BACHELOR OF TECHNOLOGY
COMPUTER SCIENCE AND ENGINEERING
(Accredited by NBA)

ACADEMIC REGULATIONS
COURSE STRUCTURE (VCE-R18)
(Accredited

CHOICE BASED CREDIT SYSTEM

B. Tech. - Regular Four Year Degree Program
(For batches admitted from the Academic Year 2018 - 2019)

&

B. Tech. - Lateral Entry Scheme
(For batches admitted from the Academic Year 2019 - 2020)
PRELIMINARY DEFINITIONS AND NOMENCLATURES

- “Autonomous Institution / College” means an institution / college designated as autonomous institute / college by University Grants Commission (UGC), as per the UGC Autonomous College Statutes.

- “Academic Autonomy” means freedom to a College in all aspects of conducting its academic programs, granted by the University for promoting excellence.

- “Commission” means University Grants Commission.

- “AICTE” means All India Council for Technical Education.

- “University” means Jawaharlal Nehru Technological University Hyderabad.

- “College” means VARDHAMAN COLLEGE OF ENGINEERING, Hyderabad unless indicated otherwise by the context.

- “Program” means:
  - Bachelor of Technology (B. Tech.) Degree program
  - UG Degree Program: B. Tech.

- “Branch” means specialization in a program like B. Tech. Degree program in Civil Engineering, B. Tech. Degree program in Computer Science and Engineering etc.

- “Course” or “Subject” means a theory or practical subject, identified by its course-number and course-title, which is normally studied in a semester. For example, A4001:Linear Algebra and Ordinary Differential Equations, A4501:Programming for Problem Solving, etc. The description of allocation of course code is mentioned in the table 1.

**Table1: Course Code Description**

<table>
<thead>
<tr>
<th>First Digit</th>
<th>Second Digit</th>
<th>Third Digit</th>
<th>Fourth and Fifth Digits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicates Program</td>
<td>Indicates Regulation</td>
<td>Indicates Department</td>
<td>Indicates Course Number</td>
</tr>
<tr>
<td>A : B. Tech.</td>
<td>1: R11</td>
<td>0: H&amp;S/MBA</td>
<td>01</td>
</tr>
<tr>
<td>B : M. Tech.</td>
<td>2: R14</td>
<td>1: Civil</td>
<td>02</td>
</tr>
<tr>
<td>C : MBA</td>
<td>3: R15</td>
<td>2: EEE</td>
<td>..</td>
</tr>
<tr>
<td></td>
<td>4: R18</td>
<td>3: MECH</td>
<td>..</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4: ECE</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5: CSE</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6: IT</td>
<td></td>
</tr>
</tbody>
</table>

- T – Tutorial, P – Practical, D – Drawing, L - Theory, C - Credits
FOREWORD

The autonomy conferred on VARDHAMAN COLLEGE OF ENGINEERING by UGC based on its performance as well as future commitment and competency to impart quality education. It is a mark of its ability to function independently in accordance with the norms set by the monitoring bodies like UGC and AICTE. It reflects the confidence of the UGC in the autonomous institution to uphold and maintain standards it expects to deliver on its own behalf and thus awards Degrees on behalf of the college. Thus, an autonomous institution is given the freedom to have its own curriculum, examination system and monitoring mechanism, independent of the affiliating University but under its observance.

VARDHAMAN COLLEGE OF ENGINEERING is proud to win the credence of all the above bodies monitoring the quality in education and has gladly accepted the responsibility of sustaining, if not improving upon the standards and ethics for which it has been striving for more than a decade in reaching its present standing in the arena of contemporary technical education. As a follow up, statutory bodies like Academic Council and Board of Studies are constituted under the guidance of the Governing Body of the College and recommendations of the JNTUH to frame the regulations, course structure and syllabi under autonomous status.

The autonomous regulations, course structure and syllabi have been prepared after a prolonged and detailed interaction with several expertise solicited from academics, industry and research, in accordance with the vision and mission of the college in order to produce quality engineering graduates for the society.

All the faculty, parents and students are requested to go through all the rules and regulations carefully. Any clarifications, if needed, are to be sought, at appropriate time and with principal of the college, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The cooperation of all the stake holders is sought for the successful implementation of the autonomous system in the larger interests of the college and brighter prospects of engineering graduates.

PRINCIPAL
Vision:
To be a pioneer institute and leader in engineering education to address societal needs through education and practice.

Mission:
- To adopt innovative student centric learning methods.
- To enhance professional and entrepreneurial skills through industry institute interaction.
- To train the students to meet dynamic needs of the society.
- To promote research and continuing education.

Quality Policy:
We at VARDHAMAN COLLEGE OF ENGINEERING, endeavour to uphold excellence in all spheres by adopting best practices in effort and effect.
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Department Vision:

To be a leading source of competent computer engineers, meeting the needs of industry and society at large.

Department Mission:

- Facilitate learning in advanced technologies adopting innovative methods
- Associate continuously with industry, with focus on curriculum design and implementation.
- Promote Research and Development through Special Interest Groups (SIGs)
- Provide platform for harnessing entrepreneurial and leadership qualities.

Program Educational Objectives (PEOs)

PEO1: Graduate will establish himself/herself as effective professionals by solving real world problems using investigative and analytical skills along with the knowledge acquired in the field of Computer Science and Engineering.

PEO2: Graduate will demonstrate his/her ability to adapt to rapidly changing environment in advanced areas of Computer Science and scale new height in their profession through lifelong learning.

PEO3: Graduate will prove his/her ability to work and communicate effectively as a team member and/or leader to complete the task with minimal resources, meeting deadlines.

PEO4: Graduate will embrace professional code of ethics in the profession while deliberately being part of projects which contributes to the society at large without disturbing the ecological balance.

Program Outcomes (POs):

PO1: Engineering Knowledge: Apply knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

PO3: Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet specified needs with appropriate consideration for the public health and safety, and cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.

PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The Engineer and Society: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.

PO7: Environment and Sustainability: Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multi-disciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project Management and Finance: Demonstrate knowledge and understanding of engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

PSO1: To collect requirements, analyze, design, implement and test software Systems.

PSO2: To analyze the errors and debug them within minimal time.
1. **APPLICABILITY**
   All the rules specified herein, approved by the Academic Council, will be in force and applicable to students admitted from the academic year 2018-2019 onwards.

2. **EXTENT**
   All the rules and regulations, specified hereafter shall be read as a whole for the purpose of interpretation and as and when a doubt arises, the interpretation of the Chairman of Academic Council is final. As per the requirements of statutory bodies, Principal, VARDHAMAN COLLEGE OF ENGINEERING shall be the Chairman of the Academic Council.

3. **ADMISSION**

   **3.1. Admission into First year of Four Year B. Tech. Degree Program of study in Engineering:**

   **3.1.1. Eligibility:**
   A student seeking admission into the first year of four-year B. Tech. Degree Program should have

   (i) Passed either Intermediate Public Examination (I.P.E) conducted by the Board of Intermediate Education, Telangana, with Mathematics, Physics and Chemistry as optional subjects or any equivalent examination recognized by Board of Intermediate Education, Telangana or a Diploma in Engineering in the relevant branch conducted by the Board of Technical Education, Telangana or equivalent Diploma recognized by Board of Technical Education for admission as per the guidelines of Telangana State Council for Higher Education (TSCHE).

   (ii) Secured a rank in the EAMCET examination conducted by TSCH for allotment of a seat by the Convener, EAMCET, for admission into the program offered by the Institution.

   **3.1.2. Admission Procedure:**
   Admissions are made into the first year of four-year B.Tech. Degree Program as per the stipulations of TSCHE.

   (a) Category A seats are filled by the Convener, EAMCET.

   (b) Category B seats are filled by the Management.

   **3.2. Admission into the Second year of Four Year B. Tech. Degree Program in Engineering**

   **3.2.1. Eligibility:**
   A student seeking admission under lateral entry into the II year I semester B. Tech. Degree Program should have passed the qualifying exam (B.Sc. Mathematics & Diploma holders),
based on the rank secured by the student at Engineering Common Entrance Test (FDH) in accordance with the instructions received from the Convener, ECET and Government of Telangana.

3.2.2. Admission Procedure:
Admissions are made into the II year of four-year B. Tech degree Program through Convener, ECET (FDH) 20% against the sanctioned strength in each Program of study under lateral entry scheme.

4. PROGRAMS OFFERED

VARDHAMAN COLLEGE OF ENGINEERING, an autonomous college affiliated to JNTUH, offers the following B. Tech Programs of study leading to the award of B. Tech. Degree under the autonomous status.

1) B. Tech. - Civil Engineering
2) B. Tech. - Electrical and Electronics Engineering
3) B. Tech. - Mechanical Engineering
4) B. Tech. - Electronics and Communication Engineering
5) B. Tech. - Computer Science and Engineering
6) B. Tech. - Information Technology

5. MEDIUM OF INSTRUCTION

The medium of instruction is English for all the courses.

6. DURATION OF THE PROGRAMS

6.1. Minimum Duration

6.1.1. B. Tech. Degree program duration is for a period of minimum four academic years leading to the Degree of Bachelor of Technology (B.Tech.) of the Jawaharlal Nehru Technological University Hyderabad.

6.1.2. For students admitted under lateral entry scheme, B. Tech. Degree program duration is for a period of minimum three academic years leading to the Degree of Bachelor of Technology (B.Tech.) of the Jawaharlal Nehru Technological University Hyderabad (JNTUH).

6.2. Maximum Duration

6.2.1. The maximum period within which a student must complete a full-time academic program is eight academic years for B. Tech. If a student fails to complete the program within the maximum duration as specified above, student will forfeit the seat.

6.2.2. For students admitted under lateral entry scheme the maximum duration is six academic years. If a student fails to complete the program within the maximum duration as specified above, student will forfeit the seat.

6.2.3. The period is calculated from the academic year in which the student is admitted for the first time into the B. Tech. Degree Program.

7. SEMESTER STRUCTURE

The College follows semester system. An academic year consists of first semester, second semester and the summer term follows in sequence. The duration of each semester shall be of 23 weeks spell which includes time for course work, preparation and examinations. Each semester shall have a minimum of 90 instructional days.

Each semester has Continuous Internal Evaluation(CIE) and Semester End Examination(SEE). Choice Based Credit System(CBCS) and Credit Based Semester System(CBSS) as indicated by UGC and curriculum/course structure as suggested by AICTE are followed.
8. PROGRAM STRUCTURE
In the B.Tech. program structure, every course is placed in any one of the eight categories. The total 160 credits are distributed into these eight categories mentioned below in the table 2.

Table 2: Category wise distribution of credits

<table>
<thead>
<tr>
<th>S.No</th>
<th>Broad Course Classification</th>
<th>Course Group/Category</th>
<th>Course Description</th>
<th>Total Credits (Approximate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Foundation Courses (FnC)</td>
<td>BS- Basic Sciences courses</td>
<td>Includes Mathematics, Physics and Chemistry</td>
<td>23</td>
</tr>
<tr>
<td>2</td>
<td>ES- Engineering Sciences Courses</td>
<td>Includes Fundamental Engineering subjects</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>HS- Humanities and Social Sciences Courses including Management courses</td>
<td>Includes subjects related to Humanities, Social sciences and Management</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>PC– Professional Core Courses</td>
<td>Includes core subjects related to the parent discipline/Department/branch of Engineering</td>
<td>57</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Project Work (PW)</td>
<td>B. Tech. project or UG project or UG major project</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Project Work Industrial training / Mini Project Seminar</td>
<td>Industrial training/Internship/UG Mini-Project/Mini-Project</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PW : Project Work</td>
<td>Seminar/Colloquium based on core contents related to parent discipline/Department/branch of Engineering</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>PE – Professional Electives Courses</td>
<td>Includes elective subjects related to the parent discipline/Department/branch of Engineering</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>OE-Open Electives Courses</td>
<td>Elective subjects which include interdisciplinary subjects or subjects in an area outside the parent discipline/Department/branch of Engineering</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Mandatory Courses (MC)</td>
<td>-</td>
<td>Mandatory courses (Non-Credit)</td>
<td></td>
</tr>
</tbody>
</table>

9. CREDIT BASED SYSTEM
All the academic programs under autonomy are based on credit system. Credits are assigned based on the following norms, shown in table 3.

Table 3: Credit Representation

<table>
<thead>
<tr>
<th>Lectures (hrs/wk/Sem.)</th>
<th>Tutorials (hrs/wk/Sem.)</th>
<th>Practical Work (hrs/wk/Sem.)</th>
<th>Credits (L: T: P)</th>
<th>Total Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3:0:0</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>0</td>
<td>3:1:0</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>3</td>
<td>3:1:1.5</td>
<td>5.5</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>0</td>
<td>3:2:0</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>2</td>
<td>3:0:1</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>4</td>
<td>3:0:2</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>0</td>
<td>4:0:0</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>0</td>
<td>4:1:0</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>3</td>
<td>4:0:1.5</td>
<td>5.5</td>
</tr>
</tbody>
</table>
9.1. The duration of each semester will normally be 23 weeks with 6 days a week (every second Saturday will be observed as holiday). A working day shall have six lecture hours each of 60 minutes duration.

9.2. The four-year curriculum of any B. Tech. program of study shall have 160 credits in total. The exact requirements of credits for each course will be as recommended by the Board of Studies concerned and approved by the Academic Council.

In the case of lateral entry students, B. Tech. program of study shall have a total 122 credits.

10. COURSE REGISTRATION

10.1. A ‘faculty advisor or counsellor or Mentor’ shall be assigned to a group of 20 students, who will advise student about the under graduate program, its course structure and curriculum, choice/option for subjects/courses, based on their competence, progress, pre-requisites and interest.

10.2. The college Exam cell invites ‘registration forms’ from students before the beginning of the semester through ‘on-line registration’, ensuring ‘date and time stamping’. The on-line registration requests for any ‘current semester’ shall be completed before the commencement of SEEs (Semester End Examinations) of the ‘preceding semester’.

10.3. A student can apply for on-line registration, only after obtaining the ‘written approval’ from faculty advisor/counsellor, which should be submitted to the Examination section through the Head of the Department. A copy of it shall be retained with Head of the Department, faculty advisor/counsellor and the student.

10.4. If the student submits ambiguous choices or multiple options or erroneous entries during on-line registration for the subject(s)/course(s) under a given/specified course group/category as listed in the course structure, only the first mentioned subject/course in that category will be taken into consideration.

10.5. Subject/course options exercised through on-line registration are final and cannot be changed or inter-changed; further, alternate choices also will not be considered. However, if the subject/course that has already been listed for registration by the Head of the Department in a semester could not be offered due to any unforeseen or unexpected reasons, then the student shall be allowed to have alternate choice either for a new subject (subject to offering of such a subject), or for another existing subject (subject to availability of seats). Such alternate arrangements will be made by the head of the department, with due notification and time-framed schedule, within the first week after the commencement of class-work for that semester.

10.6. Open electives: The students have to choose one open elective (OE-I) during III year II semester, one (OE-II) during IV year I semester and one (OE-III) in IV year II semester from the list of open electives given. However, the student cannot opt for an open elective subject offered by their own (parent) department, if it is already listed under any category of the subjects offered by parent department in any semester.

10.7. Professional Electives: students have to choose professional elective I (PE-I) in III year I semester, Professional elective II (PE-II) in III yearII semester, Professional electives III (PE-III) in IV year I semester and Professional Elective IV (PE –IV) in IV year II semester, from the list of professional electives given.

11. SUBJECTS/ COURSES TO BE OFFERED

11.1. A typical section (or class) strength for each semester shall be 60.

11.2. A subject/course may be offered to the students, only if a minimum of 20 students (1/3 of the section strength) opt for it. The maximum strength of a section is limited to 80 (60 + 1/3 of the section strength).
11.3. More than one faculty member may offer the same subject (lab/practical may be included with the corresponding theory subject in the same semester) in any semester. However, selection of choice for students will be based on ‘first come first serve basis and CGPA criterion’ (i.e. the first focus shall be on early on-line entry from the student for registration in that semester, and the second focus, if needed, will be on CGPA of the student).

11.4. If more entries for registration of a subject come into picture, then the Head of Department concerned shall decide, whether or not to offer such a subject/course for two (or multiple) sections.

11.5. In case of options coming from students of other departments/branches/disciplines (not considering open electives), first priority shall be given to the student of the ‘parent department’.

12. METHOD OF EVALUATION
The performance of a student in each semester shall be evaluated subject-wise with a maximum of 100 marks each for Integrated, non-integrated courses (Either theory or lab). In addition, mini-project and technical seminar work shall be evaluated for 100 marks each and project work shall be evaluated for 200 marks.

12.1. Theory Courses
The evaluation of the students in each integrated/non-integrated course is a continuous process and is based on their performance in different examinations as mentioned below:

Table 4.1: Method of Evaluation for integrated course

<table>
<thead>
<tr>
<th>Evaluation Type</th>
<th>Internal Evaluation</th>
<th>External Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Internal Evaluation (CIE)</td>
<td>Theory: 50 Marks&lt;br&gt;Midterm exam-1: 20 marks&lt;br&gt;Alternate Assessment 1: 05 marks&lt;br&gt;Midterm exam-2: 20 marks&lt;br&gt;Alternate Assessment 2: 05 marks&lt;br&gt;Practical: 50 marks&lt;br&gt;Day to day evaluation: 10 marks&lt;br&gt;Alternate assessment: 05&lt;br&gt;Lab end exam: 35 Marks&lt;br&gt;Total marks: 100 (scale down to 30 marks)</td>
<td>Semester End Examination (SEE): 100 Marks (scale down to 70 marks)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30 Marks&lt;br&gt;70 Marks</td>
</tr>
</tbody>
</table>

Table 4.2: Method of Evaluation for Non-integrated course (Theory course)

<table>
<thead>
<tr>
<th>Evaluation Type</th>
<th>Internal Evaluation</th>
<th>External Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Internal Evaluation (CIE)</td>
<td>Theory: 50 Marks&lt;br&gt;Midterm exam-1: 20 marks&lt;br&gt;Alternate Assessment 1: 05 marks&lt;br&gt;Midterm exam-2: 20 marks&lt;br&gt;Alternate Assessment 2: 05 marks&lt;br&gt;Total marks: 50 (scale down to 30 marks)</td>
<td>Semester End Examination (SEE): 100 Marks (scale down to 70 marks)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30 Marks&lt;br&gt;70 Marks</td>
</tr>
</tbody>
</table>

Integrated course: A Theory course combined with practical course
Non-integrated course: An independent theory course or an independent practical course.

12.1.1. Midterm Examinations:
There will be two midterm examinations for both integrated and non-integrated theory courses for a maximum of 30 marks to be answered in 90 minutes duration (multiplied by 2/3). The first midterm examination will be on the first two units of the syllabus and the second midterm examination will be on the last three units. The final marks of midterm exam are calculated by taking sum of two midterm examinations. In case a student does not appear for midterm examination, a missing examination will be conducted upon the
recommendations of standing committee, subject to payment of a prescribed fee for each missing examination.

12.1.2. **Alternate Assessment:**
The modalities for conducting the alternate assessment will be decided by the department concerned. It can be assignment/seminar/activity etc.

12.1.3. **Semester End Examinations (SEE):**
The SEE question paper in theory courses (for both integrated and non-integrated courses) will be for a maximum of 100 marks to be answered in three hours duration. The details of the question paper pattern are as follows,

- The SEE will be conducted for 100 marks consisting of two parts viz.
  i) **Part- A** for 25 marks, ii) **Part - B** for 75 marks.

- **Part-A** is compulsory which consists of ten questions. The first five questions are from each unit and carry 2 marks each. The next five questions are one from each unit and carry 3 marks each.

