

## 2.5 Evaluation Process and Reforms

### 2.5.1 - Mechanism of internal assessment is transparent and robust in terms of frequency and mode. Write a description within 200 words.

- The institute prepares its own academic calendar well in advance before the commencement of the semester based on the Academic Calendar notified by the University. It includes specific dates for completion of syllabus coverage, the conduct of Continuous Assessments for theory and laboratory.
- Further changes in schedules, patterns, methods if any, are immediately notified to the students through classroom briefing by the concerned subject teachers and the department notice board.
- For theory subjects, during a semester, there will be two mid-term examinations. Each midterm examination consists of one objective paper (online) for 10 marks, one descriptive paper for 15 marks and one assignment for 5 marks. The total marks secured by the student in each midterm examination are evaluated for 30 marks. Final internal marks will be calculated with 80% weightage for better of two mids and 20% weightage for other mid exam.
- For practical subjects there shall be continuous evaluation during the semester for 15 internal marks and 35 end examination marks. The internal 15 marks shall be awarded as follows: day to day work - 5 marks, Record-5 marks and the remaining 5 marks to be awarded by conducting an internal laboratory test. The end examination shall be conducted by the teacher concerned and external examiner appointed by the controller of examinations, JNTUK.
- For practical subjects there shall be continuous evaluation during the semester internal 15 marks shall be awarded as follows: day to day work - 5 marks, Record-5 marks and the remaining 5 marks to be awarded by conducting an internal laboratory test and 35 end examination marks.
- For project work 200 marks and distribution shall be 60 marks for internal and 140 marks for external evaluation. The supervisor assesses the student for 30 marks (Report: 15 marks, Seminar: 15 marks) and the same is to be evaluated by the departmental Project Review Committee consisting of supervisor, a senior faculty and HOD for 30 marks. The external evaluation of Project Work is a Viva-Voce





Examination conducted in the presence of internal examiner and external examiner appointed by the University and is evaluated for 140 marks.

- R 23 Regulation For theory subjects, during a semester, there will be two mid-term examinations. Each midterm examination consists of one objective paper for 10 marks, one descriptive paper for 15 marks and one assignment for 5 marks. The total marks secured by the student in each midterm examination are evaluated for 30 marks. Final internal marks will be calculated with 80% weightage for better of two mids and 20% weightage for other mid exam.
- For practical subjects there shall be continuous evaluation during the semester for 30 internal marks and 70 end examination marks. The internal 30 marks shall be awarded as follows: day to day work - 10 marks, Record-5 marks and the remaining 15 marks to be awarded by conducting an internal laboratory test. The end examination shall be conducted by the teacher concerned and external examiner appointed by the controller of examinations, JNTUK.
- For practical subjects there shall be continuous evaluation during the semester internal 30 marks shall be awarded as follows: day to day work - 10 marks, Record-5 marks and the remaining 15 marks to be awarded by conducting an internal laboratory test and 70 end examination marks.

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- The answer scripts of the class test are evaluated and distributed within one week of the internal exams for verification of marks.
- The written responses are saved and document for future reference and validation. Students are free to interact with the teacher to resolve grievances if any, regarding the assessment.
- Complete transparency is maintained in the system of internal assessment which enhances the bonding between faculty members and the students.
- An examination committee has been established by the institute to handle all activities relating to exams at the institute level.
- The faculty must prepare the question paper for the midterms before the allotted time given by the examination section.



**ACADEMIC REGULATIONS (R20)**  
**COURSE STRUCTURE & DETAILED SYLLABUS**

For

**B. Tech FOUR YEAR DEGREE COURSE**

**(Applicable for the batches admitted from 2020-21)**



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**KAKINADA – 533003, ANDHRA PRADESH, INDIA**

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## ACADEMIC REGULATIONS (R20) FOR B. TECH. (REGULAR)

Applicable for students of B. Tech. (Regular) from Academic Year 2020-21 onwards

Jawaharlal Nehru Technological University Kakinada (JNTUK) 2020 Regulations (R20 Regulations) applicable to all affiliated colleges are given hereunder. These regulations govern the B. Tech programmes offered by all affiliated colleges with effect from the students admitted to the programmes in academic year 2020-21.

### 1. Courses of study:

The following courses of study are offered at present as specializations for the B. Tech. Courses in the jurisdiction of all affiliated colleges of JNTUK.

S. No	Branch	Short Name	Code
1	Civil Engineering	CE	01
2	Electrical & Electronics Engineering	EEE	02
3	Mechanical Engineering	ME	03
4	Electronics and Communication Engineering	ECE	04
5	Computer Science Engineering	CSE	05
6	Computer Science & Technology	CST	06
7	Electronics and Instrumentation Engineering	EIE	10
8	Information Technology	IT	12
9	Automobile Engineering	AME	24
10	Mining Engineering	MM	26
11	Petroleum Engineering	PE	27
12	Agriculture Engineering	AGE	35
13	Artificial Intelligence and Machine Learning	AIML	42
14	Artificial Intelligence	AI	43
15	Data Science	DS	44
16	Artificial Intelligence and Data Science	AIDS	45
17	Cyber Security	CS	46
18	Internet of things and Cyber security including Block chain Technology	IOTCSBT	47
19	Computer Science and Business System	CSBS	48
20	Internet of Things	IOT	49
21	Electronics & Communication Technology	ECT	50
22	Food Engineering	FE	51

- 2. Medium of Instruction:** The medium of instruction of the entire B. Tech undergraduate programme in Engineering & Technology (including examinations and project reports) will be in **English** only.
- 3. Admissions:** Admission to the B. Tech Programme shall be made subject to the eligibility, qualifications and specialization prescribed by the A.P. State Government/University from time to time. Admissions shall be made either on the basis of the merit rank obtained by the student in the common entrance examination conducted by the A.P. Government/University or on the basis of any other order of merit approved by the A.P. Government/University, subject to reservations as prescribed by the Government/University from time to time.



#### 4. Programme Pattern:

- a) Total duration of the of B. Tech (Regular) Programme is four academic years
- b) Each Academic year of study is divided in to two semesters.
- c) Minimum number of instruction days in each semester is 90.
- d) Grade points, based on percentage of marks awarded for each course will form the basis for calculation of SGPA (Semester Grade Point Average) and CGPA (Cumulative Grade Point Average).
- e) The total credits for the Programme are 160.
- f) A three-week induction program is mandatory for all first year UG students and shall be conducted as per AICTE/UGC/APSCH guidelines.
- g) Student is introduced to "Choice Based Credit System (CBCS)".
- h) A pool of interdisciplinary and job-oriented mandatory skill courses which are relevant to the industry are integrated into the curriculum of concerned branch of engineering (total five skill courses: two basic level skill courses, one on soft skills and other two on advanced level skill courses)
- i) A student has to register for all courses in a semester.
- j) All the registered credits will be considered for the calculation of final CGPA.
- k) Each semester has - 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)'. Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as indicated by UGC and course structure as suggested by AICTE are followed.
- l) A 10 months industry/field mandatory internship, both industry and social, during the summer vacation and also in the final semester to acquire the skills required for job and make engineering graduates to connect with the needs of the industry and society at large.
- m) All students shall be mandatorily registered for NCC/NSS activities.
- n) Each college shall assign a faculty advisor/mentor after admission to each student or group of students from same department to provide guidance in courses registration/career growth/placements/opportunities for higher studies/GATE/other competitive exams etc.

#### 5. Subject/Course Classification: All subjects/courses offered for the undergraduate programme in E & T (B. Tech degree programmes) are broadly classified as follows.

S.No	Category	Code	APSCH breakdown of Credits	AICTE Credits of breakup
1	Humanities and social science including Management courses	HSMC	10.5	12
2	Basic Science courses	BSC	21	25
3	Engineering courses science	ESC	24	24
4	Professional core Courses	PCC	51	48
5	Open Elective Courses	OEC	12	18
6	Professional Courses Elective	PEC	15	18
7	Internship, seminar, project work	PROJ	16.5	15
8	Skill Oriented Courses	SC	10	-
9	Laboratory Courses	LC	-	-
10	Mandatory courses	MC	Non-credit	Non-credit
<b>Total Credits</b>			<b>160</b>	<b>160</b>



6. Registration for Courses:

- i) The college shall invite registration forms from the students at the beginning of the semester for the registration for courses each semester. The registration process shall be closed within one week. If any student wishes to withdraw the registration, he/she shall submit a letter to the principal through the class teacher/instructor and HOD. The principal shall communicate the registration and withdraw details courses of each student in a consolidated form to the college examination section and University without fail.
- ii) There are four open electives in each branch. All Open Electives are offered to students of all branches in general. A student shall choose an open elective, by consulting the HOD/advisor, from the list in such a manner that he/she has not studied the same course in any form during the Programme.
- iii) A student shall be permitted to pursue up to a maximum of two elective courses under MOOCs during the programme. Students are advised to register for only for minimum 12 weeks in duration MOOCs courses. Student has to pursue and acquire a certificate for a MOOC course only from the SWAY/NPTE through online with the approval of Head of the Department in order to earn the 3 credits. The Head of the department shall notify the list of such courses at the beginning of the semester. The details of the MOOCs courses registered by the students shall be submitted to the University examination center as well as college examination center. The Head of the Department shall appoint a mentor for each of the MOOC subjects registered by the students to monitor the student's assignment submissions given by SWAYAM/NPTEL. The student needs to submit all the assignments given and needs to take final exam at the proctor center. The student needs to earn a certificate by passing the exam. The student will be awarded the credits given in curriculum only by submission of the certificate. In case if student does not pass subjects registered through SWAYAM/NPTEL, the same or alternative equivalent subject may be registered again through SWAYAM/NPTEL in the next semester with the recommendation of HOD and shall be passed.
- iv) Two summer internships each with a minimum of six weeks duration shall be mandatorily done/completed respectively at the end of second and third years (during summer vacations). The internship can be done by the students at local industries, Govt. Organizations, construction agencies, Industries, Hydel and thermal power projects and also in software MNCs. After completing the summer internship, the students shall register in the immediate respective odd semester and it will be evaluated at the end of the semester as per norms of the university. The student has to produce the summer internship satisfactory report and certificate taken from the organization to be considered for evaluation. The College shall facilitate and monitor the student internship programs. Completion of internships is mandatory, if any student fails to complete internship, he/she will not be eligible for the award of degree. In such cases, the student shall repeat and complete the internship.
- v) In the final semester, the student should mandatorily register and undergo internship and in parallel he/she should work on a project with well-defined objectives. At the end of the semester the candidate shall submit an internship completion certificate and a project report. A student shall also be permitted to submit project report on the work carried out during the internship. The project report shall be evaluated with an external examiner.
- vi) Curricular Framework for Skill oriented courses
  - a) There are five (05) skill-oriented courses shall be offered during III to VII semesters and students must register and pass the courses successfully.
  - b) For skill oriented/skill advanced course, one theory and 2 practical hours (1-0-2) or two theory hours (2-0-0) may be allotted as per the decision of concerned BOS.
  - c) Out of the five skill courses; (i) two shall be skill-oriented courses from the same domain and shall be completed in second year (ii) Of the remaining 3 skill courses, one shall be necessarily be a soft skill course and the remaining 2 shall be skill-advanced courses either from the same domain or job-oriented skill courses, which can be of inter disciplinary nature.
  - d) Students may register the interdisciplinary job-oriented skill courses based on the prerequisites and eligibility in consultation with HOD of the college.



- e) The student shall be given an option to choose either the skill courses being offered by the college or to choose a certificate course being offered by industries/Professional bodies/APSSDC or any other accredited bodies. However, the department has to assign mentors in the college to monitor the performance of the students.
- f) If a student chooses to take a Certificate Course offered by industries/Professional bodies/APSSDC or any other accredited bodies, in lieu of the skill advanced course offered by the Department, then the department shall mark overall attendance of the student for the remaining courses in that semester excluding the skill course in all the calculations of mandatory attendance requirements upon producing a valid certificate. However, the student is deemed to have fulfilled the attendance requirement of the course, if the external agency issues a certificate with satisfactory condition. If the certificate issued by external agency is marked with unsatisfactory condition, then the student shall repeat the course either in the college or at external agency. The credits will be awarded to the student upon producing the successful Course Completion Certificate from the agency/professional bodies and after passing in the viva-voce examination conducted at college as per university norms at the end of the semester.
7. (a) **Award of B. Tech. Degree:** A student will be declared eligible for the award of B. Tech. Degree if he fulfills the following academic regulations:
- A student shall be declared eligible for award of the B. Tech Degree, if he pursues a course of study in not less than four and not more than eight academic years.
  - After eight academic years from the year of their admission, he/she shall **forfeit** their seat in B. Tech course and their admission stands cancelled.
  - The student shall register for 160 credits and must secure all the 160 credits.
  - All students shall register for NCC/NSS activities and will be required to participate in an activity specified by NSS officer during second and third semesters. Grade shall be awarded as Satisfactory or Unsatisfactory in the mark sheet on the basis of participation, attendance, performance and behavior. If a student gets an unsatisfactory Grade, he/she shall repeat the above activity in the subsequent years, in order to complete the degree requirements.
  - Courses like Environmental Sciences, Universal Human Values, Ethics, Indian Constitution, Essence of Indian Traditional Knowledge etc., shall be included in the curriculum as non-credit mandatory courses. Environmental Sciences is to be offered compulsorily as mandatory course for all branches. A student has to secure 40% of the marks allotted in the internal evaluation for passing the course. ~~No marks or letter grade shall be allotted for all mandatory non-credit courses.~~
  - Credit Definition:

1 Hour Lecture (L) per week	1 Credit
1 Hour Tutorial (T) per week	1 Credit
1 Hour Practical (P) per week	0.5 Credit
2 Hours Practical (Lab) per week	1 Credit

- (b) **Award of B. Tech. (Honor)/B. Tech. (Minor):** B. Tech. with Honors or a B. Tech. with a Minor will be awarded if the student earns 20 additional credits are acquired as per the regulations/guidelines. The regulations/guidelines are separately provided. Registering for Honors/Minor is optional.

#### 8. Attendance Requirements

- A student is eligible to write the University examinations if he acquires a minimum of 40% in each subject and 75% of attendance in aggregate of all the subjects.
- Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) may be granted by the College Academic Committee. However, this condonation concession is applicable only to any two semesters during the entire programme.
- Shortage of Attendance below 65% in aggregate shall not be condoned.
- A student who is short of attendance in a semester may seek re-admission into that semester when offered within 4 weeks from the date of commencement of class work.
- Students whose shortage of attendance is not condoned in any semester are not eligible to write their end semester examination of that class.



- f) A stipulated fee of Rs. 500/- in the concerned semester shall be payable towards condonation of shortage of attendance. Students availing condonation on medical ground shall produce a medical certificate issued by the competitive authority.
- g) A student will be promoted to the next semester if he satisfies the (i) attendance requirement of the present semester and (ii) minimum required credits.
- h) If any candidate fulfills the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.
- i) For induction programme attendance shall be maintained as per AICTE norms.
- j) For non-credit mandatory courses the students shall maintain the attendance similar to credit courses.

