scholarships.gov.in or nsp.gov.in</i></b>
<b><i>1<sup>st</sup> year Students</i></b>	<b><i>AICTE-Pragati.etc</i></b>	<b><i>Online application</i></b>	<b><i><u><a href="http://www.aicte-india.org">www.aicte-india.org</a></u></i></b>

- Scholarship details will be published in the notice board near College Academic Section. Students must see the notice board and submit the application before due dates.
- All SC/ST and Category I students who have not paid any fee in CET must apply for Fee concession or Scholarship. Otherwise they must pay the tuition fee and college fee.
- The students, who are applying for any of the above scholarship through online, must submit the hardcopy with supporting documents (with attestation) to the academic section in time.

# **B. E. SYLLABUS**

**INFORMATION SCIENCE  
& ENGINEERING**

**III & IV SEMESTER**

**With  
Scheme of Teaching  
& Examination**

## **DEPARTMENT : INFORMATION SCIENCE & ENGINEERING**

<b>Sl.No</b>	<b>Name of the Faculty</b>	<b>Qualification</b>	<b>Designation</b>
1.	Dr. Karthik Pai B. H.	Ph.D	Professor & Head
2.	Dr. Karuna Pandit	Ph.D	Professor
3.	Dr. Balasubramani R.	Ph.D	Professor
4.	Dr. D K Sreekantha	Ph.D	Professor
5.	Dr. Ashwini B.	Ph.D	Associate Professor
6.	Dr. Ravi B	Ph.D	Associate Professor
7.	Mr. Bola Sunil Kamath	M.Tech.,( Ph.D)	Assistant Professor Gd. III
8.	Mr. Vasudeva Pai	M.Tech	Assistant Professor Gd. II
9.	Ms. Deepa	M.Tech., (Ph.D)	Assistant Professor Gd. II
10.	Mr. Devidas	M.Tech., (Ph.D)	Assistant Professor Gd. II
11.	Ms. Rashmi Naveen	M.Tech., (Ph.D)	Assistant Professor Gd. II
12.	Mr. Jason Elroy Martis	M.Tech., (Ph.D)	Assistant Professor Gd. II
13.	Ms. Chinmai Shetty	M.Tech., (Ph.D)	Assistant Professor Gd. II
14.	Mr. Abhishek S Rao	M.Tech.	Assistant Professor Gd. II
15.	Mr. Abhir Bhandary	M.Tech., (Ph.D)	Assistant Professor Gd. II
16.	Mr. Srikanth Bhat K.	M.Tech.	Assistant Professor Gd. II
17.	Ms. Akshaya	M.Tech.	Assistant Professor Gd. I
18.	Ms. Prathyakshini	M.Tech.	Assistant Professor Gd. I
19.	Ms. Anusha N	M.Tech.	Assistant Professor Gd. I
20.	Ms. Nikitha Saurabh	M.Tech.	Assistant Professor Gd. I
21.	Ms. Sapna S	M.Tech.	Assistant Professor Gd. I
22.	Ms. Alaka Ananth	M.Tech.	Assistant Professor Gd. I
23.	Ms. Tanzila Nargis	M.Tech.	Assistant Professor Gd. I
24.	Ms. Sandhya S	M.Tech.	Assistant Professor Gd. I
25.	Mr. Balaji N	M.Tech.	Assistant Professor Gd. I
26.	Ms. Vanajakshi J	M.Tech.	Assistant Professor Gd. I
27.	Ms. Deepa Kumari	M.Tech.	Assistant Professor Gd. I
28.	Ms. Pratheeksha Hegde N	M.Tech.	Assistant Professor Gd. I

## **DEPARTMENT OF INFORMATION SCIENCE & ENGINEERING**

### **VISION:**

Excellence in information science and engineering through a strong research and teaching environment that address the emerging global challenges and market demands.

### **MISSION:**

- To provide outstanding education and research training to the students for their productive careers in industry, academia and government.
- To provide a learning environment that promotes excellence and innovation, ethical practice and responsibility towards society.
- To prepare the students to practice their professions competently to meet the ever- changing needs of society and to continue learning their discipline, allowing them to move into other related fields.
- To promote active learning, critical thinking, and engineering judgment coupled with business and entrepreneurial skills.

### **Programme Educational Objectives (PEOs):**

- Graduates must gain both theoretical and practical knowledge to identify, formulate & solve challenges in Information Science & Engineering problems.
- Graduates must work productively as Information Science Engineers, including supportive and leadership roles on multidisciplinary teams.
- Graduates must communicate effectively, recognize and incorporate societal needs and constraints in their professional endeavors, and practice their profession with high regard to legal and ethical responsibilities.
- Graduates must engage in life-long learning, such as graduate study, to remain current in their profession and be leaders in our technological society.

### **Programme Outcomes (POs):**

After successful completion of the program students will be able to:

1. Apply the knowledge of mathematics, science, engineering fundamentals and Information Science & Engineering principles to the solution of complex engineering problems.

2. Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
3. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal and environmental considerations.
4. Design solutions to the problems that cannot be solved by straightforward application of knowledge, theories and techniques applicable to the engineering discipline.
5. Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequence responsibilities relevant to the professional engineering practice.
7. Understand the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development.
8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings.
10. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear instructions.
11. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

**Programme Specific Outcome (PSO):**



1. Design, develop and test software systems to provide solutions to real world problems.
2. Equip students with skills to analyze, design and recommend the appropriate IT infrastructure required for the implementation of a project.

**Graduate Attributes:**

Sl. No.	Graduate Attributes
a	Engineering Knowledge
b	Problem Analysis
c	Design / development of solutions
d	Conduct investigations of complex problems
e	Modern tool usage
f	The engineer and society
g	Environment and sustainability
h	Ethics
i	Individual and team work
j	Communication
k	Project management and finance
l	Life-long learning

**DEPARTMENT OF INFORMATION SCIENCE & ENGINEERING**  
**SCHEME OF TEACHING AND EXAMINATION**

**III SEMESTER B.E.**

**32 Hours / Week**

<b>Sl. No.</b>	<b>Code</b>	<b>Course Title</b>	<b>Theory/Tuto./Prac./ Self-Study</b>	<b>Total Hrs. / Week</b>	<b>CIE</b>	<b>SEE</b>	<b>Credits</b>
1	19IS301	Discrete Mathematical Structures	3+0+0+0	3	50	50	3
2	19IS302	Software Engineering	3+0+0+0	3	50	50	3
3	19IS303	UNIX Programming	4+0+0+1	4	50	50	4.5
4	19IS304	Computer Organization	4+0+0+0	4	50	50	4
5	19IS305	Data structures	4+1+0+0	5	50	50	4.5
6	19IS306	Programming in Python	0+1+3+0	4	50	50	2
7	19HU311	Enhancing Self Competence	1+0+2+0	3	50	50	2
8	19IS307	Data Structures Lab	0+0+2+0	2	50	50	1
9	19IS308	UNIX Programming Lab	0+0+2+0	2	50	50	1
10	19HU312	ಆಡಳಿತ ಕನ್ನಡ ಪಠ್ಯ ಪುಸ್ತಕ/ವ್ಯವಹಾರಿಕ ಕನ್ನಡ ಪಠ್ಯ ಪುಸ್ತಕ	0+2+0+0	2	50	-	-
<b>TOTAL</b>				<b>32</b>	<b>500</b>	<b>450</b>	<b>25</b>

**DEPARTMENT OF INFORMATION SCIENCE & ENGINEERING**  
**SCHEME OF TEACHING AND EXAMINATION**

**IV SEMESTER B.E.**

**30 Hours / Week**

<b>Sl. No.</b>	<b>Code</b>	<b>Course Title</b>	<b>Theory/Tuto./Prac./ Self-Study</b>	<b>Total Hrs. / Week</b>	<b>CIE</b>	<b>SEE</b>	<b>Credits</b>
1	19IS401	Linear Algebra and Probability Theory	3+0+0+0	3	50	50	3
2	19IS402	Design & Analysis of Algorithms	4+0+0+0	4	50	50	4
3	19IS403	Java Programming	4+0+0+1	4	50	50	4.5
4	19IS404	Data Communications	3+1+0+0	4	50	50	3.5
5	19IS405	Digital System Design	4+0+0+0	4	50	50	4
6	19IS408	Design & Analysis of Algorithms Lab	0+0+2+0	2	50	50	1
7	19IS409	Digital Design Lab	0+0+2+0	2	50	50	1
8	19IS410	Java Programming Lab	0+0+2+0	2	50	50	1
9	19HU312	ಆಡಳಿತ ಕನ್ನಡ ಪಠ್ಯ ಪುಸ್ತಕ/ವ್ಯವಹಾರಿಕ ಕನ್ನಡ ಪಠ್ಯ ಪುಸ್ತಕ	0+2+0+0	2	50	-	-
<b>TOTAL</b>				<b>30</b>	<b>500</b>	<b>450</b>	<b>22</b>

# DISCRETE MATHEMATICAL STRUCTURES

## (For ISE branch)

<b>Course Code</b>	<b>19IS301</b>	<b>CIE Marks</b>	<b>50</b>
<b>Teaching Hours/Week (L:T:P)</b>	<b>3:0:0</b>	<b>SEE Marks</b>	<b>50</b>
<b>Total Hours</b>	<b>39</b>	<b>Credits</b>	<b>03</b>

### **Prerequisite**

Basic Algebra.

### **Course Learning Objectives (CLO)**

After studying this subject, the student should be able to:

1. Prepare for a background in abstraction, notation, and critical thinking for the mathematics most directly related to computer science.
2. Learn the set theoretic concepts and basics of relations.
3. Study about functions and partial ordered sets with applications to computer science.
4. Describe the basics of graph theory, counting techniques and their applications in computer science.
5. Know the relevance of elementary number theory in cryptography.
6. Study the core idea of induction, recursive relations, logic and their use in computer science.

## **UNIT - I**

### **SET THEORY & COUNTING**

Sets and subsets, Operations on sets, The Pigeonhole principle and Recurrence Relations.

### **RELATIONS & PROPERTIES**

Product sets and Partitions, Relations and Digraphs, Paths in relations and Digraphs. Properties of Relations, Partitions, Equivalence Relations, Transitive Closure and Warshall's Algorithm, Computer representation of Relations and Digraphs

### **FUNCTIONS**

Definition, Types of Functions, Invertible Functions, Permutation Functions, Functions For Computer Science.

**15 Hours**

## **UNIT - II**

**ORDER RELATIONS & STRUCTURES:** Partially Ordered Sets, External Elements of Partially Ordered Sets, Lattice: Definition and Examples.

### **GRAPHS & THEIR APPLICATIONS**

Introduction to Graphs, Graph Models, Bipartite Graphs, Modeling Applications using Bipartite Graphs, Representing Graphs: Adjacency Matrices, Incidence Matrices. Some Applications of Special Types of Graphs, Applications of Vertex and Edge Connectivity, Applications of Euler Paths and Circuits, Applications of Hamilton Circuits, Applications of Planar Graphs, Applications of Graph Colorings.

### **FUNDAMENTALS OF LOGIC**

Propositions and Logical Operations, Conditional Statements, Biconditional statements, The laws of logic, Logical implication- Rules of inference, Mathematical Induction.

**15 Hours**

# INTRODUCTION TO NUMBER THEORY

## 9 Hours

At the end of the course the student will be able to

- ### Graduate Attributes (GA)

This course will map the following GA as per NBA:

1. Engineering Knowledge
2. Problem Analysis
3. Life-long Learning

[illegible]

CO2	3	2											
CO3	2	3											
CO4	3	1											
CO5	2	3											

(L/1 = Low 30%-49%, M/2 = Medium 50%-69%, H/3 = High >70%)

### TEXTBOOKS:

1. "Discrete Mathematical Structures" - Bernard Kolman, Robert C. Busby, Sharon Ross, III edition, PHI 2001.
2. "Elementary Number Theory" - David M. Burton, II Edition, UBS New Delhi.
3. "Discrete Mathematics and its applications", Kenneth H. Rosen, Tata McGraw Hill, V Edition-2003.

### REFERENCE BOOKS:

1. "Discrete and Combinatorial Mathematics" - Ralph P. Grimaldi, Pearson Education, Asia, IV Edition-2002.
2. "Discrete Mathematical Structures with applications to computer Science" - J. P. Tremblay, R. Manohar, Tata McGraw Hill-1987.
3. "Discrete Mathematics and its applications" - Kenneth H. Rosen, Tata McGraw Hill, V Edition-2003.
4. "Cryptography and Network Security" - William Stallings, II edition, Pearson Education Asia.  
Discrete Mathematics, J K Sharma, 3rd edition, 2013, Macmillan India Ltd

### Website/ E-Books / Online Resources

1. Discrete Mathematics with Algorithms by M. O. Albertson, J. P. Hutchinson - J. 1988, Wiley.
2. Discrete Mathematics for Computer Science, Gary Haggard, John Schlipf, Sue Whitesides, Thomson Brooks/Cole, 2006.
3. <http://ocw.mit.edu/courses/mathematics/> (online course material)

### MOOC

1. <http://www.nptelvideos.in/2012/11/discrete-mathematical-structures.html>

### SEE Question Paper Pattern:

There will be **8** questions of **20** marks each in the question paper divided into **3 Units** as per the syllabi & contact hours and the student will have to answer **5** full questions, selecting **2** full questions from **Unit - I & Unit – II** and **1** full question from **Unit – III**.

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<b>SOFTWARE ENGINEERING</b>			
<b>Course Code</b>	<b>19IS302</b>	<b>CIE Marks</b>	<b>50</b>
<b>Teaching Hours/Week (L:T:P)</b>	<b>3:0:0:0</b>	<b>SEE Marks</b>	<b>50</b>
<b>Total Hours</b>	<b>39</b>	<b>Credits</b>	<b>03</b>

### **Course Learning Objectives:**

#### **This Course will enable students to**

1. To understand principles, concepts, methods, and techniques of the Software engineering
2. To understand the approach to producing quality software (particularly for large, complex systems).
3. To organize and manage medium-sized software development projects, including project plans and documentation, schedule and cost estimates, and quality assurance activities.
4. To function effectively as a member of a team engaged in technical work.
5. To value ethical and social issues in software engineering.