- **Part-B** consists of five questions (numbered from 2 to 6) carrying 15 marks each. Each of these questions is from one unit and may contain sub-questions. For each question there will be an “either “or” choice, which means that there will be two questions from each unit and the student should answer either of the two questions.

The question paper shall be set externally and valued both internally and externally. If the difference between both the valuations is less than 15 marks, the average marks of the two valuations shall be awarded as final marks, otherwise third valuation will be conducted and the average marks of the best two valuations shall be awarded as final marks.

12.1.4. **Valuation:**
Both midterm examination and semester end examination answer scripts are evaluated digitally/manually.

12.2. **Practical Examinations (if it is not integrated with theory course)**
Practical examinations shall be evaluated for 100 marks, out of which 70 marks shall be for external examination and 30 marks for internal. The 30 internal marks are distributed as 20 marks for day-to-day evaluation and 10 marks for internal examination. The external end-examination shall be conducted by the teacher concerned and an external examiner from outside the college.

12.3. **Internship**
The internship shall be carried out during semester break for a minimum of 4 weeks. A report has to be submitted for assessment to an internal evaluation committee comprising Head of the Department or his nominee and two faculty members of the department including the project supervisor for 100 marks each.

12.4. **Project Work**
The project work shall be evaluated for 200 marks of which 130 marks shall be for internal evaluation (100 marks for project work stage-1 and 30 for project work stage-2) and 70 marks for end-semester evaluation. A project batch shall comprise of not more than four students.

12.5. **Mandatory courses:** For all mandatory courses (non-credit courses), there will be only final exam for 100 marks for which a student has to get minimum 40 % marks to get satisfactory. The question paper is set and evaluated internally (only single evaluation). The examination will be conducted in open book system.

13. **ATTENDANCE REQUIREMENTS TO APPEAR FOR THE END SEMESTER EXAMINATION**
A student shall be eligible to appear for the semester end examinations, if student acquires a minimum of 75% of attendance in aggregate of all the subjects/courses. Shortage of attendance in aggregate up to 10% (65% and above, and below 75%) in each semester may be condoned by the college academic committee on genuine and valid grounds, based on the student’s representation with supporting evidence. A stipulated fee shall be payable towards condonation. Shortage of attendance below 65% aggregate shall not be considered for condonation.

13.1. **Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examinations of that semester. They get detained and their registration for that semester**
shall stand cancelled. They will not be promoted to the next semester. They may seek re-registration for all those subjects registered in that semester in which student was detained, by seeking re-admission into that semester as and when offered; in case if there are any professional electives and/or open electives, the same may also be re-registered if offered. However, if those electives are not offered in later semesters, then alternate electives may be chosen from the same set of elective subjects offered under that category.

13.2. Condonation for a student will be given for a maximum of four times during his/her course of study, whereas for lateral entry students it will be for a maximum of three times.

13.3. A student fulfilling the attendance requirement in the present semester shall not be eligible for readmission into the same semester.

14. EVALUATION

Following procedure governs the evaluation.

14.1. The marks for the internal evaluation components will be added to the external evaluation marks secured in the end semester examinations to arrive at total marks for any subject in that semester.

14.2. Performance in all the courses is tabulated course-wise and will be scrutinized by the Examination Committee. Moderation is applied, if needed, based on the recommendations of results committee and then course-wise grade lists are finalized.

14.3. Student-wise tabulation is done and grade sheet is generated which is issued to the student.

15. REVALUATION

Students shall be permitted to apply for revaluation only for SEE Theory courses after the declaration of semester end examination results within due dates by paying prescribed fee. After revaluation if there is any betterment in the grade, then improved grade will be considered. Otherwise old grade shall be retained.

16. SUPPLEMENTARY EXAMINATION

16.1. Supplementary Examination:

Supplementary examinations for the odd semester shall be conducted with the regular examinations of even semester and vice versa, for those who appeared and failed or absent in regular examinations. Such students writing supplementary examinations may have to write more than one examination per day.

16.2. Advanced Supplementary Examination:

Advanced supplementary examinations will be conducted for IV year II semester after announcement of regular results.

17. ACADEMIC REQUIREMENTS FOR PROMOTION / COMPLETION OF REGULAR B. TECH. PROGRAM OF STUDY

The following academic requirements have to be satisfied in addition to the attendance requirements for promotion/completion of regular B. Tech. Program of study.

For students admitted into B. Tech. program (Batches admitted from 2018–2019)

17.1 Academic Requirements

i. A student shall be deemed to have satisfied the minimum academic requirements for each theory, practical, design, drawing subject and project, if he secures not less than 35% (24 out of 70 marks) of marks in the end semester examination and a minimum of 40% of marks in the sum total of the Continuous Internal Evaluation (CIE) and Semester End Examination(SEE) taken together.

ii. In case of mini project, a student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each of them, if he secures not less than 40% of marks.

iii. In case of project work, a student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted, if he secures not less than 40% of marks on the aggregate in the internal evaluation and external end-evaluation taken together.

iv. A student shall register for all credits and has to earn all the credits. Grade points obtained in all subjects shall be considered for the award of the class based on aggregate of grades.

v. A student should register for all Mandatory courses mentioned in the curriculum and get minimum pass marks to get the degree. Grade points obtained in these courses will not be considered for awarding class.
### Promotion Rules

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Promotion</th>
<th>Conditions to be fulfilled</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>First year first semester to first year second semester</td>
<td>Regular course of study of first year first semester.</td>
</tr>
</tbody>
</table>
| 2     | First year second semester to second year first semester | (i) Regular course of study of first year second semester.  
(ii) Must have secured at least 19 credits out of 38 credits i.e., 50% credits up to first year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not. |
| 3     | Second year first semester to second year second semester | Regular course of study of second year first semester.                                                                                                                                                         |
| 4     | Second year second semester to third year first semester | (i) Regular course of study of second year second semester.  
(ii) Must have secured at least 48 credits out of 80 credits for Regular students and 25 credits out of 42 credits for Lateral Entry students i.e., 60% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not. |
| 5     | Third year first semester to third year second semester | Regular course of study of third year first semester.                                                                                                                                                         |
| 6     | Third year second semester to fourth year first semester | (i) Regular course of study of third year second semester.  
(ii) Must have secured at least 74 credits out of 124 credits for Regular students and 51 credits out of 86 credits for Lateral Entry students i.e., 60% credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not. |
| 7     | Fourth year first semester to fourth year second semester | Regular course of study of fourth year first semester.                                                                                                                                                         |

For lateral entry students (Batches admitted from 2019–2020)

For Lateral Entry students, the regulations are same as Regular students, except maximum duration to complete the program. It is six years for Lateral Entry students.

### Transitory Regulations

For students detained due to shortage of attendance:

**18.1.** A student who has been detained in any of the semesters under old Regulations (prior to R18) due to lack of attendance, shall be permitted to join in the same semester where he/she got detained. In such case/s the readmitted student shall have to follow R18 regulations with substitute subjects wherever necessary as recommended by academic standing committee.

**18.2.** A student who has been detained for want of credits under old Regulations (prior to R18), shall be permitted to join in the next semester where he got detained, provided if the student gets required number of credits. In such case the readmitted student shall have to follow R18 regulations with substitute subjects wherever necessary as recommended by academic standing committee.

**18.3.** A student who has got detained belongs to R18 regulations for want of attendance/credits and readmitted into the next regulations has to follow the new regulations with substitute subjects wherever necessary as recommended by academic standing committee.

### Transfer of Students from Other Colleges/Universities

Transfer of students from other colleges or universities are permitted subjected to the rules and regulations of TSCHE (TE Department) and JNTUH in vogue.

### Transcripts

After successful completion of the entire program of study, a transcript containing performance of all academic years will be issued as a final record. Transcripts will also be issued, if required, after payment of
21. AWARD OF DEGREE

The Degree will be conferred and awarded by Jawaharlal Nehru Technological University Hyderabad on the recommendations of the Chairman, Academic Council.

21.1. For students admitted into B.Tech. program (Batches admitted from 2018-2019)

Eligibility: A student shall be eligible for the award of B. Tech. Degree, if he/she fulfils all the following conditions:

- The student shall pursue a course of study for not less than four academic years and not more than eight academic years.
- The student shall register for 160 credits and has to secure all 160 credits. Marks obtained in all 160 credits shall be considered for the award of the class based on aggregate of grades.
- The student has to obtain not less than 40% of marks (minimum requirement for declaring as passed) in all the courses.
- The student has no dues to the college, hostel, and library etc. and to any other amenities provided by the College.
- The student has no disciplinary action pending against him.
- The student should satisfy minimum requirements for all Mandatory courses.

21.2. For lateral entry students (Batches admitted from 2019–2020)

Same as Regular students except minimum duration which is 3 years and maximum duration which is 6 years to complete course and number of credits.

The student shall register for 122 credits and has to secure all 122 credits. Marks obtained in all 122 credits shall be considered for the award of the class based on aggregate of grades.

21.3. Award of class

After a student has satisfied the requirement prescribed for the completion of the Program and is eligible for the award of B. Tech. Degree, he/she shall be placed in one of the following four classes shown in Table 5:

<table>
<thead>
<tr>
<th>Class Awarded</th>
<th>CGPA to be Secured</th>
<th>From the aggregate marks secured from 160 Credits for Regular Students and 122 Credits for Lateral Entry Students.</th>
</tr>
</thead>
<tbody>
<tr>
<td>*First Class with Distinction</td>
<td>≥ 8.0</td>
<td></td>
</tr>
<tr>
<td>**First Class</td>
<td>≥ 6.5</td>
<td></td>
</tr>
<tr>
<td>Second Class</td>
<td>5.5 to &lt;6.5</td>
<td></td>
</tr>
<tr>
<td>Pass Class</td>
<td>5.0 to &lt;5.5</td>
<td></td>
</tr>
<tr>
<td>Fail</td>
<td>Below 5.0</td>
<td></td>
</tr>
</tbody>
</table>

* Students with final CGPA (at the end of the undergraduate programme) ≥ 8.0, and fulfilling the following conditions shall be placed in 'First Class with Distinction'.

(i) Should have passed all the subjects/courses in 'first appearance' within the first 4 academic years (or 8 sequential semesters) from the date of commencement of first year first semester.

(ii) Should have secured a CGPA ≥ 8.0, at the end of each of the 8 sequential semesters, starting from I year I semester onwards.

(iii) Should not have been detained or prevented from writing the end semester examinations in any semester due to shortage of attendance or any other reason.

Students fulfilling the conditions listed above alone will be eligible for award of ‘college rank’ and ‘gold medal’.
**Students with final CGPA (at the end of the undergraduate programme) ≥6.5, and not fulfilling the conditions listed above, shall be placed in ‘First class’ only.

21.4. Grade Point
It is necessary to provide equivalence of percentages and/or Grade Point (GP). This shall be done by prescribing certain specific thresholds of marks in a subject.

**Table 6: Percentage Equivalence of Grade Points (For a 10-Point Scale)**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Grade Points (GP)</th>
<th>Percentage of Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>O</td>
<td>10</td>
<td>≥ 90</td>
</tr>
<tr>
<td>A+</td>
<td>9</td>
<td>≥ 80 and &lt;90</td>
</tr>
<tr>
<td>A</td>
<td>8</td>
<td>≥ 70 and &lt;80</td>
</tr>
<tr>
<td>B+</td>
<td>7</td>
<td>≥ 60 and &lt;70</td>
</tr>
<tr>
<td>B</td>
<td>6</td>
<td>≥ 50 and &lt;60</td>
</tr>
<tr>
<td>C</td>
<td>5</td>
<td>≥ 40 and &lt;50</td>
</tr>
<tr>
<td>F</td>
<td>0</td>
<td>Below 40</td>
</tr>
<tr>
<td>AB</td>
<td>0</td>
<td>ABSENT</td>
</tr>
</tbody>
</table>

For calculating the final percentage of marks equivalent to the computed CGPA, the following formula may be used.

Percentage of marks = (CGPA-0.5) X 10

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

\[ \text{SGPA} (S_{i}) = \frac{\sum (C_{i} \times G_{i})}{\sum C_{i}} \]

Where \( C_{i} \) is the number of credits of the \( i^{th} \) course and \( G_{i} \) is the grade point scored by student in the \( i^{th} \) course.

**Table 7: Illustration of calculation of SGPA**

<table>
<thead>
<tr>
<th>Course/Subject(i)</th>
<th>Credits (Ci)</th>
<th>Letter Grade</th>
<th>Grade Points (Gi)</th>
<th>Credit Points Ci X Gi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course 1</td>
<td>4</td>
<td>A</td>
<td>8</td>
<td>4 X 8 = 32</td>
</tr>
<tr>
<td>Course 2</td>
<td>4</td>
<td>O</td>
<td>10</td>
<td>4 X 10 = 40</td>
</tr>
<tr>
<td>Course 3</td>
<td>4</td>
<td>C</td>
<td>5</td>
<td>4 X 5 = 20</td>
</tr>
<tr>
<td>Course 4</td>
<td>3</td>
<td>B</td>
<td>6</td>
<td>3 X 6 = 18</td>
</tr>
<tr>
<td>Course 5</td>
<td>3</td>
<td>A+</td>
<td>9</td>
<td>3 X 9 = 27</td>
</tr>
<tr>
<td>Course 6</td>
<td>3</td>
<td>C</td>
<td>5</td>
<td>3 X 5 = 15</td>
</tr>
</tbody>
</table>

\[ \sum C_{i} = 21 \]

\[ \sum C_{i} X G_{i} = 152 \]

SGPA = 152/21 = 7.24

21.6. Cumulative grade point average (CGPA)
The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a program, i.e.

\[ \text{CGPA} = \frac{\sum (C_{i} \times S_{i})}{\sum C_{i}} \]

Where \( S_{i} \) is the SGPA of the \( i^{th} \) semester and \( C_{i} \) is the total number of credits in that semester.
Table 8: Illustration of calculation of CGPA

<table>
<thead>
<tr>
<th>Course/Subject(i)</th>
<th>Credits (C_i)</th>
<th>Letter Grade</th>
<th>Grade Points (G_i)</th>
<th>Credit Points C_i × G_i</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Year I Semester</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Course 1</td>
<td>4</td>
<td>A</td>
<td>8</td>
<td>4 × 8 = 32</td>
</tr>
<tr>
<td>Course 2</td>
<td>4</td>
<td>A+</td>
<td>9</td>
<td>4 × 9 = 36</td>
</tr>
<tr>
<td>Course 3</td>
<td>4</td>
<td>B</td>
<td>6</td>
<td>4 × 6 = 24</td>
</tr>
<tr>
<td>Course 4</td>
<td>3</td>
<td>O</td>
<td>10</td>
<td>3 × 10 = 30</td>
</tr>
<tr>
<td>Course 5</td>
<td>3</td>
<td>B+</td>
<td>7</td>
<td>3 × 7 = 21</td>
</tr>
<tr>
<td>Course 6</td>
<td>3</td>
<td>A</td>
<td>8</td>
<td>3 × 8 = 24</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>21</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>167</td>
</tr>
<tr>
<td>I Year II Semester</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Course 7</td>
<td>4</td>
<td>B+</td>
<td>7</td>
<td>4 × 7 = 28</td>
</tr>
<tr>
<td>Course 8</td>
<td>4</td>
<td>O</td>
<td>10</td>
<td>4 × 10 = 40</td>
</tr>
<tr>
<td>Course 9</td>
<td>4</td>
<td>A</td>
<td>8</td>
<td>4 × 8 = 32</td>
</tr>
<tr>
<td>Course 10</td>
<td>3</td>
<td>B</td>
<td>6</td>
<td>3 × 6 = 18</td>
</tr>
<tr>
<td>Course 11</td>
<td>3</td>
<td>C</td>
<td>5</td>
<td>3 × 5 = 15</td>
</tr>
<tr>
<td>Course 12</td>
<td>3</td>
<td>A+</td>
<td>9</td>
<td>3 × 9 = 27</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>21</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>160</td>
</tr>
<tr>
<td>SGPA (S_i) = 7.95</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CGPA = Σ (C_i × S_i) / Σ C_i</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>= (21×7.95 + 21×7.61) / (21+21)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>= 7.78</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
22. TERMINATION FROM THE PROGRAM
The admission of a student to the program may be terminated and the student is asked to leave the college in the following circumstances:

I. If the student fails to satisfy the requirements of the program within the maximum period stipulated for that program.

II. If the student fails to satisfy the norms of discipline specified by the Institute from time to time.

23. CURRICULUM
I. For each program being offered by the Institute, a Board of Studies (BOS) is constituted in accordance with AICTE/UGC/JNTUH statutes.

II. The BOS for a program is completely responsible for designing the curriculum at least once in two years for that program.

24. WITHHOLDING OF RESULTS
If the student has not paid any dues to the college/if any case of indiscipline/malpractice is pending against him/her, the results of the student will be withheld. The issue of the Degree is liable to be withheld in such cases.

25. GRIEVANCES REDRESSAL COMMITTEE
“Grievance and Redressal Committee” (General) constituted by the Principal shall deal in all grievances pertaining to the academic/administrative/disciplinary matters. The composition of the complaints cum Redressal committee shall be:

- Headed by Senior Faculty member
- Heads of all departments
- A senior lady staff member from each department (if available)

The committee constituted shall submit a report to the principal of the college and the penalty to be imposed. The Principal upon receipt of the report from the committee shall, after giving an opportunity of being heard to the person complained against, submit the case with the committee’s recommendation to the Governing Body of the college. The Governing Body shall confirm with or without modification the penalty recommended after duly following the prescribed procedure.

26. MALPRACTICE PREVENTION COMMITTEE
A malpractice prevention committee shall be constituted to examine and punish the student who involves in malpractice/behaves in an in-disciplinary manner during the examination. The committee shall consist of:

- Principal
- Subject expert
- Head of the department to which the student belongs to
- The invigilator concerned
- Controller of Examinations

The committee constituted shall conduct the meeting on the same day of examination or latest by next working day of the incident and punish the student as per the guidelines prescribed by the JNTUH from time to time.

Any action on the part of student at the examination like trying to get undue advantage in the performance at examinations, trying to help another, or derive the same through unfair means is punishable according to the provisions contained hereunder. The involvement of the Staff who are in-charge of conducting examinations, evaluating examination papers and preparing/keeping records of documents relating to the examinations, in such acts (inclusive of providing incorrect or misleading information) that infringe upon the course of natural justice to one and all concerned at the examination shall be viewed seriously and will be recommended for appropriate punishment after thorough enquiry.

27. AMENDMENTS TO REGULATIONS
The Academic Council of VARDHAMAN COLLEGE OF ENGINEERING reserves the right to revise, amend, or change the regulations, scheme of examinations, and/or syllabi or any other policy relevant to the needs of the society or industrial requirements etc., without prior notice.
28. STUDENTS’ FEEDBACK
It is necessary for the College to obtain feedback from students on their course work and various academic activities conducted. For this purpose, suitable feedback forms shall be devised by the College and the feedback is obtained from the students regularly in confidence by administering the feedback form in print or on-line in electronic form.

The feedback received from the students shall be discussed at various levels of decision making at the College and the changes/improvements, if any, suggested shall be given due consideration for implementation.

29. GRADUATION DAY
The College shall have its own annual Graduation Day for the distribution of Degrees to students completing the prescribed academic requirements in each case, in consultation with the University and by following the provisions in the Statute.

The College shall institute Prizes and Awards to meritorious students, for being given away annually at the Graduation Day. This will greatly encourage the students to strive for excellence in their academic work.

