SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE



Syllabus

For

B.Voc. (Electrical)

Electrical Appliances - Maintenance and Repairing

BACHELOR OF VOCATIONAL (B.Voc.)

COMMON SYLLABUS STRUCTURE, RULES AND REGULATIONS

1. Preamble

The Government of India to meet the goal of empowering the youth and also to make education relevant and creating 'industry fit' skilled work force, initiated the B. Voc. programs. Based upon the guidelines for B. Voc. courses issued by AICTE, UGC and also the guidelines of B. Voc. programs in colleges in NSQF (Academic council sub-committee report of SPPU, June 2019) the Board of studies has prepared the admission rules, regulations and syllabus structure common for the programs.

2. Objectives

- To provide judicious mix of skills relating to a profession and appropriate content of general education.
- To ensure that the students have adequate knowledge and skills so that they are work ready at each exit point of the program.
- To provide flexibility to the students by means of pre-defined entry and exit points.
- To integrate NSQF within the UG level of higher education in order to enhance employability of the graduates and meet industry requirements. Such graduates apart from meeting the needs of local and national industry are also expected to be equipped to become part of the global workforce.
- To provide vertical mobility to students coming out of 10+2 vocational subjects.
- Global mobility of skilled work force from India through international equivalence of NSQF.

The focus is to formulate courses as per the regional skill gap as per the need of

- i. Industry in specialized areas
- ii. Design curriculum and contents in the areas of skill development.
- iii. Pedagogy, assessment for skills development education and training.
- iv. Trained faculty to deliver in the areas of skill development and
- v. Entrepreneurship development.
- 3. Duration of the B. Voc. Programs: 3 years [Six semesters].
- 4. Eligibility for Admission to the B. Voc. Programs

- i. Type A Students who have already acquired NSQF certification level 4 in a particular trade and opted
- ii. Type B Students who have passed 10+2 or equivalent in any stream from any recognized board or university without any background of vocational training.
- iii. Type C Students passed 10+2 examination with conventional schooling without any background of vocational training.

While admitting type B and type C students' additional courses for skill intensive training and teaching during the first six months shall be mandatory for such students, who will be assessed and certified for NSQF level 4 of skill competency by concerned CSA at the end of first semester. However, students belonging to type A will not require such certification as they were already having NSQF level 4 certificates in same industry sector / job role required for specified skill credits. All students continuing to Diploma courses or further will be treated at par from second semester onwards. Student may exit after diploma or advanced diploma level courses or above. The academic progression for students in vocational stream after senior secondary level should be as per table 1 and thus the curriculum shall be framed as per these guidelines.

NSQF level	Skill component credits	General Education Credits	Total credits for Award	Duration	Award
7	108	72	18 0	Six Semester (3 Year)	B. Voc. Degree in B.Voc (Electrical) Electrical Appliances - Maintenance and Repairing
6	72	48	12 0	Four Semester (2 Year)	Advanced Diploma in B.Voc (Electrical) Electrical Appliances - Maintenance and Repairing
5	36	24	60	Two Semester (1 Year)	Diploma in B.Voc (Electrical) Electrical Appliances - Maintenance and Repairing
4	18	12	30	One Semester (6Month)	Certificate Course in B.Voc (Electrical) Electrical Appliances - Maintenance and Repairing

 Table 1: Stages and Exit points and Credits

5. COMMON COURSE STRUCTURE AND CREDIT DISTRIBUTION

Table 2: Typical courses and distribution of theory, practical, contact hoursand credits.

Course structure of B. Voc. Electrical Appliances - Maintenance and Repairing

Certificate Course in B.Voc. Electrical Appliances : Maintenance & Re	epairing
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	Semester I				
Course code	Name of Subject	Theory/Practical	Contact hours	Credits	
Ge	neral education component				
EAT11	Communication Skills	Theory	60	04	
EAT12	Fundamentals of Electrical Technology	Theory	60	04	
EAT13	Electrical Appliances-I	Theory	60	04	
Skill Based Component					
EAP11	Communication Skills	Practical	90	06	
EAP12	Fundamentals of Electrical Technology	Practical	90	06	
EAP13	Electrical Appliances-I	Practical	90	06	
	Total		450	30	

Diploma in Electrical Appliances - Maintenance and Repairing

First year (Semester I & II)

Semester I				
Course code	Name of Subject	Theory/Practical	Contact hours	Credits
General education component				
EAT11	Communication Skills	Theory	60	04
EAT12	Fundamentals of Electrical Technology	Theory	60	04
EAT13	Electrical Appliances-I	Theory	60	04
	Skill Based Component			

EAP11	Communication Skills	Practical	90	06
EAP12	Fundamentals of Electrical Technology	Practical	90	06
EAP13	Electrical Appliances-I	Practical	90	06
	Total		450	30
	Semester I	I		
Ge	neral education component			
EAT21	Electrical Wiring	Theory	60	04
EAT22	Power Supplies	Theory	60	04
EAT23	Electrical Appliances-II	Theory	60	04
	Skill Based Component			
EAP21	Electrical Wiring	Practical	90	06
EAP22	Power Supplies	Practical	90	06
EAP23	Electrical Appliances-II	Practical	90	06
EA24	Physical Education	Grade		1
	Total		450	30

Course structure of B. Voc Electrical Appliances - Maintenance and Repairing Advanced Diploma in Electrical Appliances - Maintenance and Repairing

Second year (Semester III & IV)

Semester III				
Course code	Name of Subject	Theory/Practical	Contact hours	Credits
Ge	eneral education component			
EAT31	Fundamentals of Computer	Theory	60	04
EAT32	Entertainment Electronics	Theory	60	04
EAT33	Refrigerator & Air Conditioning	Theory	60	04
	Skill Based Component			
EAP31	Fundamentals of Computer	Practical	90	06
EAP32	Entertainment Electronics	Practical	90	06
EAP33	Refrigerator & Air Conditioning	Practical	90	06
	Total		450	30
Semester IV				

Ge	eneral education component			
EAT41	Business Communication	Theory	60	04
EAT42	Electrical Machines	Theory	60	04
EAT43	Laboratory Instruments- I	Theory	60	04
	Skill Based Component			
EAP41	Business Communication	Practical	90	06
EAP42	Electrical Machines	Practical	90	06
EAP43	Laboratory Instruments- I	Practical	90	06
EVA	Environmental Awareness	Grade	·	
	Total		450	30

