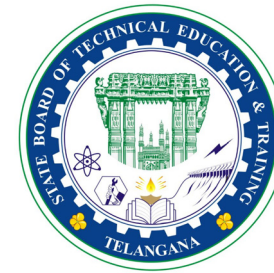

CURRICULUM – 2014

(C-14)

**DIPLOMA IN
APPLIED ELECTRONICS AND
INSTRUMENTATION ENGINEERING**

1



**State Board of Technical Education & Training
Telangana State
HYDERABAD**

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CURRICULUM (C-14) FOR DIPLOMA COURSES IN Telangana

I. PREAMBLE

The State Board of Technical Education and Training, **Telangana** under the aegis of the Department of Technical Education, Telangana generally reviews the Curricula once in every five years. However, recognizing the changing needs as stated by the user industries, the Board has decided to bring forward the revision of curriculum. Consequently, the Board with the assistance of NITTTR, Chennai under the guidance of Prof. C. Nagendra Rao, performed the evaluation of C-09 Curriculum in force. On finding the merits and demerits of C-09 Curriculum the faculty have made a thorough assessment of the curricular changes that have to be brought in. It was felt that there is an urgent need to improve hands-on experience among the students pursuing diploma courses. Further, the urgency of enhancing communication skills in English was also highlighted in the feedback and suggestions made by the user industries. Keeping these in view, a number of meetings and deliberations were held at district and state level, with experts from industry, academia and senior faculty of the department. The new Curricula for the different diploma courses have been designed with the active participation of the members of the faculty teaching in the Polytechnics of Telangana, besides reviewed by Expert Committee constituted with eminent academicians.

The primary objective of the curricular change is to produce best technicians in the country by correlating growing needs of the industries with the academic input.

The revised New Curriculum i.e., Curriculum – 2014 or C-14 is vetted by NITTTR, Chennai followed by BoG approval of SBTET for its implementation with effect from 2014-15.

Salient Features:

1. Duration of course is either 3 years / 3½ years duration of Regular Academic Instruction.
2. The Curriculum is prepared in Semester Pattern. However, First Year is maintained as Year-wise pattern.
3. The policy decisions taken at the State and Central level with regard to environmental science are implemented by including relevant topics in

Chemistry. This is also in accordance with the Supreme Court guidelines issued in Sri Mehta's case.

4. Keeping in view the increased need of communication skills which is playing a major role in the success of Diploma Level students in the Industries, emphasis is given for learning and acquiring listening, speaking, reading and writing skills in English. Further as emphasized in the meetings, Communication Skills lab and Life Skills lab are introduced in IV and V semesters respectively for all the branches except Chemical Engineering and Chemical Engineering (Sugar Technology) for which life skills is introduced at 3rd semester level..
5. In addition to Engineering Mathematics in I year (Mathematics -102) and III semester (Mathematics-301), Mathematics-401 has been introduced in the IV semester of present syllabus.
6. Modern topics relevant to the needs of the industry and global scenario suitable to be taught at Diploma level are also incorporated in the curriculum.
7. CAD specific to the branch has been given more emphasis in the curriculum. Preparing drawings using CAD software has been given more importance.
8. Every student is exposed to the computer lab at the 1st year itself in order to familiarize himself with skills required for keyboard/mouse operation, internet usage and e-mailing.
9. The number of teaching hours allotted to a particular topic/chapter has been rationalized keeping in view the past experience
10. Upon reviewing the existing C-09 curriculum, it is found that the theory content is found to have more weightage than the Practical content. In the revised C-14 curriculum, more emphasis is given to the practical content of Laboratories and Workshops, thus strengthening the practical skills.
11. With increased emphasis for the student to acquire Practical skills, the course content in all the subjects is thoroughly reviewed and structured as outcome based than the conventional procedure based. While the course content in certain subjects is reduced, in rest of the subjects the content has been enhanced as per the need.
12. A new subject "**Field Practices**" is introduced in 5th Semester. In Field Practices, the students will perform all the industry oriented activities for all types of Field tastings and make use of the machinery, equipment and tools actually used in the industry. By this, the student will get first-

hand experience of performing various practical procedures and field experiments to enhance their skills.

13. All Practical subjects are independent of each other and the practice of grouping two or more practical subjects is dispensed with.
14. Curriculae of Laboratory and Workshops have been thoroughly revised based on the suggestions received from the industry and faculty, for better utilization of the equipment available at the Polytechnics. The experiments /exercises that are chosen for the practical sessions are identified to conform to the field requirements of industry.
15. The Members of the working group are grateful to Sri Ajay Jain, I.A.S., Commissioner of Technical Education & Chairman, S.B.T.E.T. and Smt.Sailaja Ramaiyer, I.A.S., for their guidance and valuable inputs in revising, modifying and updating the curriculum.
16. The Members acknowledge with thanks the cooperation and guidance provided by the Sri. D. Venkateswarlu, Secretary, SBTET, Telangana and Dr. CN Rao, Professor and Head, NITTTR, ECH and other officials of Directorate of Technical Education and the State Board of Technical Education, Telangana, experts from industry, academia from the universities and higher learning institutions and all teaching fraternity from the Polytechnics who are directly and indirectly involved in preparation of the curricula.

II. RULES AND REGULATIONS

1. ADMISSION PROCEDURES :

1.1 DURATION AND PATTERN OF THE COURSES

All the Diploma programs run at various institutions are of AICTE approved 3 years or 3½ years duration of Academic Instruction.

All the Diploma courses are run on year wise pattern in the First year, and the remaining two or two & half years are run in the semester pattern. In respect of few courses like Diploma in Electronics with specialization in CP/ CN/ IE/ TV/ BM/ Embedded systems, the training will be in the seventh semester.

1.2 PROCEDURE FOR ADMISSION INTO THE DIPLOMA COURSES:

Selection of candidates is governed by the Rules and regulations laid down in this regard from time to time.

- i) Candidates who wish to seek admission in any of the Diploma courses will have to appear for Common Entrance Test for admissions into Polytechnics (POLYCET) conducted by the State Board of Technical Education and Training, Telangana, Hyderabad.

Only the candidates satisfying the following requirements will be eligible to appear for the Common Entrance Test for admissions into Polytechnics (POLYCET).

- a) The candidates seeking admission should have appeared for the X class examination, conducted by the Board of Secondary Examination, Telangana or equivalent examination thereto, at the time of making application to the Common Entrance Test for Polytechnics for admissions into Polytechnics (POLYCET). In case of candidates who apply pending results of their qualifying examinations, their selection shall be subject to production of proof of their passing the qualifying examination in one attempt or compartmentally at the time of interview for admission.
- b) Admissions are made based on the merit obtained in the Common Entrance Test (POLYCET) and the reservation rules stipulated by the Government of Telangana from time to time.
- c) For admission into the following Diploma Courses for which entry qualification is 10+2, candidates need not appear for POLYCET. A separate notification will be issued for admission into these courses.

1). D.H.M.C.T. 2). D.Pharmacy

1.3 MEDIUM OF INSTRUCTION

The medium of instruction and examination shall be English.

1.4 PERMANENT IDENTIFICATION NUMBER (PIN)

A cumulative / academic record is to be maintained of the Marks secured in sessional work and end examination of each year for determining the eligibility for promotion etc., a Permanent Identification Number (PIN) will be allotted to each candidate so as to facilitate this work and avoid errors in tabulation of results.

1.5 NUMBER OF WORKING DAYS PER SEMESTER / YEAR:

- a). The Academic year for all the Courses usually shall be from Fifteenth June of the year of admission to the 31st March of the succeeding year.
- b). The Working days in a week shall be from Monday to Saturday
- c). There shall be 7 periods of 50 minutes duration on all working days.
- d). The minimum number of working days for each semester / year shall be 90 / 180 days excluding examination days. If this prescribed minimum is not achieved due to any reason, special arrangements shall be made to conduct classes to cover the syllabus.

1.6 ELIGIBILITY OF ATTENDANCE TO APPEAR FOR THE END EXAMINATION

- a). A candidate shall be permitted to appear for the end examination in all subjects, if he or she has attended a minimum of 75% of working days during the year/Semester.
- b). Condonation of shortage of attendance in aggregate upto 10% (65% and above and below 75%) in each semester or 1st year may be granted on medical grounds.
- c). Candidates having less than 65% attendance shall be detained.
- d). Students whose shortage of attendance is not condoned in any semester / 1st year are not eligible to take their end examination of that class and their admissions shall stand cancelled. They may seek re-admission for that semester / 1st year when offered next.
- e). A stipulated fee shall be payable towards condonation for shortage of attendance.

1.7 READMISSION

Readmission shall be granted to eligible candidates by the respective RJD / Principal.

- 1) Within 15 days after commencement of class work in any semester (Except industrial Training).
- 2) Within 30 days after commencement of class work in any year (including D. Pharmacy course or first year course in Engineering and Non Engineering Diploma streams).

Otherwise such cases shall not be considered for readmission for that semester / year and are advised to seek readmission in the next subsequent eligible academic year.

The percentage of attendance of the readmitted candidates shall be calculated from the first day of beginning of the regular class work for that year / Semester, as officially announced by CTE/SBTET but not from the day on which he/she has actually reported to the class work, after readmission is granted.

2. SCHEME OF EXAMINATION**2.1 a) First Year**

THEORY EXAMINATION: Each Subject carries 80% marks with examination of 3 hours duration, along with 20% marks for internal evaluation. (Sessional marks). However, there are no minimum marks prescribed for sessionals.

PRACTICAL EXAMINATION: There shall be 40% Marks for regular practical work done, i.e. sessional marks for each practical subject with an end examination of 3 hours duration carrying 60% marks. However, there are no minimum marks prescribed for sessionals.

b) III, IV, V and VI Semesters:

THEORY EXAMINATION: Each subject carries usually 80 marks and 40 marks in respect of specified subjects of 3hours duration, along with 20/ 10 marks for internal evaluation (sessional marks) respectively.

PRACTICAL EXAMINATION: Each subject carry 30/60 marks of 3hours duration 20/40 sessional marks.

2.2 INTERNAL ASSESSMENT SCHEME

- a) Theory Subjects: Theory Subjects carry 20 % sessional marks, Internal examinations will be conducted for awarding sessional marks on the dates specified. **Three unit tests will be conducted for I year students**

and two Unit Tests for semesters. Average of marks obtained in all the prescribed tests will be considered for awarding the sessional marks.

- b) Practicals: Student's performance in Laboratories / Workshop shall be assessed during the year of study for 40% marks in each practical subject. Allotment of marks should be discrete taking into consideration of the students skills, accuracy, recording and performance of the task assigned to him / her. Each student has to write a record / log book for assessment purpose. In the subject of Drawing, which is also considered as a practical paper, the same rules hold good. Drawing exercises are to be filed in seriatum.
- c) Internal assessment in Labs / workshops / Survey field etc., during the course of study shall be done and sessional marks shall be awarded by the concerned Lecturer / Senior Lecturer / Workshop superintendent as the case may be.
- d) For practical examinations, except in drawing, there shall be two examiners. External examiner shall be appointed by the Principal in consultation with respective head of the department preferably choosing a person from an Industry. Internal examiner shall be the person concerned with internal assessment as in (c) above. The end examination shall be held along with all theory papers in respect of drawing.
- e) Question Paper for Practicals: Question paper should cover all the experiments / exercise prescribed.
- f) Records pertaining to internal assessment marks of both theory and practical subjects are to be maintained for official inspection.
- g) **In case of Diploma courses having Industrial Training**, the training assessment shall be done and marks be awarded in the following manner.

Industrial assessment	:	200 marks (in two spells of 100 marks each)
Maintenance of log book	:	30 marks
Record Work	:	30 marks
Seminar / viva-voce	:	40 marks

TOTAL	:	300 marks

The assessment at the institute level will be done by a minimum of three members Internal Faculty, Industrial Experts and H.O.D. and be averaged.

- h) In case of Diploma courses **not having Industrial Training** in the curriculum, the students shall make **Industrial visits** as per the schedule given below:

S.No	Semester	Nature of Training/Exposure	Duration
1	III Semester	Industrial Visits	5 no. (One week)
2	IV Semester	Industrial Visits	5 no. (One week)
3	End of Semester Vacation of IV Semester	Industrial Training	4 Weeks
4	V Semester	Industrial Visits	5 no. (one Week)
		Simulated Industrial Training (Field Practices)	3 Weeks
5	VI Semester	Industrial Visits	5 no. (one Week)
Total			11 Weeks

NOTE: No Marks shall be awarded for the above industrial visits. However, it will be evaluated as satisfactory/unsatisfactory.

2.3 MINIMUM PASS MARKS

THEORY EXAMINATION:

For passing a theory subject, a candidate has to secure a minimum of 35% in end examination and a combined minimum of 35% of both Sessional and end examination marks put together.

PRACTICAL EXAMINATION:

For passing a practical subject, a candidate has to secure, a minimum of 50% in end examination and a combined minimum of 50% of both sessional and practical examination marks put together. In case of D.C.C.P., the pass mark for typewriting and short hand is 45% in the end examination. There are no sessional marks for typewriting and Shorthand subjects of D.C.C.P course.

2.4 PROVISION FOR IMPROVEMENT

- Improvement is allowed only after he / she has completed all the subjects from First Year to Final semester of the Diploma.
- Improvement is allowed in any 4 (Four) subjects of the Diploma.
- The student can avail of this improvement chance only once, that too within the succeeding two examinations after the completion of Diploma, with the condition that the duration including Improvement examination shall not exceed FIVE years from the first admission.

- No improvement is allowed in Practical / Lab subjects or Project work or Industrial Training assessment. However, improvement is allowed in drawing subject.
- If improvement is not achieved, the marks obtained in previous Examinations hold good.
- Improvement is not allowed in respect of the candidates who are punished under Mal-practice in any Examination.
- Examination fee for improvement shall be paid as per the notification issued by State Board of Technical Education and Training from time to time.
- All the candidates who wish to appear for improvement of performance shall deposit the original Marks Memos of all the years / Semesters and also original Diploma Certificate to the Board. If there is improvement in performance of the current examination, the revised Memorandum of marks and Original Diploma Certificate will be issued else the submitted originals will be returned.

3 RULES OF PROMOTION TO NEXT LEVEL :

3.1 For Diploma Courses (Except HMCT, Architecture, Chemical-Sugar & Auto mobile Engineering) From 1ST YEAR TO 3rd, 4th, 5th, 6th and 7th Semesters:

- A candidate shall be permitted to appear for first year examination provided he / she puts in 75% attendance and pays the examination fee. However, he/she can be condoned on Medical grounds upto 10% (i.e. attendance after condonation on Medical grounds should not be less than 65%) and he/she has to pay the condonation fee along with examination fee.
- A candidate shall be promoted to 3rd semester if he/she puts the required percentage of attendance in the first year and pays the examination fee. A candidate who could not pay the first year examination fee has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 3rd semester.
- A candidate shall be promoted to 4th semester provided he/she puts the required percentage of attendance in the 3rd semester and pays the examination fee. A candidate who could not pay the 3rd semester exam fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 4th semester.

A candidate is eligible to appear for the 4th semester exam if he/she

- i) Puts the required percentage of attendance in the 4th semester
 - ii) Should not have failed in more than Four backlog subjects of 1st year
4. A candidate shall be promoted to 5th semester provided he / she puts the required percentage of attendance in the 4th semester and pays the examination fee on fulfilment of 3(i)(ii) clauses stated above. A candidate, who could not pay the 4th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 5th semester.
- A candidate is eligible to appear for the 5th semester exam if he/she
- i) Puts the required percentage of attendance in the 5th semester
 - ii) Should have obtained eligibility to appear for 4th Semester examination.

For IVC students.

- i) Puts the required percentage of attendance in the 5th semester
 - ii) Should have appeared for 4th Semester examination.
 - iii) Should not have failed in more than Four backlog subjects of III Semester
5. A candidate shall be promoted to 6th semester provided he/she has puts the required percentage of attendance in the 5th semester and pay the examination fee, a candidate who could not pay the 5th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 6th semester.
- A candidate is eligible to appear for 6th semester examination if he/she
- i) Puts the required percentage of attendance in 6th semester and
 - ii) Should not have failed in more than six backlogs subjects of 1st year, 3rd & 4th semesters put together.

For IVC students.

- i) Puts the required percentage of attendance in the 6th semester
- ii) Should have obtained eligibility to appear for V semester examination.
- iii) Should not have failed in more than Six backlog subjects of III & IV Semester put together.

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3.2 For HMCT, Architecture and Chemical - Sugar courses

- 1) The same rules are applicable on par with other diploma courses with the exception that the Industrial Training is in the 5th semester.
 - 2) A candidate shall be promoted to 5th semester (Industrial Training) provided he/she puts the required percentage of attendance in the 4th semester and pay the examination fee. A candidate, who could not pay the 4th semester examination fee, has to pay the promotion fee as prescribed by the SBTET from time to time before commencement of 5th semester (Industrial Training).
 - 3) A candidate shall be promoted to 6th semester of the course provided he/she has successfully completed the Industrial Training (Passed).
- A candidate is eligible to appear for the 6th semester examination if he/she
- (i) Puts the required percentage of attendance in 6th semester.
 - (ii) Should not have failed in more than six backlog subjects of 1st Year, 3rd & 4th semesters put together.

For IVC students

- i) Puts the required percentage of attendance in the 6th semester
- ii) Should have completed the Industrial Training.
- iii) Should not have failed in more than Six backlog subjects of III & IV Semester put together.

3.3 For Automobile Engineering Course

The same rules are applicable on par with other diploma courses with the exception that the Industrial Training is in the 6th semester. A Candidate shall be promoted to 6th semester provided he/she puts the required percentage of attendance in 5th semester and pay the examination fee. A candidate, who could not pay the 5th semester examination fee, has to pay the promotion fee prescribed by SBTET from time to time before commencement of 6th semester (Industrial Training).

Or

The Automobile Engineering Industrial Training may be shifted to 5th semester on par with **HMCT/ARCH/CH (ST)**

3.4 For Diploma Courses of 3 ½ Years duration:

3.4.1 MET/ CH/ CHPP/ CHPC/ CHOT/ TT

1. A candidate shall be permitted to appear for 1st year examination provided he / she puts in 75% attendance (which can be condoned on Medical grounds upto 10%) i.e. attendance after condonation on Medical grounds should not be less than 65% and pay the examination fee.
2. A candidate shall be promoted to 3rd semester if he/she puts the required percentage of attendance in the 1st year and pays the examination fee. A candidate who could not pay the 1st year examination fee has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 3rd semester.
3. A candidate shall be promoted to 4th semester provided he/she puts the required percentage of attendance in the 3rd semester and pay the examination fee. A candidate, who could not pay the 3rd semester exam fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 4th semester.
A candidate is eligible to appear for the 4th semester exam if he/she
 - i) Puts the required percentage of attendance in the 4th semester
 - ii) Should not have failed in more than Four backlog subjects of 1st year.
4. A candidate shall be promoted to 5th semester provided he / she puts the required percentage of attendance in the 4th semester and pays the examination fee. A candidate, who could not pay the 4th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 5th semester.
5. Promotion from 5th to 6th semester is automatic (i.e., from 1st spell of Industrial Training to 2nd spell) provided he/she puts the required percentage of attendance, which in this case would be 90 % attendance and attends for the VIVA-VOCE examination at the end of training.
6. A candidate shall be promoted to 7th semester of the course provided he/she has successfully completed both the spells of Industrial Training (Passed).
A candidate is eligible to appear for 7th semester examination if he/she
 - i) Puts the required percentage of attendance in the 7th semester and
 - ii) Should not have failed in more than 6 backlog subjects of 1st year, 3rd and 4th semesters put together.

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- iii) Should not have failed in more than six backlog subjects of 3rd and 4th semester put together for IVC students.

3.4.2 For Diploma Courses of 3 ½ Years duration:

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- i) In respect of Diploma in Footwear Technology, the Industrial training is offered in two spells, the 1st spell of Industrial training after the First Year (i.e. III semester of the course) and the second spell of industrial training after the V semester (i.e VI Semester of the course). The promotion rules for this course are on par with the other sandwich Diploma courses except that there is no restriction on number of backlog subjects to get eligibility to appear for the 4th semester examination and ,
A candidate is eligible to appear for 5th semester examination if he/she
 1. Puts the required percentage of attendance in the 5th semester and
 2. Should not have failed in more than four subjects of 1st year.
- ii) A candidate shall be promoted to 7th semester of the course provided he/she has successfully completed second spell of Industrial Training (Passed).
A candidate is eligible to appear for 7th semester examination if he/she
 1. Puts the required percentage of attendance in the 7th semester and
 2. Should not have failed in more than 6 backlog subjects of 1st year and 4th semesters put together.
 3. Should not have failed in more than six backlog subjects of 4th and 5th semester
put together for IVC students.

3.4.3 For Diploma Courses of 3 ½ Years duration:

BM

- The same rules as are applicable for conventional courses also apply for these courses. Since the industrial training in respect of these courses is restricted to one semester (6 months) after the 6th semester (3 years) of the course.
- A candidate shall be promoted to 7th semester provided he/she puts the required percentage of attendance in 6th semester and pay the examination fee. A candidate, who could not pay the 6th semester examination fee, has to pay the promotion fee prescribed by SBTET

from time to time before commencement of the 7th semester (Industrial Training).

OR

Run through system for 1st Year and 3rd semester to 6/7th semester provided that the student puts in 75% of attendance (which can be condoned on medical grounds upto 10%) i.e. attendance after condonation on medical grounds should not be less than 65%.

3.5 OTHER DETAILS

- In case a candidate does not successfully complete the Industrial training, he / she will have to repeat the training at his / her own cost.
- The I spell of Industrial training shall commence 10 days after the completion of the last theory examination of 4th Semester.
- The Second spell of Industrial training shall commence within 10 days after the completion of I spell of Industrial training.
- Each Semester of Institutional study shall be a minimum of 90 working days. (With 6 working days in a week i.e. from Monday to Saturday, with 7 periods of 50 minutes, duration per day.

4 STUDENTS PERFORMANCE EVALUATION

4.1 AWARD OF DIPLOMA

Successful candidates shall be awarded the Diploma under the following divisions of pass.