30. AWARD OF A RANK UNDER AUTONOMOUS SCHEME
30.1. Merit Rank will be declared only for those students who have been directly admitted in VCE under Autonomous Regulations and complete the entire course in VCE only within the minimum possible prescribed time limit, i.e., 4 years for B. Tech. and 3 years for B. Tech. under lateral entry scheme.

30.2. A student shall be eligible for a merit rank at the time of award of Degree in each branch of Bachelor of Technology, provided, the student has passed all subjects prescribed for the particular Degree program in first attempt only.

31. CODE OF CONDUCT
31.1. Each student shall conduct himself in a manner befitting his association with VCE.
31.2. He is expected not to indulge in any activity, which is likely to bring disrepute to the college.
31.3. He should show due respect and courtesy to the teachers, administrators, officers and employees of the college and maintain cordial relationships with fellow students.
31.4. Lack of courtesy, decorum, indecorous behaviour or untoward attitude both inside and outside the college premises is strictly prohibited. Willful damage or discard of Institute’s property or the belongings of fellow students are not at all accepted. Creating disturbance in studies or adopting any unfair means during the examinations or breach of rules and regulations of the Institute or any such undesirable means and activities shall constitute violation of code of conduct for the student.
31.5. Ragging in any form is strictly prohibited and is considered a serious and punishable offence as per law. It will lead to the expulsion of the offender from the college.
31.6. Violation of code of conduct shall invite disciplinary action which may include punishment such as reprimand, disciplinary probation, debarring from the examination, withdrawal of placement services, withholding of grades/Degrees, cancellation of registration, etc., and even expulsion from the college.
31.7. Principal, based on the reports of the warden of Institute hostel, can reprimand, impose fine or take any other suitable measures against an inmate who violates either the code of conduct or rules and regulations pertaining to college hostel.
31.8. A student may be denied the award of Degree/certificate even though he has satisfactorily completed all the academic requirements if the student is found guilty of offences warranting such an action.
31.9. Attendance is not given to the student during the suspension period.

32. OTHER ISSUES
The quality and standard of engineering professionals are closely linked with the level of the technical education system. As it is now recognized that these features are essential to develop the intellectual skills and knowledge of these professionals for being able to contribute to the society through productive and satisfying careers as innovators, decision makers and/or leaders in the global economy of the 21st century, it becomes necessary that certain improvements are introduced at different stages of their education system. These include:

a. Selective admission of students to a Program, so that merit and aptitude for the chosen technical
branch or specialization are given due consideration.

b. Faculty recruitment and orientation, so that qualified teachers trained in good teaching methods, technical leadership and students' motivation are available.

c. Instructional/Laboratory facilities and related physical infrastructure, so that they are adequate and are at the contemporary level.

d. Access to good library resources and Information & Communication Technology (ICT) facilities, to develop the student’s aptitude effectively.

These requirements make it necessary for the College to introduce improvements like:

a. Teaching-learning process on modern lines, to provide Add-On Courses for audit/credit in a number of peripheral areas useful for students’ self-development.

b. Life-long learning opportunities for faculty, students and alumni, to facilitate their dynamic interaction with the society, industries and the world of work.

c. Generous use of ICT and other modern technologies in everyday activities.

33. SCOPE

33.1. The academic regulations should be read as a whole, for the purpose of any interpretation.

33.2. In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final.

33.3. The College may change or amend the academic regulations, course structure or syllabi at any time, and the changes or amendments made shall be applicable to all students with effect from the dates notified by the college authorities.

35. GENERAL

Where the words “he”, “him”, “his”, “himself” occur in the regulations, they include “she”, “her”, “herself”.

Note: Failure to read and understand the regulations is not an excuse.
## Disciplinary Action for Improper Conduct in Examinations

<table>
<thead>
<tr>
<th>Nature of Malpractices/Improper Conduct</th>
<th>Punishment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. (a) Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the student which can be used as an aid in the subject of the examination)</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject only.</td>
</tr>
<tr>
<td>(b) Gives assistance or guidance or receives it from any other student orally or by any other body language methods or communicates through cell phones with any student or persons in or outside the exam hall in respect of any matter.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject only of all the students involved. In case of an outsider, he will be handed over to the police and a case is registered against him.</td>
</tr>
<tr>
<td>2. Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the student is appearing.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the student is to be cancelled and sent to the University.</td>
</tr>
<tr>
<td>3. Impersonates any other student in connection with the examination.</td>
<td>The student who has impersonated shall be expelled from examination hall. The student is also debarred and forfeits the seat. The performance of the original student, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.</td>
</tr>
<tr>
<td>4. Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.</td>
<td>Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.</td>
</tr>
<tr>
<td>5. Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.</td>
<td>Cancellation of the performance in that subject.</td>
</tr>
<tr>
<td>6. Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance</td>
<td>In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other</td>
</tr>
<tr>
<td>Clause</td>
<td>Action</td>
</tr>
<tr>
<td>--------</td>
<td>--------</td>
</tr>
<tr>
<td>1.</td>
<td>of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in-charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.</td>
</tr>
<tr>
<td>2.</td>
<td>Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.</td>
</tr>
<tr>
<td>3.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred and forfeits the seat.</td>
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<td>4.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred and forfeits the seat.</td>
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<td>5.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred and forfeits the seat.</td>
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<td>6.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred and forfeits the seat.</td>
</tr>
<tr>
<td>7.</td>
<td>Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.</td>
</tr>
<tr>
<td>8.</td>
<td>Possess any lethal weapon or firearm in the examination hall.</td>
</tr>
<tr>
<td>9.</td>
<td>If student of the college, who is not a student for the particular examination or any person not connected with the college indulge in any malpractice or improper conduct mentioned in clause 6 to 8.</td>
</tr>
<tr>
<td>10.</td>
<td>Comes in a drunken condition to the examination hall.</td>
</tr>
<tr>
<td>11.</td>
<td>Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.</td>
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<tr>
<td>12.</td>
<td>If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.</td>
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COURSE STRUCTURE (VCE-R18)
# B. TECH – COMPUTER SCIENCE AND ENGINEERING

## REGULATIONS: VCE-R18

### I YEAR I SEMESTER

#### Induction Program for Three Weeks

<table>
<thead>
<tr>
<th>Code</th>
<th>Course</th>
<th>Category</th>
<th>Periods per Week</th>
<th>Credits</th>
<th>Scheme of Examination</th>
<th>Maximum Marks</th>
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**TOTAL**: 10 2 10 17 210 490 700

### I YEAR II SEMESTER

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**TOTAL**: 13 2 12 21 270 630 900
## B. TECH - COMPUTER SCIENCE AND ENGINEERING

### REGULATIONS: VCE-R18

### II YEAR I SEMESTER

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**TOTAL** 18 1 8 21 210 590 800

### II YEAR II SEMESTER

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**TOTAL** 18 1 6 21 180 590 800

*Grade Points awarded for audit courses will not be considered for calculating SGPA and CGPA*
### III YEAR I SEMESTER

<table>
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<tr>
<th>Code</th>
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**TOTAL** 17 1 6 22 250 450 700

### III YEAR II SEMESTER

<table>
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<tr>
<th>Code</th>
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<th>Periods per Week</th>
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**TOTAL** 17 1 12 22 280 520 800

*Marks awarded for audit courses will not be considered for calculating SGPA and CGPA

*Self learning in semester break. Internship will be carried in Semester break after II year II Semester and assessment will be done in the beginning of the III year I Semester
### B. TECH - COMPUTER SCIENCE AND ENGINEERING

#### PROFESSIONAL ELECTIVE-I

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<tr>
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<td>A4654</td>
<td>Software Testing Methodologies</td>
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<tr>
<td>A4551</td>
<td>Fuzzy logic and neural networks</td>
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<td>A4552</td>
<td>Formal Languages and Automata Theory</td>
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#### PROFESSIONAL ELECTIVE-II

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<td>Service Oriented Architecture</td>
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#### OPEN ELECTIVE-I

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#### OPEN ELECTIVE-II

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Note: Open electives to be offered will be notified by each department at the time of registration.

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<th>Abbreviation</th>
<th>Course Title</th>
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<tr>
<td>HS</td>
<td>Humanities and Social Sciences</td>
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<td>BE</td>
<td>Basic Engineering</td>
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<td>AC*</td>
<td>Audit Course</td>
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<td>PE</td>
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<td>OE</td>
<td>Open Elective</td>
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<td>MP</td>
<td>Mini Project</td>
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SYLLABUS
I YEAR I SEMESTER
UNIT – I
THEORY OF MATRICES: Real, Complex matrices and their properties, Rank of a matrix by reducing to Echelon form and Normal form, Inverse of a matrix by Gauss-Jordan method, Consistency of system of linear equations using the rank of a matrix.

UNIT – II
EIGEN VALUES, EIGEN VECTORS AND QUADRATIC FORMS: Linear dependence and independence of vectors, Linear transformation, Eigen values and Eigenvectors of a matrix, Properties of Eigen values and Eigen vectors of real and complex matrices, Cayley-Hamilton theorem (statement and verification), Inverse and powers of a matrix using Cayley-Hamilton theorem, Diagonalization of a matrix, Quadratic forms up to three variables: Rank, index, signature and nature of quadratic forms, Reduction of quadratic form to canonical form by orthogonal transformation.

UNIT – III
ORDINARY DIFFERENTIAL EQUATIONS OF FIRST ORDER: Differential equations of first order and first degree: Exact equations and equations reducible to exact form using integrating factors, Linear and Bernoulli’s equations. Equations not of first degree: Equations solvable for \( p \), Equations solvable for \( y \), Equations solvable for \( x \) and Clairaut’s equation, Applications: Newton’s law of cooling, Law of natural growth and decay.

UNIT – IV
HIGHER ORDER LINEAR ORDINARY DIFFERENTIAL EQUATIONS: Linear differential equations of second and higher order with constant coefficients, Non-homogeneous term of the type \( Q(x) = e^{ax}, \sin(ax+b)/\cos(ax+b), x^n, e^{ax}V(x), x^nV(x) \). Equations reducible to linear equations with constant coefficients: Cauchy’s homogeneous linear equation, Legendre’s linear equation, Method of variation of parameters, Applications: \( L – C – R \) Circuits and Simple Harmonic Motion.

UNIT-V
LAPLACE TRANSFORMS: Laplace transforms of elementary functions, First shifting theorem, Change of scale property, Multiplication by \( t^n \), Division by \( t \), Laplace transforms of derivatives and integrals, Laplace transform of unit step function, Second shifting theorem, Laplace transform of periodic function, Evaluation of some kind of integrals by Laplace transforms, Inverse Laplace transforms, Finding inverse Laplace transforms by different methods, Convolution theorem (without proof), Solving ordinary differential equations by Laplace transform method.

TEXT BOOKS:
REFERENCE BOOKS:
UNIT - I
ATOMIC AND MOLECULAR STRUCTURE: Introduction, Concept of atomic and molecular orbitals, Molecular orbital theory, and Molecular orbital energy level diagrams of diatomic molecules - O₂ and N₂. Crystal field theory – crystal field splitting in Octahedral, Tetrahedral and Square planar complexes.

UNIT - II

UNIT - III
ELECTROCHEMISTRY AND BATTERIES: Electrochemical cells -Types, cell notation, cell reaction and cell emf - concentration cells – Electrode and Electrolyte concentration cells, numerical problems.

Electrochemical series and its applications. Electrode potential, standard electrode potential, types of electrodes –Hydrogen, Calomel and Quinhydrone electrode. Batteries: Primary battery (Zinc-Carbon Battery) and Secondary battery (lead acid and lithium ion battery) - Applications. Fuel cells: Concept of Fuel-Cells. Hydrogen –Oxygen fuel cell – advantages and applications.

UNIT - IV

UNIT - V

TEXT BOOKS:

REFERENCE BOOKS:
UNIT – I
INTRODUCTION TO PROGRAMMING: Introduction to components of Computer Systems.

ALGORITHM DEVELOPMENT: Steps to solve logical and numerical problems. Representation of Algorithm, Flowchart and Pseudo code with examples.

INTRODUCTION TO THE C LANGUAGE: C program structure, identifiers, data types, Formatting input/output, Syntax and Logical Errors in compilation, object and executable code.

UNIT – II
OPERATORS: Arithmetic, Logical, Relational, Conditional, Assignment, Increment and Decrement operators.

EXPRESSIONS: Arithmetic Expressions, Operator precedence and associativity.

DECISION MAKING AND LOOPING: Writing and evaluation of decision making, branching and looping.

UNIT – III
ARRAYS: Definition, Types of Arrays, declaration and Initialization of n-Dimensional Arrays and Character array, String manipulation.

SEARCHING AND SORTING: Linear search, Bubble sort and Selection sort.

UNIT – IV
FUNCTIONS: Functions, Parameter passing in functions through call by value, passing arrays to functions, storage classes.

RECURSION: Recursion as a different way of solving problems. Example programs, such as finding factorial, Fibonacci series.

UNIT – V
POINTERS: Definition, Declaration, Pointer arithmetic, Pointer to Pointer, Pointer to an array (base pointer), Dynamic memory allocation, Command Line arguments, idea of call by reference in functions.

STRUCTURES: Defining, Declaring and initialization of structures, nested structures, Array of Structures.

TEXT BOOKS:

REFERENCE BOOKS:
LIST OF EXPERIMENTS

PART – A (TRADES FOR LECTURES & VIDEOS)

Note: Minimum one Hour Lecture on each Trade, to be discussed by any class room teaching technique in following trades.

Manufacturing Methods:

1. Casting, Forming, Joining, Machining, Advanced Manufacturing Methods
2. CNC machining, Additive Manufacturing
3. Fitting Operation & Power Tools, Carpentry, Plastic Molding, Glass Cutting, Metal Casting
4. Welding (Arc Welding & Gas Welding), Brazing, Sheet Metal Forming

PART-B (TRADES FOR PRACTICE)

1. Fitting Trade:
   a. L-Fitting Joint   b. V- Fitting Joint
   c. Square - Fitting Joint   d. Semicircular - Fitting Joint

2. Carpentry Trade:
   a. Lap Joint (Two Experiments)   b. Bridle Joint (Two Experiments)

3. House wiring Trade:
   a. House Wiring (5 Experiments)

4. Welding Trade:
   a. Arc Welding (Two Experiments)   b. Gas Welding (Two Experiments)

5. Foundry Trade:
   a. Single Piece Pattern   b. Multiple Piece Pattern

6. Tin Smithy Trade:
   a. Open Scoop   b. Funnel
   c. Rectangular Tray   d. Square & Cylindrical Pipes

7. Black Smithy Trade:
   a. Round to Square and Vice Versa   b. S - Hook
   c. O - Ring

Note: Minimum one experiment from each Trade with total of 12 Experiments.
TEXT BOOKS:

REFERENCE BOOKS:
LIST OF EXPERIMENTS

1. Estimation of strength of hydrochloric acid by conductometric titration.
2. Estimation of strength of hydrochloric acid by potentiometric titration.
3. Estimation of Iron in Mohr’s salt by potentiometric titration.
4. Estimation of hardness of water by complexometry using EDTA
5. Determination of chloride content in water by Argentometry.
6. Determination of viscosity of a given fluid by Ostwald’s viscometer.
7. Determination of surface tension of a given liquid by using Stalagmometer
9. Thin layer chromatography calculation of Rf values. Eg. ortho and para nitro phenols.
10. Verification of Freundlich adsorption isotherm of acetic acid on Charcoal.
11. Determination of partition coefficient of acetic acid between butanol and water.
12. Determination of the rate constant of acid catalyzed hydrolysis of methylacetate.

REFERENCE BOOKS:
LIST OF PROGRAMS

1. Programs using I/O statements and various operators.
2. Programs using expression evaluation and precedence
3. Programs using decision making statements and branching statements.
4. Programs using loop statements.
5. Programs to demonstrate applications of n dimensional arrays.
6. Programs to demonstrate searching and sorting.
7. Programs to demonstrate use of string manipulation functions.
8. Programs using user-defined functions.
9. Programs to demonstrate parameter passing mechanism.
10. Programs to demonstrate recursion
11. Programs to demonstrate use of pointers.
12. Programs to demonstrate command line arguments.
13. Programs to demonstrate dynamic memory allocation.
14. Programs to demonstrate applications of structures.
15. Programs to demonstrate file operations.

TEXT BOOKS:

REFERENCE BOOKS:
Module – 1:
INTRODUCTION TO SOCIAL INNOVATION: Core definitions, core elements and common features of social innovation, a typology of social innovation, Awakening social consciousness.

Module – 2:
CREATE MINDSETS: Seven mindsets – Empathy, Optimism, Iteration, Creative confidence, Making it, Embracing ambiguity, Learning from failures.

Module – 3:
WICKED PROBLEMS: Distinguish between simple, complicated and complex problems; describe the characteristics of wicked problems, breakdown a given problem by unpacking its complexity.

Module – 4:
CRITICAL THINKING FOR SOCIAL INNOVATION: Definition, engineering thinking and learning, distinguish between creativity and innovation.

Module – 5:
MODELS FOR CREATIVE THINKING: Appreciative Inquiry (AI), Asset Based Community Development (ABCD) and Concept of Bricolage.

Module – 6:
PROCESS OF SOCIAL INNOVATION: Community study, develop questionnaire, identifying the causes of a particular problem.

Module – 7:
PROCESS OF SOCIAL INNOVATION: Identify needs, record your learning’s.

Module – 8:
PROCESS OF SOCIAL INNOVATION: Generate ideas, select promising ideas, prototyping and testing.

Module – 9:
SOCIAL INNOVATION ACROSS FOUR SECTORS: The non-profit sector, public sector, the private sector, the informal sector, links between and cross sectors.

Module – 10:
STAGES OF INNOVATION: Social organizations and enterprises, social movements, social software and open source methods, common patterns of success and failure.
TEXT BOOKS:

REFERENCE BOOKS:
SYLLABI FOR
I YEAR II SEMESTER
UNIT – I
CALCULUS: Evaluation of improper integrals: Beta and Gamma functions and their properties, Rolle’s Theorem, Lagrange’s mean value theorem and Cauchy’s mean value theorem, Taylor’s and Maclaurin’s series. Functions of several variables: Limit, continuity and partial derivatives of functions of two variables (not to be examined), Jacobians, Functional dependence, Maxima and minima of functions of two variables, Lagrange’s method of undetermined multipliers.

UNIT – II
MULTIPLE INTEGRALS: Double integrals, Change of order of integration, Change of variables, Area enclosed by plane curves, Triple integrals, Change of variables, Area, volume, mass and centre of gravity (constant and variable densities).

UNIT – III
VECTOR DIFFERENTIATION: Scalar and vector point functions, Gradient, Directional derivative, Tangent plane and normal line to the surface, Divergence, Curl and their related properties, Scalar potential function, Laplacian operator, Vector identities.

UNIT – IV
VECTOR INTEGRATION: Line integral, work done, Surface integrals, Volume integrals. Vector integral theorems: Green’s theorem in a plane, Stoke’s theorem and Gauss divergence theorem (without proof) and related problems, Irrotational fields.

UNIT – V
FOURIER SERIES AND FOURIER TRANSFORMS: Euler’s formulae, Dirichlet’s conditions, Fourier series for functions having period \(2\pi\), Fourier series for even and odd functions, Half range Fourier sine and cosine series. Fourier integral theorem (without proof), Fourier sine and cosine integrals, Fourier transforms, Fourier sine and cosine transforms, Inverse Fourier transforms.

