Dayananda Sagar University Bengaluru

DSU live the dream

HANDBOOK

Programme: M. Tech - CSE
Academic Batch: (2020-2022)

Department of Computer Science and Engineering,
School of Engineering

DAYANANDA SAGAR UNIVERSITY

DevaraKaggala Halli,
Harohalli, Kanakapura Main Road,
Ramanagaram, Bengaluru, Karnataka.

SCHOOL OF ENGINEERING

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

HANDBOOK

FOR

M. Tech-Computer Science & Engineering

2020-2022

M. Tech-Computer Science & Engineering

VISION AND MISSION

Vision

• To develop pool of high caliber professionals, researchers and entrepreneurs in the areas of Computer Science & Engineering and Information Technology with exceptional technical expertise, skills and ethical values, capable of providing innovative solutions to the national and global needs.

Mission

• To create a robust ecosystem where academicians, concept developers, product designers, business incubators, product developers, entrepreneurs, mentors and financial institutions are brought together under one platform of the department.

• To establish Project Environment in the Department with open-source tools, provide hands-on experience to students by establishing a process to channelize their effort towards acquiring relevant competencies and skills in their chosen technology areas and domains.

• To create continuous learning environment for faculty and establish Research Centers in collaboration with Industries and Institutions of National/International repute and conduct research in emerging areas as well as socially relevant technical and domain areas through funded research projects.

PROGRAM EDUCATIONAL OBJECTIVES

Program Educational Objectives (PEO's):

- **PE-O1**: Graduates will compete on a global platform to pursue their professionalcareers/higher education/ research in various fields of Computer science and Engineering.
- **PE-O2**: Graduates will acquire skills to define a problem, design an appropriate solution for the problem, and apply effectively in Academics/Industry/Research fields.
- **PE-O3**: Work in teams, collaborating in inter disciplinary boundaries and thus playingan essential role in the growth towards societal and industrial needs.
- **PE-O4**: Graduates will continue learning and successfully growing to meet the constantchanges in technology and development, research, engineering

TABLE OF CONTENTS

GOVERNING REGULATIONS FOR MASTER OF TECHNOLOGY (M. TECH)-2020

PREAMBLE

The School of Engineering under Dayananda Sagar University (DSU) provides Science & Technology based education leading to the development of high caliber engineers suitable for Industry and Scientific Organization. The curriculum focuses on knowledge-based course work integrated with skill development as a part of training. It equally helps in inculcating the scientific temper for the lifelong processes of learning. At the Under Graduate level, a candidate goes through the foundation courses in Science, Humanities & Engineering. Each department ensures that the courses cover both the core & electives courses, as required. Provision for Institutional elective help the candidates to acquire interdisciplinary knowledge base or specialize significantly in an area outside the parent discipline.

DEFINITIONS OF KEY WORDS

(i) **Academic Year:** Two consecutive odd, even semesters and a summer term for make up if required.

(ii) **Course:** Usually referred to as a subject, a course may consist of any of Lecture/Tutorials/Practical /Seminar/Mini project/Project work.

(iii) **Credit:** A unit by which the course work is measured. One credit is equivalent to one hourof lecture or one hour of tutorial or two hours of laboratory/practical/ workshop practice per week.

(iv) **Credit Point:** It is the product of grade point and number of credits per course.

(v) **Cumulative Grade Point Average (CGPA):** It is the measure of overall cumulative performance over all semesters. It is expressed up to two decimal places.

(vi) **First Attempt:** If a candidate has completed all formalities of academic requirement in a term and become eligible to attend the examinations and attend all the end semester examinations, such attempt shall be considered as first attempt.

(vii) **Grade Point:** It is a numerical weight allotted to each letter grade on a 10-point scale.

(viii) **Letter Grade:** It is an index of the performance in a said course. Grades are denoted by alphabets.

(ix) **Programme:** An educational activity leading to award a degree or Certificate.

(x) **Semester Grade Point Average:** It is a measure of performance during a semester. It shall be expressed up to two decimal places.

(xi) **Transcript:** Based on the grades earned, a grade certificate shall be issued after every semester to the candidate registered.

(xii) **Failure:** It is the case of appearing for Semester End Examinations, but fails to obtain minimum passing marks in Semester End Examinations.

(xiii) **Detain**: It is the case of not satisfying the eligibility criteria w.r.t Attendance /Internal Assessment in each course to appear for Semester End Examination.

(xiv) **Audit Course:** A course to be taken by the student without benefit of a grade or a credit.

(xv) **Not Fit for The Program (NFFTP)**: It is the failure of satisfying the criteria laid down by regulations to continue the program of study, which leads to the termination from the University

RULES AND REGULATIONS

PG 1. All M. Tech programmes offered by the University shall be governed by DSU M. Tech Rules and Regulations – 2021.

PG 2. The M. Tech. rules and regulations shall be applicable to any new discipline(s) that may be introduced in future.

PG 3. A candidate shall become eligible for the award of the M.Tech. Degree after fulfilling all the academic requirements as prescribed by the M.Tech. Rulesand Regulations of DSU.

PG 4. ELIGIBILITY FOR ADMISSION

PG 4.1: Admission to First Year Master of Technology shall be open to candidates who have passed FOUR YEAR Bachelor of engineering or B. Tech from anyAICTE approved colleges.

PG 4.2: Pass in B. Tech in ECE, CSE, ISE, Biomedical, Medical Electronics, Electronics & instrumentation, EEE, Telecommunications, Mechatronics and other circuit Branches with a minimum of 50% marks in aggregate (45% in case of candidate belonging to SC/ST & OBC)

PG 5. ACADEMIC SESSION

PG 5.1: Each academic session is divided into two semesters of approximately sixteen Weeks duration and a summer term: an odd semester (August -December), an even semester (January - May) and summer term (Make-up term) June-July.

PG 5.2: The approved schedule of academic activities for a session, inclusive of dates for registration, mid-semester and end-semester examinations, vacation breaks, shall be laid down in the Academic Calendar for the session. two semestersof their studies in their first attempt, without having to pass any course requirementin the summer term examination.

PG 5.3: All changes of branch made in accordance with the above rules shall be effective from the third semester of the applicants concerned. No change of branch shall be permitted after this.

PG 6. COURSE STRUCTURE

PG 6.1: Medium of instruction, examination and project reports shall be in English incase of any language audit courses.

UG 6.2: Teaching of the courses shall be reckoned in credits:

Credits are assigned to the Courses based on the following general pattern:

(a) One credit for each lecture period.
(b) One credit for each tutorial period.
(c) One credit per two hours for each Laboratory or Practical or work shop session.
(d) Credits for seminar, mini project, project as indicated in the scheme/curriculum of teaching.

PG 7.: Qualify for a M.Tech degree

In order to qualify for a M. Tech. degree of the University, a candidate is required to complete the credit requirement as prescribed in the scheme/curriculum for a particular programme.

PG 7.1: The program of a study consists of the following components:

PG 7.4: The program of a study consists of the following components:

- ✓ Humanities and Social Sciences including Management courses
- ✓ Basic Science courses
- ✓ Engineering Science courses
- ✓ Professional core courses

- ✓ Open Electives
- ✓ Project work, seminar and internship
- ✓ Mandatory/Audit Courses

PG 7.5: Every M. Tech. Programme shall have a curriculum and syllabi for the courses approved by the Board of Governors. Board of Studies will discuss and recommend the syllabi of all the Postgraduate courses offered by the department from time to time before sending the same to the Academic Council. Academic Council will consider the proposals from the Board of Studies and make recommendations to the Board of Management and Board of Governors for consideration and approval. For all approved courses, the copyright shall be with DSU.

PG 7.6: Faculty Advisor: To help the candidates in planning their courses of study and getting general advice on the academic programme, the concerned department will assign a Faculty Advisor to each candidate.

PG 8. REGISTRATION

PG 8.1: Every candidate is required to register for approved courses through the assigned Faculty Advisor at the commencement of each semester on the day fixed for such registration and notified in the Academic Calendar. The Dean may cancel the registration of one or more courses if they are foundto violate some rules or if there are restrictions imposed due to disciplinary reasons.

PG 8.2: Only those candidates shall be permitted to register who have:

- ✓ The academic eligibility to move to higher semesters (PG 3 & UG 4)
- ✓ Cleared all University, Hostel and Library dues and fines (if any) of the previous semesters,
- ✓ Paid all required advance payments of University and Hostel dues for the current semester,
- ✓ Not been debarred from registering on any specific ground.
- ✓ A minimum CGPA of 5 in the previous semesters

PG 9: EXAMINATION: ASSESSMENT CRITERIA & ELIGIBILITYFORPROGRESSION

Every student shall be assessed for eligibility to higher semester through Continuous Internal Assessment (CIA) and Semester End Examination (SEE) as prescribed.

PG 9.1: The Continuous Internal Assessment (CIA), shall normally be conducted by the assessment components spread through the running semester; the components of CIA may be tests, mid-term exam,quiz, term paper, simulation-based problem solving, open-book test, solving open-end problems, mini-projects, seminars, viva-voce, awarding marks for attendance and such activities that enhance originalthinking of students. The Course instructor shall announce the detailed methodology for conducting the various components of CIA together specifying component-wise weightages right in the commencement of each semester.

PG 9.2: The Semester End Examinations (SEE), shall be conducted at the end of each semester. The SEE components may be a closed or open book examination, project demo, viva-voce, and/or a portfolio presentation.

PG 9.3: CIA and SEE shall respectively have 60:40 percent weightage. The Vice-Chancellor, on the recommendations of the Dean of Faculty and Department Chair, in exceptional cases, may approvethe variation in this weightage ratio.

PG 9.4: The performance of a student with respect to a course in a semester shall be the combined score of marks/points, he/she secures in CIA and SEE, put together. A minimum of securing 40% marks, combining both the CIA with SEE marks secured with respect to a course, shall entail the student a PASS in the course. The Vice-Chancellor, in such cases where the entire class has fared poorly in the course, upon receiving a representation by the students / department, and based on the recommendations of the committee constituted for the purpose, may review the criterion of 40%.

PG 9.5: ATTENDANCE ELIGIBILITY

PG 9.5.1: Candidates are required to attend all the classes (Lectures, Tutorials, Practical, WorkshopPractice, etc.) for which they have been registered.

PG 9.5.2: The candidate shall not be allowed to appear for the end semester examination if his/herattendance falls below 85% in each course and shall be awarded a "NE" grade in that course.

PG 9.5.3: A provision for condonation of 10% of the attendance by the Vice-Chancellor on the specific recommendation of the chairman of the department and Dean, showing reasonable cause such as:

- ✓ Any medical emergencies/ illness where the candidate requires rest for the specified number of days certified by a Government Doctor only /any death in the family (near and dear ones).
- ✓ If the student represents the University in Sports/ Cultural Activities/Extra-curricular activities/Co-curricular activities.
- ✓ If a student presents a Paper in National/ International Conferences or attendsany recognized Workshops/Seminars.

PG 9.5.4: If the period of leave is for a short duration (less than two weeks), prior application for leave shall have to be submitted to the Chairman of the Department concerned stating fully the reasonsfor the leave requested for along with supporting document(s). Such leave will be granted by the Chairman of the Department. However, the student shall comply with 9.5.2 and 9.5.3. of regulations.

PG 9.5.5: If the period of absence is likely to exceed two weeks, a prior application for grant of leave will have to be submitted through the Chairman of the Department to the Dean with supporting documents in each case. The decision to grant leave shall betaken by the Dean on the recommendationof the Chairman of the Department. However, the student shall comply with 9.5.2 and 9.5.3. of regulations.

PG 9.5.6: It shall be the responsibility of the candidate to intimate the concerned course instructor(s)regarding his/her absence before availing the leave.

PG 9.6. CONTINUOUS INTERNAL ASSESSMENT

PG 9.6.1: Candidate shall participate in all components of Continuous Internal Assessment (CIA) to become eligible to take up the Semester End Examination or else 'NE' grade shall be awarded. However, the Vice-Chancellor, under exceptional circumstances on the recommendations of Dean of Faculty and Department Chair, may exempt a student from participation in CIA component/s andpermit taking up SEE.

PG 9.6.2: There shall be no marks improvement of Continuous Internal Assessment; however, thewithdrawal and re-registering of the course shall be permitted.

PG 9.6.3: Continuous Evaluation consists of:

PG 9.6.3.1: Under normal circumstances for theory courses, total CIA weightage shall be a total of60%, put together all components with varying weightages; Under exceptional circumstances withthe approval of the Vice-Chancellor on the recommendation of Dean of the School, the weightage of CIA may be lower/higher than 60%.The components of CIA may be tests, mid-term exam, quiz,term paper, simulation-based problem solving, open-book test, solving open-end problems, mini- projects, seminars, viva-voce, awarding marks for attendance and such activities that enhance original thinking of students.

PG 9.6.3.2: Under normal circumstances for the practical courses (laboratory, workshops, and anysuch hands-on activity), total CIA weightage shall be a total of 60%, put together all components with varying weightages; Under exceptional circumstances with the approval of the Vice-Chancelloron the recommendation of Dean of the School, the weightage of CIA may be lower/higher than 60%.CIA may have components such as conduction of an experiment, record writing, viva-voce, tests, simulation, mid-term exam, quiz, demo, term paper, mini-projects, seminars, marks for attendance and activities which enhances original thinking of students.