**9. Evaluation-Distribution and Weightage of marks**

- (i) Paper setting and evaluation of the answer scripts shall be done as per the procedures laid down by the University Examination section from time to time.
- (ii) For non-credit mandatory courses, like Environmental Sciences, Universal Human Values, Ethics, Indian Constitution, Essence of Indian Traditional Knowledge, the student has to secure 40% of the marks allotted in the internal evaluation for passing the course. No marks or letter grade shall be allotted for all mandatory non-credit courses.
- (iii) A student is deemed to have satisfied the minimum academic requirements if he has earned the credits allotted to each theory/practical design/drawing subject/ project etc by securing not less than 35% of marks in the end semester exam and minimum 40% of marks in the sum total of the internal marks and end semester examination marks together.

**(iv) Distribution and Weightage of marks:**

The assessment of the student's performance in each course will be based on Continuous Internal Evaluation (CIE) and Semester-End Examination (SEE). The performance of a student in each semester shall be evaluated subject-wise with a maximum of 100 marks for theory subject and 50 marks for practical subject. For theory subjects the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End Examinations.

S. No	Components	Internal	External	Total
1	Theory	30	70	100
2	Engineering Graphics/Design/Drawing	30	70	100
3	Practical	15	35	50
4	Mini Project/Internship/Industrial Training/ Skill Development programmes/Research Project	-	50	50
5	Project Work	60	140	200

**(v) Continuous Internal Theory Evaluation:**

- (a) For theory subjects, during a semester, there shall be two mid-term examinations. Each mid-term examination consists of (i) one online objective examination (ii) one descriptive examination and (iii) one assignment. The online examination (objective) shall be 10 marks and descriptive examination shall be for 15 marks with a total duration of 1 hour 50 minutes (20 minutes for objective and 90 minutes for descriptive paper).
- (b) The first online examination (objective) is set with 20 multiple choice questions for 10 marks (20 questions x ½ marks) from first two and half units (50% of the syllabus) and it is conducted by University Examination Section. The descriptive examination is set with 3 full questions for 5 marks each from first two and half units (50% of the syllabus), the student has to answer all questions. In the similar lines, the second online and descriptive examinations shall be conducted on the rest of the syllabus.
- (c) The assignment is given by the concerned class teacher for five marks from first two and half units (50% of the syllabus). The second assignment shall be given from rest of the syllabus. The first assignment should be submitted before the conduct of the first mid-term examination, and the second assignment should be submitted before the conduct of the second mid-term examination.
- (d) The total marks secured by the student in each mid-term examination are evaluated for 30 marks. The first mid marks (Mid-1) consisting of marks of online objective examination, descriptive



- examination and assignment shall be submitted to the University examination section within one week after completion of first mid examination.
- (e) The mid marks submitted to the University examination section shall be displayed in the concerned college notice boards for the benefit of the students.
  - (f) If any discrepancy found in the submitted Mid-1 marks, it shall be brought to the notice of university examination section within one week from the submission.
  - (g) Second mid marks (Mid-2) consisting of marks of online objective examination, descriptive examination and assignment shall also be submitted to University examination section within one week after completion of second mid examination and it shall be displayed in the notice boards. If any discrepancy found in the submitted mid-2 marks, it shall be brought to the notice of university examination section within one week from the submission.
  - (h) Internal marks can be calculated with 80% weightage for better of the two mids and 20% Weightage for another mid exam.

Example:

**Mid-1 marks** = Marks secured in (online examination-1+descriptive examination-1  
+one assignment-1)

**Mid-2 marks** = Marks secured in (online examination-2+descriptive examination-2  
+one assignment-2)

**Final internal Marks** = (Best of (Mid-1/Mid-2) marks x 0.8  
+ Least of (Mid-1/Mid-2) marks x 0.2)

- (i) With the above criteria, university examination section will send mid marks of all subjects in consolidated form to all the concerned colleges and same shall be displayed in the concerned college notice boards. If any discrepancy found, it shall be brought to the notice of university examination section through proper channel within one week with all proofs. Discrepancies brought after the given deadline will not be entertained under any circumstances.
- (vi) **Semester End Theory Examinations Evaluation:**
- (a) The semester end examinations will be conducted university examination section for 70 marks consists of five questions carrying 14 marks each. Each of these questions is from one unit and may contain sub-questions. For each question there will be an "either" "or" choice, which means that there will be two questions from each unit and the student should answer either of the two questions.
  - (b) For practical subjects there shall be continuous evaluation during the semester for 15 internal marks and 35 end examination marks. The internal 15 marks shall be awarded as follows: day to day work - 5 marks, Record-5 marks and the remaining 5 marks to be awarded by conducting an internal laboratory test. The end examination shall be conducted by the teacher concerned and external examiner appointed by controller of examinations, JNTUK.  
Note: Laboratory marks and the internal marks awarded by the College are not final. The marks are subject to scrutiny and scaling by the University wherever felt desirable. The internal and laboratory marks awarded by the College will be referred to a Committee. The Committee shall arrive at a scaling factor and the marks will be scaled as per the scaling factor. The recommendations of the Committee are final and binding. All the laboratory records and internal test papers shall be preserved in respective departments as per University norms and shall be produced to the Committees of University as and when they ask for.
  - (c) For the subject having design and / or drawing (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 30 marks for internal evaluation (15 marks for continuous Assessment (day-to-day work) and 15 marks for internal tests) and 70 marks for end examination. There shall be two internal tests in a Semester for 15 marks each and final marks can be calculated with 80% weightage for better of the two tests and 20% weightage for other test and these are to be added to the marks obtained in day-to-day work.
  - (d) Evaluation of the summer internships: It shall be completed in collaboration with local industries, Govt. Organizations, construction agencies, Industries, Hydel and thermal power projects and also in software MNCs in the area of concerned specialization of the UG



programme. Students shall pursue this internship during summer vacation just before its offering as per course structure. The minimum duration of this course shall be at least 6 weeks. The student shall register for the internship as per course structure after commencement of academic year. A supervisor/mentor/advisor has to be allotted to guide the students for taking up the summer internship. The supervisor shall monitor the attendance of the students while taking up the internship. Attendance requirements are as per the norms of the University. After successful completion, students shall submit a summer internship technical report to the concerned department and appear for an oral presentation before the departmental committee consists of an external examiner appointed by the University; Head of the Department, supervisor of the internship and a senior faculty member of the department. A certificate from industry/skill development center shall be included in the report. The report and the oral presentation shall carry 40% and 60% weightages respectively. It shall be evaluated for 50 external marks at the end of the semester. There shall be no internal marks for Summer Internship. A student shall secure minimum 40% of marks for successful completion. In case, if a student fails, he/she shall reappear as and when semester supplementary examinations are conducted by the University.

- (e) The job-oriented skill courses may be registered at the college or at any accredited external agency. A student shall submit a record/report on the on the list skills learned. If the student completes job-oriented skill course at external agency, a certificate from the agency shall be included in the report. The course will be evaluated at the end of the semester for 50 marks (record: 15 marks and viva-voce: 35 marks) along with laboratory end examinations in the presence of external (appointed by the university) and internal examiner (course instructor or mentor). There are no internal marks for the job-oriented skill courses.
- (f) **Mandatory Course (M.C):** Environmental Sciences, Universal Human Values, Ethics, Indian Constitution, Essence of Indian Traditional Knowledge etc non-credit (zero credits) mandatory courses. Environmental Sciences shall be offered compulsorily as mandatory course for all branches. A minimum of 75% attendance is mandatory in these subjects. There shall be an external examination for 70 marks and it shall be conducted by the college internally. Two internal examinations shall be conducted for 30 marks and a student has to secure at least 40% of the marks for passing the course. There is no online internal exam for mandatory courses. No marks or letter grade shall be printed in the transcripts for all mandatory non-credit courses, but only Completed (Y)/Not-completed (N) will be specified.
- (g) **Procedure for Conduct and Evaluation of MOOC:** There shall be a Discipline Centric Elective Course through Massive Open Online Course (MOOC) as Program Elective course. The student shall register for the course (Minimum of 12 weeks) offered by SWAYAM/NPTEL through online with the approval of Head of the Department. The Head of the Department shall appoint one mentor for each of the MOOC subjects offered. The student needs to register the course in the SWAYAM/NPTEL portal. During the course, the mentor monitors the student's assignment submissions given by SWAYAM/NPTEL. The student needs to submit all the assignments given and needs to take final exam at the proctor center. The student needs to earn a certificate by passing the exam. The student will be awarded the credits given in curriculum only by submission of the certificate. In case if student does not pass subjects registered through SWAYAM/NPTEL, the same or alternative equivalent subject may be registered again through SWAYAM/NPTEL in the next semester with the recommendation of HOD and shall be passed.
- (h) **Major Project (Project - Project work, seminar and internship in industry):**  
In the final semester, the student should mandatorily register and undergo internship and in parallel he/she should work on a project with well-defined objectives. At the end of the semester the candidate shall submit an internship completion certificate and a project report. A student shall also be permitted to submit project report on the work carried out during the internship. The project report shall be evaluated with an external examiner.  
**Evaluation:** The total marks for project work 200 marks and distribution shall be 60 marks for internal and 140 marks for external evaluation. The supervisor assesses the student for 30 marks (Report: 15 marks, Seminar: 15 marks). At the end of the semester, all projects shall be showcased at the department for the benefit of all students and staff and the same is to be



evaluated by the departmental Project Review Committee consisting of supervisor, a senior faculty and HOD for 30 marks. The external evaluation of Project Work is a Viva-Voce Examination conducted in the presence of internal examiner and external examiner appointed by the University and is evaluated for 140 marks.

10. Recounting of Marks in the End Semester Examination: A student can request for recounting of his/her answer book on payment of a prescribed fee as per university norms.
11. Re-evaluation or Revaluation by Challenge of the End Semester Examination: A student can request for Revaluation or Revaluation by Challenge of his/her answer book on payment of a prescribed fee as per university norms.
12. Supplementary Examinations: A student who has failed to secure the required credits can appear for a supplementary examination, as per the schedule announced by the University.
13. Malpractices in Examinations: Disciplinary action shall be taken in case of malpractices during Mid/End examinations as per the rules framed by the University.

#### 14. Promotion Rules

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.8 for promotion to higher classes

- a) A student shall be promoted from first year to second year if he fulfills the minimum attendance requirement as per University norm.
- b) A student will be promoted from II to III year if he fulfills the academic requirement of 40% of credits up to either II year I-Semester or II year II-Semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in II year II semester.
- a) A student shall be promoted from III year to IV year if he fulfills the academic requirements of 40% of the credits up to either III year I semester or III year II semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.

#### 15. Course Pattern

- a) The entire course of study is for four academic years; all years are on semester pattern.
- b) A student eligible to appear for the end semester examination in a subject, but absent from it or has failed in the end semester examination, may write the exam in that subject when conducted next.
- c) When a student is detained for lack of credits/shortage of attendance, he may be re-admitted into the same semester/year in which he has been detained. However, the academic regulations under which he was first admitted shall continue to be applicable to him.

#### 16. Earning of Credit:

A student shall be considered to have completed a course successfully and earned the credits if he/she secures an acceptable letter grade in the range A+ to E as given below. Letter grade 'F' in any course implies failure of the student in that course and no credits earned. Absent is also treated as no credits earned. For project same % percentages will be followed for grading.

Marks Range Theory (Max - 100)	Marks Range Lab (Max - 50)	Level	Letter Grade	Grade Point
≥ 90	≥ 45	Outstanding	A+	10
≥ 80 to < 89	≥ 40 to < 44	Excellent	A	9
≥ 70 to < 79	≥ 35 to < 39	Very Good	B	8
≥ 60 to < 69	≥ 30 to < 34	Good	C	7
≥ 50 to < 59	≥ 25 to < 29	Fair	D	6
≥ 40 to < 49	≥ 20 to < 24	Satisfactory	E	5
< 40	< 20	Fail	F	0
-	-	Absent	AB	0

#### 17. Computation of SGPA and CGPA

The UGC recommends the following procedure to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):



- (i)  $SGPA(S_k)$  of  $k^{th}$  semester (1 to 8) is ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the total number of credits of all the courses undergone/registered by a student, i.e.,

$$SGPA(S_k) = \frac{\sum_{i=1}^n (C_i \times G_i)}{\sum_{i=1}^n C_i}$$

Where  $C_i$  is the number of credits of the  $i^{th}$  course/subject in a semester and  $G_i$  is the grade point scored by the student in the  $i^{th}$  course/subject and  $n$  is the number of courses/subjects registered in that semester.

- (ii) CGPA: The CGPA is calculated in the same manner taking into account all the 'm' courses/subjects registered by student over all the semesters of a Programme i.e., in all eight semesters

$$CGPA = \frac{\sum_{i=1}^m (C_i \times S_i)}{\sum_{i=1}^m C_i}$$

Where  $S_i$  is SGPA of the  $i^{th}$  semester and  $C_i$  is total number of credits in that semester.

- (iii) SGPA and CGPA shall be rounded off to 2 decimal points and reported in transcripts.  
 (iv) While computing the SGPA/CGPA, the subjects in which the student is awarded Zero grade points will also be included.  
 (v) *Grade Point*: It is a numerical weight allotted to each letter grade on a 10-point scale.  
 (vi) *Letter Grade*: It is an index of the performance of students in a said course. Grades are denoted by letters A+, A, B, C, D, E, F and AB.  
 (vii) As per AICTE regulations, conversion of CGPA into equivalent percentage as follows:  
 Equivalent Percentage = (CGPA - 0.75) x 10  
 (viii) Illustration of Computation of SGPA and CGPA

**Illustration for SGPA:** Let us assume there are 6 subjects in a semester. The grades obtained as follows:

Course	Credit	Grade Obtained	Grade point	$S_i$ - Credit Point (Credit x Grade)
Subject 1	3	B	8	3 X 8 = 24
Subject 2	4	C	7	4 X 7 = 28
Subject 3	3	D	6	3 X 6 = 18
Subject 4	3	A+	10	3 X 10 = 30
Subject 5	3	E	5	3 X 5 = 15
Subject 6	4	D	6	4 X 6 = 24
	20			139

Thus,  $SGPA = 139/20 = 6.95 = 6.9$  (approx.)

**Illustration for CGPA:**

Semester 1	Semester 2	Semester 3	Semester 4
Credits: 20 SGPA: 6.9	Credits: 22 SGPA: 7.8	Credits: 25 SGPA: 5.6	Credits: 26 SGPA: 6.0
Semester 5	Semester 6	Semester 7	Semester 8





Credits: 26 SGPA: 6.3	Credits: 25 SGPA: 8.0	Credits: 21 SGPA: 6.4	Credits: 23 SGPA: 7.5
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Thus,

$$CGPA = \frac{20 \times 6.9 + 22 \times 7.8 + 25 \times 5.6 + 26 \times 6.0 + 26 \times 6.3 + 25 \times 8.0 + 21 \times 6.4 + 23 \times 7.5}{188} = \frac{1276.3}{188} = 6.78$$

#### 18. Award of Class

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

Class Awarded	CGPA to be secured	Remarks
First Class with Distinction	$\geq 7.75$ (Without any supplementary appearance)	From the CGPA secured from 160 Credits
First Class	$\geq 6.75$	
Second Class	$\geq 5.75$ to $< 6.75$	
Pass Class	$\geq 5.00$ to $< 5.75$	

#### 19. Minimum Instruction Days

The minimum instruction days for each semester shall be 90 working days. There shall be no branch transfers after the completion of the admission process. There shall be no transfer from one college/stream to another within the Constituent Colleges and Units of Jawaharlal Nehru Technological University Kakinada.