- First Class with Distinction shall be awarded to the candidates who secure an overall aggregate of 75% marks and above.
- First Class shall be awarded to candidates who secure overall aggregate of 60% marks and above and below 75% marks.
- Second Class shall be awarded to candidates who secure a pass with an overall aggregate of below 60%.

The Weightage of marks for various year/Semesters which are taken for computing overall aggregate shall be 25% of I year marks + 100% of 3rd and subsequent Semesters.

With respect to the intermediate vocational candidates who are admitted directly into diploma course at the 3rd semester (i.e., second year) level the aggregate of (100%) marks secured at the 3rd and subsequent semesters of study shall alone be taken into consideration for

determining the overall percentage of marks secured by the candidates for award of class/division.

- Second Class shall be awarded to all students, who fail to complete the Diploma in the regular three years and four subsequent examinations, from the first admission.

4.2 EXAMINATION FEE SCHEDULE:

The examination fee should be paid as per the notification issued by State Board of Technical Education and Training from time to time.

4.3 STRUCTURE OF END EXAMINATION QUESTION PAPER:

The question paper for theory examination is patterned in such a manner that the Weightage of periods/marks allotted for each of the topics for a particular subject be considered.

Examination paper is of 3/6/9 hour's duration.

- Each theory paper consists of Section 'A' and Section 'B'. Section 'A' contains 10 short answer questions. All questions are to be answered and each carries 3 marks Max. Marks: 10 x 3 = 30.

Section B contains 8 essay type questions including Numerical questions, out of which 5 questions each carrying 10 marks are to be answered.

Max.Marks: 5 x 10 = 50.

Total Maximum Marks: 80.

- For Engineering Drawing Subject (107) consist of section 'A' and section 'B'. Section 'A' contains four (4) questions. All questions in section 'A' are to be answered and each carries 5 marks. Max. Marks: 4 x 5=20. Section 'B' contains six (6) questions. Out of which four (4) questions to be answered and each question carries 10 Marks. Max. Marks 4 x 10 = 40.

Practical Examinations

For Workshop practice and Laboratory Examinations,

Each student has to pick up a question paper distributed by Lottery System.

Max. Marks for an experiment / exercise : 50%

Max. Marks for VIVA-VOCE : 10%

Total : 60%

In case of practical examinations with 50 marks, the marks will be worked out basing on the above ratio.

In case of any change in the pattern of question paper, the same shall be informed sufficiently in advance to the candidates.

4.4 ISSUE OF MEMORANDUM OF MARKS

All candidates who appear for the end examination will be issued memorandum of marks without any payment of fee. However candidates who lose the original memorandum of marks have to pay the prescribed fee to the Secretary, State Board of Technical Education and Training, Telangana. for each duplicate memo.

4.5 MAXIMUM PERIOD FOR COMPLETION OF DIPLOMA COURSES:

Maximum period for completion of the course is twice the duration of the course from the date of First admission (includes the period of detention and discontinuation of studies by student etc) failing which they will have to forfeit the claim for qualifying for the award of Diploma (They will not be permitted to appear for examinations after that date). This rule applies for all Diploma courses of 3 years and 3 ½ years of engineering and non-engineering courses.

4.6 ELIGIBILITY FOR AWARD OF DIPLOMA

A candidate is eligible for award of Diploma Certificate if he / she fulfils the following academic regulations.

- i. He / She pursued a course of study for not less than 3 / 3 ½ academic years & not more than 6 / 7 academic years.
- ii. He / she has completed all the subjects.

Students who fail to fulfill all the academic requirements for the award of the Diploma within 6 / 7 academic years from the year of admission shall forfeit their seat in the course & their seat shall stand cancelled.

4.7 RECOUNTING, ISSUE OF PHOTO COPY OF VALUED ANSWER SCRIPT & REVERIFICATION:

- 4.7.1 a) A candidate desirous of applying for Recounting/ issue of Photo copy of valued answer scripts/ Reverification should submit the application to the Secretary, State Board of Technical Education and Training, Telangana., Hyderabad – 500 063 within 15 days from the date

of receipt of Tabulated Marks Statement by the Principal of concerned Polytechnic or the date specified.

Recounting shall be done for any TWO theory subjects per Year/Semester only, including drawing subjects. No request for recounting shall be entertained from any candidate who is reported to have resorted to Malpractice in that examination. The fee prescribed for Recounting should be paid by way of Demand Draft drawn on any Scheduled Bank payable at Hyderabad in favour of the Secretary, State Board of Technical Education and Training, Telangana., Hyderabad. The verification of the totaling will be done by an Officer of the Board and will be intimated to the candidate by post only.

The following documents should be invariably be enclosed with the application failing which the application will not be considered.

1. Marks secured as per Tabulated Marks Sheet certified by the Principal.
2. Demand draft towards the payment of fee
3. Self – addressed and stamped envelopes of 11" X 5" size.

The applications received after the prescribed date will not be accepted and any correspondence in this regard will not be entertained.

4.7.2 FOR ISSUE OF PHOTO COPIES OF VALUED ANSWER SCRIPTS

1. A candidate desirous of applying for Photo copy of valued answer script/ scripts should submit the application to the Secretary, State Board of Technical Education and Training, Telangana., Hyderabad – 500 063 along with the required fee in the form of Demand Draft within 07 days from the date of receipt of Tabulated Marks Statement by the Principal of concerned Polytechnic or the date specified in the covering letter whichever is earlier.
2. Photo copies of valued answer scripts will be issued to all theory subjects including drawing subjects.
3. The following documents should invariably be enclosed with the application
 - (1) Marks secured as per Tabulated Marks Sheets certified by the Principal
 - (2) Self-addressed Stamped Envelope/Cloth-line cover of size 10" x 14".
 - (3) Fee in the form of Demand Draft

4.7.3 FOR RE-VERIFICATION OF THE VALUED ANSWER SCRIPT

1. A candidate desirous of applying for Re-verification of valued answer script should submit the application to the Secretary, State Board of Technical Education and Training, Telangana., Hyderabad – 500 063 along with the required fee in the form of Demand Draft, within 15 days from declaration of result.
2. Re-verification of valued answer script shall be done for all theory subjects including drawing subjects.
3. The following documents should invariably be enclosed with the application failing which the application will not be considered.
 - (i) Marks secured as per Tabulated Marks Sheets certified by the Principal.
 - (ii) Fee in the form of Demand Draft.

4.7.4 MALPRACTICE CASES:

If any candidate resorts to any Mal Practice during examinations, he / she shall be booked and the Punishment shall be awarded as per rules and regulations framed by SBTET from time to time.

4.7.5 DISCREPANCIES/ PLEAS:

Any Discrepancy /Pleas regarding results etc., shall be represented to the Board within one month from the date of issue of results. Thereafter, no such cases shall be entertained in any manner.

5 ISSUE OF CERTIFICATES AND VETO

5.1. ISSUE OF DUPLICATE DIPLOMA

If a candidate loses his/her original Diploma Certificate and desires a duplicate to be issued he/she should produce written evidence to this effect. He / she may obtain a duplicate from the Secretary, State Board of Technical Education and Training, Telangana on payment of prescribed fee and on production of an affidavit signed before a First Class Magistrate (Judicial) and *non-traceable certificate* from the Department of Police. In case of damage of original Diploma Certificate, he / she may obtain a duplicate certificate by surrendering the original damaged certificate on payment of prescribed fee to the State Board of Technical Education and Training.

In case the candidate cannot collect the original Diploma within 1 year from the date of issue of the certificate, the candidate has to pay the penalty prescribed by the SBTET from time to time.

5.2 ISSUE OF MIGRATION CERTIFICATE AND TRANSCRIPTS:

The Board on payment of prescribed fee will issue these certificates for the candidates who intend to prosecute Higher Studies in India or Abroad.

5.3 GENERAL

- i. The Board may change or amend the academic rules and regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students, for whom it is intended, with effect from the dates notified by the competent authority.
- ii. All legal matters pertaining to the State Board of Technical Education and Training are within the jurisdiction of Hyderabad.
- iii. In case of any ambiguity in the interpretation of the above rules, the decision of the Secretary, SBTET is final.

V Semester

DIPLOMA IN APPLIED ELECTRONICS AND INSTRUMENTATION ENGINEERING

SCHEME OF INSTRUCTIONS AND EXAMINATIONS V Semester

Subject Code	Name of the Subject	Instruction period / week		Total Period / Sem	Scheme of Examination			
		Theory	Practical/ Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
THEORY:								
AEI-501	Industrial Safety & Quality Control	4	-	60	3	20	80	100
AEI-502	Process Control	5	-	75	3	20	80	100
AEI-503	Linear Integrated Circuits & Applications	4	-	60	3	20	80	100
AEI-504	Micro Controllers & Applications	5	-	75	3	20	80	100
AEI-505	Analytical Instrumentation	4	-	60	3	20	80	100
PRACTICAL								
AEI-506	Process Control Lab Practice	-	3	45	3	40	60	100
AEI-507	Micro Controllers Lab Practice	-	3	45	3	40	60	100
AEI-508	Life skills	-	3	45	3	40	60	100
AEI-509	LIC & CAD Lab Practice	-	4	60	3	40	60	100
AEI-510	Field Practice	-	7	105	3	40	60	100
TOTAL		22	20	630	-	300	700	1000

INDUSTRIAL SAFETY AND QUALITY CONTROL

Subject Title : INDUSTRIAL SAFETY AND QUALITY CONTROL

Subject Code : AEI-501

Periods/Week : 04

Periods/Semester : 60

TIME SCHEDULE

Sl. No.	Major Topics	No. of Periods	Weightage of marks	Short Questions	Essay Questions
1	Safety Management	10	16	2	1
2	Safety procedures	15	26	2	2
3	Safety performance	20	29	3	2
4	Product Testing	10	26	2	2
5	Documentation	05	13	1	1
	Total	60	110	10	8

100

OBJECTIVES:

On completion of the study of the subject a student should be able to

1.0 Understand Safety management

- 1.1 Give the importance of safety management in industries.
- 1.2 Explain the Occupational health and safety policy
- 1.3 Explain the steps to be followed in planning of safety
- 1.4 Explain the role of Safety Management representative
- 1.5 Explain the role of Safety committees
- 1.6 List the various methods of safety management

2.0 Understand Safety procedures

- 2.1 List the safety procedures
- 2.2 Explain about safety operations to be performed in the industry
- 2.3 Explain about the maintenance procedures

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- 2.4 List the general hazardous materials in industry.
- 2.5 Mention the hazardous areas in industry.
- 2.6 Explain the safety procedures pertaining to the storage of hazardous substances
- 2.7 Explain the safety procedures pertaining to the hazardous areas in industry.
- 2.8 Explain about the practical and effective safety performance measures.
- 2.9 Explain how to compute the injury rates
- 3.0 Understand Safety performance**
- 3.1 Give the importance of safety performance.
- 3.2 Explain the procedures in training of employees on safety
- 3.3 Explain the causes of an accident
- 3.4 Distinguish between accident and injury
- 3.5 Explain the role of the safety professional in prevention of accidents
- 3.6 Explain occupational health and Industrial hygiene
- 3.7 List the steps involved in emergency preparedness programs and plans
- 4.0 Understand Product Testing**
- 4.1 Explain the importance of product testing
- 4.2 List the various testing methods of electronic components
- 4.3 Explain about environmental product testing
- 4.4 Explain about Dry heat testing
- 4.5 Explain about Vibration testing
- 4.6 Explain about random testing
- 4.7 Explain EMI and EMC compliance testing standardization
- 4.8 Explain the various standardization methods used in the industrial electronic production.
- 5.0 Understand Documentation**
- 5.1 Explain the importance of documentation
- 5.2 List the types of documentation
- 5.3 List the rules of effective documentation
- 5.4 Explain the documentation pertaining to product assembling unit
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- 5.5 Explain the process of preparing a manual service document, test reports etc.
- 5.6 Explain product documentation bill of materials and product test specifications.

COURSE CONTENTS

1. **SAFETY MANAGEMENT:** Introduction to safety management, Occupational health and safety policy, Planning, safety committees, safety management, safety audit
2. **SAFETY PROCEDURES:** Introduction, safety procedures, safety operations, maintenance procedures, procedures pertaining to the storage of hazardous substances, effective safety performance measures, Computation of injury rates.
3. **SAFETY PERFORMANCE:** Introduction to safety performance, Training of Employees, Incident, accident, Incident Vs Accident, Role of safety personnel in prevention of accidents, Occupation health and Industrial hygiene, emergency preparedness programmes and plans
4. **PRODUCT TESTING:** Introduction to Product testing, Environmental testing, dry heat, vibration, random testing, EMI and EMC compliance testing ,standardisation
5. **DOCUMENTATION:** Importance of documentation, Assembly and fabrication documentation, Rules for documentation, user manual, service manual, Product test specifications.

Reference Books:

- 1) Industry safety Management- L. M Desmukh, Tata Mc Graw Hill 2006.
- 2) Heinrich H.W 'Industrial Accident Prevention Tata Mc Graw-Hill, 1959.
- 3) Peterson, D Techniques of Safety Management McGraw Hill,

PROCESS CONTROL**Subject Title : Process Control****Subject Code : AEI- 502****Periods/Week : 05****Periods/Semester : 75****TIME SCHEDULE**

Sl. No.	Major Topics	No. of Periods	Weight age of marks	Short Questions	Essay Questions
1	Process control	10	13	1	1
2	Controller principles	20	29	3	2
3	Final control elements	20	29	3	2
4	Advanced process Control systems	17	26	2	2
5	Process instrument diagrams and standards	08	13	1	1
	Total	75	110	10	8

OBJECTIVES: On completion of the study of the subject a student should be able to

comprehend the following

1.0 Understand process control

- 1.1 Define process control.
- 1.2 Explain an automatic process control with example.
- 1.3 Draw the block diagram of a process control loop.
- 1.4 Describe each element in a process control loop.
- 1.5 Explain batch process and continuous process.
- 1.6 Give the concept of controlled variable and manipulated variable with an example.
- 1.7 Explain a physical control system with block diagram.

- 1.8 Give the concept of control system objective.
- 1.9 List the requirements of control system objective.

2.0 Understand Controller principles

- 2.1 Define process load, process lag and self-regulation.
- 2.2 Define error, control lag, dead time, and cycling.
- 2.3 List the Discontinuous control modes.
- 2.4 Explain two positions control mode.
- 2.5 Explain multi position control mode.
- 2.6 Explain floating control mode.
- 2.7 List the continuous control modes.
- 2.8 Describe proportional control mode.
- 2.9 Define proportional band, and offset.
- 2.10 List the characteristics of proportional control mode.
- 2.11 Describe integral control mode.
- 2.12 List the characteristics of integral control mode.
- 2.13 Describe the derivative control mode.
- 2.14 List the characteristics of derivative control mode.
- 2.15 List the composite control modes.
- 2.16 Describe the Proportional-Integral Control mode.
- 2.17 List the characteristics of Proportional-Integral Control mode.
- 2.18 Describe PD control mode.
- 2.19 Describe PID control mode.
- 2.20 List advantages and disadvantages of PI, PD & PID controllers.
- 2.21 State the need for tuning of PID controllers.
- 2.22 List methods of tuning of PID controllers
- 2.23 Explain Ultimate gain method of tuning of PID controllers

3.0 Understand Final control Elements

- 3.1 Explain the principle of operation of final control element in a process with block diagram.

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- 3.2 State the need for electric to pressure and pressure to electric converters.
 - 3.3 Explain the working of Nozzle-Flapper system with a diagram.
 - 3.4 Explain the working of Electric to Pressure converter.
 - 3.5 Explain the working of Pressure to Electric converter.
 - 3.6 List the types of Actuators.
 - 3.7 Explain the principle of Pneumatic Actuator with diagram.
 - 3.8 Explain the principle of Hydraulic Actuator with diagram.
 - 3.9 Explain the working of Electro Pneumatic Actuator with diagram.
 - 3.10 Explain the working of Solenoid valve actuator
 - 3.11 Explain the working Stepper motor actuator
 - 3.12 Classification of Control valves.
 - 3.13 Explain the construction and working of Sliding stem control valve.
 - 3.14 Explain the construction and working of Single seat Plug Control valve
 - 3.15 Explain the construction and working of Rotating shaft Control valve
 - 3.16 Explain the construction and working of Butterfly control valve
 - 3.17 Give the Flow-Lift characteristics of control valves such as Quick opening, Linear, Equal percentage valves.

4.0 Understand Advanced process Control systems

- 4.1 Define single loop control system
- 4.2 Explain the following control system configuration.
 - a) Single variable control system.
 - (i) Independent single variable control system
 - (ii) Interactive single variable control system
 - b) Compound variable control system and
 - c) Multivariable control system
- 4.3 Define cascade control system
- 4.4 Explain the block diagram of cascade control system.
- 4.5 Mention the merits of cascade control system over single loop control system
- 4.6 Give examples for i) Cascade control ii) Single loop control system

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- 4.7 Justify how the cascade control system is better than single loop control system with an example.
 - 4.8 List the applications of cascade control system.
 - 4.9 Explain feed forward control system with block diagram.
 - 4.10 Distinguish between feedback and feed forward control systems.
 - 4.11 Explain the operation of Ratio control with a diagram.
 - 4.12 List the applications of Ratio control system.
 - 4.13 Define Adaptive control.
 - 4.14 Explain programmed adaptive control system with block diagram.
 - 4.15 Explain self – adaptive control system with block diagram.
 - 4.16 List the applications of adaptive control system.

5.0 Understand the process line diagrams, Symbols and standards

- 5.1 Give the importance of process line diagrams and symbols in process control.
- 5.2 Explain the representation of following in a process using line diagrams.
 - a) Process line, connection to process or instrument supply
 - b) Fluid pressure Line.
 - c) Electric signal
 - d) Pneumatic signal
 - e) Hydraulic signal
 - f) Capillary tube.
 - g) Electromagnetic or Sonic signal (guided and not guided).
 - h) Undefined signal.
 - i) Mechanical link
 - j) Internal system link (software or data link or computer signal)
 - k) Orifice installed line.
 - l) Point of measurement
- 5.3 Explain the representation of following controllers and transmitters using symbols.

- (a) Pressure transmitter
 (b) Flow Transmitter
 (c) Level Transmitter
 (d) Temperature Transmitter
 (e) Pressure Controller
 (f) Flow Controller
 (g) Level Controller
 (h) Temperature Controller
- 5.4 Explain the representation of following control valves using symbols.
- (a) Hydraulically operated control valve
 (b) Pneumatically operated control valve
 (c) Electrically operated control valve
 (d) Butterfly valve
 (e) Solenoid Valve
 (f) Gate valve
 (g) Gate valve-hand operated
 (h) Globe Valve
 (i) Globe valve- hand operated
- 5.5 Explain the representation of following general instruments by Balloon symbols
- (a) Instrument at locally mounted
 (b) Instrument at control centre
 (c) Instrument- bi-functional /two services
 (d) Instrument-transmitting type
- 5.6 Define piping and instrumentation diagram (P&I diagram).
- 5.7 Give simple application oriented P & I diagram.
- 5.8 Explain the use of letter codes for identification of instruments.
- 5.9 Explain different standards used in Instrumentation.
- a) ISI
 b) ANSI

- c) BS
 d) ISA
 e) DIN

COURSE CONTENTS

1. Process control:

Process control principle-process control block diagram –typical control variables-controlled variable, manipulated variable- Continuous and Batch process

2. Controller principles: - process characteristics –process load – process lag-self regulation-control system parameters: - error-control lag-dead time - cycling.

Controller modes–discontinuous-two-position, multi-position, floating, continuous control modes: - proportional, integral, derivative control mode. Composite control modes: - PI, PD and PID-Controller. tuning methods-Ultimate gain method and process reaction curve method.

3. Final control elements: -P/I and I/P converters- Different types of the Actuators: -Pneumatic, Hydraulic, Electro pneumatic,Actuators-different types of control valves.

4. Advanced process Control systems: - single loop control system-Single variable – compound variable. Multivariable control systems–cascade control–feed forward control-ratio controls– adaptive control systems.

5. Process instrumentation diagrams and standards: Line diagrams- Definition of P & I diagrams- Use of letter code of identification of Instruments-Introduction to standards that are widely used in instrumentation Viz., ISI, ANSI, BIS, ISA

REFERENCE BOOKS

- Automatic process control by Donald.P.Eckmann
- Instrument Engineers Hand book by Liptak, Volume II
- Instrument Technology by B.E.Jones, Volume I, II, III
- Process Analysis & Control by Coughnour.
- Process control instrumentation technology by Curtis .D.Johnson Seventh edition
- Process Control by D.Patranabis
- Chemical Process Control by George stephanopoulos

LINEAR INTEGRATED CIRCUITS AND APPLICATIONS**SUBJECT NAME : LINEAR INTEGRATED CIRCUITS AND APPLICATIONS****SUBJECT CODE : AEI- 503****PERIODS/WEEK : 04****PERIODS/SEMESTER : 60****TIME SCHEDULE**

SI.No.	Major Topics	No. of Periods	Weightage of marks	Short Answer Questions	Essay Questions
1	Introduction to Operational amplifiers	15	26	2	2
2	Applications of Operational amplifiers	15	26	2	2
3	Active filters	10	16	2	1
4	Timer IC	10	21	2	1½
5	Special applications of OP AMPs	10	21	2	1½
	Total	60	110	10	8

OBJECTIVES**1.0 Understand the characteristics of operational amplifiers**

- 1.1 State the requirement of an operational amplifier.
- 1.2 Draw the circuit of differential amplifier.
- 1.3 Explain the operation of differential amplifier.
- 1.4 List the basic specifications of ideal operational amplifier.
- 1.5 Define A_V , Z_o , Z_i , BW input offset voltage, input offset current, input bias current and input resistance give typical values for an ideal operational amplifier.
- 1.6 Define C.M.R.R
- 1.7 State the need for high C.M.R.R
- 1.8 List the limitations of differential amplifier using discrete components.