## **UNIT – I**

### **Introduction**

Professional software development, Software engineering ethics, Case studies. **(T1: 1.1-1.3)**

### **Sociotechnical systems**

Complex systems, Systems engineering, System procurement, System development, System operation. **(T1: 10.1-10.5)**

### **Dependability and security**

Dependability properties, Availability and reliability, Safety, Security. **(T1: 11.1-11.4)**

### **Software processes**

Software process models, Process activities, Coping with change, The rational unified process. **(T1: 2.1-2.4)**

### **Requirements engineering**

Functional and non-functional requirements, The software requirements document, Requirements specification, Requirements engineering processes, Requirements elicitation and analysis, Requirements validation, Requirements management. **(T1: 4.1-4.7)**

**15 Hours**

## **UNIT – II**

### **System modeling**

Context models, Interaction models, Structural models, Behavioral models, Model-driven engineering. **(T1: 5.1-5.5)**

### **Project planning**

Software pricing, Plan-driven development, Project scheduling, Agile planning, Estimation techniques. **(T1: 23.1-23.5)**

### **Architectural design**

Architectural design decisions, Architectural views, Architectural patterns, Application architectures. **(T1: 6.1-6.4)**

## Design and implementation

Object-oriented design using the UML, Design patterns, Implementation issues, Open source development. **(T1: 7.1-7.4)**

**15 Hours**

### UNIT - III

#### Agile software development

Agile methods, Plan-driven and agile development, Extreme programming, Agile project management, Scaling agile methods. **(T1: 3.1-3.5)**

#### Software testing

Development testing, Test-driven development, Release testing, User testing. **(T1: 8.1-8.4)**

#### Software evolution

Evolution processes, Program evolution dynamics, Software maintenance, Legacy system management. **(T1: 9.1-9.4)**

#### Project management

Risk management, Managing people, Teamwork. **(T1: 22.1-22.3)**

**09 Hours**

#### Course Outcomes:

At the end of the course the student will be able to

Sl. No.	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C302.1	Explain the significance of software engineering, ethical and professional responsibilities that are important for the software engineers.	L2
C302.2	Apply the phases and activities of the software process models and requirement engineering process.	L3
C302.3	Demonstrate system modeling and project planning techniques.	L2
C302.4	Develop architectural design and illustrate object-oriented design using the UML.	L3
C302.5	Utilize agile software development principle and summarize the concept of software testing, software evolution and people management.	L3

**Table: Mapping of COs to PIs, POs and BTL**

Course Outcomes (COs)	Program Outcomes (POs) Addressed	Performance Indicators (PI)	Bloom's Taxonomy Level (BTL)
CO1	1,8,10	1.3.1, 1.4.1, 8.2.2, 10.1.1, 10.1.2, 10.1.3, 10.2.1, 10.2.2, 10.3.2	L2
CO2	1,8,10	1.3.1, 1.4.1, 8.2.2, 10.1.1, 10.1.2, 10.1.3, 10.2.1, 10.2.2, 10.3.2	L3



CO3	1,2,10	1.3.1 ,1.4.1, 2.2.1, 2.2.2, 2.2.3, 2.2.4, 2.2.5 ,2.4.2, 2.4.3, 2.4.4, 10.1.1, 10.1.2, 10.1.3, 10.2.1, 10.2.2,10.3.1, 10.3.2	L2
CO4	1,2,10	1.3.1 ,1.4.1, 2.2.1, 2.2.2, 2.2.3, 2.2.4, 2.2.5 ,2.4.2, 2.4.3, 2.4.4, 10.1.1, 10.1.2, 10.1.3, 10.2.1, 10.2.2,10.3.1, 10.3.2	L3
CO5	9,10,11	9.1.1, 9.1.2, 9.2.1, 9.2.2, 9.2.3, 9.2.4, 9.3.1, 10.1.1, 10.1.2, , 10.1.3, 10.2.1, 10.2.2, 10.3.1, 10.3.2, 11.1.1, 11.1.2, 11.2.1, 11.3.1, 11.3.2	L3

#### **Mapping of POs & COs:**

<b>POs COs</b>	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PO 10</b>	<b>PO 11</b>	<b>PO 12</b>	<b>PSO 1</b>	<b>PSO 2</b>
C302.1	2							1	1	1		1	1	
C302.2	2							1	1	1		1	2	
C302.3	2	3							1	1		1	2	
C302.4	2	3							1	1		1	2	
C302.5	1								1	1	1	1	3	1

**(L/1 = Low 30%-49%, M/2 = Medium 50%-69%, H/3 = High >70%)**

#### **TEXTBOOK:**

1. Ian Somerville: Software Engineering, 9th Edition, Pearson Education Ltd., 2011.

#### **REFERENCE BOOKS:**

1. Roger S.Pressman: Software Engineering-A Practitioner's approach, 7th Edition, McGraw-Hill, 2007.
2. Pfleeger: Software Engineering Theory and Practice, 3rd Edition, Pearson Education, 2006.
3. Waman S Jawadekar: Software Engineering Principles and Practice, Tata McGraw Hill, 2004.

#### **E-RESOURCES:**

1. <http://nptel.ac.in/courses/106101061/>

#### **SEE Question Paper Pattern:**

There will be **8** questions of **20** marks each in the question paper divided into **3 Units** as per the syllabi & contact hours and the student will have to answer **5** full questions, selecting **2** full

questions from **Unit - I & Unit – II** and **1** full question from **Unit – III**.

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<b>UNIX AND SHELL PROGRAMMING</b>			
<b>Course Code</b>	<b>19IS303</b>	<b>CIE Marks</b>	<b>50</b>
<b>Teaching Hours/Week (L:T:P)</b>	<b>4:0:0:1</b>	<b>SEE Marks</b>	<b>50</b>
<b>Total Hours</b>	<b>52</b>	<b>Credits</b>	<b>4.5</b>

### **Course Learning Objectives**

After studying this subject, the student should be able to:

1. Describe fundamentals/significance of UNIX based computer systems.
2. Apply UNIX commands to solve common problems.
- 3 Write shell scripts effectively for a given problem
- 4 Apply appropriate Unix commands for Process control and system administration.
- 5 Write perl and awk scripts effectively for a given problem

## **UNIT – I**

### **Background and some basic commands**

Brief History, Salient features of a UNIX System, POSIX and the single UNIX specification, The UNIX architecture. Locating Commands, Internal and External Commands, Flexibility of Command usage, man: Browsing and Manual Pages On-line, Understanding the man documentation. **(T1:2.1-2.10)**

### **The filesystem and some file handling commands**

The File, What's in a (File) name ?, The Parent-Child Relationship, The HOME Variable: The Home Directory, pwd: Checking your current directory, cd: Changing the current directory, mkdir: Making directories, rmdir: Removing directories, Absolute Pathnames, Relative Pathnames, ls: Listing Directory contents, The UNIX file system. **(T1:4.1-4.12)**

Cat: Displaying and creating Files, cp: Copying a File, rm: Deleting files, mv: Renaming files, more: Paging output, The lp Subsystem: Printing a file, file: Knowing the file types, wc: Counting lines, words and characters, od: Displaying data in octal, cmp: Comparing two Files, comm.: What is common?, diff: Converting one file to other. **(T1:5.1-5.12)**

**11 Hours**

## **UNIT – II**

### **The Shell**

The shell's interpretive cycle, Pattern matching- The wild-cards, Escaping and Quoting, Redirection: The three standard file, /dev/null and /dev/tty: Two special files, pipes, tee: Creating a Tee, Command Substitution, Shell variables. **(T1:8.1-8.10)**

### **FILE ATTRIBUTES**

ls -l: listing file attributes, The -d option: Listing Directory attributes, Listing inode number, listing hidden files, time associated with a file, listing timestamps, File ownership, File permissions, chmod: Changing file permissions, Directory permissions, Changing file

ownership. **(T1:6.1-6.7)**

File systems and inodes, Hard links, Symbolic Links and In, The Directory, umask: Default File and Directory Permissions, Modification and Access Times, find: Locating Files. **(T1:11.1-11.7)**

### **THE PROCESS**

Process basics, ps: Process status, System Processes (-e or -a), Mechanism of process creation, Internal and External commands, Running jobs in background, nice: Job execution with lower priority, Killing process with signals, Job control, fg and bg commands at and batch: Execute later, cron: Running jobs periodically, time: Timing Processes **(T1:9.1-9.13)**

**11 Hours**

## **UNIT – III**

### **SIMPLE FILTERS**

The sample database, pr: Paginating files, head: Displaying the beginning of a file, tail: Displaying the end of the file, cut: slitting a file vertically, paste: Pasting files, sort: Ordering file, uniq: Locate repeated and non-repeated lines, tr: translating characters An example: Displaying a Word-count List. **(T1:12.1-12.10)**

### **FILTERS USING REGULAR EXPRESSIONS – grep AND sed**

Searching for a pattern, Basic regular expressions (BRE) – An Introduction, Extended regular expressions (ERE) and egrep. The stream editor, Line addressing, Using multiple instructions (-E and -F), Context addressing, Writing selected lines to the file (w), Text editing, Substitution. **(T1:13.1-13.10)**

**10 Hours**

## **UNIT – IV**

### **SHELL PROGRAMMING**

Shell scripts, read: Making scripts interactive, Using command line arguments, exit and Exit status of Command, The logical operators && and || - Conditional Execution, The if conditional, Using test and [] to evaluate expressions, The case conditional, expr: Computation and string handling, \$0: Calling a script by different names, while: Looping, for: looping with a list, set and shift: Manipulating the positional parameters, The here document(<<), trap: Interrupting a program, Debugging shell script with -x **(T1:14.1-14.16)**

Shells and sub-shells, export: Exporting shell variables, Running a script in the current shell: The. Command, let computation, Arrays, String handling, Conditional parameter substitution, Merging streams, Shell functions, eval: Evaluating twice, The exec statement. **(T1:21.1-21.12)**

**10 Hours**

## **UNIT – V**

### **awk – AN ADVANCED FILTER**

Simple awk Filtering, Splitting a Line into Fields, printf: Formatting output, Variables and Expressions, The Comparison operators, Number Processing, Variables, The -f option: storing awk programs in a file, The BEGIN and END sections, Built in variables, Arrays, Functions, Control flow,- the if statement, Looping with for, Looping with while. **(T1:18.1-**

## 18.15)

### Perl-THE MASTER MANIPULATOR

Perl preliminaries, The chop function: Removing the last character, Variables and operators, The string handling functions, Specifying filenames in command line, \$\_: The default variable, Current line number(\$.) and the Range operator(..), Lists and arrays, foreach: Looping through a list, split: Splitting into a list or array, join: Joining a list, dec2bin.pl:converting a Decimal Number to binary, grep: Searching an array for a pattern, Associative arrays, Regular expressions and substitution, file handling, File tests, Subroutines. **(T1:19.1-19.18)**

**10 Hours**

### SELF STUDY TOPICS:

#### Basic Commands

cal: The Calendar, date: Displaying and System date, echo: Displaying a Message, printf: An Alternative to echo, bc: The Calculator, script: Recording a session, passwd: Changing your password, who: who are the users?, uname: Knowing your machine's characteristics, tty: Knowing your terminal, stty: Displaying and setting Terminal characteristics. **(T1:3.1-3.6, 3.9-3.13)**

#### The vi Editor

Vi Basics, Input mode- Entering and replacing text, Saving text and Quoting- The ex mode, Navigation, Editing Text, Undoing last editing instructions (u and U), Repeating the last command(,), Searching for a pattern(/ and ?), Substitution- Search and Replace(:s). **(T1:7.1-7.9)**

#### Shell Programming

while: Looping, for: looping with a list, Arrays, String handling, Conditional parameter substitution, Merging streams, Shell functions **(T1:21)**

### Course Outcomes:

Sl. No.	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C303.1	Comprehend with the Unix environment, Executing various commands in Unix and understanding the concept of Shell, File system in Unix.	2
C303.2	Understand the Process basics and file attributes. To know about the permission related to the files and change the permission according the requirement.	2
C303.3	Experiment with usage of different filters in Unix.	3
C303.4	Develop user space applications either by writing the commands in the shell script file or writing c programs.	3
C303.5	Apply the concepts of AWK in various problems, Identify and	3

	analyze various Perl programs.	
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Table: Mapping of COs to PIs, POs and BTL			
Course Outcomes (COs)	Program Outcomes (POs) Addressed	Performance Indicators (PI)	Bloom's Taxonomy Level (BTL)
CO1	1,2,12	1.3.1,1.4.1,,2.2.3,12.2.2	2
CO2	1,2,12	1.3.1,1.4.1,,2.2.3,12.2.2	2
CO3	1,2,12	1.3.1,1.4.1,,2.2.3,12.2.2	3
CO4	1,2,10,12	1.3.1,1.4.1,,2.2.3,10.1.1,10.1.2,12.2.2	3
CO5	1,2,10,12	1.3.1,1.4.1,,2.2.3,10.1.1,10.1.2,12.2.2	3

#### Mapping Course Outcomes with Programme Outcomes:

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C303.1	2	1										1	2	2
C303.2	2	1										1	2	2
C303.3	2	1										1	2	2
C303.4	2	1								1		1	2	2
C303.5	2	1								1		1	2	2

(1 = Low 30%-49%, 2 = Medium 50%-69%,3 = High >70%)

#### TEXTBOOK:

1. **"UNIX-Concepts and Applications"**, Sumitaba Das, 4th Edition, Tata McGraw Hill, 2006.(Chapters 1.1,1.2,2,3,4,5,6,7,8,9,11,12,13,14,19,21).

#### REFERENCE BOOKS:

1. **"Unix and Shell Programming"**, M.G. Venkateshmurthy, Pearson Education, 2005.
2. **"UNIX and Shell Programming"**, Behrouz A. Forouzan and Richard F. Gilberg, Thomson 2005. (Chapters Appendix H,9 ).

#### E-RESOURCE

<https://nptel.ac.in/courses/117106113>

#### SEE Question Paper Pattern:

There will be **10** questions of **20** marks each in the question paper divided into **5** units as per the syllabi & contact hours and the student will have to answer **5** full questions, selecting **one full** question from **each** unit.

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COMPUTER ORGANIZATION			
Course Code	19IS304	CIE Marks	50

<b>Teaching Hours/Week (L:T:P)</b>	<b>4:0:0:0</b>	<b>SEE Marks</b>	<b>50</b>
<b>Total Hours</b>	<b>52</b>	<b>Credits</b>	<b>04</b>

### **Course Learning Objectives:**

#### **This course enables students to**

1. To discuss the need of computer organization.
2. To implement the concepts to solve a computer related issue.
3. To understand the need of memory in a computer based system.
4. To implement the steps involved in performing arithmetic calculations
5. To understand the working of buses and implement the need of control signals

## **UNIT - I**

### **INTRODUCTION**

#### **Basic Structure of Computers:**

Computer Types, Functional Units, Operational Concepts, Bus Structures, Performance (1.6.1, 1.6.2, 1.6.4, 1.6.7), CISC v/s RISC.

#### **Machine Instructions and Programs:**

Numbers, Arithmetic Operations and Characters, Memory Location and Addresses, Memory Operations, Instructions and Instruction Sequencing (2.4.1 to 2.4.6), Addressing Modes, Basic Input Output Operations, Stacks( 2.8 Push and Pop operations), Subroutines (2.9.1, 2.9.2).Additional Instructions.

**12 Hours**

## **UNIT - II**

### **BASIC INPUT/ OUTPUT OPERATIONS**

#### **Input /Output Organization:**

Accessing I/O Devices, Interrupts (4.2.1 To 4.2.3), Direct Memory Access, Buses, and Interface Circuits: Keyboard to Processor Connection (Fig. 4.28), Printer to Processor connection (Fig. 4.31), Data Transfer using PCI and SCSI(without timing diagrams), USB characteristics and architecture.

**12 Hours**

## **UNIT – III**

### **MEMORY SYSTEMS**

### **Memory**

#### **System:**

Basic Concepts, Semiconductor RAM Memories (5.2.1 to 5.2.5), Read Only Memories, Speed, Size, and Cost, Cache Memories(5.5.1 , 5.5.2), Replacement Algorithms, Performance consideration(5.6.2, 5.6.3), Virtual Memories.

**12 Hours**

**Self-Study:** Secondary Storage (5.9.1, 5.9.2, 5.9.3)

## **UNIT - IV**

### **ARITHMETIC OPERATIONS**

**Arithmetic:** Addition and Subtraction of Signed Numbers, Design of Fast Adders Multiplication of Positive Numbers, Signed Operand Multiplication, Fast Multiplication.