TEXT BOOKS:

REFERENCE BOOKS:
VARDHANAM COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. CSE I Year II Sem. VCE-R18

SEMICONDUCTOR PHYSICS
(Common to CSE & IT)

Course Code: A4003

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SYLLABUS

UNIT-I

UNIT-II

UNIT-III
INTRODUCTION TO SEMICONDUCTORS: Types of electronic materials: metals, semiconductors, and insulators, Concept of effective mass of electron and hole, Density of states, Intrinsic and Extrinsic semiconductors, Fermi-Dirac distribution function, Fermi level, Carrier concentration in intrinsic semiconductors, donor and accepter impurities, Variation of Fermi level with temperature, Position of Fermi level in intrinsic and extrinsic semiconductor, Mobility of electrons and holes, charge densities in a semiconductor, direct and indirect band gap semiconductors, Carrier transport: diffusion and drift, Hall Effect.

UNIT-IV
SEMICONDUCTOR DEVICES: P-N junction diode – V-I Characteristics, Diode current equation, Temperature dependence of V-I characteristics, Diode resistances, Diode models, Diode capacitances, Breakdown mechanisms, Zener diode and their I-V characteristics, Recombination mechanisms, LED, Types of semiconductor photo detectors - PN junction, PIN, and Avalanche and their structure, materials, working principle, and characteristics, solar cell.

UNIT-V
LASERS & OPTICAL FIBRES: Absorption, spontaneous and Stimulated emission, Einstein’s coefficients, population inversion, pumping processes, three and four level laser systems, He-Ne laser, Semiconductor lasers (homo junction and hetero junction), Applications of lasers.

Introduction to Optical fibres, total internal reflection, Acceptance angle, Numerical aperture, step and graded index fibre, Losses in optical fibres, Applications of optical fibres.

TEXT BOOKS:
5. Satya Prakash, Swati Saluja. Quantum Mechanics, Kedar Nath Ram Nath, 2018

REFERENCE BOOKS:
UNIT – I

UNIT – II
AC CIRCUITS: Representation of sinusoidal waveforms, peak and RMS values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance in series R-L-C circuit. Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT – III

UNIT – IV

UNIT – V
ELECTRICAL INSTALLATIONS: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries.

TEXT BOOKS:

REFERENCE BOOKS:
FUNCTIONAL ENGLISH
(Common to All Branches)

Course Code: A4009

UNIT - I

Vocabulary: Word Formation – Prefixes – Suffixes – Guessing the meanings of the words using prefixes and suffixes- Standard Abbreviations

Grammar: Articles

Reading: Presidential Address by APJ Abdul Kalam: Techniques for effective comprehension - Skimming and Scanning-Types of texts – Summarizing

Writing: Sentences – Paragraphs – Cohesion – Coherence – Logical, Lexical and Grammatical Devices – Punctuation – Types of Paragraphs: Description – Definition – Classification.

UNIT – II

Vocabulary: Synonyms – Antonyms

Grammar: Prepositions

Reading: The Road Not Taken (Robert Frost): Reading using different strategies: Types of Reading – Extensive and Intensive-Do’s and Don’t’s of reading


UNIT - III

Vocabulary: Homonyms, Homophones, Homographs, Foreign Words - Redundancies – Clichés


UNIT - IV

Vocabulary: Idiomatic Expressions - One Word Substitutes

Grammar: Noun-Pronoun Agreement – Misplaced Modifiers

Reading: Good Manners (J C Hill): Practice in reading different types of texts efficiently - Predicting the Content – Understanding the gist - Note Making- Understanding Coherence- Sequencing Sentences


UNIT - V

Reading: *Exercises for practice


*Reading material from Text books and Reference books

TEXT BOOKS:
REFERENCE BOOKS:
UNIT – I

INTRODUCTION TO ENGINEERING DRAWING: Introduction to engineering drawing: Principles of Engineering Graphics and their significance, usage of Drawing instruments, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epi-cycloid, Hypocycloid; Scales – Plain, Diagonal.

UNIT – II

ORTHOGRAPHIC PROJECTIONS AND PROJECTIONS OF REGULAR SOLIDS: Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined to both Planes; Projections of Regular Solids: Prism, Cylinder, Pyramid, Cone-inclined to both planes.

UNIT – III

SECTIONAL VIEWS AND DEVELOPMENT OF SURFACES OF RIGHT REGULAR SOLIDS: Sectional views of right regular solids: Prism, Cylinder, Pyramid, Cone-Development of surface of right regular solids: Prism, Cylinder, Pyramid, Cone.

UNIT – IV

ISOMETRIC PROJECTIONS: Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa.

UNIT – V

COMPUTER BASED DRAWING OVERVIEW OF COMPUTER GRAPHICS: Overview of Computer Graphics, Customisation, Demonstration of a simple team design project: listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software; Customisation& CAD Drawing: consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles; Annotations, layering & other functions: applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings ; Demonstration of a simple team design project: Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids.

TEXT BOOKS:
REFERENCE BOOKS:
LIST OF EXPERIMENTS

1. Determine the work function of a given material using Photoelectric Effect
2. Determine the energy gap of a given semiconductor diode.
3. Forward and reverse bias characteristics of a P-N junction diode.
4. Zener diode characteristics and Zener diode as voltage regulator.
5. Study the V-I Characteristics of Solar Cell.
6. Plot the V-I characteristics and determine the threshold voltage of Light Emitting Diode.
7. Determine the Hall Co-efficient using Hall Effect.
8. Determine the wavelength of a given source of Laser light using diffraction grating.
9. Measurement of numerical aperture and acceptance angle of a given Optical Fiber.
10. Determine the bending and transmission losses in Optical Fibers.

TEXT BOOKS:

REFERENCE BOOKS:
LIST OF EXPERIMENTS

1. Verification of Ohms Law.
2. Verification of KVL and KCL.
3. Transient Response of Series RL and RC circuits using DC excitation.
4. Transient Response of RLC Series circuit using DC excitation.
5. Resonance in series RLC circuit.
8. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation).
9. Three Phase Transformer: Verification of Relationship between Voltages and Currents.
   (Star-Delta, Delta-Delta, Delta-star, Star-Star)

TEXTBOOKS:
LIST OF EXPERIMENTS

a. Computer Assisted Language Learning (CALL) Lab
b. Interactive Communication Skills (ICS) Lab

Module – 1:
CALL: Introduction to Phonetics - Speech Sounds – Vowels and Consonants
ICS: Ice-Breaking activity and JAM session.

Module – 2:
CALL: Past Tense Marker and Plural Marker – Syllable Structure – Consonant Clusters - Minimal Pairs

Module – 3:

Module – 4:
CALL: Basic Rules of Word Accent – Stress Shift – Weak Forms and Strong Forms

Module – 5:
ICS: Asking for and Giving Directions – Giving Instructions – Seeking Clarifications – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions

Module – 6:
CALL: Neutralization of Mother Tongue Influence-Common Indian Variants in Pronunciation – Differences between British and American pronunciation

Module – 7:
CALL: Intonation Patterns-Types of Tones - Sentence Stress

Module – 8:
ICS: Social and Professional Etiquette - Telephone Etiquette

Module – 9:
ICS: Oral Presentation Skills (short presentations) - Making a Presentation-Prepared –Extempore

Module – 10:
ICS: Listening-Types of Listening-Steps to effective Listening –Business Listening Comprehension exercises
REFERENCE BOOKS:
SYLLABUS

Module – 1:
Introduction to Engineering and Engineering Study: Difference between science and engineering, scientist and engineer, needs and wants.

Module – 2:
Various disciplines of engineering, some misconceptions of engineering, Expectation for the 21st century engineer and Graduate Attributes.

Module – 3:
Engineering Design Process, Multidisciplinary facet of design, Importance of analysis in engineering design, general analysis procedure.

Module – 4:
Introduction to mechatronics system, generation of multiple solution, decision matrix, Concepts of reverse engineering.

Module – 5:
Introduction to various platform based development (Arduino) programming and its essentials.

Module – 6:
Introduction to sensors, transducers and actuators and its interfacing with arduino.

Module – 7:
Engineering Ethics: Identifying Engineering as a Profession, Significance of Professional Ethics, Code of Conduct for Engineers.

Module – 8:
Identifying Ethical Dilemmas in different tasks of engineering, Applying Moral Theories and codes of conduct for resolution of Ethical Dilemmas.

Module – 9:
Sustainability: Introduction to sustainability, Sustainability leadership, Life cycle assessment.

Module – 10:
Project Management: Introduction, Significance of team work, Importance of communication in engineering profession.

Module – 11:
Project management tools: Checklist, Timeline, Gantt Chart, Significance of documentation.

TEXT BOOKS:
REFERENCES BOOKS:
SYLLABI FOR
II YEAR I SEMESTER
VARDHMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. CSE II Year I Sem. VCE-R18

DISCRETE MATHEMATICAL STRUCTURES
Course Code: A4503

UNIT – I

UNIT – II
RELATIONS AND FUNCTIONS: Relations, Properties of Binary Relations in a Set, Equivalence Relations, Compatibility Relations, and Partial Ordering.
FUNCTIONS: Composition of Functions, Inverse Functions.

UNIT – III

UNIT – IV
RECURRENCE RELATIONS:
Solving Recurrence Relations by Substitution and Generating Functions, the Method of Characteristic Roots, Solutions of Inhomogeneous Recurrence Relations.

UNIT – V
GRAPH THEORY: Representation of Graph, Planar graphs, Isomorphism and Sub graphs, Euler circuits, Hamiltonian graphs, Chromatic Number.

TEXT BOOKS:

REFERENCE BOOKS:
UNIT-I

UNIT – II
SEARCHING TECHNIQUES: Linear Search and Binary Search

UNIT – III
LINEAR DATA STRUCTURES - STACKS: Introduction to Stacks, Array Representation of Stacks, Operations on a Stack, Applications of Stacks, Infix-to-Postfix Transformation, evaluating Postfix Expressions.
QUEUES: Introduction to Queues, Array Representation of Queues, Operations on a Queue, Circular Queue.

UNIT – IV

UNIT-V
NON LINEAR DATA STRUCTURES:
GRAPHS: Introduction, Graph Terminologies, Representation of Graphs- Set, Linked, Matrix, Graph Traversals- Breadth First Search (BFS) and Depth First Search (DFS).

LABORATORY EXPERIMENTS
Week- 1: (Recursion function)
1. Write recursive C programs for the following:
   a) Calculation of Factorial of an integer.
   b) Calculation of GCD (n, m).
   a) For Towers of Hanoi: N disks are to be transferred from peg S to peg D with Peg I as the intermediate peg.
Week-2: (Searching Techniques)
2. Write C programs that use both recursive and non-recursive functions to perform for the following:
   a) Searching operations for a key value in a given list of integers by using linear search technique.
   b) Searching operations for a key value in a given list of integers by using binary search technique.

Week-3: (Sorting Techniques)
3. Write C programs for the following:
   a) Implement Bubble sort, to sort a given list of integers in descending order.
   b) Implement Selection sort, to sort a given list of integers in ascending order.
   c) Implement Insertion sort, to sort a given list of integers in descending order.

Week-4: (Sorting Techniques)
4. Write C programs for the following:
   a) Implement Quick sort, to sort a given list of integers in ascending order.
   b) Implement Merge sort, to sort a given list of integers in ascending order.

Week-5: (Stack and Queue)
5. Write C programs for the following:
   a) Implement Stack operations using array.
   b) Implement Queue operations using array.
   c) Uses Stack operations to convert infix expression into postfix expression.
   d) Uses Stack operations for evaluating the postfix expression.

Week-6: (Linked List)
6. Write C programs for the following:
   a) Uses functions to perform the following operations on single linked list.
      (i) Creation (ii) insertion (iii) deletion (iv) traversal
   c) Implement Stack operations using linked list.
   d) Implement Queue operations using linked list.
   e) To store a polynomial expression in memory using linked list.
   f) To represent the given sparse matrix using linked list.

Week-7: (Linked List)
7. Write C programs for the following:
   a) Uses functions to perform the following operations on Circular linked list.
      (i) Creation (ii) insertion (iii) deletion (iv) traversal
   b) Uses functions to perform the following operations on double linked list.
      (i) Creation (ii) insertion (iii) deletion (iv) traversal in both ways.

Week-8: (Trees)
8. Write C programs for the following:
   a) To create a Binary Tree of integers.
   b) Uses Recursion for traversing a binary tree in pre-order, in-order and post-order.
   c) Write a C program to implement the following operations on Binary Search Tree.
      (i) insert (ii) delete (iii) search (iv) traverse
   d) Implement the Breadth First Search Graph Traversal.
   e) Implement the Depth First Search Graph Traversal.
TEXT BOOKS:

REFERENCE BOOKS:
UNIT – I
EVOLUTION OF JAVA: Object Oriented Programming, Compiling and executing a sample program, JVM, Data Types, Variables, Type conversion and casting, Operators, Control statements, Arrays.

CLASS, METHODS, OBJECTS AND CONSTRUCTORS: Classes, Objects, Methods, Constructors, this keyword, Argument passing, static, Garbage Collection, Constructor overloading, Method overloading, Command-line arguments. Exploring String and StringBuffer classes

UNIT – II
INHERITANCE: Inheritance Basics, Member Access and Inheritance, Method Overriding, Dynamic Method Dispatch, Keywords: super, abstract and final, the Object class.

PACKAGES AND INTERFACES: Defining a Package, Finding Packages and CLASSPATH, Access Protection, Importing Packages, Interfaces, Defining an Interface, interface with inheritance

UNIT – III
EXCEPTION HANDLING: Exception-Handling Fundamentals, Exception Types, Keywords: try, catch, finally, throw and throws, Java's Built-in Exceptions, Creating Your Own Exception Subclasses.

MULTITHREADED PROGRAMMING: The Java Thread Model, Creating a Thread, Thread Priorities, Keywords: synchronized, Inter-thread Communication.

UNIT – IV
FILE I/O: Streams, Stream Classes - Byte and Character, File Operations – Reading, Writing and Closing.
Exploring java.util package - ArrayList, Vector, Hashtable, StringTokenizer, and Date.

UNIT – V
SWINGS: Introducing Swing, Top Level Containers - JFrame, JWindow, Swing Components - JLabel and Image Icon, JTextField, JButton, JToggleButton, JCheckBox, JRadioButton, JComboBox, Model View Controller (MVC).

APPLETS: Applet Basics, Applet Lifecycle, Applet Skeleton, Simple Applet Display Methods, the HTML APPLET Tag, Passing Parameters to Applets.

LABORATORY EXPERIMENTS
Week–1 (Selection Statements)
Write Java programs for the following:

a. Prints all roots of the quadratic equation \( ax^2 + bx + c = 0 \) based on the discriminate \( b^2 - 4ac \). Read in \( a, b, c \) and use the quadratic formula.
b. Given three integers, a b c, one of them is small, one is medium and one is large. Return true if the three values are evenly spaced, so the difference between small and medium is the same as the difference between medium and large.

Input: (2, 4, 6) → true
Input: (4, 6, 2) → true
Input: (4, 6, 3) → false

Week – 2 (Control statements)
2. Write Java programs for the following:
   a. Pentagonal numbers are generated by the formula, \( P_n = \frac{n(3n-1)}{2} \). The first ten pentagonal numbers are:
      
      1, 5, 12, 22, 35, 51, 70, 92, 117, 145, ...

      It can be seen that \( P_4 + P_7 = 22 + 70 = 92 = P_8 \). However, their difference, 70 − 22 = 48, is not pentagonal. Find the pair of pentagonal numbers, \( P_j \) and \( P_k \), for which their sum and difference are pentagonal
   b. Read the order and elements of two matrices. Check the condition for matrix multiplication and display the result.
   c. Read a line of integers, and then display each integer and the sum of all the integers (Use String Tokenizer class of java.util).

Week – 3 (Strings)
3. Write Java programs for the following:
   a. Given a string and an int n, return a string made of n repetitions of the last n characters of the string. You may assume that n is between 0 and the length of the string, inclusive.
      
      repeatEnd("Hello",3)→"llollollo"
      repeatEnd("Hello",2)→"lolo"
      repeatEnd("Hello", 1) → "o"
   b. We'll say that a "triple" in a string is a char appearing three times in a row. Return the number of triples in the given string. The triples may overlap.
      
      countTriple("abcXXXabc")→1
      countTriple("xxxabyyyycd")→3
      countTriple("a") → 0

Week – 4 (Strings)
4. Write Java programs for the following:
   a. Consider a company requires the details of an employee identity card such as firstname, middlename, lastname. Convert each character from the entered name into uppercase and display the names.
   b. Display the names of n members of a team whose name starts with letter ‘s’ or ‘S’ and ends with ‘s’ or ‘S’.

Week – 5 (Class, Method, Object, Constructor)
5. Write Java programs for the following:
   a. Create a Product class, which has instance variables product name, price and quantity; a constructor to initialize the instance variables, two methods putDetails() and changeQuantity(). The putDetails() method should display both old quantity and new quantity. Create array of objects in the main() function and access the methods.
b. Create a class Account with two overloaded constructors. The first constructor is used to initialize
the details of the account holder like account_name, account_number and initial_amount. The
second constructor is used to initialize account_name, account_number, address, account_type and
current_balance. The Account class is having methods Deposit(), Withdraw(), and GetBalance().
Make the necessary assumptions for data members and return types of the methods. Create objects
of Account class and use them.

Week – 6 (Method Overloading)
6. Write Java programs for the following:
a. Create an overloaded methods named void calc_volume( ), that has been overloaded to perform
the following functions. Execute the overloaded methods and display the volume in the respective
functions:
•Volume of Sphere
•Volume of Cylinder
•Volume of Cone

b. Create an abstract class named Calculate that contains an empty method named
calc_value(). Provide three classes named Triangle, Pentagonal and Hexagonal such that each one of
the classes extends the class Calculate. Each one of the classes contains only the method
calc_value() that displays:
Triangle, pentagonal, and hexagonal numbers which are generated by the following formulae:
Triangle \( T_n = n(n+1)/2 \) 1, 3, 6, 10, 15, ...
Pentagonal \( P_n = n(3n−1)/2 \) 1, 5, 12, 22, 35, ...
Hexagonal \( H_n = n(2n−1) \) 1, 6, 15, 28, 45, ...

Week – 7 (Interface)
7. Write Java programs for the following:
a. Create an interface String_Process which has methods find (), replace () and reverse (). Create a
class such that it inherits the methods of String_Process interface and defines the methods.
b. Create a Package Measure; in which store a class named Convertor that contains methods to
convert mm to cm, cm to m and m to km. Define a class Need_Convertor that imports the Convertor
class, now store Need_Convertor outside the package Measure. Perform path settings accordingly.

Week – 8 (Exception Handling)
8. Write Java programs for the following:
a. Creates a user interface to perform integer divisions. The user enters two numbers in the text
fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the
Div- id button is clicked. If Num1 or Num2 were not an integer, the program would throw a
NumberFormatException. If Num2 is Zero, the program would throw an ArithmeticException.
Display the exception in a message dialog box.

b. Create an Exception subclass “ValidateException”. This exception is raised when user types a
password which is less than 6 characters, one of the characters not a number and one of the
characters not in uppercase. If all the password restrictions are satisfied; display “Logged
Successfully” otherwise display “Week Password- Try again”.
Week – 9 (Threads)
9. Write Java programs for the following:
   a. Illustrate creation of threads using Runnable interface. (Start method starts each of the newly created thread. Inside the run method there is sleep () for suspend the thread for 500 milliseconds).
   
   b. Write Java programs for the following: a. Creates three threads in which First thread displays “Good Morning” every one second, the Second thread displays “Hello” every two seconds and the third thread displays “Welcome” every three seconds.
   
   c. Implement the concept of producer consumer problem.