PG 10. GRADING

PG 10.1: There shall be continuous assessment of a candidate's performance throughout the semester and grades shall be awarded by the concerned course instructor and/or the appropriate committee appointed for this purpose on the following basis.

PG 10.2: The grading will normally be based on CIA and SEE.

PG 10.3: Practical Courses/ Work Shop Practice: The evaluation will be based on instructor'scontinuous internal assessment, a test and end semester examination.

PG 10.4: The weightage assigned to different components of continuous internal assessment will beannounced by the concerned instructor(s) in the beginning of the semester.

PG 10.5: The results of performance of the candidates in the Continuous Internal assessment Testshall be announced by the instructors.

PG 10.6: In case of seminar, evaluation will be as determined by the grade awarding Committee(as per the Program scheme).

PG 10.7: Mini project /projects will be based on Continuous evaluation by Guide(s) and SemesterEnd Examination (as per the Program scheme)

PG 10.8: The results of performance of the candidates shall be announced by the Controller ofExaminations.

UG 10.9. METHOD OF AWARDING LETTER GRADES

PG 10.9.1: Relationships among Grades, Grade points and % of marks are listed in Table1.

PG 10.10: DESCRIPTION OF GRADES

PG 10.10.1: Table 1 shows the relationships among the grades, grade points and percentage of marks.

GRADE	GRADEPOINTS	DESCRIPTION	% MARKS
O	10	Outstanding	90 to 100
A+	9	Excellent	80 to 89
A	8	Very Good	70 to 79
B+	7	Good	60 to 69
B	6	Above Average	55 to 59
C	5	Average	50 to 54
P	4	Pass	40 to 49
F	0	Fail	Less than 40
AP	-	Audit Pass	-
AF	-	Audit Fail	-
IC	-	In Complete	-
NE	-	Not Eligible	-

Table 1: Grade, Points, Grade Description and % of marks

PG 10.10.2: A student will have to ensure a minimum CGPA of 5, to become eligible for the award ofthe degree.

PG 10.10.3: A candidate shall have to repeat all courses in which he/she obtains 'F' Grades until apassing grade is obtained.

PG 10.10.4: An IC grade denotes incomplete performance in any Theory and/or Practical Assessment. It may be awarded in case of absence on medical grounds or other special circumstances for SEE. Requests for IC grade should be made at the earliest but not later than the last day of SEE.

PG 10.10.5: The student can appear for the course/s with IC grade, when exams are conducted subsequently by the University for those Courses.

PG10.11 EVALUATION OF PERFORMANCE

PG10.11.1: The performance of a candidate shall be evaluated in terms of the Semester Grade Point Average (SGPA) which is the Grade Point Average for a semester, Cumulative Grade Point Average (CGPA) which is the Grade Point Average for all the completed semesters.

PG 10.11.2: The Earned Credits (EC) are defined as the sum of course credits for courses in which candidates have been awarded grades between O to P. (Table 1)

PG 10.11.3: Points earned in a semester = (Course credits X Grade point) for Grades O - P

PG 10.11.4: The SGPA is calculated on the basis of grades obtained in all courses, except auditcourses and courses in which F grade or below, registered for in the particular semester.

$$\text{SGPA} = \frac{\text{Points secured in the semester (O} - \text{P Grades) Credits registered in the semester, excluding audit}}{}$$

P**G 10.11.5:** The CGPA is calculated on the basis of all pass grades, except audit courses.

$$\text{CGPA} = \frac{\text{Cumulative points secured in all the passed courses (O} - \text{P Grades)}}{\text{Cumulativeregistered credits, excluding audit}}$$

PG 10.12 WITHHOLDING OF GRADES

PG 10.12.1: Grades shall be withheld when the candidate has not paid his/her dues or when there isa disciplinary action pending against him/her.

PG 10.13. CONVERSION OF CGPA INTO PERCENTAGE

PG 10.13.1: Conversion formula for the conversion of CGPA into percentage is:Percentage of Marks Scored = (CGPA Earned − 0.75) × 10

PG 11. PROMOTION CRITERIA AND ENROLLMENTS TO HIGHER SEMESTERS

PG 11.1: During registration to the higher semesters, the following criteria/conditions for promotion, shall be satisfied.

PG 11.1.1: A student shall 'Not Eligible' (NE) for writing SEE if he/she does not comply to the minimum prescribed attendance in any course that carry a credit. Students shall register afresh for such course/s, whenever offered next, to meet the attendance requirements and secure a passgrade, subsequently in that course/s.

PG 11.1.2: In a semester (ODD / EVEN), a student is deemed to be Not Eligible (NE) if he/she does not satisfy minimum attendance requirements criteria in a credit course. If this course

happens to be a prerequisite to a connected course in the subsequent semester, then the student shall not be permitted to register for that connected course until he / she secures pass grade in the prerequisite course by complying to the minimum attendance requirement when the prerequisite course is offered next (either during summer term or regular semester).

PG 11.1.3: A student shall be permitted to register for FOUR credited courses or to a total of 16 credits whichever is higher along with pending audit courses, if any, during a summer term by paying the prescribed course registration fee per credit notified bythe university from time totime.

PG 11.1.4: The students with NE (‘NOT ELIGIBLE’ due to shortage in attendance) in any Credit Course/s other than Audit Courses in a semester shall have to secure a pass grade by compliance to minimum attendance requirements in the NE course to register for connected courses if NE course happens to be prerequisite course for those connected courses offered in the subsequent semesters.

PG 11.1.5: Candidates who secure 'F' grade in any courses in regular semester or summer term shall secure PASS grade in such course/s either in the subsequent summer term examination or shall repeat in the next appropriate semester whenever it is/they are offered, i.e.odd semester courses during odd semesters examinations and even semester courses during even semester examinations, respectively.

PG 11.2. In case of failure in Practical/Workshop practice course the candidate in any semester may clear it in the subsequent summer term examination or semester examination.

PG 11.3. In case a candidate fails in Practical/ Workshop practice he/she shall register when it is offered next either in the summer term or subsequent semester, as the case maybe.

PG 11.4. Candidates may add and drop course(s) with the concurrence of the Faculty Advisor, and under intimation to the concerned course instructors and the academic section provided this is done within the date mentioned in the Academic Calendar.

PG 11.5 SUMMER TERM

PG 11.5.1: A summer term program may be offered by a department and with the approval of the Dean.

PG 11.5.2: Summer term courses will be announced by the Academic Affairs Office at the end of the even semester and before the commencement of the end semester examination. A candidate willhave to register for summer term courses by paying the prescribed fees within the stipulated time inthe announcement.

PG 11.5.3: The total number of contact hours in any summer term program will be the same as in theregular semester course. The assessment procedure in a summer term course will also be similar tothe procedure for a regular semester course.

PG 11.5.4: Candidates granted semester drop by the Board of Governors, on medical ground, shall be allowed to clear the concerned courses in summer term course and subject to conditions as stated under clauses 11.5.1, 11.5.2.and 11.5.3.

PG 11.5.5: The Candidates with "NE" grade shall register for summer term by paying the prescribed fees.

PG 11.5.6: Candidates who are awarded 'F' grades in regular semester examinations have the option to register for the concerned courses in summer term examinations to the conditions as stated under clauses 11.5.1, 11.5.2.and 11.5.3above, or they can re-sit for subsequent semester/summer term examination only.

PG 12. DURATION OF THE PROGRAMME

PG 12.1: Normally a candidate should complete all the requirements for post graduate programme in two years. However, academically weaker candidates who do not fulfil some of the requirements in their first attempt and have to repeat them in subsequent semesters may be permitted up to eight consecutive years (from the first year of registration) to complete all the requirements of the degree.

PG 12.2: Normally a candidate under lateral entry should complete all the requirements for post graduate programme in three years. However, academically weaker candidates who do not fulfil some of the requirements in their first attempt and have to repeat them in subsequent semesters may be permitted up to second consecutive years to complete all the requirements of the degree.

PG 13. TERMINATION FROM THE PROGRAMME

PG 13.1: A candidate may also be compelled to leave the Program in the University on disciplinary grounds.

PG 13.2: On having been found to have produced false documents or having made false

declaration at the time of seeking admission.

PG 13.3: On having been found to be pursuing regular studies and/or correspondence courses (leading to degree or diploma) in any other college, university or an educational institution simultaneously.

PG 13.4: On having been found to be concurrently employed and performing duty or carrying out business in contravention to academic schedules of the University and without seeking approval from the University.

PG 13.5: If a student fails to earn a pass grade even after 4 attempts such a student is terminated from the university on the grounds of NOT FIT FOR THE PROGRAM(NFFTP).

PG 13.6: If a student secures a CGPA less than 5.0, 4 times during entire duration of the program of study, such a student is terminated from the university on the grounds of NOT FIT FOR THE PROGRAM (NFFTP).

PG 13.7: However, if the student appeals for reconsideration of termination from the university under NFFTP rule by providing the guanine reasons to the Vice-Chancellor throughthe Dean of Faculty, then the Vice-Chancellor may consider constituting a committee for the purpose of review and provide 2 additional attempts on the recommendations of the committee.

PG 14. TEMPORARY WITHDRAWAL FROM THE UNIVERSITY

PG 14.1: Candidate who has been admitted to an undergraduate programme of the Universitymay be permitted to withdraw temporarily from the University on the grounds of prolonged illness or grave calamity in the family for a period of one semester or more, provided:

PG 14.1.1: He/she applies to the University within at least 6 weeks of the commencement of the semester or from the date he last attended his/her classes whichever is later, stating fully thereasons for such withdrawal together with supporting documents and endorsement of his/her guardian.

PG 14.1.2: The University is satisfied that, counting the period of withdrawal, the candidate is likely to complete his/her requirements of the M. Tech. Degree within the time limits specifiedin Clause 12.1 or 12.2 above.

PG14.1.3: There are no outstanding dues or demands in the University/Hostel/Department/ Library.

PG 14.1.4: Normally, a candidate will be permitted only one such temporary withdrawal during his/her tenure as a candidate of the undergraduate programme.

PG 15. TRANSFER OF CANDIDATES

PG 15.1: Transfer of candidates from higher education institutions outside university shall be considered at the beginning of Third and Fifth Semesters but subject to confirmation of equivalence.

PG 15.2: The candidates shall apply for equivalence with the No-objection for admission to DSU from the University where they are perusing their study.

PG 15.3: The candidates must have passed in all courses in the earlier semesters prior to transfer.

PG 16. ELIGIBILITY FOR THE AWARD OF M. TECH. DEGREE

A candidate shall be declared to be eligible for the award of M. Tech. degree if he/she has:

PG 16.1: Completed all the credit requirements for the degree with a CGPA 5.0 or higher at the end of the programme.

PG 16.2: Satisfactorily completed all the mandatory audit courses.

PG 16.3: No dues to the University, Department, Hostels.

PG 16.4: No disciplinary action pending against him/her.

PG 17. AWARD OF DEGREE

The award of M. Tech. degree must be recommended by the Academic Council and approved by the Board of Management and Board of Governors of the DSU.

PG 18. CONDUCT AND DISCIPLINE

PG 18.1: Candidates shall conduct themselves within and outside the precincts of the University in a manner befitting the candidates of an institution of national importance. The University has a separate ordinance Code and Conduct of Candidates which is applicable to all candidates of the University.

PG 19. REPEAL AND SAVINGS

Notwithstanding anything contained in these Regulations, the provisions of any guidelines, orders, rules or regulations in force at the University shall be inapplicable to the extent of their inconsistency with these Regulations. The Academic Council, Board of Management and Board of Governors of Dayananda Sagar University may revise, amend or change the regulations from time to time.

PG 20. INTERPRETATION

Any questions as to the interpretation of these Regulations shall be decided by the University, whose decision shall be final. The University shall have the powers to issue clarifications to remove any doubt, difficulty or anomaly which may arise during the implementation of the provisions of these regulations.

SCHEME & SYLLABUS

FOR

MASTER OF TECHNOLOGY

(M. Tech) - 2020

SCHOOL OF ENGINEERING

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

(With Effect from 2020-21)

SEMESTER-I									
Sl.no	**Course Code**	**Course Title**	**Course Title**	**CR / AU**	**Scheme of Teaching**				
					L	T	P	S/P	C
1	202	20CSE5101	MATHEMATICAL FOUNDATIONS FOR EMERGINGTECHNOLOGIES	CR	03	02	-	-	05
2	202	20CSE5102	CLEVER ALGORITHMS DESIGN	CR	03	-	04	-	05
3	202	20CSE5103	BIG DATA ANALYTICS	CR	03	-	04	-	05
4	202	20CSE51XXX	DEPARTMENTAL ELECTIVE-I	CR	03	-	02	-	04
5	202	20CSE5XXX	DEPARTMENTAL ELECTIVE-II	CR	03	-	02	-	04
6	202	20CSE5104	SPECIAL TOPICS-1	CR	-	-	-	02	01
					15	**02**	**12**	**02**	**24**

N**OTE: CR-CREDIT, AU-AUDIT, L-LECTURE, T-TUTORIAL, P-PRACTICAL, S/P-SEMINAR/PROJECT, C-NO. OF CREDITS**.