Integer Division, Floating-point Numbers and Operations (6.7.1, 6.7.2)

**8 Hours**

## UNIT - V

### BASIC PROCESSING UNIT

**Basic Processing Unit:** Some Fundamental Concepts, Execution of a Complete Instruction, Multiple Bus Organization. Hard-wired Control, Micro programmed Control (Fig. 7.15, 7.16, 7.17, 7.18)

**8 Hours**

#### Course Outcomes:

At the end of the course the student will be able to

Sl. No.	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C304.1	Understand the basic structure and organization of computer systems.	L2
C304.2	Comprehend the basic input/ output operations in a computer system.	L2
C304.3	Model the computer memory systems.	L3
C304.4	Identify and apply the circuits for arithmetic operations	L3
C304.5	Model the instruction processing which is implemented in a processor.	L3

**Table: Mapping of COs to PIs, POs and BTL**

Course Outcomes (COs)	Program Outcomes (POs) Addressed	Performance Indicators (PI)	Bloom's Taxonomy Level (BTL)
CO1	1,2	1.4.1,2.1.2,2.2.2,2.3.2,	L2
CO2	1,2	1.4.1,2.1.2,2.2.4	L2
CO3	1,2	1.3.1,1.4.1,2.1.1,2.1.2,2.2.2,2.2.3,2.3.1,	L3
CO4	1,2	1.3.1,1.4.1,,2.1,2.2.4,	L3
CO5	1,2	1.3.1,1.4.1,,2.1,2.2.2,2.2.4	L3

#### Mapping of POs & COs:

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C304.1	1	2												2
C304.2	1	2												2
C304.3	2	3												2
C304.4	2	2												2
C304.5	2	3												2

**(1 = Low 30%-49%, 2 = Medium 50%-69%, 3 = High >70%)**

**TEXTBOOK:**

1. Organization, Carl Hamacher, Zvonko Vranesic, Safwat Zaky, 5th Edition, TMH, 2002.

**REFERENCE BOOKS:**

1. Organization & Architecture, William Stallings, 7th Edition, PHI, 2006.
2. Computer Systems Design & Architecture, Vincent P Heuring & Harry F Jordan, 2nd Edition, Pearson Publication 2004.
3. Computer Architecture – A hardware approach through Microprocessors – Dr. K M Hebbar, Mac Millan Publishers India Limited – 2009.

**SEE Question Paper Pattern:**

There will be **10** questions of **20** marks each in the question paper divided into **5** units as per the syllabi & contact hours and the student will have to answer **5** full questions, selecting **one full** question from **each** unit.

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<b>DATA STRUCTURES</b>			
<b>Course Code</b>	<b>19IS305</b>	<b>CIE Marks</b>	<b>50</b>
<b>Teaching Hours/Week (L:T:P)</b>	<b>4:1:0:0</b>	<b>SEE Marks</b>	<b>50</b>
<b>Total Hours</b>	<b>52</b>	<b>Credits</b>	<b>4.5</b>

**Prerequisites**

1. A preliminary knowledge of Computer Concepts and C programming.

**Course Learning Objectives:**

**This Course will enable students to**

1. To understand and analyze various data organizations.
2. To identify and implement the appropriate data structure and modify it if required for modelling a given problem and perform various operations on it.
3. To classify and examine linear and nonlinear data structures
4. To demonstrate and practice iterative and recursive solutions for elementary problems.
5. To formulate algorithms and programs that use data structures such as arrays, linked lists, stacks, queues, trees.

**UNIT – I****INTRODUCTION AND OVERVIEW**

Definitions, Concepts of data structures, types, Overview of data structures.

Pointers Definition and Concepts, Accessing variables through pointers, Pointers and functions, Arrays and pointers, Array of pointers, Pointer arithmetic.(R1:1.1,1.2,1.3,L2).

**LINEAR DATA STRUCTURES – STACKS**



Introduction and Definition, Representation of stack: Array and structure representation of stacks, Operations on stacks, Applications of stack: Conversion of Expressions, Evaluation of expressions, Recursion: Implementation, Simulating Recursion, examples on Recursion.(T1:3.1,3.2,3.6,R1:4.5)

**10 Hours**

## **UNIT – II**

### **LINEAR DATA STRUCTURES – QUEUES**

Introduction and Definition Representation of Queue: Array and Structure representation of queue, various queue Structures: ordinary queue, circular queue, priority queue.(T1:3.3,3.4,R1:5.4)

### **LINEAR DATA STRUCTURES - SINGLY LINKED LISTS**

Memory allocation functions. Definition and concepts singly Linked List: Representation of link list in memory, Operations on singly Linked List, Circular Linked List. (T1:4.1,4.2,4.5)

**10 Hours**

## **UNIT - III**

### **LINEAR DATA STRUCTURES - DOUBLY LINKED LISTS**

Doubly Linked List: Representation and Operations, Circular doubly Link list: Representation and Operations. Linked List representation of stack, Linked List representation of queue.(T1:4.8,R1:3.3,3.4,3.5)

### **NONLINEAR DATA STRUCTURES - TREE DATA STRUCTURES 1**

Basic Terminologies, Binary Trees: Properties, Representation of Binary Tree: Linear representation, Linked representation, Operations on Binary Tree: Insertion, Simple Deletion, Traversals. Binary Search Tree, Operations on Binary Search Tree: Insertion, Traversals.(R1:7.1,7.2,7.3,7.4)

**12 Hours**

## **UNIT – IV**

### **NONLINEAR DATA STRUCTURES - TREE DATA STRUCTURES 2**

Expression Tree: Evaluating expression tree, Constructing expression tree from postfix expression, traversals, Threaded binary Tree: types, B-Trees, B+ Trees, AVL Trees: Definition, Constructing a general AVL tree.(R1:7.5,7.7,7.8,T1:5.1,5.2,5.3,5.5)

**10 Hours**

## **UNIT – V**

### **NONLINEAR DATA STRUCTURE-GRAPHS**

Graph terminologies: Walks, Paths, Circuits, Connected graphs, Disconnected graphs and

Components, Euler graphs. Directed graphs, Undirected graphs, Hamiltonian paths and Circuits.(R1:8.1,8.2,8.3,8.4,8.5)

### **Representation of Graphs**

Set Representation, Linked representation, Matrix representation. Operations on Graphs: Insertion and Deletion of edges and vertices (linked representation), DFS, BFS.(T1:6.3,R1:9.1,9.2)

**Course Outcomes:**

At the end of the course the student will be able to

Sl. No.	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C305.1	Apply the concepts of data structure, data type and array data structure, pointers, stacks.	L3
C305.2	Apply the concept of queues and singly linked list data structure to solve problems.	L3
C305.3	Apply the concept of circular and doubly linked list data structure	L3
C305.4	Apply the concept of Trees to solve problems	L3
C305.5	Apply the concept of threaded binary tree and study hashing techniques	L3

**Table: Mapping of COs to PIs, POs and BTL**

Course Outcomes (COs)	Program Outcomes (POs) Addressed	Performance Indicators (PI)	Bloom's Taxonomy Level (BTL)
CO1	1,2,3	1.3,1.4,2.1.2,2.4.3,3.2.1	L3
CO2	1,2,3	1.3,1.4,2.1.2,2.4.3,3.2.1	L3
CO3	1,2,3	1.3,1.4,2.1.2,2.4.3,3.2.1	L3
CO4	1,2,3	1.3,1.4,2.1.2,2.4.3,3.2.1	L3
CO5	1,2,3	1.3,1.4,2.1.2,2.4.3,3.2.1	L3

**Mapping of POs & COs:**

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C305.1	1	2											2	2
C305.2	1	2											2	2
C305.3	1	2											2	2
C305.4	1	2											2	2
C305.5	1	2											2	2

**(1 = Low 30%-49%, 2 = Medium 50%-69%, 3 = High >70%)**

**TEXTBOOKS:**

1. Fundamentals of Data Structures In C; 2nd Edition; Ellis Horowitz, Anderson-Freed, Sahni; Universities Press 2008.
2. Data Structure using C; Aaron M. Tenenbaum, Yedidyah Langsam & Moshe J. Augenstein; Pearson Education/PHI.
3. Data Structures With C; Seymour Lipschutz; Tata McGraw Hill Education Private

Limited 2010.

4. Data Structures Using C And C++; 2nd Edition; Langsam Yedidyah, Augenstein Moshe J., Tenenbaum Aaron M; Prentice-Hall 2009.

#### **REFERENCE BOOKS:**

1. Classic Data Structures: D. Samanta.
2. Data Structures and Program Design in C; R. Kruse et.al, Pearson Education Asia, Delhi-2002.
3. Computer Science A Structured Programming Approach Using C; Second Edition; Behrouz A. Forouzan and Richard F. Gilberg; Thomson, 2003.
4. Ronald J Tocci, Neal S. Widmer, Gregory L Moss, Digital Systems Principles and Applications, 10th Edition, PHI/Pearson Education, 2007.

#### **E-RESOURCES:**

1. [https://onlinecourses.nptel.ac.in/noc16\\_cs06/](https://onlinecourses.nptel.ac.in/noc16_cs06/)
2. [www.tutorialspoint.com/cprogramming/c\\_pointer](http://www.tutorialspoint.com/cprogramming/c_pointer)

#### **SEE Question Paper Pattern:**

There will be 10 questions of 20 marks each in the question paper divided into 5 units as per the syllabi & contact hours and the student will have to answer 5 full questions, selecting one full question from each unit.

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<b>PROGRAMMING IN PYTHON</b>			
<b>Course Code</b>	<b>19IS306</b>	<b>CIE Marks</b>	<b>50</b>
<b>Teaching Hours/Week (L:T:P)</b>	<b>0:1:3:0</b>	<b>SEE Marks</b>	<b>50</b>
<b>Total Hours</b>	<b>4 Hours / Week</b>	<b>Credits</b>	<b>02</b>

#### **Introduction to the Lab**

#### **Prerequisites**

Knowledge in C programming language is required.

#### **Course Learning Objectives:**

##### **This Course will enable students to**

1. Construct Python programs using data types and looping.
2. Make use of python operators for manipulating lists, dictionaries and files.
3. Design object-oriented Python programs using classes and objects
4. Design useful stand-alone and GUI applications in Python
5. Demonstrate a sound technical knowledge of their selected project topic

#### **Week 1**

**Introduction to python; Installing Python; basic syntax, interactive shell, editing, saving, and running a script, The concept of data types: variables, assignments; immutable variables.**

1. Write a python program to print prime numbers.

2 Write a program to ask the user width and height of the rectangle and print area

### **Week 2**

**Numerical types; arithmetic operators and expressions; comments in the program; understanding error messages, Conditions, Boolean logic, logical operators; ranges. Control statements: if-else, loops (for, while); short-circuit (lazy) evaluation.**

1. Write a program which will find all such numbers which are divisible by 7 but are not a multiple of 5, between 2000 and 3200 (both included).

2. Write a program to implement Rock paper scissor game(hint: Ask for player plays(using input), compare them, print out a message of congrats to the winner and ask if the players want to start a new game)

Rules:

- Rock beats Scissor
- Scissor beats paper
- Paper beats rock

### **Week 3**

**Strings and text files; manipulating files and directories, OS and sys modules; text files: reading/writing text and numbers from/to a file; creating and reading a formatted file (csv or tab-separated).**

1. Write a program to count the number of lines in a file.

2. Write a program to read the contents of a file and count the number of vowels and consonants in them and display them

### **Week 4**

**String manipulations; subscript operator, indexing, slicing a string; strings and number system: converting strings to numbers and vice versa, Binary, octal, hexadecimal numbers.**

1. Write a program to count the number of characters (character frequency) in a string and number of words in a sentence.

2. Identify given pattern from in the given set of Input String

### **Week 5**

**Lists, tuples, and dictionaries; basic list operators, replacing, inserting, removing an element; searching and sorting lists.**

1. Write a python program to create a dictionary with key as first character and value as words starting with that character.

Sample output:

Enter string: Hello world this is a test string.

('a', ':', ['a'])

('i', ':', ['is'])

('H', ':', ['Hello'])

('s', ':', ['string'])

<p>('t', ':', ['test', 'this'])  ('w', ':', ['world'])).</p> <p>2. Design a program that takes a list of lists and sorts the list according to the second element in the sub list.</p> <p>Sample:  Input: a=[['A',34],['B',21],['C',26]]  Output: a=[['B',21],['C',26],['A',34]]</p>
<p style="text-align: center;"><b>Week 6</b></p> <p><b>Dictionaries; dictionary literals, adding and removing keys, accessing and replacing values; traversing dictionaries.</b></p>
<p>1. Write a program to copy one dictionary to other dictionary  2. Write a program to create and merge two dictionary and display the new one</p>
<p style="text-align: center;"><b>Week 7</b></p> <p><b>Functions; Design with functions: hiding redundancy, complexity; arguments and return values; formal vs actual arguments, named arguments. Program structure and design. Recursive functions.</b></p>
<p>1. Write a function to add two numbers and print them.  2. Write a function to find the average of numbers in a list.</p>
<p style="text-align: center;"><b>Week 8</b></p> <p><b>Classes and OOP; Classes, objects, attributes and methods; defining classes; design with classes, data modeling; persistent storage of objects, inheritance</b></p>
<p>1. Write a class as student and methods to read and display name and USN.  2. Write a program to create a class called ""Book"" with instance variables such as ""title"" and ""pages"". Demonstrate addition of books to display the total number of pages in the books.</p>
<p style="text-align: center;"><b>Week 9</b></p> <p><b>Polymorphism, operator overloading (_eq_, _str_, etc); abstract classes; exception handling, try block;</b></p>
<p>1. Write a program to add two numbers using method overloading  2. Write a program to demonstrate polymorphism</p>
<p style="text-align: center;"><b>Week 10</b></p> <p><b>File Handling; Reading From Text Files, Writing to Text Files, Reading from Binary Files, Writing to Binary Files, Seeking Within Files;</b></p>
<p>1. Write a program to read and writing to a binary file.  2. Assume a file sample.txt which contains as "life is beautiful". Open the file in read mode and print its correct position and also read the contents of the file and print its current position.</p>
<p style="text-align: center;"><b>Week 11</b></p> <p><b>Graphical user interfaces, Event-driven programming paradigm, Creating simple GUI.</b></p>
<p>1. Create User Application using Tkinter  2. Design a program to open the file dialog and select the file. Read the contents of the file and display that in a text area.</p>

<b>Week 12</b>
<b>Buttons, labels, entry fields, dialogs;</b>
1. Design an interface to enter two numbers and calculate and display its sum, difference and average. Display the difference in red colour, if result is <0 2. Create a user interface that generates random colours on each click and count the number of mouse clicks. Display a message after very five clicks.
<b>Week 13</b>
<b>Mini Project</b>
1. Mini projects are assigned to formed groups with focus on implementation of creating simple GUI; buttons, labels, entry fields, dialogs; widget attributes - sizes, fonts, colors layouts, nested frames

**Course Outcomes:**

Sl. No.	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C306.1	<b>Make use of</b> with the basics of Python programming like data types and looping	3
C306.2	<b>Apply</b> string manipulation ,operator overloading concepts in programming.	3
C306.3	<b>Make use of</b> lists, dictionaries and files	3
C306.4	<b>Develop</b> object-oriented Python programs using classes and objects	5
C306.5	<b>Design</b> User Interface applications using Tkinter	5

Table: Mapping of COs to PIs, POs and BTL			
Course Outcomes (COs)	Program Outcomes (POs) Addressed	Performance Indicators (PI)	Bloom's Taxonomy Level (BTL)
CO1	1,2,3	1.3.1, 1.4.1, 2.1.1, 3.2.2	3
CO2	1,2,3	1.3.1, 1.4.1, 2.1.1, 3.2.2	3
CO3	1,2,3,4	1.3.1, 1.4.1, 2.1.1, 3.2.2, 4.3.3	3
CO4	1,2,3,4,12	1.3.1, 1.4.1, 2.1.1, 3.2.2, 4.2.1, 12.2.1,12.2.2	5
CO5	1,2,3,5	1.3.1, 1.4.1, 2.1.1, 3.2.2,5.1.1	5

<b>Table: Mapping Course Outcomes with Programme Outcomes</b>
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Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C306.1	1	2	2											
C306.2	1	2	2											
C306.3	1	2	2	2										
C306.4	1	2	2	2								2		
C306.5	1	2	2		2									

(1 = Low 30%-49%, 2 = Medium 50%-69%, 3 = High >70%)

#### TEXTBOOK:

1. "The Fundamentals of Python: First Programs", Kenneth A. Lambert, 2011, Cengage Learning, ISBN: 978-1111822705 (Chapters 1,2,3,4,5,6,7,8,9,11,12).