Week-10 (File Handling & util package)
10. Write Java programs for the following:
   a. Reads a file and displays the file on the screen, with a line number before each line.
   
   b. Displays the number of characters, lines and words in a text file.
   
   c. Write a java program to do following operations on Array List
      1. Add element
      2. Remove a particular element
      3. Modify
      4. View All elements(Use Iterator)
      5. View a Particular element (get() )

Week – 11 (Swing Controls)
11. Write Java programs for the following:
   a. Create a simple calculator by using Grid Layout to arrange buttons for the digits and for the +,-,*, and % operations. Add a text field to display the result of the operations.
   
   b. Simulate a Traffic Light Signals in which the user selects one of three lights: Red, Yellow, and Green. When a radio button is selected, the light is turned ON, and only one light can be ON at a time. No light is ON when the program starts.

Week – 12 (APPLET)
12. Write Java programs for the following:
   a. Develop an applet that displays a login applet as shown below

<table>
<thead>
<tr>
<th>LOGIN APPLET</th>
<th>-</th>
<th>□</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>USER NAME</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PASSWORD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOGIN BUTTON</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
When LOGIN BUTTON is clicked, if username is respective student’s rollno and password is vmeg88 then display a message box stating LOGGED SUCCESSFULLY otherwise display a message box stating ACCESS DENIED.

b. Develop an applet that displays a simple message in centre of the screen

TEXT BOOKS:

REFERENCE BOOKS:
SYLLABUS

UNIT – I
Number System: Binary numbers, number base conversions, octal and hexadecimal numbers, complements, signed binary numbers, different binary codes, BCD addition.
Boolean algebra: axiomatic definition of Boolean algebra, digital logic gates, logic implementation.

UNIT – II
Gate Level Minimization: Canonical and standard forms, Sum of Products and Product of Sums simplification, the k-map method, four-variable map, don’t-care conditions.
Combinational Logic: Binary adder, binary adder / subtractor, BCD adder, decoder, encoders, and multiplexers.

UNIT – III
Sequential Logic: Flip-Flops (SR, JK, D, T), Conversions, Analysis of clocked sequential circuits
Registers and Counters: registers, counters, ripple counter, synchronous counter, counter with unused states.

UNIT – IV
Structure of computers: Von-Neumann architecture, performance, floating point representation.
Register Transfer and Micro-Operations: Register transfer language, bus and memory transfers, arithmetic micro-operations, logic micro-operations, and shift micro-operations.

UNIT – V
Basic computer Organization: Instruction formats, instruction cycle, addressing modes.
Computer Arithmetic: Addition and subtraction, multiplication (normal and Booth’s) and digital division algorithm and floating point addition and subtraction.

TEXT BOOKS:

REFERENCE BOOKS:
Experiment -1: Make a Dosa: Each person sketches a diagram of how to make Dosa. When comparing diagrams, people are shocked at how diverse the diagrams are, revealing a wide range of models of what’s important in making Dosa. It’s a great launch pad for drawing out what’s really important to the group.

Experiment -2: College Challenge: Learners get 30 minutes to choose a Goal that is relevant and meaningful to them, and then they get into small groups. The group researches the goal quickly, by answering the questions: What does the world need to know about this goal and what can we do about it? The group then creates a short PSA (Public Service Announcement) and shares it widely with an authentic audience. It is fun, fast, and shows the power of design sprints to teach content and skills.

Experiment-3: GIFT: The Gift-Giving Project is (plus debrief) fast-paced project through a full design cycle. Students pair up to interview each other, come to a point-of-view of how they might design for their partner, ideate, and prototype a new solution to “redesign the gift-giving experience” for their partner.

Experiment -4: Invent a sport: We’ve all played sports at some point in our life. Who came up with the rules? Who created the game? Who made the constraints? And who decided the objects to play with? Now, with limited time and resources, your group will create and invent a new sport, and a set of directions for people to actually play the game.

Experiment -5: Write a book: Give a group a book (fiction or non-fiction). Then you break them up into smaller groups (or individuals) to read different parts of the book. Each group (or person) has to read and then create an overview/trailer of their part of the book to share chronologically with the rest of the class.

Experiment -6: Cover Story design: is an activity about pure imagination. The purpose is to think expansively around an ideal future state for the organization, class, group etc; it’s an exercise in visioning. The object of the game is to suspend all disbelief and envision a future state that is so stellar that it landed your organization on the cover of a well-known magazine. The players must pretend as though this future has already taken place and has been reported by the mainstream media.

Experiment -7 & 8 : Roller coaster challenge: You have been asked by the CEO to submit a proposal to create the next great rollercoaster. As the lead engineer you will need to figure out how to get guests from point A to point B in the safest and most Thrilling way possible. The first step of this project is to design a prototype of your roller coaster to present to the board members. Each hill, twist, turn, and loop will impress the board and increase the likelihood that you will get the bid to build the final rollercoaster. But take note, you will have to remain under budget to win the bid. You will be competing against other firms across the country (classroom). Good luck with your project.
Experiment -9 & 10:

**Generate an Idea:** Examine what already exists and explore the problems you are trying to solve. Once thoroughly explored and looked for patterns and idea generates.

**Experiment 11 & 12:** Design and develop prototype by using all the concepts of Design course. Prototype should have structured process, people centered, globally accepted and predictable.

**TEXT BOOKS:**
1. G.pahl and W.Beitz,” Engineering design: A systematic approach”, Springer 2\textsuperscript{nd} Editon.

**REFERENCE BOOK:**
UNIT-I


Unit – II


Unit – III

Discrete and Continuous Distributions: Discrete distributions: Binomial distribution, Poisson distribution, Continuous Distribution: Uniform distribution, Normal distribution.

Unit – IV

Estimation and Testing of Hypothesis for Large samples: Point estimation, Maximum error estimate, Interval Estimation, Introduction to Hypothesis, Type I and Type II error, Level of significance, one tailed and two tailed test, Test concerning one mean and one proportion, Two means and two Proportions.

Unit – V

Testing of Hypothesis for Small samples: Test for single mean, difference of means and paired t-test, Test for ratio of variances (F-test), Chi-square test for goodness of fit and independence of attributes.

TEXT BOOKS:


REFERENCE BOOKS:

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. CSE II Year I Sem.

QUALITATIVE APTITUDE

Course Code: A4017

SYLLABUS

UNIT – I
Ratio and Proportion: Ratio, Proportion, Variations, Problems on Ages
Average, Mixtures and Alligation: Averages, Weighted average, Difference between mixture and alligation, Problems on Mixtures and alligation

UNIT - II
Percentages, SI & CI: Fundamentals of Percentage, Percentage change, SI and CI, Relation between SI, CI
Data Interpretation: Introduction, Tabulation, Bar Graph, Pie Charts, Line Graphs, Combined Graphs

UNIT – III
Profit and loss, Partnerships: Basic terminology in profit and loss, Types of partnership, Problems related to partnership
Logarithms: Fundamental formulae of logarithms and problems, finding no of terms on expanding a given number.

UNIT – IV
Permutation and combination: Fundamentals counting principle, Definition of Permutation, Seating arrangement, Problems related to alphabets, Rank of the word, Problems related to numbers, Circular permutation, Combination

UNIT – V
Clocks: Introduction, Finding angle between hands of clock, Gain/Loss of Time, Finding time, Gain or loss of time
Calendar: Calendars method- 1, Calendars method -2

REFERENCE BOOKS:
1. Quantitative Aptitude for competitive examinations by R.S Aggarwal
2. Quantitative Aptitude for competitive examinations by Abhijit Guha
3. The Pearson guide to Quantitative Aptitude by Dinesh Khattar
UNIT – I
ECOSYSTEMS: INTRODUCTION: Environment Definition, The multidisciplinary nature of environmental studies, importance of environmental education.

UNIT – II

UNIT – III

UNIT – IV

UNIT – V

TEXT BOOKS:

REFERENCE BOOKS:
SYLLABI FOR
II YEAR II SEMESTER
VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
B. Tech. CSE II Year II Sem. VCE-R18
OPERATING SYSTEMS
Course Code: A4507

<table>
<thead>
<tr>
<th>L</th>
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<th>P</th>
<th>C</th>
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<tbody>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

SYLLABUS

UNIT – I
OPERATING SYSTEMS OVERVIEW: Definition, Operating System Types, Operating System operations, Operating system services, System calls and System Programs, Distributed Systems, Special Purpose Systems.

UNIT – II


UNIT – III

UNIT – IV

MASS-STORAGE STRUCTURE: Introduction to Magnetic Disks, Disk Structures, Disk Scheduling, Swap Space Management.

UNIT – V
DEADLOCKS: System Model, Deadlock Characterization, Deadlock Prevention, Avoidance, Detection and recovery from deadlock.


TEXT BOOKS:
REFERENCES:
UNIT – I
INTRODUCTION: Introduction to database management systems, database management system applications, database management systems versus file systems, view of data, database users and administrators, database system structure.

DATABASE DESIGN: E-R diagrams, entities, attributes, entity sets, relationships and relationship sets, additional features of the E-R model
SQL - PART I: Database languages- DDL, DML, DCL and TCL commands, SQL Overview, the form of a basic SQL query, basic SQL queries examples, union, intersect, except operators and aggregate operators.

UNIT – II
THE RELATIONAL MODEL: Introduction to the relational model, integrity constraints over relations, querying relational data, logical database design: E-R to relational

SQL-PART II: joins, nested queries, null values, PL/SQL basics for writing triggers, cursors, stored procedures, SQL Vs NoSQL.

RELATIONAL ALGEBRA AND CALCULUS: relational algebra and relational calculus.

UNIT – III
SCHEMA REFINEMENT AND NORMAL FORMS: Introduction to schema refinement, properties of decompositions, functional dependencies, reasoning about FDs. Normalization, Normal forms: 1NF, 2NF, 3NF, BCNF, 4NF, 5NF, schema refinement in database design.

UNIT – IV
TRANSACTION MANAGEMENT: Transaction concept, transaction states, ACID properties, implementation of atomicity and durability, concurrent executions, Anomalies due to interleaved execution of transactions, serializability and recoverability.

CONCURRENCY CONTROL: Concurrency control - lock based protocols, time-stamp based protocols, validation based protocols, deadlock handling.

UNIT – V
OVERVIEW OF RECOVERY AND INDEXING: Recovery system – failure classification, log-based recovery, shadow paging, recovery with concurrent transactions, ARIES Algorithm. RAID, Overview of File organization, Tree index structures: ISAM and B+ trees.
LABORATORY EXPERIMENTS

1. CASE STUDY : EMPLOYEE AND DEPARTMENT DATABASE

The BlueX Company pvt.ltd has maintaining Employee information contains employee details. The company has four departments. Any employee working in the company belongs to any one of the department. An employee joined in company above 25 years only. The company may give commission for every employee if and only if more than 2 years experience. Construct the database design such that there is no redundancy.

Consider the table structure as follows:

Employee(empno, ename, job, mgr, hiredate, sal, comm, deptno)

Department(deptno, dname, location)

Construct queries for the following:

1. Write queries for creating above relations Employee and Department.
2. Write queries for inserting necessary data into above relations
3. display all information of emp table
4. display unique jobs from emp table
5. list the employes in ascending order of their salaries
6. display unique job groups in descending order
7. Display all the details of all 'Mgrs'
8. List the emps who joined before 1981.
9. List the Empno, Ename, Sal, Daily sal of all emps in the asc order of Annsal
10. Display the Empno, Ename, job, Hiredate, Exp of all Mgrs
11. List the Empno, Ename, Sal, Exp of all emps working for Mgr 7369
12. Display all the details of the emps whose Comm. is more than their Sal.
13. List the emps in the asc order of Designations of those joined after the second half of 1981.
14. List the emps along with their Exp and Daily Sal is more than Rs.100.
15. List the emps who are either ‘CLERK’ or ‘ANALYST’ in the Desc order.
16. List the emps who joined on 1-MAY-81, 3-DEC-81, 17-DEC-81, 19-JAN-80 in asc order of seniority.
17. List the emp who are working for the Deptno 10 or 20
18. List the emps who are joined in the year 81.
19. List the emps who are joined in the month of Aug 1980.
20. List the emps Who Annual sal ranging from 22000 and 45000
21. List the Enames those are having five characters in their Names.
22. List the Enames those are starting with ‘S’ and with five characters.
23. List the emps those are having four chars and third character must be ‘r’.
24. List the emps whose Sal is four digit number ending with Zero.
25. List all the emps except ‘PRESIDENT’ & ‘MGR’ in asc order of Salaries.
26. List all the emps who joined before or after 1981.
27. List the emps whose Empno not starting with digit78
28. Display the details of SMITH.
29. Display the location of SMITH.
30. Display the total information of the emps along with Grades in the asc order.
31. List the details of the emps whose Salaries more than the employee BLAKE.
32. List the emps whose Jobs are same as ALLEN
33. List the emps who are senior to King
34. List the emps Whose Jobs are same as MILLER or Sal is more than ALLEN.
35. Find details of highest paid employee.
36. Find the highest paid employee of sales department.
37. List the employee in dept 20 whose sal is >the average sal of dept 10 emps.
38. List the no. of emps in each department where the no. is more than 3.
39. Display the number of employee for each job group
40. Display the number of employee for each job group deptno wise.
41. List the department, details where at least two emps are working
42. List the employees whose salary is more than 3000 after giving 20% increment.
43. List the emps name ,dept, sal and comm. For those whose salary is between 2000 and 5000 while loc is Chicago.
44. List the name ,job, dname, location for those who are working as MGRS.

2. CASE STUDY: SAILORS, RESERVES, BOATS DATA BASE
In Database user has to maintain sailors information with sailors sid, sailor name and every sailor age is more than 25 years and has a rating i.e (rating >=10),the sailors reserved the boats for shipment of goods. Each boat identified by bid, name, color. Every sailors may reserve more than one boat. Reservation can notice based on the date.

Answer to the following Queries
1. Create above relations and create indexing for accessing records faster.
2. First insert data into sailors table , then insert data into Boats table and last insert data into Reserves table. Use data shown in above tables to insert.
3. display the sailors names and age
4. display the unique sailor names and age
5. Find the names of sailors who have reserved at least one boat.
6. Find all information of sailors who have reserved boat number 101
7. Find the names of sailors who have reserved a red boat
8. Find the name and the age of the youngest sailor
9. Calculate the average age of all sailors
10. Find the average age of sailors for each rating level
11. Find the sid’s , names of sailors who have reserved all boats and having age greater than 30.
12. Find the sids ,names of sailors who have reserved a red or a green boat
13. Find the sids of sailors with age over 20 who have not reserved a red boat
14. Compute increments for the rating of sailors who have sailed two different boats on the same day
15. Find the average age of sailors who are of voting age (i.e., at least 18 years old) for each rating level that has at least two sailors.
16. Find those ratings for which the average age of sailors is the minimum overall ratings
17. Find sailors whose rating is better than some sailor called “Horatio”
18. Find sailors whose rating is better than every sailor called “Horatio
19. Find the names of sailors who are older than the oldest sailor with a rating of 10
   Find the average age of sailors for each rating level that has at least two sailors

3. Design an ER diagram for Bank Database.

4. CASE STUDY :BANK DATABASE
A bank has many branches and a large number of customers. A customer can open different kinds of accounts with the bank. The bank keeps track of a customer by his SSN, name, address, and phone number. Age is used as a factor to check whether he is a major. There is different type of loans, each identified by a loan number. A customer can take out more than one type of loan, and all branches can give loans. Loans have a duration and interest rate. The account holder can enquire about the balance in his account; create a data base design for the bank. Make any suitable assumptions.

Create necessary relations and create indexing for accessing records faster.
Answer to the following Queries:
1. Find all account whose balance is smaller than 500.
2. Find all employees who se salary is greater than 1400 and working branch is not ‘Downtown’
3. Give the name of the customer having maximum deposit among deposits of city “Harrison” for branch “Perry ridge”.
4. Give the names of cities in which the maximum number of branches located.
5. Add amount “100” to the account of all those depositors who are having the highest deposit amount in their respective branches.
6. Find the name, account number, and balance of all customers who have an account with a balance of $400 or less.
7. Find the names, street, addresses and cities of residence of all employees who work for First Bank Corporation and earn more than 10000/-
8. Give all loans numbers for a loan made at the Perryidge branch with loan amount greater than 1200
9. Find customer name, loan number, loan amount branch name for all loans
10. Find customer name, loan number, loan amount branch name for all loans given by “perryridge” branch
11. Find names of all branches that have asserts greater than all branches located in Brooklyn
12. Find names of all branches that have asserts greater than at least one branch located in Brooklyn.
13. Find average balance for each customer who lives in Harrison and has at least 2 accounts

Delete borrower of branches having the minimum number of customers.

5. Design an ER diagram for inventory management system database.
   Convert the ER diagram into relational model tables.
   Normalize the above tables upto 3rd Normal Form to reduce redundancy.

6. CASE STUDY: INVENTORY MANAGEMENT SYSTEM DATA BASE
   There are many items in a departmental store, which are sold to customer and purchased from supplier. An order is placed by the customer-required details, which are listed below:
   o Item number
   o Part number
   o quantity
   The order processing executes, look up the stock of each item (parts) is available or not then order fulfilled by the management of departmental store. The system periodically checks the stock of each item if it is found below the reorder level then purchase order placed to the supplier for that item, if the supplier is not able to supply whole order then rest of quantity supplied by the another supplier. After fulfilled the formalities, bill generated by the system and sent to the customer. Create a database design to maintained by the management for whole process is being done.

Answer to the following Queries
Create necessary relations and create indexing for accessing records faster.
1. Display supplier names for supplier who supply at least one part supplied by supplier s2
2. Get supplier names for supplier who supply all parts
3. Get supplier names for suppliers who do not supply part P2
4. Find supplier numbers for suppliers who supply at least all those parts supplied by supplier S2
5. Get a part numbers for parts that either weight more than 16 pounds, or are supplied by supplier S2, or both.
6. For each part, get the pat number and the total shipment quantity
7. For each supplier, get the supplier number and the total number of parts supplied
8. Get all Paris of supplier numbers such that the who suppliers are located in the same city
9. Get color and city for “non Paris” parts with weight greater than ten
10. Get part number for all parts supplied by more than one supplier
11. Get supplier numbers for supplier with less than the current maximum status in the “s” table
12. Get supplier names for supplier who supply at least one brown part

B] PL/SQL PROGRAMS

7a) Write a PL/SQL program to read number from a user and find out whether it is Odd or Even.
7b) Write a PL/SQL program to insert a row into emp table using variables
7c) Write a PL/SQL program to get the name and salary of employee whose eno is 501.(use %type)
8a) Write a PL/SQL program to display Salary of a employee whose eno is 502 by increasing with 500 if its salary is more than 3000.
8b) Write a PL/SQL program to read employee number from a user and increase its salary depends on the current salary as follows.
<table>
<thead>
<tr>
<th>Salary</th>
<th>Increment</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;= 5000</td>
<td>10%;</td>
</tr>
<tr>
<td>&lt;5000</td>
<td>05%</td>
</tr>
</tbody>
</table>
8c) Write a PL/SQL Block to read employee name from a user if it is exist display its salary otherwise display appropriate message using exception handling.
9a) Write a PL/SQL Block to insert add one row in employee table. Display appropriate message using exception handling on duplication entry of employee number.(use Dup_val_on_index exception)
9b) Write a PL/SQL program to read number from a user and find out whether it is Odd or Even.
9c) Write the PL/SQL program to retrieve the data from emp table?
10a) The L& T Pvt.ltd Company has maintaining Employee information contains employee details .The company has four departments. Any employee working in the company belongs to any one of the department. Write a PL/SQL block to insert a record in emp table and update the salaries of Blake and Clark by 2000 and 1500.Then check to see that the total salary does not exceed 20000. If total >20000 then undo the updates made to salaries of Blake and clerk?
10b) A table Product attributes pno, pname, sales price . A table old price attributes pno, old sales price. If the price of product pool1 is <4000 then change the price to 4000. The price change is to be recorded in the old price table with product number, date on which the price was last changed?