#### 20. Withholding of Results

If the student is involved in indiscipline/malpractices/court cases, the result of the student will be withheld.

#### 21. Transitory Regulations

- Discontinued or detained candidates are eligible for re-admission as and when next offered.
- The re-admitted candidate will be governed by the rules & regulations under which the candidate has been admitted.
- (i) In case of transferred students from other Universities, credits shall be transferred to JNTUK as per the academic regulations and course structure of JNTUK.  
(ii) The students seeking transfer to colleges affiliated to JNTUK from various other Universities / Institutions have to obtain the credits of any equivalent subjects as prescribed by JNTUK. In addition, the transferred candidates have to pass the failed subjects at the earlier Institute with already obtained internal/sessional marks to be conducted by JNTUK.

#### 22. Gap - Year

Gap Year concept of Student Entrepreneur in Residence shall be introduced and outstanding students who wish to pursue entrepreneurship are allowed to take a break of one year at any time after I/II/III year to pursue entrepreneurship full time. This period shall be counted for the maximum time for graduation. An evaluation committee at university level shall be constituted to evaluate the proposal submitted by the student and the committee shall decide on permitting the student for availing the Gap Year.

#### 23. General

- Wherever the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".
- The academic regulation should be read as a whole for the purpose of any interpretation.
- In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.
- The University may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the University.

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**ACADEMIC REGULATIONS (R20) FOR B. TECH**  
**(LATERAL ENTRY SCHEME)**

Applicable for students admitted into II B. Tech. from the Academic Year 2020-21 onwards

**1 Award of B. Tech. Degree**

A student will be declared eligible for the award of B. Tech. Degree if he fulfills the following academic regulations:

- a) A student shall be declared eligible for the award of the B. Tech Degree, if he pursues a course of study in not less than three academic years and not more than six academic years. After six academic years from the year of their admission, he/she shall forfeit their seat in B. Tech course and their admission stands cancelled.
- b) The candidate shall register for 121 credits and secure all the 121 credits.

2. The attendance regulations of B. Tech. (Regular) shall be applicable to B.Tech (lateral entry).

**3. Promotion Rule**

A student shall be promoted from second year to third year if he fulfills the minimum attendance requirement.

A student shall be promoted from III year to IV year if he fulfills the academic requirements of 40% of the credits up to either III year I semester or III year II semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.

**4. Award of Class**

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

Class Awarded	CGPA to be secured	Remarks
First Class with Distinction	$\geq 7.75$ (Without any supplementary appearance)	From the CGPA secured from 121 Credits from II Year to IV Year
First Class	$\geq 6.75$	
Second Class	$\geq 5.75$ to $< 6.75$	
Pass Class	$\geq 5.00$ to $< 5.75$	

The Grades secured, Grade points and Credits obtained will be shown separately in the memorandum of marks.

5. All the other regulations as applicable to B. Tech. 4-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme).





## COMMUNITY SERVICE PROJECT

### *Introduction*

1. Community Service Project is an experiential learning strategy that integrates meaningful community service with instruction, participation, learning and community development
2. Community Service Project involves students in community development and service activities and applies the experience to personal and academic development.
3. Community Service Project is meant to link the community with the college for mutual benefit. The community will be benefited with the focused contribution of the college students for the village/ local development. The college finds an opportunity to develop social sensibility and responsibility among students and also emerge as a socially responsible institution.

### *Objective*

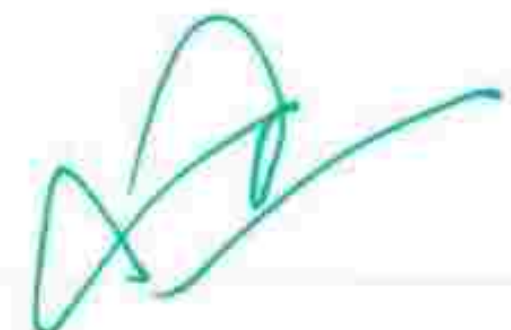
Community Service Project should be an integral part of the curriculum, as an alternative to the 2 months of Summer Internships / Apprenticeships / On the Job Training, whenever there is an exigency when students cannot pursue their summer internships. The specific objectives are;

1. To sensitize the students to the living conditions of the people who are around them,
2. To help students to realize the stark realities of the society.
3. To bring about an attitudinal change in the students and help them to develop societal consciousness, sensibility, responsibility and accountability
4. To make students aware of their inner strength and help them to find new /out of box solutions to the social problems.
5. To make students socially responsible citizens who are sensitive to the needs of the disadvantaged sections.
6. To help students to initiate developmental activities in the community in coordination with public and government authorities.
7. To develop a holistic life perspective among the students by making them study culture, traditions, habits, lifestyles, resource utilization, wastages and its management, social problems, public administration system and the roles and responsibilities of different persons across different social systems.

### *Implementation of Community Service Project*

1. Every student should put in a minimum of **180 hours** for the Community Service Project during the summer vacation.
2. Each class/section should be assigned with a mentor.
3. Specific Departments could concentrate on their major areas of concern. For example, Dept. of Computer Science can take up activities related to Computer Literacy to different sections of people like - youth, women, house-wives, etc
4. A log book has to be maintained by each of the student, where the activities undertaken/involved to be recorded.
5. The log book has to be countersigned by the concerned mentor/faculty in charge.
6. Evaluation to be done based on the active participation of the student and grade could be awarded by the mentor/faculty member.
7. The final evaluation to be reflected in the grade memo of the student.
8. The Community Service Project should be different from the regular programmes of NSS/NCC/Green Corps/Red Ribbon Club, etc.
9. Minor project report should be submitted by each student. An internal Viva shall also be conducted by a committee constituted by the principal of the college.
10. Award of marks shall be made as per the guidelines of Internship/apprentice/ on the job training

### *Procedure*





1. A group of students or even a single student could be assigned for a particular habitation or village or municipal ward, as far as possible, in the near vicinity of their place of stay, so as to enable them to commute from their residence and return back by evening or so.
2. The Community Service Project is a twofold one –
  - a) First, the student/s could conduct a survey of the habitation, if necessary, in terms of their own domain or subject area. Or it can even be a general survey, incorporating all the different areas. A common survey format could be designed. This should not be viewed as a duplication of work by the Village or Ward volunteers, rather, it could be another primary source of data.
  - b) Secondly, the student/s could take up a social activity, concerning their domain or subject area. The different areas, could be like –
    - Agriculture
    - Health
    - Marketing and Cooperation
    - Animal Husbandry
    - Horticulture
    - Fisheries
    - Sericulture
    - Revenue and Survey
    - Natural Disaster Management
    - Irrigation
    - Law & Order
    - Excise and Prohibition
    - Mines and Geology
    - Energy
    - Internet
    - Free Electricity
    - Drinking Water

## ***EXPECTED OUTCOMES***

### **BENEFITS OF COMMUNITY SERVICE PROJECT TO STUDENTS**

#### ***Learning Outcomes***

1. Positive impact on students' academic learning
2. Improves students' ability to apply what they have learned in "the real world"
3. Positive impact on academic outcomes such as demonstrated complexity of understanding, problem analysis, problem-solving, critical thinking, and cognitive development
4. Improved ability to understand complexity and ambiguity

#### ***Personal Outcomes***

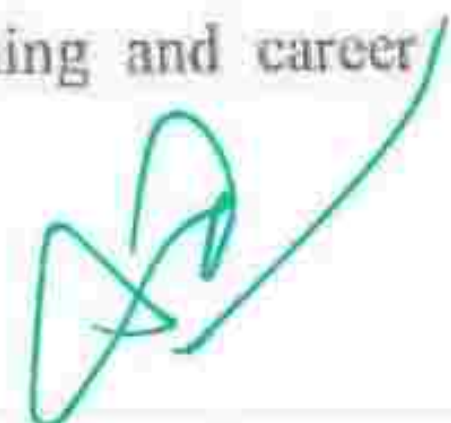
1. Greater sense of personal efficacy, personal identity, spiritual growth, and moral development
2. Greater interpersonal development, particularly the ability to work well with others, and build leadership and communication skills

#### ***Social Outcomes***

1. Reduced stereotypes and greater inter-cultural understanding
2. Improved social responsibility and citizenship skills
3. Greater involvement in community service after graduation

#### ***Career Development***

1. Connections with professionals and community members for learning and career opportunities





2. Greater academic learning, leadership skills, and personal efficacy can lead to greater opportunity

#### ***Relationship with the Institution***

1. Stronger relationships with faculty
2. Greater satisfaction with college
3. Improved graduation rates

#### ***BENEFITS OF COMMUNITY SERVICE PROJECT TO FACULTY MEMBERS***

1. Satisfaction with the quality of student learning
2. New avenues for research and publication via new relationships between faculty and community
3. Providing networking opportunities with engaged faculty in other disciplines or institutions
4. A stronger commitment to one's research

#### ***BENEFITS OF COMMUNITY SERVICE PROJECT TO COLLEGES AND UNIVERSITIES***

1. Improved institutional commitment
2. Improved student retention
3. Enhanced community relations

#### ***BENEFITS OF COMMUNITY SERVICE PROJECT TO COMMUNITY***

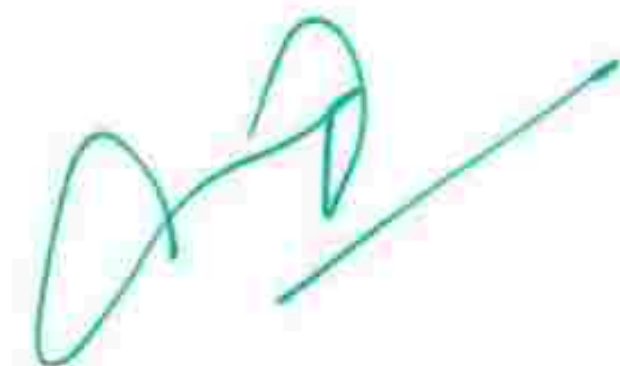
1. Satisfaction with student participation
2. Valuable human resources needed to achieve community goals
3. New energy, enthusiasm and perspectives applied to community work
4. Enhanced community-university relations.

#### ***SUGGESTIVE LIST OF PROGRAMMES UNDER COMMUNITY SERVICE PROJECT***

The following the recommended list of projects for Engineering students. The lists are not exhaustive and open for additions, deletions and modifications. Colleges are expected to focus on specific local issues for this kind of projects. The students are expected to carry out these projects with involvement, commitment, responsibility and accountability. The mentors of a group of students should take the responsibility of motivating, facilitating, and guiding the students. They have to interact with local leadership and people and appraise the objectives and benefits of this kind of projects. The project reports shall be placed in the college website for reference. Systematic, Factual, methodical and honest reporting shall be ensured.

#### ***For Engineering Students***

1. Water facilities and drinking water availability
2. Health and hygiene
3. Stress levels and coping mechanisms
4. Health intervention programmes
5. Horticulture
6. Herbal plants
7. Botanical survey
8. Zoological survey
9. Marine products
10. Aqua culture
11. Inland fisheries
12. Animals and species
13. Nutrition
14. Traditional health care methods
15. Food habits
16. Air pollution
17. Water pollution
18. Plantation
19. Soil protection





20. Renewable energy
21. Plant diseases
22. Yoga awareness and practice
23. Health care awareness programmes and their impact
24. Use of chemicals on fruits and vegetables
25. Organic farming
26. Crop rotation
27. Flourey culture
28. Access to safe drinking water
29. Geographical survey
30. Geological survey
31. Sericulture
32. Study of species
33. Food adulteration
34. Incidence of Diabetes and other chronic diseases
35. Human genetics
36. Blood groups and blood levels
37. Internet Usage in Villages
38. Android Phone usage by different people
39. Utilization of free electricity to farmers and related issues
40. Gender ration in schooling level- observation.

*Complimenting the community service project, the students may be involved to take up some awareness campaigns on social issues/special groups. The suggested list of programmes are;*

**Programmes for School Children**

1. Reading Skill Programme (Reading Competition)
2. Preparation of Study Materials for the next class.
3. Personality / Leadership Development
4. Career Guidance for X class students
5. Screening Documentary and other educational films
6. Awareness Programme on Good Touch and Bad Touch (Sexual abuse)
7. Awareness Programme on Socially relevant themes.

**Programmes for Women Empowerment**

1. Government Guidelines and Policy Guidelines
2. Womens' Rights
3. Domestic Violence
4. Prevention and Control of Cancer
5. Promotion of Social Entrepreneurship

**General Camps**

1. General Medical camps
2. Eye Camps
3. Dental Camps
4. Importance of protected drinking water
5. ODF awareness camp
6. Swatch Bharat
7. AIDS awareness camp
8. Anti Plastic Awareness
9. Programmes on Environment
10. Health and Hygiene
11. Hand wash programmes
12. Commemoration and Celebration of important days

**Programmes for Youth Empowerment**



1. Leadership
2. Anti-alcoholism and Drug addiction
3. Anti-tobacco
4. Awareness on Competitive Examinations
5. Personality Development

#### **Common Programmes**

1. Awareness on RTI
2. Health intervention programmes
3. Yoga
4. Tree plantation
5. Programmes in consonance with the Govt. Departments like –
  - i. Agriculture
  - ii. Health
  - iii. Marketing and Cooperation
  - iv. Animal Husbandry
  - v. Horticulture
  - vi. Fisheries
  - vii. Sericulture
  - viii. Revenue and Survey
  - ix. Natural Disaster Management
  - x. Irrigation
  - xi. Law & Order
  - xii. Excise and Prohibition
  - xiii. Mines and Geology
  - xiv. Energy

#### **Role of Students:**

1. Students may not have the expertise to conduct all the programmes on their own. The students then can play a facilitator role.
2. For conducting special camps like Health related, they will be coordinating with the Governmental agencies.
3. As and when required the College faculty themselves act as Resource Persons.
4. Students can work in close association with Non-Governmental Organizations like Lions Club, Rotary Club, etc or with any NGO actively working in that habitation.
5. And also, with the Governmental Departments. If the programme is rolled out, the District Administration could be roped in for the successful deployment of the programme.
6. An in-house training and induction programme could be arranged for the faculty and participating students, to expose them to the methodology of Service Learning.