Course structure of B. Voc Electrical Appliances - Maintenance and Repairing B. Voc. Electrical Appliances - Maintenance and Repairing Third year (Semester V & VI)

	Semester V				
Course code	Name of Subject	Theory/Practical	Contact hours	Credits	
Ge	neral education component				
EAT51	Entrepreneurship Development	Theory	60	04	
EAT52	Lab Instruments II	Theory	60	04	
EAT53	Lab Instruments III	Theory	60	04	
	Skill Based Component				
EAP51	Entrepreneurship Development	Practical	90	06	
EAP52	Lab Instruments II	Practical	90	06	
EAP53	Lab Instruments III	Practical	90	06	
	Total		450	30	
	Semester V	Γ			
Ge	neral education component				
EAT61	Research Methodology	Theory	60	04	
EAT62	Professional Practices	Theory	60	04	
EAT63	Renewable energy Sources	Theory	60	04	
	Skill Based Component				
EAP64	Electrical Workshop	Practical	45	03	

EAP65	Industrial Training	Practical	225	15
	Total		450	30

a. One credit would mean equivalent of 15 periods of 60 minutes each for theory lectures.. b. For lab course / workshops/ internship/ field work / project, the credit weightage for equivalent hours shall be 50% that for lectures.

c. The courses offered shall be in accordance to the rules / norms of the respective apex body (UGC/AICTE).

d. The number theory papers and practicals shall be decided by each program depending upon the knowledge domains required.

6. Examination

a. Theory Courses -

i. The assessment of theory subjects shall include continuous internal assessment [CIA] of 50% of total marks which can include midterm test, short quiz, assignment, extension work, project work, seminar, presentations etc. There shall be semester end examination [SEE] of 50% of the total marks.

ii. The student should get minimum 30% marks in CIA and SEE each and minimum 40% in CIA and SEE jointly.

iii. In case of failure in CIA the student shall appear only in the next academic year when the said course is offered in the regular academic session at his/her responsibility. However in case of failure in SEE in particular course(s) exam will be conducted in immediate subsequent semester.

iv. In case a student fails in certain course(S) in a particular semester and the same course(s) are modified / revised/removed from the curriculum in due course, the student will have to appear as per the newly framed curriculum and/or pattern in subsequent semester at his/her own responsibility.

b. Practical Courses-

i. The skill component of the course will be assessed and certified by the respective Certified Skill Assessor. The Certified skill assessor for a specific trade is made available by the respective sector skill council or a committee headed by the respective board or prescribed by the concerned regulatory body. Assessment of practical courses / on job training course shall be in equal proportion by the internal and external examiners.

ii. The semester end exam for practical courses shall be conducted at the end of each semester along with the theory exams.

iii. A student must get minimum 40% marks (jointly in internal and external) to pass in the practical courses.

7. Grading System

Table 3: Letter Grades, Points and Marks

Letter Grade	Points	Marks obtained
O (Outstanding)	10	80-100
A+ (Excellent)	9	70-79
A (Very Good)	8	60-69
B+ (Good)	7	55-59
B (Above Average)	6	50-54
C (Average)	5	45-49
P (Pass)	4	40-44
F (Fail)	0	0-39
Ab (Absent)	0	0

Table 4: Grade point Average

Grade Point Average	Grade
9.00 - 10.00	0
8.50 - 8.99	A+
7.50 - 8.49	А
6.50 - 7.49	B+
5.50 - 6.49	В
4.25 - 5.49	С
4.00 - 4.24	Р
0.00 - 3.99	F

8. Computation of SGPA and CGPA

• The semester end grade sheet will contain grades for the course along with titles and SGPA. Final grade sheet and transcript shall contain CGPA.

• SGPA: The performance of a student in a semester is indicated by a number called the semester grade point average (SGPA). The SGPA is the weighted average of grade points obtained in all the courses registered by the student during the semester.

Semester Grade Point Average (SGPA) =

$$SGPA = \frac{\sum_{i=1}^{p} CiGi}{\sum_{i=1}^{p} Ci}$$

$= \frac{\sum Grade \ Points \ earned \ \times Credits \ for \ each \ course}{Total \ credits}$

SGPA is calculated up to two decimal places by rounding off.

• CGPA: The CGPA is the weighted average of the grade points obtained in all the courses (theory Practical courses) of all the semesters till the respective exit point. It is calculated in the same manner as the SGPA. It is calculated based upon the SGPA of the concerned semesters.

9. OTHER RULES- University may frame additional rules and regulations or modify these regulations if needed and once approved by the University they would be binding on the students.

10. Structure of the Course:

Certificate Course in B.Voc. (Electrical) Electrical Appliances: Maintenance & Repairing

Certificate Course			
Paper Code	Title of the Paper		
EAT11	Communication Skills		
EAT12	Fundamentals of Electrical Technology		
EAT13	Electrical Appliances-I		
EAP11	Communication Skills		
EAP12	Fundamentals of Electrical Technology		
EAP13	Electrical Appliances-I		

First Year

Semester I		Semester II	
Paper Code	Title of the Paper	Paper Code	Title
EAT11	Communication Skills	EAT21	Electrical Wiring

EAT12	Fundamentals of Electrical Technology	EAT22	Power Supplies
EAT13 Electrical Appliances-I		EAT23	Electrical Appliances-II
EAP11	Communication Skills	EAP21	Electrical Wiring
EAP12	Fundamentals of Electrical Technology	EAP22	Power Supplies
EAP13	Electrical Appliances-I	EAP23	Electrical Appliances-II
		EA24	Physical Education

Second Year

Semester III		Semester IV	
Paper Code	Title of the Paper	Paper Code	Title
EAT31	Fundamentals of Computer	EAT41	Business Communication
EAT32	Entertainment Electronics	EAT42	Electrical Machines
EAT33	Refrigerator & Air Conditioning	EAT43	Laboratory Instruments- I
EAP31	Fundamentals of Computer	EAP41	Business Communication
EAP32	Entertainment Electronics	EAP42	Electrical Machines
EAP33	Refrigerator & Air Conditioning	EAP43	Laboratory Instruments- I
		EVA	Environmental Awareness

Third Year

Semester V		Semester VI	
Paper Code	Title of the Paper	Paper Code	Title
EAT51	Entrepreneurship Development	EAT61	Research Methodology
EAT52	Lab Instruments II	EAT62	Professional Practices
EAT53	Lab Instruments III	EAT63	Renewable energy Sources
EAP51	Entrepreneurship Development	EAP64	Electrical Workshop
EAP52	Lab Instruments II	EAP65	Industrial Training
EAP53	Lab Instruments III		