11. CURSORS
   a) Write a PL/SQL block that will display the name, dept no, salary of fist highest paid employees.
   b) Update the balance –stock in the item master table each time a transaction takes place in the item transaction table. The change in item master table depends on the itemID is already present in the item master then update operation is performed to decrease the balance stock by the quantity specified in the item transaction in case the itemid is not present in the item master table then the record is inserted in the item master table.
   c) The table trans has the following structure acno, transtype, trans date. The table bank has acno, bal, minbal. Assuming that the same acno exists in both tables update the bank
table. If trans.type='d' then Balance=bank.balance + trans.amount. if transtype='w' then balance = bank.balance-trans.amount. Take precaution in case of withdrawals.

12. TRIGGERS
   a) Write a PL/SQL block that will display the name, dept no ,salary of fist highest paid employees.
   b) Display sailors information using cursor. if the sailor is not available insert the sailors details
   c) Create pl/sql program to insert and update record in customer table using cursors
   d) Write a PL/SQL program for deletion of row from employee table using Triggers.
   e) Write a PL/SQL program to update a row from employee table using Triggers.

TEXT BOOK(S):

REFERENCE BOOK(S):
UNIT-I (10 Lectures)
INTRODUCTION - Algorithm definition, Pseudo code Specifications, Performance Analysis-Space Complexity, Time Complexity, Asymptotic Notations-Big-Oh, Omega, and Theta.
DIVIDE AND CONQUER - General Method, Finding Maximum and Minimum, Merge Sort, Quick sort, Strassen’s Matrix Multiplication.

UNIT-II (08 Lectures)
THE GREEDY METHOD - General Method, Real Knapsack Problem, Job sequencing with deadlines, Minimum-cost spanning trees- Prim’s Algorithm and Kruskal’s algorithm, Single source shortest Path.

UNIT-III (8 Lectures)
DYNAMIC PROGRAMMING - General method, All pairs shortest path, Matrix Chain Multiplication, Optimal Binary search trees, 0/1 Knapsack, the travelling salesman problem.

UNIT-IV (08 Lectures)
BACK TRACKING - The General Method, The n-Queens Problem, Sum of subsets, Graph coloring, Hamiltonian cycles, Knapsack Problem.

UNIT-V (08 Lectures)
BRANCH AND BOUND - General method, applications - Travelling sales person problem, 0/1 knapsack problem LC Branch and Bound solution, FIFO Branch and Bound solution.
NP-HARD AND NP-COMPLETE PROBLEMS - Basic concepts, Non-deterministic algorithms, NP-Hard and NP Complete Classes.

TEXT BOOKS:

REFERENCE BOOKS:
LAboratory Experiments

1. Write a program to implement the following sorting algorithms, measure and compare their time complexities.
   a) Quick sort
   b) Merge sort
   c) Insertion sort

2. Write a program for matrix multiplication of two matrices
   a) Conventional matrix multiplication
   b) Stassen’s matrix multiplication

   Compare the time complexities of both algorithms and fix the time difference boundary.

3. Write a program to find out minimum and maximum values of a list, with more than 1000 elements using iterative and divide and conquer methods. Compare the time complexities.

4. Write a program to find out the solution vector of knapsack problem using greedy method; consider the profits and weights of more than 10 objects.

5. Write a program to find the sequence of jobs to maximize the total profit. Where each job is associated deadline and profit, the application will get the profit if a job is completed within its deadline. Analyze the execution times of different number of jobs and propose the time complexity.

   Note: consider the jobs with single unit execution time.

6. Write a program to read a weighted connected graph to find out the minimum distances from a given vertex to all other vertices using dijkstra’s algorithm.

   Note: read the weighted graph in the form of matrix. Where the element $a_{ij}$ represents the cost of edge from $i^{th}$ vertex to $j^{th}$ vertex.

7. Implement the 0/1 knapsack algorithm and compare the output with greedy knapsack problem for same set of input objects. Compare its time complexities.

8. Write a program to read a weighted connected graph to find out the minimum distance between each pair of vertices (All pair shortest paths). Find its time complexity.

   Note: read the weighted graph in the form of matrix. Where the element $a_{ij}$ represents the cost of edge from $i^{th}$ vertex to $j^{th}$ vertex.

9. Find the matrix multiplication of matrices $A_0,A_1,A_2,\ldots,A_n$, to minimize the number of total elementary multiplications. Where in each consecutive pair of matrices, the number of first matrix columns is equal to number rows in second column.

10. Write a program to read a weighted connected and implement the below spanning tree algorithms
     a) Prims algorithm
     b) Krushkal algorithm

11. Write a backtracking algorithm to solve the problem of placing eight queens on (eight by eight) chess board. Two queens are said to attack each other if they are on the same row, Column or diagonal.
12. Write a recursive program for the below algorithms using backtracking method and find the time complexities
   a) Find the chromatic number(number of colors) of a connected graph
   b) Sum of subsets problem.

13. Consider a currency system with coins of decreasing value $c_1, c_2, c_3, \ldots, c_N$ rupees.
   Give an algorithm that computes
   a) The minimum number of coins required to give K rupees in change.
   b) The number of different ways to give K rupees in change.

TEXT BOOKS:

REFERENCE BOOKS:
VARDHAMAN COLLEGE OF ENGINEERING  
(AUTONOMOUS)

B. Tech. CSE II Year II Sem.  

PYTHON PROGRAMMING

Course Code: A4510

VCE-R18

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SYLLABUS

UNIT I:

Introduction to Python Programming: Features of Python, History of Python
Python Basics: Literal Constants, Variables and Identifiers, Data Types, Input/output Operations, Comments, Reserved Words, Indentation.

UNIT II:

Operators and Expressions: Arithmetic, Comparison, Assignment, Relational, Unary, Bitwise, Shift, Logical, Membership, Identity, Operator Precedence and Associativity, Expressions.
Decision Control Statements: Selection/Conditional Branching Statements – if, if-else, Nested if.
Basic Loop Structures/Iterative Statements: while, for, Nested loops, continue, break, pass statements.

UNIT III:

Data Structures: Lists, Tuple, Sets, Dictionaries
Introduction to Functions: Declaration and Definition, Variable Scope and Lifetime, Return Statements, Types of Arguments, Lambda function, Recursion, Random module

UNIT IV:

Python NumPy: Features of Numpy, NumPy ndarray, Data Types, Functions of NumPy Array, Numpy Array Indexing, Mathematical Functions on Arrays in NumPy

UNIT V:

Python Pandas: Pandas Features, Install Pandas, Dataset in Pandas, Data Frames, Manipulating the Datasets, Describing a Dataset, group by Function, Filtering, Missing Values in Pandas, Concatenating Data Frames

TEXT BOOKS:

T1: Python Programming using Problem solving Approach – Reema Thareja, Oxford University Press

REFERENCE BOOKS:

R2: Zelle, Python Programming: An Introduction to Computer Science. Franklin, Beedle & Assoc., 2010
LABORATORY EXPERIMENTS

Week 1:
1. Write a python program to find the area of triangle
2. Write a python program to take the marks of 5 courses and display the average of it.

Week 2:
1. Write a program that reads the user input for a number of seconds and prints out how many minutes and seconds that is.
   \( \text{(For instance, 200 seconds is 3 minutes and 20 seconds. [Hint: Use the } // \text{ operator to get minutes and the } \% \text{ operator to get seconds.])} \)
   2. Write a program that reads the user input to enter a length in centimeters. If the user enters a negative length, the program should tell the user that the entry is invalid. Otherwise, the program should convert the length to inches and print out the result. \( \text{[Hint: Consider 2.54 centimeters as 1 inch]} \)

Week 3:
1. Read the user input to enter a temperature in Celsius. The program should print a message based on the temperature:
   - If the temperature is less than -273.15, print that “The temperature is invalid” because it is below absolute zero.
   - If it is exactly -273.15, print that “The temperature is absolute 0”.
   - If the temperature is between -273.15 and 0, print that “The temperature is below freezing”.
   - If it is 0, print that “The temperature is at the freezing point”.
   - If it is between 0 and 100, print that “The temperature is in the normal range”.
   - If it is 100, print that “The temperature is at the boiling point”.
   - If it is above 100, print that “The temperature is above the boiling point”.
2. Write a Python program to find GCD (greatest common divisor) of two numbers using loops.

Week 4:
1. Write a program to print all Armstrong numbers between given range using for loop. \( \text{[Hint:- } 153=1^3+5^3+3^3 \text{ (use 2 digits for 2 squares, 3 digit for 3 cubes)} \)
2. Write a program that counts how many of the squares of the numbers from 1 to 100 end in a 4 and how many end in a 9.

Week 5:
1. Write a program that reads the user input to enter a List of integers. Do the following:
   (a) Print the total number of items in the list.
   (b) Print the last item in the list.
   (c) Print the list in reverse order.
   (d) Print Yes if the list contains a 5 and No otherwise.
   (e) Print the number of fives in the list.
   (f) Remove the first and last items from the list, sort the remaining items, and print the result.
   (g) Print how many integers in the list are less than 5.
   (h) Print the average of the elements in the list.
   (i) Print the largest and smallest values in the list.
   (j) Print the second largest and second smallest entries in the list.
   (k) Print how many even numbers are in the list.
Week 6:
1. Write a program that uses a dictionary that contains ten user names and passwords. The program should read the user input to enter their username and password. If the username is not in the dictionary, the program should indicate that the person is 'Not a valid user'. If the username is in the dictionary, but the user does not enter the right password, the program should say that the 'Password is valid'.

Week 7:
1) Write a python program to demonstrate various operations on tuples.
2) Write a python program to demonstrate various operations on sets

Week 8:
1) Write a python program to find factorial of a given number using recursion.
2) Write a python program to find sum of individual digits of a given number using recursion

Week 9:
1) Create a Numpy array and do the following
   a) How to replace items that satisfy a condition with another value in numpy array?
   b) How to replace items that satisfy a condition without affecting the original array?
   c) How to reshape an array?
   d) How to stack two arrays vertically?
   e) How to stack two arrays horizontally?

Week 10:
1. Create a Table and do the following using Pandas
   a) How to combine many series to form a data frame?
   b) How to assign name to the series’ index?
   c) How to get the items of series A not present in series B?
   d) How to get the items not common to both series A and series B?
   e) How to get the minimum, 25th percentile, median, 75th, and max of a numeric series?

Practice:
1. Implement a program in python to demonstrate the usage of python variables, data types, operators and I/O
2. Implementing python Decision making and Looping constructs
3. Implementing arrays and multidimensional arrays in python
4. Implementing python data types like lists and tuples.
5. Programs on python string manipulation operations
6. Programs on implementing set and dictionary data types in python
7. Programs on implementing functions and recursion in functions using python
8. Programs on implementing file operations in python

Assignment Questions:
1. What is a variable?
2. What are the primitive built-in types in Python?
3. When should we use """" (triple quotes) to define strings?
4. Assuming (name = “John Smith”), what does name[1] return?
5. What are the 3 types of numbers in Python?
6. What is the result of float(1)?
7. What is the result of bool(“False”)?
8. What are the falsy values in Python?
9. What is the result of 10 == “10”?
10. What is the result of “bag” > “apple”?
11. What is the result of not(True or False)?
12. What about name[-2]?
13. What about name[1:-1]?
14. How to get the length of name?
15. What are the escape sequences in Python?
16. What is the result of f"{2+2}+{10%3}"?
17. Given (name = “john smith”), what will name. title() return?
18. What does name.strip() do?
19. What will name.find(“Smith”) return?
20. What will be the value of after we run (x += 2)?
21. How can we check to see if name contains “John”?
22. What is the difference between 10 / 3 and 10 // 3?
23. What is the result of 10 ** 3?
24. Given (x = 1), what will be the value of after we run (x += 2)?
25. How can we round a number?
26. Under what circumstances does the expression 18 <= age < 65 evaluate to True?
27. What does range(1, 10, 2) return?
28. Name 3 iterable objects in Python.
29. What is the difference between a parameter and an argument?
30. All functions in Python by default return …?
31. What are keyword arguments and when should we use them?
32. How can we make a parameter of a function optional?
33. What happens when we prefix a parameter with an asterisk (*)?
34. What about two asterisks (**)?
35. What is scope?
36. What is the difference between local and global variables?
37. Why is using the global statement a bad practice?
38. Write a Python Program to Check Whether a String is Palindrome or Not
39. Write a Python Program to Sort Words in Alphabetic Order
40. Write a Python Program to Check if a Number is Odd or Even
41. Write a python program to check if a number is positive, negative or zero
42. Write a python program for demonstrating join() in strings
43. consider a string str="this is explaining string splitting". write a program for splitting the given string into a list of words.
44. consider a string str="this is explaining string replacing". write a program for replacing "this is" with "I am" in given string using replace() in strings
45. consider a string str="this is explaining string searching". write a program for searching for substring "explaining" in main string using find() in strings
46. Write a python program to print table of given number
47. Write a Python Program to Find ASCII Value of given Character
48. Write a python program to find whether given number is Armstrong number or not
49. Write a Python Program to Check Prime Number
50. python program to generate dictionary by reading values from key board.(use update())
51. Python Program to Check if a Given Key Exists in a Dictionary or Not(use keys())
52. Python Program to Generate a Dictionary that Contains Numbers (between 1 and n) in the Form (x as key ,x*x as values). (use fromkeys())
53. Python Program to Sum All the Items in a Dictionary (use sum())
54. Python Program to Multiply All the Items in a Dictionary
55. Python Program to Remove the Given Key from a Dictionary
56. Python Program to Map Two Lists into a Dictionary (one list as keys and other list as values)(use append(), dict(),zip())
57. Python Program to Count the Frequency of Words Appearing in a String Using a Dictionary (use dict(),zip() or without these functions)
58. Python Program to Replace all Occurrences of ‘a’ with $ in a String
59. Python Program to remove the nth Index Character from a Non-Empty String
60. Python Program to detect if Two Strings are Anagrams
61. Python Program to Form a New String where the First Character and the Last Character have been exchanged
62. Python Program to Count the Number of Vowels in a String
63. Python Program to Take in a String and Replace Every Blank Space with Hyphen
64. Python Program to Calculate the Length of a String Without Using a Library Function
65. Python Program to Remove the Characters of Odd Index Values in a String
66. Python Program to Calculate the Number of Words and the Number of Characters Present in a String
67. Python Program to Take in Two Strings and Display the Larger String without Using Built-in Functions
68. Python Program to Count Number of Lowercase Characters in a String
69. Python Program to Check if a String is a Palindrome or Not
70. Python Program to Calculate the Number of Upper Case Letters and Lower Case Letters in a String
71. Python Program to Check if a String is a Pangram or Not
72. Python Program to Accept a Hyphen Separated Sequence of Words as Input and Print the Words in a Hyphen-Separated Sequence after Sorting them Alphabetically
73. Python Program to Calculate the Number of Digits and Letters in a String
74. Python Program to Form a New String Made of the First 2 and Last 2 characters From a Given String
75. Python Program to Count the Occurrences of Each Word in a Given String Sentence
76. Python Program to check if a Substring is Present in a Given String
77. Write a function that returns the minimum of two numbers.
78. Write a function called THREE_FIVE that takes a number.
   a) If the number is divisible by 3, it should return “THREE”.
   b) If it is divisible by 5, it should return “FIVE”.
   c) If it is divisible by both 3 and 5, it should return “THREEFIVE”.
   d) Otherwise, it should return the same number.
79. Write a function for checking the speed of drivers. This function should have one parameter: speed.
   a) If speed is less than 70, it should print “Ok”.
   b) Otherwise, for every 5km above the speed limit (70), it should give the driver one demerit point and print the total number of demerit points. For example, if the speed is 80, it should print: “Points: 2”.
   c) If the driver gets more than 12 points, the function should print: “License suspended”
UNIT – I
INTRODUCTION: Network hardware, Reference models: OSI, TCP/IP, Internet, Connection oriented network and connectionless network.

THE PHYSICAL LAYER: Guided transmission media, wireless transmission media.

UNIT – II
THE DATA LINK LAYER: Design issues, error detection and correction, elementary data link protocols, sliding window protocols.

THE MEDIUM ACCESS SUBLAYER: Channel allocations problem, multiple access protocols: ALOHA, CSMA, Collision free protocols; Ethernet, Data Link Layer switching.

UNIT – III

UNIT – IV

UNIT – V
THE APPLICATION LAYER: Domain name system- DNS Name Space, Domain Resource Records, Name Servers.


LABORATORY EXPERIMENTS

Experiment – 1
1. Implementation of bit stuffing.

Experiment-2
2. Implementation of character stuffing.

Experiment- 3
3. Implementation of Cyclic redundancy check.

Experiment - 4
4. Implementation of hamming code.
Experiment - 5
5. Implementation of data encryption and decryption.

Experiment - 6

Experiment - 7
7. Implementation of the evolution of Distance Vector Routing algorithm.

Experiment – 8
8. Implementation of the evolution of Link State Routing algorithm.

Experiment – 9
9. Implementation of Stop and Wait protocol working.

Experiment- 10

Experiment- 11
11. Implement, and verify through a simulator, a program to create sub-network and assign addresses based on the number of hosts connected to the network.

Experiment- 12
Create a simulator to transfer of files from PC to PC using packet tracer software.
(Additional Practice)

Experiment- 13
Implementation of Iterative and Concurrent Echo Server using Connection Oriented Protocol (TCP) and Connection Less Protocol (UDP).
(Additional Practice)

TEXT BOOKS:

REFERENCE BOOKS:
UNIT – I
Coding and Decoding: Coding and Decoding, Arrow Method, Chinese coding, Series, Analogy, Odd man out.

UNIT - II
a) Articles and Tenses: Introduction, usage of articles, Omission of Articles, Types of tenses, Forms and Usage of tenses
b) Direction Sense: Introduction, Distance method, Facing Method and Shadow Method

UNIT – III
a) Blood Relations: Introduction, Direct, Puzzle and Coded models
b) Voices and Forms of Speech: Introduction, conversion of active and passive voice, conversions of direct and indirect speech.

UNIT – IV
a) Data Arrangements: Linear Arrangement, Circular Arrangement, Multiple Arrangements
b) Syllogisms: Introduction, Tick-Cross method, Inferential Technique, Venn-Diagram method

UNIT - V
a) Visual Reasoning: Patterns, Folded Images, Cubes and Analytical Reasoning
b) Sentence Correction: Subject-Verb Agreement, Pronoun Antecedent, Parallelism, Verb-Time Sequence Error, Determiners and Modifiers

REFERENCE BOOKS:
2. Test of Reasoning Paperback by Edgar Thorpe and Logical Reasoning by Arun Sharma.
MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Code: A4025

SYLLABUS

UNIT – I

ELASTICITY OF DEMAND & DEMAND FORECASTING: Elasticity of Demand - Meaning, Types, Measurement and Significance. Demand Forecasting - Meaning, Need, Methods of demand forecasting.

UNIT – II
PRODUCTION ANALYSIS: Production – Meaning, Production function, Production function with one variable input, Iso-quants and Iso-costs, MRTS, Least Cost Combination of Inputs, Law of returns to scale.

COST & BREAK EVEN ANALYSIS: Cost- Meaning, Cost Concepts - Opportunity cost, Fixed vs. Variable costs, Explicit costs Vs. Implicit costs, Marginal cost, Sunk cost. Break-even Analysis (BEA) - Determination of Break-Even Point (simple problems) - Significance and limitations of BEA.