SEMESTER-II									
Sl.no	**Course Code**	**Course Title**	**Course Title**	**CR / AU**	**Scheme of Teaching**				
					L	T	P	S/P	C
1	202	20CSE5201	DATA MANAGEMENT	CR	03	-	04	-	05
2	202	20CSE5202	AGILE PROJECT MANAGEMENT & DEVOPS	CR	03	01	02	-	05
3	202	20CSE5203	ARTIFICIAL INTELLIGENCE: PRINCIPLES AND TECHNIQUES	CR	03	-	04	-	05
4	202	20CSE5XXX	DEPARTMENTAL ELECTIVE-III	CR	03	-	02	-	04
5	202	20CSE5XXX	DEPARTMENTAL ELECTIVE-IV	CR	03	-	02	-	04
6	202	20CSE5204	SPECIAL TOPICS-II	CR	-	-	-	02	01
					15	**01**	**14**	**02**	**24**

NOTE: CR-CREDIT, AU-AUDIT, L-LECTURE, T-TUTORIAL, P-PRACTICAL, S/P-SEMINAR/PROJECT, C-NO. OF CREDITS.

SEMESTER-III									
Sl.no	**Course Code**	**Course Title**	**Course Title**	**CR / AU**	**Scheme of Teaching**				
					L	T	P	S/P	C
1	202	20CSE5XXX	DEPARTMENTAL ELECTIVE-III	CR	03	-	02	-	04
2	202	20CSE5301	DISSERTATION-I	CR	-	-	-	24	12
					03	**-**	**02**	**24**	**16**

SEMESTER-IV									
Sl.no	**Course Code**	**Course Title**	**Course Title**	**CR / AU**	**Scheme of Teaching**				
					L	T	P	S/P	C
1	202	20CSE5XXX	DEPARTMENTAL ELECTIVE-IIV	CR	03	-	02	-	04
2	202	20CSE5401	DISSERTATION-II	CR	-	-	-	24	12
					03	**-**	**02**	**24**	**16**

NOTE 1: Dept. Elective V and VI will be conducted in flipped learning Mode.
NOTE 2: CR-CREDIT, AU-AUDIT, L-LECTURE, T-TUTORIAL, P-PRACTICAL, S/P-SEMINAR/PROJECT, C-NO. OF CREDITS

DEPARTMENTAL ELECTIVES: I/II/III/IV:

Sl.no	Course Code	Course Title
1	20CSE5001	MACHINE LEARNING
2	20CSE5002	CLOUD COMPUTING &APPLICATIONS
3	20CSE5003	DEEP LEARNING-I
4	20CSE5004	DEEP LEARNING-II
5	20CSES00S	IOT AND NETWORK SECURITY
6	20CSE5006	KNOWLEDGE ENGINEERING AND EXPERT SYSTEMS
7	20CSE5007	PROBLEM SOLVING METHODS AND AUTOMATED REASONING
8	20CSE5008	DATA SCIENCE
9	20CSE5009	PATTERN RECOGNITION

DEPARTMENTAL ELECTIVES: V/VI

Sl.no	Course Code	Course Title
1	20CSE5010	COMPUTER VISION
2	20CSE5011	MEDICAL IMAGE PROCESSING
3	20CSE5012	DIGITAL IMAGE PROCESSING
4	20CSE5013	BUSINESS INTELLIGENCE
5	20CSE5014	DATA ANALYTICS & VISUALIZATION
6	20CSE5015	INFORMATION RETRIEVAL TECHNIQUES
7	20CSE5016	ROBOTICS &AUTOMATION
8	20CSE5017	NATURAL LANGUAGE PROCESSING

MATHEMATICAL FOUNDATIONS FOR EMERGENCE TECHNOLOGIES

Semester/Year: 1/1

Course Code: 20CSE5101

Title of the course: MATHEMATICAL FOUNDATIONS FOR EMERGINGTECHNOLOGIES

L: T/A:P:C: 3:0:4:5

COURSE OBJECTIVES:

1. To gain knowledge of Mathematical foundations that are needed for Machine Learning/ IoT/ Artificial Intelligence/Cloud Computing
2. To mathematically analyze different techniques in Machine Learning/ IoT/Artificial intelligence/Cloud Computing domain

COURSE OUTCOMES:

At the end of the course students will be able to:

1. Analyze the mathematical concepts behind various Emerging Technologies and algorithms
2. Apply the knowledge to do mathematical analysis and proofs of various algorithms in therespective domain
3. Apply algorithm to avoid any pitfalls that occur due to shallow understanding of the mathematical concepts

MODULE 1 - Review of Machine Learning 09 hrs

Machine Learning Problem, Linear Regression, Generalization, Logistic Regression, k-Nearest Neighbors, k-Means, Revision of Variables, coefficients, and functions: logarithmic and exponential functions such as Sigmoid, trigonometric such as tanh, Softmax

MODULE 2 - Calculus and Optimization methods 09 hrs

Calculus: Concept of a derivative and partial derivative, Gradients, Gradient Descent Algorithm, Chain rule Optimization methods, Overflow and Underflow, Poor Conditioning, Gradient-Based Optimization, Constrained Optimization

MODULE 3 - Linear Algebra 10 hrs

Scalars, Vectors, Matrices and Tensors, Multiplying Matrices and Vectors, Identity and Inverse Matrices, Linear Dependence, Rank, Norms, Special Kinds of Matrices and Vectors, Eigen decomposition, Singular Value Decomposition, The Trace Operator, The Determinant, Dimensionality Reduction

MODULE 4 - Probability and Information Theory 12 hrs

Random Variables, Probability, Distributions, Marginal Probability, Conditional Probability, The Chain Rule of Conditional Probabilities, Independence and Conditional Independence, Expectation, Variance and Covariance, Common Probability Distributions, Naive Bayes',Bias and Variance tradeoff, Maximum Likelihood Estimation, Information Theory, Entropy, Mutual Information, Cross Entropy, Decision Trees

MODULE 5 -Trends In Emerging Technologies 10 hrs

Mathematical analysis of latest research papers in machine Learning/Artificial Intelligence/IoT/Cloud Computing

Text Books

1. Aston Zhang, Zack C. Lipton, Mu Li, Alex J. Smola, Dive into Deep Learning, Amazon Science, 2020
2. Deep Learning By Ian Goodfellow, Yoshua Bengio and Aaron Courville, MIT Press
3. Mathematics for Machine Learning. Marc Peter Deisenroth, A. Aldo Faisal, and Cheng SoonOng., Cambridge University Press, 2020

Reference Books

1. Linear Algebra and Optimization for Machine Learning: *A* Textbook 1st ed. 2020 by CharuC. Aggarwal
2. Foundations of Machine Learning, Second Edition, Mehryar Mohri, Afshin Rostamizadeh,andAmeet Talwalkar, MIT Press, 2018
3. Computational Linear Algebra for Coders, Jeremy Howard and Rachel Thomas, fast.ai
4. https://github.com/fastai/numerical-linear-algebra/blob/master/README.md

CLEVER ALGORITHMS DESIGN

Semester/Year: 1/1

Course Code: 20CSE5102

Title of the course: CLEVER ALGORITHMS DESIGN

L: T/A:P:C: 3:0:4:5

COURSE OBJECTIVES

1. To understand the design of advanced algorithms and data Structures.
2. To understand the applications of algorithms in different fields such as AI, geometry, number theory, signal processing and linear algebra.
3. To get acquainted with various search and optimization algorithms.

COURSE OUTCOMES

1. Skill of advanced algorithm design.
2. Knowledge of advanced data structures
3. Knowledge of search and optimization algorithms

MODULE 1: **9hrs**

INTRODUCTION: What is Al, Problem Domains, and Unconventional Optimization.

STOCHASTIC ALGORITHMS: Overview, Random Search, Stochastic Hill Climbing, Iterated Local Search, Guided local search, Scatter Search, Tabu Search.

MODULE 2: **9 hrs**

EVOLUTIONARY ALGORITHMS: Genetic Algorithm, Genetic Programming, Evolution Strategies,Differential Evolution, Evolutionary Programming, Grammatical Evolution

MODULE 3: **9 hrs**

PHYSICAL ALGORITHMS: Simulated Annealing, Harmony Search, Cultural Algorithm, MemeticAlgorithm.

PROBABILISTIC ALGORITHMS: Population-Based Incremental Learning, DistributionAlgorithm, Cross-Entropy Method

MODULE 4: **9 hrs**

SWARM ALGORITHMS: Particle Swarm Optimization, Ant System, Ant Colony System, BeesAlgorithm

MODULE 5: **9hrs**

ADVANCED TOPICS: Programming Paradigms, Devising New Algorithms, Testing Algorithms,Visualizing Algorithms, Problem Solving Strategies, Benchmarking Algorithms.

Text Books:

1. Jason Brownlee, Clever Algorithms: Nature-Inspired Programming Recipes, Revision 2. 16th June2012

BIG DATA ANALYTICS

Semester/Year: 1/1

Course Code: 20CSE5103

Title of the course: BIG DATA ANALYTICS

L: T/A:P:C: 3:0:4:5

COURSE OBJECTIVES

1. To optimize business decisions and create competitive advantage with Big Data analytics
2. To explore the fundamental concepts of big data analytics.
3. To learn to analyze the big data using intelligent techniques.
4. To understand the various search methods and visualization techniques.
5. To learn to use various techniques for mining data stream.
6. To understand the applications using Map Reduce Concepts.
7. To introduce programming tools PIG & HIVE in Hadoop echo system.

COURSE OUTCOMES:

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

1. Work with big data platform and explore the big data analytics techniques business applications.
2. Design efficient algorithms for mining the data from large volumes.
3. Analyze the HADOOP and Map Reduce technologies associated with big data analytics
4. Explore on Big Data applications Using Pig and Hive.
5. Understand the fundamentals of various big data analytics techniques.
6. Build a complete business data analytics solution

MODULE 1: **08hrs**

Introduction to big data: Introduction to Big Data Platform - Characteristics of big data• Data in the warehouse and data in Hadoop- Importance of Big data- Big data Use cases: Patterns for Big data deployment Challenges of Conventional Systems - Analytic Processes and Tools - Analysis vs Reporting.

MODULE 2: **09hrs**

Mining data streams: Introduction To Streams Concepts - Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream - Filtering Streams -Real time Analytics Platform(RTAP) Applications - Case Studies - Real Time Sentiment Analysis- Stock Market Predictions.

MODULE 3: **10 hrs**

Hadoop: History of Hadoop- the Hadoop Distributed File System - Components of Hadoop Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Developinga Map Reduce Application-How Map Reduce Works-Anatomy of a Map Reduce Job run•

Failures-Job Scheduling-Shuffle and Sort - Task execution - Map Reduce Types and Formats- Map Reduce Features Hadoop environment.

MODULE 4: 09hrs

Frameworks: Applications on Big Data Using Pig and Hive - Data processing operators in Pig - Hive services - HiveQL - Querying Data in Hive - fundamentals of HBase and ZooKeeper -IBM InfoSphere Big Insights and Streams.

MODULE 5: 09hrs

Predictive Analytics- Simple linear regression- Multiple linear regression• Interpretation of regression coefficients. Visualizations - Visual data analysis techniques- interaction techniques - Systems and applications

Text Books

1. Tom White "Hadoop: The Definitive Guide" Third Edition, O'reilly Media, 2012.
2. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", McGrawHill Publishing, 2012.

Reference Books

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
2. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", CUP,2012.
3. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley& sons, 2012.
4. Glenn J. Myatt, "Making Sense of Data", John Wiley & Sons, 2007.
5. Pete Warden, "Big Data Glossary", O'Reilly, 2011.
6. Jiawei Han, Micheline Kamber "Data Mining Concepts and Techniques", 2 ndEdition, Elsevier, Reprinted 2008.

DEEP LEARNING-I

SEMESTER/YEAR : 1/1
COURSE CODE : 20CSE5002
TITLE OF THE COURSE : Deep Learning-I
L: T/A:P:C :3:0:2:4

COURSE OBJECTIVES

1. To understand the basic building blocks and general principles that allows one to design Deep learning algorithms
2. To become familiar with specific, widely used Deep learning networks
3. To introduce building blocks of Convolution neural network architecture
4. To learn to use deep learning tools and framework for solving real-life problems

COURSE OUTCOMES:

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

1. Build various deep learning models
2. Identify and apply the deep learning algorithms which are more appropriate for various types of learning tasks in various domains
3. Implement deep learning algorithms and solve real-world problems deep learning tools and framework

MODULE-1 **7 Hrs**

Introduction to Machine learning - Types of Machine Learning problems, Linear Regression-Basic elements of linear regression, Vectorization for Speed, From Linear Regression to Deep Networks, Softmax Regression

MODULE-2 **5 Hrs**

Mathematical background for Deep learning- Data Manipulation and Data Preprocessing, Linear Algebra, Calculus, Probability

MODULE-3 **5 Hrs**

Multilayer Perceptron's-hidden layers, activation functions, Model Selection, underfitting, overfitting, weight decay, dropout

MODULE-4 **6 Hrs**

Forward Propagation, Backward Propagation, and Computational Graphs Layersand Blocks, shallow neural network, deep neural network, Optimization for training Deep Models.