I. Compulsory Paper: All papers are compulsory

II. Optional Paper: Not applicable

III. Question Paper and Paper: As mentioned above

IV. Medium of Instructions: English

11. Equivalence of previous syllabus along with propose syllabus: Not applicable

- 12. University Terms: 6 terms
- 13. Subject wise Detailed Syllabus: Attached with this format
- 14. Recommended Books: Given at the end of syllabus
- 15. Qualification of Teacher: As per UGC regulations

Syllabus for Certificate Course B.Voc (Electrical) (6 Months)

Paper Code: EAT11Title: Communication SkillsCredit : 4

- Formal Communication in Marathi (ejkBh): iz'kklfud ejkBh % izkLrkfod] vtZys[ku] dk;kZy;hu fVli.kh ys[ku] bfro`Rrys[ku] ?kks"k.kki=] fufonk] ekfgrhi=d] fuea=.k if=dk tkfgjkr ys[ku vkf.k tkghj fuosnu % izkLrkfod] tkfgjkr ys[ku] tkfgj fuosnu] ek/;es ¼fy[khr] JkO;] nqzdJkO;½] tkfgjkrhpk vkd`rhca/k izek.k Hkk"ksps ys[ku O;kogkjhd laokn dkS'kY; % izLrkouk] O;k[;k] oSf'k"V;s laoknkps egRo] fofo/k ek/;ekalkBh gks.kkjs laokn] laoknkrhy vMFkGs] besy
- **2. Office Correspondence:** Meaning, Importance, Types, Drafting Memo (Memorandums), Orders, Circulars, Letters, Press Releases.
- 3. Business letters: Meaning, Importance, Qualities or Essentials, Physical
- **4. Appearance and Layout of Business Letters:** Enquiry letters, Replies to Enquiry letters, Order letters, Credit and Status Enquiries, Sale Letters, Complaint letters.
- **5.** Job Application Letter: Meaning, Types and Drafting of Job Application Letters, Resume / Curriculum Vitae.
- **6. Definition and Basics of Personality**: Analyzing Strength and Weakness, Theories on Personality Development, Body Language, Increasing Vocabulary
- **7. Preparation of Self Introduction:** Listening Skills, Communication Barriers, Overcoming these barriers, Building Self-Esteem and Self-Confidence, Attitudes: Assertive, Aggressive and Submissive.
- 8. **Introduction to Leadership:** Leadership Styles, Group Dynamics, Team Building, Interpersonal Communication and Relationship

References

1)Balasubramanian T. 1989. A Textbook of Phonetics for Indian Students. Orient Longman, New Delhi.

2) Balasubrmanyam M. 1985. Business Communication. Vani Educational Books, New Delhi.

3) Naterop, Jean, B. and Rod Revell. 1997. Telephoning in English. Cambridge University Press,

Cambridge.

4) Mohan Krishna and Meera Banerjee. 1990. Developing Communication Skills. Macmillan India Ltd. New Delhi.

5) Krishnaswamy, N and Sriraman, T. 1995. Current English for Colleges. Macmillan India Ltd.Madra

Paper Code : EAT12Title: Fundamentals of Electrical TechnologyCredit : 4

- **1. Passive Components :** Resistor, Capacitor, Inductor, Connecters, Fuses- Circuit Symbol, Working principle, Types, Specification, Application.
- **2. Batteries :** Battery Chemistry, Circuit Symbol, Working principle, Types and Specification.
- **3.** Cables :Twisted pair cable, Co-axial cable, fibre optic cable- Specification, Applications.
- 4. Switches : Circuit Symbol, Working principle, Types, specification, Application.
- 5. Relays : Circuit Symbol, Working principle, Types, Specification, Application.
- **6. Transformer :** Circuit Symbol, Working principle, Types, Specification, Application.
- 7. Active Components : Diodes, BJT, Solar cell, Optocoupler, DIAC, TRIAC, SCR-Circuit Symbol, Working principle, Types, Specification, Application.
- 8. Test & Measuring Instruments : Moving Coil Galvanometer, Voltmeter, Ammeter, Digital meter, Multimeter, Tachometer, Earth resistance tester : Megger, Wattmeter, Energy meter.

References

- 1. B. L.Theraja, A.K. Theraja, Textbook of Electrical Technology Volume I –, S. Chand & Co.
- 2. E. Fitzgerald, Arvin Grabel, David E. Higginbotham, Textbook of Basic Electrical Engineering –TMH Publishing Co.
- 3. A. Patel, Textbook of Elements of Electrical Engineering, Mahajan Publishing House, Ahmedabad.
- 4. Nagrath, Basic Electrical Engineering, TMH Publishing Co. Ltd.
- 5. Small Appliances Servicing P.T. Brook Woll Jr.

- 1. Testing Equipments & Basic control equipments: line tester, electronic line tester, series test lamp for single phase, parallel test lamp for single phase, series test lamp for three phase, parallel test lamp for three phase, thermostat, bimetallic relay, thermocouple, overload switch, electromagnetic relay, MCB (Miniature Circuit Breaker), ELCB (Earth Leakage Circuit Breaker)
- **2. Tube Light:** Principle, working, various parts and their use, types, specification, maintenance and trouble shooting
- **3. Electric Iron :** Principle, working, various parts and their use, types, specification, maintenance and trouble shooting
- 4. Water Heater & Geyser : Principle, working, various parts and their use, types, specification, maintenance and trouble shooting
- **5. Room Heater :** Principle, working, various parts and their use, types, specification, maintenance , and trouble shooting
- **6. Hair dryer :** Principle, working, various parts and their use, types, specification, maintenance and trouble shooting
- **7. Fan Regulator :** Principle, working, various parts and their use, types, specification, maintenance and trouble shooting
- **8.** Table lamp : Principle, working, various parts and their use, types, specification, maintenance and trouble shooting
- **9.** Torch : Principle, working, various parts and their use, types, specification, maintenance and trouble shooting
- **10. Electric door bell :** Principle , working, various parts and their use, types, specification, maintenance and trouble shooting
- **11. Tea- Coffee maker :** Principle , working, various parts and their use, types, specification, maintenance and trouble shooting
- **12. OTG (Oven, Toaster, Griler) :** Principle, working, various parts and their use, types, specification, maintenance and trouble shooting

References

- 1. Study of Home Appliances-K.B.Bhatiya
- 2. Home Appliances-Anwari
- 3. Home Appliances Services-E.P.Andersons