#### **Timeline for the Community Service Project Activity**

##### **Duration: 8 weeks**

1. **Preliminary Survey (One Week)**
  - a) A preliminary survey including the socio-economic conditions of the allotted habitation to be conducted.
  - b) A survey form based on the type of habitation to be prepared before visiting the habitation with the help of social sciences faculty. (However, a template could be designed for different habitations, rural/urban.
  - c) The Governmental agencies, like revenue administration, corporation and municipal authorities and village secretariats could be aligned for the survey.
2. **Community Awareness Campaigns (Two Weeks)**



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

#### Malpractices identified by squad or special invigilators

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

\* \* \* \* \*



**MALPRACTICES RULES**  
**DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS**

	Nature of Malpractices/Improper conduct	Punishment
	<i>If the candidate:</i>	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and <del>all the other subjects</del> the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant - Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in-charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.



Based on the survey and the specific requirements of the habitation, different awareness campaigns and programmes to be conducted, spread over two weeks of time. The list of activities suggested could be taken into consideration.

3. *Community Immersion Programme (Four Weeks)*

Along with the Community Awareness Programmes, the student batch can also work with any one of the below listed governmental agencies and work in tandem with them. This community involvement programme will involve the students in exposing themselves to the experiential learning about the community and its dynamics. Programmes could be in consonance with the Govt. Departments.

4. *Community Exit Report (One Week)*

During the last week of the Community Service Project, a detailed report of the outcome of the 8 weeks works to be drafted and a copy shall be submitted to the local administration. This report will be a basis for the next batch of students visiting that particular habitation. The same report submitted to the teacher-mentor will be evaluated by the mentor and suitable marks are awarded for onward submission to the University. Throughout the Community Service Project, a daily log-book need to be maintained by the students batch, which should be countersigned by the governmental agency representative and the teacher-mentor, who is required to periodically visit the students and guide them.





JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA  
VIZIANAGARAM-535 003, A.P  
(Established by Andhra Pradesh Act No.22 of 2021)

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## **Academic Regulations (R23) for B. Tech (Regular-Full time)**

(Effective for the students admitted into I year from the Academic  
Year **2023-24** onwards)

&

## **Academic Regulations (R23) for B.Tech.(Lateral Entry Scheme)**

(Effective for the students admitted into II year through Lateral  
Entry Scheme from the Academic Year 2024 - 25 onwards)



## Academic Regulations (R23) for B. Tech (Regular-Full time)

(Effective for the students admitted into I year from the Academic Year 2023-24 onwards)

### 1. Award of the Degree

- (a) Award of the B.Tech. Degree / B.Tech. Degree with a Minor if he/she fulfils the following:
- (i) Pursues a course of study for not less than four academic years and not more than eight academic years. However, for the students availing Gap year facility this period shall be extended by two years at the most and these two years would in addition to the maximum period permitted for graduation (Eight years).
  - (ii) Registers for 160 credits and secures all 160 credits.
- (b) **Award of B.Tech. degree with Honors** if he/she fulfils the following:
- (i) Student secures additional 15 credits fulfilling all the requisites of a B.Tech. program i.e., 160 credits.
  - (ii) Registering for Honors is optional.
  - (iii) Honors is to be completed simultaneously with B.Tech. programme.

2. Students, who fail to fulfil all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in B.Tech. course and their admission stands cancelled. This clause shall be read along with clause 1 a) i).

### 3. Admissions

Admission to the B. Tech Program shall be made subject to the eligibility, qualifications and specialization prescribed by the A.P. State Government/University from time to time. Admissions shall be made either based on the merit rank obtained by the student in the common entrance examination conducted by the A.P. Government/University or any other order of merit approved by the A.P. Government/University, subject to reservations as prescribed by the Government/University from time to time.

### 4. Program related terms

**Credit:** A unit by which the course work is measured. It determines the number of hours of instruction required per week. One credit is equivalent to one hour of teaching (Lecture/Tutorial) or two hours of practical work/field work per week.

#### Credit Definition:

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
1 Hr. Practical (P) per week	0.5 credit
2 Hrs. Practical (Lab) per week	1 credit



- a) **Academic Year:** Two consecutive (one odd + one even) semesters constitute one academic year.
- b) **Choice Based Credit System (CBCS):** The CBCS provides a choice for students to select from the prescribed courses.

#### 5. Semester/Credits:

- i) A semester comprises 90 working days and an academic year is divided into two semesters.
- ii) The summer term is for eight weeks during summer vacation. Internship/ apprenticeship / work-based vocational education and training can be carried out during the summer term, especially by students who wish to exit after two semesters or four semesters of study.
- iii) Regular courses may also be completed well in advance through MOOCs satisfying prerequisites.

#### 6. Structure of the Undergraduate Programme

All courses offered for the undergraduate program (B. Tech.) are broadly classified as follows:

S.No.	Category	Breakup of Credits (Total 160)	Percentage of total credits	AICTE Recommendation (%)
1.	Humanities and Social Science including Management (HM)	13	8 %	8 – 9%
2.	Basic Sciences (BS)	20	13 %	12 - 16%
3.	Engineering Sciences (ES)	23.5	14%	10 – 18%
4.	Professional Core (PC)	54.5	34 %	30 – 36%
5.	Electives – Professional (PE) & Open (OE); Domain Specific Skill Enhancement Courses (SEC)	33	21 %	19 - 23%
6.	Internships & Project work (PR)	16	10 %	8 – 11%
7.	Mandatory Courses (MC)	Non-credit	Non-credit	-

#### 7. Course Classification:

All subjects/ courses offered for the undergraduate programme in Engineering & Technology (B.Tech. degree programmes) are broadly classified as follows:



S.No.	Broad Course Classification	Course Category	Description
1.	Foundation Courses	Foundation courses	Includes Mathematics, Physics and Chemistry; fundamental engineering courses; humanities, social sciences and management courses
2.	Core Courses	Professional Core Courses (PC)	Includes subjects related to the parent discipline/department/branch of Engineering
3.	Elective Courses	Professional Elective Courses (PE)	Includes elective subjects related to the parent discipline/department/ branch of Engineering
		Open Elective Courses (OE)	Elective subjects which include interdisciplinary subjects or subjects in an area outside the parent discipline/ department/ branch of Engineering
		Domain specific skill enhancement courses (SEC)	interdisciplinary/job-oriented/domain courses which are relevant to the industry
4.	Project & Internships	Project	B.Tech. Project or Major Project
		Internships	Summer Internships – Community based and Industry Internships; Industry oriented Full Semester Internship
5.	Audit Courses	Mandatory non-credit courses	Covering subjects of developing desired attitude among the learners

### 8. Programme Pattern

- i. Total duration of the of B. Tech (Regular) Programme is four academic years.
- ii. Each academic year of study is divided into two semesters.
- iii. Minimum number of instruction days in each semester is 90 days.
- iv. There shall be mandatory student induction program for freshers, with a three-week duration before the commencement of first semester. Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations etc., are included as per the guidelines issued by AICTE.
- v. Health/wellness/yoga/sports and NSS /NSS /Scouts & Guides / Community service activities are made mandatory as credit courses for all the undergraduate students.
- vi. Courses like Environmental Sciences, Indian Constitution, Technical Paper Writing & IPR are offered as non-credit mandatory courses for all the undergraduate students.
- vii. Design Thinking for Innovation & Tinkering Labs are made mandatory as credit courses for all the undergraduate students.
- viii. Increased flexibility for students through an increase in the elective component of the curriculum, with 05 Professional Elective courses and 04 Open Elective courses.



- ix. Professional Elective Courses, include the elective courses relevant to the chosen specialization/branch. Proper choice of professional elective courses can lead to students specializing in emerging areas within the chosen field of study.
- x. A total of 04 Open Electives are offered in the curriculum. A student can complete the requirement for B.Tech. Degree with a Minor within the 160 credits by opting for the courses offered through various verticals/tracks under Open Electives.
- xi. While choosing the electives, students shall ensure that they do not opt for the courses with syllabus contents similar to courses already pursued.
- xii. A pool of interdisciplinary/job-oriented/domain skill courses which are relevant to the industry are integrated into the curriculum of all disciplines. There shall be 05 skill-oriented courses offered during III to VII semesters. Among the five skill courses, four courses shall focus on the basic and advanced skills related to the domain/interdisciplinary courses and the other shall be a soft skills course.
- xiii. Students shall undergo mandatory summer internships, for a minimum of eight weeks duration at the end of second and third year of the programme. The internship at the end of second year shall be community oriented and industry internship at the end of third year.
- xiv. There shall also be mandatory full internship in the final semester of the programme along with the project work.
- xv. Undergraduate degree with Honors is introduced by the University for the students having good academic record.
- xvi. Each college shall take measures to implement Virtual Labs (<https://www.vlab.co.in>) which provide remote access to labs in various disciplines of Engineering and will help student in learning basic and advanced concept through remote experimentation. Student shall be made to work on virtual lab experiments during the regular labs
- xvii. Each college shall assign a faculty advisor/mentor after admission to a group of students from same department to provide guidance in courses registration/career growth/placements/opportunities for higher studies/GATE/other competitive exams etc.
- xviii. Preferably 25% of course work for the theory courses in every semester shall be conducted in the blended mode of learning.

## 9. Evaluation Process

The performance of a student in each semester shall be evaluated subject wise with a maximum of 100 marks for theory and 100 marks for practical subject. Summer Internships shall be evaluated for 50 marks, Full Internship & Project work in final semester shall be evaluated for 200 marks, mandatory courses with no credits shall be evaluated for 30 mid semester marks.

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



## Theory Courses

Assessment Method	Marks
Continuous Internal Assessment	30
Semester End Examination	70
<b>Total</b>	<b>100</b>

- i) For theory subject, the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End-Examination.
- ii) For practical subject, the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End- Examination.
- iii) If any course contains two different branch subjects, the syllabus shall be written in two parts with 3 units each (Part-A and Part-B) and external examination question paper shall be set with two parts each for 35 marks.
- iv) If any subject is having both theory and practical components, they will be evaluated separately as theory subject and practical subject. However, they will be given same subject code with an extension of 'T' for theory subject and 'P' for practical subject.

### a) Continuous Internal Evaluation

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

### Note:

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



units. The second midterm examination shall be conducted for III, IV and V units with one either or type question from each unit.

- v) Final mid semester marks shall be arrived at by considering the marks secured by the student in both the mid examinations with 80% weightage given to the better mid exam and 20% to the other.

**For Example:**

Marks obtained in first mid: 25

Marks obtained in second mid: 20

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

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

Marks obtained in first mid: Absent

Marks obtained in second mid: 25

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

**b) End Examination Evaluation:**

End examination of theory subjects shall have the following pattern:

- i) There shall be 6 questions and all questions are compulsory.
- ii) Question I shall contain 10 compulsory short answer questions for a total of 20 marks such that each question carries 2 marks.
- iii) There shall be 2 short answer questions from each unit.
  - a) In each of the questions from 2 to 6, there shall be either/or type questions of 10 marks each. Student shall answer any one of them.
- iv) The questions from 2 to 6 shall be set by covering one unit of the syllabus for each question.

End examination of theory subjects consisting of two parts of different subjects, for Example: Basic Electrical & Electronics Engineering shall have the following pattern:

- i) Question paper shall be in two parts viz., Part A and Part B with equal weightage of 35 marks each.
- ii) In each part, question 1 shall contain 5 compulsory short answer questions for a total of 5 marks such that each question carries 1 mark.
- iii) In each part, questions from 2 to 4, there shall be either/or type questions of 10 marks each. Student shall answer any one of them.
- iv) The questions from 2 to 4 shall be set by covering one unit of the syllabus for each question.

**Practical Courses**

Assessment Method	Marks
Continuous Internal Assessment	30
Semester End Examination	70
<b>Total</b>	<b>100</b>



- b) For practical courses, there shall be a continuous evaluation during the semester for 30 sessional marks and end examination shall be for 70 marks.
- c) Day-to-day work in the laboratory shall be evaluated for 15 marks by the concerned laboratory teacher based on the record/viva and 15 marks for the internal test.
- d) The end examination shall be evaluated for 70 marks, conducted by the concerned laboratory teacher and a senior expert in the subject from the same department.
- Procedure: 20 marks
  - Experimental work & Results: 30 marks
  - Viva voce: 20 marks.

In a practical subject consisting of two parts (Eg: Basic Electrical & Electronics Engineering Lab), the end examination shall be conducted for 70 marks as a single laboratory in 3 hours. Mid semester examination shall be evaluated as above for 30 marks in each part and final mid semester marks shall be arrived by considering the average of marks obtained in two parts.

- e) For the subject having design and/or drawing, such as Engineering Drawing, the distribution of marks shall be 30 for mid semester evaluation and 70 for end examination.

Assessment Method	Marks
Continuous Internal Assessment	30
Semester End Examination	70
<b>Total</b>	<b>100</b>

Day-to-day work shall be evaluated for 15 marks by the concerned subject teacher based on the reports/submissions prepared in the class. And there shall be two midterm examinations in a semester for duration of 2 hours each for 15 marks with weightage of 80% to better mid marks and 20% for the other. The subjective paper shall contain 3 either or type questions of equal weightage of 5 marks. There shall be no objective paper in mid semester examination. The sum of day-to-day evaluation and the mid semester marks will be the final sessional marks for the subject.

The end examination pattern for Engineering Graphics, shall consists of 5 questions, either/or type, of 14 marks each. There shall be no objective type questions in the end examination. However, the end examination pattern for other subjects related to design/drawing, multiple branches, etc is mentioned along with the syllabus.

- f) There shall be no external examination for mandatory courses with zero credits. However, attendance shall be considered while calculating aggregate attendance and student shall be declared to have passed the mandatory course only when he/she secures 40% or more in the internal examinations. In case, the student fails, a re-



examination shall be conducted for failed candidates for 30 marks satisfying the conditions mentioned in item 1 & 2 of the regulations.

- g) The laboratory records and mid semester test papers shall be preserved for a minimum of 3 years in the respective institutions as per the University norms and shall be produced to the Committees of the University as and when the same are asked for.

#### 10. Skill oriented Courses

- i) There shall be five skill-oriented courses offered during III to VII semesters.
- ii) Out of the five skill courses two shall be skill-oriented courses from the same domain. Of the remaining three skill courses, one shall be a soft skill course and the remaining two shall be skill-advanced courses from the same domain/Interdisciplinary/Job oriented.
- iii) The course shall carry 100 marks and shall be evaluated through continuous assessments during the semester for 30 sessional marks and end examination shall be for 70 marks. Day-to-day work in the class / laboratory shall be evaluated for 30 marks by the concerned teacher based on the regularity/assignments/viva/mid semester test. The end examination similar to practical examination pattern shall be conducted by the concerned teacher and an expert in the subject nominated by the principal.
- iv) The Head of the Department shall identify a faculty member as coordinator for the course. A committee consisting of the Head of the Department, coordinator and a senior Faculty member nominated by the Head of the Department shall monitor the evaluation process. The marks/grades shall be assigned to the students by the above committee based on their performance.
- v) The student shall be given an option to choose either the skill courses being offered by the college or to choose a certificate course being offered by industries/Professional bodies or any other accredited bodies. If a student chooses to take a Certificate Course offered by external agencies, the credits shall be awarded to the student upon producing the Course Completion Certificate from the agency. A committee shall be formed at the level of the college to evaluate the grades/marks given for a course by external agencies and convert to the equivalent marks/grades.
- vi) The recommended courses offered by external agencies, conversions and appropriate grades/marks are to be approved by the University at the beginning of the semester. The principal of the respective college shall forward such proposals to the University for approval.
- vii) If a student prefers to take a certificate course offered by external agency, the department shall mark attendance of the student for the remaining courses in that semester excluding the skill course in all the calculations of mandatory attendance requirements upon producing a valid certificate as approved by the University.

#### 11. Massive Open Online Courses (MOOCs):





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

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

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

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

## 12. Credit Transfer Policy

Adoption of MOOCs is mandatory, to enable Blended model of teaching-learning as also envisaged in the NEP 2020. As per University Grants Commission (Credit Framework for Online Learning Courses through SWAYAM) Regulation, 2016, the University shall allow up to a maximum of 20% of the total courses being offered in a particular programme i.e., maximum of 32 credits through MOOCs platform.

- i) The University shall offer credit mobility for MOOCs and give the equivalent credit weightage to the students for the credits earned through online learning courses.
- ii) Student registration for the MOOCs shall be only through the respective department of the institution, it is mandatory for the student to share necessary information with the department.
- iii) Credit transfer policy will be applicable to the Professional & Open Elective courses only.
- iv) The concerned department shall identify the courses permitted for credit transfer.
- v) The University/institution shall notify at the beginning of semester the list of the online learning courses eligible for credit transfer.
- vi) The institution shall designate a faculty member as a Mentor for each course to guide the students from registration till completion of the credit course.
- vii) The university shall ensure no overlap of MOOC exams with that of the university examination schedule. In case of delay in results, the university will re-issue the marks sheet for such students.
- viii) Student pursuing courses under MOOCs shall acquire the required credits only



after successful completion of the course and submitting a certificate issued by the competent authority along with the percentage of marks and grades.

- ix) The institution shall submit the following to the examination section of the university:
  - a) List of students who have passed MOOC courses in the current semester along with the certificate of completion.
  - b) Undertaking form filled by the students for credit transfer.
- x) The universities shall resolve any issues that may arise in the implementation of this policy from time to time and shall review its credit transfer policy in the light of periodic changes brought by UGC, SWAYAM, NPTEL and state government.

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

### 13. Academic Bank of Credits (ABC)

The University has implemented Academic Bank of Credits (ABC) to promote flexibility in curriculum as per NEP 2020 to

- i. provide option of mobility for learners across the universities of their choice
- ii. provide option to gain the credits through MOOCs from approved digital platforms.
- iii. facilitate award of certificate/diploma/degree in line with the accumulated credits in ABC
- iv. execute Multiple Entry and Exit system with credit count, credit transfer and credit acceptance from students' account.

### 14. Mandatory Internships

**Summer Internships :** Two summer internships either onsite or virtual each with a minimum of 08 weeks duration, done at the end of second and third years, respectively are mandatory. It shall be completed in collaboration with local industries, Govt. Organizations, construction agencies, Power projects, software MNCs or any industries in the areas of concerned specialization of the Undergraduate program. One of the two summer internships at the end of second year (Community Service Project) shall be society oriented and shall be completed in collaboration with government organizations/NGOs & others. The other internship at the end of third year is Industry Internship and shall be completed in collaboration with Industries. The student shall register for the internship as per course structure after commencement of academic year. The guidelines issued by the APSCHE / University shall be followed for carrying out and evaluation of Community Service Project and Industry Internship.

Evaluation of the summer internships shall be through the departmental committee. A student will be required to submit a summer internship report to the concerned department and appear for an oral presentation before the departmental committee comprising of Head of the Department, supervisor of the internship and a senior faculty member of the department. A certificate of successful completion from industry shall be included in the report. The report and the oral presentation shall carry 50% weightage



each. It shall be evaluated for 50 external marks. There shall be no internal marks for Summer Internship. A student shall secure minimum 40% of marks for successful completion. In case, if a student fails, he/she shall reappear as and when semester supplementary examinations are conducted by the University.

**Full Semester Internship and Project work:** In the final semester, the student should mandatorily register and undergo internship (onsite/virtual) and in parallel he/she should work on a project with well-defined objectives. At the end of the semester the candidate shall submit an internship completion certificate and a project report. A student shall also be permitted to submit project report on the work carried out during the internship.

The project report shall be evaluated with an external examiner. The total marks for project work 200 marks and distribution shall be 60 marks for internal and 140 marks for external evaluation. The supervisor assesses the student for 30 marks (Report: 15 marks, Seminar: 15 marks). At the end of the semester, all projects shall be showcased at the department for the benefit of all students and staff and the same is to be evaluated by the departmental Project Review Committee consisting of supervisor, a senior faculty and HOD for 30 marks. The external evaluation of Project Work is a Viva-Voce Examination conducted in the presence of internal examiner and external examiner appointed by the University and is evaluated for 140 marks.

The college shall facilitate and monitor the student internship programs. Completion of internships is mandatory, if any student fails to complete internship, he/she will not be eligible for the award of degree. In such cases, the student shall repeat and complete the internship.

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### 15. Guidelines for offering a Minor

To promote interdisciplinary knowledge among the students, the students admitted into B.Tech. in a major stream/branch are eligible to obtain degree in Minor in another stream.

- i) The Minor program requires the completion of 12 credits in Minor stream chosen.
- ii) Two courses for 06 credits related to a Minor are to be pursued compulsorily for the minor degree, but maybe waived for students who have done similar/equivalent courses. If waived for a student, then the student must take an extra elective course in its place. It is recommended that students should complete the compulsory courses (or equivalents) before registering for the electives.
- iii) Electives (minimum of 2 courses) to complete a total of 12 credits.

**Note:** A total of 04 Open Electives are offered in the curriculum. A student can complete the requirement for Minor by opting for the courses offered through various verticals/tracks under Open Electives.

### 16. Guidelines for offering Honors

The objective of introducing B.Tech. (Hons.) is to facilitate the students to choose additionally the specialized courses of their choice and build their competence in a





specialized area in the UG level. The programme is a best choice for academically excellent students having good academic record and interest towards higher studies and research.

- i) Honors is introduced in the curriculum of all B. Tech. programs offering a major degree and is applicable to all B. Tech (Regular and Lateral Entry) students admitted in Engineering & Technology.
- ii) A student shall earn additional 15 credits for award of B.Tech.(Honors) degree from same branch/department/discipline registered for major degree. This is in addition to the credits essential for obtaining the Undergraduate degree in Major Discipline (i.e., 160 credits).
- iii) A student is permitted to register for Honors in IV semester after the results of III Semester are declared and students may be allowed to take maximum two subjects per semester pertaining to the Honors from V Semester onwards.
- iv) The concerned Principal of the college shall arrange separate class work and timetable of the courses offered under Honors program.
- v) Courses that are used to fulfil the student's primary major may not be double counted towards the Honors. Courses with content substantially equivalent to courses in the student's primary Major may not be counted towards the Honors.
- vi) Students can complete the courses offered under Honors either in the college or in online platforms like SWAYAM with a minimum duration of 12 weeks for a 3-credit course and 8 weeks duration for a 2-credit course satisfying the criteria for credit mobility. If the courses under Honors are offered in conventional mode, then the teaching and evaluation procedure shall be similar to regular B. Tech courses.
- vii) The attendance for the registered courses under Honors and regular courses offered for Major degree in a semester are to be considered separately.
- viii) A student shall maintain an attendance of 75% in all registered courses under Honors to be eligible for attending semester end examinations.
- ix) A student registered for Honors shall pass in all subjects that constitute the requirement for the Honors degree program. No class/division (i.e., second class, first class and distinction, etc.) shall be awarded for Honors degree programme.
- x) If a student drops or is terminated from the Honors program, the additional credits so far earned cannot be converted into open or core electives; they will remain extra. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.
- xi) The Honors will be mentioned in the degree certificate as Bachelor of Technology (Honors) in XYZ. For example, B.Tech. (Honors) in Mechanical Engineering

#### **Enrolment into Honors:**

- i) Students of a Department/Discipline are eligible to opt for Honors program offered by the same Department/Discipline
- ii) The enrolment of student into Honors is based on the CGPA obtained in the major degree program. CGPA shall be taken up to III semester in case of regular entry students and only III semester in case of lateral entry students. Students having 7 CGPA without any backlog subjects will be permitted to register for Honors.
- iii) If a student is detained due to lack of attendance either in Major or in Honors, registration shall be cancelled.



- iv) Transfer of credits from Honors to regular B. Tech degree and vice-versa shall not be permitted.
- v) Honors is to be completed simultaneously with a Major degree program.

**Registration for Honors:**

- i) The eligible and interested students shall apply through the HOD of his/her parent department. The whole process should be completed within one week before the start of every semester. Selected students shall be permitted to register the courses under Honors.
- ii) The selected students shall submit their willingness to the principal through his/her parent department offering Honors. The parent department shall maintain the record of student pursuing the Honors.
- iii) The students enrolled in the Honors courses will be monitored continuously. An advisor/mentor from parent department shall be assigned to a group of students to monitor the progress.
- iv) There is no fee for registration of subjects for Honors program offered in offline at the respective institutions.

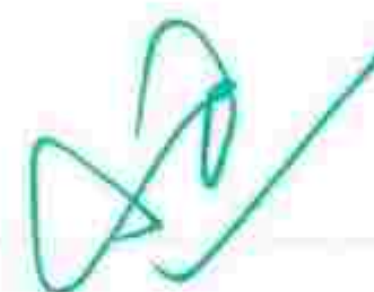
**17. Attendance Requirements:**

- i) A student shall be eligible to appear for the University external examinations if he/she acquires a minimum of 40% attendance in each subject and 75% of attendance in aggregate of all the subjects. b) Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee.
- ii) Shortage of Attendance below 65% in aggregate shall in NO CASE be condoned.
- iii) A stipulated fee shall be payable towards condonation of shortage of attendance to the University.
- iv) Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled.
- v) A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester. They may seek readmission for that semester from the date of commencement of class work.
- vi) If any candidate fulfils the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.
- vii) If the learning is carried out in blended mode (both offline & online), then the total attendance of the student shall be calculated considering the offline and online attendance of the student.

18. For induction programme attendance shall be maintained as per AICTE norms.  
Promotion Rules:

The following academic requirements must be satisfied in addition to the attendance requirements mentioned in section 16.

- i) A student shall be promoted from first year to second year if he/she fulfils the minimum attendance requirement as per university norms.





- ii) A student will be promoted from II to III year if he/she fulfils the academic requirement of securing 40% of the credits (any *decimal* fraction should be *rounded off* to *lower* digit) up to in the subjects that have been studied up to III semester.
- iii) A student shall be promoted from III year to IV year if he/she fulfils the academic requirements of securing 40% of the credits (any *decimal* fraction should be *rounded off* to *lower* digit) in the subjects that have been studied up to V semester.

And in case a student is detained for want of credits for a particular academic year by ii) & iii) above, the student may make up the credits through supplementary examinations and only after securing the required credits he/she shall be permitted to join in the V semester or VII semester respectively as the case may be.

- iv) When a student is detained due to lack of credits/shortage of attendance he/she may be re-admitted when the semester is offered after fulfilment of academic regulations. In such case, he/she shall be in the academic regulations into which he/she is readmitted.

### 19. Grading:

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

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

Structure of Grading of Academic Performance

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

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



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

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

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

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

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

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

where " $S_i$ " is the SGPA of the  $i^{\text{th}}$  semester and  $C_i$  is the total number of credits up to that semester.

Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

While computing the SGPA the subjects in which the student is awarded Zero grade points will also be included.

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

#### **Award of Class:**

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

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

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



## 20. With-holding of Results

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

## 21. Multiple Entry / Exit Option

### (a) Exit Policy:

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

- i) **UG Certificate in (Field of study/discipline)** - Programme duration: First year (first two semesters) of the undergraduate programme, 40 credits followed by an additional exit 10-credit bridge course(s) lasting two months, including at least 6-credit job-specific internship/ apprenticeship that would help the candidates acquire job-ready competencies required to enter the workforce.
- ii) **UG Diploma (in Field of study/discipline)** - Programme duration: First two years (first four semesters) of the undergraduate programme, 80 credits followed by an additional exit 10-credit bridge course(s) lasting two months, including at least 6-credit job-specific internship/ apprenticeship that would help the candidates acquire job-ready competencies required to enter the workforce.
- iii) **Bachelor of Science (in Field of study/discipline) i.e., B.Sc. Engineering in (Field of study/discipline)**- Programme duration: First three years (first six semesters) of the undergraduate programme, 120 credits.

### (b) Entry Policy:

Modalities on multiple entry by the student into the B.Tech. programme will be provided in due course of time.

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

## 22. Gap Year Concept:

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



### 23. Transitory Regulations

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

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

### 24. Minimum Instruction Days for a Semester:

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

### 25. Medium of Instruction:

The medium of instruction of the entire B. Tech undergraduate programme in Engineering & Technology (including examinations and project reports) will be in English only.

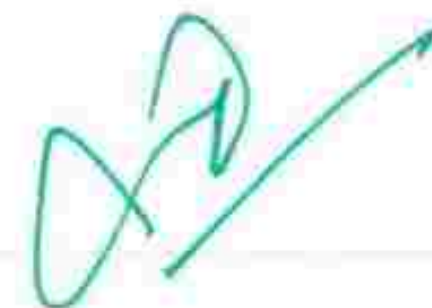
### 26. Student Transfers:

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

### 27. General Instructions:

- i. The academic regulations should be read as a whole for purpose of any interpretation.
- ii. Malpractices rules-nature and punishments are appended.
- iii. Where the words "he", "him", "his", occur in the regulations, they also include "she", "her", "hers", respectively.
- iv. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.
- v. The Universities may change or amend the academic regulations or syllabi at any time and the changes or amendments shall be made applicable to all the students on rolls with effect from the dates notified by the Universities.
- vi. In the case of any doubt or ambiguity in the interpretation of the guidelines given, the decision of the Vice-Chancellor / Head of the institution is final.

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## ACADEMIC REGULATIONS (R23)

### FOR B. TECH. (LATERAL ENTRY SCHEME)

*(Effective for the students admitted into II year through Lateral Entry Scheme from the Academic Year 2024-25 onwards)*

#### I. Award of the Degree

- (a) Award of the B.Tech. Degree / B.Tech. Degree with a Minor if he/she fulfils the following:
  - (i) Pursues a course of study for not less than three academic years and not more than six academic years. However, for the students availing Gap year facility this period shall be extended by two years at the most and these two years would in addition to the maximum period permitted for graduation (Six years).
  - (ii) Registers for 120 credits and secures all 120 credits.
- (b) **Award of B.Tech. degree with Honors** if he/she fulfils the following:
  - (i) Student secures additional 15 credits fulfilling all the requisites of a B.Tech. program i.e., 120 credits.
  - (ii) Registering for Honors is optional.
  - (iii) Honors is to be completed simultaneously with B.Tech. programme.

- 2. Students, who fail to fulfil the requirement for the award of the degree within six consecutive academic years from the year of admission, shall forfeit their seat.

#### 3. Minimum Academic Requirements

The following academic requirements have to be satisfied in addition to the requirements mentioned in item no.2

- i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project if he secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the mid semester evaluation and end examination taken together.
- ii. A student shall be promoted from III year to IV year if he/she fulfils the academic requirements of securing 40% of the credits (any decimal fraction should be rounded off to lower digit) in the subjects that have been studied up to V semester.

And in case if student is already detained for want of credits for particular academic year, the student may make up the credits through supplementary exams of the above exams before the commencement of IV year I semester class work of next year.



**4. Course Pattern**

- i) The entire course of study is three academic years on semester pattern.
- ii) A student eligible to appear for the end examination in a subject but absent at it or has failed in the end examination may appear for that subject at the next supplementary examination offered.
- iii) When a student is detained due to lack of credits/shortage of attendance the student may be re-admitted when the semester is offered after fulfilment of academic regulations, the student shall be in the academic regulations into which he/she is readmitted.

5. All other regulations as applicable for B. Tech. Four-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme).





JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA  
VIZIANAGARAM-535 003, A.P  
(Established by Andhra Pradesh Act No.22 of 2021)

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## **COURSE STRUCTURE FIRST YEAR**

### **B. Tech (Regular-Full time)**

(Effective for the students admitted into I year from the  
AcademicYear **2023-24** onwards)









JAWAHARLALNEHRUTECHNOLOGICALUNIVERSITY-GURAJADA-VIZIANAGARAM  
VIZIANAGARAM-535003Andhra Pradesh (India)  
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**Group-A**

**B.TECH-CSE,IT, CSE(DS),CSE(AI), CSE(CS),CSE(AI&ML),AI&DS,AI&ML**

I Year I Semester						
S.No	Course Code	Course Name	L	T	P	Credits
1.	R23BS01	Linear Algebra & Calculus	3	0	0	3
2.	R23BS03	Engineering Physics	3	0	0	3
3.	R23HS01	Communicative English	2	0	0	2
4.	R23ES01	Basic Civil & Mechanical Engineering	3	0	0	3
5.	R23ES07	Introduction to Programming	3	0	0	3
6.	R23HS01	Communicative English Lab	0	0	2	1
7.	R23BS03	Engineering Physics Lab	0	0	2	1
8.	R23ES02	Engineering Workshop	0	0	3	1.5
9.	R23ES06	IT Workshop	0	0	2	1
10.	R23ES07	Computer Programming Lab	0	0	3	1.5
11.	R23MC01	Health and Wellness, Yoga and Sports	0	0	1	0.5
<b>Total</b>						<b>20.5</b>

I Year II Semester						
S.No	Course Code	Course Name	L	T	P	Credits
1.	R23BS02	Differential Equations and Vector calculus	3	0	0	3
2.	R23BS05	Chemistry	3	0	0	3
3.	R23ES03	Engineering Graphics	1	0	4	3
4.	R23ES04	Basic Electrical & Electronics Engineering	3	0	0	3
5.	R23PC04	Data Structures	3	0	0	3
6.	R23BS05	Chemistry Lab	0	0	2	1
7.	R23ES05	Electrical & Electronics Engineering workshop	0	0	3	1.5
8.	R23PC04	Data Structures Lab	0	0	3	1.5
9.	R23MC02	NSS/NCC/Scouts & Guides/Community Service	0	0	1	0.5
<b>Total</b>						<b>19.5</b>









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**Group-B**  
**B.TECH- Mechanical & Automobile Engineering**

I Year I Semester						
S.No	Course Code	Course Name	L	T	P	Credits
1.	R23BS01	Linear Algebra & Calculus	3	0	0	3
2.	R23BS04	Engineering Chemistry	3	0	0	3
3.	R23ES07	Introduction to Programming	3	0	0	3
4.	R23ES03	Engineering Graphics	1	0	4	3
5.	R23ES04	Basic Electrical & Electronics Engineering	3	0	0	3
6.	R23BS04	Engineering Chemistry Lab	0	0	2	1
7.	R23ES07	Computer Programming Lab	0	0	3	1.5
8.	R23ES05	Electrical & Electronics Engineering Workshop	0	0	3	1.5
9.	R23MC02	NSS/NCC/Scouts & Guides/Community Service	0	0	1	0.5
		<b>Total</b>				<b>19.5</b>

I Year II Semester						
S.No	Course Code	Course Name	L	T	P	Credits
1.	R23BS02	Differential Equations and Vector Calculus	3	0	0	3
2.	R23BS03	Engineering Physics	3	0	0	3
3.	R23HS01	Communicative English	2	0	0	2
4.	R23ES01	Basic Civil & Mechanical Engineering	3	0	0	3
5.	R23PC01	Engineering Mechanics	3	0	0	3
6.	R23HS01	Communicative English Lab	0	0	2	1
7.	R23BS03	Engineering Physics Lab	0	0	2	1
8.	R23ES06	IT workshop	0	0	2	1
9.	R23ES02	Engineering Workshop	0	0	3	1.5
10.	R23PC01	Engineering Mechanics Lab	0	0	3	1.5
11.	R23MC01	Health and Wellness, Yoga and Sports	0	0	1	0.5
		<b>Total</b>				<b>20.5</b>









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**Group-B**  
**B.TECH-Civil Engineering**

I Year I Semester						
S.No	Course Code	Course Name	L	T	P	Credits
1.	R23BS01	Linear Algebra & Calculus	3	0	0	3
2.	R23BS04	Engineering Chemistry	3	0	0	3
3.	R23ES07	Introduction to Programming	3	0	0	3
4.	R23ES03	Engineering Graphics	1	0	4	3
5.	R23ES04	Basic Electrical & Electronics Engineering	3	0	0	3
6.	R23BS04	Engineering Chemistry Lab	0	0	2	1
7.	R23ES07	Computer Programming Lab	0	0	3	1.5
8.	R23ES05	Electrical & Electronics Engineering Workshop	0	0	3	1.5
9.	R23MC02	NSS/NCC/Scouts & Guides/Community Service	0	0	1	0.5
		<b>Total</b>				<b>19.5</b>

I Year II Semester						
S.No	Course Code	Course Name	L	T	P	Credits
1.	R23BS02	Differential Equations and Vector Calculus	3	0	0	3
2.	R23BS03	Engineering Physics	3	0	0	3
3.	R23HS01	Communicative English	2	0	0	2
4.	R23ES01	Basic Civil & Mechanical Engineering	3	0	0	3
5.	R23PC01	Engineering Mechanics	3	0	0	3
6.	R23HS01	Communicative English Lab	0	0	2	1
7.	R23BS03	Engineering Physics Lab	0	0	2	1
8.	R23ES06	IT workshop	0	0	2	1
9.	R23ES02	Engineering Workshop	0	0	3	1.5
10.	R23PC01	Engineering Mechanics & Building Practices Lab	0	0	3	1.5
11.	R23MC01	Health and Wellness, Yoga and Sports	0	0	1	0.5
		<b>Total</b>				<b>20.5</b>









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**Group-B**  
**B.TECH- EEE**

I Year I Semester						
S.No	Course Code	Course Name	L	T	P	Credits
1.	R23BS01	Linear Algebra & Calculus	3	0	0	3
2.	R23BS04	Chemistry	3	0	0	3
3.	R23ES07	Introduction to Programming	3	0	0	3
4.	R23ES03	Engineering Graphics	1	0	4	3
5.	R23ES04	Basic Electrical & Electronics Engineering	3	0	0	3
6.	R23BS04	Chemistry Lab	0	0	2	1
7.	R23ES07	Computer Programming Lab	0	0	3	1.5
8.	R23ES05	Electrical & Electronics Engineering Workshop	0	0	3	1.5
9.	R23MC02	NSS/NCC/Scouts & Guides/Community Service	0	0	1	0.5
		<b>Total</b>				<b>19.5</b>

I Year II Semester						
S.No	Course Code	Course Name	L	T	P	Credits
1.	R23BS02	Differential Equations and Vector Calculus	3	0	0	3
2.	R23BS03	Engineering Physics	3	0	0	3
3.	R23HS01	Communicative English	2	0	0	2
4.	R23ES01	Basic Civil & Mechanical Engineering	3	0	0	3
5.	R23PC01	Electrical Circuit Analysis-I	3	0	0	3
6.	R23HS01	Communicative English Lab	0	0	2	1
7.	R23BS03	Engineering Physics Lab	0	0	2	1
8.	R23ES06	IT workshop	0	0	2	1
9.	R23ES02	Engineering Workshop	0	0	3	1.5
10.	R23PC01	Electrical Circuit Lab	0	0	3	1.5
11.	R23MC01	Health and Wellness, Yoga and Sports	0	0	1	0.5
		<b>Total</b>				<b>20.5</b>









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**Group-B**  
**B.TECH- ECE**

I Year I Semester						
S.No	Course Code	Course Name	L	T	P	Credits
1.	R23BS01	Linear Algebra & Calculus	3	0	0	3
2.	R23BS04	Chemistry	3	0	0	3
3.	R23ES07	Introduction to Programming	3	0	0	3
4.	R23ES03	Engineering Graphics	1	0	4	3
5.	R23ES04	Basic Electrical & Electronics Engineering	3	0	0	3
6.	R23BS04	Chemistry Lab	0	0	2	1
7.	R23ES07	Computer Programming Lab	0	0	3	1.5
8.	R23ES05	Electrical & Electronics Engineering Workshop	0	0	3	1.5
9.	R23MC02	NSS/NCC/Scouts & Guides/Community Service	0	0	1	0.5
<b>Total</b>						<b>19.5</b>

I Year II Semester						
S.No	Course Code	Course Name	L	T	P	Credits
1.	R23BS02	Differential Equations and Vector Calculus	3	0	0	3
2.	R23BS03	Engineering Physics	3	0	0	3
3.	R23HS01	Communicative English	2	0	0	2
4.	R23ES01	Basic Civil & Mechanical Engineering	3	0	0	3
5.	R23PC01	Network Analysis	3	0	0	3
6.	R23HS01	Communicative English Lab	0	0	2	1
7.	R23BS03	Engineering Physics Lab	0	0	2	1
8.	R23ES06	IT workshop	0	0	2	1
9.	R23ES02	Engineering Workshop	0	0	3	1.5
10.	R23PC01	Network Analysis And Simulation Laboratory	0	0	3	1.5
11.	R23MC01	Health and Wellness, Yoga and Sports	0	0	1	0.5
<b>Total</b>						<b>20.5</b>







NAME OF THE FACULTY: AVS Deepak


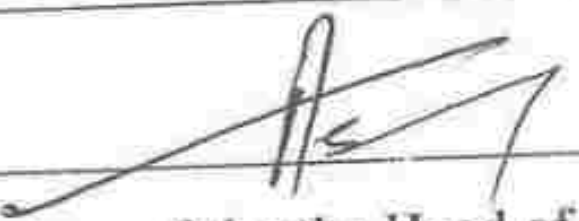
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NAME OF THE LAB : C programming

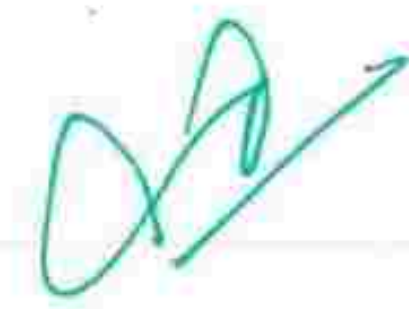
S.No.	Roll No.	Name of the Student	Internal	Day-to-Day	Revised	Total Marks
1	23811A0566	KOMAKULA DURGA KRISHNA PRASAD	10	7	3	20
2	23811A0567	KOMMU PURUSHOTHAM	13	9	4	26
3	23811A0568	KONA CHANDHRA LOKESH	9	6	2	17
4	23811A0569	KONA VINAY	13	9	4	26
5	23811A0570	KOPPISETTI GAYATHRI	14	9	5	28
6	23811A0571	KOPPULA GUNAPRIYA	15	10	5	30
7	23811A0572	KOTA MAHENDHAR NAIDU	11	7	3	21
8	23811A0573	KUNDATEERI LAVYA	15	10	4	29
9	23811A0574	KUNISETTI RUDRINI SOWMYA AKASHA	14	9	4	27
10	23811A0575	KURACHA PAVAN KISHORE	13	9	4	26
11	23811A0576	LAGUDU RAMU	12	8	4	24
12	23811A0577	LAGUDU SAI GANESH	10	7	3	20
13	23811A0578	MADAKA MADHU SUDAN RAO	11	7	3	22
14	23811A0579	MADDALA JASWANTH SIDDHU	9	6	2	17
15	23811A0580	MAILARU PRAVALLIKA	14	9	4	27
16	23811A0581	MAKIREDDY LAVANYA	14	9	5	28
17	23811A0582	MALLA NIKHIL	11	7	3	21
18	23811A0583	MALLA YASWANATH	13	9	4	26
19	23811A0584	MAMIDIPAKA BHARGAVI	13	9	4	26
20	23811A0585	CHINNI NAGA POOJITHA	15	10	5	30
21	23811A0586	MANNEPURI LOKYA	14	9	4	27
22	23811A0587	MARRAPU NIHARIKA	12	8	4	24
23	23811A0588	MEDISETTI VENKAT	13	8	4	25
24	23811A0589	DUBASI ROHITH NAGESH	9	6	2	17
25	23811A0590	MOHAMMAD ABDUL ALEEM	12	8	3	23
26	23811A0591	MOKA RAJESWARI	13	8	4	25
27	23811A0592	MUDAVATH ANAND NAIK	11	7	3	21
28	23811A0593	MULAGAPATI ESWAR VARMA	13	8	4	25
29	23811A0594	MULIKI PARDHA SARADI	11	7	4	22
30	23811A0595	MUMMINA JAYANTH	12	8	4	24
31	23811A0596	MUNAGAVALASA PAVAN KUMAR	12	8	3	23
32	23811A0597	NALLA MEGHANA	14	9	5	28



S.No.	Roll No.	Name	1	2	3	4
33	23811A0598	NANEPALLI SUMANTH	12	8	4	24
34	23811A0599	NARAM JOGI SIMHADRI SRINIVASA RAO	12	8	3	23
35	23811A05A0	NUTHALAPATI SRINIVAS	11	7	3	21
36	23811A05A1	PADALA LAKSHMI NAGA SUREKHA	14	9	5	28
37	23811A05A2	PAMMI REVATHI	11	7	3	21
38	23811A05A3	PANDURI VENKATA SAI KUMAR	10	6	3	19
39	23811A05A4	PATTUGARLA RAJESH	12	8	4	24
40	23811A05A5	PEBBULI SURYA	10	6	3	19
41	23811A05A6	PEDAGADI KOWSHIK	11	7	3	21
42	23811A05A7	PEDAPATI YASODA SURYA LAKSHMI	13	8	4	25
43	23811A05A8	PEDDINTI GAYATHRI	14	9	5	28
44	23811A05A9	PENDEM VEERA SURYA UMA MADESWADI	12	8	4	24
45	23811A05B0	PINDI CHINNABALAJI	12	8	4	24
46	23811A05B1	POLIREDDY BHEEMARJUN	15	10	5	29
47	23811A05B2	PONNAPU JOHN MOJESH	10	7	3	20
48	23811A05B3	PRATAPARAO VISWAVARDHAN	11	7	4	22
49	23811A05B4	PUVVALA VIDYA SEKHAR	9	6	3	18
50	23811A05B5	PYLA HIMA BINDU	15	10	4	29
51	23811A05B6	RACHAPATHI DEVI PRIYANKA	12	8	3	23
52	23811A05B7	RAPA SATISH	9	6	2	17
53	23811A05B8	RAVIPATI VENKATA NAGA CHANDRA SEKHAR	10	7	3	20
54	23811A05B9	REDDY MOHITH NAIDU	14	9	4	27
55	23811A05C0	REESA PARASURAMUDU	9	6	3	18
56	23811A05C1	RUTHALA PADMA	14	9	4	27
57	23811A05C2	RUTTHALA KUSUMA	14	9	5	28
58	23811A05C3	SAKA SALMON SATYANAND	9	6	3	18
59	23811A05C4	SANIVARAPU LASHA SREE	13	9	4	26
60	23811A05C5	SHAIK AFSA	15	10	5	30
61	23811A05C6	SINGAMPALLI PARVATHI	15	10	4	29
62	23811A05C7	SONTYANA VIDHYA	13	8	4	25
63	23811A05C8	SURISSETTY JAYASRI	12	9	4	26
64	23811A05C9	SURLA MANIKANTA SWAMY	9	6	3	18
65	23811A05D0	SURLA VIJAY CHANDAN	10	7	3	20

	
Signature of the Faculty	Signature of the the Head of Department


Signature of the Principal









S.NO.	ROLL NO.	NAME OF THE STUDENT	I Mid (30 Marks)	I Mid (15 Marks) (A)	I Objective (20 Marks)	I Objective (10 Marks) (B)	Assignment Marks (05 M) (C)	Test I Marks (A+B+C)	II Mid (30 Marks)	II Mid (15 Marks) (D)	II Objective (20 Marks)	II Objective (10 Marks) (E)	Assignment Marks (05 M) (F)	Test II Marks (D+E+F)	Best Test (80%) (G)	Non Best Test (20%) (H)	Final Marks (30 Marks) (G+H)	Test - I Analysis
23	23811A0588	MEDISETTI VENKAT	21	11	19	10	5	26	26	13	18	09	5	27	21.6	3.6	26	
24	23811A0589	DUBASI ROHITH NAGESH	22	1	13	7	4	12	11	06	10	05	4	15	12	1.2	14	
25	23811A0590	MOHAMMAD ABDUL AL FAYZ	4	2	17	9	4	15	22	11	14	07	5	23	18.4	1.4	20	
26	23811A0591	MOKA RAJESWARI	14	7	20	10	4	21	28	14	16	08	5	27	21.6	3	25	
27	23811A0592	MUDAVATH ANAND NAIK	12	6	13	7	4	17	26	13	12	06	5	24	19.2	3	23	
28	23811A0593	MULAGAPATI ESWAR VARMA	21	11	19	10	5	26	25	13	18	09	5	27	21.6	4.6	27	
29	23811A0594	MULIKI PARDHA SARADI	16	5	15	8	4	17	23	12	16	08	5	25	20	3.2	24	
30	23811A0595	MUMMINA JAYANTH	19	10	14	7	5	22	21	11	12	06	5	22	17.6	4.2	22	
31	23811A0596	MUNAGAVALASA PAVAN KIMMAR	15	8	18	9	5	22	21	11	18	09	5	25	20	4	24	
32	23811A0597	NALLA MEGHANA	29	15	20	10	5	30	29	15	20	10	5	30	24	5.4	30	
33	23811A0598	NANEPALLI SUMANTH	15	8	16	8	5	21	24	12	16	08	5	25	20	3.6	24	
34	23811A0599	NARAM JOGI SIMHADRI SRIKANTH RAO	19	10	18	9	5	24	24	12	10	05	5	22	17.6	3.6	22	
35	23811A05A0	NUTHALAPATI SRINIVAS	11	6	12	9	4	19	19	10	18	09	4	23	18.4	2.4	21	
36	23811A05A1	PADALA LAKSHMI NAGA SIBIRI	25	13	19	10	5	28	28	14	20	10	5	29	23.2	4.2	28	
37	23811A05A2	PANMI REVATHI	17	9	18	9	5	23	22	11	20	10	5	26	20.8	3.2	24	
38	23811A05A3	PANDURI VENKATA SAI KUMAR	16	8	15	8	5	21	18	09	10	05	4	18	14.4	3	18	
39	23811A05A4	PATTUGARLA RAJESH	26	10	20	10	5	25	23	12	16	08	5	25	20	3.4	24	
40	23811A05A5	PEBBULI SURYA	12	6	8	4	4	14	17	09	14	07	4	20	16	2.4	19	
41	23811A05A6	PEDAGADI KOWSHIK	10	5	18	9	4	18	24	12	14	07	5	24	19.2	3.2	23	
42	23811A05A7	PEDAPATI YASODA SURYA LAKSUMI	24	12	20	10	5	27	21	11	20	10	5	26	20.8	4.6	26	
43	23811A05A8	PEDDINTI GAYATHRI	29	10	19	10	5	25	28	14	20	10	5	29	23.2	5.8	29	
44	23811A05A9	PENDEM VEERA SURYA LINA MADHESWARADI	23	12	17	9	5	26	25	13	14	07	5	25	20	3.6	24	
45	23811A05B0	PINDI CHINNABALAJI	14	7	19	10	4	21	21	11	14	07	5	23	18.4	2.8	22	
46	23811A05B1	POLIREDDY BHEEMARJUN	28	14	20	10	5	29	30	15	18	09	5	29	28.2	4.8	28	



S.NO.	ROLL NO.	NAME OF THE STUDENT	I Mid (30 Marks)	I Mid (15 Marks) (A)	I Objective (20 Marks)	I Objective (10 Marks) (B)	Assignment Marks (05 M) (C)	Test I Marks (A+B+C)	II Mid (30 Marks)	II Mid (15 Marks) (D)	II Objective (20 Marks)	II Objective (10 Marks) (E)	Assignment Marks (05 M) (F)	Test II Marks (D+E+F)	Best Test (80%) (G)	Non Best Test (20%) (H)	Final Marks (30 Marks) (G+H)	Test - I Analysis
47	23811A05B2	PONNAPU JOHN MOJESH	10	5	19	10	4	19	16	08	16	08	4	20	16	1.8	18	
48	23811A05B3	PRATAPARAO VISWANATHAN	16	8	19	10	5	23	21	11	14	07	5	23	18.4	3.4	22	
49	23811A05B4	PUVVALA VIDYA SEKHAR	10	5	17	9	4	18	16	08	02	01	4	13	12.8	2.6	16	
50	23811A05B5	PYLA HIMABINDU	29	15	20	10	5	30	30	15	20	10	5	30	24	5.2	30	
51	23811A05B6	RACHAPATHI DEVI PRIYANKA	14	7	18	9	4	20	25	13	16	08	5	26	20.8	2.6	24	
52	23811A05B7	RAPA SATISH	11	6	13	7	4	17	14	07	04	02	4	13	13.6	2.6	17	
53	23811A05B8	RAVIPATI VENKATA NAGA CHANDRA SEKHAR	11	6	18	9	4	19	23	12	02	01	5	18	14.4	2.8	18	
54	23811A05B9	REDDY MOHITH NAIDU	21	11	20	10	5	26	25	13	16	07	5	25	20	4.2	25	
55	23811A05C0	REESA PARASURAMUDU	5	3	18	9	4	16	14	07	14	07	4	18	14.4	2	17	
56	23811A05C1	RUTHALA PADMA	19	10	19	10	5	25	26	13	18	09	5	27	21.6	3.8	26	
57	23811A05C2	RUTHALA KUSUMA	29	15	20	10	5	30	29	15	20	10	5	30	24	4.8	29	
58	23811A05C3	SAKA SALMON SATYANAND	10	5	17	9	4	18	13	07	0	0	4	11	8.8	2.2	11	
59	23811A05C4	SANIVARAPU LASHA SREE	17	9	20	10	5	21	29	15	14	07	5	27	21.6	3.2	25	
60	23811A05C5	SHAIK AFSA	27	13	20	10	5	28	30	15	20	10	5	30	24	4.8	29	
61	23811A05C6	SINGAMPALLI PARVATHI	29	15	20	10	5	30	30	15	20	10	5	30	24	4.8	29	
62	23811A05C7	SONTYANA VIDHYA	27	13	20	10	5	28	27	14	18	09	5	28	22.4	4.6	27	
63	23811A05C8	SURISSETTY JAYASRI	21	11	17	9	5	25	27	14	16	08	5	27	21.6	4.4	26	
64	23811A05C9	SURLA MANIKANTA SWAMY	13	7	16	8	4	19	15	08	0	00	4	12	11.2	2.4	14	
65	23811A05D0	SURLA VIJAY CHANDAN	12	6	13	7	4	17	20	10	10	05	5	20	16	2.6	19	

1st Mid		2nd Mid	
Signature of the Principal	Signature of the Principal	Signature of the Subject Faculty	Signature of the Subject Faculty
Best of Two		Best of Two	
Roll Numbers below 10		Roll Numbers between 11 to 15	

509, 503, 589, 568







AVANTHI INSTITUTE OF ENGINEERING & TECHNOLOGY, MAKAVARAPALEM MANDAL, VISAKHA DIST.  
I.B.TECH. - I SEM CSE-II (R23) (2023 ADMITTED BATCH) MID & ON - LINE MARKS KEY LISTS FOR THE YEAR 2023 -24

S.NO.	ROLL NO.	NAME OF THE STUDENT	Subject Code R2311004										Name of the Subject BCME					Test - I Analysis	
			I Mid (30 Marks)	I Objective (20 Marks)	I Objective (10 Marks)	Assign ment Marks (05 M)	Test I Marks (A+B+C)	II Mid (30 Marks)	II Mid (15 Marks)	II Objective (20 Marks)	II Objective (10 Marks)	Assign ment Marks (05 M)	Test II Marks (D+E+F)	Best Test (80%) (G)	Non Best Test (20%) (H)	Final Marks (30 Marks) (G+H)	Range	Student s	
1	23811A0566	KOMAKULA DURGA	20	14	7	5	22	18	9	15	8	5	22	17.6	4.4	22	<10	2	
2	23811A0567	KOMMU PURUSHOTHAM	25	6	3	5	21	29	15	16	8	5	28	22.4	4.2	27	11-15	9	
3	23811A0568	KONA CHANDHRA LOKESH	10	4	2	5	12	23	12	20	10	5	29	21.6	2.4	24	16-19	15	
4	23811A0569	KONA VINAY	27	16	8	5	27	29	15	19	10	5	30	24	5.4	30	20-24	21	
5	23811A0570	KOPPISETTI GAYATHRI	27	14	7	5	26	29	15	20	10	4	29	23.2	5.2	29	25-30	17	
6	23811A0571	KOPPULA GUNAPRIYA	27	18	9	5	28	29	15	14	7	5	27	21.6	3.8	25.4	Absentees	01	
7	23811A0572	KOTA MAHENDHAR NAIDU	24	16	8	5	25	29	15	16	8	5	28	22.4	5	28	Total	65	
8	23811A0573	KUNDATEERI LAVYA	24	12	6	5	23	29	15	18	9	5	29	23.2	4.6	28			
9	23811A0574	KUNSETTI RUDRINI	23	12	6	5	22	25	13	20	10	5	28	22.4	4.4	27			
10	23811A0575	KURACHA PAVAN KISHORE	21	14	7	5	24	27	14	14	7	5	26	20.8	4.8	26			
11	23811A0576	LAGUDU RAMU	23	12	6	5	22	28	14	14	7	5	26	20.8	4.4	26			
12	23811A0577	LAGUDU SAI GANESH	22	16	8	5	22	28	14	14	7	5	29	23.2	5	29			
13	23811A0578	MADAKA MADHU SUDAN	24	16	8	5	25	28	14	20	10	5	25	20	2	22			
14	23811A0579	MADDALA JASWANTH	03	8	4	4	10	23	12	20	10	3	30	24	5.4	30			
15	23811A0580	MAILARU PRAVALLIKA	27	16	8	5	27	29	15	20	10	5	28	22.4	5.2	28			
16	23811A0581	MAKIREDDY LAVANYA	26	16	8	5	26	28	14	18	9	5	28	20.8	3.8	25			
17	23811A0582	MALLA NIKHIL	20	8	4	5	19	24	17	18	9	5	26	13.6	0	14			
18	23811A0583	MALLA YASWANTH	13	10	5	5	17	AB	AB	AB	AB	0	0	0	0	14			
19	23811A0584	MAMIDIPAKA BHARGAVI	24	14	7	5	24	27	14	18	9	5	28	22.4	4.8	28			
20	23811A0585	CHINNI NAGA POOJITHA	24	10	5	5	22	28	14	18	9	5	28	22.4	4.4	27			
21	23811A0586	MANNEPURI LOKYA	26	14	7	5	25	28	14	20	10	5	29	22.4	5	29			
22	23811A0587	MARRAPU NIHARIKA	18	12	6	5	20	24	12	20	10	5	27	21.6	4	26			



S.NO.	ROLL NO.	NAME OF THE STUDENT	I Mid (30 Marks)	I Mid (15 Marks) (A)	I Objective (20 Marks)	I Objective (10 Marks) (B)	Assignment Marks (05 M) (C)	Test I Marks (A+B+C)	II Mid (30 Marks)	II Mid (15 Marks) (D)	II Objective (20 Marks)	II Objective (10 Marks) (E)	Assignment Marks (05 M) (F)	Test II Marks (D+E+F)	Best Test (80%) (G)	Non Best Test (20%) (H)	Final Marks (30 Marks) (G+H)	Test - 1 Analysis
23	23811A0588	MEDISETTI VENKAT	23	12	8	4	5	21	27	14	10	5	5	24	24	4.2	24	
24	23811A0589	DUBASI ROHITH NAGESH	02	1	0	0	5	6	28	14	10	5	3	22	17.6	1.2	19	
25	23811A0590	MOHAMMAD ABDUL AL FEM	19	10	4	2	5	17	20	10	6	3	5	18	14.4	3.4	18	
26	23811A0591	MOKA RAJESWARI	20	10	4	2	5	17	28	14	15	8	5	27	21.6	3.4	25	
27	23811A0592	MUDAVATH ANAND NAIK	16	8	0	0	5	13	28	14	0	0	5	19	15.2	2.6	18	
28	23811A0593	MULAGAPATI ESWAR VADALI	14	7	10	5	5	17	27	14	20	10	5	29	23.2	3.4	27	
29	23811A0594	MULIKI PARDHA SARADI	13	7	10	5	5	17	25	13	10	5	5	23	18.4	3.4	22	
30	23811A0595	MUMMINA JAYANTH	23	12	10	5	5	22	26	13	16	8	5	26	20.8	4.4	26	
31	23811A0596	MUNAGAVVALASA PAVAN KIMAR	16	8	16	8	5	21	26	13	14	7	5	25	20	4.2	25	
32	23811A0597	NALLA MEGHANA	27	14	20	10	5	29	28	14	20	10	5	29	23.2	5.8	29	
33	23811A0598	NANEPALLI SUMANTH	25	13	8	4	5	22	28	14	14	7	5	26	20.8	4.4	26	
34	23811A0599	NARAN JOGI SIMHADRI Srinivasa Rao	26	13	10	5	5	23	25	13	18	9	5	27	21.6	4.6	27	
35	23811A05A0	NUTHALAPATI SRINIVAS	27	9	16	8	5	22	27	14	20	10	5	29	23.2	5	29	
36	23811A05A1	PADALA LAKSHMI NAGA SUREKHA	27	14	12	6	5	25	28	14	20	10	5	29	23.2	5	29	
37	23811A05A2	PAMMI REVATHI	22	11	6	3	5	19	27	14	18	9	5	28	22.4	3.8	27	
38	23811A05A3	PANDURI VENKATA SAI KINAD	17	9	2	1	5	15	26	13	14	7	5	25	20	3	23	
39	23811A05A4	PATTUGARLA RAJESH	24	12	14	7	5	24	27	14	16	8	5	27	21.6	4.8	27	
40	23811A05A5	PEBBULI SURYA	13	7	10	5	5	17	26	13	15	8	5	26	20.8	3.4	25	
41	23811A05A6	PEDAGADI KOWSHIK	12	6	4	2	5	13	22	11	16	8	5	24	19.2	2.6	22	
42	23811A05A7	PEDAPATI YASODA SURYA Lakshmi	26	13	6	3	5	21	27	14	16	8	5	27	21.6	4.2	26	
43	23811A05A8	PEDDINTI GAYATHRI	←	ABSENT	→	→	5	05	29	15	20	10	5	30	24	1	25	
44	23811A05A9	PENDEM VEERA SURYA Uma Maheswari	16	8	4	2	5	15	26	13	16	8	5	26	20.8	3	24	
45	23811A05B0	PINDI CHINNABALAJI	20	10	0	0	5	15	26	13	14	7	5	25	20	3	23	
46	23811A05B1	POLIREDDY BHEEMARJUN	18	9	0	0	5	14	28	14	20	10	5	29	23.2	2.8	26	



S.NO.	ROLL NO.	NAME OF THE STUDENT	I Mid (30 Marks)	I Mid (15 Marks) (A)	I Objective (20 Marks)	I Objective (10 Marks) (B)	Assignment Marks (05 M) (C)	Test I Marks (A+B+C)	II Mid (30 Marks)	II Mid (15 Marks) (D)	II Objective (20 Marks)	II Objective (10 Marks) (E)	Assignment Marks (05 M) (F)	Test II Marks (D+E+F)	Best Test (80%) (G)	Non Best Test (20%) (H)	Final Marks (30 Marks) (G+H)	Test - I Analysis
47	23811A05B2	PONNAPU JOHN MOJESH	9	5	8	4	5	14	27	14	18	9	5	28	22.4	2.8	26	
48	23811A05B3	PRATAPARAO VISWAVARDHAN	18	9	10	5	5	19	26	13	16	8	5	26	20.8	3.8	25	
49	23811A05B4	PUVVALA VIDYA SEKHAR	20	10	4	2	5	17	21	11	12	6	5	22	27.6	3.4	21	
50	23811A05B5	PYLA HIMABINDU	26	13	12	6	5	24	28	14	20	10	5	29	23.2	4.8	28	
51	23811A05B6	RACHAPATHI DEVI PRIYANKA	22	11	10	5	5	21	27	14	20	10	5	29	23.0	4.2	28	
52	23811A05B7	RAPA SATISH	20	10	6	3	5	18	24	12	16	8	5	25	28.4	3.6	22	24
53	23811A05B8	RAVIPATI VENKATA NAGA CHANDRA SEKHAR	19	10	10	5	5	20	26	13	18	9	5	27	21.6	4	26	
54	23811A05B9	REDDY MOHITH NAIDU	27	14	16	8	5	27	28	14	20	10	5	29	23.2	5.4	29	
55	23811A05C0	REESA PARASURAMUDU	17	9	0	0	5	14	20	10	18	9	5	24	19.2	2.8	22	
56	23811A05C1	RUTHALA PADMA	25	13	8	4	5	22	26	13	18	9	5	27	20.6	4.4	26	
57	23811A05C2	RUTTHALA KUSUMA	25	13	16	8	5	26	29	15	20	10	5	30	24	5.2	30	
58	23811A05C3	SAKA SALMON SATYANAND	18	9	10	5	5	19	27	14	16	8	5	27	21.6	3.8	26	
59	23811A05C4	SANIVARAPU LASHA SREE	27	14	16	8	5	27	29	15	20	10	5	30	24	5.4	30	
60	23811A05C5	SHAIK AFSA	27	14	14	7	5	26	28	14	18	9	5	28	22.4	5.2	28	
61	23811A05C6	SINGAMPALLI PARVATHI	27	14	18	9	5	28	29	15	20	10	5	30	24	5.6	30	
62	23811A05C7	SONTYANA VIDHYA	27	14	6	3	5	22	29	15	20	10	5	30	24	4.4	29	
63	23811A05C8	SURISSETTY JAYASRI	25	13	14	7	5	25	28	14	20	10	5	29	23.2	5	29	
64	23811A05C9	SURLA MANIKANTA SWAMY	20	10	8	4	5	19	25	13	16	8	5	26	20.8	3.8	25	
65	23811A05D0	SURLA VIJAY CHANDAN	23	12	11	2	5	19	28	14	16	8	5	27	21.6	3.8	26	

2nd Mid

1st Mid

23811A0583  
Signature of the Subject Faculty  
Signature of the Principal

23811A05A8  
Signature of the Subject Faculty  
Signature of the Principal

Best of Two  
Roll Numbers between 11 to 15  
23811A0583

Best of Two  
Roll Numbers below 10



02





# AVANTHI INSTITUTE OF ENGINEERING & TECHNOLOGY

Tamaram, Makavarapalem, Narsipatnam Revenue Division, Visakhapatnam Dist - 531 113

## LAB MAIN ANSWER SHEET : INTERNAL

Course : B.tech Year 1<sup>st</sup> Semester : II

Month & Year : May, 2024

Branch : CSE-III

Name of the Laboratory : Data structure

Date : 03/05/2024

HALL TICKET NO.									
2	3	8	1	1	A	0	5	F	0

MARKS	
30	30

Signature of the ~~Internal~~ / Examiner-1

Signature of the Internal / Examiner - 2

- ① a) Write a C program to implement bubble sort ~~and insertion sort~~  
 b, singly linked list, insertion, and deletion operation.

① Bubble sort:

a: Theoretical Analysis:

Sorting means arranging the array in a specific order i.e ascending or descending order. Compare each element in an array if the element is greater than next element, swap the elements.

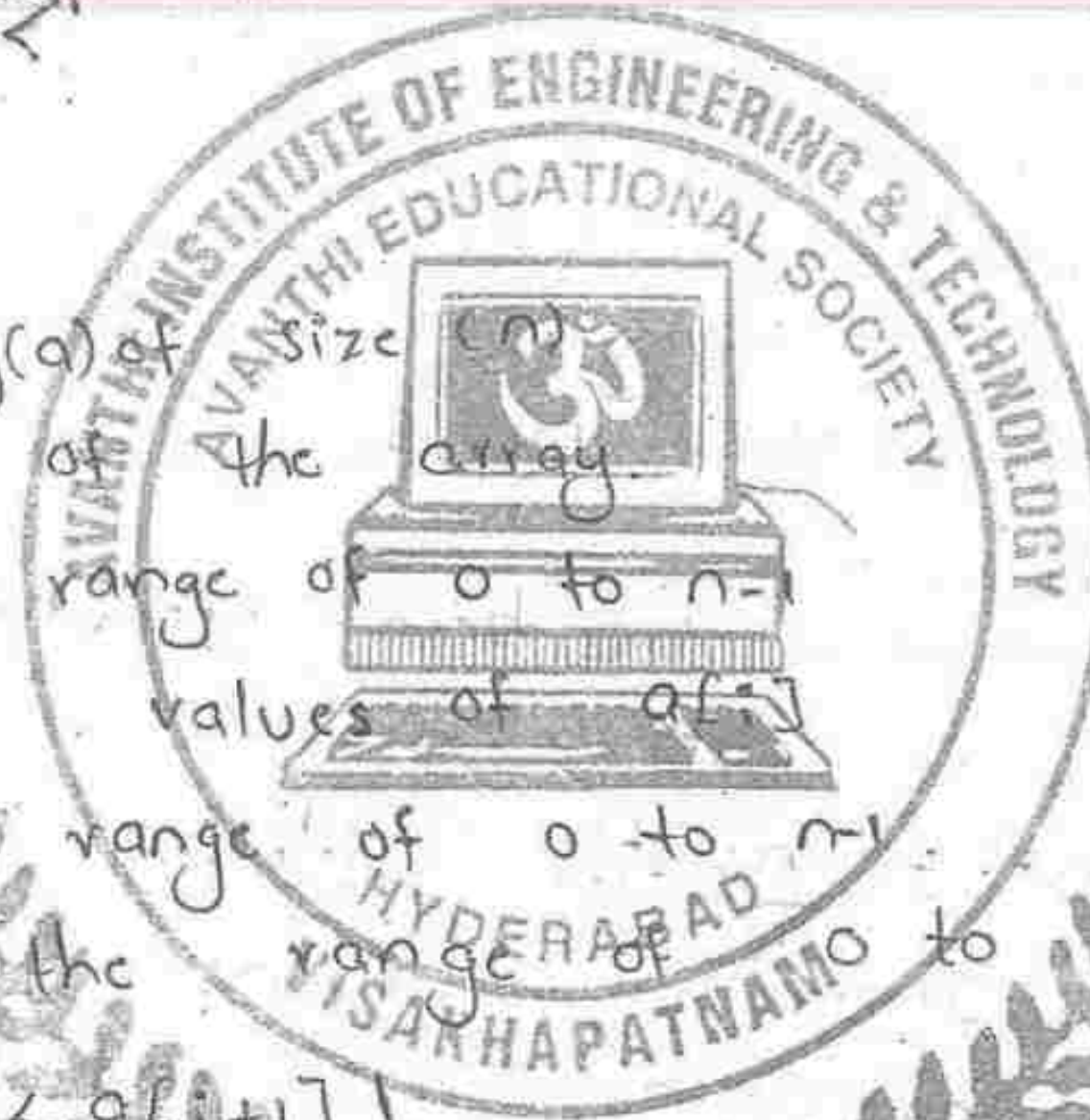
Algorithm:

1. Start
2. Declare an array (a) of size (n)
3. Read the size of the array
4. for i in the range of 0 to n-1
  - 4.1. Read the values of a[i]
5. for i in the range of 0 to n-1
  - 5.1. for j in the range of 0 to n-i-1
    - if (a[j] > a[j+1])
    - Declare temporary variable
    - swap the a[j] and a[j+1]
6. Print the reversed sorted array.
7. Stop

expected output:

enter the size of array : 3.

enter the elements : 7, 8, 5.





Program :

```
#include <stdio.h>
int main () {
    int n, i, j;
    printf("enter the size of array:");
    scanf("%d", &n);
    int a[n];
    printf("enter the elements:");
    for (i=0; i<n; i++) {
        scanf("%d", &a[i]);
    }
    for (i=0; i<n-1; i++) {
        for (j=0; j<n-1-i; j++) {
            if (a[j] < a[j+1]) {
                int temp = a[j];
                a[j] = a[j+1];
                a[j+1] = temp;
            }
        }
    }
    printf("sorted array:");
    for (i=0; i<n; i++) {
        printf("%d", a[i]);
    }
    printf("\n"); return 0;
}
```

output: enter the size of array: 3  
enter the elements: 9, 12, 5.

Result: sorted array: 5, 9, 12.  
A C program that has been executed and developed to implement bubble sort.

Singly linked list - Insertion, Deletion

Theoretical Analysis: Insertion operations include 3 stages.  
1, insertion at beginning, 2, insertion at end, 3, insertion at position.  
Singly linked list contains two nodes, one for data and another for reference to next node.

Algorithm:

1. start
2. Define a struct node structure that contains data part and pointer to next node.

Insertion at beginning:



- if empty
- update the head pointer to newnode.
- else
  - set the newnode next points to reference of head pointer
  - update the head pointer to newnode.

#### 4. Insertion at end:

- check if the list is empty or not.
  - if empty
    - update head pointer to newnode
  - else
    - Initialise temporary pointer to head.
    - Traverse the list till (temp  $\rightarrow$  next  $\neq$  NULL)
    - Set the temp  $\rightarrow$  next points to newnode
    - set newnode  $\rightarrow$  next points to NULL

#### 5. Insertion at position:

- Traverse the list until the given position.
- set the prev node next points to newnode.
- new node points to temp  $\rightarrow$  next.

#### 6. Deletion at beginning:

- check if the list is empty or not
  - if empty
    - Deletion not possible
  - else
    - declare temporary variable points to head.
    - ~~temp = temp~~ head = head  $\rightarrow$  next
    - free (temp)

#### 7. Deletion at end:

- Traverse the list till temp  $\rightarrow$  next  $\neq$  NULL
- set the temp  $\rightarrow$  prev = NULL

#### 8. Deletion at position:

- Traverse the list till the given position
- temp = temp  $\rightarrow$  next  $\rightarrow$  next
- free (temp  $\rightarrow$  next)

#### 9. Main function:

- at start head pointer points to NULL
- call insertion and deletion operations.
- Print the list.

#### 10. Expected output:

original linked list: 10 20 30  
 list after insertion: 10 20 30 40  
 list after deletion: 20 30 40

#### Program:

```
#include <stdio.h>
#include <stdlib.h>
```



```

newnode->data = newdata;
newnode->next = (*head-ref);
*head-ref = newnode;
}
void insertatend (struct node **head-ref, int newdata) {
struct node *newnode = (struct node *) malloc (sizeof (struct node));
struct node *last =
*last->next = newnode;
newnode->next = NULL;
}
void insertatAfter (struct node *prev-node, int newdata) {
struct node *newnode = (struct node *) malloc (sizeof (struct node));
if (*prev-node->next = newnode;
newnode->next = *prev-node;
}
void deleteatbeginning (struct node *head-ref) {
if (node == NULL) {
printf ("deletion not possible\n");
}
else
struct node *temp = head;
head = head->next;
free (temp);
}

```

```

int printlist (struct node *node)
while (node != NULL) {
printf ("%d", node->data);
node = node->next;
}

```

```

int main() {
struct node *head = NULL;
insertatbeginning (head, 30);
insertatbeginning (head, 20);
insertatbeginning (head, 10);
printf ("original linked list");
printlist (head);
insertatbeginning (head, 40);
printf ("list after insertion");
printlist (head);
deleteatbeginning (head, 10);
printf ("list after deletion");
printlist (head);
return 0;
}

```

output: original linked list = 10 20 30  
list after insertion = 10 20 30 40  
list after deletion = 10 20 30