- 1.9 Explain how an integrated operational amplifier circuit overcomes the limitations of discrete operational amplifier.
- 1.10 Draw and explain the block diagram/circuit of a typical integrated circuit operational amplifier.
- 1.11 Name the commonly used manufacturing methods of linear IC s.
- 1.12 Name and sketch different package styles of analog ICs.
- 1.13 Draw the pin diagrams of metal can package and dual-in-line package for a typical IC 741 or equivalent.
- 1.14 Define slew rate of operational amplifier.
- 1.15 Draw the schematic and pin diagram of operational amplifier.

2.0 Comprehend the basic applications of operational amplifiers

- 2.1 Describe the open loop operation of an operational amplifier.
- 2.2 Explain the effect of negative feedback on an amplifier.
- 2.3 Draw the circuits of i) inverting, ii) non inverting amplifiers ,iii) voltage follower.
- 2.4 Explain the operation of above circuits.(no derivations)
- 2.5 Draw the circuits of i) summing amplifier, ii) difference amplifier iii) integrator, iv) Differentiator circuits.
- 2.6 Explain the operation of above circuits.
- 2.7 Explain the circuit of i) current to voltage converter, ii) voltage to current converters.
- 2.8 Give Equations for output voltage of I/V and output current of V/I converters.
- 2.9 Mention the applications of I/V and V/I converters.
- 2.10 Define i) Instrumentation amplifier ii) Isolation amplifier
- 2.11 Explain the operation of Instrumentation amplifier
- 2.12 Explain the operation of isolation amplifier.
- 2.13 Mention the applications of Isolation amplifier.

3.0 Understand the active filter application of operational amplifier (No mathematical treatment)

- 3.1 Define electric filter

- 3.2 Mention the types of ideal filters
- 3.3 Define i) LPF ii)HPF, iii) BPF and iv) BSF filters
- 3.4 Draw the ideal and practical frequency response plots for a LPF, HPF
- 3.5 Draw the ideal and practical frequency response plots for a BPF,BSF.
- 3.6 List the limitations of passive filters.
- 3.7 List the merits of active filters.
- 3.8 Draw the circuits for LPF, HPF, and BPF using operational amplifiers.
- 3.9 Explain the operation of LPF filters using operational amplifier
- 3.10 Give the equation for output voltage and frequency
- 3.11 Explain the operation of HPF filters using operational amplifier
- 3.12 Give the equation for output voltage and frequency
- 3.13 Explain the operation of BPF filters using operational amplifier
- 3.14 Give the equation for output voltage and frequency
- 3.15 Mention the applications of above filter circuits in instrumentation.

4.0 Understand the operation and application of Timer IC

- 4.1 Draw the block diagram of 555 timer IC.
- 4.2 Explain the operation of various blocks of a 555 timer.
- 4.3 Give the pin diagram of 555 IC
- 4.4 Mention the function of each pin
- 4.5 Draw the circuits of for mono stable Multivibrator using 555 IC.
- 4.6 Explain the operation of mono stable Multivibrator using 555 IC
- 4.7 Give the equation for Timing (T_{on} and T_{off})
- 4.8 Draw the basic Astable multivibrator using timer.
- 4.9 Explain the operation of above circuit.
- 4.10 Give the formula for output frequency
- 4.11 Explain the use of 555IC to generate square wave using diodes.
- 4.12 Mention the applications of 555 Timer IC

5.0 Comprehend the special applications of operational amplifier

- 5.1 Draw the square wave generator using OP.AMP.
- 5.2 Explain the working of square wave generator using waveforms.
- 5.3 Draw the wien's bridge oscillator using OP.AMP.
- 5.4 Explain the working of wien's bridge oscillator using waveforms.
- 5.5 Draw the Triangular wave generator using OP.AMP.
- 5.6 Explain the working of Triangular wave generator using waveforms.
- 5.7 Draw the basic comparator using OP.AMP.
- 5.8 Explain the operation of a comparator circuit.
- 5.9 Draw the circuit Schmitt trigger using OP.AMP.
- 5.10 Describe the operation of Schmitt trigger circuit using waveforms
- 5.11 Draw the internal block diagram of of 3 terminal positive series regulated power supply (78XX series)
- 5.12 Draw the circuit of positive regulated power supply using 78XX regulator lcs

COURSE CONTENTS

1. **OP-AMP Constructional features and characteristics:** Requirements-Differential amplifier-specifications—limitations of differential amplifier-Block diagram of typical operational amplifier; types of IC s manufactures designations, IC package, pin identification-Input offset voltage, input offset current, input bias current, input resistance, slew rate, CMRR, with reference to operational amplifier, characteristics of ideal op-amp
2. **Applications of OP-AMP :** Open loop op-amp configuration-effects of negative feedback- inverting and non-inverting amplifier.Op-amp with feedback: Voltage follower-summing amplifier, differential amplifier, integrator, differentiator, Instrumentation amplifier,isolation amplifier voltage to current converter and current to voltage converter
3. **Active Filters(No mathematical treatment):** Electric filter-types of filters-Low pass, high pass, Band pass and Band stop filters, frequency response, single stage filters-Limitations of passive filter-merits of active filter-applications

4.0 Timer IC: IC 555 timer-block diagram-pin diagram-function of each pin-Monostable, Astable multivibrator –square wave generator-applications

5. Special applications of OP-AMP: Square wave generator, wein bridge oscillator, Triangular wave generator, Basic comparator, Schmitt trigger, Regulated power supply

REFERENCE BOOKS

1. Op Amps & Linear Integrated Circuits — Ramakanth A Gaykwad
2. linear Integrated Circuits — Roy Chowdary
3. Integrated Circuits — Botkar
4. Op Amps & Linear Integrated Circuits — Ramakanth A Gykwad
5. Integrated Circuits — Botkar

MICRO CONTROLLERS AND APPLICATIONS

SUBJECT TITLE : Micro Controllers and Applications

SUBJECT CODE : AEI-504

PERIODS/WEEK : 05

PERIODS/SEMESTER : 75

TIME SCHEDULE

Sl. No.	Major Topics	No. of Periods	Weightage of marks	Short Questions	Essay Questions
1	Architecture of 8051	15	19	3	1
2	Instruction set of 8051	20	29	3	2
3	Programming concepts	25	36	2	3
4	Peripheral ICs	10	16	2	1
5	Applications	05	10	-	1
	Total	75	110	10	8

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OBJECTIVES: On completion of the study of the subject a student should be able to

1.0 Comprehend the architecture of Microcontroller 8051

- 1.1 Draw the block diagram of a microcomputer & explain the function of each block.
- 1.2 Explain the functional block diagram of 8085 Microprocessor.
- 1.3 List the differences between Microprocessors and microcontrollers
- 1.4 Know the features of micro controllers.
- 1.5 Give the functional block diagram of 8051 microcontroller.
- 1.6 Know the register structure of 8051.
- 1.7 Mention the importance of special function registers and list them.
- 1.8 Give the pin diagram of 8051 micro controller & specify the purpose of each pin.
- 1.9 Describe internal memory, external memory and ports of 8051.

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- 1.10 Explain counters & timers of 8051.
- 1.11 Explain serial input/output of 8051.
- 1.12 Explain interrupts of 8051.
- 2.0 Understand the instruction set of 8051 micro controller**
- 2.1 State the need for an instruction set.
- 2.2 Give the instruction format of 8051.
- 2.3 Explain fetch cycle, execution cycle and instruction cycle.
- 2.4 Distinguish between machine cycle and T-state.
- 2.5 Know the timing diagram for memory write, memory read operations of 8051.
- 2.6 Define the terms machine language, assembly language, and mnemonics.
- 2.7 Give the difference between machine level and assembly level programming.
- 2.8 List the major groups in the instruction set along with examples.
- 2.9 Explain the data manipulation functions data transfer, arithmetic, logic and branching.
- 2.10 Classify the 8051 instructions into one byte, two byte and three byte instructions.
- 2.11 Explain the various addressing modes of 8051.
- 2.12 Explain data transfer instructions of 8051.
- 2.13 Explain the arithmetic instructions and recognise the flags that are set or reset for given data conditions.
- 2.14 Explain the logic instructions and recognize the flags that are set or reset for given data conditions.
- 2.15 Illustrate the logic operations and explain their use in making, setting and resetting of individual bits.
- 2.16 Explain unconditional and conditional jump instructions and how flags are used to change the sequence of a program.
- 3.0 Comprehend the Programming concepts**

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- 3.1 Give the various symbols used in drawing flow charts.
- 3.2 Draw flow charts for some simple problems.
- 3.3 Write programs in mnemonics to illustrate the application of data copy instructions and translate these mnemonics into hex codes.
- 3.4 Write programs of instructions to perform single byte, double byte and multi byte addition and subtraction.
- 3.5 Illustrate the application of jump instruction in the program.
- 3.6 Write a program using counter techniques.
- 3.7 Define a subroutine and explain its use.
- 3.8 Explain the sequence of program when subroutine is called and executed.
- 3.9 Explain how information is exchanged between the program counter and the stack and identify the stack pointer register when a subroutine is called.
- 3.10 List and explain unconditional and conditional call and return instructions.
- 3.11 Use PUSH, POP instructions in programs.
- 3.12 Illustrate the concept of nesting, multiple ending and common ending in subroutines.
- 3.13 Use input/output, machine related statements in writing assembly language programs.
- 3.14 Explain the term debugging of a program.
- 3.15 Write instructions to set up time delay.
- 4.0 Understand the interfacing of Peripherals**
- 4.1 Define interfacing.
- 4.2 Explain the need for interfacing.
- 4.3 List various interfacing devices.
- 4.4 Mention the purpose of each interfacing device. (8255,8257,8279)
- 4.5 Mention the features of 8255.

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- 4.6 Give the functional block diagram of 8255.
- 4.7 Give the PIN configuration of 8255
- 4.8 Explain the functional block diagram of 8255.
- 4.9 Define the three modes of operation of 8255.
- 4.10 List 3 ports of 8255 and Explain their features
- 4.11 Explain the concept of CWR (Control Word Register).
- 4.12 With the help of a circuit explain Interfacing 8255 to 8051
- 4.13 Explain the functional block diagram of DMA controller 8257.
- 4.14 Explain the interfacing 8257 with micro controllers
- 5.0 Understand the Applications of micro controllers 8051.**
- 5.1 Develop a program to control Traffic lights using 8051.
- 5.2 Give the block diagram of the above application.
- 5.3 Develop a program to control the functioning of a Printer using 8051.
- 5.4 Give the block diagram of the above application.
- 5.5 Develop a program to control the rotation of a Stepper motor using 8051.
- 5.6 Give the block diagram of the above application.
- 5.7 Develop a program to control LCD interface.
- 5.8 Give the block diagram of the above application.
- 5.9 Develop a program to control Seven segment display interface
- 5.10 Give the block diagram of the above application.

COURSE CONTENTS

1.0 Architecture of 8051:

Block diagram of microcomputer, 8085 microprocessor and 8051 Microcontroller, Pin out diagram of 8051, registers, timers, interrupts, modes of operation.

2.0 Instruction set of 8051:

Instruction set of 8051, instruction format, fetch cycle, execution cycle, instruction cycle, machine cycle, timing diagrams, machine language, assembly language, classification of instructions, addressing modes- Groups of instructions, opcode, operand.

3.0 Programming concepts:

Flow charts, Data transfer, single and multi byte addition and subtraction, subroutines, nesting, multiple ending and common ending, use of Input output and machine related statements, debugging, time delay program.

4.0 Peripheral ICs:

Know the block diagram, pin configuration, function and interfacing of 8255, 8257-control word register

1.0 Applications:

Traffic lights, printer interface, stepper motor control, Seven segment display interface, LCD interface.

REFERENCE BOOKS:

1. 8051 Micro controller by Mazidi and Mazidi.
2. 8051 Micro controller by Kenneth J. Ayala.
3. Programming customizing the 8051 Microcontroller by Myke Predko TMH
4. Microprocessors and interfacing by Douglas Hall. McGraw Hill.
5. Intel Microprocessors by Barry Brey, Prentice-Hall.

ANALYTICAL INSTRUMENTATION

Sub. Title	: ANALYTICAL INSTRUMENTATION
Sub. Code	: AEI-505
Periods/week	: 04
Periods/Semester	: 60

TIME SCHEDULE

S. No	Topics	No. of periods	Weight age of marks	Short Answer Questions	Essay Type Questions
01	Nuclear instrumentation	10	29	3	2
02	Analytical instrumentation	15	23	1	2
03	Analyzers	15	26	2	2
04	Mass Spectroscopy and chromatography	10	16	2	1
05	Applications of Analytical Instruments	10	16	2	1
	Total	60	110	10	8

OBJECTIVES:

On completion of the study of the subject a student should be able to

1.0 Understand Nuclear instrumentation

- 1.1 List the types of radiations.
- 1.2 Give the importance of radiation detection.
- 1.3 Explain Alpha Particle type of radiation
- 1.4 Explain Beta particle type of radiation
- 1.5 Explain Gamma Particle type of radiation
- 1.6 Explain Neutron type of radiation

- 1.7 Explain Geiger Muller method of detection
- 1.8 Explain Ionization chamber method of detection
- 1.9 Explain Scintillation counter method of detection
- 1.10 Explain a method of detection of neutrons.

2.0 Understand analytical instrumentation.

- 2.1 Mention the importance of analytical Instrumentation.
- 2.2 Explain block diagram of Analytical instrumentation
- 2.3 Explain Electromagnetic spectrum.
- 2.4 State Beer Lamberts law.
- 2.5 Explain Beer Lamberts law.
- 2.6 List the types of Mono chromators (Prism and Grating)
- 2.7 Explain prism type mono chromator.
- 2.8 Explain grating type mono chromator.
- 2.9 List the types of Visible.UV and IR light sources.
- 2.10 List the types of Visible.UV and IR light detectors.
- 2.11 Explain the description and working of U.V. Spectro photo meter.
- 2.12 List the applications of U.V. Spectro photo meter.
- 2.13 Explain the description and working of Visible Spectrophotometer.
- 2.14 List the applications of Visible Spectrophotometer.
- 2.15 Explain the description and working of IR Spectrophotometer.
- 2.16 List the applications of IR Spectrophotometer.

3.0 Understand different types of Analyzers

- 3.1 Define analyzer.
- 3.2 Explain the necessity of analyzers.
- 3.3 Explain the working of Flame Photometer with diagram.
- 3.4 List the applications of Flame Photometer.
- 3.5 Explain the working of Spectrofluorometer with diagram.
- 3.6 List the applications of Spectrofluorometer.

- 3.7 Explain the working of Refractometer with diagram. .
- 3.8 List the applications of Refractometer.
- 3.9 Explain the working of Interferometer with diagram.
- 3.10 List the applications of Interferometer.
- 3.11 Explain the working of Polarimeter with diagram.
- 3.12 List the applications of Polarimeter.
- 3.13 Explain the working of Paramagnetic gas analyzer with diagram.
- 3.14 List the applications of Paramagnetic gas analyzer.
- 3.15 Explain the working of Zirconia gas analyzer with diagram.
- 3.16 List the applications of Zirconia gas analyzer.
- 3.17 Explain the working of Electro chemical gas analyzer with diagram.
- 3.18 Explain the working of Thermal conductivity type analyzer with diagram.
- 3.19 List the applications of Thermal conductivity type analyzer.
- 3.20 Explain the working of Auto analyzer with diagram.

4.0 Understand the Mass spectroscopy and chromatography

- 4.1 Explain the concept of Mass spectroscopy.
- 4.2 Derive the expression for m/e ratio.
- 4.3 List the four advantages of mass spectrometer.
- 4.4 Explain the working of mass spectrometer with diagram.
- 4.5 Mention the four applications of mass spectrometer.
- 4.6 Define chromatography.
- 4.7 Classify chromatographs.
- 4.8 Explain the working of Gas chromatograph with diagram.
- 4.9 List four applications of Gas chromatograph.
- 4.10 Explain the working of Liquid chromatograph with diagram.
- 4.11 List four applications of Liquid chromatograph.

5. Applications of Analytical Instruments

- 5.1 List the industries in which analytical instruments are used.

- 5.2 List any four analytical instruments used in clinical labs.
- 5.3 Mention the use of above instruments.
- 5.4 List any four analytical instruments used in Pharmaceutical industry.
- 5.5 Mention the use of above instruments.
- 5.6 List five methods for determining the particle size analytically.
- 5.7 Explain Photon correlation spectroscopy method to determine particle size.
- 5.8 List three advantages and disadvantages of above technique
- 5.9 Explain the rapid control of fertilizer with auto analyzer.
- 5.10 Explain the necessity of air quality monitoring system.
- 5.11 List six hazardous pollutants in the air.
- 5.12 Mention any four analytical instruments used for air quality monitoring.
- 5.13 Explain the working of air pollution monitoring system with block diagram.

COURSE CONTENTS

1. Nuclear instrumentation

Types of radiations ,importance of detection, Alpha Particles, Beta particles, Gamma Particles, Neutrons, Detection , Methods. Geiger Muller method, Ionization chamber, Scintillation counter .Detection of neutrons,

2. Analytical instrumentation

Importance of analytical instrumentation, block diagram of analytical instrumentation, Electromagnetic spectrum, beer lamberts law, monochromators , prism and gratings , UV, IR and visible light sources and detectors - UV, IR, Visible spectro photo meters,

3. **Analyzers:** Define analyzer, necessity of analyzer, Flame Photometer, Spectrofluorometer, Refractometer, Interferometer, Polari meter and their applications Gas analyzers - Paramagnetic gas analyzer, Zirconia gas analyzer, Electro chemical gas analyzer, Thermal conductivity type analyzer, Auto analyser, applications of Paramagnetic gas analyzer, Zirconia gas analyzer and Thermal conductivity type analyzer.

- 4.0 **Mass spectroscopy and chromatography:** concept of mass spectro photometer, expression for m/e ratio, advantages, block diagram and applications of mass spectro photometer ,definition of chromatography,

classification of chromatography ,Gas chromatography, Liquid chromatography and their applications.

5.0 Applications of Analytical instrumentation

List of analytical instruments used industries, list clinical instruments and their use, list pharmaceutical instruments and their use, methods of particle size determination, photon correlation spectroscopy method, advantages and disadvantages, rapid control of fertilizers, necessity of air quality monitoring , hazardous pollutants in air, block diagram of air pollution monitoring system.

REFERENCE BOOKS

1. Biomedical Instrumentation and measurements by Laslie Cromwell, Fred weibell, Erich Pfierrfer
2. Principles of medical electronics and Bio-medical instrumentation by Raja Rao and Guha –Universities press.
3. Instrumental Methods of Chemical Analysis by Willard, Merritt
4. Instrumental Methods of Chemical Analysis by Chatwal & Anand
5. Hand Book of Analytical Instrumentation by R.S. Khandpur

PROCESS CONTROL LAB PRACTICE

Sub. Name	: PROCESS CONTROL LAB PRACTICE
Sub. Code	: AEI-506
No.periods/Week	: 03
No.Periods /Semester	: 45

Rationale: **Process control Lab Practice is included in the same semester to ensure contiguity and give an opportunity for the students to reinforce their theoretical knowledge by practically verifying in the laboratory. care has been taken to match the Experiments with field requirements**

TIME SCHEDULE

S. No.	Practice	No. of Periods
1.	Temperature controller	12
2.	Flow controller	9
3.	Level controller	9
4	Pressure controller	9
5	I to P, P to I converters	6
	Total	45

LIST OF EXPERIMENTS

- I. Temperature controller**
 1. To control Temperature using P & PI
 2. To control Temperature using PID.
- II. Flow Controller**
 3. To control Flow using P & PI
 4. To control Flow using PID

III. Level controller

5. To control Level using P&PI
6. To control Level using PID.

IV. Pressure controller

7. To control Pressure using P & PI
8. To control Pressure using PID.
9. To control Temperature in P & PI mode using EPID
10. To control Temperature in PID mode using EPID

V. I to P, P to I Converters

11. To plot the performance characteristics of I / P converter
12. To plot the performance characteristics of P/I converter.
13. To draw the performance characteristics of Open loop Pressure control
14. To draw the performance characteristics of Closed loop Pressure control
15. To draw the performance characteristics of Closed loop Level control

Competencies and Key Competencies to be achieved

113

Exp No	Name of the Experiment	Competencies	Key Competencies
1	To control Temperature using P & PI	<ul style="list-style-type: none"> ➤ Familiarize with the temperature controller set up. ➤ Identify the P & PI controls of the set up ➤ Make connections ➤ Follow the procedure ➤ Adjust the controls 	<ul style="list-style-type: none"> ▪ Use P &PI control based equipment ▪ Adjust the controls to the required parameters
2	To control Temperature using PID.	<ul style="list-style-type: none"> ➤ Familiarize with the temperature controller set up. ➤ Identify the Components of the PID set up ➤ Make connections ➤ Follow the procedure ➤ Adjust the controls 	<ul style="list-style-type: none"> ▪ Use PID control based equipment ▪ Adjust the controls to the required parameters
3	To control Flow using P & PI	<ul style="list-style-type: none"> ➤ Familiarize with the Flow controller set up ➤ Make connections ➤ Follow the procedure ➤ Adjust the controls 	<ul style="list-style-type: none"> ▪ Use P &PI control based equipment ▪ Adjust the controls to the required parameters
4	To control Flow using PID	<ul style="list-style-type: none"> ➤ Familiarize with the Flow controller set up ➤ Make connections ➤ Follow the procedure ➤ Adjust the controls 	<ul style="list-style-type: none"> ▪ Use PID control based equipment ▪ Adjust the controls to the required parameters
5	To control Level using P & PI	<ul style="list-style-type: none"> ➤ Familiarize with the Level controller set up ➤ Make connections ➤ Follow the procedure ➤ Adjust the controls 	<ul style="list-style-type: none"> ▪ Use P &PI control based equipment ▪ Adjust the controls to the required parameters
6	To control Level using PID.	<ul style="list-style-type: none"> ➤ Familiarize with the Level controller set up ➤ Make connections ➤ Follow the procedure ➤ Adjust the controls 	<ul style="list-style-type: none"> ▪ Use PID control based equipment ▪ Adjust the controls to the required parameters

7	To control Pressure using P&PI	<ul style="list-style-type: none"> ➤ Familiarize with the Pressure controller set up ➤ Make connections ➤ Follow the procedure ➤ Adjust the controls 	<ul style="list-style-type: none"> ▪ Use P & PI control based equipment ▪ Adjust the controls to the required parameters
8	Pressure control using PID.	<ul style="list-style-type: none"> ➤ Familiarize with the Pressure controller set up ➤ Make connections ➤ Follow the procedure ➤ Adjust the controls 	<ul style="list-style-type: none"> ▪ Use PID control based equipment ▪ Adjust the controls to the required parameters
9	Temperature control in P&PI mode using EPID	<ul style="list-style-type: none"> ➤ Familiarize with the EPID Temperature controller set up ➤ Make connections ➤ Follow the procedure ➤ Adjust the controls 	<ul style="list-style-type: none"> ▪ Use EPID control based equipment ▪ Adjust the controls to the required parameters
10	Temperature control in PID mode using EPID	<ul style="list-style-type: none"> ➤ Familiarize with the EPID Temperature controller set up ➤ Make connections ➤ Follow the procedure ➤ Adjust the controls 	<ul style="list-style-type: none"> ▪ Use EPID control based equipment ▪ Adjust the controls to the required parameters
11	To plot the performance characteristics of I / P converter	<ul style="list-style-type: none"> ➤ Familiarize with the I/P converter ➤ Make connections ➤ Follow the procedure ➤ Adjust the controls ➤ Interpret data sheets 	<ul style="list-style-type: none"> ▪ Use I/P converter ▪ Adjust the controls to the required parameters
12	To plot the performance characteristics of P/I converter.	<ul style="list-style-type: none"> ➤ Familiarize with the P/I converter ➤ Make connections ➤ Follow the procedure ➤ Adjust the controls ➤ Interpret data sheets 	<ul style="list-style-type: none"> ▪ Use P/I converter ▪ Adjust the controls to the required parameters
13	To draw the performance characteristics of Open loop Pressure control	<ul style="list-style-type: none"> ➤ Familiarize with the Open loop control set up ➤ Make connections ➤ Follow the procedure ➤ Adjust the controls ➤ Interpret data sheets 	<ul style="list-style-type: none"> ▪ Use Open loop controller ▪ Adjust the controls to the required parameters

14	To draw the performance characteristics of Closed loop Pressure control	<ul style="list-style-type: none"> ➤ Familiarize with the Closed loop set up ➤ Make connections ➤ Follow the procedure ➤ Adjust the controls ➤ Interpret data sheets 	<ul style="list-style-type: none"> ▪ Use Closed loop controller ▪ Adjust the controls to the required parameters
15	To draw the performance characteristics of Closed loop Level control	<ul style="list-style-type: none"> ➤ Familiarize with the Closed loop ➤ Make connections ➤ Follow the procedure ➤ Adjust the controls ➤ Interpret data sheets 	<ul style="list-style-type: none"> ▪ Use Closed loop controller ▪ Adjust the controls to the required parameters

MICROCONTROLLERS LAB PRACTICE

SUBJECT TITLE : MICROCONTROLLERS LAB PRACTICE

SUBJECT CODE : AEI- 507

PERIODS/WEEK : 03

PERIODS/SEMESTER : 45

Rationale: Microcontrollers Lab Practice is included in the same semester to ensure contiguity and give an opportunity for the students to reinforce their theoretical knowledge by practically verifying in the laboratory. Care has been taken to match the Experiments with field requirements.