Paper Code : EAP11 Title: Communication Skills

Objectives : Enable the students to

- 1. Outline & Draft, various letters such as Job Application letter, Appointment Letter, Enquiry letter, Quotation Letter, Purchase order letter, Complaint Letter, Memorandums Letter, circular letter
- 2. Use Fax machine & Internet for communication

Experiments :

- 1. ejkBh dk;kZy;hu i=ys[ku ¼ fufonk] ekfgrhi=d] fuea=.k if=dk ½
- 2. Draft Job Application letter in response to advertisement
- 3. Draft Service Appointment Letter in response to application received
- 4. Enquiry letter : With reference to an advertisement draft a enquiry letter
- 5. Draft Quotation Letter
- 6. Draft Sale / Purchase order letter
- 7. Draft Complaint Letter
- 8. Draft Memorandums Letter
- 9. Draft circular letter (Announcing opening of shop in city)
- 10. Prepare the outline of the advertisement of your product/ business
- **11.** Filling of tender
- 12. Use of Fax machine & Internet for communication
- 13. One-on-One Sessions for Individual Personality Traits
- 14. Role Play and Impromptu Conversation/Public Speaking Practice focusing on Body Language
- 15. Role Play for Self Introduction in the class.

References

 Narayanaswamy V R. 1979. Strengthen your writing. Orient Longman, New Delhi.
 Sharma R C and Krishna Mohan. 1978. Business Correspondence. Tata Mc Graw Hill publishing Company, New Delhi.

3) Carnegie, Dale. 2012. How to Win Friends and Influence People in the Digital Age. Simon &

Schuster.

4) Covey Stephen R. 1989. The Seven Habits of Highly Successful People. Free Press.
5) Spitzberg B, Barge K & Morreale, Sherwyn P. 2006. Human Communication: Motivation,

Knowledge & Skills. Wadsworth.

Paper Code : EAP12Title: Fundamentals of Electrical TechnologyCredit : 6

Objectives : Enable the students to

- 1. Use the Analog & Digital Measuring Instruments
- 2. Understand & Use Active & Passive Component
- **3.** Use energy meters

Experiments :

- **1.** Study of Multimeter : Analog & Digital
- **2.** Study of Passive Components : Resistor, Capacitor, Inductor, Connecters, Cables & Fuses.
- **3.** Study of switches & Relays : Mechanical, Electronic & Electro-mechanical.
- 4. Study of transformer: Step up, Step- down, Auto, with Center tap
- 5. Study of Active Components : Diodes, BJT, etc.
- 6. Study of Solar cell, Optocoupler, DIAC, TRIAC, SCR
- **7.** Study of Batteries : Physical (Solar & Thermal), Chemical(Fuel cell, Rechargeable , Non- Rechargeable)
- 8. Study of Moving Coil Galvanometer
- 9. Study & use of Voltmeter & Ammeter
- **10.** Study of Earth resistance tester : Megger
- **11.** Study of Electrical Energy Meter
- 12. Visit to Electronic Component shop & Survey of Test & Measuring Instruments

References

- 1. Vincent Del Toro, Textbook of Principles of Electrical Engg., Prentice Hall of India Pvt. Ltd., New Delhi.
- 2. S. Samaddar, Textbook of Electric Wiring, New Central Book Agency (P) Ltd., Calcutta.
- 3. Surjit Singh, Textbook of Electrical Design Estimating and Costing, Dhanpat Rai & Sons.
- 4. Robert Boylestad, Louis Mashlsky, Electronics Devices and Circuit theory, Peerson
- 5. Morris Mano, Digital logic and computer Design, PHI

Paper Code : EAP13 Title: Electrical Appliances – I

Objectives: To enable the students to

- **1.** Understand the working principle and construction of common domestic appliances
- 2. Know the cause of faults in these appliances
- 3. Acquire skills to testing and repairs of appliances
- 4. Know the students about manufacturing of different appliances

Experiments :

- **1.** Use of Line tester, MCB (Miniature Circuit Breaker), ELCB (Earth Leakage Circuit Breaker)
- 2. Study of Thermocouple & Thermostat.
- **3.** Dismantling, reassembling, testing & repairs of Electric Iron.
- **4.** Dismantling, reassembling, testing & repairs of Tea- coffee maker, Electric toaster.
- **5.** Testing & repairing of Oven ,OTG.
- 6. Testing & repairing of Switches, Fuse.
- 7. Study, maintenance & repair of Water Heater & Geyser.
- 8. Testing & repairing of Room Heater, Hair dryer.
- 9. Testing & repairing of Electric door bell, Fan Regulator.
- **10.** Testing & repairing of Tube -light, Torch, Table Lamp.
- **11.** Market survey : Comparative study of electrical appliances.
- **12.** Visit to Electrical appliances service & repair shop.

References

- 1. Study of Home Appliances-K.B.Bhatiya
- 2. Home Appliances-Anwari
- 3. Home Appliances Services-E.P.Andersons

Electrical Appliances: Maintenance & Repairing Detail Syllabus for F.Y. B.Voc (Electrical) Diploma

First Year: Semester –I Syllabus is same as that of Certificate Course of B.Voc. (Electrical) (6 Months)

First Year: Semester –II

Paper Code : EAT21Title: Electrical WiringCredit : 4

- **1. Safety precautions and shock treatment :** Workplace Discipline, Electrical shocks and procedure for separating person form contact with live wire, First Aid different methods of artificial respiration, Electric fire, Fire extinguishers
- **2.** Electrical Tools : Pliers, combination, side cutting, round nose, long nose, Screw drivers, connectors, electrical knife, neon tester, test lamp, Symbols used in electrical technology, reading of electrical drawing
- **3.** DC Circuits : Series circuit , Parallel circuit , Ohm's law, Kirchhoff's current and voltage law
- Printed Circuit Board : Introduction, types and testing,
 Soldering : Introduction, equipments, precautions & technique
- **5.** Common electrical wiring accessories : Types of wires, lamp holders, distribution boards and other accessories
- 6. Domestic wiring (house wiring) : Introduction of wiring, selection of wiring, types of wiring, I.E.(Indian Electricity) rules of domestic wiring, testing and installation of domestic wiring, Earthing formats for electrical connections

References

- 1. Electrical Wiring Estimating & Costing S. L. Uppal
- 2. Electrical Wiring Estimating & Costing J. D. Gupta
- 3. Indian Electricity Rules Nausheer Bharocha
- 4. Basic Electrical Engineering, PHI- S.N.Singh