#### REFERENCE BOOKS:

1. "Python Essential Reference", David M. Baezly, Addison-Wesley Professional, 4 edition.
2. "Python Cookbook", David M. Baezly O'Reilly Media. 3 edition

#### E-Resources

1. For Introduction to Python  
<https://www.codecademy.com/learn/python>
2. For Tkinter  
[www.learnpython.org/](http://www.learnpython.org/)

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ENHANCING SELF COMPETENCE (ESC)			
Course Code	19HU311	CIE Marks	50
Teaching Hours/Week (L:T:P)	1:0:2:0	SEE Marks	50
Total Hours	39	Credits	02

#### Pre-requisites:

Students must have essential knowledge of English Language Communication.

#### Course Learning Objectives (CLO):

By the end of the course, students should be able to:

1. Introspect and learn about oneself.
2. Develop professional writing skills.
3. Acquaint with the various social behaviour and etiquette.
4. Apply the techniques of fundamental communication skills.
5. Develop necessary techniques for formal presentations and be acquainted with cultural diversities & issues related to gender sensitivity.

## Course Content

<b>UNIT - I</b>
<b>Personality Traits:</b> Types & Kinds of personality, Ways to Identify Self (Entry -Exit survey- Tests; SWOT Analysis, Johari Window). <div style="text-align: right;"><b>(6 Hours)</b></div>
<b>UNIT - II</b>
<b>Effective Communication Skills:</b> One-way and two-way Communication (Square activities), Active listening, Speaking. <div style="text-align: right;"><b>(8 Hours)</b></div>
<b>UNIT - III</b>
<b>Writing Skills:</b> Formal E-mails, Framing Requests, Greetings, Salutations, Close <div style="text-align: right;"><b>(8 Hours)</b></div>
<b>UNIT - IV</b>
<b>Social Behavior and Etiquette:</b> Time Management, Personal Grooming, Hygiene, Dressing for different occasions, Making Small Talk, Showing Respect, Feedback. <div style="text-align: right;"><b>(7 Hours)</b></div>
<b>UNIT - V</b>
<b>Professional Presentation Techniques:</b> Group discussion, Formal Presentation, Awareness of the cultural diversity of the workplace, the global work cultures, Introduction to Gender Sensitivity <div style="text-align: right;"><b>(10 Hours)</b></div>

### **Course Outcomes (CO):**

By the end of the course, students will be able to:

CO1 - Understand the importance of human conduct.

CO2 - Demonstrate knowledge of theory and competence in office communication.

CO3 - Develop and assess various types of communication.

CO4 - Be Familiar with the current practices of social behaviour.

CO5 - Prepare and deliver presentation appropriate for the workplace.

COs	POs	a	b	c	d	e	f	g	h	i	j	k	l
<b>CO 1</b>			L				M	M		H			
<b>CO 2</b>									H	M	L		L
<b>CO 3</b>				M			M	M	M				M
<b>CO 4</b>			H							M	H	M	
<b>CO 5</b>		M	M		L					M			

### **REFERENCE BOOKS:**



1. Adler, Ronald B & Jeanne Marquardt Elmhorst. *Communicating at Work – Principles and Practices for Business and the Professions*. 6th Ed. McGraw Hill College.
2. Covey, Stephen R. *The 7 Habits of Highly Effective People*. Great Britan: Simon &Schuster, 1994.
3. Gulati, Sarvesh *Corporate grooming and Etiquette*. New Delhi: Rupa Publications India Pvt. Ltd., 2010.
4. Luthans, Fred. *Organizational Behaviour*. McGraw Hill International.
5. Rath, Tom *Strengths Finder 2.0*. New York: Gallup Press, 2007.
6. Rizvi, M Ashraf. *Effective Technical Communication*. New Delhi: Tata McGraw-Hill, 2005.
7. Robbins, Stephen P. *Organizational Behaviour*. New Delhi: Prentice Hall.

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<b>DATA STRUCTURES LAB</b>			
<b>Course Code</b>	<b>19IS307</b>	<b>CIE Marks</b>	<b>50</b>
<b>Teaching Hours/Week (L:T:P)</b>	<b>0:0:2:0</b>	<b>SEE Marks</b>	<b>50</b>
<b>Total Hours</b>	<b>26</b>	<b>Credits</b>	<b>01</b>

### **Course Learning Objectives:**

**This Course will enable students to**

1. Implement Stack operations using appropriate modern engineering and IT tools/programming languages.
2. Design and implement variants of queue and operations of singly linked list using appropriate Modern engineering and IT tools/programming Languages.
3. Develop and Implement the variants and operations of doubly linked using appropriate modern Engineering and IT tools/programming.
4. Implement operations of Binary Search Tree.
5. Design and implement appropriate data structure for given problem.

### **COURSE CONTENT**

#### **Week- 1**

1	Implement stack operations such as Push, Pop and Display using arrays/global variables. The program should print appropriate messages for stack overflow and stack underflow.
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#### **Week- 2**

2	Convert a given valid parenthesized infix arithmetic expression to postfix
---	--

	expression. The expression consists of single character operands and +, -, *, / operators.
--	--

### **Week – 3**

3	Evaluate a valid suffix/postfix expression using stack. Assume that suffix/postfix expression is read as a single line consisting of non-negative single digit operands and binary arithmetic operators. The arithmetic operators are +, -, /, *, ^(\$).
4	Find if a given string is a palindrome or not using stack.

### **Week – 4**

5	Implement Queue operations such as Insert, Delete and Display. Display appropriate messages on Queue overflow and Queue underflow conditions.
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### **Week – 5**

6	Implement Circular queue operations such as Insert, Delete and Display. Display appropriate messages on Queue overflow and Queue underflow conditions.
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### **Week – 6**

7	Implement Priority queue operations such as Insert, Delete and Display. Display appropriate messages on Queue overflow and Queue underflow conditions.
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### **Week – 7**

8	Implement Insert, Delete and Display operations on Singly Linked List.
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### **Week -8**

9	Implement stack operations using linked list.
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### **Week – 9**

10	Implement queue operations using linked list.
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### **Week – 10**

11	Implement Insert, Delete and Display operations on Doubly Linked List.
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### **Week -11**

12	Implement Insert, Delete and Display operations on Circular Doubly Linked List.
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### **Week -12**

13	Implement a Binary Search Tree of integers.
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14	Construct a Binary Search Tree and traverse it using In order, Pre order and Post order traversals.
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### Week -13

#### Mid Semester Examination

#### Course Outcomes:

At the end of the course the student will be able to

Sl. No.	Course Outcome (CO)	PI	Bloom's Taxonomy Level (BTL)
C307.1	Implement Stack operations using appropriate modern engineering and IT tools/programming languages.	4.1.2, 4.3.3, 5.2.2	L3
C307.2	Design and implement variants of queue and operations of singly linked list using appropriate Modern engineering and IT tools/programming. Languages.	4.1.2, 4.3.3, 5.2.2	L3
C307.3	Develop and Implement the variants and operations of doubly linked using appropriate modern Engineering and IT tools/programming.	4.1.2, 5.2.2	L3
C307.4	Implement operations of Binary Search Tree.	4.1.2, 4.3.3, 5.2.2	L3
C307.5	Design and implement appropriate data structure for given problem.	4.2.1, 5.2.2	L4

#### Mapping of POs & COs:

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>C307.1</b>				2	1									2
<b>C307.2</b>				2	1								2	
<b>C307.3</b>				1	1								2	
<b>C307.4</b>				2	1								2	
<b>C307.5</b>				1	1									2

(L = 1: 30%-49%, M = 2: 50%-69%, H = 3: >70%)

#### TEXTBOOKS:

1. Fundamentals of Data Structures In C; 2nd Edition; Ellis Horowitz, Anderson-Freed, Sahni; Universities Press 2008.
2. Data Structure using C; Aaron M. Tenenbaum, Yedidyah Langsam & Moshe J. Augenstein; Pearson Education/PHI.

3. Data Structures With C; Seymour Lipschutz; Tata McGraw Hill Education Private Limited 2010.
4. Data Structures Using C And C++; 2nd Edition; Langsam Yedidyah, Augenstein Moshe J., Tenenbaum Aaron M; Prentice-Hall 2009.

#### **REFERENCE BOOKS:**

1. Classic Data Structures: D.Samanta.
2. Data Structures and Program Design in C; R. Kruse et.al, Pearson Education Asia, Delhi-2002.
3. Computer Science A Structured Programming Approach Using C; Second Edition; Behrouz A. Forouzan and Richard F. Gilberg; Thomson, 2003.
4. Ronald J Tocci, Neal S. Widmer, Gregory L Moss, Digital Systems Principles and Applications, 10th Edition, PHI/Pearson Education, 2007.

#### **E-RESOURCES:**

1. [https://onlinecourses.nptel.ac.in/noc16\\_cs06/](https://onlinecourses.nptel.ac.in/noc16_cs06/)

**Note: In the examination, each student will pick one full question from a lot of 8 questions.**

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<b>UNIX AND SHELL PROGRAMMING LAB</b>			
<b>Course Code</b>	<b>19IS308</b>	<b>CIE Marks</b>	<b>50</b>
<b>Teaching Hours/Week (L:T:P)</b>	<b>0:0:2:0</b>	<b>SEE Marks</b>	<b>50</b>
<b>Total Hours</b>	<b>26</b>	<b>Credits</b>	<b>01</b>

Introduction to the Lab

#### **Prerequisites**

Knowledge in C programming language is required.

#### **Course Learning Objectives:**

**This Course will enable students to**

1. Execute programs written in C under UNIX environment.
2. Demonstrate how to use the basic Bourne Shell commands like cat, grep, ls, more, ps, chmod etc.
3. Study about simple filters, grep and sed filters.
4. Learn about basic shell constructs, positional parameters, reading input to a Shell script, command substitution, comments, and exporting variables. In addition, test on numeric values, test on file type, and test on character strings are covered.
5. Understand the use of PERL and AWK script.

<p style="text-align: center;"><b>Week 1</b></p> <p><b>Basic Unix Commands, Simple Shell scripts</b></p> <ol style="list-style-type: none"> <li>1. Illustrate the usage of unix commands and vi editor concept.</li> <li>2. Implement a shell program to find and display largest and smallest of three numbers</li> </ol>
<p style="text-align: center;"><b>Week 2</b></p> <p><b>Simple Shell scripts/Command Substitution</b></p> <ol style="list-style-type: none"> <li>1. Find the number n is divisible by m or not using shell script. Where m and n are supplied as command line argument or read from key board interactively</li> <li>2. Plan and implement a shell program to search a pattern in a file that will take both pattern and file name from the command line arguments.</li> </ol>
<p style="text-align: center;"><b>Week 3</b></p> <p><b>File attributes/expr command demonstration</b></p> <ol style="list-style-type: none"> <li>1. Design a shell program that takes two file names, checks the permissions for these files are identical and if they are identical, output the common permissions; otherwise output each file name followed by its permissions.</li> <li>2. Implement a shell program to display the length of the name and also display first three characters and last three characters in the name in two different lines if the name contains at least 6 characters.</li> </ol>
<p style="text-align: center;"><b>Week 4</b></p> <p><b>Arithmetic operators/Command Substitution</b></p> <ol style="list-style-type: none"> <li>1. Write a shell program to implement simple calculator operations.</li> <li>2. Design a Shell Program that takes the any number of arguments and print them in same order and in reverse order with suitable messages.</li> </ol>
<p style="text-align: center;"><b>Week 5</b></p> <p><b>String handling operations/Command Substitution</b></p> <ol style="list-style-type: none"> <li>1. For the given path names (ex a/b,a/b/c), design a shell script to create all the components in that path names as directories.</li> <li>2. Develop a shell script that performs following string handling operations i) Calculate the length of the string ii) locate a position of a character in a string iii) extract last three characters from string</li> </ol>
<p style="text-align: center;"><b>Week 6</b></p> <p><b>Command Substitution/PERL script</b></p> <ol style="list-style-type: none"> <li>1. For every filename, check whether file exists in the current directory or not and then convert its name to uppercase only if a file with new name doesn't exist using shell script.</li> <li>2. Execution of exercise Shell scripts</li> </ol>
<p style="text-align: center;"><b>Week 7</b></p> <p><b>'x' operator/PERL script</b></p>

1. Prompt user to input the string and a number, and prints the string that many times, with each string on separate line using PERL script.
2. Implement a PERL script to convert a decimal number (supplied as argument) to an unsigned binary number

### **Week 8**

#### **File operations in PERL**

1. Implement a PERL script that takes file as a argument, checks whether file exists and prints binary if file is binary.
2. Find the sum of digits of an unsigned number passed through argument using PERL.

### **Week 9**

#### **PERL script**

1. Implement a PERL script that prints its command line argument , one per line after translating all lower case letters to uppercase.
2. Execution of extra PERL programs

### **Week 10**

#### **AWK scripts**

1. Create a file "emp.lst" and store the employee records in the following form: emp\_num | emp\_name | emp\_designation | emp\_department | emp\_DOJ (dd/mm/yy) | emp\_salary  
Implement an Awk code to calculate and display the salary, DA, HRA and gross pay for individual employees and the average salary, average DA, average gross pay and average HRA.
2. Design an Awk program to provide extra symbol( i.e. \* or @ ) at the end of the line(if required) so that the line length is maintained as 127.

### **Week 11**

#### **AWK scripts**

1. Design an Awk script to delete duplicated lines from a text file. The order of the original must remain unchanged.
2. Find the transpose of a given matrix using an Awk script.

### **Week 12**

#### **AWK scripts**

1. A file contains a fixed number of fields in the form of space-delimited numbers. Design an Awk program to print the lines as well as total of its rows.
2. Implement an Awk script that folds long line into 15 columns. Thus any line that exceeds 15 characters must be broken after 15th and is to be continued with the residue. The inputs to be supplied through a text file created by the user.