TIME SCHEDULE

S. No.	Practice	No. of Periods
1.	Microcontroller Kit	06
2.	Instruction set	09
3.	Counters, Timers Interrupts and Flags	15
4	Interfacing	15
	Total	45

LIST OF EXPERIMENTS

I. Familiarization with Microcontroller Kit & Simulators

1. Practice with microcontroller kits and Simulators

- Familiarize with 8051 Microcontroller Kit
- Familiarize with 8051 simulator EDSIM 51 (or similar)
- Write small ALP to verify different register addressing techniques

II. 8051 Instruction set

2. Practice Arithmetic instructions of 8051

- Write an ALP to demonstrate Addition , subtraction , division and multiplication of 8 bit numbers using immediate data access.
- Write an ALP to Add and Subtract 16 bit numbers

- Write an ALP to find the Square and Cube of a decimal number
- Write an ALP to find LCM of given 3 decimal numbers
- Write an ALP To find HCF of given 3 decimal numbers

3. Practice Data transfer instructions

- Write an ALP to Block move - 10bytes of data from 0X30-0X39 to 0X40-0X49 (without overlap)
- Write an ALP to Block move - 10bytes of data from 0X30-0X39 to 0X35-0X39 (with overlap)
- Write an ALP to Block exchange – 10bytes of data between 0X30-0X39 to 0X40-0X49
- Write an ALP to Block move - 10bytes of data from 0X30-0X39 to 0X1000-0X1009 (Internal to external memory or vice versa)

4. Practice Data Manipulation

- Find Smallest/Largest number in 10bytes of data from 0X30-0X39 (R3 – should store the smallest/largest number and R4 – should store address of the smallest/largest number)
- Search for an element in the 10 bytes of data from 0X30-0X39 (R3 =1, if element is found else R3=0)
- Sort 10bytes of data from 0X30-0X39 in Ascending order
- Sort 10bytes of data from 0X30-0X39 in Descending order

5. Practice Boolean & Logical instructions :

- Find 2's complement of a number using (CPL) instruction
- Convert Packed to Unpacked BCD (bit Masking) Using (ANL) Instruction
- Convert ASCII to BCD Using(XRL) instruction.

III. implement Counters ,Timers Interrupts and Flags

6. Implement a HEX up/down counter - (Program should check value @R0=0X30, if 0X30=0 then up counter else down counter)

- implement BCD(00-99) up/down counter - (Program should check value @R0=0X30, if 0X30=0 then up counter else down counter)

7. Implement Delays and Timers

- Write a program in assembly language and in "C" produce required time delay a) by Using instructions only b) by Using Timers

b) Write a program in assembly language and C to verify Call and return instructions with port programming

c) Write a program in assembly language and C to verify Logical or Delay loop using Call and return instructions

8. Use 8051 Interrupts and Flags

Write a program to generate a square wave of 50 Hz on pin 1.2 . Assume that crystal frequency is 11.0592 MHz using timer.

IV . practice Interfacing Techniques

9. Micro controller interfacing

a) Interfacing Switches and LEDS to 8051

i) Make an LED connected to port 1.5, light up for specific time on pressing a switch connected to port 2.3

ii) Write a Program to make an LED connected to pin 1.7 to blink at a specific rate

iii) Connect a Relay in place of LED to control a AC 230 V Lamp

10. Interface 3-digit 7SEGMENT LED DISPLAY using timer for digit scan

a) Interface a Single DOTMATRIX DISPLAY and display the given number

11. Interface a (3x4 matrix) Key Board to 8051

12. Control the direction of rotation of a small DC motor

13. Interface I²C BUS Device using DS1307 IC .

a) Interface a) ADC IC b) DAC IC

b) Interface Microcontroller serial interface to PC COM port

14. Burn executable code into EPROM

a) Burn executable code into flash memory for 89C51

Competencies and Key Competencies to be achieved

Exp No	Name of the Experiment (No of Periods)	Competencies	Key Competencies
1	To practice with microcontroller kits and Simulators (3) a) To Familiarize with 8051 Microcontroller Kit b) To Familiarize with 8051 simulator EDSIM 51 (or similar) c) To Write small ALP to verify different register addressing techniques	<ul style="list-style-type: none"> ➤ Identify the component assemblies in the kit ➤ Enter the ALP at the specified address and execute ➤ Use the simulator for the same ALP and verify the register contents and the Flags 	<ul style="list-style-type: none"> ▪ Enter the ALP at the specified address and execute ▪ Use the simulator for the same ALP and verify the register contents and the Flags
2	To Practice Arithmetic instructions of 8051 (3) a) Write an ALP to demonstrate Addition , subtraction , division and multiplication of 8 bit numbers using immediate data access. b) Write an ALP to Add and Subtract 16 bit numbers c) Write an ALP to find the Square and Cube of a decimal number d) Write an ALP to find LCM of given 3 decimal numbers e) Write an ALP To find HCF of given 3 decimal numbers	<ul style="list-style-type: none"> ➤ Enter the ALP at the specified address and execute ➤ Use Arithmetic Instructions ➤ Use the simulator for the same ALP and verify the register contents 	<ul style="list-style-type: none"> ▪ Enter the ALP at the specified address and execute ▪ Use Arithmetic Instructions ▪ Use the simulator for the same ALP and verify the register contents

3	<p>To Write an ALP to Block move - 10bytes of data from 0X30-0X39 to 0X40-0X49 (without overlap) (3)</p> <p>a) Write an ALP to Block move - 10bytes of data from 0X30-0X39 to 0X35-0X39 (with overlap)</p> <p>b) Write an ALP to Block exchange – 10bytes of data between 0X30-0X39 to 0X40-0X49</p> <p>c) Write an ALP to Block move - 10bytes of data from 0X30-0X39 to 0X1000-0X1009 (Internal to external memory or vice versa)</p>	<ul style="list-style-type: none"> ➤ Enter the ALP at the specified address and execute ➤ Use DATA Transfer Instructions ➤ Use the simulator for the same ALP and verify the Memory contents 	<ul style="list-style-type: none"> ▪ Enter the ALP at the specified address and execute ▪ Use Arithmetic Instructions ▪ Use the simulator for the same ALP and verify the register contents
4	<p>To Practice Data Manipulation (3)</p> <p>a) To find Smallest/Largest number in 10bytes of data from 0X30-0X39 (R3 – should store the smallest/largest number and R4 – should store address of the smallest/largest number)</p> <p>b) To Search for an element in the 10 bytes of data from 0X30-0X39 (R3 =1, if element is found else R3=0)</p> <p>c) To Sort 10bytes of data from 0X30-0X39 in Ascending order</p> <p>d) To Sort 10bytes of data from 0X30-0X39 in Descending order</p>	<ul style="list-style-type: none"> ➤ Enter the ALP at the specified address and execute ➤ Use Logical Instructions ➤ Use the simulator for the same ALP and verify the result 	<ul style="list-style-type: none"> ▪ Enter the ALP at the specified address and execute ▪ Use Arithmetic Instructions ▪ Use the simulator for the same ALP and verify the register contents

4	<p>To Find 2's complement of a number using (CPL) instruction (3)</p> <p>a) To Convert Packed to Unpacked BCD (bit Masking) Using (ANL) Instruction</p> <p>b) To convert Unpacked BCD to ASCII Using (ORL) instruction.</p> <p>c) To Convert ASCII to BCD Using(XRL) instruction.</p>	<ul style="list-style-type: none"> ➤ Enter the ALP at the specified address and execute ➤ Use Boolean Instructions ➤ Use the simulator for the same ALP and verify the result 	<ul style="list-style-type: none"> ▪ Enter the ALP at the specified address and execute ▪ Use Arithmetic Instructions ▪ Use the simulator for the same ALP and verify the register contents
5	<p>To implement a HEX up/down counter - (Program should check value @R0=0X30, if 0X30=0 then up counter else down counter) (3)</p> <p>b) To implement BCD(00-99) up/down counter - (Program should check value @R0=0X30, if 0X30=0 then up counter else down counter)</p>	<ul style="list-style-type: none"> ➤ Enter the ALP at the specified address and execute ➤ Use timer/Counter 	<ul style="list-style-type: none"> ▪ Enter the ALP at the specified address and execute ▪ Use timer/Counter
6	<p>To implement a HEX up/down counter - (Program should check value @R0=0X30, if 0X30=0 then up counter else down counter) (3)</p> <p>a) To implement BCD(00-99) up/down counter - (Program should check value @R0=0X30, if 0X30=0 then up counter else down counter)</p>	<ul style="list-style-type: none"> ➤ Enter the ALP at the specified address and execute ➤ Use timer/Counter 	<ul style="list-style-type: none"> ▪ Enter the ALP at the specified address and execute ▪ Use timer/Counter

7	<p>To Implement Delays using Timers (3)</p> <p>a) To write a program in assembly language and in "C" produce required time delay a) by Using instructions only b) by Using Timers</p> <p>b) To write a program in assembly language and C to verify Call and return instructions with port programming</p> <p>c) To write a program in assembly language and C to verify Logical or Delay loop using Call and return instructions</p>	<ul style="list-style-type: none"> ➤ Enter the "C" program in the simulator ➤ Debug and execute ➤ Use CALL and RET Instructions ➤ Verify STACK Contents in the Simulator 	<ul style="list-style-type: none"> ▪ Enter the "C" program in the simulator ▪ Debug and execute ▪ Use CALL and RET Instructions ▪ Verify STACK Contents in the Simulator
8	<p>To Use 8051 Interrupts and Flags (3)</p> <p>To Write a program to generate a square wave of 50 Hz on pin 1.2 . Assume that crystal frequency is 11.0592 MHz using timer.</p>	<ul style="list-style-type: none"> ➤ Enter the ALP at the specified address ➤ Calculate the ➤ Timer Data to be loaded for 50 Hz ➤ Execute the Program 	<ul style="list-style-type: none"> ▪ Enter the ALP at the specified address ▪ Calculate the ▪ Timer Data to be loaded for 50 Hz ▪ Execute the Program

9	<p>Micro controller interfacing</p> <p>a) Interfacing Switches and LEDS to 8051 (3)</p> <p>i) To make an LED connected to port 1.5, light up for specific time on pressing a switch connected to port 2.3</p> <p>ii) To Write a Program to make an LED connected to pin 1.7 to blink at a specific rate</p> <p>ii) To Connect a Relay in place of LED to control a AC 230 V Lamp</p>	<ul style="list-style-type: none"> ➤ Enter the ALP at the specified address ➤ Rig up the circuit ➤ Execute the Program 	<ul style="list-style-type: none"> ▪ Enter the ALP at the specified address ▪ Rig up the circuit ▪ Execute the Program
10	<p>To Interface 3-digit 7SEGMENT LED DISPLAY using timer for digit scan (3)</p> <p>a) To Interface a Single DOTMATRIX DISPLAY and display the given number</p> <p>b) To Interface a (3x4 matrix) Key Board to 8051</p> <p>c) To control the direction of rotation of a small DC motor</p>	<ul style="list-style-type: none"> ➤ Rig Up the circuit ➤ Enter The C Program in the simulator ➤ Debug and Execute 	<ul style="list-style-type: none"> ▪ Rig Up the circuit ▪ Enter The C Program in the simulator ▪ Debug and Execute
11	<p>To Interface a (3x4 matrix) Key Board to 8051 (3)</p>	<ul style="list-style-type: none"> ➤ Rig Up the circuit ➤ Enter The C Program in the simulator ➤ Debug and Execute 	<ul style="list-style-type: none"> ▪ Rig Up the circuit ▪ Enter The C Program in the simulator ▪ Debug and Execute
12	<p>To control the direction of rotation of a small DC motor (3)</p>	<ul style="list-style-type: none"> ➤ Rig Up the circuit ➤ Enter The C Program in the simulator ➤ Debug and Execute 	<ul style="list-style-type: none"> ▪ Rig Up the circuit ▪ Enter The C Program in the simulator ▪ Debug and Execute

13	To interface I ² C BUS Device using DS1307 IC . (6) a) To interface i) ADC IC ii) DAC IC b) To interface Microcontroller serial interface to PC COM port	<ul style="list-style-type: none"> ➤ Rig Up the circuit ➤ Enter The C Program in the simulator ➤ Debug and Execute 	<ul style="list-style-type: none"> ▪ Rig Up the circuit ▪ Enter The C Program in the simulator ▪ Debug and Execute
14	To Burn executable code into EPROM (3) b) To burn executable code into flash memory for 89C51	<ul style="list-style-type: none"> ➤ Compile the C Program ➤ Use the Programmer SW to Load the .HEX file into the Programmer Memory ➤ To burn the code into EPROM/FLASH Memory of Controller ➤ To SECURE the CODE by programming the LOCK feature 	<ul style="list-style-type: none"> ▪ Compile the C Program ▪ Use the Programmer SW to Load the .HEX file into the Programmer Memory ▪ To burn the code into EPROM/FLASH Memory of Controller ▪ To SECURE the CODE by programming the LOCK feature

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LIFE SKILLS
(Common to all Branches)

Subject Title	:	Life skills
Subject Code	:	AEI – 508
Periods per week	:	03
Period per semester	:	45

TIME SCHEDULE

Sl No.	Major Topics	No. of periods
1.	Concept of life skills	03
2.	Enhancing self esteem	03
3.	Goal setting	03
4.	Positive attitude	03
5.	Managing emotions	06
6.	Stress management	06
7.	Time management	03
8.	Interpersonal skills	03
9.	Creativity	03
10.	Problem solving and Decision making skills	03
11.	Assertiveness	06
12.	Leadership skills & Team spirit	03
TOTAL		45

Note: No Written Examination

The students may be asked to demonstrate 1 or 2 skills from unit 2 to unit 12.

Marks: Internal – 40; External - 60

OBJECTIVES

On the completion of the course the students shall be able to

1.0 Understand the concept of Life Skills

- 1.1 Define Life Skills
- 1.2 Explain need and impact of Life Skills Programme
- 1.3 List the elements of Life Skills
- 1.4 Identify the sources of Life Skills

2.0 Understand the concept of Self esteem

- 2.1 Define the term self esteem
- 2.2 Explain the concept of Self esteem
- 2.3 List the characteristics of High Self esteem
- 2.4 List the characteristics of Low Self esteem
- 2.5 Explain the advantages of High Self esteem
- 2.6 Explain the behaviour patterns of Low self esteem
- 2.7 Explain the causes of Low self esteem
- 2.8 List the steps to build a positive Self esteem

Practicals

Exp No	Exercise	Activity (Questionnaire / Game and Role play)
1.	Identifying the Behaviour	<ul style="list-style-type: none"> Identifying the behavior patterns of low self-esteem people.
2.	Practice Positive Self Esteem	<ul style="list-style-type: none"> Steps to build a positive self esteem

3.0 Understand the concept of Goal setting

- 3.1 Define the term Goal
- 3.2 Explain the significance of Goal setting
- 3.3 Explain the following concepts
a) Wish b) Dream c) Goal
- 3.4 Explain the reasons for not setting goals
- 3.5 Explain effective goal setting process
- 3.6 List the barriers to reach goals

Practicals

Exp No	Exercise	Activity
1.	Differentiate among Wish, Dream and Goal	<ul style="list-style-type: none"> Draw a picture of Your Self/ Your Country/ Your Society after 10yrs. Discussion: Setting Personal Goals Story Telling Identifying of barriers Analysis barriers Overcoming barriers

4.0 Practise positive attitude

- 4.1 Define Attitude
- 4.2 Explain the concept of positive attitude
- 4.3 Explain the concept of negative attitude
- 4.4 Explain the effects of negative attitude
- 4.5 Identify the attitude of self and peers
- 4.6 Explain the effect of peers on self and vice-versa.
- 4.7 List the steps to enhance positive attitude
- 4.8 Explain the strategies to enhance positive attitude

Practicals

Exp No	Exercise	Activity (Psychological Instrument/ Game & Role play)
1.	Identify Positive attitude	<ul style="list-style-type: none"> To study & to identify the attitude of self and peer List & practise the strategies to enhance positive attitude.
2.	Observe	<ul style="list-style-type: none"> Positive attitudes of self and Peers Negative attitudes of self and Peers
3.	Practice Strategies to enhance Positive attitude	<ul style="list-style-type: none"> Celebrating success Listing successes

5.0 Practise managing emotions**5.1 Explain the concept of emotion**

- 5.2 List the different types of emotions
- 5.3 Differentiate between positive and negative emotions
- 5.4 Identify the type of emotion
- 5.5 Explain the causes of different types of emotions.

- 5.6 Implement methods to manage major emotions (anger / depression)
- 5.7 Define Emotional Intelligence.
- 5.8 Explain the method to enhance Emotional Intelligence.

Practicals

Exp No	Exercise	Activity (Story / simulated situational act /GD & Role play)
1.	Identify the Type of Emotion	<ul style="list-style-type: none"> To identify the type and to study the cause of the emotion.
2	Managing Emotions	<ul style="list-style-type: none"> Managing major emotions -Anger and Depression

6.0 Practise stress management skills

- 6.1 Define Stress
- 6.2 Explain the concept of stress
- 6.3 List the types of stress
- 6.4 Explain the causes of stress
- 6.5 Comprehend the reactions to stress
- a) Physical b) Cognitive c) Emotional d) Behavioural
- 6.6 Explain the steps involved in coping with stress by
- a) Relaxation b) Meditation c) Yoga
- 6.7 Practice stress relaxing techniques by 3 methods.
- a) Relaxation b) Meditation c) Yoga
- 6.8 Comprehend changing personality and cognitive patterns.
- 6.9 Observe changing personality and cognitive patterns.

Practicals

Exp No	Exercise	Activity(Questionnaire /Interview and practice)
1	Identify the type of stress	<ul style="list-style-type: none"> To study & to identify the type and causes of stress.
2	Stress –Relaxation Techniques	<ul style="list-style-type: none"> Practice some simple Stress –Relaxation Techniques, Meditation, Yoga.

Practise some simple Stress –Relaxation Techniques, Meditation, Yoga.

7.0 Practice Time Management Skills

- 7.1 Define Time management.
- 7.2 Comprehend the significance of Time management.
- 7.3 Explain the strategies to set priorities.
- 7.4 List the steps to overcome barriers to effective Time management.
- 7.5 Identify various Time stealers.
- 7.6 Explain Time-Management skills.
- 7.7 List different Time-Management skills.
- 7.8 Comprehend the advantages of Time-Management skills.