First Year : Semester –II

Paper Code : EAT22Title: Power SuppliesCredit : 4

- 1. Rectifier Circuits : Half wave, Full wave, Bridge, Merits, Demerits.
- 2. Filters : Reactance, Capacitor, Inductor, RC, RL, RLC and their types
- 3. Spike Guard: Principle & Working
- **4.** Zener Regulator: Avalanche breakdown, Zener breakdown, Zener Characteristics.
- **5. Power Supply:** Block diagram, line regulation, load regulation, series & shunt regulation.
- **6. Stabilizer :** Block diagram, Principle , working, specification, maintenance , and trouble shooting
- 7. 78XX & 79XX regulator IC : Block diagram, working and design of series / shunt regulation.
- 8. Power Transistor: Symbol, Construction, working and their types.
- 9. Heat Sink : Need of Heat Sink, Types, Specification.
- 10. Inverter: Principle & block diagram, UPS-Online, offline.

References

- 1. Electrical Engineering B. L. Theraja P I, II, III, IV
- 2. Maintenance of Domestic Appliances R. B. Lal
- 3. Basic Electrical Engineering (PHI) S.N.Singh
- 4. Engineering Circuit Analysis TMH- William Hayt
- 5. Electronic Devices & Circuit Pearson Education Boylestad & Nashelsky
- 6. Electronic Devices and Circuits McGraw Hill Millman, Halkias and Jit
- 7. Electronic Devices & Circuit Tata McGraw Hill-S.Salivahanan, N.Suresh Kr,&
- A.Vallavaraj

First Year : Semester –II

Paper Code : EAT23Title: Electrical Appliances- IICredit : 4

- **1. Water purifiers :** Principle, working, various parts and their use, types, specification, maintenance and trouble shooting
- **2.** Water cooler : Principle, working, various parts and their use, types, specification, maintenance and trouble shooting
- **3.** Air Cooler: Principle, working, various parts and their use, types, specification, maintenance and trouble shooting
- **4.** Fan : Principle, working, various parts and their use, types, specification, maintenance and trouble shooting
- **5. Blender :** Principle, working, various parts and their use, types, specification, maintenance and trouble shooting
- **6. Mixer :** Principle, working, various parts and their use, types, specification, maintenance and trouble shooting
- 7. Food processor : Principle, working, various parts and their use, types, specification, maintenance and trouble shooting
- **8.** Induction stove : Principle, working, various parts and their use, types, specification, maintenance and trouble shooting
- **9. Microwave Oven :** Principle, working, various parts and their use, types, specification, maintenance and trouble shooting
- **10. Washing Machine :** Principle, working, various parts and their use, types, specification, maintenance and trouble shooting
- **11. Vacuum Cleaner :** Principle, working, various parts and their use, types, specification, maintenance , and trouble shooting
- **12. Drill Machine :** Types-Mechanical, Electrical Principle , working, various parts and their use, specification, maintenance and trouble shooting
- **13. Domestic Flour Mill :** Principle, working, various parts and their use, types, specification, maintenance and trouble shooting

Refrences:-

- 1) Small Appliances Servicing P.T. Brook Woll Jr.
- 2) How to repair small Appliances Jack Darr
- 3) Audels Home appliances servicing Edwin P. Anderson
- 4) Maintenance of Domestic Appliances R. B. Lal

First Year: Semester –II

Paper Code: EAP21 Title: Electrical Wiring

Credit: 6

Objectives: To enable the students to

- 1. Acquire knowledge and skills about safety precautions while working.
- 2. Identify and to use different tools used in wiring.
- **3.** All units with properties and usage of different materials.
- 4. Understand the general concept of different wires.
- 5. Know about electrical house wiring.

Experiments:

- **1.** Study of Safety precautions while working on electrical installations & necessity of earthing (Grounding)
- **2.** Personal protection, basic injury prevention, symbol & sign for danger, warning & caution and elementary first aid
- 3. Artificial respiration techniques of separating person in contact with & live wire
- 4. Demonstration of use of Fire Extinguishers
- **5.** Demonstration and use of electrical tools.
- 6. Demonstration of different types of wires.
- 7. Study of Series circuit, Parallel circuit and Ohm's law
- 8. Study of Kirchhoff's current and voltage law
- **9.** Study of PCB and its testing
- **10.** Study of soldering techniques
- 11. Design and testing of Switch Board
- **12.** Study of Domestic Electrical Wiring

References

- 1. Electrical Wiring Estimating & Costing S. L. Uppal
- 2. Electrical Wiring Estimating & Costing J. D. Gupta
- 3. Indian Electricity Rules Nausheer Bharocha
- 4. Basic Electrical Engineering, PHI- S.N.Singh

First Year : Semester -II

Paper Code : EAP22	Title: Power Supplies	Credit : 6

Objectives: To enable the students to

- 1. Understand various components used in power supply.
- 2. Design and develop a power supply.
- 3. Understand the specification, use of Inverter and UPS.

Experiments :

- 1. Rectifier diode characteristic (Forward and Reverse)
- 2. Study of Half wave rectifier
- 3. Study of Full wave / Bridge Rectifier
- 4. Study of passive filters
- 5. Study of Zener diode characteristic
- 6. Study of 1) Line Regulation 2) Load Regulation in laboratory power supply
- 7. Study and testing of laboratory stabilizer.
- 8. To design, build and test IC regulated power supply
- 9. Study and testing of Inverter
- **10.** Study and testing of UPS
- 11. Market Survey of Power Supplies
- 12. Market Survey of components used for power supply.

References

1. Electrical Engineering – B. L. Theraja P – I, II, III, IV

- 2. Maintenance of Domestic Appliances R. B. Lal
- 3. Basic Electrical Engineering (PHI) S.N.Singh
- 4. Engineering Circuit Analysis TMH- William Hayt
- 5. Electronic Devices & Circuit Pearson Education Boylestad & Nashelsky
- 6. Electronic Devices and Circuits McGraw Hill Millman, Halkias and Jit
- 7. Electronic Devices & Circuit Tata McGraw Hill-S.Salivahanan, N.Suresh Kr,&
- A.Vallavaraj

First Year : Semester -II

Paper Code : EAP23 Title: Electrical Appliances- II

Credit : 6

Objectives : Enable the students to

- 1. Understand the working principle, construction, and uses of different domestic electrical appliances such as water purifier, water cooler, air Cooler, fans, mixer, blender, food processor, Induction Stove, Microwave oven, Washing Machine, Vacuum Cleaner, drill machine, domestic flour mill
- 2. Acquire skills of testing and repairing electrical appliances.