MODULE-5 **5 Hrs**

Foundations of Convolutional Neural Networks- Convolution operation, Convolutional Layers, Object Edge Detection in Images, Padding and Stride, Multiple Input and Multiple Output Channels, 1 x 1 Convolutional Layer, Pooling, Convolutional Neural Networks(LeNet)

Text Books

1. Aston Zhang, Zack C. Lipton, Mu Li, Alex J. Smola, "Dive into Deep Learning",Amazon, 2020
2. Frarn;ois Chollet, "Deep Learning Python", Manning Publications, 2018
3. Ethem Alpaydin, "Introduction to Machine Learning", PHI, 2005
4. Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning", The MIT Press,2016.

Reference Books

1. Tom Mitchell, Machine Learning, McGraw-Hill, 1997
2. Aurelien Geron, "Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems", O'Reilly Media; 1 edition (April 9, 2017)
3. Josh Patterson, "Deep Learning: A Practitioner's Approach", O'Reilly Media; 1st edition(August 19, 2017)

CLOUD COMPUTING AND APPLICATIONS

Semester/Year: 1/1

Course Code: 20CSE5002

Title of the course: CLOUD COMPUTING AND APPLICATIONS

L: T/A:P:C: 3:0:4:5

COURSE OBJECTIVES:

1. To understand concepts of Cloud, Virtualization and limitations.
2. To understand cloud computing concepts, technologies and services.

COURSE OUTCOMES:

1. Articulate the main concepts, key technologies, strengths and limitations of cloud computing.
2. Conceptual and sound knowledge of virtualization and different types of virtualization.
3. Acquire knowledge of cloud computing, technologies and services.
4. Explain the core issues of cloud computing such as security, privacy and interoperability.

MODULE 1 **08 hrs**

Introduction to Cloud Computing: Introduction- Historical Development - Cloud Computing Architecture - The Cloud Reference Model - Cloud Characteristics -Cloud Deployment Models: Public, Private, Community, Hybrid Clouds- Cloud Delivery Models: IaaS, PaaS, Saas - Open Source Private Cloud Software: Eucalyptus, Open Nebula, Open Stack.

MODULE 2: **09 hrs**

Virtualization: Definition, benefits, Data Center Technology - Virtualization - Characteristics of Virtualized Environments, Types of Virtualizations, Para Virtualization, Hardware Assisted, Networking in virtualized environment, Virtual Machines and Access Control, Implementation Levels of Virtualization - Tools and Mechanisms: Xen, VMWare, Microsoft Hyper-V, KVM, Virtual Box

MODULE 3: **10 hrs**

Cloud Computing Mechanism: Cloud Infrastructure Mechanism: Cloud Storage, CloudUsage Monitor, Resource Replication - Specialized Cloud Mechanism: Load Balancer, SLA Monitor, Pay-per-use Monitor, Audit Monitor, Failover System, Hypervisor, Resource Cluster, Multi Device Broker, State Management Database - Cloud Management Mechanism: Remote Administration System, Resource Management System, SLA Management System, Billing Management System.

MODULE 4: **09 hrs**

Security in the cloud: Basic Terms and Concepts - Threat Agents - Cloud Security Threats -Cloud Security Mechanism: Encryption, Hashing, Digital Signature, Public Key Infrastructure, Identity and Access Management, Single Sign-on, Cloud Based Security Groups, Hardened Virtual Server Images AWS, Google Compute Engine, Azure, Bean Stack, Red Hat. OpenShift

MODULE 5: **09 hrs**

Introduction to developing Cloud Services: Web-Based Application - Pros and Cons of Cloud Service Development - Types of Cloud Service Development - Web Services - On• Demand Computing - Discovering Cloud Services Development Services and Tools - Amazon Ec2 - Google App Engine - Microsoft Azure - IBM Clouds.

TEXTBOOKS:

1. D. Marshall, W. A. Reynolds, and D. Mc Corry, Advanced Server Virtualization, Aurbech Publications, 2006.

2. John Ritting house& James Ransome, "Cloud Computing, Implementation, Management and Strategy", CRC Press, 2010.

3. Toby Velte, Anthony Velte, Robert C. Elsenpeter, "Cloud Computing, A PracticalApproach", Tata McGraw-Hill Edition, 2010.

4. Dan C Marinescu-Cloud Computing Theory and Practice. Elsevier (MK) 2013.

5. Rajkumar Buyya, James Broberg, Andrzej Goscinski- Cloud Computing Principles and Paradigms, Willey 2014.

AGILE PROJECT MANAGEMENT & DEVOPS

Semester/Year: II/I

Course Code: 20CSE5202

Title of the course: AGILE PROJECT MANAGEMENT & DEVOPS

L: T/A:P:C: 3:0:4:5

COURSE OBJECTIVES:

The objectives of the course are to learn.

1. Agile methodology, Scrums, Sprints.
2. Agile testing, test automation, DevOps.
3. Agile Start-up, Design Thinking, Lean Startup.

COURSE OUTCOMES:

After undergoing this course, students will be able to

1. Be able to compare and contrast the differences between Agile and other project managementmethodologies
2. Be able to interpret and apply various principles, phases and activities of the Scrum methodology
3. Be able to understand Agile Testing principles for real life situations and learn the basics ofSAFe for scaled agile
4. Be able to identify and use various tools for Agile development and DevOps principles for CI/CD
5. Enable start-up mindset through design thinking, lean startup and due-diligence

MODULE-1 **09hrs**

Introduction to Agile. Introduction to Software engineering, SDLC, Software process models• waterfall, V model, Iterative model, Spiral model; Introduction to Agile: Agile versus traditional method comparisons and process tailoring; Introduction to Agile, Various Agile methodologies - Scrum, XP, Lean, and Kanban, Agile Manifesto, Scrum: Scrum process, roles - Product Owner, ScrumMaster, Team, Release manager, Project Manager, product manager, architect, events, and artifacts; Product Inception: Product vision, stakeholders, initial backlog creation; Agile Requirements - User personas, story mapping, user stories, 3Cs, INVEST, acceptance criteria, sprints, requirements, product backlog and backlog grooming; Test First Development; Pair Programming and Codereviews; Tools: Agile tracking tools such as JIRA for defect tracking; Scaled agile frameworks: SAFe, Scrum@Scale, Disciplined Agile.

MODULE-2 **09 hrs**

Scrum and Sprint. Definition of Done, Definition of Ready; Estimation; Agile forecasting and projectManagement - Big visible information radiators, velocity, progress tracking, Track Done pattern, project forecasting, Ux Design, Control the Flow: Sprint Planning, Sprint Reviews, Sprint Retrospectives, Sprint Planning - Agile release and iteration (sprint) planning, Develop Epics and Stories, Estimating Stories, Prioritizing Stories (WSJF technique from SAFe), Create product roadmap Sprints: Iterations/Sprints Overview. Velocity Determination, Iteration Planning Meeting, Iteration, Planning Guidelines, Development, Testing, Daily Stand-up Meetings, Progress Tracking, Velocity Tracking, Monitoring and Controlling: Burn down Charts, Inspect & Adapt (Fishbone Model), Agile Release Train.

MODULE-3 **09hrs**

Introduction to Agile Testing. Testing: Functionality Testing, UI Testing, Performance Testing,Security Testing, A/B testing; Agile Testing: Principles of agile testers; The agile testing quadrants, Agile automation, Test automation pyramid; Test Automation Tools - Selenium, Appium, AI based testing; Unit testing of Kafka real-time streams; Traceability matrix

MODULE-4 **09 hrs**

DevOps. DevOps: Continuous Integration and Continuous Delivery; CI/CD: Jenkins, Git/Github Creating pipelines, Setting up runners Containers and container orchestration (Dockers and Kubernetes) for application development and deployment; Build tools - maven; Checking build status;Configuration management - puppet, chef, ansible; Fully Automated Deployment; CM - Continuous monitoring with Nagios; Introduction to DevOps on Cloud.

MODULE-5 **09hrs**

Agile Start-up. Agile Start-up= Design thinking+ Lean startup + Agile; Design thinking - Empathize,Define, Ideate, Prototype, Test; Lean Startup - Ideas, Build, Product, Empathize, Data, Learn; Due diligence - Reverse Engineering, Design thinking, Triz, Product Design and Development, Patenting,Start-up commercials, Funding aspects; Regulations - GDPR, Open-source licensing.

Practice Exercises

1. Applying an Agile Mindset
2. Agile Estimation
3. Sprint Review, Retrospective and Execution
4. Scrum using Jira
5. Test Automation using Selenium
6. Test Automation using Appium
7. Unit Testing of Kafka Real-Time Streaming
8. CI/CD using Jenkins
9. Build a virtual start-up

Textbooks

1. Henrik Kniberg, Scrum and XP from the Trenches, 2nd Edition, 2015, Published by C4Media,publisher of InfoQ.com
2. Kenneth S. Rubin, Essential Scrum: A Practical Guide to the Most Popular Agile Process, 2012,published by Addison-Wesley Professional
3. Alistair Cockburn, Agile Software Development: The Cooperative Game, 2nd Edition, 2006,Addison-Wesley Professional

Reference Books

1. Agile Project Management: Creating Innovative Products, Second Edition By Jim Highsmith,Addison-Wesley Professional, 2009
2. Agile Project Management: Managing for Success, By James A Crowder, Shelli Friess, Springer 2014
3. Learning Agile: Understanding Scrum, XP, Lean, and Kanban, By Andrew Stellman, JenniferGreene, 2015, 0 Reilly
4. DevOps: Continuous Delivery, Integration, and Deployment with DevOps: Dive ... By Sricharan Vadapalli, Packt, 2018
5. Agile Testing: A Practical Guide For Testers And Agile Teams, Lisa Crispin, Janet Gregory,Pearson, 2010
6. More Agile Testing: Learning Journeys for the Whole Team By Janet Gregory, Lisa Crispin,Addison Wesley, 2015
7. DevOps: Puppet, Docker, and Kubernetes By Thomas Uphill, John Arundel, Neependra Khare, Hideto Saito, Hui-Chuan Chloe Lee, Ke-Jou Carol Hsu, Packt, 2017

ARTIFICIAL INTELLIGENCE: PRINCIPLES AND TECHNIQUES

Semester/Year: II/I

Course Code: 20CSE5203

Title of the course: ARTIFICIAL INTELLIGENCE: PRINCIPLES AND TECHNIQUES

L:T/A:P:C : 3:0:4:5

COURSE OBJECTIVES:

1. To understand basic principles of Artificial Intelligence
2. To learn and design intelligent agents
3. To understand the basic areas of Artificial Intelligence including problem solving, knowledge representation, reasoning, decision making, planning, perception and action
4. To master the fundamentals of mathematical framework and learning algorithms

COURSE OUTCOMES:

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

1. Design Intelligent Agent for AI system
2. Apply the AI Principles and Implement AI based problem-solving techniques for solving realtime problems

MODULE 1 **09 hrs**

Introduction - Definition -Foundations of Artificial Intelligence - Characteristics of Intelligent Agents-Typical Intelligent Agents - Structure Intelligent Agents - Agent communication - Negotiation and Bargaining - Argumentation among Agents - Trust and Reputation in Multi-agent systems.

MODULE 2 **10 hrs**

AI Problems, AI Techniques and Types -The Level of the Model, Criteria for Success - Defining theProblem as a State Space Search -Problem Characteristics Un-Informed Search, Heuristic Search Techniques: Generate-And- Test, Hill Climbing - Constraint Satisfaction Problem- game trees - Adversarial Search: Minimax algorithm - Alpha beta pruning - Game playing.

MODULE 3 **09 hrs**

Logical Agent - Knowledge Representation - Propositional logic - First Order Predicate Logic• inferences in first order logic - forward chaining - backward chaining - Natural Deduction - Representing Knowledge using rules -Techniques - Matching Techniques.

MODULE4 **09 hrs**

Quantifying Uncertainty - Probabilistic Reasoning - Probabilistic Reasoning over Time - Planning with state-space search - Partial-order planning - planning graphs - planning and acting in the real world - Learning from observation - Inductive learning - Decision trees - Explanation based learning Statistical Learning methods - Reinforcement Learning.

MODULE 5 **10 hrs**

AI applications - Language Models - Information Retrieval- Information Extraction - Natural Language Processing - Machine Translation - Speech Recognition - Robot - Hardware – Perception Planning - Moving.