Practicals

Exp No	Exercise	Activity (Group work and Games)
1	Identify Time stealers	<ul style="list-style-type: none"> Assign a activity to different Groups –Observe the time of accomplishing the task, Identify the time stealers.
2.	Practice Time-Management skills	<ul style="list-style-type: none"> Perform the given tasks- Games

8.0 Practise Interpersonal skills

- 8.1 Explain the significance of Interpersonal skills.
- 8.2 List the factors that prevent building and maintaining positive relationships.
- 8.3 Advantages of positive relationships.
- 8.4 Disadvantages of negative relationships

Practicals

Exp No	Exercise	Activity
1.	Identify Relationships	<ul style="list-style-type: none"> Positive Relationships, Negative Relationships – Factors that affect them- Through a story
2.	Practise Rapport building	<ul style="list-style-type: none"> Exercises on Rapport building Developing Correct Body Language

9.0 Understand Creativity skills

- 9.1 Define Creativity
- 9.2 List the synonyms like Invention, Innovation and Novelty
- 9.3 Distinguish between Creativity , Invention, Innovation, and Novelty
- 9.4 Discuss the factors that lead to creative thinking like observation and imitation , improvement etc.
- 9.5 Distinguish between Convergent Thinking and Divergent Thinking
- 9.6 Explain various steps involved in Scientific approach to creative thinking namely
- a) Idea generation b) Curiosity c) Imagination d) Elaboration e) Complexity
- f) Abstraction and simplification g) Divergent Thinking h) Fluency
- i) Flexibility j) Persistence k) Intrinsic Motivation l) Risk taking
- m) Projection/empathy n) Originality o) Story telling p) Flow.
- 9.7 List the Factors affecting the creativity in Individuals.
- 9.8 Give the concept of Vertical thinking and Lateral thinking.
- 9.9 Explain the importance of Lateral thinking.
- 9.10 Compare Lateral thinking and Vertical thinking

Practicals

Exp No	Exercise	Activity (Games and Group work)
1	Observe any given object	<ul style="list-style-type: none"> Identifying finer details in an object
2.	Imagine	<ul style="list-style-type: none"> Imagining a scene Modifying a story (introduce a twist) Improving a product Finding different uses for a product
3	Skills	<ul style="list-style-type: none"> Making paper craft
4	Product development	<ul style="list-style-type: none"> Brain storming session
5	Developing originality	<ul style="list-style-type: none"> Come up with original solutions for a given problem

10.0 Understand Problem Solving and Decision Making Skills

- 10.1 Define a Problem
- 10.2 Analyze the performance problems
- 10.3 Categorize the problems
- 10.4 List the barriers to the solutions to problems.

Practicals

Exp No	Exercise	Activity (Brainstorming – checklist technique free association, attribute listing)
1	Gathering the facts and Data and Organizing the information.	<ul style="list-style-type: none"> Information gathering and organizing Identifying the solutions to the problem Identifying the barriers to the solutions Zeroing on Optimum solution
2.	Problem solving	<ul style="list-style-type: none"> Games on Problem solving

11.0 Understand Assertive and Non Assertive behaviour

- 11.1 List the 3 types of Behaviours 1. Assertive 2. Non assertive (passive) 3. Aggressive Behaviour 4. Submissive behaviours
- 11.2 Discuss the personality of a person having above behaviours
- 11.3 Explain the usefulness of assertive behaviour in practical situations.
- 11.4 Explain the role of effective communication in reflecting assertive attitude
- 11.5 Give examples of Assertive statements a) Assertive request b) assertive NO
- 11.6 Explain the importance of goal setting
- 11.7 Explain the method of Conflict resolution.
- 11.8 Discuss the methods of controlling fear and coping with criticism.

Practicals

Exp No	Exercise	Activity (Simulated situational act)
1	Observation of behavior	<ul style="list-style-type: none"> Identifying different personality traits from the body language
2.	Practicing assertiveness	<ul style="list-style-type: none"> Write statements Reaction of individuals in a tricky situation Facing a Mock interview Detailing the characteristics of peers setting goals – Games like throwing a coin in a circle Giving a feedback on a)Successful program b) Failed project Self disclosure
3	Skills	<ul style="list-style-type: none"> Dealing with a critic Saying NO Dealing with an aggressive person
4	Simulation	<ul style="list-style-type: none"> Role play- skit <ol style="list-style-type: none"> Assertive statements goal setting self disclosure

12.0 Practise Leadership Skills

- 12.1 Explain the concept of leadership
- 12.2 List the traits of an effective leader
- 12.3 Distinguish between Managing and leading
- 12.4 List the 3 leadership styles
- 12.5 Compare the above styles of leadership styles
- 12.6 Discuss choice of leadership style
- 12.7 Explain the strategies to develop effective leadership.
- 12.8 Explain the importance of Decision making
- 12.9 Explain the procedure for making effective decisions.

Practicals

Exp No	Exercise	Activity (Games and Group work)
1	Observation	<ul style="list-style-type: none"> Questionnaire
2.	Identification of a Leader	<ul style="list-style-type: none"> Give a task and observe the leader Discuss the qualities and his /her leadership style Ask the other members to identify the leadership qualities Reflection on the self
3	Skills	<ul style="list-style-type: none"> Decision making – followed by discussion
4	Building Team spirit	<ul style="list-style-type: none"> Motivation – Intrinsic and Extrinsic Training- Communication- Challenge

Competencies for Practical Exercises

S.No	Title	Competency	Key competencies
1.	Concept of life skills	<ul style="list-style-type: none"> Explain need and impact of Life skills 	
2.	Enhancing self esteem	<ul style="list-style-type: none"> Follow the steps to build a positive self esteem 	
3.	Goal setting	<ul style="list-style-type: none"> Practise the effective goal setting process 	
4.	Positive attitude	<ul style="list-style-type: none"> Practise the steps to enhance positive attitude. Observe the effects of peers on self and vice-versa. 	Practise the steps to enhance positive attitude
5.	Managing emotions	<ul style="list-style-type: none"> Practise the steps to manage emotional intelligence Identify different types of emotions Exercise control over Emotions 	<ul style="list-style-type: none"> Identify different types of emotions
6.	Stress management	<ul style="list-style-type: none"> Practise stress management techniques 	
7.	Time management	<ul style="list-style-type: none"> Practise Time management techniques 	
8.	Interpersonal skills	<ul style="list-style-type: none"> Identify positive and Negative Relations 	
9.	Creativity	<ul style="list-style-type: none"> Lead a small group for accomplishment of a given task. Build positive relationships. 	<ul style="list-style-type: none"> Build positive relationships.
10.	Problem solving and Decision making skills	<ul style="list-style-type: none"> Identify the various Problem solving and Decision making skills Make appropriate decision 	<ul style="list-style-type: none"> Identify the various Problem solving and Decision making skills
11.	Assertive and non Assertive behaviour	<ul style="list-style-type: none"> Practise Assertive and non Assertive behavior 	
12.	Leadership skills	<ul style="list-style-type: none"> Exhibit Leadership skills 	<ul style="list-style-type: none"> Exhibit Leadership skills

COURSE CONTENT**1.0 Concept of life skills**

Definition of life skills, Need and impact of life skills programme

2.0 Enhancing self esteem

Concept, Characteristics of high and low self esteem people, Advantages of high self esteem, Causes of low self esteem- Identification of behaviour patterns of low self esteem – Practice session of Questionnaire / Game -Steps to build positive self esteem – Practice session of Role play

3.0 Goal setting

Significance of goal setting, Concepts of Wish, Dream, and Goal Identify Wish, Dream, and Goal and differentiate among them. Reasons for not setting the goals, Barriers to reach goals, Identify Barriers, Effective goal setting process & Practise Effective goal setting

4.0 Positive attitude

concept effects of negative attitude, attitude of self and peers, effect of peers on self and vice-versa, steps to enhance positive attitude, strategies to enhance positive attitude

5.0 Managing emotions

Problem-definition, performance problems, Categorize the problems, barriers to the solutions to problems.

6.0 Stress management

concept of stress, Types of stress, causes of stress, reactions of stress, coping with stress, stress relaxing techniques, changing personality and cognitive patterns

7.0 Time management

Definition, significance of various Time stealers, Time management, strategies to set priorities, steps to overcome barriers, Time-Management skills- its advantages.

8.0 Interpersonal skills

Significance of Interpersonal skills, positive relationships- Advantages, negative relationships- Disadvantages

9.0 Creativity

Definition, Invention, Innovation, Novelty, Creative Thinking, observation and imitation, improvement, Expertise, skill, and motivation, components of Creativity, Convergent Thinking and Divergent Thinking, various steps involved in Scientific approach to creative thinking namely, Factors affecting the creativity in Individuals, Vertical Thinking and Lateral Thinking.

10.0 Problem solving and Decision making skills

Definition, performance problems –analysis, categorizing, barriers to the solutions to problems.

11.0 Assertive and non Assertive behaviour

Types of Behaviours – their characteristics, need for controlling and avoiding aggressive behaviours, making and refusing an assertive request – their evaluation, importance of goal setting, method of giving feed back.

12.0 Leadership skills

Concept, importance, Role of a Leader in an Organization, Traits of an effective leader, Managing and leading, leadership styles-their comparison, theories of leadership, strategies to develop effective leadership, importance of Decision making, concept of ethical leadership and moral development.

REFERENCE

1. Robert Nlussier, Christopher F. Achua Leadership: Theory, Application, & Skill development: Theory, Application.

LINEAR INTEGRATED CIRCUITS AND e-CAD LAB PRACTICE

Sub. Name : Linear Integrated Circuits
and eCad Lab Practice

Sub. Code : AEI- 509

No. periods/Week : 04

No. Periods /Semester : 60

Rationale:

Linear integrated circuits lab is introduced to reinforce the theoretical knowledge by experimental verification. Experiments on opamps are designed in such a way they also give insight into design concepts.

TIME SCHEDULE

S. No.	Practice	No. of Periods
I.	Operational Amplifier Circuits	9
II.	Wave shaping Circuits	9
III.	Opamp Oscillators	9
IV	555 Timer IC	9
V	Circuit simulation using Pspice	24
	Total	60

List of Experiments**I. Operational Amplifier Circuits**

1. Familiarize with Operational amplifier 741 and Quad Opamp LM 324 and comparator LM 339 ICs
2. Determine the CMRR and Slew Rate of the OP-AMP.
- 3) Implement and test 741 OpAmp as
 - a) inverting amplifier
 - b) Non Inverting amplifier

- c) Voltage follower (Buffer),
- 4) implement and test 741 Operation amplifier as**
- summing Amplifier
 - Difference amplifier
 - Scale changer (with two OpAmps)
- II. Wave shaping Circuits**
- 5. Realize Clipper and Clamper circuits and observe the waveforms on CRO**
- Realize Series and Parallel diode clippers
 - Assemble and test Positive and negative clipper circuits with and without bias
 - implement Amplitude limiter (two diodes connected back to back) and observe the waveform on CRO.
 - Implement a Zener diode Clipper and measure the output voltage with DMM and also observe waveform on CRO
- 6 implement Wave shaping circuits using OpAmp**
- implement &test Differentiator and Integrator circuits .
 - implement &test a Voltage comparator Circuit
 - implement &test Opamp Schmitt trigger and draw characteristics
- III. Signal conditioning Circuits using Opamp**
- 7 implement &test Signal conditioning Circuits using Opamp**
- Interface op amp output with TTL gates with input amplitude limiting circuit
 - implement &test Current to Voltage converter using Op amps
 - Implement &test Current to Voltage converter and use it to detect photodiode reverse current.
8. implement &test Voltage to current converter
- Implement &test a Voltage to current converter that produces a proportionate current in the range of 4mA to 20mA corresponding to input voltages from 0 to 5V
- IV. Opamp Oscillators &555 Timer IC**

- 9) implement & test Sine wave Oscillator Circuits using OpAmp CA 3011**
- RC-phase shift oscillator
 - Wien bridge oscillator
- 10) implement Op-Amp Relaxation Oscillators**
- implement &test Monostable multivibrator circuit and observe output waveforms on CRO
 - Implement &test Astable multivibrator observe output waveforms on CRO
- 11) Verify different modes of 555 IC.**
- Implement Monostable multi vibrator and observe output waveforms on CRO
 - Implement Astable multivibrator and observe output waveforms on CRO
- V Circuit simulation using Pspice**
- 12 Familiarize with the PSPICE modelling using eCAD software
- Representation of passive elements
 - Representation of active elements
 - Representation of time Vary signals
 - Representation of nodes
- 13 To simulate half wave and full wave rectifier circuits with filters and assess the performance
- 14 To simulate 12v Zener regulator circuit and assess the performance for various loads.
- 15 To Simulate of CE amplifier and observe the effect of disconnecting bypass capacitor.
- 16 To simulate Single stage RC coupled Amplifier circuit and observe the effect of change in component values on output waveform
- 17 To simulate JFET Common source Amplifier circuit and observe the effect of change in gate bias.
- 18 To simulate Colpitts oscillator circuit and observe the effect of change in component values.
- 19 To simulate Hartley oscillator circuit and observe the effect of change in component values.

- 20 To simulate transistor Astable multivibrator circuit and observe the effect of change in component values.
- 21 Design a PCB for the RC coupled amplifier circuit with built in power supply

Competencies & Key Competencies to be achieved

Exp No	Name of the Experiment	Competencies	Key Competencies
1	To familiarize with Operational amplifier 741 and Quad opamp LM 324 and comparator LM 339 Ics	<ul style="list-style-type: none"> ➤ Identify the iC package ➤ Identify Power supply pins , inverting & Non inverting input pins of 741 and other ICs ➤ Refer to the data sheets & note down the specifications , Package details etc 	<ul style="list-style-type: none"> ▪ Identify the OpAmp IC from the number ▪ Identify & Draw the pin Configuration ▪ Interpret datasheet specifications
2	To Determine the CMRR and Slew Rate of the OP-AMP	<ul style="list-style-type: none"> ➤ Rig up the circuit ➤ Set correct +ve and - Ve Vcc ➤ Apply Common signal to the IC input Pins ➤ Measure the output voltage accurately ➤ Observe & Measure the signal on CRO ➤ Compare other Opamp Specifications from datasheets 	<ul style="list-style-type: none"> ▪ Apply Common signal to the IC input Pins ▪ Measure the output voltage accurately ▪ Observe & Measure the signal on CRO ▪ Select right op amp for a given application from data sheets
3	To implement and test 741 Operation amplifier as a) inverting amplifier b) Non Inverting amplifier c) Voltage follower (Buffer),	<ul style="list-style-type: none"> ➤ Rig up the circuit . ➤ Choose correct values of feedback and input Resistors ➤ Measure input & Output signals with DMM 	<ul style="list-style-type: none"> ▪ Rig up the circuit . ▪ Choose correct values of feedback and input Resistors ▪ Measure input & Output signals with DMM

4	To implement and test 741 Operation amplifier as a) summing Amplifier b) Difference amplifier c) Scale changer (with two OpAmps)	<ul style="list-style-type: none"> ➤ Rig up the circuit . ➤ Choose correct values of feedback and input Resistors ➤ Measure input & Output signals with DMM 	<ul style="list-style-type: none"> ▪ Rig up the circuit . ▪ Choose correct values of feedback and input Resistors ▪ Measure input & Output signals with DMM
5	To Realize Clipper and Clamper circuits and observe the waveforms on CRO A) To Realize Series and Parallel diode clippers B) To Assemble and test Positive and negative clipper circuits with and without bias c) To implement Amplitude limiter (two diodes connected back to back) and observe the waveform on CRO. d) To Implement a Zener diode Clipper and measure the output voltage with DMM and also observe waveform on CRO	<ul style="list-style-type: none"> ➤ Rig up the circuit ➤ Apply correct level of input signal from Function generator ➤ Observe & Measure the input and output waveforms on CRO 	<ul style="list-style-type: none"> ▪ Apply correct level of input signal from Function generator ▪ Observe & Measure the input and output waveforms on CRO ▪ Use the Clipper circuits in practical applications

6	<p>To implement Wave shaping circuits using OpAmp</p> <p>a) To implement Differentiator and Integrator circuits .</p> <p>b) To implement a Voltage comparator Circuit</p> <p>c) To implement Opamp Schmitt trigger and draw characteristics</p>	<ul style="list-style-type: none"> ➤ Rig up the circuit ➤ Choose correct values for components to achieve desired time constant ➤ Observe& measure the input and output wave forms on CRO. ➤ Observe the effect of change in circuit Time constant 	<ul style="list-style-type: none"> ▪ Observe& measure the input and output wave forms on CRO. ▪ Observe the effect of change in circuit Time constant ▪ Use the Opamp for wave shaping & other applications.
7	<p>To implement Signal conditioning Circuits using Opamp</p> <p>a) To Interface op amp output with TTL gates with input amplitude limiting circuit</p> <p>b) To implement Current to Voltage converter using Op amps</p> <p>c) To Implement Current to Voltage converter and use it to detect photodiode reverse current.</p>	<ul style="list-style-type: none"> ➤ Rig up the circuit ➤ Apply correct levels of Input signals ➤ Measure the Input / Output Voltages and currents using DMM 	<ul style="list-style-type: none"> ▪ Apply correct levels of Input signals ▪ Measure the Input / Output Voltages and currents using DMM ▪ Use OpAmp as I/V converter
8	<p>To implement Voltage to current converter</p> <p>a) To Implement a Voltage to current converter that produces a proportionate current in the range of 4mA to 20mA corresponding to input voltages from 0 to 5V</p>	<ul style="list-style-type: none"> ➤ Rig up the circuit ➤ Apply correct levels of Input signals ➤ Measure the Input / Output Voltages and currents using DMM 	<ul style="list-style-type: none"> ▪ Apply correct levels of Input signals ▪ Measure the Input / Output Voltages and currents using DMM ▪ Use opamp as V/I converter

9	<p>To implement Sine wave Oscillator Circuits using OpAmp CA 3011</p> <p>a) RC-phase shift oscillator</p> <p>b) Wien bridge oscillator</p>	<ul style="list-style-type: none"> ➤ Familiarize with CA 3011 pin configuration ➤ Choose correct values for frequency determining components ➤ Rig up the circuit Observe & measure the output waveform on CRO ➤ Change RC component Values & Observe the effect on output signal on CRO 	<ul style="list-style-type: none"> ▪ Choose correct values for frequency determining components ▪ Observe & measure the output waveform on CRO ▪ Change RC component Values & Observe the effect on output signal on CRO ▪ Use CA3011 Opamp for single supply applications
10	<p>To implement & test Op-Amp Relaxation Oscillators</p> <p>a) To implement Monostable multivibrator circuit and observe output waveforms on CRO</p> <p>b) To Implement Astable multivibrator observe output waveforms on CRO</p>	<ul style="list-style-type: none"> ➤ Choose correct values for frequency determining components ➤ Rig up the circuit Observe & measure the output waveform on CRO ➤ Change RC component Values & Observe the effect on output signal on CRO 	<ul style="list-style-type: none"> ▪ Choose correct values for frequency determining components ▪ Observe & measure the output waveform on CRO ▪ Change RC component Values & Observe the effect on output signal on CRO ▪ Design Opamp circuits for pulse & square wave generator applications
11	<p>To Verify different modes of 555 IC.</p> <p>a) Implement Monostable multi vibrator</p> <p>b) Implement Astable multivibrator</p>	<ul style="list-style-type: none"> ➤ Choose correct values for frequency determining components ➤ Rig up the circuit Observe & measure the output waveform on CRO c. Change RC component Values & Observe the effect on output signal on CRO 	<ul style="list-style-type: none"> ▪ Choose correct values for frequency determining components ▪ Observe & measure the output waveform on CRO ▪ Change RC component Values & Observe the effect on output signal on CRO

eCAD LAB practice			
12	Familiarize with the PSPICE modelling using eCAD software A. Representation of passive elements B. Representation of active elements C. Representation of time Vary signals D. Representation of nodes	<ul style="list-style-type: none"> ➤ Use pspice interface ➤ Define circuit parameters ➤ Model the circuit ➤ Simulate the circuit ➤ Observe and interpret results ➤ Saving the files 	<ul style="list-style-type: none"> ▪ Use Pspice/or eCAD tools for circuit simulation and debugging ▪ .Set circuit parameters
13	To simulate half wave and full wave rectifier circuits with filters and assess the performance	<ul style="list-style-type: none"> ➤ Define circuit parameters ➤ Model the circuit ➤ Simulate the circuit ➤ Observe and interpret results ➤ Save the files 	<ul style="list-style-type: none"> ▪ Use Pspice/or eCAD tools for circuit simulation and debugging ▪ Setcircuit parameters
14	To simulate 12v Zener regulator circuit and assess the performance for various loads.	<ul style="list-style-type: none"> ➤ Define circuit parameters ➤ Model the circuit ➤ Simulate the circuit ➤ Observe and interpret results ➤ Save the files 	<ul style="list-style-type: none"> ▪ Use Pspice/or eCAD tools for circuit simulation and debugging ▪ .Setcircuit parameters
15	To Simulate of CE amplifier and observe the effect of disconnecting bypass capacitor.	<ul style="list-style-type: none"> ➤ Define circuit parameters ➤ Model the circuit ➤ Simulate the circuit ➤ Observe and interpret results ➤ Save the files 	<ul style="list-style-type: none"> ▪ Use Pspice/or eCAD tools for circuit simulation and debugging ▪ .Setcircuit parameters
16	To simulate Single stage RC coupled Amplifier circuit and observe the effect of change in component values on output waveform	<ul style="list-style-type: none"> ➤ Define circuit parameters ➤ Model the circuit ➤ Simulate the circuit ➤ Observe and interpret results ➤ Save the files 	<ul style="list-style-type: none"> ▪ Use Pspice/or eCAD tools for circuit simulation and debugging ▪ Set circuit parameters
17	To simulate JFET Common source Amplifier circuit and observe the effect of change in gate bias.	<ul style="list-style-type: none"> ➤ Define circuit parameters ➤ Model the circuit ➤ Simulate the circuit ➤ Observe and interpret results ➤ Save the files 	<ul style="list-style-type: none"> ▪ Use Pspice or eCAD tools for circuit simulation and debugging ▪ Set circuit parameters

18	To simulate Colpitts oscillator circuit and observe the effect of change in component values.	<ul style="list-style-type: none"> ➤ Define circuit parameters ➤ Model the circuit ➤ Simulate the circuit ➤ Observe and interpret results ➤ Save the files 	<ul style="list-style-type: none"> ▪ .Use Pspice/or eCAD tools for circuit simulation and debugging ▪ Set circuit parameters
19	To simulate Hartley oscillator circuit and observe the effect of change in component values.	<ul style="list-style-type: none"> ➤ Define circuit parameters ➤ Model the circuit ➤ Simulate the circuit ➤ Observe and interpret results ➤ Save the files 	<ul style="list-style-type: none"> ▪ Use Pspice/or eCAD tools for circuit simulation and debugging ▪ .Set circuit parameters
20	To simulate transistor Astable multivibrator circuit and observe the effect of change in component values.	<ul style="list-style-type: none"> ➤ Define circuit parameters ➤ Model the circuit ➤ Simulate the circuit ➤ Observe and interpret results ➤ Save the files 	<ul style="list-style-type: none"> ▪ .Use Pspice/or eCAD tools for circuit simulation and debugging ▪ .Set circuit parameters

FIELD PRACTICES

Subject Title	:	Field Practices
Subject code	:	AEI-510
Periods/Week	:	07
Periods/Semester	:	105

Rationale: Field practices subject is introduced as an alternative for industrial Training. This course is aimed at imparting same skills a student would acquire in the industry during the initial training period. In other words, industry-like environment is simulated in the institution during this course to prepare the students for industry.