UNIT – III
INTRODUCTION TO MARKETS: Market – Meaning, structure, Types of competition - Features of Perfect competition, Monopoly and Monopolistic Competition, Oligopoly - Price-Output Determination in case of Perfect Competition, Monopoly.


UNIT – IV
INTRODUCTION TO FINANCIAL ACCOUNTING: Accounting Principles - Concepts, Conventions - Double-Entry Book Keeping - Journal, Ledger, Trial Balance

PREPARATION OF FINANCIAL STATEMENTS: Final Account problems with simple adjustments.

UNIT – V
FINANCIAL ANALYSIS THROUGH RATIOS: Ratio – Meaning, importance - Types: Liquidity Ratios, Solvency Ratios, Turnover Ratios and Profitability ratios. (Simple problems).

CAPITAL BUDGETING: Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting - Payback Method, Accounting Rate of Return (ARR), Net Present Value Method, Profitability Index, Internal rate of return (simple problems).

TEXT BOOK:

REFERENCE BOOKS:
UNIT: I
1. Gender Sensitization: Why should we study it?
2. Socialization: Making Women, Making Men
   Introduction
   Preparing for womanhood
   Growing up male
   First lessons in caste
   Different masculinities
3. Just Relationships: Being Together as Equals
   Mary Kom and Onler
   Love and Acid just do not mix
   Love letters
   Mothers and fathers
   Further Reading: Rosa Parks-The Brave heart

UNIT: II
1. Missing Women: Sex Selection and Its Consequences
   Declining Sex Ratio
   Demographic Consequences
2. Gender Spectrum: Beyond the Binary
   Two or Many?
   Struggles with Discrimination
3. Additional Reading: Our Bodies, Our Health

UNIT: III
1. Housework: The Invisible Labour
   “My Mother doesn't work”
   “Share the load”
2. Women’s Work: Its Politics and Economics
   Fact and fiction
   Unrecognized and unaccounted work
   Further Reading: wages and conditions of work.

UNIT: IV
1. Sexual Harassment: Say No!
   Sexual harassment, not eve-teasing
   Coping with everyday harassment
   Further Reading: “Chupulu”
2. Domestic Violence: Speaking Out
   Is home a safe place?
   When women unite (Film)
   Rebuilding lives
   Further Reading: New Forums for justice.
3. Thinking about Sexual Violence
Blaming the Victim: “I Fought for my life…”
Further Reading: The caste face of violence.

UNIT: V

1. **Knowledge: Through the Lens of Gender**
   - Point of view
   - Gender and the structure of knowledge
   - Further Reading: Unacknowledged women artists of Telangana

2. **Whose History? Questions for Historians and Others**
   - Reclaiming a Past
   - Writing other Histories
   - Further Reading: Missing pages from modern Telangana history

**TEXT BOOK:**

**ADDITIONAL RESOURCES:**
www.worldofequals.org.in
SYLLABI FOR

III YEAR I SEMESTER
ARTIFICIAL INTELLIGENCE

Course Code: A4512

UNIT-I  (07 Lectures)
Introduction: AI problems, Intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, Structure of agents, Problem solving agents, Problem formulation.

UNIT-II  (08 Lectures)
Knowledge Representation & Reasons: Knowledge – Based Agents, the Wumpus world. Propositional Logic: Reasoning patterns in propositional logic - Resolution, Forward & Backward Chaining. Inference in First order logic: Propositional vs. first order inference.

UNIT-III  (10 Lectures)

UNIT-IV  (09 Lectures)
Constrain satisfaction problems: Backtracking search for CSPs local search for constraint satisfaction problems. Game Playing: Games, Min - Max algorithm, Optimal decisions in multiplayer games, Alpha-Beta pruning.

UNIT-V  (08 Lectures)
Planning: Classical planning problem, Language of planning problem, planning with state – space search, forward state spare search, backward state space search, Heuristics for state space search, Partial order planning Graphs, Planning graphs.

TEXT BOOK(S):

REFERENCE BOOKS:
UNIT-I


UNIT-II


UNIT-III
DESIGN CONCEPTS: Importance of modeling, Overview of modeling, conceptual model of Unified Modeling Language (UML), Architecture.

RELATIONSHIPS: dependency, Generalization, association, aggregation

COMMON MECHANISMS: Stereotypes: Include, extend, copy, type, tagged value and Constraints

UNIT-IV
STRUCTURAL MODELING (Terms, Concepts, Relations): Class diagram, Object diagram, Component diagram, Deployment diagram.


UNIT-V


TEXT BOOKS:
REFERENCE BOOKS:
2. Rajib Mall (2005), Fundamental of Software Engineering, PHI.

LABORATORY EXPERIMENTS

Do the following 8 exercises for any two projects given in the list of sample projects or any other projects:
4. Design Structural Diagrams using CASE tool
5. Design Behavioral Diagrams using CASE tools.
6. Develop test cases for unit testing and integration testing.
7. Develop test cases for various System and Regression testing techniques.

Sample Projects:
2. Online Bus Ticket Reservation System.
3. Exam Registration.
4. Library Management System.
5. Online course reservation system.
7. Software Personnel Management System.
8. Credit Card Processing.
10. Recruitment system.

TEXT BOOKS:
3. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education

REFERENCE BOOKS:
2. Rajib Mall (2005), Fundamental of Software Engineering, PHI.
WEB TECHNOLOGIES

Course Code: A4602

L T P C
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SYLLABUS

UNIT –I
HYPERTEXT MARKUP LANGUAGE: Introduction, Common tags, Lists, Tables, Form Elements, Frames.
CASCADING STYLE SHEETS: Introduction, Types of Style sheets, CSS properties: Text, Background, border, margin.
JAVA SCRIPT: Introduction, objects, event handling

UNIT-II
BOOTSTRAP: Introduction, Bootstrap with CSS, Images, Tables
XML: Introduction, DTD, XML Schema, XSLT, Types of parsers: DOM, SAX

UNIT-III
JDBC: Introduction, Types of JDBC Drivers, Process to establish a connection, Types of Statements, Result set Metadata
SERVLETS: Introduction to server side programming, web server, servlet life cycle, types of servlets, reading servlet parameters, initialization of servlet parameters, Sessions and Cookies.

UNIT-IV

UNIT-V
PHP: Introduction, variables, data types, constants, control structures, arrays, functions, working with forms and database.

TEXT BOOKS:
2. The complete Reference Java 2, 7th Edition by Patrick Naughton and Herbert Schildt. TMH
3. Java Server Pages – Hans Bergsten, SPD O’Reilly
4. An Introduction to Web Design + Programming, Wang, Katila, CENGAGE

REFERENCE BOOKS:
LABORATORY EXPERIMENTS

Week-1:
- HTML Program to work with Lists.
- HTML Program to work with tables.

Week-2:
- HTML Program to design login page, registration page.
- HTML program to design feedback form.

Week-3:
- CSS Program to work with background and border properties.
- Java script program to print multiplication table of the given integer.
- Java script program to validate the registration form contents with the following rules (Use RegExp Object):
  a) Username Must starts with Uppercase followed by set of lowercase letters or digits.
  b) Password must contain only uppercase letters and length must be in between 8 to 12.
  c) Phone number contains 10 digits.
E-mail must follow some predefined format (example@domain.com)

Week-4:
- Apply Various Bootstrap CSS Properties
- Create a DTD document to validate the XML document.
- Create a XML Schema document to validate the XML document.

Week-5:
- JDBC Program to create a student table in the database.
- JDBC Program to perform various DML Operations on the database using Statement.

Week-6:
- JDBC Program to perform various DML operations using Prepared Statement.
- JDBC Program to execute stored procedure using Callable Statement.
- JDBC Program to execute stored function using Callable Statement.

Week-7:
- Servlet program to read the parameters from user interface and display welcome message.
- Servlet program to read initialization parameters using ServletConfig and ServletContext object.

Week-8:
- Servlet program to work with HttpSession Object.
- Servlet program to work with Cookie.
- Servlet program to insert the form contents into the database using JDBC.

Week-9:
- JSP Program to print multiplication table.
- JSP Program to handle the exceptions.
- JSP Program to retrieve the student data from database based on his roll number.

Week-10:
- JSP Program to access bean information using useBean tag.
- JSP Program to authenticate the login details. If user is valid forward the control to success.html otherwise forward to fail.html.
Week-11:

- PHP program to work with associative arrays.
- PHP program to find factorial using Recursion.
- PHP Program to display the following.
  - a) Sum of array elements.
  - b) Product of array elements
  - c) Display array elements in sorted order
  - d) Display array elements in reverse sorted order.

Week-12:

- PHP Program to perform various DDL operations on MySQL database.
- PHP Program to perform various DML operations on MySQL database.

TEXT BOOKS:

2. The complete Reference Java 2, 7th Edition by Patrick Naughton and Herbert Schildt. TMH
4. An Introduction to Web Design + Programming, Wang, Katila, CENGAGE.

REFERENCE BOOKS:

B. Tech. CSE III Year I Sem. VCE-R18

BIG DATA ANALYTICS

Course Code: A4513

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SYLLABUS

UNIT – I
INTRODUCTION TO DATA MINING: Motivation, Importance, Definition of Data Mining, Kind of Data, Data Mining Functionalities, Kinds of Patterns, Classification of Data Mining Systems, Data Mining Task Primitives, Major Issues In Data Mining, Types of Data Sets and Attribute Values, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity.

PREPROCESSING: Data Quality, Major Tasks in Data Preprocessing, Data Reduction, Data Transformation and Data Discretization, Data Cleaning and Data Integration.

UNIT – II
DATA EXPLORATION: Data Warehouse basic concepts, Data Warehouse Modeling – data cube and OLAP, Data Warehouse Implementation, Data Generalization by Attribute-Oriented Induction

UNIT – III
MINING FREQUENT PATTERNS, ASSOCIATIONS AND CORRELATIONS: Basic Concepts, Frequent Item set Mining Methods Apriori, FP tree.

FREQUENT PATTERN AND ASSOCIATION MINING: Mining multilevel association rules, Mining Multi dimensional association rules, Constraint-Based Frequent Pattern Mining

UNIT – IV
CLASSIFICATION: Basic Concepts, Decision Tree Induction, Rule-Based Classification, nearest neighbor classifier, Bayesian classification, Support Vector Machines, Classification by Neural Networks, Ensemble Methods. Model Evaluation and Selection, Techniques to Improve Classification Accuracy.

UNIT – V
CLUSTER ANALYSIS: Basic Concepts of Cluster Analysis, Major Clustering Approaches, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Outlier Detection Techniques: statistical approaches, Proximity based outlier detection, density based outlier detection.

TEXT BOOK(S):

REFERENCE BOOK(S):
LABORATORY EXPERIMENTS

Working with HDFS

Week-1:
1. a) Basic file commands
   b) Web Based User Interface

Week-2:
2. Reading & Writing to files

Week-3:
3. Run a word count program

Week-4:
4. View jobs in the Web UI

Installation & Configuration for Hadoop Ecosystems

Week-5:
5. a) Types of installation (RPM’s & Tar files)
   b) Set up ‘ssh’ for the Hadoop cluster

MapReduce

Week-6:
6. a) Writing mapper programs
   b) Writing reducer programs

Week-7:
7. Word Count Job.

[Hands On]Hive

Week-8:
8. Partitions and Buckets.

Week-9:
9. Hive Tables (Managed Tables and External Tables)

Week-10:
10. a) Importing Data.
    b) Querying Data.

Week-11:

Week-12:
12. Pig Queries [Hands-on]
TEXT BOOK:

REFERENCE BOOKS:
INDIAN CONSTITUTION

Course Code: A4016

SYLLABUS

UNIT-I

Evolution of Indian constitution: Indian independence act 1947, formation of constituent assembly of India, committees of the constituent assembly, constitution of India drafting committee, brief study about Dr. B. R. Ambedkar, time line of formation of the constitution of India

UNIT-II

Structure of the constitution of India: Parts, schedules, appendices, constitution and government, constitution and judiciary

UNIT-III

Preamble to the constitution of India: Brief study about sovereignty, socialist, secularism, democracy, republic, justice (political justice, social justice, economic justice), liberty, equality, fraternity, unity & integrity

UNIT-IV

Acts: Right to education act, right to information act, anti-defection law, Jan Lokpal bill

UNIT-V

Fundamental rights: Right to equality, right to freedom (freedom of speech and expression, right to practice any profession etc.), right against exploitation, right to freedom of religion, cultural & education rights, right to property, right to constitutional remedies

TEXT BOOK:

REFERENCE BOOKS:
1) Subhash C. Kashyap, Our Constitution, National Book Trust, New Delhi, 2011.

JOURNALS/MAGAZINES
1. Indian Journal of Constitutional & Administrative Law

SWAYAM/NPTEL/MOOCs:
- B.R. Ambedkar: Liberal democracy and constitutional morality.
  https://nptel.ac.in/courses/109103135/24

SELF-LEARNING EXERCISES:
- Importance of vote in democracy
- Judicial independence
- The collegium system
- Federalism in India
- Election reforms by T.N.Seshan
INFORMATION SECURITY (PE-I)

Course Code: A4605

SYLLABUS

UNIT – I
INTRODUCTION: Computer security concepts, OSI security architecture, security attacks, security services, security mechanisms, A model for network security.

CLASSICAL ENCRYPTION TECHNIQUES: Symmetric Cipher Model, Substitute Techniques, Transposition Techniques.

UNIT – II
BLOCK CIPHER AND DATA ENCRYPTION STANDARDS: Traditional Block Cipher Structure, Data Encryption Standard, Strength of DES, Block Cipher Design Principles.

ADVANCED ENCRYPTION STANDARDS: AES Structure, AES Transformation Functions, AES Key Expansion.

UNIT – III


UNIT – IV
CRYPTOGRAPHIC HASH FUNCTIONS: Applications of Cryptographic Hash Functions, Hash Functions Based on Cipher Block Chaining, Secure Hash Algorithm (SHA-512).

DIGITAL SIGNATURE: Digital Signature Requirements, Attacks and Forgeries, Properties, Digital Signature Algorithm.

UNIT – V

EMAIL SECURITY: Pretty Good Privacy (PGP)

TEXT BOOKS:

REFERENCE BOOKS:
VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

B. Tech. CSE III Year I Sem. VCE-R18

FUZZY LOGIC AND NEURAL NETWORKS (PE-I)

Course Code: A4551

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SYLLABUS

UNIT-I
Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions.

UNIT-II
Fuzzification, Membership value assignment, development of rule base and decision-making system, Defuzzification to crisp sets, Defuzzification methods

UNIT-III
Basic Concepts of Neurons, Artificial Neural Networks (ANN) - their biological roots and motivations. Comparison Between Artificial and Biological Neural Networks, Learning Process: Error-Correction Learning, Memory-Based Learning, Hebbian Learning, Competitive Learning, Boltzman Learning

UNIT-IV
Single-Layer Perceptrons, Multi-Layer Perceptrons, Radial Basis Function Networks, Associative Memories, Self-Organizing Networks

UNIT-V

TEXT BOOKS:

REFERENCE BOOKS:

JOURNALS/MAGAZINES
1. Journal of Information Organization (JIO)
2. Open Source for You
3. PC Quest.

SWAYAM/NPTEL/MOOCs:
1. https://nptel.ac.in/courses/127105006/
2. https://nptel.ac.in/courses/111/102/111102130/
PREREQUISITES:
Following are the prerequisites to extract the maximum knowledge from the course:

- A strong mathematical background.
- Proficiency with algorithms.
- Critical thinking and problem solving skills.
UNIT-I  
INTRODUCTION AND THE TAXONOMY OF BUGS: Purpose of testing, some dichotomies, a model for testing, the consequences of bugs, taxonomy for bugs, some bug statistics.

UNIT-II  
FLOW GRAPHS AND PATH TESTING: Path testing basics, predicates, path predicates and achievable paths, path sensitizing, path instrumentation.

UNIT-III  
PATHS, PATH PRODUCTS AND REGULAR EXPRESSIONS: Path products and path expressions, a reduction procedure, applications, regular expressions and flow anomaly detection.

UNIT-IV  
TRANSACTION FLOW TESTING AND DATA FLOW TESTING: Transaction flows, transaction flow testing techniques, dataflow testing basics, data flow testing strategies, application, tools and effectiveness.

UNIT-V  
Testing tools: JUnit: Introduction, Environment setup, test framework, usage, API, Writing tests cases.  

TEXT BOOKS:  

REFERENCE BOOKS:  
UNIT-I
FINITE AUTOMATA (FA): Introduction, model and behavior, Deterministic Finite Automata (DFA) - Formal definition, simpler notations (state transition diagram, transition table), language of a DFA. Nondeterministic Finite Automata (NFA)-definition of NFA, language of an NFA, Equivalence of Deterministic and Nondeterministic Finite Automata, Finite Automata with Epsilon Transitions, Eliminating epsilon transitions, Minimization of DFA, Finite automata with output (Moore and Mealy machines)

UNIT-II
REGULAR EXPRESSIONS (RE): Introduction, algebraic laws for Regular Expressions, Finite Automata and Regular Expressions-from DFA's to Regular Expressions, converting Regular Expressions to Automata. Proving languages to be non-regular -Pumping lemma. Closure properties of regular languages (Proofs not required).

UNIT-III
CONTEXT- FREE GRAMMARS (CFG): Formal definition, sentential forms, leftmost and rightmost derivations, the language of a CFG. Parse tree, ambiguous grammar.
SIMPLIFICATION OF CFG: Removing useless symbols, Null (epsilon) productions and unit productions. Normal forms –CNF, GNF. Proving that some languages are not context free -Pumping lemma for CFLs, closure properties of CFLs (Proofs not required).

UNIT-IV
PUSHDOWN AUTOMATA (PDA): Definition of the Pushdown Automata, the languages of PDA (acceptance by final state and empty stack), Equivalence of PDA's and CFG's-CFG to Pushdown Automata, Pushdown Automata to CFG. Deterministic PDA and Non-Deterministic PDA.

UNIT- V
TURING MACHINES (TM): Formal definition and behavior, languages of a TM, TM as accepters, computable functions, Types of TMs.
RECURSIVE AND RECURSIVELY ENUMERABLE LANGUAGES (REL): Properties of recursive and recursively enumerable languages.
COMPUTABILITY THEORY: Context sensitive language and linear bounded automata (LBA), Chomsky hierarchy, post's correspondence problem (PCP).

TEXT BOOKS:

REFERENCE BOOKS:
SYLLABI FOR

III YEAR - II SEMESTER
MOBILE APPLICATION DEVELOPMENT

Course Code: A4604

L T P C 3 0 2 4

SYLLABUS

UNIT - I : ANDROID INTRODUCTION (5 LECTURES)

UNIT – II : WORKING WITH ANDROID APPLICATIONS (5 LECTURES)
Creating first android application, Anatomy of android application, Deploying Android app on USB connected Android device, Core Building Blocks of Android application, Activity life cycle, Intent Types, Linking activities by using EXTRAS.

UNIT – III : FRAGMENTS AND UI WIDGETS (11 LECTURES)
Introduction to Fragments, Fragments life cycle, Layouts in Android, Managing changes to screen orientation, Utilizing the Action Bar.


UNIT – IV : WORKING WITH APPLICATIONS (11 LECTURES)
Working with Menus: Option menu, Popup menu

Working with Images: ImageView, ImageSwitcher
Working with Alert Dialog, Alarm manager, SMS messaging, Sending E-mail, Media Player, Using camera for taking pictures, recording video, Handling Telephony Manager

UNIT – V : WORKING WITH DATABASE AND PUBLISH APK (10 LECTURES)

Database: The SQLite database, Connecting with the SQLite database and CRUD (Create, Read, Update and Delete) operations.