Text Books

1. Russell and P. Norvig, Artificial Intelligence: *A* Modern Approach, Prentice Hall, Third Edition,2009.
2. Ivan Bratko, -Prolog: Programming for Artificial Intelligence, Fourth edition,Addison Wesley Educational Publishers Inc, 2011.
3. Kishan Mehrotra, "Elements of ANN", II Edition, Pen ram International Publishing (I)Pvt.Ltd. Unit.
4. M.Tim Jones, -Artificial Intelligence: *A* Systems Approach (Computer Science), Jones andBartlett Publishers, Inc.; 1 edition, 2008
5. Nils J. Nilsson, -The Quest for Artificial Intelligence, Cambridge University Press, 2009.

DEEP LEARNING - II

Semester/Year: II/I

Course Code: 20CSE5004

Title of the course: DEEP LEARNING – II

L:T/A:P:C : 3:0:4:5

COURSE OBJECTIVES

1. To understand the building blocks and working principles of advanced Deep learningmodels
2. To become familiar with few advanced topics in Deep learning

COURSE OUTCOMES

1. Identify and apply the learnt deep learning algorithms on specific tasks in variousdomains
2. Implement deep learning algorithms and solve real-world problems in various domains
3. To use learnt models for solving few real-life problems

MODULE 1 **09Hrs**

Introduction to RNN: Basics of RNN, Rnns Computational Graph across Time, RNN's For Sequence Modeling- Language Modeling, Back Propagation Through Time, Standard RNN Gradient Flow, LSTM Network

MODULE 2 **08Hrs**

Applications of RNN: Music Generation, Sentiment Classification, Machine Translation, Environment Modeling, Stock Market Prediction, Next Word Prediction

MODULE 3 **09 Hrs**

Deep Generative models: Generative Modelling, Autoencoders, Variational Autoencoders, Latent Perturbations, Image and Video Applications

MODULE4 **09 Hrs**

GANs: Generative Adversarial Networks - Intuition behind Gans, Training Gans, Recent Advances In Gans

MODULE 5 **07Hrs**

Success Stories and Limitations of using DL: Limitations and New Frontiers, Bias and Fairness, Taming Dataset Bias, Success Stories From Industry Domains

Text Books

1. Aston Zhang, Zachary C. Lipton, Mu Li, And Alexander J. Smola, "Dive Into Deep Learning", April 2021
2. Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning", The MIT Press, 2016.

Reference Books

1. Palash Goyal Sumit Pandey Karan Jain, "Deep Learning For Natural Language Processing: Creating Neural Networks With Python", Apress, 2018
2. Umberto Michelucci, "Applied Deep Learning *A* Case-Based Approach ToUnderstanding Deep Neural Networks", 2018
3. Aureilien Geron, Hands-On Machine Learning With Scikit-Learn & Tensorflow: Concepts, Tools, And Techniques To Build Intelligent Systems, O'Reilly, 2017
4. Josh Patterson, "Deep Learning: *A* Practitioner's Approach", O'Reilly Media; 1 Edition (August 19, 2017)

MACHINE LEARNING

Semester/Year: II/I

Course Code: 20CSE5001

Title of the course: MACHINE LEARNING

L:T/A:P:C : 3:0:2:4

COURSE OBJECTIVES:

1. To know about basic concepts of Machine Learning
2. To obtain a thorough knowledge of various Machine learning techniques and their representation schemes
3. To study about Evaluating Hypothesis
4. To have an overview of various Machine Learning applications

COURSE OUTCOMES: At the end of the course students will be able to:

1. Technical knowhow of Machine Learning applications, heuristics, Knowledge representation Systems,
2. To Acquire knowledge of various Machine Learning techniques

Module 1: **6 hrs**

Introduction: Basic definitions **Statistical Learning:** Estimate F, Supervised Versus Unsupervised Learning, Regression Versus Classification Problems **Accessing Model Accuracy:** Quality of fit, Bias -Variance trade-off, Classification Setting.

Module 2 **6 hrs**

Linear Regression: Simple Linear Regression, Multiple Linear Regression **Classification:Logistic** Regression, Linear Discriminant Analysis: Baye's Theorem for classification, Quadratic Discriminant Analysis, KNN Method, Comparison of classification methods.

Module 3 **6 hrs**

Resampling Methods: Cross Validation: Leave-One-Out Cross-Validation, k-fold cross validation, Bootstrap.

Tree based methods: The Basics of Decision Tree: Regression tree method, Classification trees, Trees Versus Linear Models, Advantages and Disadvantages of Trees, Bagging , Random forest, boosting.

Module 4 **6 hrs**

Support Vector Machines: Maximal Margin classifier, Support Vector classifier, Classification with non-linear decision boundaries, SVM with more than two classes.

Unsupervised Learning: Challenges, Principal component Analysis Clustering -K-Means clustering, Hierarchical clustering.

Module 5 **6 hrs**

Deep Learning: Artificial Neural Networks: Universal Approximation Theorem, Feedforward Neural networks. Gradient descent and the Backpropagation Algorithm.

Convolutional Neural Networks: Architectures, convolution / pooling layers

Recurrent Neural Networks: LSTM, GRU, Encoder Decoder architectures
A Case Study -Computer Vision

Text Books

1. James, G., Witten, D., Hastie, T., Tibshirani, R. An Introduction to Statistical Learning with Applications in R, Springer Texts in Statistics.

Reference Books

1. Bengio, Yoshua, Ian J. Goodfellow, and Aaron Courville. "Deep learning." An MITPress book in preparation. (2015).
2. Thomas M. Mitchell, Machine Learning, McGraw-Hill, Inc. New York, ISBN:0070428077 9780070428072
3. Ethem Alpaydin, Introduction to Machine Learning (Adaptive Computation and Machine Learning series), The MIT Press; second edition, 2009

BUSINESS INTELLIGENCE

Semester/Year: II/I

Course Code: 20CSE5013

Title of the course: BUSINESS INTELLIGENCE

L: T/A:P:C: 3:0:2:4

COURSE OBJECTIVES

1. To understand the fundamentals of Business Intelligence
2. To identify the appropriateness and need Analysis the data
3. To learn the preprocessing, mining and post processing of the data
4. To understand various methods, techniques and algorithms in Business Intelligence

COURSE OUTCOMES:

At the end of the course the students will be able to:

1. Apply basic, intermediate and advanced techniques to analysis the data
2. Analyze the output generated by the process of Business Intelligence
3. Explore the hidden patterns in the data
4. Optimize the mining process by choosing best Business Intelligence technique

MODULE 1 **09 Hrs**

Business Intelligence: Effective and timely decisions - Data, information and Knowledge - Role of mathematical models - Business intelligence architectures: Cycle of a business intelligence analysis - Enabling factors in business intelligence projects - Development of a business intelligence system - Ethics and business intelligence.

MODULE2 **09Hrs**

Knowledge Delivery: The business intelligence user types, Standard reports, Interactive Analysis and Ad Hoc Querying, Parameterized Reports and Self-Service Reporting, dimensional analysis. Visualization: Charts, Graphs, Widgets, Scorecards and Dashboards, Geographic Visualization

MODULE3 **09Hrs**

Decision Making Concepts Concepts of Decision Making, Techniques of Decision Support System (DSS), Types of Decision Support System (DSS), Development of Decision Support System (DSS), Applications of DSS, Role of Business Intelligence in DSS

MODULE4 **09Hrs**

Classification Models, Classification Trees, Bayesian Method; Association Rule: Structure of Association Rule, Apriori Algorithm, General Association; Clustering: Clustering Methods, Partition Methods, Hierarchical Methods.

MODULE 5 **09 Hrs**

Business Intelligence Applications: Data analytics, business analytics, ERP and Business Intelligence, BI Applications in CRM, BI Applications in Marketing, BI Applications in Logistics and Production, Role of BI in Finance, BI Applications in Banking, BI Applications in Telecommunications

Text Books:

1. R. Sharda, D. Delen, & E. Turban, Business Intelligence and Analytics. Systems for Decision Support,10th Edition. Pearson/Prentice Hall, 2015.ISBN-13: 978-0-13- 305090-5, ISBN-10: 0-13-305090-4;
2. Business Process Automation, Sanjay Mahapatra, PHI.

References

1. Larissa T. Moss, S. Atre, "Business Intelligence Roadmap: The Complete Project Lifecycle of Decision Making", Addison Wesley, 2003.
2. Carlo Vercellis, "Business Intelligence: Data Mining and Optimization for Decision Making", Wiley Publications, 2009.
3. David Loshin Morgan, Kaufman, "Business Intelligence: The Savvy Manager"s Guide", Second Edition, 2012.
4. Cindi Howson, "Successful Business Intelligence: Secrets to Making BI a Killer App", McGraw-Hill, 2007.
5. Ralph Kimball, Margy Ross, Warren Thornthwaite, Joy Mundy, Bob Becker, "The Data Warehouse Lifecycle Toolkit", Wiley Publication Inc.,2007.

CLOUD NETWORKING & SECURITY

SEM/YEAR : 11/1

COURSE CODE : 20CIT5002

TITLE OF THE COURSE: CLOUD NETWORKING & SECURITY

L: T/A:P:C : 3:0:4:5

COURSE OBJECTIVES

1. The course on cloud networking and security introduces the basic concepts of security systems and Google cloud networking.
2. Students learn about the broad variety of networking options on Google Cloud. This course uses lectures, demos, and hands-on labs to explore and deploy Google Cloud networking technologies, including Virtual Private Cloud (VPC) networks, subnets, and firewalls; interconnection among networks; load balancing; Cloud DNS; Cloud CON; and Cloud NAT.
3. Students will also learn about common network design patterns and automated deployment using Cloud Deployment Manager or Terraform. It also discusses Cryptographic protocols, which are widely used in the design of cloud security.
4. The issues Related multi tenancy operation, virtualized infrastructure security and methods to improve Virtualization security are also dealt with in this course.

COURSE OUTCOMES:

After the course, the students must be able to:

1. Understand the Google cloud networking platform. Compare modern security concepts as they are applied to cloud computing
2. Assess the security of virtual systems
3. Evaluate the security issues related to multi-tenancy
4. Appraise compliance issues that arise from cloud computing

MODULE 1 10 Hrs

Security Concepts: Confidentiality, privacy, integrity, authentication, non-repudiation, Availability, access control, defense in depth, least privilege, how these concepts apply in theCloud, what these concepts mean and their importance in PaaS, IaaS and Saas. User Authentication in the cloud; Cryptographic Systems: Symmetric cryptography, stream Ciphers, block ciphers, modes of operation, public-key cryptography, hashing, digital Signatures, public-key infrastructures, key management, X.509 certificates, OpenSSL.

MODULE 2 **09Hrs**

Multi-tenancy Issues: Isolation of users/VMs from each other. How the cloud provider can provide this; Virtualization System Security Issues: e.g. ESX and ESXi Security, ESX file System security, storage considerations, backup and recovery; Virtualization System Vulnerabilities: Management console vulnerabilities, management server vulnerabilities, Administrative VM vulnerabilities, guest VM vulnerabilities, hypervisor vulnerabilities, Hypervisor escape vulnerabilities, configuration issues, malware (botnets etc).

MODULE3 **09 Hrs**

Networking options on Google Cloud. explore and deploy Google Cloud networking technologies, including Virtual Private Cloud (VPC) networks, subnets, firewalls; interconnection among networks; load balancing; Cloud DNS; Cloud CDN; and Cloud NAT.common network design patterns and automated deployment using Cloud Deployment Manager or Terraform.

MODULE4 **09 Hrs**

Fundamentals of Virtual Private Cloud (VPC) networking in Google Cloud. Different types of VPC objects, Internal DNS, Cloud DNS, IP aliases and VMs with multiple network interfaces. ways to control access to VPC Networks, Cloud Identity and Access Management (Cloud IAM) and firewall rules.

MODULE 5 **09Hrs**

Legal and Compliance Issues: Responsibility, ownership of data, right to penetration test. Local laws, examination of modern Security Standards (eg PCIDSS), Standards to deal with cloud services and virtualization, compliance for the cloud provider vs. compliance for the customer.

Text Books

1. Tim Mather, Subra Kumaraswamy, ShahedLatif, Cloud Security and Privacy: AnEnterprise Perspective on Risks and Compliance, O'ReillyMediainc, 2009
2. Coursera "Google cloud security specialization " course.

Reference Books

1. Tim Mather, Subra Kumaraswamy, ShahedLatif, Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance [ISBN: 0596802765]
2. Ronald L. Krutz, Russell Dean Vines, Cloud Security [ISBN: 0470589876]
3. John Rittinghouse, James Ransome, Cloud Computing [ISBN: 1439806802]
4. J.R. ("Vic") Winkler, Securing the Cloud [ISBN: 1597495921]
5. Cloud Security Alliance 2009, Security Guidance for Critical Areas of Focus inCloud Computing

6. vmware VMware Security Hardening Guide
7. Cloud Security Alliance 2010, Top Threats to Cloud Computing
8. NIST Guidelines on Security and Privacy in Public Cloud Computing
9. NIST Guide to Security for Full Virtualization Technologies
10. NIST The NIST Definition of Cloud Computing
11. William Hau, Rudolph Araujo et al How Virtualization Affects PCI DSS www.mcafee.com/us/resources/.../wp-how-virt-affect-pci-dss-part-1.pdf
12. Chenxi Wang Compliance with Clouds: Caveat Emptor

Data Management

Semester/Year: II/I

Course Code: 20CSE5201

Title of the course: Data Management

L: T/A:P:C: 3:0:5:5

COURSE OBJECTIVES:

- To understand advanced Data base concepts, query optimization
- To understand database concepts and structures and query language
- To understand the E R model and relational model
- To understand Data Warehouse, Data Mining, Relational Data BaseModelling, and Storage Management and Indexing
- To understand query processing and techniques involved in query optimization.
- To understand the principles of storage structure and recovery management.