### **Week 13**

#### **Miscellaneous**

Exercise of shell, PERL and AWK script programs.

### **Course Outcomes**

<b>Sl. No.</b>	<b>Course Outcome (CO)</b>	<b>Bloom's Taxonomy Level (BTL)</b>
C308.1	<b>Interpret</b> Unix commands to get familiarized with Unix operating system.	2
C308.2	<b>Develop and implement</b> shell script file using UNIX commands.	3
C308.3	<b>Apply</b> the concept of file attributes and filters to understand about the file permissions and pattern matching.	3
C308.4	<b>Design and implement</b> Awk scripts based on the filtering requirements.	3
C308.5	<b>Develop and implement</b> PERL scripts for the given problems.	3

**Table: Mapping of COs to PIs, POs and BTL**

<b>Course Outcomes (COs)</b>	<b>Program Outcomes (POs) Addressed</b>	<b>Performance Indicators (PI)</b>	<b>Bloom's Taxonomy Level (BTL)</b>
CO1	1,12	1.3.1, 1.4.1,10.1.1,12.1.1,12.2.2	2
CO2	1,2,3,4,12	1.3.1, 1.4.1, 2.1.1, 3.1.1, 3.2.1, 4.1.1, 4.2.1, 12.1.1, 12.1.2	3
CO3	1,2,3,4,12	1.3.1, 1.4.1, 2.1.1 ,3.1.1, 3.2.1, 4.1.1, 4.2.1, 12.1.1, 12.1.2	3
CO4	1,2,3,4,12	1.3.1, 1.4.1, 2.1.1, 3.1.1, 3.2.1, 4.1.1, 4.2.1, 12.1.1, 12.1.2	3
CO5	1,2,3,4,12	1.3.1, 1.4.1, 2.1.1, 3.1.1, 3.2.1, 4.1.1, 4.2.1, 12.1.1, 12.1.2	3

**Table: Mapping Course Outcomes with Programme Outcomes**

<b>Course Outcomes</b>	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PO 10</b>	<b>PO 11</b>	<b>PO 12</b>	<b>PSO 1</b>	<b>PSO 2</b>
C308.1	3											1		
C308.2	2	1	2	2								2		
C308.3	2	1	2	2								2		
C308.4	2	1	2	2								2		
C308.5	2	1	2	2								2		

**(1 = Low 30%-49%, 2 = Medium 50%-69%,3 = High >70%)**

**TEXTBOOK:**

1. "UNIX-Concepts and Applications", Sumitaba Das, 4th Edition, Tata McGraw Hill, 2006.(Chapters 1.1,1.2,2,3,4,5,6,7,8,9,11,12,13,14,19,21).

**REFERENCE BOOKS:**

1. "Unix and Shell Programming", M.G. Venkateshmurthy, Pearson Education, 2005.
2. "UNIX and Shell Programming", Behrouz A. Forouzan and Richard F. Gilberg, Thomson 2005. (Chapters Appendix H,9 ).

**E-RESOURCES**

1. For Introduction to Shell scripting  
[https://swayam.gov.in/nd2\\_aic20\\_sp05/preview](https://swayam.gov.in/nd2_aic20_sp05/preview)
2. For PERL Scripting  
<https://nptel.ac.in/courses/117/106/117106113/>
3. For AWK Script  
<https://nptel.ac.in/courses/106/108/106108101/>

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ಆಡಳಿತ ಕನ್ನಡ ಪಠ್ಯ ಪುಸ್ತಕ (ಕನ್ನಡಿಗರಿಗಾಗಿ – for Kannadigas – Common to all branches)			
Course Code	19HU312	Semester	III / IV



Teaching Hours/Week (L:T:P)	0:2:0	CIE Marks	50
Total Hours	26	SEE Marks	--

ಆಡಳಿತ ಕನ್ನಡ ಭಾಷಾ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು.

- ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದ ಆಡಳಿತ ಕನ್ನಡದ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.
- ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಕನ್ನಡ ಭಾಷೆಯ ವ್ಯಾಕರಣದ ಬಗ್ಗೆ ಅರಿವು ಮೂಡಿಸುವುದು.
- ಕನ್ನಡ ಭಾಷಾ ರಚನೆಯಲ್ಲಿನ ನಿಯಮಗಳು ಮತ್ತು ಕನ್ನಡ ಭಾಷಾ ಬರಹದಲ್ಲಿ ಕಂಡುಬರುವ ದೋಷಗಳು ಹಾಗೂ ಲೇಖನ ಚಿಹ್ನೆಗಳನ್ನು ಪರಿಚಯಿಸುವುದು.
- ಸಾಮಾನ್ಯ ಅರ್ಜಿಗಳು, ಸರ್ಕಾರಿ ಮತ್ತು ಅರೆ ಸರ್ಕಾರಿ ಪತ್ರವ್ಯವಹಾರದ ಬಗ್ಗೆ ಅರಿವು ಮೂಡಿಸುವುದು.
- ಭಾಷಾಂತರ ಮತ್ತು ಪ್ರಬಂಧ ರಚನೆ ಬಗ್ಗೆ ಆಸಕ್ತಿ ಮೂಡಿಸುವುದು.
- ಕನ್ನಡ ಭಾಷಾಭ್ಯಾಸ ಮತ್ತು ಸಾಮಾನ್ಯ ಕನ್ನಡ ಹಾಗೂ ಆಡಳಿತ ಕನ್ನಡದ ಪದಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.

## ಪರಿವಿಡಿ

- ಅಧ್ಯಾಯ- 1 ಕನ್ನಡಭಾಷೆ - ಸಂಕ್ಷಿಪ್ತ ವಿವರಣೆ.
- ಅಧ್ಯಾಯ- 2 ಭಾಷಾ ಪ್ರಯೋಗದಲ್ಲಾಗುವ ಲೋಪದೋಷಗಳು ಮತ್ತು ಅವುಗಳ ನಿವಾರಣೆ.
- ಅಧ್ಯಾಯ- 3 ಲೇಖನ ಚಿಹ್ನೆಗಳು ಮತ್ತು ಅವುಗಳ ಉಪಯೋಗ.
- ಅಧ್ಯಾಯ- 4 ಪತ್ರ ವ್ಯವಹಾರ.
- ಅಧ್ಯಾಯ- 5 ಆಡಳಿತ ಪತ್ರಗಳು.
- ಅಧ್ಯಾಯ- 6 ಸರ್ಕಾರದ ಆದೇಶ ಪತ್ರಗಳು.
- ಅಧ್ಯಾಯ- 7 ಸಂಕ್ಷಿಪ್ತ ಪ್ರಬಂಧ ರಚನೆ (ಪ್ರಿಂಸೈಸ್ ರೈಟಿಂಗ್), ಪ್ರಬಂಧ ಮತ್ತು ಭಾಷಾಂತರ.
- ಅಧ್ಯಾಯ- 8 ಕನ್ನಡ ಶಬ್ದಸಂಗ್ರಹ.
- ಅಧ್ಯಾಯ- 9 ಕಂಪ್ಯೂಟರ್ ಹಾಗೂ ಮಾಹಿತಿ ತಂತ್ರಜ್ಞಾನ.
- ಅಧ್ಯಾಯ- 10 ಪಾರಿಭಾಷಿಕ ಆಡಳಿತ ಕನ್ನಡ ಪದಗಳು ಮತ್ತು ತಾಂತ್ರಿಕ / ಕಂಪ್ಯೂಟರ್ ಪಾರಿಭಾಷಿಕ ಪದಗಳು.

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ವ್ಯವಹಾರಿಕ ಕನ್ನಡ ಪಠ್ಯ ಪುಸ್ತಕ (ಸಂವಹನಕ್ಕಾಗಿ ಕನ್ನಡ – Communication in Kannada) (Common to all branches)			
Course Code	19HU312	Semester	III / IV
Teaching Hours/Week (L:T:P)	0:2:0	CIE Marks	50

<b>Total Hours</b>	<b>26</b>	<b>SEE Marks</b>	<b>--</b>
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**Course Learning Objectives:**

The course will enable the students to understand Kannada and communicate in Kannada language.

**Chapter – 1 : Vyavaharika Kannada – Parichaya (Introduction to Vyavaharika Kannada)**

**Chapter – 2 : Kannada Aksharamale haagu uchcharane (Kannada Alpabets and Pronunciation)**

**Chapter – 3 : Sambhashanegaagi Kannada Padagalu (Kannada Vocabulary for Communication)**

**Chapter – 4 : Kannada Grammar in Conversations (Sambhashaneyalli Kannada Vyakarana)**

**Chapter – 5 : Activities in Kannada.**

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<b>LINEAR ALGEBRA AND PROBABILITY THEORY</b> (For CSE/ISE branches)			
<b>Course Code</b>	<b>19CS401/19IS401</b>	<b>CIE Marks</b>	<b>50</b>
<b>Teaching Hours/Week (L:T:P)</b>	<b>3:0:0</b>	<b>SEE Marks</b>	<b>50</b>
<b>Total Hours</b>	<b>39</b>	<b>Credits</b>	<b>03</b>

### **Prerequisites**

This subject requires the students to know about Matrices, Set theory, Basics of Probability.

### **Course Learning Objectives:**

**This Course will enable students to**

1. **Apply** the theory of matrices and vector spaces to solve various engineering problems.
2. **Understand** the notion of linear transformation, Gradient and Hessian of linear and quadratic function.
3. **Solve** problems using Bayes' theorem.
4. **Derive** the mean and variance of Binomial, Poisson and normal distributions.
5. **Find** marginal distribution and variance of two dimensional random variable.

### **UNIT - I**

#### **MATRIX & VECTOR SPACE**

Vector spaces, subspaces, bases and dimension, coordinates, row space, column space and null space. Review of Matrix Properties, Trace, Norms, Relation between trace and Eigen values of a matrix, Eigen values and Eigen vectors of symmetric matrices. Gradient, Hessian, Gradient and Hessian of linear and quadratic functions.

**15 Hours**

### **UNIT - II**

#### **LINEAR TRANSFORMATIONS**

Linear transformations, algebra of linear transformations, representation of transformations by matrices, isomorphism, Range and Null space of a linear transformation. Rank – nullity theorem. Inner products, orthogonal sets of projections, Gram-Schmidt's orthogonalization process. Least squares.

**9 Hours**

### **UNIT - III**

#### **PROBABILITY THEORY**

Finite sample space, conditional probability and independence, Bayes' theorem (overview). One dimensional random variable, pdf, cdf, expectation and variance. Two and higher dimensional random variables, joint pdf and marginal pdf.

**DISTRIBUTIONS:** Binomial, Poisson, normal and exponential distributions, simple problems.

**15 Hours**

### **Course Outcomes:**

Upon completion of this course, students will be able to:

1. **Find** trace, eigen values and eigen vectors of the given symmetric matrix. Realize the importance of the notions of basis and dimension in the study of vector spaces.
2. **Demonstrate** the concept of linear transformation as a linear function from one vector space to another. **obtain** the Gradient and Hessian of linear transformation.
3. **Classify** and **appreciate** probabilistic models for situations involving chance effect and

appreciate the concepts of pdf, cdf, random variables and its consequences.

**4. Illustrate** some of the important distributions of discrete random variables and continuous random variables.

**5. Apply** the concepts of distributions in real life situations.

### Graduate Attributes (GA)

This course will map the following GA as per NBA:

1. Engineering Knowledge
2. Problem Analysis
3. Life-long Learning

Table: Mapping of COs to PIs, POs and BTL			
Course Outcomes (COs)	Program Outcomes (POs) Addressed	Performance Indicators (PI)	Bloom's Taxonomy Level (BTL)
CO1	1,2	1.1.1, 2.1.2, 2.1.3, 2.4.1, 2.4.2	L2, L3
CO2	1,2	1.1.1, 2.1.2, 2.1.3, 2.4.1, 2.4.2	L2, L3
CO3	1,2	1.1.1, 2.1.3, 2.4.1, 2.4.2	L2, L3
CO4	1,2	1.1.2, 2.2.3, 2.4.4	L1, L2
CO5	1,2	1.1.2, 2.2.3, 2.4.4	L2, L3

Table: Mapping Levels of COs to POs												
COs	Program Outcomes (POs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	1										
CO2	3	2										
CO3	2	1										
CO4	1	2										
CO5	3	2										

**H: Substantial (High)**

**M: Moderate (Medium)**

**L: Poor (Low)**

### TEXTBOOKS:

1. B.S.Grewal, "Higher Engineering Mathematics" – 36<sup>th</sup> Edition.
2. P.L.Meyer, "Introduction of Probability and Statistical Applications", second edn. 1975, American Publishing.
3. David C Lay, "Linear Algebra and its applications", 3<sup>rd</sup> Edition, Person Education (Asia) Pvt. Ltd., 2005.
4. Seanean Dineen, "Multivariate Calculus and Geometry", 2<sup>nd</sup> edition, Springer

publications.

### REFERENCE BOOKS:

1. Hogg and Craig, "Introduction of Mathematical Statistics", 4<sup>th</sup> Edition 1975 McMillan.
2. J. Medhi, "Stochastic Process".
3. B. V. Ramana, "Higher Engineering Mathematics", Tata Mc Graw –Hill Ltd.

### SEE Question Paper Pattern:

There will be **8** questions of **20** marks each in the question paper divided into **3 Units** as per the syllabi & contact hours and the student will have to answer **5** full questions, selecting **1** full question from **Unit - II** and **2** full questions from **Unit –I & III**.

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DESIGN AND ANALYSIS OF ALGORITHMS			
Course Code	19IS402	CIE Marks	50
Teaching Hours/Week (L:T:P)	4:0:0:0	SEE Marks	50
Total Hours	52	Credits	04

### Course Learning Objectives:

This course will enable students to

1. **Explain** the requirements of an Algorithm.
2. **Identify** the basic real life problems and convert them into mathematical Models.
3. **Assess** the benefits of the various Cross linked used Techniques that are popular.
4. **Analyze** basic resource classification and how to utilize them effectively.
5. **Compare** different emerging new Classes of Algorithms and assess them effectively.