Experiments :

- 1. Dismantling, reassembling ,testing & repairs of water purifier
- 2. Dismantling, reassembling ,testing & repairs of water cooler
- 3. Dismantling, reassembling ,testing & repairs of air Cooler
- 4. Dismantling, reassembling ,testing & repairs of fans
- 5. Dismantling, reassembling ,testing & repairs of mixer, blender, food processor
- 6. Dismantling, reassembling ,testing & repairs of Induction Stove
- 7. Dismantling, reassembling ,testing & repairs of Microwave oven
- 8. Dismantling, reassembling ,testing & repairs of Washing Machine
- 9. Dismantling, reassembling ,testing & repairs of Vacuum Cleaner
- 10. Study and use of drill machine.
- 11. Dismantling, reassembling ,testing & repairs of domestic flour mill
- 12. Visit to Shop and Market Survey

Refrences:-

- 1) Small Appliances Servicing P.T. Brook Woll Jr.
- 2) How to repair small Appliances Jack Darr
- 3) Audels Home appliances servicing Edwin P. Anderson
- 4) Maintenance of Domestic Appliances R. B. Lal

Second Year : Semester –III

Paper Code : EAT31Title: Fundamentals of ComputerCredit : 4

- **1. Introduction :** Block Diagram, Types , Generation , Computer hardware & software
- 2. Mother board components and their function: Types, I/O ports, BIOS, power supply, Slots: Memory slots, expansion slots, Back panel, connectors: power, IDE, Memory and processor, CMOS battery
- **3. Storage devices :** Primary and Auxiliary types, functions, applications and their specifications
- 4. Input / Output devices: Keyboard, Mouse, Monitor, Printers, Scanner, Plotter, Joystick, OMR etc
- **5. PC Maintenance:** Partitioning, Formatting, Installation of Operating System and Software, Use of anti-virus , Trouble shooting
- **6.** Networking: Data Communication, types, Protocols, Cables, Maintenance and trouble shooting

References:

1." **Computer Fundamentals**" by P K Sinha.

2." Computer Fundamentals" by Goel.

3." **Fundamentals** of Natural **Computing**: **Basic** Concepts, Algorithms, and Applications (Chapman & Hall/CRC **Computer** and Information Science **Series**)" by de Castro and Leandro Nunes.

Second Year : Semester -III

Paper Code : EAT32 Title: Entertainment Electronics

Credit : 4

1. Sensor and Transducer: Definition, Active and passive sensors, specifications, Types-

Temperature, pressure, pH, humidity, optical, displacement, IR, tilt sensor etc.

 Amplifiers & Oscillators: Amplifiers: History, Principle, Types: Power amplifier, operational amplifier, distributed amplifier. Application.
 Oscillators: Construction & working, Basic types of oscillators.

3. Speakers & Car mp3 players:

Speakers: Introduction, History, Drive design, Driver types: Full range driver, Woofer, Tweeter, specification, electrical characterization, other speaker design, moving iron, piezo electric, plasma arc, etc.

Car mp3 players: Various types of m/c, Various Audio systems e.g. 2.1ch, 5.1 etc, Standard specification of Audio system, mp3 players used in cars.

- **4.** (**CRT**) **Colour TV. System:** Colour TV Block diagram, various sections of colour TV-viz -vertical section, various type of Monitor, Video Camera Block diagram, S.M.P.S.
- **5.** Modern Colour TV's: Various new types (except CRT type) of TV's-plasma, LCD, LED, OLED, QLED, Curved, foldable, 3D, Smart TV.

References:

1. Audels Home appliances servicing - Edwin P. Anderson

- 2. Micro Electronic Circuit, Oxford University Press VIth Edition -Sedra & Smith
- 3. Basic electronics By V. K. Me

4. Electronic Devices and Circuits McGraw Hill Millman, Halkias and Jit

5. Electronic Devices & Circuit Pearson Education - Boylestad & Nashelsky

6.Introducing Electronic Devices & Circuit, Pearson Education VIIth Edition – Robert T.

Paynter

7. Electronic Devices & Circuit - Tata McGraw Hill-S. Salivahanan, N. Suresh Kr, A. Vallavara

Second Year : Semester –III

Paper Code : EAT33Title: Refrigerator and Air ConditioningCredit : 4

- 1. Introduction to Refrigeration: Definition of Refrigeration, method of refrigeration, Law's of refrigeration, principles of refrigeration, unit of refrigeration, coefficient of performance, reversed Carnot cycle, rating of refrigeration machine.
- 2. Vapour compression refrigeration System : Vapour compression cycle, effect of sub cooling and super heating, effect of varying condensing and suction temperature on COP.
- **3. Refrigerants :** Properties and applications of commonly used refrigerants such as CFC, HFC, R-22, NH₃, R-410A, R-32, brine solution, Effects of refrigerants : ODP, GWP
- **4.** Component of vapour compression cycle : Function, type, specification and constructional details of components such as- compressor, condenser, throttle device, evaporator.
- **5. Introduction to Air conditioning**: Definition of air conditioning, metabolism in human body, human comfort, application of air conditioning.
- **6. Psychrometry :** Psychometric properties of Air- Dry bulb temperature, wet bulb temperature, dew point temperature, specific humidity, relative humidity.
- **7. Types of Air Conditioning Systems:** Room air conditioners, central air conditioning system, split air conditioner system.

- 1. Air Conditioning Principles & Systems, Prentice Hall of India Pvt. Ltd- Pita
- 2. Air Conditioning, Tata Mc Graw Hill- Jones
- 3.Study of Electrical Appliances and devices K.B.Bhatia
- 4. Maintenance of Domestic Appliances R. B. Lal

Second Year : Semester –III

Paper Code : EAP31Title: Fundamentals of ComputerCredit : 6

Objectives: To enable the students to

- 1. Understand various parts and their functions of Computer
- 2. Understand different types of storage devices
- 3. Understand various I/O devices
- 4. Know the Installation of operating system and software
- 5. Understand troubleshooting of Computer
- 6. Make use of MS- Office for office atomization
- 7. Understand Networking of Computers

Experiments :

- 1. Study of various parts of Computer & their connections
- 2. Study of Mother Board
- **3.** Study of Various Storage Devices
- 4. Study of Keyboard, Mouse and Monitor
- **5.** Study of Printers and their installation
- 6. Installation of operating system and software
- 7. Antivirus Software use and its maintenance
- **8.** Troubleshooting of Computer
- 9. Study and Application of MS Word
- 10.Study and Application of MS Excel / Power Point
- **11.**Networking of Computers
- 12. Visit to Computer Shop and Market Survey

- 1. "A First Course in **Computers**" by Sanjay Sexena.
- 2. "Programming in ANSI C" by Balaguruswamy.
- 3. "C Programming Language" by Brian W Kerighan and Dennis M Ritchie.
- 4. "Introduction To Computers" by Ms Shikha Nutiyal.
- 5. "Introduction to Information Technology" by Rajaraman V.