COURSE OUTCOMES:

- Understand and apply the advanced concepts in Real time DBMS applications using structured query language and query optimization.
- To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.
- Analyze performance characteristics of RDBMS & Perform PL/SQL programmingusing concept of Cursor Management, Error Handling, Package and Triggers
- Apply various Normalization techniques to avoid data redundancy & applythe principles of storage structure and recovery management
- Implement various advance SQL queries related to Transaction Processing& Locking using concept of Concurrency control.

COURSE CONTENT:

MODULE 1 **08Hrs**

OVERVIEW OF DATABASE SYSTEMS: Managing Data, A Historical Perspective, File Systems versus a DBMS, Advantages of a DBMS, Describing and Storing Data in a DBMS INTRODUCTION TO DATABASE DESIGN: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, ConceptualDesign with the ER Model.

MODULE 2 **08Hrs**

RLEATIONAL DATABASE MODELING: An overview of data models, Basics of Relational Model, Defining a Relation Schema in SQL, An algebraic Query Language, Constraints on Relations, Functional Dependencies, Rules About Functional Dependencies, Design of Relational Database Schemas.

MODULE3 **8Hrs**

SQL: QUERIES, CONSTRAINTS, TRIGGERS: Overview, The Form of a Basic SQL Query, UNION, INTERSECT, and EXCEPT, Nested Queries, Aggregate Operators, Null Values, Complex Integrity Constraints in SQL, Triggers and Active Databases, Introductionto NoSQL, Applications of NoSQL.

MODULE 4 **8Hrs**

STORING DATA: DISKS AND FILES: The Memory Hierarchy, Buffer Manager, Files of Records, Page Formats, Record Formats

SECURITY AND AUTHORIZATION: Introduction to Database Security, Access Control, Discretionary Access Control, Mandatory Access Control, Security for Internet Applications.

MODULE 5 **8Hrs**

STORAGE MANAGEMENT AND INDEXING: Physical Storage Systems: Storage Interfaces, Magnetic Discs, Flash Memory, **RAID,** Data Storage Structures: Database Storage Architecture, File Organization, Database Buffer, Storage Organization in Main Memory, Indexing.

List of Laboratory/Practical Experiments activities to be conducted:

1. Advanced SQL: Perform queries for DCL Commands and Locks, implementauthorization, authentication, privileges on database, perform queries to Create synonyms, sequence and index, perform queries to Create, Alter and update views.

2. PL/ SQL and Triggers: Implement PL/SQL programs using control structures, Implement PL/SQL programs using Cursors, Implement PL/SQL programs using exception handling, implement user defined procedures and functions using PL/SQL blocks, perform various operations on packages, Implement various triggers.

TEXTBOOKS:

1. Data base Management Systems, Raghu Ramakrishnan, Johannes Gehrke, TMH,3rd Edition, 2003.
2. Database Systems The complete Book, Hector Garcia-Molina Jeffrey D. Ullman Jennifer Widom, 2nd Edition, 2002.
3. Data base System Concepts, A. Silberschatz, H.F. Korth, S. Sudarshan, McGrawhill, VII edition, 2006.
4. Fundamentals of Database Systems 6th edition. Ramez Elmasri, Shamkant B.Navathe, Pearson Education, 2008.

DATA SCIENCE

Semester/Year: II/I

Course Code: 20CSE5008

Title of the course: DATA SCIENCE

L: T/A:P:C: 3:0:2:4

COURSE OBJECTIVE:

1. To use the statistical and computational techniques to Discover, Analyze, Visualize and Present the Data.

COURSE OUTCOMES:

At the end of the course the students will be able to:

1. To Summarize the data using visual & summary analytics and common probability distributions
2. To make inference about a sample & population using hypothesis test.
3. To fit, interpret, and assess regression models and classification with one ormore predictors.
4. To assess the data integrity and data relevancy to a specific application

COURSE CONTENTS:

MODULE 1: INTRODUCTION 10 Hrs

Overview of the Data Science process. Different types of data, Data Preprocessing: Data Cleaning-Missing values, Noisy data, Data cleaning as process, Data Reduction: Principal Components Analysis, Data Transformation: Strategies Overview, Data Transformation by normalization, Discretization by binning. Introducing Python Libraries (Pycharm)

MODULE 2: EXPLORATORY DATA ANALYSIS AND HYPOTHESIS TESTING 09 Hrs

Exploratory Data Analysis: Central Tendency, Dispersions, five number Distributions, Crosstabulations. Data Visualization: Histogram, Box Plot, Correlation Plot, Scatter Plot, Line Chart, Bar Chart, Pie Chart, Bubble Chart, Decision Tree, Cluster Charts.

Hypothesis Testing: Confidence Intervals, Constructing a hypothesis, Null Hypothesis & Alternative Hypothesis, Type I and Type II errors, Power Value

MODULE 3: PARAMETRIC AND NON-PARAMETRICTESTS 07 Hrs

Parametric test: Z test, One Sample T-TEST, Paired T-TEST, Independent Sample T-TEST,

ANOVA, MANOVA, Level of significance, Power of a test.
Non parametric test: Chi Square Test, Fisher's Test, Mann-Whitney U test, Kruskal-Wallis Rank Test, Wilcoxon sign rank.

MODULE4: CLASSIFICATIONMODELS 8Hrs

Classification Models: Logistic Regression, Discriminate Regression Analysis, Test of Associations, Chi-square strength of association, Maximum likelihood estimation, Confusionmatrix, Support Vector Machines (SVM), Naive Bayes, Random Forests: Bagging & Boosting, CHAID Analysis, Decision trees, k-Nearest Neighbors, Neural Network.

MODULE 5: UNSUPERVISED LEARNING 7 Hrs

Unsupervised Learning: Principal component analysis, Reliability Test, KMO tests, Eigen Value Interpretation, Rotation and Extraction steps. Clustering Methods: K Means clustering,Agglomerative Clustering

Text Books:

1. Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data, EMC Education Services, Wiley
2. Jiawei Han, Micheline Kember and Jian Pei, Data Mining Concepts and Techniques, 3rdedition, Elsevier, 2012
3. Statistics for Managers Using Microsoft Excel, 8th Edition, by David M. Levine, David F. Stephan, and Kathryn A. Szabat, Publisher: Pearson

References

1. Data Mining in excel: Lecture Notes and cases by Galit Shmueli, Publisher: Wiley
2. Hastie, Tibshirani, Friedman, "The Elements of Statistical Learning" (2nd ed)., Springer,2008.

COMPUTER VISION

SEM/YEAR : IV/11
COURSE CODE : 20CSE5010
TITLE OF THE COURSE: COMPUTER VISION
L: T/A:P:C : 3:0:2:4

COURSE OBJECTIVE:

1. To introduce various topics of computer vision with their applications.
2. Combining the analytics with CV which helps in various Video Analytics processing.

COURSE OUTCOMES:

1. Computer Vision along with video analysis helps the students to do the video analytics ina much easier way using Stereo Vision and Structure from motionfeatures.
2. Students will be able to do analysis on various real time application of video analytics.

COURSE CONTENTS:

MODULE 1: IMAGE FORMATION AND CAMERA CALIBRATION 08 Hrs

Introduction to computer vision, geometric camera models, orthographic and perspective projections, weak- perspective projection, intrinsic and extrinsic camera parameters, linear and nonlinear approaches of camera calibration.

MODULE 2: IMAGE ANALYSIS-FEATURE DETECTION AND MATCHING 07 Hrs

Edge detection, interest points and corners, local image features for image analysis, feature matching and Hough transform, model fitting and RANSAC, scale invariant feature matching.

MODULE 3: VIDEO ANALYSIS-STEREO VISION 12Hrs

Stereo camera geometry and peripolar constraints, essential and fundamental matrix, image rectification, local methods for stereo matching: correlation and multi-scale approaches, global methods for stereo matching: order constraints and dynamic programming, smoothnessand graph
based energy minimization, optical flow

MODULE 4: ANALYSIS ON STRUCTURE FROM MOTION 08 Hrs

Camera self-calibration, Euclidean structure and motion from two images, Euclidean structureand motion from multiple images, structure and motion from weak-perspective and multiple cameras.

MODULE 5: VIDEO ANALYTICS AND ITS APPLICATIONS **08Hrs**

Introduction to Video Analytics, Analysis Parameters-Real Time Security & User Insights, Storage analysis for Processed Video Data, Applications: Analysis on Facial Surveillance, License Plate Recognition, DWELL Analytics, Queue Line Analytics, People Counter Analytics-Analytics for shopper Data, Demographic Analytics. Case Study: Leveraging Video Analytics to Boost In-Store Performance.

Text Books:

1. Forsyth, D. A and Ponce, J., "Computer Vision: A Modern Approach", Prentice Hall, 2ndEd. 2011.
2. Szeliki, R., "Computer Vision: Algorithms and Applications", Springer, 2011.
3. Hartley, R. and Zisserman, A, "Multiple View Geometry in Computer Vision", CambridgeUniversity Press, 2003.
4. Gonzalez, R. C. and Woods, R. E., "Digital Image Processing", Prentice Hall, 3rdEd, 2009.
5. Trucco, E. and Verri, A, "Introductory Techniques for 3-D Computer Vision", PrenticeHa

Code of Conduct in Dayananda Sagar University

Short title, extent and commencement	**1**		**i**	These Guidelines shall be called "Guidelines for Maintaining Discipline in DSU - 2020"
			ii	They shall come into force from the above date of their approval bythe Executive Council;
			iii	These Guidelines shall be read in conjunction with the Act, Statutes, Regulations Governing Academic and Research Programmes and other notifications of the University;
			iv	These Guidelines shall be applicable to the students admitted to DSUfrom the academic year 2020-21 onwards.
Definitions	**2**			In these Guidelines, unless the context otherwise requires:
			i	"Act" means The Dayananda Sagar University Act, 2012 (KarnatakaAct No.20 of 2013);
			ii	"Board of Governors", "Executive Council", "Academic Council", and"Finance Council", means respectively the Board of Governors,Executive Council, Academic Council, and Finance Council, of the University;
			iii	"Campus" means a campus established and maintained by the University;
			iv	"CGPA", "SGPA" means respectively Cumulative Grade PointAverage and Semester Grade Point Average;
			v	"Chancellor", "Pro Chancellor", "Vice-Chancellor", "Registrar", "Controller of Examinations", "Dean", and "Departmental Chairperson" mean respectively the Chancellor, Pro Chancellor, Vice-Chancellor, Registrar, Controller of Examinations, Dean, and Departmental Chairperson of the University;
			vi	"ISA"and "ESA" mean respectively the In-Semester Assessment, andEnd-Semester Assessment of the University;
			vii	"Committees" means the committees formed by the various authorities and officers of the University;
			viii	"Convocation" means the convocation of the University, where Degrees, Honorary Degrees, Diplomas, Academic Distinctions, andCertificates are awarded as per requirements of the University;
			ix	"Course" means a plan of study on a particular subject in programme.
			x	"Credit" means credit earned by a student after a successfulcompletion of a credited course;

			xi	"Degree" means a degree awarded by the University with orwithout Specialization and/or Minor;
			xii	"Examination Hall" means both the hall were theory examinationsare conducted or the laboratory or workshop where practical examinations are conducted;
			xiii	"Government" means the Government of Karnataka;
			xiv	"Notification" means the notification of the University;
			xv	"Prescribed" means prescribed by the rules made by the Universityunder the Act, Statutes, Regulations, and Notifications;
			xvi	"Programme" or "Programme of study" means a higher education programme pursued for a degree awarded by the University as specified under Section-22(3) of the UGC Act;
			xvii	"Regulations" means the Regulations of the University, notified by the Executive Council;
			xv i ii	"Statutes" means the Statutes of DSU University, notified by theBoard of Governors;
			xix	"Student" means a person admitted to and pursuing a specifiedProgramme of study in the University;
			xx	"Teacher", "Course Instructor" means respectively a faculty appointedfor imparting instruction and research guidance to students in the University and the Teacher instructing a course;
			xxi	"University" means the DSU, Bangalore, established and incorporated under the Dayananda Sagar University Act, 2012.
Student Discipline Committee	**3**	**3.1**		A Student Discipline Committee shall be constituted by the Vice-Chancellor with the following framework:
			i	Registrar – Chairperson;
			ii	Dean of one of the faculties by rotation – Member;
			iii	ONE Departmental Chairperson by rotation – Member-Secretary;
			iv	TWO senior Teachers nominated by the Vice-Chancellor, of whomatleast one shall be a woman – Members;
			v	TWO students nominated by the Vice-Chancellor, of whom at leastone shall be a woman – Invited Members.
		3. 1. 1		The Vice-Chancellor may invite additional members to theCommittee as deemed fit.
		3. 2		The Student Discipline Committee shall:
			i	Consider matters concerning discipline among the sudents;