### UNIT - I

#### INTRODUCTION:

What is an Algorithm? , Fundamentals of Algorithmic Problem Solving, Important Problem Types, Fundamental Data Structures. (T1- 1.1, 1.2, 1.3, 1.4)

#### FUNDAMENTALS OF THE ANALYSIS OF ALGORITHM EFFICIENCY:

The Analysis Framework, Asymptotic Notations and Basic Efficiency Classes, Mathematical Analysis of Non-Recursive Algorithms, Mathematical Analysis of Recursive Algorithms, Computing of the nth Fibonacci Number. (T1 – 2.1, 2.2, 2.3, 2.4, 2.5)

**11 Hours**

### UNIT - II

#### BRUTE FORCE:

Selection Sort and Bubble Sort, Sequential Search and Brute-Force String Matching,

Exhaustive Search, Depth-First Search and Breadth-First Search. (T1 – 3.1, 3.2, 3.4, 3.5)

**DIVIDE AND CONQUER:**

Merge sort, Quick sort, Multiplication of large integers and Strassen's Matrix Multiplication (T1 – 5.1, 5.2, 5.4)

**10 Hours**

**UNIT - III**

**DECREASE AND CONQUER:**

Insertion Sort, Topological Sorting, Algorithms for Generating Combinatorial Objects – Generating Permutations, Generating Subsets. (T1 – 4.1, 4.2, 4.3)

**TRANSFORM AND CONQUER:**

Presorting – Element Uniqueness, Balanced Search Trees – AVL Trees, 2-3 Trees, Heaps and Heapsort. (T1 – 6.1(Element uniqueness), 6.3, 6.4)

**11 Hours**

**UNIT - IV**

**SPACE AND TIME TRADEOFFS:**

Sorting by Counting, Input Enhancement in String Matching – Horspool's algorithm and Boyer-Moore algorithm, Hashing – Open Hashing and Closed Hashing. (T1 – 7.1, 7.2, 7.3)

**DYNAMIC PROGRAMMING:**

The Knapsack Problem and Memory Functions, Warshall's and Floyd's Algorithms (T1 – 8.2, 8.4)

**11 Hours**

**UNIT - V**

**GREEDY TECHNIQUE:**

Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm, Huffman Trees and Codes. (T1 – 9.1, 9.2-(Kruskal's Algorithm), 9.3, 9.4)

**BACKTRACKING:**

n-Queens Problem, Subset-Sum problem (T1 – 12.1.1, 12.1.3)

**BRANCH AND BOUND:**

Assignment Problem, Knapsack Problem (T1 – 12.2.1, 12.2.2)

**9 hours**

**Course Outcome:**

Sl. No.	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C402.1	Explain the basics of algorithm design and analyze efficiency.	2
C402.2	Apply brute force and divide and conquer technique to solve a problem	3
C403.3	Make use of decrease and conquer, transform and conquer technique to solve a problem.	3
C404.4	Solve space and time tradeoffs and dynamic programming problems.	3
C405.5	Apply greedy technique, backtracking and branch and bound	3

	technique to solve a problem.	
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<b>Table: Mapping of COs to PIs, POs and BTL</b>			
<b>Course Outcomes (COs)</b>	<b>Program Outcomes (POs) Addressed</b>	<b>Performance Indicators (PI)</b>	<b>Bloom's Taxonomy Level (BTL)</b>
CO1	1,2	1.1,1.3,1.4,2.1.2,2.1.3,2.2.2,2.2.3,2.2.4,2.4.1	2
CO2	1,2	1.1,1.3,1.4,2.1.2,2.1.3,2.2.2,2.2.3,2.2.4,2.4.1	3
CO3	1,2	1.1,1.3,1.4,2.1.2,2.1.3,2.2.2,2.2.3,2.2.4,2.4.1	3
CO4	1,2	1.1,1.3,1.4,2.1.2,2.1.3,2.2.2,2.2.3,2.2.4,2.4.1	3
CO5	1,2	1.1,1.3,1.4,2.1.2,2.1.3,2.2.3,2.2.4,2.4.1	3

### **Mapping of POs & COs:**

<b>COs</b>	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PO 10</b>	<b>PO 11</b>	<b>PO 12</b>	<b>PSO 1</b>	<b>PSO 2</b>
C402.1	2	3								1		1	1	1
C402.2	2	3								1		1	2	2
C402.3	2	3								1		1	2	2
C402.4	2	3								1		1	3	2
C402.5	2	3								1		1	1	1

**(L/1 = Low 30%-49%, M/2 = Medium 50%-69%, H/3 = High >70%)**

### **TEXTBOOK:**

- 1) Introduction to The Design & Analysis of Algorithms, Anany Levitin, 3<sup>rd</sup> Edition, Pearson Education, 2011.

### **REFERENCES BOOKS:**

1. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, 2nd Edition, PHI, 2006.
2. Fundamentals of Computer Algorithms by Horowitz E., Sahni S., Rajasekaran S, Galgotia Publications, 2004.
3. Introduction to the Design and Analysis of Algorithms - A Strategic Approach, R.C.T. Lee, S.S. Tseng, R.C. Chang & Y. T. Tsai, TMH, 2005.

### **E-RESOURCES:**

<https://nptel.ac.in/courses/106/106/106106131/>

### **SEE Question Paper Pattern:**

There will be **10** questions of **20** marks each in the question paper divided into **5** units as

per the syllabi & contact hours and the student will have to answer **5** full questions, selecting **one full** question from **each** unit.

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JAVA PROGRAMMING			
Course Code	19IS403	CIE Marks	50
Teaching Hours/Week (L:T:P)	4:0:1	SEE Marks	50
Total Hours	52	Credits	4.5

### **Course Learning Objectives:**

#### **This Course will enable students:**

1. To understand the fundamental concepts of object orientation using Java and to utilize various types of constructors.
2. To understand the concept of code reusability using inheritance, purpose and creation of packages, implement interfaces and know the exception handling mechanisms in Java.
3. To understand how Java achieves concurrency through APIs and to know to work with Files.
4. To understand the architecture to store and manipulate the group of objects using a collection framework and to understand the benefits of generics.
5. To understand the importance of light-weight components and to know the fundamentals of event handling in JavaFX.

## **UNIT – I**

**Introduction to Java:** The History and Evolution of Java, An overview of Java, Data Types, Variables, and Arrays.

**Introducing Classes:** Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The this keyword, Garbage Collection, The finalize() method, A stack class. **Methods and Classes:** Overloading Methods, Overloading Constructors, Using objects as Parameters, Argument passing, Returning objects, Access control, Understanding static, final, Nested and Inner classes, Using Command-line arguments. **(T1: Ch:1 Ch: 2 Ch:3 Ch:6 Ch:7)**

**10 Hours**

## **UNIT – II**

**Inheritance:** Inheritance Basics, Using super, Creating a Multilevel Hierarchy, When Constructors are Called, Method Overriding, Dynamic method dispatch, Using abstract classes, Using final with Inheritance.

**Packages and Interfaces:** Packages, Access Protection, Importing Packages, Interfaces.

**Exception Handling:** Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions, Creating your Own Exception Subclasses. **(T1:**



**Ch:8 Ch: 9 Ch: 10)**

**12 Hours**

### **UNIT - III**

#### **Multithreaded Programming**

The Java Thread Model, The Main Thread, Creating a Thread, Creating Multiple Threads, Using `isAlive()` and `join()`, Thread Priorities, Synchronization, Interthread Communication, Suspending, Resuming, and Stopping Threads.

**Input/Output:** The Java I/O Classes and Interfaces, File, The Closeable and Flushable Interfaces, The Stream Classes, The Byte Streams: `InputStream`, `OutputStream`, `FileInputStream`, `FileOutputStream`; The Character Streams: `Reader`, `Writer`, `FileReader`, `FileWriter`. **(T1: Ch:11 Ch:19)**

**12 Hours**

### **UNIT – IV**

**The Collections Framework:** Collections Overview, Recent Changes to Collections, The Collection Interfaces: The Collection interface, The List interface, The Set interface; The Collection Classes: The `ArrayList` Class, The `LinkedList` Class, The `HashSet` Class, The `LinkedHashSet` class, The `TreeSet` class; Accessing a Collection via an Iterator, Storing User-Defined Classes in Collections, Working with Maps: The Map interfaces, The Map classes: The `HashMap` class, The `TreeMap` class, The `LinkedHashMap` class, Comparators.

**Generics:** What Are Generics?, A Simple Generics Example, A Generic Class with Two Type Parameters, Bounded Types, Using Wildcard Arguments. **(T1: Ch:17 Ch: 14)**

**10 Hours**

### **UNIT – V**

**Introducing JavaFX GUI Programming:** JavaFX Basic Concepts, The Application Class and the Life-cycle methods, Launching a JavaFX Application, A JavaFX Application Skeleton, Compiling and Running a JavaFX Program, The Application Thread, A Simple JavaFX Control: Label, Using Buttons and Events, Event Basics, Introducing the Button Control, Demonstrating Event Handling and the Button.

**Exploring JavaFX Controls:** Using Image and `ImageView`, Adding an Image to a Label, Using an Image with a Button, `ToggleButton`, `RadioButton`, `CheckBox`, `ComboBox`, `TextField`, `ScrollPane`. **(T2: Ch:34 Ch:35)**

**08 Hours**

#### **Self Study:**

**String Handling:** The String Constructors, String Length, Special String Operations, String Conversion and `toString()`, Character Extraction, String Comparison, Modifying a String, `StringBuffer`. **(T2: Ch:17)**

#### **Course Outcomes:**

Students will be able to:

Sl. No.	Course Outcome	Blooms Taxonomy Level
C403.1	Explain the concepts of class and objects to represent real	L2

	world entities.	
C403.2	Write programs using the concept of inheritance, interface ,exception handling mechanism to avoid abnormal termination of a program.	<b>L2</b>
C403.3	Make use of thread concepts and file operations for a given problem.	<b>L3</b>
C403.4	Apply collections framework and generics for a specific problem.	<b>L3</b>
C403.5	Develop GUI based applications using JavaFX.	<b>L4</b>

<b>Table: Mapping of COs to PIs, POs and BTL</b>			
<b>Course Outcomes (COs)</b>	<b>Program Outcomes (POs) Addressed</b>	<b>Performance Indicators (PI)</b>	<b>Bloom's Taxonomy Level (BTL)</b>
CO1	1,2	1.4.1,1.3.1,2.3.1	L2
CO2	1,2,3	1.4.1,1.3.1,2.1.1,2.1.2,2.2.4,3.1.1,3.2.1,3.2.2	L2
CO3	1,2,3	1.4.1,1.3.1,2.1.1,2.1.2,2.2.4,3.1.1,3.2.1,3.2.2	L3
CO4	1,2	1.4.1,1.3.1,2.3.1	L3
CO5	1,2,3	1.4.1,1.3.1,2.1.1,2.1.2,2.2.4,3.1.1,3.1.6,3.2.1,3.2.2	L4

#### **Mapping of POs & COs:-**

<b>POs/ COs</b>	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PO 10</b>	<b>PO 11</b>	<b>PO 12</b>	<b>PSO 1</b>	<b>PSO 2</b>
C403.1	2	2								1		1		
C403.2	2	2	2							1		1		
C403.3	2	2	2							1		1		
C403.4	2	2								1		1		
C403.5	2	2	2							1		1	2	3

**(L/1 = Low 30%-49%, M/2 = Medium 50%-69%, H/3 = High >70%)**

#### **TEXTBOOKS:**

1. Java™: The Complete Reference, Seventh Edition, Herbert Schildt, Tata McGraw Hill, 2007.
2. Java The Complete Reference, Tenth Edition, Herbert Schildt, Tata McGraw Hill, 2018.

#### **REFERENCE BOOKS:**

1. Y. Daniel Liang: Introduction to JAVA Programming, 7<sup>th</sup> Edition, Pearson Education, 2007.
2. E Balagurusamy, Programming with Java A primer, Tata McGraw Hill companies.

#### **E-RESOURCES**

1. [https://swayam.gov.in/nd1\\_noc19\\_cs84/preview](https://swayam.gov.in/nd1_noc19_cs84/preview) (Programming in Java), Swayam.
2. <https://www.udemy.com/course/java-programming-tutorial-for-beginners/>, Java Programming for Complete Beginners), Udemy.

### **SEE Question Paper Pattern:**

There will be **10** questions of **20** marks each in the question paper divided into **5** units as per the syllabi & contact hours and the student will have to answer **5** full questions, selecting **one full** question from **each** unit.

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<b>DATA COMMUNICATIONS</b>			
<b>Course Code</b>	<b>19IS404</b>	<b>CIE Marks</b>	<b>50</b>
<b>Teaching Hours/Week (L:T:P)</b>	<b>3:1:0</b>	<b>SEE Marks</b>	<b>50</b>
<b>Total Hours</b>	<b>39</b>	<b>Credits</b>	<b>3.5</b>

### **Course Learning Objectives:**

**This Course will enable students to**

1. Clearly analyze and understand the OSI reference model and TCP/IP protocol suite.
2. Try to highlight the difference between analog and digital transmission and its applications.
3. Explain the concepts of multiplexing, error detection and correction and transmission media.
4. Study the error detection code algorithms and flow control, error control and framing.
5. Explain about medium access control protocols and its working.

## **UNIT – I**

### **Introduction to data communications:**

**Communication Networks and Services:** Telegraph Networks and Message Switching, Telephone Networks and Circuit Switching, the Internet, Computer Networks and Packet Switching. **(T2: 1: 1.1.1-1.1.3)**

### **Applications and Layered Architectures:**

**The OSI Reference model:** The Seven-Layer OSI Reference Model, Unified view of Layers, Protocols, and Services. **(T2: 2.2: 2.2.1-2.2.2)**

### **Overview of TCP/IP Architecture:**

TCP/IP Architecture, TCP/IP Protocol, How the layer work together, Protocol Overview, Application Layer Protocols. **(T2: 2.3: 2.3.1-2.3.3, 2.5:2.5.1-2.5.5)**

### **Digital Transmission Fundamentals – I:**

Analog and Digital Data, Analog and Digital Signals, Periodic and Non-Periodic Signals, Periodic Analog Signals, Basics of Digital Signals and Digital Signals as composite signals, Transmission Impairment Data rate limits: Nyquist Bit rate and Shannon Channel Capacity, Performance **(T1: 3.1-3.6)**

**14 Hours**

## UNIT - II

**Digital Transmission:** Digital to digital Conversion, Line coding, Block coding, and Scrambling. Analog to digital Conversion: Pulse Code Modulation Delta Modulation. Transmission Modes: Parallel and Serial transmission. **(T1: 4.1-4.3)**

### **Digital Transmission Fundamentals – II:**

**Analog Transmission:** Digital to analog conversion, Amplitude shift keying, Frequency shift keying and phase shift keying. Quadrature Amplitude Shift keying. **(T1: 5.1: 5.1.1-5.1.5)**

### **Analog to analog conversion:**

Amplitude Modulation, Frequency Modulation, Phase Modulation. **(T1:5.2:5.2.1-5.2.3)**

**Transmission Media:** Twisted Pair, Coaxial Cable, Fiber Optic Cable, Radio waves, Microwaves, Infrared. **(T1:7.1-7.3)**

**Error Detection and Correction:** Introduction, Two dimensional Parity Checks, Internet Checksum, Polynomial codes, Standardized Polynomial codes, Error detecting Capability of a Polynomial Code, Linear codes, Error Correction. **(T2:3.9: 3.9.1-3.9.8)**

**15 Hours**

## UNIT - III

### **Multiplexing and Peer to Peer Protocols:**

**Multiplexing:** Frequency Division Multiplexing, Wavelength Division Multiplexing, Time Division Multiplexing, Framing, HDLC. **(T1:6.1.1-6.1.3, 11.1,11.3)**

**Data Control, Flow and Error Control:** Stop-and-Wait ARQ, Go-Back-N ARQ, Selective Repeat ARQ **(T1:11.5)**

### **Medium Access Control:**

**The Medium Access Protocols:** CSMA, CSMA-CD. Scheduling Approaches to Medium Access Control: Reservation Systems, Polling, Token Pass Ring. Channelization: FDMA, CDMA, and TDMA. **(T1:12.1-12.3)**

**10 Hours**

### **Course Outcomes:**

At the end of the course the student will be able to

Sl. No.	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C404.1	Illustrate communication networks, services, layered architectures and application layer protocols.	L2
C404.2	Make use of digital transmission fundamentals and solve data rate limit problems.	L3
C404.3	Apply analog to digital and digital to analog conversion techniques.	L3
C404.4	Explain transmission media and solve problems related to error detection and correction.	L3
C404.5	Illustrate the concept of multiplexing and medium access control protocols.	L2

<b>Table: Mapping of COs to PIs, POs and BTL</b>			
<b>Course Outcomes (COs)</b>	<b>Program Outcomes (POs) Addressed</b>	<b>Performance Indicators (PI)</b>	<b>Bloom's Taxonomy Level (BTL)</b>
CO1	1,2	1.1.1, 1.3.1, 1.4.1, 2.1.2, 2.1.3, 2.2.2	L2
CO2	1, 2	1.1.1, 1.3.1, 1.4.1, 2.1.2, 2.1.3, 2.2.2	L3
CO3	1, 2	1.1.1, 1.3.1, 1.4.1, 2.1.2, 2.1.3, 2.2.2, 2.2.4, 2.2.5	L3
CO4	1, 2	1.1.1, 1.3.1, 1.4.1, 2.1.2, 2.1.3, 2.2.2, 2.2.4, 2.2.5	L3
CO5	1, 2	1.1.1, 1.3.1, 1.4.1, 2.1.2, 2.1.3, 2.2.2	L2

#### **Mapping Course Outcomes with Programme Outcomes:**

<b>Cos</b>	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PO 10</b>	<b>PO 11</b>	<b>PO 12</b>	<b>PSO 1</b>	<b>PSO 2</b>
C404.1	2	2												1
C404.2	2	3												1
C404.3	2	3												2
C404.4	2	3												3
C404.5	1	3												1

**(L/1 = Low 30%-49%, M/2 = Medium 50%-69%, H/3 = High >70%)**

#### **TEXTBOOKS:**

1. Behrouz A. Forouzan, Data Communications and Networking, 5th Edition, 2012, Tata McGraw-Hill.
2. Alberto Leon Garcia and Indra Widjaja, Communication Networks -Fundamental Concepts and Key architectures, 2nd edition, 2004, Tata McGraw Hill.