TIME SCHEDULE

S. No.	Practice	No. of Periods
1.	Standard practices in the Industry	10
2.	Manufacturing	35
3.	Maintenance & Servicing	36
4	Organising	12
5	Documentation & Data processing	12
	Total	105

Note :

- i) **All the seven periods should be conducted on the same day for practice and to ensure contiguity.**
- ii) **General List Of Industry Practices are mentioned (Other Industry practices may be added)**

I. Standard practices in the Industry

1. Practice Industrial Safety, First Aid, dress code, tie, shoe etc...)
 - i) To Keep workplace clean and tidy.
 - ii) To handle material with due precautions and care
 - iii) To maintain/house keeping the Laboratories/work area
 - iv) To follow Industry Mannerisms and Etiquette (Greeting , Smiling , Shaking hands - Polite conversation, Requesting etc) –To practice the use first aid and fire extinguishers

II. Manufacturing

2. **a)** carry out following activities
 - i) Prepare wires ii) Practice wire bunching iii) Make wire tips/joints iv) Keep the component set ready for population on PCB
 - b)** Set up layout for work space for fabrication .
 - c)** Supervise Manufacturing/ Testing activities.
3. Practice soldering of SMD components
4. Design /Prepare drawing for an electronic circuit/ equipment
 - i) Manually
 - ii) Using software tools
5. Fabricate /Rig up Prototype circuit
 - i) To prepare circuit boards for the experiments mentioned in the curriculum and test.
6. Prepare required test jigs or circuits for the above and test
7. Trouble shoot the faults in the equipment using CRO, DMM, Logic Analyzer etc.
8. Carry out Reverse Engineering(Decode the circuit from a circuit board and interpret/identify the circuit
9. Follow the standard procedures/Instructions given in the Equipment manual to operate and set up the equipment
10. Work with sophisticated tools/equipment used in electronic industry as per standard procedure
11. Calibration of resistance temperature transducer (PT100)
12. Use software tools like Pspice , Multisim , Matlab etc and design the circuits
13. Carry out Quality assurance Tests

III. Maintenance & Servicing

- 14. Maintain a) Electrical wiring/equipment in the laboratory b) Institute Earthing c) UPS Batteries
- 15. General maintenance of a) Bio-medical Equipment(X-ray machine, ECG, EEG etc.)
b) Process control Equipment (temperature controller, Pressure and level controller)
- 16. Maintain/Troubleshoot computers and Computer Networks in the institute
- 17. Install and Test equipment like i) UPS ii) inverters, iii) Servo stabilizers

IV. Organising

- 18. Prepare i) Inventory, ii) follow industry procedures, iii) Maintain log iv) housekeeping v) Documentation
- 19. Carry out market survey to find the resources , Equipment suppliers etc.
- 20. Organize seminars , Events and presentations.
i) To Set up Computer-LCD projector / PA system , etc

V. Documentation & Data processing

practice Data processing on computer

- i) Browse the internet and search for the most relevant information on latest trends in communication engineering (or any other engineering topic) and prepare a report /presentation

- V. Prepare Project reports/Manuals for the kits prepared

Competencies and Key Competencies to be achieved

Exp No	Name of the Experiment	Competencies	Key Competencies
1	To Practice Industrial Safety, First Aid, dress code, tie, shoe etc... i) To Keep workplace clean and tidy. ii) To maintain the Laboratories iii) To follow Industry Mannerisms and Etiquette (Greeting , Smiling , Shaking hands - Polite conversation, Requesting etc) – iv) To practice the use first aid and fire extinguishers	<ul style="list-style-type: none"> ➤ Clean the equipment ➤ Follow Industry mannerisms ➤ Use first aid & act under emergencies ➤ Maintain Laboratories 	<ul style="list-style-type: none"> ▪ Follow Industry mannerisms ▪ Maintain Laboratories ▪ Use first aid & act under emergencies
2	To carryout following activities i) prepare wires ii) Practice wire bunching iii) Make wire tips/joints iv) Keep the component set ready for population on PCB b) To Prepare layout for workspace to carry fabrication c) To Supervise fabrication activities	To prepare <ul style="list-style-type: none"> ➤ Wire tips ➤ Bunching ➤ Select components ➤ Set up experiment ➤ Supervise 	<ul style="list-style-type: none"> ▪ To prepare ▪ Wire tips ▪ Bunching ▪ Select components ▪ Set up experiment ▪ Supervise
3	To Practice soldering of SMD components	<ul style="list-style-type: none"> ➤ Handle SMD components ➤ Solder SMD components with proper precautions ➤ Testing the soldered joints 	<ul style="list-style-type: none"> ▪ Handle SMD components ▪ Solder SMD components with proper precautions ▪ Testing the soldered joints
4	To Design /Prepare drawing for an electronic circuit/ equipment i) Manually ii) Using software tools	<ul style="list-style-type: none"> ➤ Prepare drawings /Circuits and layouts both manually and by using computer 	<ul style="list-style-type: none"> ▪ Prepare drawings /Circuits and layouts both manually and by using computer

5	To fabricate /Rig up Prototype circuit	<ul style="list-style-type: none"> ➤ To prepare prototypes ➤ Carry out necessary modifications ➤ Testing ➤ Troubleshooting ➤ Search resources 	<ul style="list-style-type: none"> ▪ To prepare prototypes ▪ Carry out necessary modifications ▪ Testing ▪ Troubleshooting ▪ Search resources
6	To prepare required test jigs or circuits for the above and test	<ul style="list-style-type: none"> ➤ Prepare/Design suitable test jigs ➤ Test the circuits 	<ul style="list-style-type: none"> ▪ Prepare/Design suitable test jigs ▪ Test the circuits
7	To Trouble shoot the faults in the equipment using 4 Channel DSCRO DMM, Logic Analyzer Spectrum analyzer etc.	<ul style="list-style-type: none"> ➤ Identify the fault ➤ Troubleshoot ➤ Replace/Substitute ➤ Rectify the problem 	<ul style="list-style-type: none"> ▪ Identify the fault ▪ Troubleshoot ▪ Replace/Substitute ▪ Rectify the problem
8	To carry out Reverse Engineering(Decode the circuit from a circuit board and interpret/identify the circuit	<ul style="list-style-type: none"> ➤ Reading the circuit Diagrams ➤ Identifying the circuit in the PCB ➤ Decoding the circuit ➤ Preparing a drawing ➤ Verifying the drawing ➤ Implement the circuit ➤ Testing the circuit ➤ Modifying ➤ Prepare prototype 	<ul style="list-style-type: none"> ▪ Reading the circuit Diagrams ▪ Identifying the circuit in the PCB ▪ Decoding the circuit ▪ Preparing a drawing ▪ Verifying the drawing ▪ Implement the circuit ▪ Testing the circuit ▪ Modifying ▪ Prepare prototype
9	To follow the standard procedures/Instructions given in the Equipment manual to operate and set up the equipment	<ul style="list-style-type: none"> ➤ Read the Instructions and Follow ➤ operate the equipment as per procedure ➤ Verify the results 	<ul style="list-style-type: none"> ▪ Read the Instructions and Follow ▪ operate the equipment as per procedure ▪ Verify the results
10	To work with sophisticated tools/equipment used in electronic industry as per standard procedure	<ul style="list-style-type: none"> ➤ work with sophisticated tools/equipment used in electronic industry as per standard procedure ➤ Follow due precautions 	<ul style="list-style-type: none"> ▪ work with sophisticated tools/equipment used in electronic industry as per standard procedure ▪ Follow due precautions
11	To use software tools like Pspice , Multisim , Matlab or any other simulation softwares. and design the circuits	<ul style="list-style-type: none"> ➤ use software tools like Pspice , Multisim , Matlab etc for designing the circuits ➤ Implement the circuit ➤ Modify using software tools 	<ul style="list-style-type: none"> ▪ use software tools like Pspice , Multisim , Matlab etc for designing the circuits ▪ Implement the circuit ▪ Modify using software tools

13	To maintain a) Electrical wiring/equipment in the laboratory b) Institute Earthing c) UPS Batteries	<ul style="list-style-type: none"> ➤ Replace fuses- ➤ Repair Power cords ➤ Replace faulty Sockets and Plugs ➤ Replace faulty Tube lights/Lamps ➤ Maintain earthing ➤ Maintain UPS Batteries 	<ul style="list-style-type: none"> ▪ Replace fuses- ▪ Repair Power cords ▪ Replace faulty Sockets and Plugs ▪ Replace faulty Tube lights/Lamps ▪ Maintain earthing ▪ Maintain UPS Batteries
14	To maintain/Troubleshoot computers and Computer Networks in the institute	<ul style="list-style-type: none"> ➤ Act as Computer administrator in the computer lab ➤ Maintain LAN ➤ Install/Run Antivirus ➤ Remove unwanted files ➤ Rectify any computer problems 	<ul style="list-style-type: none"> ▪ Act as Computer administrator in the computer lab ▪ Maintain LAN ▪ Install/Run Antivirus ▪ Remove unwanted files ▪ Rectify any computer problems
15	General maintenance of a) Bio-medical Equipment(X-ray machine, ECG, EEG etc.) b) Process control Equipment (temperature controller, Pressure and level controller)	<ul style="list-style-type: none"> ➤ Follow standard procedure to maintain the equipment ➤ Follow due precautions ➤ Follow standard procedure to maintain the equipment ➤ Follow due precautions 	<ul style="list-style-type: none"> ▪ Maintain the equipment ▪ Fix simple problems ▪ Maintain the equipment ▪ Fix simple problems
16	To Install and Test equipment like i) UPS ii) inverters, iii) Servo stabilizers	<ul style="list-style-type: none"> ➤ Install Laboratory Equipment as per procedure ➤ Install UPS ➤ Make special wiring for UPS/Inverter ➤ Install Servo Stabilizer 	<ul style="list-style-type: none"> ▪ Install Laboratory Equipment as per procedure ▪ Install UPS ▪ Make special wiring for UPS/Inverter ▪ Install Servo Stabilizer
17	To prepare i) Inventory ii) follow industry procedures, iii) Maintain log iv) housekeeping	<ul style="list-style-type: none"> ➤ Prepare Bill of materials ➤ Material requirement ➤ Place indent ➤ Maintain log ➤ Reporting ➤ House keeping 	<ul style="list-style-type: none"> ▪ Prepare Bill of materials ▪ Material requirement ▪ Place indent ▪ Maintain log ▪ Reporting ▪ House keeping

18	To carry out market research to find the resources	<ul style="list-style-type: none"> ➤ Identify the product/component ➤ Search for similar / same items ➤ Compare features ➤ Check the Price/cost effectiveness ➤ Test the product for suitability ➤ Find the Suppliers 	<ul style="list-style-type: none"> ▪ Identify the product/component ▪ Search for similar / same items ▪ Compare features ▪ Check the cost effectiveness ▪ Test the product for suitability ▪ Find the Suppliers
19	To organize seminars Events and presentations. i) To Set up Computer-LCD projector / PA system , etc	<ul style="list-style-type: none"> ➤ Organize Events/Seminars ➤ Exhibit Leadership qualities ➤ Show Creativity ➤ Time management skills ➤ Set up laptop LCD projector etc for the event 	<ul style="list-style-type: none"> ▪ Organize Events/Seminars ▪ Exhibit Leadership qualities ▪ Demonstrate Creativity ▪ Use Time management skills ▪ Set up laptop LCD projector etc for the event
20	To practice Data processing on computer i) To browse the internet and search for the most relevant information on latest trends in communication engineering (or any other engineering topic) and prepare a report /presentation	<ul style="list-style-type: none"> ➤ Use computer ➤ Browse internet &search ➤ Download information ➤ Convert formats ➤ Prepare reports ➤ Prepare Presentation ➤ Save them into cloud storage 	<ul style="list-style-type: none"> ▪ Use computer for ▪ Checking mails/assignments/ notices etc ▪ Upload /Download information ▪ Search the web for required information ▪ Prepare laboratory Documentation
21	To prepare Project reports/Manuals for the kits prepared	<ul style="list-style-type: none"> ➤ Use MS Word ➤ Browse and search the internet ➤ Download information ➤ Convert formats 	<ul style="list-style-type: none"> ▪ Use MS Word ▪ Browse and search the internet ▪ Download information ▪ Convert formats

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VI Semester

DIPLOMA IN APPLIED ELECTRONICS AND INSTRUMENTATION ENGINEERING

SCHEME OF INSTRUCTIONS AND EXAMINATIONS VI Semester

Subject Code	Name of the Subject	Instruction period / week		Total Period / Sem	Scheme of Examination			
		Theory	Practical/ Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
THEORY:								
AEI- 601	<i>Industrial Management</i>	4	-	60	3	20	80	100
AEI-602	Industrial Automation	5	-	75	3	20	80	100
AEI - 603	Communication Engineering	4	-	60	3	20	80	100
AEI - 604	Instrumentation in Process Industries	4	-	60	3	20	80	100
AEI - 605	Bio-medical Instrumentation	4	-	60	3	20	80	100
PRACTICAL:								
AEI-606	PLC & SCADA Lab	-	3	45	3	40	60	100
AEI- 607	Analytical and Biomedical Instrumentation Lab Practice	-	3	45	3	40	60	100
AEI -608	Virtual Instrumentation Lab Practice	-	3	45	3	40	60	100
AEI -609	Computer Hardware Lab Practice		6	90	3	40	60	100
AEI -610	<i>Project work</i>	-	6	90	3	40	60	100
TOTAL		21	21	630	-	300	700	1000

INDUSTRIAL MANAGEMENT

Subject Title : INDUSTRIAL MANAGEMENT
 Subject Code : AEI-601
 Periods/Week : 04
 Periods/semester : 60

TIME SCHEDULE

Sl. No.	Major Topics	Periods	Weightage of marks	Short questions	Essay questions
1.	Overview Of Business	4	6	2	0
2.	Management Process	6	13	1	1
3.	Organizational Management	6	13	1	1
4.	Human Resource Management	12	23	1	2
5.	Financial Management	10	16	2	1
6.	Materials Management	8	13	1	1
7.	Project Management	14	26	2	2
	Total	60	110	10	8

OBJECTIVES

Upon completion of the course the student shall be able to

1.0 Understand the basics of Business

- 1.1 Define Business
- 1.2 Give the features of a business.
- 1.3 State the Types of Business (Service, Manufacturing, Trade)
- 1.4 Explain the business procedures in Process industry.
- 1.5 Explain the business procedures in Textile industry.
- 1.6 Explain the business procedures in Chemical industry.

- 1.7 Explain the business procedures in Agro industry.
- 1.8 State the need for Globalization.
- 1.9 List the Advantages & Disadvantages of globalization w.r.t. India.
- 1.10 Explain the importance of Intellectual Property Rights (I.P.R.)

2.0 Understand Management Process:

- 2.1 Define Management.
- 2.2 Explain the concept of management
- 2.3 Explain the Different Levels of management
- 2.4 Explain Administration & management
- 2.5 State the principles of Scientific management by F.W.Taylor
- 2.6 State the principles of Management by Henry Fayol (14 principles)
- 2.7 List the Functions of Management
 - i) Planning
 - ii) Organizing
 - iii) Directing
 - iv) Controlling
- 2.8 Explain the Planning Function of Management.
- 2.9 Explain the Organizing Function of Management.
- 2.10 Explain the Directing Function of Management.
- 2.11 Explain the Controlling Function of Management.

3.0 Understand the need for Organizational Management

- 3.1 Define Organization
- 3.2 List the Types of organization :a) Line b) Line & staff c) Functional d) Project
- 3.3 Explain the four types of organization.
- 3.4 Define departmentation.
- 3.5 Explain the Centralized & Decentralized type of departmentations
- 3.6 Explain the Authority & Responsibility type of departmentations

- 3.7 Explain the Span of Control type of departmentations
- 3.8 Explain the Proprietorship Form of ownership
- 3.9 Explain the Partnership Form of ownership
- 3.10 Explain the Joint stock Form of ownership
- 3.11 Explain the Co-operative Society Form of ownership
- 3.12 Explain the Govt. Sector Form of ownership
- 4.0 Understand the need for Human Resource Management**
- 4.1 Define Personal Management.
- 4.2 Explain the functions of Personal Management
- 4.3 Define Staffing .
- 4.4 State the importance of HR Planning.
- 4.5 Explain the various Recruitment Procedures.
- 4.6 Explain the need for Training & Development .
- 4.7 State the various types of training procedures(Induction, Skill Enhancement etc)
- 4.8 State the different types of Leaderships,
- 4.9 Explain the Maslow's Theory of Motivation
- 4.10 Explain the Causes of accident and the Safety precautions to be followed.
- 4.11 Explain the importance of various Acts – Factory Act, ESI Act, Workmen Compensation Act, Industrial Dispute Act etc.
- 5.0 Understand the basics of Financial Management**
- 5.1 State the Objectives of Financial Management.
- 5.2 State the Functions of Financial Management.
- 5.3. State the necessity of Capital Generation & Management.
- 5.4 List the types of Capitals.
- 5.5 List the Sources of raising Capital.
- 5.6 Explain the Production Budget (including Variance Report)
- 5.7 Explain the Labour Budget.
- 5.8 Describe Profit & Loss Account (only concepts) .

- 5.9 Describe the proforma of Balance Sheet.
- 5.10 Explain i) Excise Tax ,
ii) Service Tax
iii) Income Tax
iv) VAT
v) Custom Duty.
- 6.0 Understand the importance of Materials Management**
- 6.1. Define Inventory Management (No Numerical).
- 6.2 State the objectives of Inventory Management.
- 6.3 Explain ABC Analysis.
- 6.4 State Economic Order Quantity.
- 6.5 Describe the Graphical Representation of Economic Order Quantity.
- 6.6 State the objectives of Purchasing.
- 6.7 State the functions of Purchase Department.
- 6.8 Explain the steps involved in Purchasing.
- 6.9 State the Modern Techniques of Material Management.
- 6.10 Describe the JIT / SAP / ERP packages.
- 7.0 Understand the importance of Project Management**
- 7.1 State the meaning of Project Management.
- 7.2 Describe the CPM & PERT Techniques of Project Management.
- 7.3 Explain the critical path and find the project duration.
- 7.4 Explain the concept of Break Even Analysis
- 7.5 Define Quality.
- 7.6 State the concept of Quality.
- 7.7 Describe the various Quality Management systems.
- 7.8 Explain the importance of Quality policy, Quality control, Quality Circle.
- 7.9 State the principles of Quality Assurance.
- 7.10 State the concepts of TQM , Kaizen 5's and 6 sigma.
- 7.11 State the constituents of ISO 9000 series standards.

Course contents :**1.0 Overview of Business:**

Business - types of business in various sectors- service, manufacturing & trade- Industrial sectors – Engineering, process, Textile, Chemical, Agro industries – Globalization and effect of globalization – advantages and Disadvantages- Intellectual Property Rights (I.P.R.)

2.0 Management process

Concept of management – levels of management – Scientific management – by FW Taylor – Principles of management- functions of management – Administration – management.

3.0 Organization management

Organization – types of organization(line, line & staff, staff & project) – Departmentation – Classification (centralized, decentralized, Authority, Responsibility, and span of control – Forms of Ownership – Proprietorship – Partnership – Joint stock – Co-operative society and Government sectors.

4.0 Human resource Management

Personal Management – Staffing – Introduction to HR planning – Recruitment procedures – Types of Trainings –Personal training – skill development training – Leaderships – types – Motivation – Maslows theory – Causes of accidents – safety precautions – Factory Act – Workmen compensation Act – Industrial disputes Act- ESI Act.

5.0 Finance Management

Introduction – Objectives of Financial Management – Types of capitals – sources of raising capital – Types of budgets – production budgets – labour budgets – Concept of Profit loss Account – Concept of balance sheet – proforma – types of taxes – brief concepts of – Excise Tax, Service Tax, Income Tax, VAT and custom duty.

6.0 Material Management

Inventory Management – objectives of Inventory Management – ABC Analysis – Economic order Quality – Purchasing – Objectives of purchasing – Functions – Procedures – Material Management - JIT / SAP / ERP.

7.0 Project Management

Introduction – CPM & PERT – concept of Break event Analysis – quality system - Definition of Quality , concept of Quality , Quality policy, Quality control, Quality Circle, Quality Assurance, Introduction to TQM- Kaizen 5's and 6 sigma concepts, ISO 9000 series standards.

REFERENCES

1. Dr. O.P. Khanna - Industrial Engg & Management-Dhanpath Rai & sons New Delhi
2. Dr. S.C. Saxena & W.H. Newman & E.Kirby Warren-Business Administration & Management -Sahitya Bhavan Agra
3. Andrew R. McGill -The process of Management-Prentice- Hall
4. Rustom S. Davar -Industrial Management-Khanna Publication
5. Banga & Sharma -Industrial Organization & Management -Khanna Publication
6. Jhamb & Bokil -Industrial Management -Everest Publication, Pune.