			ii	Inquire into acts of indiscipline or misconduct by students whenever such cases are referred to the Committee, and submit its recommendations to the Vice-Chancellor;
			iii	Take preventive and precautionary steps such as conducting awareness and sensitization campaigns, and issue of notices, warnings, and instructions, for the purpose of abating occurrences of individual or collective indiscipline;
			iv	Liaison with law and order authorities, concerned departments of the Government, and neighbouring institutions regarding maintenance of law and order in the University; and
			v	Perform any other related functions assigned by Vice-Chancellor.
Anti- Ragging Committee	**4**	**4.1**		The Vice-Chancellor shall constitute an Anti-Ragging Committee comprising of:
			i	Nominee of Vice-Chancellor – Member-Secretary;
			ii	All Deans of Faculty –Members;
			iii	Concerned Departmental Chairperson – Invitee;
			iv	Registrar – Chairperson;
			v	TWO Teachers nominated by the Vice-Chancellor of whom at leastone shall be a woman.
		4.1.1		The Vice-Chancellor may invite additional members to theCommittee as deemed fit.
		4.2		The Anti-Ragging Committee shall inquire and report their findings and recommendations, if any, to the Vice-Chancellor. The decisionof the Vice-Chancellor in such matters shall be final and binding.
Anti- Sexual Harassment Committee	**5**	**5.1**		The Vice-Chancellor shall constitute an Anti-Sexual Harassment Committee comprising of:
			i	Nominee of Vice-Chancellor – Member-Secretary;
			ii	All Deans of Faculty – Members;
			iii	Concerned Departmental Chairperson – Invitee;
			iv	Registrar – Chairperson;
			v	TWO Teachers nominated by the Vice-Chancellor of whom at leastone shall be a woman.
		5.2		The Vice-Chancellor may invite additional members to the Committee as prescribed by legal stipulations and as deemed fit.

		5.3		The Anti-Sexual Harassment Committee shall inquire and report their findings and recommendations, if any, to the Vice-Chancellor. The decision of the Vice-Chancellor in such matters shall be final and binding.
Grievance RedressalCell	**6**	**6.1**		The Vice-Chancellor shall constitute a Grievance Redressal Cell comprising of:
			i	Nominee of Vice-Chancellor – Member-Secretary;
			ii	ONE Dean of Faculty nominated by the Vice-Chancellor – Member;
			iii	Concerned Departmental Chairperson – Invitee;
			iv	Registrar – Chairperson; and
			v	TWO Teachers nominated by the Vice-Chancellor of whom at leastone shall be a woman.
		6.2		The Grievance Redressal Cell shall inquire, resolve wherever possibleand report their findings and recommendations, if any, to the Vice-Chancellor. The decision of the Vice-Chancellor in such matters shallbe final and binding.
Discipline	**7**	**7.1**		Every student shall maintain discipline and decorous behavior both inside and outside the Campus and not indulge in any activity that may bring down the reputation of the University.
		7.2		Every student shall respect and extend courtesy to the staff andother students of the University.
		7.3		Any violation of the code of conduct or breach of any rule or regulation of the University by the student shall constitute an act of indiscipline and is liable for disciplinary action.
		7.4		The following shall constitute acts of gross indiscipline and students indulging in any of them shall be liable to disciplinary action:
			i	Disobeying the staff and displaying misdemeanor within theUniversity premises;
			ii	Indulging in Vandalism / violence and damaging University and /or Public property or property of fellow students;
			iii	Quarrelling, fighting and passing derogatory remarks in the University premises against its staff and others on the University campus.
			iv	Possession and use of fire-arms, weapons and potentially dangerous instruments
			v	Consumption and sale of drugs/alcohol/intoxicants
			vi	Indulging in ragging, which is strictly prohibited as per SupremeCourt ruling;
			vii	Any other act which the Disciplinary Committee may determine tobe undesirable;

Punctuality	**8**			Students shall compulsorily attend classes from day one. Those who cannot attend the class on the first day for any valid reason shall take prior permission with a letter signed by the parent supporting the reason. No fax/phone calls are accepted regarding the same. Late comers will be penalized as per the prevailing norms. Students shall be allowed to attend the classes only if they submit the Declaration Form duly signed by the parent during the first hour of class on the opening day. However, permitted late-comers may submit the declaration form to respective Departmental Chairperson upon return. Every student shall enter their classes in time and maintain punctuality for class sessions, laboratories and workshops. The class teachers have the right to deny admission to latecomers.
Mobile Phones	**9**			The University has banned the use or possession of mobile phones inside the campus. In case of violations, the mobile phones will be confiscated and sent to the University Office. Students are also not permitted to carry music players, cameras or any other electronic gadgets except laptop computers, non-programmable calculators and permitted digital tablets.
Wearing and Displayof ID Cards	**10**			It is mandatory for all students to preserve the ID card issued and to wear/display them throughout their presence inside the campus. Students without ID card will not be allowed to attend the classes.
Dress Code and Appearance	**11**			Both for boys and girls: Student should wear attire which is befitting a student of professional course. Any other dress that may be considered less than decent is not allowed.
Decorum	**12**			Students everywhere in the campus - including the classrooms, hostels, library, laboratories, workshops and canteen, and also outsidethe campus during industrial visits and educational tours shall maintain decorum befitting the University's reputation.
University Transport	**13**			Students may contact Accounts Section of the University office for availing the University bus facility. Follow queue system while boarding and alighting the bus. Respect the driver and conductor and wish as well as thank them. Start occupying the seats from the last row and last seat. Avoid reserving seats for others. Allow the next student getting in to sit next to you. Avoid rushing and pushing others. Students must use only the designated bus and bus stop assigned to them. Bus drivers are authorized to maintain control of students in the bus and report misbehavior, if any, to the authorities.

Parking and Speeding	**14**			Only 2-wheeler parking is available in the Campus for students. Secure a parking slot for your vehicle at the earliest as spaces are allotted on first-come-first-served basis. Speed limit is 15 kmph within the campus. Penalty on violators includes deflation of vehicle tyres. For repeat offenders, vehicle seizure and monetary penalty may be imposed. Students are encouraged to utilize University or public transport facility.
Social Networking	**15**			Abusing of computer-based social networking options is prohibited. Students should exercise responsibility in the usage of computer based social networking activities.
Disciplinary Action	**16**	**16.1**		Any incidence of indiscipline or misconduct related to an examination shall be referred to the Examinations Malpractice Review Committee by the Controller of Examinations. The Examinations Malpractice Review Committee shall hold an inquiry and recommend the disciplinary action, if any, to the Vice- Chancellor as per the prevailing guidelines. All other incidences of academic indiscipline shall be referred to the Student Discipline Committee by the Registrar. The Student Discipline Committee shall inquire into the incident and recommend suitable disciplinary action, if any, to the Vice-Chancellor as per the prevailing guidelines. The parents of the concerned students shall also be informed.
		16.2		Faculty / staff concerned who have witnessed the act of indiscipline / misconduct/ breach of code of conduct shall independently issue an Infraction Slip to erring students and mark on the infraction slip the action taken / recommended. A blank copy of the infraction slip with the list of charges is shown in Annexure 1. This infraction slip issued by the faculty will be different from the one that are issued by the hostel authorities. The actions can be taken separately or combined, left to the discretion of the University authorities. The disciplinary rules, code of conduct of the University / hostel may be updated on a need basis and the prevailing set of guidelines shall apply at the time of an incident. The actions beyond verbal warning, written warning and reprimand as recorded by the faculty in the infraction slip shallbe finally decided and imposed by the Disciplinary Committee.
				Commensurate with the gravity of the offence, the action will be takenor punishment will be given by the University authorities. In allmatters of disciplinary action, the decision taken by the Vice-Chancellor shall be final. A "Conduct Register" maintained by eachdepartment, shall have all the details of Infraction Slips recorded in the folio of the particular student.
		16.3		Some of the actions that the Disciplinary Committee can takeinclude:

			i	"Disciplined for Bad Conduct", if any, will be stamped / printed on the back of his Final Semester Grade Card, Degree
			ii	The Disciplinary Committee reserves the right to withhold the issue of Grade Cards, certificates till the resolution of any infraction incidence.
			iii	As per the order of Honorable Supreme Court of India, ragging in any form is considered as a criminal and culpable offence and is banned in all forms, inside & out of the campus. Any form of ragging will be severely dealt with through an inquiry committee and the action may include:
				a) University authorities exercising the right to emboss the final marks card, Degree Certificate that he/ she indulged in ragging.
				b) Summary expulsion from the University
Undertakingto be signed by a student	**17**			At the time of admission, every student jointly with one of his/herparents or an authorized local guardian, shall sign in person an undertaking, in the prescribed format, to maintain conduct and discipline as well as not to indulge in or abet ragging or sexual harassment.
Acts of Indisciplineand Misconduct	**18**			Acts of indiscipline or misconduct include:
			i	Academic indiscipline;
			ii	Ragging;
			iii	Sexual harassment; and
			iv	Other acts of indiscipline or misconduct.
Academic Indiscipline	**19**	**19.1**		Students shall maintain academic integrity at all times. The broad categories of academic indiscipline are:
			i	Plagiarism;
			ii	Cheating; and
			iii	Conflict of interest.
		19.2		*Plagiarism*: Use of material, ideas, figures, code or data without appropriate acknowledgement or permission of the original source shall be treated as cases of plagiarism. Submission of material, verbatim or paraphrased, that is authored by another person or published earlier by oneself shall also be considered as cases of plagiarism. Examples of plagiarism include:
			i	Reproducing, in whole or part, text/sentences from a report, book, thesis, publication or the internet;

			ii	Reproducing one's own previously published data, illustrations, figures, images, or someone else's data, etc.;
			iii	Taking material from class-notes or downloading material from internet sites, and incorporating it in one's class reports, presentations, manuscripts or thesis without citing the original source;
			iv	Self-plagiarism which constitutes copying verbatim from one's own earlier published work in a journal or conference proceedings without appropriate citations.
		19.3		*Cheating*: Any of the following acts shall be considered as cheating:
			i	Copying during tests, quizzes, examinations, and copying of homework assignments, term papers or manuscripts;
			ii	Allowing or facilitating copying, or writing a report or examination for someone else;
			iii	Using unauthorized material, copying, collaborating when not authorized, and purchasing or borrowing papers or material from various sources; and
			iv	Fabricating (making up) or falsifying (manipulating) data and reporting them in reports and publications.
		19.4		*Conflict of Interest*: A conflict of interest may arise from any clash of personal or private interests with academic and professional activities such as learning, research, publication, work on projects and internships. A student shall disclose in writing any potential conflicts of interests to the concerned Dean immediately after coming to know of the conflict. The Dean may constitute a committee to inquire on a case to case basis and give its recommendation to the Vice-Chancellor.
Ragging	**20**	**20.1**		All forms of ragging are prohibited. Any individual or collective actor practice of ragging shall constitute an act of gross indiscipline andshall be dealt with under the provisions of national regulatory bodies and judiciary.
		20.2		Ragging, for the purposes of these regulations, shall ordinarily mean any act, conduct or practice by which the dominant power or status of senior students is brought to bear upon the students who are in any way considered junior or inferior by the former and includes individual or collective acts or practices which:
			i	Involve physical assault or threat to use physical force;
			i	Violate the status, dignity and honour of students, in particular female students;
			iii	Expose students to ridicule or contempt or commit an act whichmay lower their self-esteem; and

			iv	Entail verbal abuse, mental torture, aggression, harassment, trauma, indecent gesture and obscene behavior.
		20.3		Handling of Incidences of Ragging:
			i	The Vice-Chancellor shall make arrangements for a sensitization programme among students, staff, parents, and other stakeholders on the ill effects of ragging to serve as a preventive mechanism.
			ii	The Vice-Chancellor shall constitute an Anti-Ragging Squad to serve as a deterrent to acts of ragging.
			iii	Any incidence, either inside or outside the Campus, of ragging, as defined in legal parlance, may be reported by anyone to the Anti-Ragging Committee.
			iv	Depending on the nature and gravity of the guilt established by the Anti-Ragging Committee, the Vice-Chancellor may impose, to those found guilty, punishments such as:
				a. Cancellation of admission;
				b. Rustication from the University;
				c. Withholding/withdrawing scholarship/ fellowship and other benefits;
				d. Debarring from appearing in any test/examination or other evaluation process;
				e. Imposing a fine; and
				f. When the persons or a group of students committing or abetting the crime of ragging are not identifiable, the University shall resortto collective punishment as a deterrent to potential offenders.
			v	The Registrar / Dean of Faculty, as the case may be, shall take immediate action on the receipt of any information that ragging has taken place or is likely to take place.
			vi	The Vice Chancellor / Registrar / Dean of Faculty, as the case may be, may take help of local police or other law enforcing authorities for immediate action.
			vii	The Chairperson of Anti-Ragging Committee or any other Officer of the University may *suo motu* inquire into any incident of ragging or likelihood of such incident and make a report in writing to the Vice-Chancellor clearly pinpointing, among other details, the identity of the student or the students who were involved in the incident and the nature of the incident.
			viii	The Chairperson of Anti-Ragging Committee or any other Officer of the University, as the case may be, may also submit an interim report to the Vice-Chancellor establishing the identity of the perpetrators of ragging and the nature of the incident.