#### **REFERENCE BOOKS:**

1. William Stallings, Data and Computer Communication, 8<sup>th</sup> Edition, Prentice Hall, India / Pearson Education.
2. William A. Shay, Understanding Data Communications and Networks, 3rd Edition, Thomson, 2003.
3. Godbole, Data Communications and Networks, Tata McGraw-Hill 2002.
4. Michael A. Gallo & William M. Handcock, Computer Communications and Networking Technologies, 2003 Edition.

#### **E-RESOURCE**

1. <http://nptel.ac.in/courses/106105082/>
2. <http://nptel.ac.in/courses/106108098/>

#### **SEE Question Paper Pattern:**

There will be **8** questions of **20** marks each in the question paper divided into **3 Units** as per the syllabi & contact hours and the student will have to answer **5** full questions, selecting **2** full questions from **Unit - I & Unit – II** and **1** full question from **Unit – III**.

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<b>DIGITAL SYSTEM DESIGN</b>			
<b>Course Code</b>	<b>19IS405</b>	<b>CIE Marks</b>	<b>50</b>
<b>Teaching Hours/Week (L:T:P)</b>	<b>4:0:0</b>	<b>SEE Marks</b>	<b>50</b>
<b>Total Hours</b>	<b>52</b>	<b>Credits</b>	<b>04</b>

### **Course Learning Objectives:**

1. Create logic circuits using basic gates such as AND, OR, NOT and universal logic gates such as NAND, NOR and Apply Boolean laws and theorems to simplify complex logic circuits.
2. Design and Build different types of Multiplexers, De-multiplexers and Decoders.
3. Interpret binary addition, subtraction, multiplication and division on binary numbers.
4. Design and analyze the operations of RS, D and JK flip-flops, Asynchronous, Synchronous and Modulo-N Counters.
5. Analyze different types of Digital Integrated Circuits and study DAC and ADC.

### **UNIT – I**

**Chapter 1: Digital Logic** The Basic Gates, Universal Logic Gates, AND-OR-Invert Gates, Positive and Negative Logic, Introduction to HDL. (T1: 2.1, 2.2, 2.3, 2.4, 2.5)

**Chapter 2: Combinational Logic Circuits** Boolean Laws and Theorems, Sum of Products Method, Truth Table to Karnaugh Map, Pairs, Quads, and Octets, Karnaugh simplifications, Don't Care Conditions, Product-of-sums method, Product-of-sums simplification, (T1: 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8) Simplification by Quine-McClusky Method, (T1: 3.11) HDL Implementation Models. (T1: 3.13)

**12 Hours**

### **UNIT - II**

**Chapter 3: Data-Processing Circuits** Multiplexers, Demultiplexers, 1-of-16 Decoder, BCD-to-Decimal Decoders, Seven-segment Decoders, Encoders, EX-OR gates, Parity Generators and Checkers, Magnitude Comparator, Read-Only-Memory, Programmable Array Logic, Programmable Logic Arrays, (T1: 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11, 4.12) HDL Implementation of Data Processing Circuits. (T1: 4.14)

**Chapter 4: Arithmetic Circuits** Binary Addition, Binary Subtraction, Unsigned Binary Numbers, Sign-Magnitude Numbers, (T1: 6.1, 6.2, 6.3, 6.4) 2's Complement Arithmetic, Arithmetic Building Blocks, The Adder-Subtractor, Fast Adder, Arithmetic Logic Unit, Binary Multiplication and Division, Arithmetic Circuits using HDL. (T1: 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12)

**11 Hours**

**UNIT - III**

**Chapter 5: Flip-Flops** RS Flip-flops, Gated Flip-flops, Edge-triggered RS, D, JK Flip-flops, (T1: 8.1, 8.2, 8.3, 8.4, 8.5) JK Master-slave Flip-flops, Switch Contact Bounce Circuits, Various Representations of Flip-flops, Analysis of Sequential Circuits, Conversion of Flip-flops – a synthesis example, HDL implementation of Flip-flop. (T1: 8.8, 8.9, 8.10, 8.11, 8.12, 8.13)

**10 Hours**

**UNIT - IV**

**Chapter 6: Registers** Types of Registers, Serial In – Serial Out, Serial In – Parallel Out, Parallel In-Serial Out, Parallel In – Parallel Out, (T1: 9.1, 9.2, 9.3, 9.4, 9.5) Applications of Shift Register, Register Implementation in HDL. (T1: 9.7, 9.8)

**Chapter 7: Counters** Asynchronous Counters, Decoding Gates, Synchronous Counters, Changing the Counter Modulus, Decade Counters, Presetable Counters, Counter Design as a Synthesis Problem, (T1: 10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 10.7) Counter Design Using HDL. (T1: 10.9)

**11 Hours**

**UNIT - V**

**Chapter 8: D/A Conversion and A/D Conversion** Variable Resistor Networks, Binary Ladders, D/A Converters, D/A Accuracy and Resolution, A/D Converter – Simultaneous Conversion, A/D Converter-Counter Method, Continuous A/D Conversion, A/D Techniques. (T1: 12.1, 12.2, 12.3, 12.4, 12.5, 12.6, 12.7, 12.8)

**8 Hours**

**Course Outcomes:**

At the end of the course the student will be able to

Sl. No.	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C405.1	Solve the boolean equations using boolean algebra, K-Map, QM methods.	3
C405.2	Model the circuit designs using data processing circuits and understand ALU operations.	3
C405.3	Illustrate the types of flipflops and its conversion.	2
C405.4	Construct counters and registers using flip flops.	3
C405.5	Interpret the Digital to Analog conversion and the IC concepts.	2

**Table: Mapping of COs to PIs, POs and BTL**

Course Outcomes (COs)	Program Outcomes (POs) Addressed	Performance Indicators (PI)	Bloom's Taxonomy Level (BTL)
CO1	1,2	1.1.1,1.3.1,1.4.1,2.2.3,2.4.1,2.4.2,2.4.4	3

CO2	1,2	1.1.1,1.3.1,1.4.1,2.2.2,2.4.1,2.4.2	3
CO3	1,2	1.1.1,1.3.1,1.4.1,2.4.2	2
CO4	1,2,	1.1.1,1.3.1,1.4.1,2.3.2,2.4.2	3
CO5	1	1.1.1,1.3.1,1.4.1	2

### **Mapping of POs & COs:**

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C405.1	2	2							1	1		1	1	1
C405.2	2	2							1	1		1	1	2
C405.3	1	2							1	1		1	1	1
C405.4	2	2							1	1		1	3	2
C405.5	3								1	1		1	1	1

**(1 = Low 30%-49%, 2 = Medium 50%-69%, 3 = High >70%)**

### **TEXTBOOK:**

1. Donald P Leach, Albert Paul Malvino & Gautham Saha , Digital Principles and Applications, , 8<sup>th</sup> Edition, TMH, 2006.

### **REFERENCE BOOKS:**

1. Charles H. Roth, Jr., Fundamentals of Logic Design, 5<sup>th</sup> Edition , Thomson Learning, 2004.
2. Ronald J Tocci, Neal S. Widmer, Gregory L Moss, Digital Systems Principles and Applications, 10<sup>th</sup> Edition, PHI/Pearson Education, 2007.

### **E-RESOURCE**

- <https://nptel.ac.in/courses/117105080/>
- <https://www.coursera.org/learn/digital-systems>

### **SEE Question Paper Pattern:**

There will be **10** questions of **20** marks each in the question paper divided into **5** units as per the syllabi & contact hours and the student will have to answer **5** full questions, selecting **one full** question from **each** unit.

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<b>DESIGN AND ANALYSIS OF ALGORITHMS LAB</b>			
<b>Course Code</b>	<b>19IS408</b>	<b>CIE Marks</b>	<b>50</b>
<b>Teaching Hours/Week (L:T:P)</b>	<b>0:0:2:0</b>	<b>SEE Marks</b>	<b>50</b>
<b>Total Hours</b>	<b>26</b>	<b>Credits</b>	<b>01</b>



## **COURSE LEARNING OBJECTIVES**

### **This Course will enable students to**

- 1 Familiarize with the Brute force and/or Divide & Conquer algorithm design techniques using appropriate modern engineering and IT tools/programming languages. Demonstrate the performance of an algorithm in terms of time complexity.
- 2 Apply the Decrease and Conquer and/or Transform and Conquer algorithm design techniques using appropriate modern engineering and IT tools/programming languages.
- 3 Choose the appropriate data structures in designing the dynamic programming-based algorithms for complex engineering problems. Implement these algorithms and analyze their performance.
- 4 Understand the greedy algorithm-based and Backtracking techniques and study the various types of algorithms of the same problem and analyze their performance
- 5 Design and implement own algorithm based on the need.

## **COURSE CONTENT**

### **Week- 1**

1	Analyse efficiency of recursive and non-recursive algorithms.
2	Apply Divide and Conquer strategy to implement Binary Search algorithm to search an element in a given array.

### **Week- 2**

3	Plan and implement to sort a given set of $n$ integer elements using Merge Sort method and compute its time complexity. Run the program for varied values of $n > 5000$ , and record the time taken to sort. Plot a graph of the time taken versus $n$ on graph sheet. The elements can be read from a file or can be generated using the random number generator. Demonstrate this algorithm using Divide-and-Conquer method.
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### **Week – 3**

4	Implement to sort a given set of elements using the Quicksort method and determine the time required to sort the elements. Repeat the experiment for different values of $n$ , the number of elements in the list to be sorted and plot a graph of the time taken versus $n$ . The elements can be read from a file or can be generated using the random number generator. Demonstrate this algorithm using Divide-and-Conquer method.
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### **Week – 4**

5	Implement to sort a given set of elements using the Insertion Sort method and
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	determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted. The elements can be read from a file or can be generated using the random number generator.
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#### **Week – 5**

6	Incorporate the array data structure and demonstrate whether a given unweighted graph is connected or not using DFS method.
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#### **Week – 6**

7	Implement the graph traversal technique using BFS method to print all the nodes reachable from a given starting node in an unweighted graph.
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#### **Week – 7**

8	Implement Horspool's String Matching algorithm.
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#### **Week -8**

9	Compute the Transitive Closure for a given directed graph using Warshall's algorithm.
10	For a given weighted graph, construct an All-Pairs Shortest Paths problem using Floyd's algorithm and implement this algorithm to find the shortest distance and their shortest paths for every pair of vertices.

#### **Week – 9**

11	Implement 0/1 Knapsack problem using Dynamic Programming Memory Functions technique
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#### **Week – 10**

12	Find Minimum Cost Spanning Tree for a given weighted graph using Prim's algorithm.
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#### **Week -11**

13	Find Minimum Cost Spanning Tree for a given weighted graph using Kruskal's algorithm.
14	From a given vertex in a weighted connected graph, determine the Single Source Shortest Paths using Dijkstra's algorithm.

#### **Week -12**

15	Implement N-Queens problem using Backtracking technique.
16	Case Study

#### **Week -13**

<b>Mid Semester Examination</b>	
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## COURSE OUTCOMES

At the end of the course the student will be able to

Sl. No.	Course Outcome (CO)	PI	Bloom's Taxonomy Level (BTL)
C408.1	Implement the Brute force and/or Divide & Conquer algorithm design techniques using appropriate modern engineering and IT tools/programming languages. Demonstrate the performance of an algorithm in terms of time complexity.	4.1.2, 4.3.3, 5.2.2	L3
C408.2	Design and implement the Decrease and Conquer and/or Transform and Conquer algorithm design techniques using appropriate modern engineering and IT tools/programming languages.	4.1.2, 5.2.2	L4
C408.3	Choose the appropriate data structures in designing the dynamic programming-based algorithms for complex engineering problems. Implement these algorithms and analyze their performance.	4.1.2, 5.2.2	L3
C408.4	Develop and implement the greedy algorithm-based and Backtracking techniques and study the various types of algorithms of the same problem and analyze their performance.	4.1.2, 5.2.2	L3
C408.5	Design and implement own algorithm based on the need.	4.2.1, 5.2.2	L4

### Mapping of POs & COs:

POs / Cos	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C408.1				1	2									
C408.2				1	2								1	
C408.3				1	2								1	2
C408.4				1	2								1	
C408.5				1	2								1	2

(L = 1: 30%-49%, M = 2: 50%-69%, H = 3: >70%)

**TEXTBOOK:**

1. Introduction to the Design & Analysis of Algorithms, Anany Levitin, 2nd Edition, Pearson Education, 2007.

**REFERENCES:**

- 1 Introduction to Algorithms , Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein, 2nd Edition, PHI, 2006.
- 2 Computer Algorithms by Horowitz E., Sahni S., Rajasekaran S, Galgotia Publications, 2001
- 3 Introduction to the Design and Analysis of Algorithms A Strategic Approach, R.C.T. Lee, S.S. Tseng, R.C. Chang &Y.T.Tsai, TMH, 2005.

**E-RESOURCES:**

1. <https://nptel.ac.in/courses/106/106/106106131/>

**Note: In the examination, each student will pick one full question from a lot of 15 questions.**

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DIGITAL DESIGN LAB			
Course Code	19IS409	CIE Marks	50
Teaching Hours/Week (L:T:P)	0:0:2:0	SEE Marks	50
Total Hours	26	Credits	01

Introduction to the Lab

**Prerequisites**

Knowledge in basic electronics is required.