INDUSTRIALAUTOMATION

Subject Title : INDUSTRIALAUTOMATION
Subject code : AEI-602
Periods/Week : 05
Periods/Semester : 75

TIME SCHEDULE

Sl. No	Major Topics	Periods	Weightage	Short Questions	Essay Questions
1.	Basics of PLC	15	26	02	02
2.	PLC Programming	20	29	03	02
3.	SCADA	15	13	01	01
4.	Computer Control in Automation	15	29	03	02
5.	Introduction to Embedded systems	10	13	01	01
	Total	75	110	10	08

OBJECTIVES

Upon completion of the course the student shall be able to

1.0 Understand basics of PLC

- 1.1 State the Importance of Automation
- 1.2 Give the concept of Relay based Control panel.
- 1.3 List the components of relay based control panel.
- 1.4 Define Programmable Logic Controller(PLC)
- 1.5 List the components of PLC based control panel.
- 1.6 Compare Relay based and PLC based Control panels.
- 1.7 Explain the Block diagram of PLC.
- 1.8 Explain the operation cycle of a PLC.

- 1.9 List different types of PLCs.
- 1.10 Explain the Interfacing of PLC with PC.

2.0 Understand PLC Programming

- 2.1 Mention different types of PLC programming
- 2.2 Define Ladder diagram
- 2.3 Mention the Rules for drawing Ladder diagram
- 2.4 List PLC Instruction set.
- 2.5 Draw the ladder diagrams for AND, OR gates
- 2.6 Explain Timers-T ON, T OFF and Retentive timer with ladder diagram.
- 2.7 Explain Counter instructions for CTU, CTD
- 2.8 Explain ladder diagrams on arithmetic and comparison instructions
- 2.9 Draw ladder diagrams for DOL starter.
- 2.10 Draw ladder diagrams for STAR-DELTA starter.
- 2.11 Draw ladder diagrams for Sequential control of induction motors.
- 2.12 Draw ladder diagrams for Traffic lights.
- 2.13 Draw ladder diagrams for Level control.
- 2.14 Draw ladder diagrams for conveyer belt.

3.0 Understand the concepts of SCADA

- 3.1 Define SCADA
- 3.2 State the need of SCADA in industry.
- 3.3 Draw the hardware architecture of SCADA.
- 3.4 Explain the hardware architecture of SCADA.
- 3.6 List the three main components of a SCADA.
- 3.7 Explain Remote Terminal Unit of SCADA.
- 3.8 Explain Master Station of SCADA.
- 3.9 Explain communication infrastructure of SCADA.
- 3.10 Explain the Creation of graphic symbols using Graphic Display builder.
- 3.11 Explain creation of tags using SCADA.

- 3.12 State the need of interfacing of SCADA with PLC.
- 3.13 Explain Interfacing of SCADA with PLC.
- 3.14 List the applications of SCADA
- 4.0 Understand Computer Control in Automation**
- 4.1 Explain the role of Computers in Process control
- 4.2 Explain the block diagram of Data Logger
- 4.3 List the applications of Data Logger
- 4.4 List the specifications of a Data Logger
- 4.5 Explain the block diagram of Data acquisition system (DAQ)
- 4.6 Explain the block diagram of Distributed Digital Control System (DDC)
- 4.7 Define a Robot
- 4.8 List the applications of a Robot
- 4.9 Explain the working of CNC Machine
- 4.10 List the four application of CNC Machine
- 5.0 Understand the basics of Embedded Systems**
- 5.1 Explain the concept of Embedded system.
- 5.2 Explain Real Time operations.
- 5.3 Mention the six important applications of Embedded systems.
- 5.4 List the components of Embedded system.
- 5.5 Explain the hardware features of Embedded system.
- 5.6 Explain the software architecture of Embedded system.
- 5.7 List the commonly used processors in Embedded systems.
- 5.8 Explain the serial communications using USB.
- 5.9 Explain the process of Embedded system development.
- 5.10 State the features of RISC (Reduced instruction set computing) processor architecture.
- 5.11 State the features of CISC (Complex instruction set computing) processor architecture.

COURSE CONTENT**1.0 Introduction to PLC**

Importance of automation- relay based control panel- components in relay based control panel and plc based control panel- PLC Definition- Block diagram-

Explanation-compare relay based and plc based control panel- different types of PLCs- -Interfacing PLC and PC.

2.0 PLC Programming

Types of PLC programming-ladder diagram definition- - rules for programming and ladder diagrams -Instruction set- Ladder diagram for AND, OR, timers TON, TOFF and retentive timers- counter instructions CTU, CTD- Ladder program for arithmetic, comparison instructions, DOL starter, Star-Delta Starter, sequential control of induction motor, Traffic light control, level controller- conveyer belt.

3.0 SCADA

SCADA definition, need of SCADA, Architecture and explanation, remote terminal unit, master station, communication infrastructure of SCADA, Graphical symbols used in SCADA , tags creation in SCADA, Interfacing of SCADA with PLC, Applications

4.0 Computer Control in Automation

Role of computers in process control, block diagram of Data Logger, Data Acquisition, Distributed Digital Control Systems, Applications. Robot definition. CNC Machine, applications of robot and CNC machine.

5.0 Embedded Systems:

Concept of Embedded systems, real time operations, applications, components, and software and hardware architectures, processors of embedded systems, serial communication using USB, Process of Embedded system development, features of RISC and CISC.

REFERENCE BOOKS

1. Industrial automation and process control by Jon Sterenson
2. Programmable Logic controllers by John W.Webb
3. Introduction to PLC by Gary Dunning- Delmar Cengage learning.
4. Embedded Real Time Systems-Dr KVKK Prasad.

COMMUNICATION ENGINEERING

Sub title : Communication Engineering
 Sub code : AEI-603
 Periods / week : 04
 Periods/ semester : 60

TIME SCHEDULE

S. No	Topics	No.of periods	Weightage of marks	Short Answer Questions	Essay Type Questions
01	Analog communication	15	26	2	2
02	AM and FM detectors, receivers	15	26	2	2
03	Pulse modulation	10	21	2	1½
04	Modern communication	10	21	2	1½
05	Computer Communication	10	16	2	1
	Total	60	110	10	8

OBJECTIVES

Upon completion of the course the student shall be able to

1.0 Understand Analog communication

- 1.1 State the need for Modulation in communication system.
- 1.2 Mention the three types of analogue modulation techniques.
- 1.3 Explain the process of Amplitude modulation (AM)
- 1.4 Give the expression for AM waveform
- 1.5 Explain the generation of side bands
- 1.6 Draw the spectrum of AM wave
- 1.7 Define the term Bandwidth.
- 1.8 Determine the bandwidth of AM wave
- 1.9 Mention the merits and demerits of Amplitude modulation
- 1.10 Explain AM generation using Transistor
- 1.11 Draw the block diagram of AM transmitter
- 1.12 Explain the working of AM transmitter.
- 1.13 Define FM.
- 1.14 Draw the waveforms of FM signal , carrier signal and modulating signal
- 1.15 Mention the 4 important merits and demerits of FM.
- 1.16 Mention the applications of FM
- 1.17 Explain i) single sideband (SSB), ii) Double sideband (DSB) iii) Vestigial sideband (VSB) modulation techniques.
- 1.18 Compare AM and FM. Techniques
- 1.19 Define Phase modulation.
- 1.20 Give the expression for Phase modulated wave.
- 1.21 Compare FM and PM.
- 1.22 Explain FM generation by using a) Reactance tube and b) Varactor diode
- 1.23 Draw the block diagram of FM Transmitter
- 1.24 Explain the working of FM transmitter.

2.0 Understand the AM and FM detectors / RecAEIvers.

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- 2.1 Classify radio receivers
 - 2.2 Explain the principle of TRF receiver
 - 2.3 Explain Heterodyning in Radio receiver
 - 2.4 Explain the need for heterodyning in a Radio receiver
 - 2.5 Draw the block diagram of super heterodyne receiver
 - 2.6 Explain the function of each block of super heterodyne receiver
 - 2.7 Define Selectivity, Sensitivity and fidelity.
 - 2.8 Explain basic principle of AM and FM detector.
 - 2.9 Explain single diode detector circuit.
 - 2.10 List two types FM demodulator circuits.
 - 2.11 Explain Fosters – Seely Demodulator.
 - 2.12 Explain FM receivers Circuit.
- 3.0 Understand the Basic principle of pulse modulation**
- 3.1 Explain the principle of pulse modulation.
 - 3.2 List different types of pulse modulation methods.
 - 3.3 Sketch the waveforms of PAM.
 - 3.4 Sketch the waveforms of PPM.
 - 3.5 Sketch the waveforms of PWM.
 - 3.6 Sketch the waveforms of PCM.
 - 3.7 Compare between PAM, PPM, PWM and PCM.
 - 3.8 List the applications of PAM.
 - 3.9 List the applications of PPM.
 - 3.10 List the applications of PWM.
 - 3.11 List the applications of PCM
 - 3.12 List different types of multiplexing methods and explain them with neat sketches.
- 4.0 Understand Modern Communication Systems**
- 4.1 State the basic principle of Radar with a block diagram.
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- 4.2 Explain the working principle of transmitter used in fiber optic communication system.
 - 4.3 Explain the working principle of receivers used in fiber optic communication system.
 - 4.4 Explain the principle of Satellite communication system.
 - 4.5 Explain features of GSM technology.
 - 4.6 Explain different channels, Transmission, Reception in GSM technology.
 - 4.7 Explain SIM Card of Cell Phone.
 - 4.8 Explain the features of CDMA technology.
 - 4.9 Explain Channel Allocation in CDMA technology.
 - 4.10 Compare CDMA & GSM.
- 5.0 Understand Computer Communication**
- 5.1 Define networking.
 - 5.2 Distinguish between LAN, WAN, and Networking
 - 5.3 Explain Internet Communication.
 - 5.4 Explain E-mail, Online chat, News group
 - 5.5 Explain Video conferencing with a block diagram.
 - 5.6 Give the concepts of VOIP
 - 5.7 Explain the need for Network security
 - 5.8 Explain the need for VPN, PPP
 - 5.9 Explain the need for Routers, ISDN, VSAT
 - 5.10 Mention the features of Routers.
 - 5.11 Mention the features of ISDN.
 - 5.12 Explain about VSAT.
 - 5.13 State the features of ATM, Modem and Cable modem.
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COURSE CONTENTS**1. Analog Communication**

Need of Modulation, Types of modulation (AM, FM, PM, SSB, DSB and VSB), Generation of AM, expression for AM waveforms, generation of side bands, definitions of bandwidth, FM and phase modulation, comparison of AM and FM, generation of FM (reactance tube and varactor diode), expression for FM and PM, AM Transmitter, FM Transmitter.

2. AM and FM Detectors / RecAEIvers

Classification of radio RecAEIvers, TRF RecAEIver, heterodyning, need of heterodyning, Super heterodyne RecAEIver, need of RF and IF amplifiers, Selectivity, Sensitivity and Fidelity, AM and FM detectors, single Diode detector, Foster Seely Demodulator, FM RecAEIver.

3. Pulse Modulation

Principle of pulse modulation, PAM, PWM, PPM, PCM, comparison of PAM, PWM, PPM, PCM and Applications of PAM, PWM, PPM, PCM, Multiplexing methods.

4. Modern communication systems

Principle of Radar, transmitter and recAEIver used in Fiber optic communication, Satellite communication, GSM technology (channels, transmission, reception), SIM Card of cell phone, CDMA, channel allocation in CDMA, Reception, comparison of CDMA and GSM.

5. Computer communication

Networking definition, difference between LAN, WAN, Networking, Internet communication, E-mail, Online chat, new group, Video conferencing, VOIP, need of Network security, VPN PPP, Routers, ISDN, VSAT, ATM, Modem, Cable Modem.

REFERENCE BOOKS

1. Communication Systems by George Kennedy
2. Fiber Optic Communication by Gover
3. Computer Networks by Tenen Baum.
4. Mobile Cellular Telecommunications by William C.Y. Lee

INSTRUMENTATION IN PROCESS INDUSTRIES

Subject Title : INSTRUMENTATION IN PROCESS INDUSTRIES

Subject Code : AEI – 604

Periods per week : 04

Periods per semester : 60

TIME SCHEDULE

S.No	Topics	No.of periods	Weightage of marks	Short Answer Questions	Essay Type Questions
01	Power Plant Instrumentation	20	36	2	3
02	Petro Chemical plant Instrumentation	15	19	3	1
03	Iron and Steel Plant Instrumentation	10	26	2	2
04	Pulp and Paper Plant Instrumentation	15	29	3	2
	Total	60	110	10	8

OBJECTIVES

Upon completion of the course the student shall be able to

1.0 Understand Power Plant Instrumentation (PPI)

- 1.1 Explain the Importance of measurement and instrumentation in power plant.
- 1.2 Mention the important power generation methods.

- 1.3 Give the principle of power generation in thermal power plant.
- 1.4 Draw the general layout of thermal power plant
- 1.5 Explain the process of generation of power based on the layout of thermal power plant.
- 1.6 Give the building blocks of boiler process in thermal power plant.
- 1.7 Draw the PI diagram of boiler process.
- 1.8 Explain a method of measurement of feed water.
- 1.9 Explain the method of measurement of level of the Boiler.
- 1.10 Explain the method of measurement of pressure of the Boiler.
- 1.11 Explain the method of measurement of temperature of the Boiler.
- 1.12 List the important safety measures in boiler control.
- 1.13 Mention the turbine trip conditions.
- 1.14 Explain the measurement of speed of turbine.
- 1.15 Explain the measurement of Vibration of turbine.
- 1.16 Explain the working of a condenser.

2.0 Understand Petro Chemical plant Instrumentation.(PCPI)

- 2.1 Draw the general layout of a Petro chemical plant.
- 2.2 Explain the process based on the layout of petro chemical plant.
- 2.3 List various units in petro chemical plant.
- 2.4 Define the following unit operations
 - a) Thermal cracking
 - b) Catalytic cracking
 - c) Polymerization
 - d) Alkalization
 - e) Isomerisation
- 2.5 Explain the process of thermal cracking.
- 2.6 List the bi products of crude oil.
- 2.7 Explain the working of distillation column.
- 2.8 List various physical parameters to be measured in PCP.

- 2.9 Explain the measurement of flow with a diagram.
- 2.10 Explain the measurement of pressure with a diagram.
- 2.11 Explain the measurement of density of a petro chemical with a diagram
- 2.12 Explain the selection and maintenance of measuring instruments in PCP

3.0 Understand Iron and Steel Plant Instrumentation (ISPI)

- 3.1 Draw general layout of iron and steel plant.
- 3.2 Explain the manufacturing process of iron and steel based on the layout.
- 3.3 List various units in ISP
- 3.4 Explain the preparation of raw materials in ISP
- 3.5 List different types of furnaces used in ISP
- 3.6 Explain the working of blast furnace with a diagram
- 3.7 Explain the process of making raw steel.
- 3.8 Explain the measurement of molten metal level.
- 3.9 Explain the measurement of density of steel.
- 3.10 Explain the measurement of temperature of furnace.
- 3.11 Explain the measurement of flow of molten metal.
- 3.12 Explain the measurement of weight of steel.
- 3.13 Explain the measurement of thickness of iron and steel products.

4.0 Understand Pulp and Paper Plant (PPP)

- 4.1 Draw the general layout of pulp and paper plant.
- 4.2 Explain the basic process of making the paper based on the layout.
- 4.3 List the raw materials for making paper.
- 4.4 List various steps in pulp production
- 4.5 Explain pulp bleaching.
- 4.6 Explain wet end and dry end operations in making paper.
- 4.7 List the various grades of paper.
- 4.8 List the physical properties of paper.
- 4.9 Explain the measurement of density of paper.

- 4.10 Explain the measurement of moisture analyzer of paper.
 4.11 Explain the measurement of paper thickness of paper.
 4.12 Explain graphic displays and alarms in PPP
 4.13 List various control systems units in PPP

Course Contents:

- 1. Power Plant Instrumentation:** - Measurement and Instrumentation importance in power plant, Power generation method-Thermal power plant layout-generation process-Boiler process, P&I diagram-Measurement of feed water, level, pressure, temperature of boiler-safety measures-measurement of speed and vibration of turbine-Turbine trip-condenser.
- 2. Petro-chemical Plant instrumentation:-**Layout of petro chemical plant - Process-Units in plant-Thermal cracking, catalytic cracking, polymerization, alkalization, isomerization, crude oil bi products, Distillation column, measurement of flow, pressure and density, selection and maintenance of instruments.
- 3. Iron and Steel Plant Instrumentation:-** plant layout-Manufacturing process-Units in ISP-Raw materials-Furnace types-blast furnace-raw steel making-Measurement of molten metal level and flow, density of steel, temperature of furnace, weight of steel, thickness of iron and steel sheets.
- 4. Pulp and Paper Plant Instrumentation:-**Plant layout-Process of making paper-Raw materials-pulp production-pulp bleaching-wet end and dry end operations -Grades of paper- Physical properties of paper - Measurement of density, moisture and thickness of paper-graphic display, alarms and Control system units.

Reference Books:

1. Bela G.Liptak: Instrumentation in Process Industries
2. D.M. Considine:Hand book of applied Instrumentation
3. Austine G.T. Shreeves:Chemical Process Industries.
4. Jervis M.J:Power Station Instrumentation

BIOMEDICAL INSTRUMENTATION

SUBJECT TITLE : BIOMEDICAL INSTRUMENTATION
 SUBJECT CODE : AEI-605
 PERIODS/WEEK : 04
 PERIODS/SEMESTER : 60

TIME SCHEDULE

Sl. No.	Major Topics	No. of Periods	Weightage of marks	Short Answer Questions	Essay Type Questions
1	Introduction to bio-medical Engg.	10	16	2	1
2	Diagnostic Medical Instruments	15	26	2	2
3	Blood pressure and blood flow Measurements	10	26	2	2
4	Therapeutic Instruments	10	26	2	2
5	Modern Imaging Systems	15	16	2	1
	Total	60	110	10	8

OBJECTIVES

Upon completion of the course the student shall be able to

1.0 Comprehend the basics of bio-medical Engineering

- 1.1 Explain resting and action potentials.
- 1.2 Explain Sodium pump and transmission of impulses.
- 1.3 Explain the use of Electro Cardiogram for monitoring health of heart..
- 1.4 Explain the use of Electro Encephalogram for monitoring health of brain activity

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- 1.5 Explain the use of Electro Miogram for monitoring of muscle activity.
 - 1.6 Explain the different types of electrodes used for ECG, EEG and EMG.
 - 1.7 Explain electrical activity of heart with the help of diagram.
 - 1.8 Explain the significance of ECG wave form.
 - 1.9 Explain the bio-electrical potentials associated with muscle activity.
 - 1.10 Explain the electrical activity of Brain.
 - 1.11 Give the wave form of electrical activity of Brain and identify different frequency regions.
 - 1.12 List the effects of electricity, electromagnetic radiations and magnetism in the human body.

2.0 Understand different types Diagnostics Instruments.

- 2.1 List different Diagnostic Medical Equipment.
- 2.2 Draw the building Blocks of an electro cardiogram (ECG).
- 2.3 Compare the bipolar and unipolar leads.
- 2.4 Mention the importance of placement of electrodes while monitoring ECG waveforms
- 2.5 Draw the electro cardiogram; indicate its amplitude and duration.
- 2.6 Give the importance of amplitude and duration of the ECG wave form.
- 2.7 List the applications of ECG.
- 2.8 List the types of electrodes used in EEG.
- 2.9 Explain the arrangement of electrodes while monitoring EEG
- 2.10 Explain the working of an EEG machine with Block diagram.
- 2.11 Classify the EEG frequency bands.
- 2.12 Draw the block diagram set up for EMG recording.
- 2.13 Mention the frequency and amplitude of EMG report.

3.0 Understand Blood Pressure measurements.

- 3.1 Give the necessity of Blood pressure measurement.
- 3.2 List the various methods of blood pressure measurement.
- 3.3 Describe direct blood pressure measurement with a diagram.
- 3.4 List the advantages and disadvantages of direct blood pressure measurement.
- 3.5 Describe indirect blood pressure measurement.
- 3.6 List the advantages and disadvantages of indirect blood pressure measurement.

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- 3.7 Explain the working principle of electromagnetic blood flow meter with diagram.
 - 3.8 Give the block diagram of LASER Doppler Blood flow meter.
 - 3.9 Explain the working of LASER Doppler Blood flow meter.

4.0 Understand the different types of therapeutic instruments

- 4.1 State the need for pacemakers
- 4.2 Classify the types of pacemakers
- 4.3 Compare the advantages of implantable pacemakers over external pacemakers
- 4.4 Give the block diagram of a ventricular synchronous demand pacemaker.
- 4.5 Explain the working of ventricular synchronous demand pacemaker.
- 4.6 Define defibrillation.
- 4.7 State the need of defibrillators.
- 4.6 List the types of defibrillators.
- 4.7 Compare ac defibrillators and dc defibrillators
- 4.8 Define dialysis.
- 4.9 Explain the importance of dialysis.
- 4.10 Explain the functions of dialysis machine
- 5.0 **Understand the working of bio-medical imaging equipment.**
- 5.1 State the need for X-Ray imaging.
- 5.2 Give the properties of X-Rays.
- 5.3 Explain the interaction of X-Ray with matter (Compton effect).
- 5.4 Explain the Production of X-Rays.
- 5.5 List the grids used in X-Ray imaging.
- 5.6 Explain the significance Grids.
- 5.7 List the applications of X-Ray imaging.
- 5.8 State the Limitations of X-Ray imaging.
- 5.9 Draw the block diagram of X-ray machine imaging.
- 5.10 Explain the working of an X-ray machine.
- 5.11 State the need for computer aided tomography (CAT).
- 5.12 Explain the working of C.A.T Scanner.
- 5.13 List the applications of CAT scanning.
- 5.14 Define magneto resonance imaging (MRI).
- 5.15 Mention the four merits of MRI over other imaging systems.

- 5.16 Explain the working of MRI with a block diagram.
 5.17 List four important applications of MRI.

COURSE CONTENTS

1 Introduction to bio-medical Engg

Bio electricity – Resting and action potential –sodium pump- transmission of impulses –use of ECG, EEG and EMG- Electrodes used for Bio potential measurement – Electrical activity of the heart; ECG waveform - Electrical Activity of the muscles; EMG Wave form - Electrical Activity of the brain, EEG wave forms - Effects of electricity, Electromagnetic radiation and magnetism on human body.