Sexual Harassment	**21**	**21.1**		Students shall conduct themselves in a manner that provides a safe working environment for women. Sexual harassment of any kind is unacceptable and shall attract disciplinary action.
		21.2		Acts of sexual harassment shall be as defined in legal parlance.
		21.3		Handling of Incidents of Sexual Harassment:
			a	The Vice-Chancellor shall make arrangements for a sensitization programme among students, staff, parents, and other stakeholders onthe ill effects of Sexual Harassment to serve as a preventive mechanism.
			b	Any incidence, either inside or outside the Campus, of Sexual Harassment, as defined in legal parlance, may be reported by anyone to the Anti-Sexual Harassment Committee.
			C	Depending on the nature and gravity of the guilt established by the Anti-Sexual Harassment Committee, the Vice-Chancellor may impose, to those found guilty, punishments such as:
			i	Cancellation of admission;
			ii	Rustication from the University;
			iii	Withholding/withdrawing scholarship/ fellowship and otherbenefits;
			iv	Debarring from appearing in any test/examination or otherevaluation process;
			v	Imposing a fine; and
			vi	When the persons or a group of students committing or abetting the crime of Sexual Harassment are not identifiable, the University shall resort to collective punishment as a deterrent to potential offenders.
Other Acts of Indiscipline or Misconduct	**22**	**22.1**		Without prejudice to the generality of the power to maintain and enforce discipline, the following actions shall amount to acts of indiscipline or misconduct on the part of a student of the University:
			i	physical assault or threat to use physical force against any teaching ornon-teaching staff or student of the University or any individual of the society;
			ii	carrying of, use of or threat to use, any weapon;
			iii	indulging in or instigating any kind of gambling / betting activities;
			iv	misbehaving or cruelty towards any teaching or non-teaching staffor student of the University or any individual of the society;
			v	use of banned drugs, intoxicants, alcohol, and tobacco products;
			vi	any violation of the provisions of the Civil Rights Protection Act, 1976;
			viii	indulging in or encouraging violence or any conduct which involves

				moral turpitude;
			viii	violation of the status, dignity and honour of a student belonging to scheduled caste or scheduled tribe;
			ix	creating / circulating bad information / rumors / gossip on socialmedia, websites, blogs, internet, sms and other e-communications,against any teaching or non-teaching staff or student of the University or any individual of the Society;
			x	discrimination against any teaching or non-teaching staff or student of the University or any individual of the society on grounds of caste, creed, language, place of origin, social and cultural background;
			xi	practicing casteism and untouchability in any form or inciting any other person to do so;
			xii	any act, whether verbal or otherwise, derogatory to women;
			xiii	any form of bribing or corruption;
			xiv	willful destruction of the property of the University or public property;
			xv	behaving in a rowdy, intemperate or disorderly manner in the premises of the University or outside the campus or encouraging or inciting any other person to do so;
			xvi	creating discord, ill-will or intolerance among the students on sectarian or communal grounds or inciting any other student to doso;
			xvii	causing any kind of disruption of the academic functioning of the University;
			xviii	giving information / misrepresentation of the University to any external agency including press or media without the consent of the University;
		22.2		The University may amend or add to the list of acts of indiscipline and misconduct on the part of a student of the University.
		22.3		Handling of Other acts of indiscipline or misconduct:
			i	Any Other act of indiscipline by one or more students shall be dealt with by the concerned Dean of Faculty.
			ii	A serious act of indiscipline by one or more students shall be referred by the concerned Dean of Faculty to the Student Discipline Committee for necessary action. The Committee shall inquire into the charges and give the concerned student an opportunity to explain himself/herself. After the hearing, the Committee shall recommend to the Vice-Chancellor suitable action if the charges aresubstantiated.

Penalties for Breach of Discipline and Conduct	**23**			Without prejudice to the generality of the powers relating to the maintenance of discipline and taking such action in the interest of maintaining discipline as deemed appropriate, the Vice-Chancellor / Registrar / Deans of Faculties may in the exercise of the vested powers aforesaid, order or direct that any student:
		23.1	**i**	be expelled from the University, in which case the student shall not be re-admitted to the University;
			ii	be, for a stated period, suspended in which case the student shall not be admitted to the University till the expiry of the period of suspension;
			iii	be imposed with fine of a specified amount of money;
			iv	be debarred from appearing in a University examination or examinations for one or more terms / years; and
			v	be reported to the local state law and order authority.
		23.2		The Vice-Chancellor, in exercise of powers aforesaid or on the recommendations of the Registrar / Deans of Faculties, may also order or direct that the result of the student concerned of the examination or examinations at which he has appeared, be cancelled.
		23.3		Mass absence shall be deemed as an act of indiscipline. The concerned Teachers are not obligated to cover the lessons planned forthe missed classes.
		23.4		A student shall be required to withdraw from the programme and leave the University on the following additional grounds:
Conditions for Termination from the Programme	**24**	**24.1**	**i**	Absence from classes for more than SIX weeks at a time in a semester without leave of absence being granted by the concerned Dean of Faculty; and
			ii	Failure to meet the standards of discipline as prescribed by the University from time to time.
Grievance RedressalCell	**25**			A student may approach the Grievance Redressal Cell to seek redressal for any grievance including any penalty imposed on the student. The Grievance Redressal Cell shall:
			i	Create awareness among students about the existence of Grievance Redressal Cell (GRC);
			ii	Encourage the students to express their grievances freely and frankly,without any fear of being victimized;
			iii	Inquire into the grievance issue and initiate the process of redressal; and

			iv	Forward recommendation(s) to the concerned authority on thebasis of its findings.
Cancellation of Studentshipof University Employees	**26**			Employees of the University may be eligible to enroll as part-time students of the University. The studentship of such an employee shall be cancelled if he/she ceases to be an employee of the University as a consequence of disciplinary action.
Rules of Residence in Campus and Off- Campus Housing	**27**	**27.1**		The University shall provide housing facilities for students to the extent possible. Such housing may be both on and off campus and shall be separate for male and female students. The following rules encompass eligibility, allotment, boarding, lodging and allied facilities, maintenance and discipline. The University shall strive to provide safe, economical and holistic living environment in its housing facility that is conducive to academic pursuits.
Eligibility	**28**	**28.1**		The hostel accommodation shall be available only for a regular student for the minimum duration of programme of study.
		28.2		Preference shall be given to students having good academicstanding.
		28.3		Preference shall be given to students hailing from rural and far off places.
Allotment	**29**	**29.1**		Each student desirous of seeking admission to the hostel shall submit an application in the prescribed form to the Warden after admission in the University along with proof of admission. The student shall appear before the hostel committee in person along with the parents / local guardian and the original documents.
		29.2		The admission to the hostel shall be granted on a first-come-first-served basis.
		29.3		On admission to the hostel, the parents shall fill the prescribedforms, pay prescribed fees, nominate the local guardian and authorized visitors to be allowed to the hostel.
		29.4		The student shall occupy the allotted room and shall not change the room or shift the furniture in / out of the room without the written permission of the Warden.
		29.5		Renewal of stay in the hostel for the subsequent years is not automatic and is based on the students' discipline, behaviour and attendance. Students staying in hostel are expected to have 100% attendance in all classes. However,z if a student's attendance falls below the academic mandatory requirement of 85%, he /she will become ineligible for hostel accommodation for the remaining period of study.

		29.6		The hostel fees and mess charges shall be specified from time totime. In case of non- payment of the same within the scheduled time, the student is liable to be asked to vacate the hostel.
		29.7		All students leaving / rejoining the hostel shall enter their names in the dining out / dining in register.
Hostel Maintenance	**30**	**30.1**		The residents of the hostel shall be responsible for the safe-keepingof their personal belongings.
		30.2		The students shall be responsible for the care and maintenance of thefurniture, furnishing, and fixtures and any damage to hostel property shall be made good by the concerned student(s).
		30.3		General upkeep of the hostel and mess buildings, facilities and equipment shall be the collective responsibility of all resident students and they shall be required to make good any damage, if the students who caused the damage could not be identified.
Hostel Discipline	**31**	**31.1**		Every student staying in the hostel, at all times, shall maintain highest standard of discipline and conduct befitting the status of a student of higher learning.
		31.2		Students shall be duty bound to report to the Warden in case they notice any unwanted incidents or undesirable activity in the hostelor on the campus.
		31.3		No student shall cause disturbance to fellow students in theirstudies.
		31.4		Students shall not arrange any function, celebration or meeting within the hostel or outside or within the Campus without specific permission of the Warden / concerned Authorities.
		31.5		Students shall not arrange any picnic outside without specific permission of the Warden / Authorities concerned.
		31.6		Students shall be collectively responsible for the hostel environment including allotted room in which they live in by keeping it clean,healthy and presentable.
		31.7		The residents shall not use any electrical appliances other than those provided or specifically permitted by the Warden in writing.
		31.8		The use of electronic equipment which may cause inconvenience to other occupants shall not be allowed.
		31.9		The permission to use computer / lap top / tablets / smart phones shall be only for legitimate purposes. If any misuse / abuse of the same is observed, the permission to use such equipment shall be withdrawn.
		31.1		When the students go out of their room they shall switch off all the

				electrical / electronic appliances, and keep the room locked at all times. Violation shall attract suitable penalty and punishment as decided by the Authorities.
		31.1		The students shall not screen pirated / unauthorized / unlicensed movies in their computers / laptops and common rooms. Any violation shall be dealt severely. Punishment for the same shall be decided by the concerned Authorities.
		31.1		The students shall not put up any posters / pictures on the walls, doors, windows and shelves or otherwise disfigure them.
		31.1		The students are prohibited to possess firearms, weapons or potentially dangerous instruments. Defaulters shall be dealt with seriously including rustication.
		31.1		Consumption of narcotic drugs / alcohol / intoxicants and smoking are strictly prohibited in the hostel premises. Defaulters shall be referred to the Student Disciplinary Committee and be severely dealt with including expulsion.
		31.2		The students indulging in vandalism/ violence within the hostel premises shall be severely dealt with including expulsion.
		31.2		Students shall not participate in any political, anti-national, anti-social or undesirable activity in or outside the campus.
		31.2		All students are required to give daily attendance at the time fixed and declared by the Warden from time to time. The students missing the attendance are liable for disciplinary action. Students shall produce the identity card as and when demanded by any authorized staff.
		31.2		Hostel students shall obtain written permission in advance for proceeding on outstation leave.
		31.2		No visitors shall be allowed to be entertained inside the rooms. The visitors / guests may, however, be entertained in the visitors' area only.
		31.2		The visit of a person of other gender is restricted to common areas such as dining hall, common room and lounge.
		31.2		No student is allowed to have guests staying in the room allotted to the student without the written permission of the Warden.
		31.2		No student is allowed to cook meals in his / her hostel room. Meals shall not be served in the room except in case of sickness.
		31.2		The consumption of food delivered to the hostel by outsideagencies shall not be entertained.

		31.2		Students shall not carry mess cookery / cutlery / glassware to their rooms. Defaulters will be severely dealt with.
Miscellaneous	**32**	**32.1**		On all matters, which are not explicitly mentioned above, the decisionof the Vice-Chancellor shall be final and binding on all concerned.
		32.2		Notwithstanding the foregoing, the Vice-Chancellor shall have the powers to make additional guidelines and regulations for the residents from time to time and to get the hostel vacated without assigning any reasons.
Protection of Action Taken in Good Faith	**33**			No suit or other legal proceedings shall lie against any Officer or other employee of the University for anything, which is done in good faith or intended to be done in pursuance of the provisions of the Act, the Statutes, or these Regulations.
Interpretation	**34**			Any question as to the interpretation of these Guidelines shall be decided by the Chancellor, whose decision shall be final and binding. The Executive Council shall have the power to issue clarifications to remove any doubt, difficulty or anomaly which may arise during implementation of the provisions of these Guidelines.
Removal of Difficulties	**35**			If any difficulty arises in giving effect to the provisions of these Guidelines, the Executive Council may, by a notification or by order, make such provisions, which are not inconsistent with the provisions of the Act, Statutes, as appear to it to be necessary or expedient, for removing the difficulty.
Power to Amend these Guidelines	**36**			The Executive Council may make new or additional Guidelines or amend or repeal these Guidelines as prescribed under Section-38 of the Act.

DSU COLLEGE CODES:

K-CET Code (B.Tech)	E240	Comed-K Code (B.Tech.)	E182
PGCET Code (M.Tech.)	T970	PGCET Code (MBA)	B365MB
PGCET Code (MCA)	C520MC		

Dayananda Sagar University

DevaraKaggala Halli, Haohalli,KanakaPura Main Road-
Ramanagaram

Karnataka

Web: www.dsu.edu.in