Publishing android applications: preparing for publishing, Deploying APK files

TEXT BOOKS:

REFERENCE BOOKS:
2. Reto Meier, Professional Android 4 Application Development, Wiley India Pvt Ltd

Web Links:
LABORATORY EXPERIMENTS

1. Create an android app to visit a specified webpage (Use Implicit Intent)
2. Create an android app to design login control and validate login details (Use Explicit Intent)
3. Create an android app to perform mathematical operations (+, -, *, /, %). (Use buttons, edittext, toast controls)
4. Create an android app to display name of the country from the list (Use spinner control)
5. Create an android app to calculate age of a person (Use DatePicker control)
6. Create an android app to demonstrate AlertDialog
7. Create an android app to demonstrate WebView control
8. Create an android app to illustrate a progressbar
9. Create an android app to demonstrate list fragment
10. Create an android app to demonstrate dialog fragment
11. Create an android app to demonstrate option menu, handling listeners
12. Create an android app to scroll list of images and display details of images (name, size etc) using ImageSwitcher control
13. Create an android app to demonstrate mediaplyer
14. Create an android app to show details phone contacts, implement calling, receiving features
15. Create an android app to demonstrate camera
16. Create an android app to demonstrate sending e-mail
17. Create an android app to perform insert, update, delete operations on student database

TEXT BOOKS:

REFERENCE BOOKS:
2. Reto Meier, Professional Android 4 Application Development, Wiley India Pvt Ltd/

Web Links:
https://developer.android.com/reference
UNIT – I: Introduction – Well-posed learning problems, Designing a learning system, Perspectives and issues in machine learning Concept learning and the general to specific ordering – Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis

UNIT – II: Decision Tree learning – Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning

UNIT – III: Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum likelihood and least squared error hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum description length principle, Bayes optimal classifier, Gibbs algorithm, Naïve Bayes classifier, An example learning to classify text, Bayesian belief networks The EM algorithm


TEXT BOOKS:
- Machine Learning – Tom M. Mitchell, – MGH

REFERENCE BOOKS:
- Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995.
- Machine Learning by Peter Flach , Cambridge.
LABORATORY EXPERIMENTS

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.

2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.

3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.

4. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.

5. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Calculate the accuracy, precision, and recall for your data set.

6. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set.

7. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering.

8. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions.

9. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

10. Let $y = w_1x_1 + w_2x_2 + w_3x_3 + w_4x_4 + w_5x_5 + w_6x_6$, where $(x_1, x_2, x_3, x_4, x_5, x_6) = (4, -2, 3.5, 5, -11, -4.7)$. Try to maximize this equation by using the genetic algorithm for the best possible values after a number of generations.

TEXT BOOKS:

- Machine Learning – Tom M. Mitchell, – MGH.

REFERENCE BOOKS:

- Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995.
- Machine Learning by Peter Flach , Cambridge.
UNIT-I
**Cloud Delivery Models:** IaaS, PaaS, SaaS – Open Source Private Cloud Software: Eucalyptus, Open Nebula, Open Stack. Features of SaaS using Owncloud **Implementing** IaaS in Cloud Using Cloudbolt: Create, manage Infrastructure services. Technology Used: Virtualbox and cloudbolt

UNIT-II
**Introduction:** The promise of the cloud, the cloud service offerings and Deployment model, Challenges in the cloud
**Broad Approaches to Migrating into Cloud:** Why Migrate? Deciding on cloud migration.
**The seven step model of Migration into Cloud:** Migration Risks and Mitigation.
**Managing Cloud Services:** Organizational Issues
**Administering Cloud Services:** Service Level Agreements (SLA) and Monitoring Support, Billing and Accounting, Technical Interface, Managing Cloud Resources, Maintaining Connections.
**Implementing** User Management in Cloud using Owncloud. Create, manage user and group of user accounts. **Technology Used:** Apache, PHP, MySql and Owncloud.

UNIT-III
**Data Center Technology & Virtualization:** Characteristics of Virtualized Environments - Taxonomy of Virtualization Techniques – Virtualization and Cloud Computing – Pros and Cons of Virtualization - Implementation Levels of Virtualization. **Technology Used:** VirtualBox. Installation and Introduction to VirtualBox. Create and run Virtual machines on Open source Operating systems.

UNIT-IV
**Cloud Security fundamentals:** Vulnerability assessment tool for cloud, Privacy and Security in cloud, Identity Access Management in Cloud. (IAM)
**Cloud computing security architecture:** Architectural Considerations- General Issues, Trusted Cloud computing, Secure Execution Environments and Communications, Micro-architectures; Identity Management and Access control Identity management, Access control, Autonomic Security
**Cloud computing security challenges:** Virtualization security management virtual threats, VM Security Recommendations, VM-Specific Security techniques. **Create And Manage AWS Users and Groups, And Use Permissions to Allow and Deny their Access to AWS Resources by using IAM. Learn and Practice AWS MFA for extra layer security on user authentication.**

UNIT-V
**Roadmap for Enterprise Cloud Computing:** Introduction, Quick wins using Public Clouds, Future of Enterprise Cloud Computing: Commoditization of the data center, Inter-operating Virtualized Data Centers, Convergence of private and public clouds, Generalized ‘cloud’ services.

**Write** Case study on Amazon S3 - Discuss technical description and organizational usage with its impact.**Write** case study on Windows Azure. Discuss technical description and organizational usage with its impact.

**TEXT BOOKS:**

**REFERENCE BOOKS:**
1. Barrie Sosinsky, Cloud Computing Bible, Wiley India, FirstEdition

**LABORATORY EXPERIMENTS**
1. **Implementing** IaaS in Cloud Using Cloudbolt
   a. Create, manage Infrastructure services.
   b. Technology Used: Virtualbox and cloudbolt

2. **Installation** and **Understanding** features of IaaS using Open stack
   a. **Technology Used:** Open Stack

3. **Implementing** User Management in Cloud using Owncloud.
   a. **Create, manage** user and group of user accounts.
   b. **Technology Used:** Apache,PHP,MySql and Owncloud

4. **Installation** and Introduction to VirtualBox
   a. **Create** and **run** Virtual machines on Open source Operating systems.
   b. **Technology Used:** VirtualBox

5. **Installation** and **Understanding** Features of SaaS using Owncloud
   a. **Install** Apache webserver
   b. **Install** PHP and MySql
   c. **Technology Used:** Apache,PHP,MySql and Owncloud

6. **Create And Manage AWS Users and Groups, And Use Permissions to Allow and Deny their Access to AWS Resources by using IAM. Learn and Practice AWS MFA for extra layer security on user authentication.**

7. **Write** Case study on Amazon S3
   a. Discuss technical description and organizational usage with its impact.
8. **Write** case study on Windows Azure.
   
a. Discuss technical description and organizational usage with its impact.

**TEXT BOOKS:**


**REFERENCE BOOKS:**

VARDHAMAN COLLEGE OF ENGINEERING  
(AUTONOMOUS)  
B. Tech. CSE III Year II Sem.  
VARDHAMAN COLLEGE OF ENGINEERING  
(AUTONOMOUS)  
B. Tech. CSE III Year II Sem.  
VCE-R18

PRODUCT REALIZATION

Course Code: A4024  

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SYLLABUS

UNIT-I  
Module 1: Introduction to Product Realization:  
Introduction to Product Realization, Need for Product Realization, Product realization process, Case Study of Product Realization for Global Opportunities

UNIT-II  
Module 2: Planning of Product Realization:  
Plan and develop the processes needed for product realization, Defining Quality objectives and requirements, establish processes documents. Needs - verification, validation, monitoring inspection and test activities (inspection nodes) and criteria for product acceptance and record needed. Case study on timeline of Product realization planning (Gnatt Chart)
Module 3: Customer-Related Processes:  
Product information Enquiries, contracts or order handling Customer feedback including customer complaints, A field survey

UNIT-III  
Module 4: Design and Development:  
Review verification and validation of each design and development stages, Functional and performance requirements, Information for purchasing, production and service provisions, review and validation, Develop a Design model of the product.
Module 5: Purchasing, Production and Service Provision:  
Purchasing information, Vendors evaluation and approval process, Verification of purchased product. Control of production, service provision, validation of processes for production and service provision, Identification and tractability, Customer property and Preservation of product.

UNIT-IV  
Module 6: Control of Monitoring and Measuring Equipment:  
Monitoring and measurements - Calibrated or verified, Adjusted or re-adjusted, Identified to determined the calibration status, Safeguarded from adjustment and Protection from change and deterioration

UNIT-V  
Module 7: Regulatory Investigation & Identification:  
Various regulatory bodies, roles and responsibilities, model of comprehensive document for the body of information about an investigational product

TEXT BOOKS:  

REFERENCE BOOKS:  
2. Renuka Thota, Suren Dwivedi, Implementation of product realization concepts in design and manufacturing courses, University of Louisiana-Lafayette
SWAYAM/NPTEL:
1. Product Design and Manufacturing - https://nptel.ac.in/courses/112104230/2#
2. Product Design and Development - https://nptel.ac.in/courses/112107217/#

LIST OF EQUIPMENT USED:
1. Computer System (PCs)
WARDHAMAN COLLEGE OF ENGINEERING  
(AUTONOMOUS)  
B. Tech. CSE III Year II Sem.  
VCE-R18  
ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE  

Course Code: A4015  

SYLLABUS  

UNIT-I  
Module 1: Introduction to traditional knowledge and basic structure of Indian Knowledge System:  
Features of Indian Traditions: Nature and Characteristics of traditional knowledge-scope and  
importance-kinds of traditional knowledge-traditional knowledge Vs western knowledge  

UNIT-II  
Module 2: Philosophical Tradition and Protection of traditional knowledge: Significance of traditional  
knowledge protection-value of traditional knowledge in global economy-role of government to  
harness traditional knowledge –Various Acts regarding protection of Traditional Knowledge  

UNIT-III  
Module 3: Modern Science and Indian Knowledge System: Historical Background- the global  
problem today-Indian contributions to global science  

UNIT-IV  
Module 4: Yoga and Holistic Health care: Science and Spirituality in India- the need for both outer  
and inner sciences- yogic science  

UNIT-V  
Module 5: Indian Artistic Tradition: Visual arts and culture- the journey of Indian art from traditional  
to modern era  
Module 6: Case studies: Conduct Field Work- Collect Data- Conducting projects-Writing Project  
Report  

REFERENCE BOOKS:  
1. Sengupta, Nirmal. Traditional Knowledge in Modern India: Preservation, Promotion, Ethical  
2. V. Sivaramakrishnan (Ed.), Cultural Heritage of India-course material, Bharatiya Vidya Bhavan,  
3. Swami Jitatmanand, Holistic Science and Vedant, Bharatiya Vidya Bhavan  
4. VN Jha (Eng. Trans.), Tarkasangraha of Annam Bhatta, International Chinmay Foundation,  
Velliarnad, Ernakulam  
5. Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkata  
6. GN Jha (Eng. Trans.), Ed. RN Jha, Yoga-darshanam with Vyasa Bhashya, Vidyanidhi Prakashan,  
Delhi 2016
VAROHAMAN COLLEGE OF ENGINEERING  
(AUTONOMOUS)  
B. Tech. CSE III Year II Sem.  
VCE-R18  
ROBOTIC PROCESS AUTOMATION DESIGN & DEVELOPMENT (PE-II)  
Course Code: A4553  

SYLLABUS  

UNIT-I  
PROGRAMMING BASICS & RECAP  
(10 Lectures)  

UNIT-II  
RPA CONCEPTS  
(10 Lectures)  

UNIT-III  
RPA TOOL INTRODUCTION & BASICS  
(12 Lectures)  

UNIT-IV  
ADVANCED AUTOMATION CONCEPTS AND TECHNIQUES  
(11 Lectures)  
UNIT-V
EMAIL AUTOMATION & EXCEPTIONAL HANDLING (9 Lectures)
Email Automation - Email Automation - Incoming Email automation - Sending Email automation - Debugging and Exception Handling - Debugging Tools - Strategies for solving issues - Catching errors.

TEXT BOOKS:

REFERENCE BOOKS:
1. Frank Casale (Author), Rebecca Dilla (Author), Heidi Jaynes (Author), Lauren Livingston (Author), Introduction to Robotic Process Automation: a Primer, Institute of Robotic Process Automation.
SYLLABUS

UNIT –I
Explore the Network - Globally Connected, LANs, WANs, and the Internet, The Network as a Platform The Changing Network Environment.
Configure a Network Operating System - IOS, Basic Device Configuration, and Address Schemes: Given an IP addressing scheme, configure IP address.
Network Protocols and Communications - Rules of Communication, Network Protocols and Standards Data Transfer in the Network

UNIT-II
Network Layer: Network Layer Protocols, Routing, Routers and Router basic configurations. IP Addressing, Configuring IPv4 and IPv6 Network Addresses to provide connectivity in small to medium-sized business networks, Subnetting IP Networks.
Build a Small Network: Network Design, Network Security, Basic Network Performance,

UNIT-III
Routing Concepts: Router Initial Configuration, Routing Decisions, Router Operation,
Static Routing: Implement Static Routes, Configure Static and Default Routes, Dynamic Routing: Dynamic Routing Protocols, RIPv2, The Routing Table, Switched Networks

UNIT-IV
Switch Configuration: Basic Switch Configuration, Switch Security
VLANs: VLAN Segmentation, VLAN Implementations, Inter-VLAN Routing Using Routers,

UNIT-V
Access Control Lists: ACL Operation, Standard IPv4 ACLs
DHCP: DHCPv4, 2 DHCPv6
NAT for IPv4: NAT Operation, Configure NAT

TEXT BOOKS:

REFERENCE BOOKS:
1. CCNA Routing and Switching 200-125, Odom Wendell, Official Cert Guide and Network Simulator Library
UNIT-I
SDLC: Introduction to SDLC, Agile Model.

UNIT-II

UNIT-III
UNIT TESTING – CODE COVERAGE:JUnit, nUnit & Code Coverage with Sonar Qube, SonarQube – Code Quality Analysis.
ARTIFACT MANAGEMENT: Nexus, JFrog Artifactory, JFrog Artifactory as Kubernetes Registry, Helm chart for Microsoft Azure Pipeline.

UNIT-IV
CONTINUOUS DELIVERY: Software components can be released in short cycles, Every Change is automatically deployed to Dev environment.
CONTINUOUS DEPLOYMENT: Extends Continuous Delivery, Every Change is automatically deployed to Production, CD Flow.
Continuous Deployment: Containerization with Docker: Introduction to Docker, Images & Containers, DockerFile, Working with containers and publish to Docker Hub.

UNIT-V
AWS & AZURE – CLOUD: Introduction to AWS & Azure Clouds, Pipeline of AWS & Azure Clouds – CI/CD.

TEXT BOOKS:
1) The DevOps Handbook:: How to Create World-Class Agility, Reliability, and...
   By Gene Kim, Jez Humble, Patrick Debois, John Willis
2) Practical DevOps By Joakim Verona

REFERENCE BOOKS:
1) DevOps for Developers By Michael Huttermann.
UNIT – I
INTRODUCTION TO COMPILERS: Definition of compiler, interpreter and its differences, the phases of a compiler, role of lexical analyzer, LEX-lexical analyzer generator.
PARSING: context free grammar, derivations, parse trees, ambiguity, elimination of left recursion, left factoring, top-down parsing– backtracking, recursive-descent parsing, predictive parsers, LL(1) grammars.

UNIT-II
BOTTOM-UP PARSING: Definition of bottom-up parsing, handles, handle pruning, stack implementation of shift-reduce parsing, conflicts during shift-reduce parsing, LR grammars, LR parsers-simple LR, canonical LR and Look Ahead LR parsers, handling of ambiguous grammar, YACC-automatic parser generator.

UNIT-III
SYNTAX-DIRECTED TRANSLATION: Syntax directed definition, construction of syntax trees, S-attributed and L-attributed definitions, and translation schemes.
INTERMEDIATE CODE GENERATION: Intermediate forms of source programs– abstract syntax tree, polish notation and three address code, types of three address statements and its implementation.

UNIT-IV
TYPE CHECKING: Definition of type checking, type expressions, type systems, static and dynamic checking of types, specification of a simple type checker, equivalence of type expressions.

UNIT-V
CODE OPTIMIZATION: Organization of code optimizer, basic blocks and flow graphs, the principal sources of optimization, the dag representation of basic block.
CODE GENERATOR: Design issues, object code forms, the target machine, a simple code generator, peephole optimization.

TEXT BOOK(S):

REFERENCE BOOK(S):
VARDHAMAN COLLEGE OF ENGINEERING  
(AUTONOMOUS)  
B. Tech. CSE III Year II Sem.  
VCE-R18  
FUNDAMENTALS OF JAVA (OPEN ELECTIVE)  

Course Code: A4531  

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SYLLABUS

UNIT – I
Introduction to OOP: Evolution of Java, OOP principles, Java Buzzwords, Implementing Java program, JVM, Data Types, Variables, Type conversions and Casting, Operators, Control statements, Arrays.

CLASS, METHODS, OBJECTS AND CONSTRUCTORS: Classes, Objects, Methods, Constructors, this keyword, Overloading Methods and Constructors, Argument passing, Exploring String class.

UNIT – II
INHERITANCE: Inheritance Basics, Using super, Multilevel Hierarchy, Method Overriding, Dynamic Method Dispatch, Abstract classes, final keyword.

UNIT – III
EXCEPTION HANDLING: Exception-Handling Fundamentals, Exception Types, Using try catch, throw throws and finally keywords, Built-in Exceptions, Creating own exception subclasses.
MULTITHREADING: Life cycle of a thread, creating threads, thread priorities, Synchronizing threads, Interthread Communication.

UNIT – IV
COLLECTIONS FRAMEWORK: Collection classes- ArrayList, LinkedList, HashSet, TreeSet, Date.
EVENT HANDLING: Delegation Event Model, Event Sources, Event Classes, Event Listener Interfaces, Handling Mouse and Keyboard Events, Adapter classes.

UNIT – V

TEXT BOOKS:

REFERENCE BOOKS:
SYLLABUS

UNIT - I
INTRODUCTION TO OPERATIONS RESEARCH: Basic definitions, Scope, objectives, phases, models and limitations of Operations Research. Linear Programming Problem, Formulation, Graphical solution of Linear Programming Problem.

ANALYTICAL METHODS: Basic simplex method, Artificial variables techniques, Big-M method, Two-phase method, Degeneracy.

UNIT - II

ASSIGNMENT MODEL: Formulation, Hungarian method for optimal solution, solving unbalanced problem, maximization Problem, Traveling salesman problem as assignment problem.

UNIT - III
SEQUENCING MODELS: INTRODUCTION: Johnsons Rule, Processing n Jobs through two machines, processing n Jobs through three machines, processing n Jobs through m Machines, Processing two Jobs through m machines.

QUEUING THEORY: Introduction, Single Channel, Poisson arrivals, exponential service times with infinite population and finite population models.

UNIT - IV
REPLACEMENT MODELS: Replacement of Items that Deteriorate whose maintenance costs increase with time without change in the money value, Replacement of Items that Deteriorate whose maintenance costs increase with time with change in the money value, Replacement of items that fail suddenly, individual replacement policy, group replacement policy.

INVENTORY MODELS: Inventory costs, Models with deterministic demand model: (a) Demand rate uniform and production rate infinite, (b) Demand rate non-uniform and production rate infinite, (c) Demand rate uniform and production rate finite. Price discounts.

UNIT - V
GAME THEORY: Competitive game, rectangular game, saddle point, minimax (maximin) method of optimal strategies, value of the game. Solution of games with saddle points, dominance principle, Rectangular games without saddle point, mixed strategy for 2 X 2 games. Graphical method.


TEXT BOOKS:
REFERENCE BOOKS: