RAJIV GANDHI NATIONAL AVIATION UNIVERSITY

(Established by Act of Parliament 2013)

Fursatganj, Amethi-229302, Uttar Pradesh (India).

Bachelor of Technology
(Electronics and Communication Engineering-Avionics)
Four Years UG Degree Programme
Academic Regulations, Programme Structure & Syllabi

With Effect From
Academic Year 2025-26

Contents

Bachelor of Technology (B.Tech.) Electronics and Communication Engineering-Avionics
Four Years UG Degree Programme
Academic Regulations

Preface:

The Rajiv Gandhi National Aviation University (RGNAU) was established by an Act of Parliament called the "Rajiv Gandhi National Aviation University (RGNAU) Act, 2013" (No. 26 of 2013) having its headquarters at Fursatganj, Dist. Amethi, Uttar Pradesh. The University has been envisaged as the premier institution of higher learning within the aviation milieu aimed at providing cutting edge and critical research to enhance the aviation industry in India. The Act of Parliament empowers the University to award Diploma, Under Graduate Degrees, Post Graduate Degrees and PhD degrees in the field of aviation and allied disciplines. At the same time collaborations and cooperation with the leading national and international universities/ institutions in the aviation domain, are being forged towards proffering global knowledge that is customized to local requirements.

RGNAU is a very student friendly place and all efforts are made to ensure that the students are provided the best opportunities that are needed to create outstanding pool of human resources to meet the global challenges in all spheres. The students are required to follow certain procedures and meet specified academic requirements each semester. This comprehensive information on the Rules and Regulations for B.Tech.(ECE-Avionics) programmes are given below.

We urge the students to make best use of the world class infrastructure and facilities available at RGNAU and wish all of them all the very best for a successful career.

1.0 Academic Programme: Under-Graduate 4 Years Degree Programme in Bachelor of Technology in Electronics and Communication Engineering-Avionics :

1.1 Rajiv Gandhi National Aviation University offers a 4-Years (8 semesters) **Bachelor of Technology (B.Tech.) in Electronics and Communication Engineering-Avionics degree programme** simultaneously under Choice Based Credit System (CBCS). This programme is designed as per UGC guidelines.

1.2 Maximum time to complete **Bachelor of Technology** degree programme by the student is 7 (Seven) years.

2.0 Academic Calendar:

2.1 The academic session is divided into two semesters each of approximately 15 weeks' duration: an Autumn Semester (July- December) and a Spring Semester (January-May).

2.2 The Academic Council approved schedule of academic activities for a session, inclusive of dates for registration, mid-semester and end-semester examinations, inter-semester breaks etc., shall be laid down in the Academic Calendar for the session and published on Institute Web Site. The Academic Calendar shall strive to provide for a total of about 90 working days in each semester.

3.0 Admission:

3.1 The Candidates who have scored a minimum of 50% marks in aggregate in 10+2 with Physics, Mathematics, and English as compulsory subjects from a recognized board can apply for admission in this Programme. Relaxation of 5% of marks is allowed for candidates belonging to SC/ST category to be eligible for admission.

3.2 Age limit: Not more than 21 years from the last date of admission, and should be able to produce the final mark sheet by 31 August of the year of admission or as prescribed from time to time.

3.3 The selection of the candidates will be based on the Academic Performance in 10+12 followed by written examination (online or offline) and/or Group Discussion & Personal Interview, as decided by the University. The details of weightage of Academic Performance written exams and/ or Group Discussion & Personal interview given below:

Sl.No.	Exam	Weightage %	Remark
1.	10^{th} Standard	15	
2.	12^{th} Standard	15	30 %
3.	Written Exams: (a) JEE Main Score – 50% (b) CUET & Other Equivalent Exams Score- 40 %	50 % or 40 %	50 % or 40 %
5.	Group Discussion:	10 %	10%
6.	Personal Interview: (a) JEE Main candidates (b) CUET & Other Equivalent Exams Candidates	10 % 20 %	10 % or 20%
	Total		100 %

Note: The decision of the University to fix above criteria and any amendment shall be final and binding on all.

3.4 University may change admission rules at the time of admission by issue of detailed admission notice on the recommendation of Academic Council.

3.5 General Rule relating to the admission as per Rajiv Gandhi National Aviation University Ordinance, 2020. Chapter XII (Part-I) shall be applicable. Ordinance is available on University Web-site (www.rgnau.ac.in) .

B. Tech. Programme structure:

4.1 A student after securing admission shall complete the B.Tech. Programme in the respective discipline in a minimum period of **Four** academic years (8 semesters), and a maximum period of **Seven** academic years (14 Semesters) starting from the date of commencement of first year first semester, failing which student shall forfeit seat in B.Tech. Programme in the respective discipline. Each student shall secure **credit**s (with CGPA ≥ 5) required for the completion of the Bachelor of Technology programme and award of the B.Tech. degree in the respective discipline.

4.2 Semester scheme:

Each undergraduate programme is of 4 academic years 8 semesters) with the academic year divided into two semesters of 15 weeks (≥ 90 instructional days) each, each semester having - 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)' under Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) indicated by UGC, and curriculum/Programme structure as suggested by University are followed.

4.3 **UGC/ AICTE** specified definitions/ descriptions are adopted appropriately for various terms and abbreviations used in these academic regulations/ norms.

4.4 Credit Programmes

All Subject/ Courses are to be registered by the student in a semester to earn credits which shall be assigned to each Subjects/ Courses in an L: T: P: C (Lecture periods: Tutorial periods: Practical periods: Credits) structure based on the following general pattern.

- One credit for one hour/ week for theory/ lecture (L) period or Tutorials (T) period.
- One Credits for two hours/ week for laboratory/ practical (P) periods.

4.5 Programme Curricula: Programme Structure and Syllabi is attached as **Annexure-1.**

5.0 Attendance requirements:

5.1 A student admitted to a Programme of study shall maintain a minimum attendance of seventy-five per cent in a semester in all his subjects/ courses during the Programme of study.

5.2 The student who fails to achieve the seventy-five per cent (75%) attendance shall not be permitted to sit for the Semester End Examination in the respective subject/ course and shall have to repeat the subject/ course.

5.3 Any student who failed to achieve the seventy-five per cent. attendance in a subject/ course more than twice during the Programme of study, the student shall be detained and such students shall have to seek fresh admission and be required to go through the entire admission process again.

5.4 The teacher handling a subject / course shall maintain a record of attendance of students who have registered for the subject / course and shall display on the notice board of the Department the monthly attendance record of each student.

5.5 The teachers shall intimate the Head of Department concerned, at least seven calendar days before the last instruction day in the semester, particulars of all students who have secured less than seventy-five per cent. attendance in their respective subject/ courses, thereafter, the Head of Department shall display on the notice board of the Department, names of all students who shall not be eligible to take the semester-end examinations in the various subject/ courses and send a copy of the same to the Dean of the School concerned.

5.6 The Dean of the School concerned may grant exemption to a candidate who has failed to obtain the minimum prescribed seventy-five per cent. attendance for valid reasons provided that such exemption shall not be granted for attendance below sixty-five per cent.

6.0 Academic requirements

The following academic requirements have to be satisfied, in addition to the attendance requirements mentioned in Item No.**5.**

6.1 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course, , if student secures not less than 35% (14 marks out of 40 marks) in the internal examinations, not less than 35% (21 marks out of 60

marks) in the semester end examination, and a minimum of 40% (40 marks out of 100 marks) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together; in terms of letter grades, this implies securing **'C'** grade or above in that subject/ course.

6.2 A student may reappear once for each of the above evaluations, when they are scheduled again; if the student fails in such 'one reappearance' evaluation also, the student has to reappear for the same in the next subsequent semester, as and when it is scheduled.

6.3 A student has to undergo Internship/Project in the last (Eighth Semester) in the Aviation Industry or related Industry. A Student has to opt for one of the faculty as internal project guide from University Department and one Industry guide from concerned Industry to be opt external project guide at the beginning of Internship/Project with approved synopsis for the Internship/Project. A student has to submit his/her detailed Internship/Project report on completion of Internship/Project for evaluation and he/she has to give presentation to the Evaluation committee constituted by HOD of the University.

6.4 A student (i) shall register for all subject/ courses covering 166 credits as specified and listed in the Programme structure, (ii) fulfills all the attendance and academic requirements for 166 credits, (iii) earn all 166 credits by securing SGPA $\geq$ 5.0 (in each semester), and CGPA (at the end of each successive semester) $\geq$ 5.0, (iv) passes all the mandatory Programmes, to successfully complete the under graduate programme. The performance of the student in these 166 credits shall be considered for the calculation of the final CGPA (at the end of under graduate programme) .

6.6 A student eligible to appear in the semester end examination for any subject/ course/ Programme, but absent from it or failed (thereby failing to secure 'C' grade or above) may reappear for that subject/ course in the supplementary examination as and when conducted. In such cases, internal marks (CIE) assessed earlier for that subject/ cour will be carried over, and added to the marks to be obtained in the SEE supplementary examination for evaluating performance in that subject/ course.

6.7 A student **detained in a semester due to shortage of attendance may be re-admitted**

in the same semester in the next academic year for fulfillment of academic requirements. The academic regulations under which a student has been readmitted shall be applicable. However, no grade allotments or SGPA/ CGPA calculations will be done for the entire semester in which the student has been detained.

7.0 Evaluation - Distribution and Weightage of marks

7.1 The performance of a student in every subject/ coursewill be evaluated for 100 marks each, with 40 marks allotted for CIE (Continuous Internal Evaluation) and 60 marks for SEE (Semester End-Examination).

7.2 In CIE, for theory subject/ courses, during a semester, there shall be two mid-term examinations. Each Mid-Term examination consists of two parts i) **Part – A** for 10 marks, ii) **Part – B** for 20 marks with a total duration of 2 hours as follows:

Mid-Term Examination for 30 marks:

Part - A: Objective/quiz paper for 10 marks.

Part – B: Descriptive paper for 20 marks. (4 questions out of 6 questions) The remaining 10 marks are for Continuous Internal Assessment (out of 40 marks) andare distributed as:

7.3 Assignment for 5 marks. (Average of 2 Assignments each for 5 marks)

7.4 PPT presentation/ group discussion/ role plays/ best practices in an organizationCase study (or) Survey (or) Team based presentations on a topic in the concerned subject/ course for 5 marks before II Mid-Term Examination.

7.5 The objective/quiz paper is set with multiple choice, fill-in the blanks and matchingtype of questions for a total of 10 marks. The descriptive paper shall contain 6 full questions out of which, the student has to answer 4 questions, each carrying 5 marks.The average of two Mid-Term examinations is considered for 30 marks.

7.6 While the first mid-term examination shall be conducted on 50% of the syllabus, the second mid-term examination shall be conducted on the remaining 50% of the syllabus.

7.7 Five (5) marks are allocated for assignments (as specified by the subject/ course teacher concerned). 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. The average of the two assignments shallbe taken as

the final marks for assignment (for 5 marks).

7.8 The student, in each subject/ course, shall have to earn 35% of marks (i.e. 14 marks out of 40 marks) in CIE, 35% of marks (i.e. 21 marks out of 60) in SEE and Overall 40% of marks (i.e. 40 marks out of 100 marks) both CIE and SEE marks put together.

7.9 The student is eligible to write Semester End Examination of the concerned subject/ course, if the student scores ≥ 35% (14 marks) of 40 Continuous Internal Examination (CIE) marks. In case, the student appears for Semester End Examination (SEE) of the concerned subject/ course but not scored minimum 35% of CIE marks (14 marks out of 40 internal marks),his performance in that subject/ course in SEE shall stand cancelled in-spite of appearing the SEE.

7.10 There is NO Computer Based Test (CBT) for R22 regulations.

7.11 A candidate shall be given only one-time chance to re-register and attend the classes for a maximum of two subject/ courses in a semester:

a) If the internal marks secured by a student in the Continuous Internal Evaluation marks for 40 (Sum of average of two mid-term examinations consisting of Objective & descriptive parts, Average of two Assignments & Subject/ course Viva- voce/PPT/ Poster presentation/ Case Study on a topic in the concerned subject/ course) areless than 35% and failed in those subject/ courses.

b) A student must re-register for the failed subject/ course(s) for 40 marks within four weeks of commencement of the classwork in next academic year.

c) In the event of the student taking this chance, his Continuous Internal Evaluation marks for 40 and Semester End Examination marks for 60 obtained in the previous attempt stand cancelled.

8.0 Grading procedure:

8.1 Grades will be awarded to indicate the performance of students in each theory subject/ course, laboratory / practical/ Industry Oriented Mini Project/Internship and project. Based on the percentage of marks obtained (Continuous Internal Evaluation plus Semester End Examination, both taken together) as specified in item 7 above, a corresponding letter grade shall be given.

8.2 As a measure of the performance of a student, a 10-point absolute grading system using the following letter grades (as per UGC/AICTE guidelines) and corresponding percentage of marks shall be followed:

% of Marks Secured in a Subject/ course (Class Intervals)	Letter Grade (UGC Guidelines)	Grade Points
Greater than or equal to 90%	O (Outstanding)	10
80 and less than 90%	A+ (Excellent)	9
70 and less than 80%	A (Very Good)	8
60 and less than 70%	B+ (Good)	7
50 and less than 60%	B (Average)	6
40 and less than 50%	C (Pass)	5
Below 40%	F (Fail)	0
Absent	Ab	0

8.3 A student who has obtained an '**F'** grade in any subject/ course shall be deemed to have '**failed'**and is required to reappear as a 'supplementary student' in the semester end examination, as and when offered. In such cases, internal marks in those subject/ courses will remain the same as those obtained earlier.

8.4 To a student who has not appeared for an examination in any subject/ course, '**Ab'** grade will be allocated in that subject/ course, and he is deemed to have '**Failed'**. A student will be required to reappear as a 'supplementary student' in the semester end examination, as and when offered next. In this case also, the internal marks in those subject/ courses will remainthe same as those obtained earlier.

8.5 A letter grade does not indicate any specific percentage of marks secured by the student, but it indicates only the range of percentage of marks.

8.6 A student earns Grade Point (GP) in each subject/ course/ Programme, on the basis of the letter gradesecured in that subject/ course/ Programme. The corresponding 'Credit Points' (CP) are computed by multiplying the grade point with credits for that particular subject/ course/ Programme.

Credit Points (CP) = Grade Point (GP) x Credits …. For a Programme

8.7 A student passes the subject/ course only when GP ≥ 5.0 ('C' grade or above)

8.8 The Semester Grade Point Average (SGPA) is calculated by dividing the sum of credit points (CP) secured from all subject/ courses/ Programmes registered in a semester, by the total number of credits registered during that semester. SGPA is rounded off to **two** decimal places. SGPA is thus computed as

$$SGPA = \frac{\sum_{i=1}^{n} c_i g_i}{\sum_{i=1}^{n} c_i}$$

where 'i' is the subject/ course indicator index (considering all subject/ courses in a semester), 'N' is the no. of subject/ courses 'registered' for the semester (as specifically required and listed under the Programme structure of the parent department), Ci is the no. of credits allotted to the ith subject/ course, and Gi represents the grade points (GP) corresponding to the letter grade awarded for that ith subject/ course.

8.9 The Cumulative Grade Point Average (CGPA) is a measure of the overall cumulative performance of a student in all semesters considered for registration. The CGPA is the ratio of the total credit points secured by a student in all registered courses (of 166) in all semesters, and the total number of credits registered in all the semesters. CGPA is rounded off to two decimal places. CGPA is thus computed from the I year II semester onwards at the end of each semester as per the formula (i.e., up to and inclusive of S semesters, S ≥ 2),

$$CGPA = \frac{\sum_{i=1}^{m} c_i g_i}{\sum_{i=1}^{m} c_i}$$

where 'M' is the total no. of subject/ courses (as specifically required and listed under the Programme structure of the parent department) the student has 'registered' i.e., from the 1st semester onwards up to and inclusive of the 6th semester, 'j' is the subject/ course indicator index (takes into account all subject/ courses from 1 to 6 semesters), Cj is the no. of credits allotted to the jth subject/ course, and Gj represents the grade points (GP) corresponding to the letter grade awarded for that j^{th} subject/ course. After registration and completion of I year I semester, the SGPA of that semester itself may be taken as the CGPA, as there are no cumulative effects.

8.10 For merit ranking or comparison purposes or any other listing, **only** the '**rounded off'** values of the CGPAs will be used.

8.11 SGPA and CGPA of a semester will be mentioned in the semester Memorandum of Grades if all subject/ courses of that semester are passed in first attempt. Otherwise, the SGPA and CGPA shall be mentioned only on the Memorandum of Grades in which sitting he passed his last exam in that semester. However, mandatory Programmes will not be taken into consideration.

9.0 Passing standards

9.1 A student shall be declared successful or 'passed' in a semester, if he secures a GP ≥ 5 ('C' grade or above) in every subject/ course in that semester (i.e. when the student gets an SGPA ≥ 5.00 at the end of that particular semester); and he shall be declared successful or 'passed' in the entire under graduate programme, only when gets a CGPA ≥ 5.00 ('C' grade or above) for the award of the degree as required.

9.2 After the completion of each semester, a grade card or grade sheet shall be issued to all the registered students of that semester, indicating the letter grades and credits earned. It will show the details of the Programmes registered (Programme code, title, no. of credits, grade earned, etc.) and credits earned. **There is NO exemption of credits in any case.**

10.0 Declaration of results:

10.1 Computation of SGPA and CGPA are done using the procedure listed in 8.1 to 8.11.

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

% of Marks = (final CGPA – 0.5) x 10

11.0 Award of degree

11.1 A student who registers for all the specified subject/ courses as listed in the Programme structure and secures the required number of 178 credits (with CGPA ≥ 5.0), within 4 academic years from the date of commencement of the first academic year, shall be declared to have 'qualified' for the award of Bachelor of Technology in Electronics and Communication Engineering (ECE) - Avionics, selected at the time of admission.

11.2 A student who qualifies for the award of the degree as listed in item 10.1 shall be placed in the following classes.

11.3 A student with final CGPA (at the end of the under graduate programme) > 8.00, and fulfilling the following conditions - shall be placed in 'First Class with Distinction'.

However, he

a) Should have passed all the subject/ courses/Programmes in 'First Appearance' within the first 4 academic years (or 8 sequential semesters) from the date of commencement of first year first semester.

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

c) A student not fulfilling any of the above conditions with final CGPA > 8 shall be placed in 'First Class'.

11.4 Students with final CGPA (at the end of the under graduate programme) ≥ 7.00 but <8.00 shall be placed in 'First Class'.

11.5 Students with final CGPA (at the end of the under graduate programme) ≥ 6.0 but < 7.0, shall be placed in 'Second Class'.

11.6 All other students who qualify for the award of the degree (as per item 10.1), with final CGPA (at the end of the under graduate programme) ≥ 5.00 but < 6.0, shall be placed in 'Pass Class'.

11.7 A student with final CGPA (at the end of the under graduate programme) < 5.00 will not be eligible for the award of the degree.

11.8 University also offer following Degree /Certificate under the UGC Curriculum & Credit Framework for undergraduate programme of B.Tech. in ECE - Avionics:

(a) A UG certificate after completing 1 year (2 semesters) of study and secured grade point-5 for Semester-1 & 2, if, in addition, they complete one vocational Programme of 4 credits during the summer vacation of the first year.

(b) A UG diploma after 2 years (4 semesters) of study and secured grade point-5 for

Semester-1 to 4, if, in addition, they complete one vocational Programme of 4 credits during the summer vacation of the first year.

12.0 Supplementary Examination

12.1 A student will be eligible to appear in the supplementary examination in a subject/ course if he/she actually appeared at the last end-semester examination in that subject/ course and obtained the grade 'F'.

12.2 However, if a student has been absent in the End Semester examination (a) due to medical reasons, that are duly certified by RGNAU Doctors or (b) due to a calamity in the family his/her case will be considered for supplementary with full credit. In such cases the student must apply in writing to the Dean (Academic) through the concerned Teacher/Head of the Department.

12.3 All medical cases will be put up for consideration to the medical board. Only upon certification by the medical board the student will be granted full credit.

12.4 A student will not be allowed to appear in more than 5 (five) subject/ courses in the supplementary examinations.

12.5 Intending students must submit their application, countersigned by the teacher(s) of the subject/ course(s) or the Head of the Department concerned, along with the necessary fees to the Academic Section by the date as announced by a notification.

12.6 The supplementary examinations shall be held on such dates as laid down in the Academic Calendar for the year or as notified separately.

12.7 The grade in the subject/ course scored by the student appearing in the supplementary examination will be recomputed by substituting the marks of the end-semester in the total marks scored by that scored in the supplementary examination. Unless granted full credit by virtue of Section 12.2 12.3 above, a student is entitled only to one grade lower than the actual grade thus scored, except that the performance grade 'C' remains unaltered, as elucidated in the table below:

Table

Grade Obtained	Grade to be Awarded
Ab	Ab
F	F
C	C
B	C
B+	B
A	B+
A+	A
O	A+

12.8 However, if a student misses the end-semester examination due to a compelling reason like serious illness of himself/herself or a calamity in the family, he/she may appeal to the

Dean, through his/her Head of the Department for permitting himself/herself to appear at the supplementary examination. A sub-committee may, after examining the documents and being convinced about the merit of the case, recommend permitting him/her to appear in the supplementary examination(s) with full credit condoning his/her absence.

12.9 With the concurrence of the Faculty Adviser a student may be allowed to change his/her registration of subject/ courses within one week from the day of registration.

12.10 Students will be permitted to appear in the examinations in only those subject/ courses for which they have registered at the beginning of the semester and have not been debarred.

13.0 Grade Revision

13.1 A letter grade once awarded shall not be changed unless the request made upon detection of genuine error of omission and/or commission by the concerned teachers/coordinators with all relevant records and justification and recommended by the departmental Academic committee and Head of the Department and approved by the Chairperson, Academic Council within a maximum period of 7 (seven) days from the assigned date(s) of the registration of the next semester due date as provided in the Academic Calendar.

13.2 No change will be permitted for re-examination and supplementary examination grades. However, in an extraordinary circumstance, the grade change will be allowed only after approval of the Chairperson, Academic Council within a maximum period of 1 (one) day after the Internal Academic Committee meeting considering the re-examination and supplementary results.

13.3 Students who have obtained CGPA lower than 5.00 may be allowed, on the recommendation of the Head of the Department and the approval of the Dean (Academic), to re-register in one or more subject/ courses in which he/she received 'C' grade(s), so as to improve his/her CGPA to 5.00 or above, provided that the subject/ course(s) is/are otherwise being offered in that semester and there is no clash in the time table. The grade will be revised and recorded only if there is an improvement.

13.4 Appearing in the end-semester examination in the theory component of a subject/ course is compulsory for a student, unless exempted as per rule. If a student fails to appear in the end-semester examination he/she will be assigned an 'F' grade in the subject/ course and will not be permitted to appear at the supplementary examination for the subject/ course.

14.0 Withdrawal from the University

14.1 A student who has been admitted to a undergraduate degree program of the University may be permitted to withdraw temporarily for a period of one semester or more from the University on grounds of prolonged illness or acute problem in the family which compelled him/her to stay at home, Provided

a) He/she applies to the University within 15 days of the commencement of the semester or from the date he/she last attended his/her classes whichever is later, stating fully the reasons for such withdrawal together with supporting documents and endorsement of the father/guardian.

b) The University is satisfied that, inclusive of the period of withdrawal, the student is likely to complete his requirements for the degree within the time limits to be specified in regulation.

c) There is no outstanding dues or demands from him/her by the University/Hostel/Department/ Library etc.

14.2 A student who has been granted temporary withdrawal from the University under the above provisions will be required to pay the tuition fee and other essential fees/charges for the intervening period till such time as his/her name is borne on the Roll of University.

14.3 A student will be granted only one such temporary withdrawal during his/her tenure as a student of the Institute.

14.4 A student who has been granted a temporary withdrawal on medical grounds will be allowed to rejoin and resume his/her studies only after being declared medically fit by the RGNAU Doctors. In specific case, the University may determine that the students may administer a mandatory medical leave on medical ground.

15. Striking-off the name from the University Roll List

If a student does not register for 3 (three) consecutive semesters, without the approval of the competent authority his/her name will be struck off from the University Roll List on recommendation by the department.

16. Relaxation:

The Academic Council may, under exceptional circumstances, consider any case of a student having a minor deficiency in respect of any of the requirements stated in these Regulations and relax the relevant provision of these Regulations based on the merit of the case. The grounds on which such relaxation is granted shall invariably be recorded and cannot be cited as precedence.

17. Withholding of results

If the student has not paid the fees to the University at any stage, or has dues pending due to any reason whatsoever, or if any case of indiscipline is pending, the result of the student may be withheld, and the student will not be allowed to promoted the next higher semester. The award or issue of the degree may also be withheld in such cases.

18. Conduct and Discipline: Following rules shall be in force to govern the conduct and discipline of all students:

18.1 Students shall show due respect to the teachers of the University, the Wardens of the Hostels, the Sports Officers and other officers/employee of the University.

18.2 Proper courtesy and consideration should be extended to the employees of the University and of the Hostels. They shall also pay due attention and courtesy to visitors.

18.3 Students are required to develop a friendly relationship with fellow students. In particular, they are expected to show kindness and consideration to the new students admitted to the

University every year. Law bans ragging in any form to any body - acts of ragging will be considered as gross indiscipline and will be severely dealt with.

18.4 The following acts of omission and/or commission shall constitute gross violation of the code of conduct and are liable to invoke disciplinary measures:

a) Ragging
b) Furnishing false statement of any kind in the form of application for admission or for award of scholarship etc.
c) Displaying lack of courtesy and decorum; resorting to indecent behavior anywhere within or outside the campus.
d) Willfully damaging or stealthily removing any property/belongings of the University, Hostel or fellow students.
e) Possession, consumption or distribution of alcoholic drinks or any kind of hallucinogenic drugs.
f) Adoption of unfair means in the examinations.
g) Organizing or participating in any group activity in company with others in or outside the campus without prior permission of the Dean
h) Mutilation or unauthorized possession of library books.
i) Resorting to noisy and unseemly behavior, disturbing studies of fellow students.
j) Misuse of Internet/e-mail facilities or tempering/ hacking with servers anywhere in the Hostel/Departments etc.
k) Not intimating his/her absence to the Warden of the Hostel before availing any leave.

18.5 Commensurate with the gravity of the offence, the punishment may be reprimand, fine, expulsion from the Hostel, debarment from an examination, rustication for a specified period or even outright expulsion from the University.

18.6 All cases involving punishment other than reprimand shall be reported to the Chairman of the Standing Disciplinary Committee.

18.7 All major acts of indiscipline, which may have serious repercussion on the general body of students, and/or which may warrant a uniform and more formalized nature of investigation, shall be handled by the **Standing Disciplinary Committee** appointed by Academic Council.

18.8 Recommendation of the committee, which will include the suggested punishment in cases of guilt proven, will be forwarded to the Chairperson Academic Council for necessary action.

18.9 Cases of adoption of unfair means in an examination shall be dealt with by the **Committee on Prevention of Examination Malpractices.**

18.10 The Committee shall recommend appropriate measures in each case to the Chairperson of the Academic Council for awarding the punishment.

19. Unfair means:

Cases of unfair means shall be dealt as per the rules of the University and the Government Public Examination (Prevention of Unfair means) Act if any in force.

20. Scope :

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

20.2 In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.

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

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

Annexure-1

Programme Structure and Syllabi for

Bachelor of Technology (Electronics and Communication Engineering -Avionics)

(B.Tech. ECE- Avionics)

Course/ Subject Code	Subject	L	T	P	Credits
	Semster-1				
	Applied Mathematics -1	3	1	0	4
	Applied Physics	3	1	0	4
	Professional Communication	2	0	0	2
	Basic Electrical Technology	3	1	0	4
	Computer Programming	2	0	1	3
	Introduction to Aerospace Eng.	3	0	0	3
	Field visit	0	0	2	2
	Semester Credit Total				**22**
	Semster-2				
	Applied Mathematics-II	3	1	0	4
	Applied Mechanics	3	0	1	4
	Analog Electronics	3	0	0	3
	Innovation and Entrepreneurship	3	0	0	3
	Introduction to Avionics	3	0	0	3
	Engineering Graphics	3	0	1	4
	Lab-1: Basic Electronics Lab	0	0	1	1
	Semester Credit Total				**22**
	Semster-3				
	Applied Mathematics-III	3	1	0	4
	Signals and Systems	3	1	0	4
	Instrumentations and Measurement	3	0	1	4
	Communication Systems	3	1	0	4
	Introduction to Control Systems	3	1	0	4
	Lab. -I: Communication Lab.	0	0	1	1
	Lab. -II: Control Lab	0	0	1	1
	Semester Credit Total				**22**
	Semster-4				
	Navigation Systems	3	0	0	3
	E.M. Theory and Radiating Waves	3	0	0	3
	Computer Organization and Architecture	3	0	0	3
	Flight and System Simulation	2	0	1	3
	Engineering Management and Ethics	3	0	0	3
	Digital Electronics	3	0	0	3
	Navigation Lab	0	0	1	1
	Digital Electronics Lab	0	0	1	1
	Summer Internship/Industrial Training	0	0	2	2

	Semester Credit Total				**22**
	Semster-5				
	Space Technology	3	0	0	3
	Material Science	3	0	0	3
	Surveillance Systems	3	0	0	3
	Power Electronics	3	0	1	4
	Digital Signal Processing	3	0	0	3
	Microprocessor and Micro Controller	3	0	0	3
	Lab.-I Surveillance Lab.	0	0	1	1
	Lab-II Microprocessor and Micro Controller	0	0	1	1
	Semester Credit Total				**21**
	Semster-6				
	Landing-Aid Systems	3	0	0	3
	Display Technology	3	0	0	3
	Computer Networks and Protocols	3	0	1	4
	Digital Image Processing	3	0	0	3
	Elective -1	3	0	0	3
	Elective -2	3	0	0	3
	Signal and Image Processing Lab-1	0	0	1	1
	Landing-aid systems Lab-2	0	0	1	1
	Semester Credit Total				**21**
	Semster-7				
	Flight Test Instrumentation and Flight Testing	3	0	1	4
	Safety Management Systems	3	0	0	3
	Elective -3	3	0	0	3
	Elective -4	3	0	0	3
	Certification Projects in the Industry	1	0	2	3
	Mini Project	0	0	4	4
	Field Visit – Flight Instrumentation and Testing	0	0	1	1
	Semester Credit Total				**21**
	Semster-8				
	Major Project/ Internship	0	0	12	12
	MOOC/ On-Line/ NPTEL/SWAYAM Courses	3	0	0	3
	Semester Credit Total				**15**

Summary of Credits

Semester	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Total**
Credit	**22**	**22**	**22**	**22**	**21**	**21**	**21**	**15**	**166**

Electives: (all electives are of 3-0-0 contact hours and 3 credits)

Course/ Subject Code	**A: Aerodynamics**	
	Computational Fluid Dynamics	Elective I or II

	Advanced computational fluid dynamics (prerequisite: 1)	Elective IV or V
	Industrial Aerodynamics	Any
	Theory of viscous flows	Any
	B: Aircraft Structures	
	Finite element method	Elective I or II
	Advanced finite element method (prerequisite: 1)	Elective IV or V
	Composite structures	Any
	Fracture Mechanics	Any
	Vibration instrumentation & control	Any
	Aeroelasticity	Any
	C: Aircraft propulsion	
	Rocket propulsion	Any
	New propulsion systems	Any
	Principles of combustion and emission	Any
	D: Flight mechanics & automatic control	
	Automatic control of aircraft	Any
	Drone and unmanned aircraft technology	Any
	Helicopter engineering	Any
	Flight Laboratory (in collaboration with IIT Kanpur)	Any
	E: Humanities & social sciences	
	Values & Ethics	Any
	Economics of airlines operations	Any
	Introduction to Psychology	Any
	F: Miscellaneous topics	
	Soft computing, Artificial Intelligence & Machine Learning	Any

Electives: Humanities, Economics & General Management :

Sr.No.	Subject	Sub. Type	L	T	P	Credit
	Semester-5					
1	VALUES AND ETHICS	Elective	3	0	0	3
2	ENVIRONMENTAL SCIENCE	Elective	3	0	0	3
3	HISTORY OF THE MODERN WORLD	Elective	3	0	0	3
4	INTRODUCTION TO MACRO- AND MICRO-ECONOMICS.	Elective	3	0	0	3
5	INTRODUCTION TO THE	Elective	3	0	0	3

	PRINCIPLES OF MANAGEMENT					
6	SCIENCE OF LIVING SYSTEM	Elective	3	0	0	3
7	INTRODUCTION TO BIOLOGY	Elective	3	0	0	3
8	TECHNOLOGY AND MORDEN CIVILIZATION	Elective	3	0	0	3
9	INTRODUCTION TO PSYCHOLOGY	Elective	3	0	0	3

Avionics Electives:

Sr.No.	Subject	Sub. Type	L	T	P	Credit
	Semester-6 and 7					
1	EMI/EMC/EMP techniques	Elective	3	0	0	3
2	Reliability Engineering	Elective	3	0	0	3
3	Software Engineering	Elective	3	0	0	3
4	AI/ML	Elective	3	0	0	3
5	ADS(B)	Elective	3	0	0	3
6	Data Structures and Algorithm	Elective	3	0	0	3
7	UAV system	Elective	3	0	0	3
8	Composite Material related to Avionics	Elective	3	0	0	3
9	Optical Communication	Elective	3	0	0	3
10	Wireless Communication	Elective	3	0	0	3
11	Cyber Security	Elective	3	0	0	3

Electives For Certification:

Sr.No.	Subject	Sub. Type	L	T	P	Credit
1	Security Equipment (X-BIS / HHMD / DFMD) & ETD (Explosive Trace Detector)	Elective	1	0	2	3
2	Terrestrial Navigation System in Aviation	Elective	1	0	2	3
3	Surveillance System in aviation (ADS-B , ASMGCS, PSR,SSR)	Elective	1	0	2	3
4	ADP in aviation	Elective	1	0	2	3
5	AMSS Hardware and Application operation	Elective	1	0	2	3
6	GNSS/GAGAN/NaViC systems	Elective	1	0	2	3
7	VHF/VCS/DVR/D-ATIS	Elective	1	0	2	3

List of Books for Reference on Avionics:

1) The Aviation Handbook : Edited by CARY R SPITZER
2) Avionics Training : Systems, Installation and Troubleshooting by Len Buckwalter
3) Aviation Handbooks and Manuals : FAA

Subject Code:		**Course Title : Applied Mathematics-I**
Contact Hours	**Lecture- 3**	**Tutorial-1** **Practical-0** **Credit-4**
Objectives		
Content		
Single Variable Calculus: Convergence of sequences and series of real numbers, non-decreasing sequence theorem, sandwich theorem and applications, L; Hospitals rule, tests of convergence; continuity of functions; differentiability, Rolles theorem, mean value theorem, Taylors theorem; power series; Riemann integration and applications, fundamental theorem of calculus, improper integrals. Multivariable Calculus: Scalar valued functions of one variable, continuity and differentiability; Scalar valued functions of several variables, continuity and differentiability, partial and directional derivatives, gradient, chain rule; tangents and normal, maxima and minima, Lagrange multiplier method; repeated and multiple integrals with applications, change of variables; vector fields, line and surface integrals; Green's, Gauss' and Stokes' theorems and their applications.		

Texts:

1. G. B. Thomas, Jr. and R. L. Finney, Calculus and Analytic Geometry, 9th ed., Pearson Education India, 2010.
2. S. R. Ghorpade and B. V. Limaye, An Introduction to Calculus and Real Analysis, Springer India, 2006.

References:

1. Stewart, J., Calculus: Early Transcendentals, 5th ed., Brooks/Cole India, 2007.
2. R. G. Bartle and D. R. Sherbert, Introduction to Real Analysis, 3 rd ed., Wiley India, 2005.

ade and B. V. Limaye, An Introduction to Calculus and Real Analysis, Springer India, 2006.

References:

1. Stewart, J., Calculus: Early Transcendentals, 5th ed., Brooks/Cole India, 2007.
2. R. G. Bartle and D. R. Sherbert, Introduction to Real Analysis, 3 rd ed., Wiley India, 2005

Subject Code:		**Course Title : Applied Physics**
Contact Hours	**Lecture- 3**	**Tutorial-1** **Practical-0** **Credit-4**
Objectives		
Content		
Calculus of Variations: Foundations, Principle of least action, Fermat's principle, Euler-Lagrange equations and its applications. Lagrangian Mechanics: Degrees of freedom, motion and constraints, generalized coordinates, Lagranges equations of motion, generalized momentum, ignorable coordinates, symmetry and conservation laws, Lagrange multipliers and constraint forces. Hamiltonian Mechanics: Concept of phase space, Hamiltonian, Hamiltons equations of motion and applications. Special Theory of Relativity: Postulates of special relativity, Galilean transformation, Lorentz transformation, simultaneity, length contraction, time dilation, relativistic addition of velocities, energy momentum relationships. Quantum Mechanics: Two-slit		

experiment, De Broglies hypothesis, uncertainty principle, wave function and wave packets, phase and group velocities; Schrodinger equation, probabilities and normalization, expectation values. eigenvalues and eigenfunctions.

Texts:
1. R. Takwale and P. Puranik, Introduction to Classical Mechanics, 1st ed., Mc-Graw Hill Edu., 2017.
2. R. Eisberg and R. Resnick, Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles,
2nd ed., Wiley-India, 2010.
References:
1. Patrick Hamill, A Student's Guide to Lagrangians and Hamiltonians, Cambridge University Press,
1st ed., 2013.
2. M. R. Spiegel, Theoretical Mechanics, Tata McGraw Hill, 2008.
3. R. Resnick, Introduction to Special Relativity, John Wiley, Singapore, 2000.
4. R. P. Feynman, R. B. Leighton, and M. Sands, The Feynman Lectures on Physics: The Millennium Edition, Vol. I, Pearson, 2024.

Subject Code:		**Course Title : Professional Communication**
Contact Hours	**Lecture-**	**Tutorial-** **Practical-** **Credit-**
Objectives		
Content		
Functional English: conversation skills – asking questions, requests, doubts, engage in conversation – different types of communication-verbal and non-verbal, body language. Teaching Grammar: grammar games, exercise. Teaching Vocabulary: Language games, exercise. Reading and appreciating stories, poems, essays – listening and appreciating video lectures – comprehensive questions and answers. **Lab:** Presentation skills – appreciation of videos, songs – role plays – debates – extemporizes – group presentations – introduction to technical writing – technical writing, how to write minutes, report, and project proposal		

References:
1. Garner, A., Conversationally Speaking: Tested New Ways to Increase Your Personal and Social Effectiveness, McGraw-Hill (1997).
2. Bechtle, M., Confident Conversation: How to Communicate Successfully in Any Situation, Revell (2008).
3. Brown, S. and Smith, D., Active Listening with Speaking, Cambridge Univ. Press (2007).

Subject Code:		**Course Title : Basic Electrical Technology**
Contact Hours	**Lecture-**	**Tutorial-** **Practical-** **Credit-**
Objectives		
Content		
DC Circuit Analysis: Network Theorems - Thevenin's theorem, Norton's theorem, Superposition theorem, Maximum power transfer theorem. AC Circuit Analysis: Basic concepts of AC circuits – RMS value and average value Behaviour of resistor, capacitor and inductor in AC circuits – Sinusoidal steadystate analysis of AC circuits – Power – Power factor - Resonance in AC circuits. Introduction to Magnetic Theory Electric Machinery: DC and AC Machines, Generators and Motors, AC single phase and three phase machines, Transformers, Performance of Dc and AC Machines		

References:
1. Vincent Del Toro: 'Electrical Engineering Fundamentals', Pearson Education, 1989
2. A.E.Fitzgerald, David E Higginbothom, Arvin Grabel: 'Basic Electrical Engineering',Tata McGraw-Hill, 2010.
3. Charles K Alexander, Mathew N O Sadiku: 'Electric Circuits' McGraw-Hill; 4th edition, 2008.
4. Fitzgerald, Kingsley, *Umans*, 'Electric Machinery', Tata Mcgraw-Hill, 2017.
5. M.G.Say, ' Performance and Design of AC Machines', CBS; 3rd edition, 2002
6. Mittle, V. N. and Mittal, A., Basic Electrical Engineering, 2nd ed., Tata Mcgraw-Hill, 2005

Subject Code:		**Course Title : Computer Programming**
Contact Hours	**Lecture-**	**Tutorial-** **Practical-** **Credit-**
Objectives		
Content		
Unit 1: Working of a computer – Data representation in various bases, Binary System, Floating-point representation, basic components of computer architecture, operating system, and how they work together, a brief history of programming languages up to C, Types of programming languages, Stages of a compilation process, an overview of logic thinking – Algorithm, Flowchart. Principles of structured programming **Unit 2: Basic Syntax of C – Structure of a C Program, Printing on a screen, escape sequences,** variables, operators, writing arithmetic and logic expressions, printing variables, format specifiers, reading from a console. Conditional statements – if, else, else if statements. Writing conditions. Nested conditional statements. Loops – for, while, do-while loops and their various formats, infinite loops, break, continue. Nested loops and conditional statements. Switch – switch-case statements and their use. Thinking and implementation of logics involving		

conditional, loops, switch-case. Patterns.

Unit 3: Functions – Syntax of C functions, parameters, arguments, return statements. Array – Single

dimensional, multi-dimensional arrays, accessing and updating array elements. Pointers – Memory address of a variable and concept of pointers. Single-dimensional and multi-dimensional pointers.

Arrays as pointers. Dynamic Memory Management – malloc, calloc, realloc, free. Concept of heap and stack segments. Passing and returning arrays and pointers to and from a function. Call by value, call by reference. Strings – Reading and Writing strings. Allocating strings dynamically. String functions.

Unit 4: Structures and Unions – User-created data types, Structure, Union, accessing and updating their members, pointers to structure and union. Storage class specifiers – auto, extern, static, register. Macros – #include, #define, #ifdef, #ifndef, #endif. Files – Opening a file, opening modes, reading from a file, writing to a file: fopen, fread, fwrite, fprintf, fscanf, fseek, fclose.

Lab:

1. Finding the maximum and minimum of given set of numbers
2. Finding Roots of a Quadratic Equation
3. Sin x and Cos x values using series expansion
4. Conversion of Binary to Decimal, Octal, Hexa and Vice versa
5. Generating a Pascal triangle and Pyramid of numbers
6. Recursion: Factorial, Fibonacci, GCD
7. Matrix addition and multiplication using arrays
8. Bubble Sort, Selection Sort
9. Programs on Linear Search and Binary Search using recursive and non-recursive procedures.

Functions for string manipulations

10. Finding the No. of characters, words and lines of given text file
11. File Handling programs

Reference Books:

1. Yashavant Kanetkar, “Let us C”, 17th edition, BPB Publications.
2. B. Gottfried, Programming with C,” 3rd Ed., Tata McGraw-Hill, 2010.
3. E. Balaguruswamy, “Programming in ANSI C,” 6th Ed., Tata McGraw-Hill, 2012.
4. 4. S. Lipschutz, “Data Structures, Schaum’s Outlines Series,” 1st Ed., Tata McGraw Hill, 2005.
5. R. J. Dromey, “How to solve it by Computer”, Pearson India.
6. Herbert Schield, “Complete Reference in C”, 4th edition, TMH.
7. Yashavant Kanetkar, “Understanding Pointers in C”, 3rd Edition, BPB Publication.
8. K. N King, C Programming: A Modern Approach, Second Edition
9. Brian W. Kernighan, Dennis M. Ritchie, “The C Programming Language”, 2nd edition, Prentice Hall.

Subject Code:		Course Title : Introduction to Aerospace Engineering
Contact Hours	Lecture- Tutorial- Practical- Credit-	
Objectives		
Content		
a) Basics of Aircraft Aerodynamics and flight b) Overview of Aircraft Structures and propulsion Anatomy of an aircraft, standard atmosphere, Aerodynamic forces, lift generation, airfoils and wings, drag polar, concept of static stability, mechanism of thrust production – propellers – jet engines and its operation, helicopters, aircraft performance, simple maneuvers c) History of aviation and wireless d) Need for Avionics and related systems on aircraft e) Fundamentals of Rocket propulsion and space technology Elements of rocket propulsion, launch vehicle dynamics, basic orbital mechanics, satellite applications and orbits, future challenges in aerospace engineering		

Reference Books:
Aeronautical/ Aerospace Engineering
1) Anderson, J. D., Introduction to Flight, 7th ed., McGraw-Hill (2011)
2) Anderson, D. F. and Eberhardt, S., Understanding Flight, 2nd ed., McGraw-Hill (2009).
3) AC Kermode, Flight without formula, Sterling book house, 1970
4) HS Siefert (ed.), Space technology, John Wiley & sons, 1959
5) Turner, M. J. L., Rocket and Spacecraft Propulsion: Principles, Practice and New Developments, 3rd ed., Springer (2009)
6) Barrere et al, Rocket propulsion, Elsevier, 1966

Subject Code:	B.Tech/Aero/7	Course Title : Field Visit
Contact Hours	Lecture- Tutorial- Practical- Credit-	
Objectives		
Content		
The students will be taken to Varanasi / Lucknow Airport. Duration of visit 4 Hrs. Objective: Students will be familiarized with the functioning of airport and the various communication, Navigation, Surveillance and Automation facilities which are in operation at airport for safe and orderly flow of air traffic.		

Subject Code:		Course Title : Applied Mathematics-II
Contact Hours	Lecture- 3 Tutorial-1 Practical- 0 Credit-4	
Objectives		

Content
Linear Algebra: Systems of linear equations and their solutions; vector space R n and its subspaces; spanning set and linear independence; matrices, inverse and determinant; rank and nullity,eigenvalues and eigenvectors; diagonalization of matrices; similarity; inner product, Gram-Schmidt process; linear transformations. Ordinary Differential Equations: First order differential equations, integrating factors, Bernoulli equations, existence and uniqueness theorem, applications; higher-order linear differential equations – solutions of homogeneous and nonhomogeneous equations, method of variation of parameters, operator method; series solutions of linear differential equations, Legendre equation and Legendre polynomials, Bessel equation and Bessel functions of first and second kinds; systems of first-order equations, phase plane, critical points, stability.

Texts:
1. G. Strang, Linear Algebra and Its Applications, 4 th ed., Brooks/Cole India, 2006.
2. S. L. Ross, Differential Equations, 3 rd ed., Wiley India, 2007.
References:
1. K. Hoffman and R. Kunze, Linear Algebra, 2 nd ed., Prentice Hall India, 2015.
2. D. Poole, Linear Algebra: A Modern Introduction, 2 nd ed., Brooks/Cole, 2005.
3. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 2009.

Subject Code:		**Course Title : Applied Mechanics**
Contact Hours	**Lecture- 3**	**Tutorial- 0** **Practical-1** **Credit-4**
Objectives		
Content		
Introduction to Mechanics: Basic concepts, system of forces, coplanar concurrent forces, moment of forces and its application, couples and resultant of force systems. Equilibrium of system of Forces: Free body diagrams, equations of equilibrium of coplanar systems and spatial systems. Friction: Types of friction, limiting friction, Laws of friction, static and dynamic frictions. Centroid and Center of Gravity: Introduction, Centroids of lines, Centroids of area, Centroids of Composite figures, Theorem of Pappus, Center of gravity of composite bodies. Area Moments of Inertia: Definition, Polar Moment of Inertia, Radius of gyration, Transfer Theorem for moment of inertia, Moments of inertia by integration, Moments of Inertia of composite figures. Mass Moment of Inertia: Introduction, Radius of gyration, Transfer formula for Mass Moments of Inertia, Mass moments of inertia by integration, Mass moment of inertia of composite bodies, Product of Inertia. Kinetics of Rigid Bodies: Types of motion, D'Alemberts principle and its applications in plane motion and connected bodies; Work energy principle and its application in plane motion of connected bodies; kinetic of rigid body rotation.		

Texts:
1. S.S. Bhavikatti and K.G. Rajashekarappa, Engineering Mechanics, 6 th ed., New Age Intl. Ltd. 2018,

2. S.P. Timoshenko, D.H. Young, J.V. Rao, and S. Pati, Engineering Mechanics, 5 th ed., McGraw
Hill Education, 2017
References:
1. R.C. Hibbeler, Engineering Mechanics: Statics and Dynamics, 14 th ed., Pearson Education, 2015.
2. R.K. Bansal, A Textbook of Engineering Mechanics, 8 th ed., Laxmi Publications (P) Ltd, 2011.
3. A.K. Tayal, Engineering Mechanics Statics and Dynamics, 14 th ed., Umesh Publications, 2010.

Subject Code:		**Course Title : Analog Electronics**
Contact Hours	**Lecture-**	**Tutorial- Practical- Credit-**
Objectives		
Content		
Energy bands in intrinsic and extrinsic semiconductors, equilibrium carrier concentration, direct and indirect band-gap semiconductors. Carrier transport: diffusion current, drift current, mobility and resistivity, generation and recombination of carriers, Poisson and continuity equations. Diode: basic structure and types, operating principle, current-voltage characteristic, large and small signal models; Diode Applications: rectifier circuits, zener voltage regulator Regards, clipper and clamper circuits; BJT and their Application: structure and modes of operation; NPN and PNP transistor in active mode, DC analysis, BJT as a switch and amplifier, small signal equivalent circuits, single stage CE amplifier; concept of stability MOSFET and Applications: switch and amplifier; Operational Amplifier and applications: Basics, summing amplifier, inverting and non-inverting configuration, voltage follower, differentiator and integrator; Current mirrors and differential amplifiers. Op-amp circuits: Amplifiers, summers, differentiators, integrators, active filters, Schmitt triggers and oscillators. Feedback: Basic concepts of feedback, ideal feedback topologies; Oscillators: Basic principle of sinusoidal oscillation, phase-shift oscillator, wien-bridge oscillator; Various classes of operation (Class A, B, AB, C etc.), their power efficiency and linearity issues. Analog ICs: DAC, ADC, VCO, PLL and 555-timer.		

Books and references

1. J. Millman and C. Halkias, Integrated Electronics: Analog and Digital Circuits and Systems, McGraw Hill, 1985.
2. Paul R. Gray and Robert G.Meyer, Analysis and Design of Analog Integrated Circuits, John Wiley, 3rd Edition Course
3. P. Horowitz and W. Hill, The Art of Electronics, 2nd edition, Cambridge University Press, 1989.
4. A.S. Sedra and K.C. Smith, Microelectronic Circuits,

5. Fundamentals of Microelectronics by Behzad Razhavi, Wiley 2013
6. J. Millman and A. Grabel, Microelectronics, 2nd edition, McGraw Hill, 1988.
7. D. Johns, and K. Martin, Analog Integrated Circuit Design, Wiley, 1997.
8. R. A. Gayakwad, Op-Amps and Linear Integrated Circuit, Prentice Hall of India, 2004.

Subject Code:		**Course Title : Innovation and Entrepreneurship**
Contact Hours	**Lecture-**	**Tutorial-** **Practical-** **Credit-**
Objectives		

Content

Module 1: Basics of Creativity and Innovation

Introduction to Creativity and Innovation, Defining creativity and innovation in a business context, Case studies: Breakthrough innovations and creative problem-solving in history.

Principles of Creative Thinking, Frameworks for creativity (e.g., Design Thinking, TRIZ), Barriers to creativity and how to overcome them, Group discussions and idea generation exercises.

Fostering Innovation, Types of innovation (incremental, disruptive, radical, and architectural), Organizational strategies to promote innovation.

Guest Speaker: Innovator/Entrepreneur sharing real-world insights.

Module 2: Market Opportunity Identification

Understanding Markets, Analysing market trends and identifying gaps, Tools for market research (e.g., SWOT analysis, PESTLE analysis),

Evaluating Market Opportunities, Assessing the feasibility and viability of business ideas, Metrics for evaluating potential market success,

Case Studies: Examples of successful market identification, Tools and Techniques for Opportunity Scouting, Using data analytics and consumer insights for market research,

Module 3: Customer Value Proposition

Crafting a Value Proposition, Understanding customer needs and pain points, Frameworks: Value Proposition Canvas, Blue Ocean Strategy.

Communicating the Value Proposition, Storytelling for entrepreneurs, Elevator pitches and persuasive communication techniques.

Module 4: Entrepreneurial Mindset

Characteristics of Successful Entrepreneurs, Resilience, risk-taking, and adaptability, Problem-Solving and Decision-Making, Tools for solving complex problems (e.g., Six Thinking Hats, Root Cause Analysis).

Cultivating an Entrepreneurial Mindset, Overcoming failure and learning from setbacks.

Module 5: Business Planning

Introduction to Business Models, Types of business models and their components, Frameworks: Business Model Canvas.

Financial Planning Basics, Understanding revenue streams, cost structures, and funding sources.

Strategic Planning for Start-Ups, Creating a roadmap for growth and scaling, Managing risks and uncertainties.

Final Presentations, Students present their business ideas, including value propositions, market opportunities, and business plans, Peer and instructor feedback.

References- Text /e- books:

1. Creativity, Inc. by Ed Catmull and Amy Wallace, 2014
2. Creative Confidence: Unleashing the Creative Potential Within Us All by Tom Kelley and David Kelley, 2013
3. Innovation and Entrepreneurship by Peter F. Drucker, 2014
4. Market Research in Practice: An Introduction to Gaining Greater Market Insight by Paul Hague, 2021
5. Value Proposition Design: How to Create Products and Services Customers Want by Alexander Osterwalder, Yves Pigneur, et al., 2015
6. Mindset: The New Psychology of Success by Carol S. Dweck, 2006
7. The Lean Start-up: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses by Eric Ries, 2011
8. Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers by Alexander Osterwalder and Yves Pigneur, 2010
9. Financial Intelligence for Entrepreneurs: What You Really Need to Know About the Numbers by Karen Berman and Joe Knight, 2008

Subject Code:		**Course Title** : **Computer Programming**
Contact Hours	**Lecture-**	**Tutorial-** **Practical-** **Credit-**
Objectives		
Content		
Unit 1: Working of a computer – Data representation in various bases, Binary System, Floating-point representation, basic components of computer architecture, operating system, and how they work together, a brief history of programming languages up to C, Types of programming languages, Stages of a compilation process, an overview of logic thinking – Algorithm, Flowchart. Principles of structured programming Unit 2: Basic Syntax of C – Structure of a C Program, Printing on a screen, escape sequences, variables, operators, writing arithmetic and logic expressions, printing variables, format specifiers, reading from a console. Conditional statements – if, else, else if statements. Writing conditions. Nested conditional statements. Loops – for, while, do-while loops and their various formats, infinite loops, break, continue. Nested loops and conditional statements. Switch – switch-case statements and their use. Thinking and implementation of logics involving conditional, loops, switch-case. Patterns. Unit 3: Functions – Syntax of C functions, parameters, arguments, return statements. Array – Single dimensional, multi-dimensional arrays, accessing and updating array elements. Pointers – Memory address of a variable and concept of pointers. Single-dimensional and multi-dimensional pointers. Arrays as pointers. Dynamic Memory Management – malloc, calloc, realloc, free. Concept of heap and stack segments. Passing and returning arrays and pointers to and from a function. Call by value, call by reference. Strings – Reading and Writing strings. Allocating strings dynamically. String functions.		

Unit 4: Structures and Unions – User-created data types, Structure, Union, accessing and updating their members, pointers to structure and union. Storage class specifiers – auto, extern, static, register. Macros – #include, #define, #ifdef, #ifndef, #endif. Files – Opening a file, opening modes, reading from a file, writing to a file: fopen, fread, fwrite, fprintf, fscanf, fseek, fclose Lab: 1. Finding the maximum and minimum of given set of numbers 2. Finding Roots of a Quadratic Equation 3. Sin x and Cos x values using series expansion 4. Conversion of Binary to Decimal, Octal, Hexa and Vice versa 5. Generating a Pascal triangle and Pyramid of numbers 6. Recursion: Factorial, Fibonacci, GCD 7. Matrix addition and multiplication using arrays 8. Bubble Sort, Selection Sort 9. Programs on Linear Search and Binary Search using recursive and non-recursive procedures. Functions for string manipulations 10. Finding the No. of characters, words and lines of given text file 11. File Handling programs

Reference Books:

1. Yashavant Kanetkar, “Let us C”, 17th edition, BPB Publications.
2. B. Gottfried, Programming with C,” 3rd Ed., Tata McGrawHill, 2010.
3. E. Balaguruswamy, “Programming in ANSI C,” 6th Ed., Tata McGraw-Hill, 2012.
4. 4. S. Lipschutz, “Data Structures, Schaum’s Outlines Series,” 1st Ed., Tata McGraw Hill, 2005.
5. R. J. Dromey, “How to solve it by Computer”, Pearson India.

6. Herbert Schield, “Complete Reference in C”, 4th edition, TMH.
7. Yashavant Kanetkar, “Understanding Pointers in C”, 3rd Edition, BPB Publication.
8. K. N King, C Programming: A Modern Approach, Second Edition
9. Brian W. Kernighan, Dennis M. Ritchie, “The C Programming Language”, 2nd edition, Prentice Hall.

Subject Code:		**Course Title : Introduction to Avionics**
Contact Hours	**Lecture-**	**Tutorial-** **Practical-** **Credit-**
Objectives		
Content		
A) Electronic and Computer Technology a) Digital Computers, Microprocessors, Computer architecture b) Software considerations, DO-178, Hardware considerations,		

DO-254 – Interfaces
c) Integrated Avionics and Weapon system, Typical Avionics sub systems, Design and Technologies. Line replaceable units, ARINC type equipment
\B) Air Data Systems ,
a) Air, temperature, pressure, air speed
b) Sensors: Pitot-Static, Angle of Attack, OAT and Air Data Computer, Gyroscopes, Synchros, Flux Gate Compass
C) Onboard Data Communication
a) Digital communication,
b) Transmission lines, Digital Data buses and Networking, Data bus protocols, ARINC 429, ARINC 629, MIL STD 1553
c) Fiber optic communication, Glass fiber, Time domain Reflectometry, ARINC 573/ 615/ 708 and other data bus protocols
D) Control and displays
a) Control and displays: Electronic display Technologies - CRT, LED, LCD, EL and Plasma Panel, Touch screen
b) RMI, HSI, ADI, RNP Displays, Direct voice input (DVI),
c) Ergonomics/Human factors
d) Civil and Military Cockpits: MFD, HMD, HUD, MFK, HOTAS
E) Support Systems
a. Electrical power sources, Batteries, Airborne environment DO-160 and Lighting systems
b. Recorders: The Black Boxes: Voice Recorder System, Flight Data Recorder System, Emergency Locator Transmitter (ELT) System, New Developments in Safety Systems
c. Utility systems management system and Electronic warfare systems

References: -
Books/ Literature: Electronics and computers
1) Malcrno A.P. and Leach, D.P., “Digital Principles and Application”, Tata McGraw-Hill, 1990.
2) Gaonkar, R.S., “Microprocessors Architecture – Programming and Application”, Wiley and Sons Ltd., New Delhi, 1990
3) RTCA DO-178B/EUROCAE ED-12B, Software Considerations in Airborne Systems and Equipment Certification,1992 and DO-254/EUROCAE ED-80, Design Assurance Guidance For Airborne Electronic Hardware, 2000, RTCA Inc.,Washington, D.C

Books/ Literature: Avionics Systems
1) Jeppesen Sanderson, “Avionics Fundamentals”, Jeppesen Sanderson Inc, 2007
2) Albert Helfrick, ‘Practical Aircraft Electronic Systems’, Prentice Hall Education, Career & Technology, 2007
3) Spitzer, C.R., “Digital Avionic Systems”, Prentice Hall, Englewood

Cliffs, N.J., USA., 1987.
Collinson R.P.G. 'Introduction to Avionics', Chapman and Hall, 1996
4) Alfred Helfrick, 'Principles of Avionics', Leesburg, VA Avionics Communications, 2002.
Books/ Literature: Displays and other Systems
1) W.M. Newman And R.F. Sproul - Principles of Interactive Computer Graphics, McGraw - Hill, 1981
2) Pallet, E.H.J. Aircraft Instruments & Integrated systems;, Longman Scientific and Technical, Mcgraw-Hill, 1992.
3) Murthy, D.V.S., ;Transducers and Measurements;, McGraw-Hill, 1995

Subject Code:	**B.Tech/Aero/14**	**Course Title: ENGINEERING GRAPHICS**
Contact Hours	**Lecture-**	**Tutorial- Practical- Credit-**
Objectives		
Content		
Introduction to IS code of drawing; Conics and Engineering Curves – ellipse, parabola, hyperbola, cycloid, trochoid, involute; Projection of lines – traces, true length; Projection of lines, planes and solids (cube, prism, pyramid, cylinder, cone and sphere); Projection on auxiliary planes; intersection of solids. Isometric projection, isometric scale; Sectioning of solids, true shape of a section. Introduction to CAD tools; development and intersection of surfaces and solids using CAD.		

Subject Code:		**Course Title Lab-1: Basic Electronics Lab**
Contact Hours	**Lecture-**	**Tutorial- Practical- Credit-**
Objectives		
Content		
Experiments using diodes and bipolar junction transistor (BJT): design and analysis of half -wave and full-wave rectifiers, clipping circuits and Zener regulators, BJT characteristics and BJT amplifiers; experiments using operational amplifiers (op-amps): summing amplifier, comparator, precision rectifier, as table and monostable multivibrators and oscillators;		