**Course Learning Objectives:****This Course will enable students to**

1. Create logic circuits using basic gates such as AND, OR, NOT and universal logic gates such as NAND, NOR and Apply Boolean laws and theorems to simplify complex logic circuits.
2. Design and Build different types of Multiplexers, De-multiplexers and Decoders.
3. Set up and verify the circuit for binary addition, subtraction using different ICs..
4. Design and analyze the operations of RS, D and JK flip-flops, Asynchronous, Synchronous and Modulo-N Counters.
5. Write a code in Hardware Definition Language (HDL) for different digital circuits and analyze the simulation.

<b>Week 1</b>
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<b>Logic gates, Boolean laws</b>
1. Simplification and Realization of Basic/Universal gates. 2. Realization of Boolean Laws.
<b>Week 2</b> <b>Half adder and Full adder</b>
1. Realization of half and full Adder using basic gates. 2. Realization of half and full adder using only NAND gates.
<b>Week 3</b> <b>4:1 Multiplexer</b>
1. Design and implementation of Full Adder using 4:1 multiplexer (IC 74153). 2. Design and implementation of 8:1 Multiplexer (MUX) using only 4:1 Multiplexer. (74153)
<b>Week 4</b> <b>8:1 Multiplexer</b>
1. Given any four variable logic expression, simplify using Entered Variable Map and realize the simplified logic expression using 8:1 multiplexer IC.
<b>Week 5</b> <b>3:8 Decoder</b>
1. Design and implementation of a Full adder and a Full Subtractor using 3:8 decoder and 4 input NAND gates.
<b>Week 6</b> <b>Comparator and 7 segment display using decoder</b>
1. Design 1-bit, 2 bit and 4-bit Comparators circuit. 2. Use decoder chip to drive LED display. (7447 & 7-segment LED display).
<b>Week 7</b> <b>Flip-flops</b>
1. Design and implementation of S-R & JK flip flop using Nor & NAND gates respectively. 2. Design and implementation of D & T flipflop.
<b>Week 8</b> <b>Ripple counter/Asynchronous counter</b>
1. Design and implementation of 3-bit ripple up counter and down counter.
<b>Week 9</b> <b>Synchronous counter</b>
1. Design and implementation of a Mod-N ( $N < 8$ ) Synchronous up counter using J-K flip flop ICs.
<b>Week 10</b> <b>Shift registers</b>
1. Design and implementation of the following using 4-bit shift register a. Ring counter b. Johnson counter
<b>Week 11</b> <b>Simulation</b>
1. Simulation of Basic Gates. 2. Simulation of half adder and full adder.



C409.4	3			2										
C409.5	3			2										

**(1 = Low 30%-49%, 2 = Medium 50%-69%, 3 = High >70%)**

### TEXTBOOK

1. Donald P Leach, Albert Paul Malvino & Gautham Saha , Digital Principles and Applications, , 6<sup>th</sup> Edition, TMH, 2006.

### REFERENCE BOOKS

1. Charles H. Roth, Jr., Fundamentals of Logic Design, 5<sup>th</sup> Edition , Thomson Learning, 2004.
2. Ronald J Tocci, Neal S. Widmer, Gregory L Moss, Digital Systems Principles and Applications, 10<sup>th</sup> Edition, PHI/Pearson Education, 2007.

### E-Resources

<http://cse15-iiith.vlabs.ac.in>

**Note: In the examination, each student will pick one full question from a lot of 15 questions.**

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JAVA PROGRAMMING LAB			
Course Code	19IS410	CIE Marks	50
Teaching Hours/Week (L:T:P)	0:0:2:0	SEE Marks	50
Total Hours	26	Credits	01

### Course Learning Objectives:

#### This Course will enable students:

1. To understand the concept of code reusability using inheritance, purpose and creation of packages, implement interfaces and know the exception handling mechanisms in Java.
2. To identify how to create threads and apply concurrency theory in programming
3. To describe how to read and write files from within a Java application.
4. To describe how to use sets, maps, and lists in Java programming.
5. To design and implement Java applications and to understand the fundamentals of event handling in JavaFX.

### Course Content:

#### Sample Program List

##### Part A

##### Week -1

1a.	Define a class called Customer that holds private fields for a customer ID number,
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	name, and credit limit. Include appropriate constructors to initialize the instance variables of the Customer class. Write a main() method that declares an array of 5 customer objects. Prompt the user for values for each Customer, and display all 5 Customer objects.
b.	<p>Define a class to represent a <b>Bank Account</b>. Include the following members.</p> <p>Data Members:</p> <ol style="list-style-type: none"> <li>1. Name of the depositor</li> <li>2. Account number</li> <li>3. Type of account</li> <li>4. Balance amount in the account</li> <li>5. Rate of interest (static data)</li> </ol> <p>Provide a default constructor and parameterized constructor to this class. Also provide methods:</p> <ol style="list-style-type: none"> <li>1. To deposit amount</li> <li>2. To withdraw amount after checking for minimum balance</li> <li>3. To display all the details of an account holder</li> <li>4. Display rate of interest (a static method)</li> </ol> <p>Illustrate all the constructors as well as all the methods by defining objects.</p>
<b>Week -2</b>	
2a.	Create a class called Counter that contains a static data member to count the number of Counter objects being created. Also, define a static member function called showCount() which displays the number of objects created at any given point of time.
b.	Design a super class called Staff with details as StaffID, Name, Phone, Salary. Extend this class by writing three subclasses namely Teaching (domain, publications), Technical (skills), and Contract (period). Write a Java program to read and display at least 3 staff objects of all three categories.
<b>Week -3</b>	
3a.	Define a base class called Student with the following two fields: Name, ID. Derive two classes called Sports and Exam from the Student base class. Class Sports has a field called s_grade and class Exam has a field called e_grade which are integer fields. Derive a class called Results which inherit from Sports and Exam. This class has a character array or string field to represent the final result. Also, it has a method called display which can be used to display the final result. Illustrate the usage of these classes in ain method.
<b>Week -4</b>	
b.	Write a Java program to create an abstract class named Shape that contains two integers and an empty method named printArea(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contain only the method printArea( ) that prints the area of the given shape.
4a.	Write a Java program to implement the concept of importing classes from user defined package and creating packages (Use access modifiers to demonstrate the



	concept of packages).
<b>Week -5</b>	
b.	Design a Stack class. Provide your own stack exceptions namely Push Exception and Pop Exception, which throw exceptions when the stack is full and when the stack is empty respectively. Show the usage of these exceptions in handling a stack object in the main method.
<b>Week -6</b>	
5a.	Create a class Phone {String brand, int memCapacity}, which contains an interface Callable {makeAudioCall(String cellNum), makeVideoCall(String cellNum)}. Create subclasses BasicPhone and SmartPhone and implement the methods appropriately. Demonstrate the creation of both subclass objects by calling appropriate constructors which accepts value from the user. Using these objects call the methods of the interface.
<b>Week -7</b>	
b.	Write a Java program that implements a multi-thread application that has three threads. First thread generates a random integer for every 1 second; second thread computes the square of the number and prints; third thread will print the value of cube of the number. (Create the threads by extending Thread class and implementing Runnable interface).
6a.	Write a Java program to copy contents of input.txt to output.txt using byte stream class and character stream classes.
<b>Week -8</b>	
b.	Write a Java program to illustrate the concept of inter thread communication.
<b>Week -9</b>	
7a.	Write a JavaFX application program that handles the event generated by Button control.
<b>Week -10</b>	
b.	Write a Java program to demonstrate positional access operations, search operations, subList operations on List interface.
8a.	Design a simple calculator to show the working for simple arithmetic operations using Java FX. Use GridLayout to design the layout.
<b>Week -11</b>	
b.	Write a Java program to illustrate the concept of HashMap, TreeMap, and LinkedHashMap.
	Introduction to Project Development process
<b>Week -12</b>	
<b>Part B</b>	
Design and implement a Java application using JavaFX for a given problem scenario.	
<b>Week -13</b>	
<b>Mid Semester Examination</b>	

**Note:** Programs can be added or modified based on the syllabus prescribed.

**Course Outcomes:**

Students will be able to:

Sl. No.	Course Outcome	PI	Blooms Taxonomy Level
C410.1	Apply the principles of object-oriented programming for a specific problem.	1.3.1,1.4.1,2.4.4, 3.2.2,4.1.3	L3
C410.2	Design user-defined classes with thread capability and understand the concurrent issues in thread programming	1.3.1,1.4.1,2.4.4, 3.2.2,3.4.2,4.1.3	L3
C410.3	Apply byte streams and character streams for file management	1.3.1,1.4.1,2.4.4, 3.2.2,3.4.2,4.1.3	L3
C410.4	Write programs using the Java Collection API	1.3.1,1.4.1,2.4.4, 3.2.2,3.4.2,4.1.3	L2
C410.5	Develop rich user-interface applications using modern API's such as JavaFX.	1.3.1,1.4.1,2.1.2,2.3.1, 2.4.4,3.2.2,3.4.2, 4.2.1,4.3.1,5.1.1,5.1.2	L4

**Mapping of POs & COs:-**

POs/ COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C410.1	2	2	2	2										
C410.2	2	2	2	2										
C410.3	2	2	2	2										
C410.4	2	2	2	2										
C410.5	2	2	2	2	2								2	3

(L/1 = Low 30%-49%, M/2 = Medium 50%-69%, H/3 = High >70%)

**TEXTBOOK:**

1. Java™: The Complete Reference, Seventh Edition, Herbert Schildt, Tata McGraw Hill, 2007.
2. Java The Complete Reference, Tenth Edition, Herbert Schildt, Tata McGraw Hill, 2018.

**REFERENCE BOOKS:**

1. Y. Daniel Liang: Introduction to JAVA Programming, 7<sup>th</sup> Edition, Pearson Education, 2007.
2. E Balagurusamy, Programming with Java A primer, Tata McGraw Hill companies.

**E-RESOURCES**

1. [https://swayam.gov.in/nd1\\_noc19\\_cs84/preview](https://swayam.gov.in/nd1_noc19_cs84/preview), Programming in Java, (Swayam).

2. <https://www.udemy.com/course/java-programming-tutorial-for-beginners/>, Java Programming for Complete Beginners, (Udemy).

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<b>ಆಡಳಿತ ಕನ್ನಡ ಪಠ್ಯ ಪುಸ್ತಕ</b> (ಕನ್ನಡಿಗರಿಗಾಗಿ – for Kannadigas – Common to all branches)			
<b>Course Code</b>	<b>19HU312</b>	<b>Semester</b>	<b>III / IV</b>
<b>Teaching Hours/Week (L:T:P)</b>	<b>0:2:0</b>	<b>CIE Marks</b>	<b>50</b>
<b>Total Hours</b>	<b>26</b>	<b>SEE Marks</b>	<b>--</b>

ಆಡಳಿತ ಕನ್ನಡ ಭಾಷಾ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು.

- ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದ ಆಡಳಿತ ಕನ್ನಡದ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.
- ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಕನ್ನಡ ಭಾಷೆಯ ವ್ಯಾಕರಣದ ಬಗ್ಗೆ ಅರಿವು ಮೂಡಿಸುವುದು.
- ಕನ್ನಡ ಭಾಷಾ ರಚನೆಯಲ್ಲಿನ ನಿಯಮಗಳು ಮತ್ತು ಕನ್ನಡ ಭಾಷಾ ಬರಹದಲ್ಲಿ ಕಂಡುಬರುವ ದೋಷಗಳು ಹಾಗೂ ಲೇಖನ ಚಿಹ್ನೆಗಳನ್ನು ಪರಿಚಯಿಸುವುದು.
- ಸಾಮಾನ್ಯ ಅರ್ಜಿಗಳು, ಸರ್ಕಾರಿ ಮತ್ತು ಅರೆ ಸರ್ಕಾರಿ ಪತ್ರವ್ಯವಹಾರದ ಬಗ್ಗೆ ಅರಿವು ಮೂಡಿಸುವುದು.
- ಭಾಷಾಂತರ ಮತ್ತು ಪ್ರಬಂಧ ರಚನೆ ಬಗ್ಗೆ ಆಸಕ್ತಿ ಮೂಡಿಸುವುದು.
- ಕನ್ನಡ ಭಾಷಾಭ್ಯಾಸ ಮತ್ತು ಸಾಮಾನ್ಯ ಕನ್ನಡ ಹಾಗೂ ಆಡಳಿತ ಕನ್ನಡದ ಪದಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.

## ಪರಿವಿಡಿ

- ಅಧ್ಯಾಯ- 1 ಕನ್ನಡಭಾಷೆ - ಸಂಕ್ಷಿಪ್ತ ವಿವರಣೆ.
- ಅಧ್ಯಾಯ- 2 ಭಾಷಾ ಪ್ರಯೋಗದಲ್ಲಾಗುವ ಲೋಪದೋಷಗಳು ಮತ್ತು ಅವುಗಳ ನಿವಾರಣೆ.
- ಅಧ್ಯಾಯ- 3 ಲೇಖನ ಚಿಹ್ನೆಗಳು ಮತ್ತು ಅವುಗಳ ಉಪಯೋಗ.
- ಅಧ್ಯಾಯ- 4 ಪತ್ರ ವ್ಯವಹಾರ.
- ಅಧ್ಯಾಯ- 5 ಆಡಳಿತ ಪತ್ರಗಳು.
- ಅಧ್ಯಾಯ- 6 ಸರ್ಕಾರದ ಆದೇಶ ಪತ್ರಗಳು.
- ಅಧ್ಯಾಯ- 7 ಸಂಕ್ಷಿಪ್ತ ಪ್ರಬಂಧ ರಚನೆ (ಪ್ರಿಂಸೈಸ್ ರೈಟಿಂಗ್), ಪ್ರಬಂಧ ಮತ್ತು ಭಾಷಾಂತರ.

- ಅಧ್ಯಾಯ- 8 ಕನ್ನಡ ಶಬ್ದಸಂಗ್ರಹ.  
ಅಧ್ಯಾಯ- 9 ಕಂಪ್ಯೂಟರ್ ಹಾಗೂ ಮಾಹಿತಿ ತಂತ್ರಜ್ಞಾನ.  
ಅಧ್ಯಾಯ- 10 ಪಾರಿಭಾಷಿಕ ಆಡಳಿತ ಕನ್ನಡ ಪದಗಳು ಮತ್ತು ತಾಂತ್ರಿಕ / ಕಂಪ್ಯೂಟರ್  
ಪಾರಿಭಾಷಿಕ ಪದಗಳು.

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ವ್ಯವಹಾರಿಕ ಕನ್ನಡ ಪಠ್ಯ ಪುಸ್ತಕ (ಸಂವಹನಕ್ಕಾಗಿ ಕನ್ನಡ – Communication in Kannada) (Common to all branches)			
Course Code	19HU312	Semester	III / IV
Teaching Hours/Week (L:T:P)	0:2:0	CIE Marks	50
Total Hours	26	SEE Marks	--

**Course Learning Objectives:**

The course will enable the students to understand Kannada and communicate in Kannada language.

**Chapter – 1 : Vyavaharika Kannada – Parichaya (Introduction to Vyavaharika Kannada)**

**Chapter – 2 : Kannada Aksharamale haagu uchcharane (Kannada Alpabets and Pronunciation)**

**Chapter – 3 : Sambhashanegaagi Kannada Padagalu (Kannada Vocabulary for Communication)**

**Chapter – 4 : Kannada Grammar in Conversations (Sambhashaneyalli Kannada Vyakarana)**

**Chapter – 5 : Activities in Kannada.**

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