2 Diagnostic Medical Equipment

Diagnostic medical equipment- Electro cardio graph (ECG) –block diagram-electrode placement- lead configuration- amplitude and duration- Electro mayo graph (EMG) –block diagram- frequency and amplitude ranges- Electro encephalograph (EEG) - block diagram- placement of electrodes – frequency ranges.

1. Blood Pressure Measurement and Blood Flow Meters

Need of blood pressure measurement-Direct Blood pressure measurement – advantages and disadvantages- Indirect Blood pressure measurement- advantages and disadvantages- Electromagnetic Blood flow meter - Laser Doppler Blood flow meter.

2. Therapeutic Instruments

Need of Cardiac Pacemakers-types-internal and external pacemakers-ventricular synchronous demand pacemaker- Defibrillation- need of defibrillator- AC and DC defibrillator –dialysis- importance and functions of dialysis machine.

5. Modern Imaging Systems

X-Ray Imaging, properties, interaction with matter, production, significance of grids, Applications, Limitations, construction and operation of an X-Ray machine, C.A.T. Scanner, working and applications, MRI, merits, block diagram and applications.

REFERENCE BOOKS

1. Biomedical Instrumentation and Measurements by Leslie Cromwell & Free.J.WAEIbell.
2. Biomedical Instruments by Dr. Arumugham.
3. Principles of Applied Bio medical Instrumentation by L.A.Taddes & Baker
4. Hand Book of Biomedical Instrumentation by R.S.Kandpur

PLC AND SCADA LAB PRACTICE

Subject Name	:	PLC AND SCADA LAB PRACTICE
Subject code	:	AEI-606
Periods / week	:	03
Periods/semester	:	45

TIME SCHEDULE

S. No.	Practice	No. of Periods
1.	Logic gates	6
2.	Timer Programs	9
3.	Counter programs	9
4	Applications	12
5	SCADA	9
	Total	45

144

LIST OF EXPERIMENTS

I. Logic gates

1. To realize the basic logic gates and execute on PLC trainer Kit
2. To realize universal gates and execute on PLC trainer Kit
3. To realize EX-OR gate and EX-NOR gates and execute on PLC trainer Kit

II. Timer Programs

4. To realize ON-Delay Timer and execute on PLC trainer Kit
5. To realize OFF-Delay Timers and execute on PLC trainer Kit

- 6 To realize Retentive timer and execute on PLC trainer Kit
 7 To realize Non-Retentive Timers and execute on PLC trainer Kit

III. Counter programs

- 8 To realize Up counter and execute on PLC trainer Kit
 9 To realize Down counter and execute on PLC trainer Kit
 10 To realize Bottle filling program using timer and execute

IV. Applications

- 11 To realize Traffic light controller and execute.
 12 To realize Conveyor controller and execute
 13 To realize Sequential control of induction motors program and execute.

V. SCADA

- 14 To create graphic symbols and associate tags with memory tags. using SCADA software
 15 To Interface SCADA with PLC and associate tags with memory and I/O and operate the PLC inputs through the switch symbol from the computer screen and view the status of the outputs using lamp and motor graphics symbols in the screen.

Competencies and key competencies to be achieved

S.NO	Name of the Experiment	Competency	Key Competencies
1	To realize the basic logic gates and on PLC trainer Kit	1.Familiarize with the plc kit 2.Identify i) input ii) output iii) Power supply iv) CPU modules	Use PLC module
2	To realize universal gates and on PLC trainer Kit	1.Draw the ladder diagram 2. Enter the program into the PLC kit 3. Execute the program s 4.Observe the output 1.Draw the ladder diagram 2. Enter the program into the PLC kit 3. Execute the program us 4.Observe the output	Use the PLC for building combinational logic
3	To realize EX-OR gate and EX-NOR gates and execute on PLC trainer Kit	1.Draw the ladder diagram 2. Enter the program into the PLC kit 3. Execute the program us 4.Observe the output	Use the PLC for building combinational logic
4	To realize ON-Delay Timer and execute on PLC trainer Kit	1.Draw the ladder diagram 2. Enter the program into the PLC kit 3. Execute the program us 4.Observe the output	Use the PLC for building combinational logic
5	To realize OFF-Delay Timers and execute on PLC trainer Kit	1.Draw the ladder diagram 2. Enter the program into the PLC kit 3. Execute the program us 4.Observe the output	Use the PLC for building combinational logic
6	To realize Retentive timer and execute on PLC trainer Kit	1.Draw the ladder diagram 2. Enter the program into the PLC kit 3. Execute the program us 4.Observe the output	Use the PLC for building combinational logic

7	To realize Non-Retentive Timers and execute on PLC trainer Kit	1.Draw the ladder diagram 2. Enter the program into the PLC kit 3. Execute the program us 4.Observing the output	Use the PLC for building combinational logic
8	To realize Up counter and execute on PLC trainer Kit	1.Draw the ladder diagram 2. Enter the program into the PLC kit 3. Execute the program us 4.Observed the output	Use the PLC for building combinational logic
9	To realize Down counter and execute on PLC trainer Kit	1.Draw the ladder diagram 2. Enter the program into the PLC kit 3. Execute the program us 4.Observed the output	Use the PLC for building combinational logic
10	To realize Bottle filling program using timer and execute	1.Draw the ladder diagram 2. Enter the program into the PLC kit 3. Execute the program us 4.Observed the output	Use the PLC for building combinational logic
11	To realize Traffic light controller and execute.	1.Draw the ladder diagram 2. Enter the program into the PLC kit 3. Execute the program us 4.Observed the output	Use the PLC for building combinational logic
12	To realize Conveyor controller and execute	1.Draw the ladder diagram 2. Enter the program into the PLC kit 3. Execute the program us 4.Observed the output	Use the PLC for building combinational logic
13	To realize Sequential control of induction motors program and execute.	1.Draw the ladder diagram 2. Enter the program into the PLC kit 3. Execute the program us 4.Observed the output	Use the PLC for building combinational logic
14	To create graphic symbols and associate tags with memory Using SCADA software tags	1. Use SCADA software create graphic symbols 2.Add tags to the symbols 3.Execute the program 4.Observed the output	Observe the output on the scada screen
15	To Interface SCADA with PLC and associate tags with memory and I/O and operate the PLC inputs through the switch symbol from the computer screen and view the status of the outputs using lamp and motor graphics symbols in the screen.	1. Use SCADA software create graphic symbols 2.Add tags to the symbols 3.Execute the program 4.Observed the output	Observe the output on the scada screen and PLC outputs

ANALYTICAL AND BIOMEDICAL LAB PRACTICE

Subject title : ANALYTICAL AND BIOMEDICAL LAB PRACTICE
 Subject code : AEI-607
 Periods /week : 03
 Periods /semester : 45

Time schedule

S. No.	Practice	No. of Periods
1.	x-RAY & ECG	12
2.	EEG & EMG	6
3.	BP measurement	6
4	Analytical Instruments	21
	Total	45

146

LIST OF EXPERIMENTS

I. X-Ray & ECG

- To identify various Bio- medical equipment.
- To develop an X-ray image report using X-ray machine.

II. ECG & EMG

- To prepare electrodes and ECG machine.
- To conduct ECG test using ECG machine.
- To place the electrodes on human scalp to take EEG report
- To place the electrodes on human muscle to take EMG report

III. BP Measurement

- To measure blood pressure using manual sphygmo manometer

8. To measure blood pressure using digital sphygmo manometer
- IV. Analytical Instruments**
9. To identify different Analytical instruments
10. To analyze the composition of the given sample using Spectro Photo Meter
11. To determine the presence of metal in a given sample.using Flame Photo Meter,
12. To Determine the dissolved Oxygen in given sample using Dissolved Oxygen meter.
13. To find the refractive index of the given sample using Refractometer.
14. To find the concentration of a given sample using Polarimeter.
15. To determine pollution levels in the air using air pollution monitoring system.

Competencies and Key competencies to be achieved

S.NO	Name of the Experiment	Competency	Key Competencies
1	To identify various Bio- medical equipment	Identify X-ray machine, ECG, EEG and EMG machines Interpret name	Identify X-ray machine, ECG, EEG and EMG machines Interpret name
2	To develop an X-ray image report using X-ray machine.	Identify the parts of X-ray machine. Follow the procedure to take X-ray image Identify various controls of X-ray machine Follow precautions	Expose X-rays and develop the image
3	To prepare electrodes and ECG machine.	Identify the electrodes Clean electrodes Connect electrodes to ECG machine	Prepare electrodes and ECG machine
4	To develop an ECG report using ECG machine.	Identify the parts of ECG machine. Follow the procedure to take ECG report Identify various controls of ECG machine Follow precautions	Operate ECG machine and take the ECG report.
5	To place the electrodes on human scalp to take EEG report	Identify the points on Scalp of human bAEIng to the place various electrodes.	Follow correct procedure to develop a EEG report.
6	To place the electrodes on human muscle to take EMG report	Identify the points on muscle of human bAEIng to the place various electrodes.	develop a EMG report. following correct procedure
7	To measure blood pressure using manual sphygmo manometer	Identify the parts of manual sphygmo manometer follow the procedure to measure BP	Measure the BP using manual sphygmo manometer

8	To measure blood pressure using digital sphygmo manometer	Identify the parts of digital sphygmo manometer follow the procedure to measure BP	Measure the BP using Digital sphygmo manometer
9	To identify different Analytical instruments	Identify analytical Instruments Interpret the name plate details	Identify analytical Instruments Interpret the name plate details
10	To analyze the composition of the given sample using Spectro Photo Meter	Identify the parts and control of Spectro Photo Meter	Determine the composition of given sample
11	To determine the presence of metal in a given sample using Flame Photo Meter,	Identify the parts of Flame Photo Meter Adjust the Flame Photo Meter	Determine the presence of metal in given sample
12	To Determine the dissolved Oxygen in given sample using Dissolved Oxygen meter.	Identify the parts and control of using Dissolved Oxygen meter.	Use Dissolved Oxygen meter to determine the oxygen dissolved in given sample
13	To find the refractive index of the given sample using Refractometer.	Identify the parts Refractometer.	Use Refractometer to find the refractive index of the given sample
14	To find the concentration of a given sample using Polarimeter.	Identify the parts Polarimeter.	Use polarimeter to find the concentration of a given sample
15	To determine pollution levels in the air using air pollution monitoring system	Identify the various components of pollution monitoring system Take air sample Measure pollution Interpret the report	Take air sample Measure pollution Interpret the report

VIRTUAL INSTRUMENTATION LAB PRACTICE

Subject Title : Virtual Instrumentation Lab Practice

Subject code : A EI-608

Periods/Week : 03

Periods/semester : 45

Time Schedule

S. No.	Practice	No. of Periods
1.	Labview Basics	12
2.	set Debugging	12
3.	VI tool set	12
4	Applications	9
	Total	45

148

LIST OF EXPERIMENTS

I. Labview Basics

- To Familiarize with Virtual Instrumentation software Environment – Lab View
- To practice LabView Editing Techniques
- To implement a VI to convert Degree Celsius to fahrenheit
- To implement Logic Gates using Labview
- To Construct basic ON-OFF control

II. Debugging

- To Practice debugging features of Lab View
- To Implement VI with two blinking indicator lights with a delay of two seconds

8. To create a case structure using switch
 9. To Create a simple calculator using Labview
 10. To create VI subsets and to convert VI to VI subset
- III. VI tool set
11. To practice working with VI Tool Set
 12. To create a program to plot data stored in an array
 13. To use a While Loop and a chart for acquiring and displaying data in real time.

IV. Applications

14. To measure voltage drop across a resistor in a potential divider circuit
15. To measure Temperature using Temperature sensor and DAQ module in labView

Competencies and key competencies to be achieved

S.NO	Name of the Experiment	Competency	Key Competencies
1	Familiarization of Virtual Instrumentation software Environment – Lab View	Familiarize with LabView environment Identify menu bars Use icons	Select correct icons and use
2	To practice LabView Editing Techniques	Identify Icons related to editing Practice opening and saving and edit the projects	Use various editing features of Lab view
3	To implent a VI to convert Degree Celsius to Foren Heat	Write a VI for a given problem Edit the program Execute and verify	Edit the program Execute and verify
4	To implement Logic Gates using Labview	Write a VI for a given problem Edit the program Execute and verify	Edit the program Execute and verify
5	Construct basic ON-OFF control	Write a VI for a given problem Use connectors and icons Edit the program Execute and verify	Use connectors and icons Edit the program Execute and verify
6	To Practice debugging features of Lab View	Explore Debugging features Step by step debugging	Explore Debugging features Step by step debugging

7	Implement VI with two blinking indicator lights with a delay of two seconds	<p>Write a VI for a given problem</p> <p>Practice inclusion of time delays</p> <p>Use connectors and icons</p> <p>Edit the program</p> <p>Execute and verify</p>	<p>Practice inclusion of time delays</p> <p>Use connectors and icons</p> <p>Edit the program</p> <p>Execute and verify</p>
8	Write a case structure using switch	<p>Create VI with a case structure using switch</p> <p>Edit the program</p> <p>Execute and verify</p>	<p>Create VI with a case structure using switch</p> <p>Edit the program</p> <p>Execute and verify</p>
9	Create a simple calculator using Labview	<p>Create VI with simple mathematical functions</p> <p>Edit the program</p> <p>Execute and verify</p>	<p>Create VI with simple mathematical functions</p> <p>Edit the program</p> <p>Execute and verify</p>
10	To write VI subsets and to convert VI to VI subset	<p>Create VI subset</p> <p>Convert VI to VI subset</p>	<p>Create VI subset</p> <p>Convert VI to VI subset</p>
11	To practice working with VI Tool Set	<p>Identify tool set features</p> <p>Use them in creating VI</p>	<p>Identify tool set features</p> <p>Use them in creating VI</p>
12	Write a program to plot data stored in an array	<p>Create VI to store data in arrays</p> <p>Explore graph and chart features</p> <p>Verify and execute</p>	<p>Create VI to store data in arrays</p> <p>Explore graph and chart features</p> <p>Verify and execute</p>

13	To use a While Loop and a chart for acquiring and displaying data in real time.	<p>Create VI to using while loop</p> <p>Use Real time data acquisition</p> <p>Produce chart</p> <p>Verify and execute</p>	<p>Create VI to using while loop</p> <p>Use Real time data acquisition</p> <p>Produce chart</p> <p>Verify and execute</p>
14	To measure voltage drop across a resistor in a potential divider circuit	<p>Create VI to test analog circuits</p> <p>Use Real time data acquisition</p> <p>Verify and execute</p>	<p>Create VI to test analog circuits</p> <p>Use Real time data acquisition</p> <p>Verify and execute</p>
15	To measure Temperature using Temperature sensor and DAQ module in labView	<p>Create VI to test analog circuits</p> <p>Use Real time data acquisition</p> <p>Verify and execute</p>	<p>Create VI to test analog circuits</p> <p>Use Real time data acquisition</p> <p>Verify and execute</p>

COMPUTER HARDWARE & NETWORKING LAB PRACTICE

Subject Title	: Computer Hardware & Networking Lab Practice
Subject Code	: AEI – 609
Periods per Week	: 06
Periods per Semester	: 90

Rationale: With the computer becoming a household item, the need for Computer hardware knowledge need not be stressed. Computer hardware industry is another major area where excellent job opportunities are available.

TIME SCHEDULE

S. No.	PRACTICE	No. of Periods
1.	CPU (Desktop &,Laptop)	45
2.	Operating system Software	18
3.	Networking	27
	Total	90

LIST OF EXPERIMENTS
I. CPU (Desktop &,Laptop)

1. To Identify motherboard components
2. To install RAM
3. To Assemble and Disassemble a PC
4. To carry out CMOS setup.
5. To carry out disk Partition and formatting of Hard disk

II. Operating system Software

6. To install operating system software (Windows xp / Windows7)
7. To install device driver software
8. To install application software (MS-Office 2007/ 2010)

9. To carry out PC up gradation
10. To Print a summary of system Hardware.
11. To recover lost data on hard drive.
12. To Trouble shooting keyboard, monitor and printer

III. Networking

13. To install Network card and its driver software
14. To prepare the UTP cable for cross and straight connections using crimping tool.
15. To install a switch and connecting systems to a network Hub / switch.
16. To assign IP addresses to PCs in a net work
17. To install a modem (internal, external or USB) and establish internet connection
18. To use FTP for uploading and downloading files.
19. To install and configure the proxy server for internet access.
20. To implement peer to peer network
21. To implement workgroup network
22. To implement Wi-Fi Network

Competencies and key competencies to be achieved

Exp.No	Name of the Experiment	Competency	Key Competencies
1	To Identify motherboard components	Identify various components on the motherboard	Identify a)Processor b)HDD c)CMOS d)PCI e)IDE f)AGP g)ISA h)NIC etc
2	To install RAM	Perform RAM installation, removal and identification	a)Installation of RAM b)Removal of RAM
3	To Assemble and Disassemble a PC	Perform Assembling and Disassembling of PC	a)Assemble PC b)Disassemble PC
4	To carry out CMOS setup.	Perform CMOS setup for required changes	Run CMOS setup
5	To carry out disk Partition and formatting of Hard disk	Practice partitioning and formatting of HDD	Practice the following a)partition b)formatting
6	To install operating system software (Windows xp / Windows7)	Practice installation of OS	Practice the following a)Windows XP or b)Windows 7
7	To install device driver software	Perform installation of required device driver software's	Install a)NIC b)chipset c)Audio / video and other required
8	To install application software (MS-Office 2007/ 2010)	Installation of application software	Install a)MS-Office 2007 / MS-Office 2010
9	To carry out PC up gradation	Perform upgradation of PC	Replace the following a)RAM b)HDD
10	To Print a summary of system Hardware.	Perform the procedure to print summary of your PC	Display summary of your PC
11	To recover lost data on hard drive.	List the steps for recovery of lost data from the hard disk	Recover the lost data a) using a working HD b) using third party tools

12	To Trouble shooting keyboard, monitor and printer	Perform the trouble shooting of keyboard, monitor and printer	Trouble shoot the following a)keyboard b)monitor c)printer
13	To install Network card and its driver software	Installation of network card and its driver software	Install the following a)NIC b)driver software
14	To prepare the UTP cable for cross and straight connections using crimping tool.	Perform UTP cable preparation for cross and straight	Prepare the following a)cross cable b)straight cable
15	To install a switch and connecting systems to a network Hub / switch.	Installation of switch and connecting systems	Install a)switch b)Connecting to systems
16	To assign IP addresses to PCs in a net work	Perform network addressing classes Know IP address components	Practice the following network addressing classes a)class A b)class B c)class C
17	To install a modem (internal, external or USB) and establish internet connection	Installation of Modem and connecting to internet	Install a)Modem and connecting to internet
18	To use FTP for uploading and downloading files.	Perform uploading and downloading of files	Practice the following a)uploading b)downloading of files
19	To install and configure the proxy server for internet access.	Carry out configuration of proxy server	Prepare proxy server and connect to internet
20	To implement peer to peer network	Implement peer to peer network	Implement peer to peer network
21	To implement workgroup network	Implement workgroup network	Implement workgroup network
22	To implement Wi-Fi Network	Implement Wi-Fi network	Implement Wi-Fi network

PROJECT WORK

Subject Title	:	Project Work
Subject Code	:	AEI- 610
Periods / Week	:	06
Periods / Semester	:	90

Rationale: Project work is intended to provide application level concepts in designing and Implementing suitable solutions to multifarious needs related to Industry as well as Day to day Life . Project work should pave way for i) implementation of Innovative Ideas ii) preparation of prototypes for commercial models.

TIME SCHEDULE

Sl	Major Topics	Periods
1	Literature survey	9
2	Concept modelling	9
3	Seminars (One Seminar before approval and one Seminar after completion of the Project)	6
4	Abstract submission	6
5	Working model of the project	45
6	Project report	15
	Total	90

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Project work should have the following components

1. Literature survey
2. Concept modelling
3. Seminars(One Seminar before approval and one Seminar after completion of the Project)
4. Abstract submission
5. Working model of the project
6. Project report

OBJECTIVES**Upon completion of the course the student should be able to**

- 1.1 Identify different works to be carried out in the Project.
- 1.2 Collect relevant information required for the project work.
- 1.3 Carry out Literature survey.
- 1.4 Select the most efficient method from the available choices based on preliminary investigation.
- 1.5 Prepare action plan and schedule for project implementation
- 1.5 Design the required elements of the project work as per standard practices.
- 1.6 Implement prototype circuits and test
- 1.7 Design proper enclosure to house the prototype
- 1.8 Identify the Tests to be carried out for verification of design parameters
- 1.9 implement project work and record the results at various stages.
- 1.10 Prepare project report as per the standard guide lines.

COURSE CONTENT

Project work is intended to provide application level concepts in designing and Implementing suitable solutions to multifarious needs related to Industry as well as Day to day Life .

Project work should pave way for i) implementation of Innovative Ideas ii) preparation of prototypes for commercial models.

Students should be formed into groups of five each and shall be assigned a problem that calls for application of the knowledge he/she acquired during the course. The faculty members shall provide necessary and also monitor / assess the project progress. The students may be encouraged to implement projects using Arduino boards / Picaxe / ARM Controllers in the fields of Communication Engineering, Industrial electronics, Robotics or any other relevant fields. Preparing a working model complete in all respects including proper enclosure, indicators switches, Power cords etc is mandatory.

Every student should prepare a project report and submit the same for assessment which includes his/her contribution in the project work. The end examination in Project work shall consist of Seminar and Viva-voce test to be assessed by a panel of examiners comprising of an External examiner, the Head of Section, and the internal guide.

Other interested faculty members and students may also be invited for attending the seminars.

Scheme of assessment

1)	Seminar1	10 Marks	
2)	Seminar 2 assessment	10 Marks	Internal
3)	Project Report/Assessment	20 Marks	
4)	Project assessment	40 Marks	External
5)	Viva-Voce	20 Marks	
		100	
	Total Marks	100	

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