Second Year : Semester –III

Paper Code : EAP32Title: Entertainment ElectronicsCredit : 6

Objectives: To enable the students to

- 1. Understand various sensors and their application.
- 2. Understand various Parts and their functions of microphone, speakers.
- 3. Understand working of Amplifier, mp3 player.
- 4. Understand working of TV.

Experiments:

- 1. Study of Temperature sensor.
- 2. Study of Testing Pressure & Piezoelectric Sensor.
- 3. Study of Displacement sensor.
- 4. Study or IR sensor.
- 5. Testing & repairing of Amplifier.
- 6. Testing & repairing of Speaker.
- 7. Testing & repairing of Microphone.
- 8. Study of Testing & Repairing of mp3 player.
- 9. Study of various section of TV.
- 10. Testing & repairing of Testing & repairing of TV.
- 11. Testing & repairing of Smart TV. (LED).
- 12. Visit to Shop & Market Survey.

References:

1. Analog Electronics. Authors- L.K. MAHESWARI, M.M.S.ANAND. 2009

2. Radio Frequency Electronics: Circuit And Application. Author: Jon B. Hagen-1996

3. Electronic Communication System. Author- Kennedy

4. Integrated Electronics Analog And Digital & System. Author – Jacob Millman. Christos C. Halkias

5. Electronic Devices For Analog Signal Processing Author: Yu. K. Rybin

Second Year : Semester –III

Paper Code : EAP33Title: Refrigerator and Air ConditioningCredit : 6

Objectives: To enable the students to

- 1. Understand various parts their functions of Household Refrigerator
- 2. Understand troubleshooting and maintenance of Refrigerator
- 3. Understand various parts their functions of Air Conditioner
- 4. Understand troubleshooting and maintenance of Air Conditioner
- 5. Install Air Conditioner

Experiments :

- 1. Study of Domestic or Household Refrigerator
- 2. Study of various tools used in refrigeration Lab
- 3. Study of Refrigeration Compressor
- 4. Study of Leak Detection, Evaluation and Charging of Refrigerants procedure
- 5. Study of Refrigerating Controls
- 6. Trial on Refrigeration Test Rig
- 7. Trial on Air Conditioning Test Rig
- 8. Installation of Air Conditioner
- 9. General maintenance and repair of refrigerator
- **10.** General maintenance and repair of air conditioner
- **11.** Technical report on visit to Refrigeration and Air Conditioning establishments (shop/showroom)

References:

Helpful for Refrigerator and A.C. Repairing and I.T.I. and Various Engineering Examinations Preparation- ISBN: 978-81-7317-546-6.Written by: Arvind Kumar Sharma

Second Year : Semester –IV

Paper Code : EAT41	Title: Business Communication	Credit : 4
-		

- 1. Business Communication: Introduction, Meaning, Definition, Features, Process or Communication, Principles of communication, Importance, Barriers to Communication and Remedies
- 2. Methods and Channels of Communication: Merits and Demerits, Types
- **3. Soft Skills**: Meaning, Definition and Importance Elements of Soft Skills
 - i. Grooming Manners and Etiquettes
 - ii. Effective Speaking
 - iii. Interview Skills
 - iv. Listening
 - v. Group Discussion
 - vi. Oral Presentation

4. New Technologies in Business Communication :

Internet: Email, Websites, Electronic Clearance System, Writing a Blog Social Media Network: Twitter, Facebook, LinkedIn, YouTube, Celleular Phone, Whats App, Voice Mail, Short Messaging Services, Video conferencing.

References:

1.Raman, Meenakshi & Sangeeta Sharma. Technical Communication: Principles and Practice. Second Edition. New Delhi: Oxford University Press, 2011.

2.Rogers, Natalie. How to Speak Without Fear. London: Ward Lock, θ 1982.

3.Rutherford, Andrea J. Basic Communication Skills for Technology:θ Second Edition. Delhi: Pearson Education, 2007.

4.Seely, John. Writing Reports. New York: Oxford University Press,θ 2002.

5.Sharma, R. C. θ & Krishna Mohan. Business Correspondence and Report Writing: Third Edition. New Delhi: Tata McGraw-Hill Publishing company Limited, 2007.

6. Thill, John V. θ & Courtland L. Bovée, Excellence in Business Communication, 10th edition. Boston : Pearson, 2013.

Second Year : Semester –IV

Paper Code : EAT42Title: Electrical MachinesCredit : 4

- **1. Electromagnetism** : Introduction, types of magnets, basic magnetic terms, electromagnet, difference between permanent magnet and electromagnet
- **2. D.C. motor** : Introduction of D.C. motor, working principle, construction, types of D.C. motors, necessity of starters, types of starters
- **3. Single phase transformer** : Introduction, types of transformer, transformation ratio, rewinding, transformer testing
- 4. Single Phase A.C. Motor: Introduction, types of single phase motor winding, fundamental definitions, winding tools and equipments, winding materials, single phase motor winding
- **5.** Single phase AC motor and Rewinding , winding : Introduction, working principle, types, construction, speed control and change of DOR (direction of rotation), testing, fault finding, Maintenance, lubricants.

References:

1.Electrical Motor Repair – I. M. Anwani 2.Electrical Motor Winding & Reapir- Anwani

Second Year : Semester –IV

Paper Code : EAT43Title: Lab Instruments - ICredit : 4

- **1. pH meter:** Principle, working, various parts, types, specification, maintenance and trouble shooting, Application
- **2. Digital Balance:** Principle, working, various parts, types, specification, maintenance and trouble shooting, Application
- **3.** Clamp meter : Principle, working, various parts, types, specification, maintenance and trouble shooting, Application
- **4. Dimmerstat:** Principle, working, types, specification, maintenance and trouble shooting, Application
- **5. Colorimeter:** Principle, working, various parts, types, specification, maintenance and trouble shooting, Application
- **6.** Laser source, Sodium source, Mercury source: Principle, working, various parts, types, specification, maintenance and trouble shooting, Application
- **7.** Lab / Industrial Trainer Kit: Principle, working, various parts, types, specification, maintenance and trouble shooting, Application
- **8. IR lamp:** Principle, working, various parts, types, specification, maintenance and trouble shooting, Application
- **9. Incubator:** Principle, working, various parts, types, specification, maintenance and trouble shooting, Application
- **10. Vacuum/Suction Pump:** Principle, working, various parts, types, specification, maintenance and trouble shooting, Application

- 1.Elements of Electrical Gadgets K.B.Bhatia
- 2.Small Appliances Servicing P.T. Brook Woll Jr.
- 3.Indian Electricity Rules Nausheer Bharocha
- 4.Fundamental's of Electricity Kernard C. Graham

Second Year : Semester –IV

Paper Code : EAP41	Title: Business Communication	Credit : 6
		0100100

Objectives : Enable the students to

- 1. Understand barriers in effective communication
- 2. Acquire different soft skills for Business Communication
- 3. Understand New Technologies in Business Communication
- **4.** Acquire skill in using social media network

Experiments :

- 1. To study barriers in effective communication in an organization
- 2. Suggestion of remedies in effective communication in an organization.
- 3. List & Study different elements in the soft skills
- **4.** Prepare an oral presentation on specific topic to address audience (Topic, Object, Outline, scope)
- 5. Organize a group discussion on a topic and summarise it.
- **6.** Prepare a demo interview for Promotion / Assessment/ Exit/ problem/ Group interview
- 7. Discuss New Technologies in Business Communication
- **8.** To study writing of Blogs
- 9. Study of Internet

10. Discuss & Study Social Media Network (Twitter, Face book, LinkedIn, You Tube) with advantage and disadvantage

11. Discuss & Study Social Media Network (Whats App, Voice mail etc) with advantage and disadvantage

12. Study on E-mail communication.

References:

1. Business Communication Today by Courtland L. Bovee, John V. Thill, Barbara E. Schatzman, Hardcover: 730 pages, Publisher: Prentice Hall

2. Excellence In Business Communication (6th Edition) by John Thill, Courtland L. Bovee, Paperback: 656 pages, Publisher: Prentice Hall

3. Essentials of Business Communication with Student CD-ROM by Mary Ellen Guffey, Paperback: 511 pages, Publisher: South-Western Educational

Second Year : Semester –IV

Paper Code : EAP42Title: Electrical MachinesCredit : 6

Objectives :

- 1. Understand the student to use & principle of different measuring electrical Instruments
- 2. Know various D.C. Motors construction, working principle & its application.
- **3.** Know various single phase transformer construction principle and transformer equation & small transformer rewinding.
- 4. Know various single phase motors, construction working principle, applications.
- 5. Know various speed controls of single phase motors.
- 6. Students able to rewinding the different single phase motors

Experiments:

- **1.** Study of DC motor & it's Connection to suitable starter & measure current, voltage & speed.
- **2.** Study on simple transformer test, continuity, short circuit & earth of primary & secondary winding
- 3. Study of transformer rewinding & verify it's voltage and current ratio.
- **4.** To Measure the insulation resistance between winding to core of single-phase transformer
- **5.** To study the parts of single phase motor, test capacitor using screw driver and multimeter method
- **6.** Identification of starting and running winding of single phase motor by measuring resistance with the help of multimeter
- 7. Dismantle and study of carbon brush and commulator of universal motor. Reassemble it start, run, reverse universal motor. Measure the current, voltage and speed
- 8. Insulate the slot and prepare new coils as per old coils test. The rewinded motor & insert wedges in the slots.
- **9.** Inserting the coils and making connection as per developed diagram, varnishing & baking.
- **10.**Assembling a motor and start it after rewinding
- **11.**Visit to Motor rewinding shop and prepare detailed report.
- **12.** Market survey on cost, size and specifications of winding materials.

- 1." Principle of Electrical Machines" by Mehta V K and Mehta Rohit.
- 2. "Electric Machines" by Ashfaq Husain and Harroon Ashfaq.
- 3. " Electrical Machinery" by P S Bimbhra.

Second Year : Semester –IV

Paper Code : EAP43Title: Lab Instruments - ICredit : 6

Objectives : Enable the students to

- 1. Understand the working principle, construction, and uses of different domestic electrical appliances such as pH meter, Digital Balance, Clamp meter, Dimmerstat, Colorimeter, Laser source, Sodium & Mercury source, Lab / Industrial Trainer Kit, IR lamp, Incubator, Vacuum/ Suction Pump.
- 2. Acquire skills of testing and repairing electrical appliances.

Experiments:

- **1.** Testing ,repairing & use of pH meter
- 2. Testing ,repairing & use of Digital Balance
- **3.** Testing ,repairing & use of Clamp meter
- 4. Testing ,repairing & use of Dimmer-stat
- **5.** Testing ,repairing & use of Colorimeter
- 6. Testing ,repairing & use of Laser source
- 7. Testing ,repairing & use of Sodium & Mercury source
- 8. Testing ,repairing & use of Lab / Industrial Trainer Kit
- 9. Testing ,repairing & use of IR lamp
- 10. Testing , repairing & use of Incubator
- **11.**Testing ,repairing & use of Vacuum/ Suction Pump
- **12.** Market survey on cost, size and specifications of Lab Instruments

- 1.Fundamentals of Electrical engineering by Ashfaq Husain.
- 2. A Textbook of Electrical Technology by B.L Thereja.
- 3. Electrical Science by J. B. Gupta

Second Year : Semester –IV

Paper Code :EVATitle: Environmental AwarenessGrade

- 1. Nature and Scope of Environmental Studies Definition, Scope, Importance, Multidisciplinary Nature, Need for public awareness
- 2. Natural Resources Renewable and non-renewable, Natural resources and associated problems of forest, water, mineral, energy, land and food, case studies, Conservation of resources
- **3.** Ecosystem Types, Characteristics, Structure and Function
- **4.** Biodiversity and its Conservation Definition, Genetic, Species and Ecosystem diversity, Biogeographical classification of India, Biodiversity at global, national and local levels, Conversation of biodiversity
- 5. Environmental Pollution Definition, effects and control measures of air, water, soil, marine, noise, thermal, nuclear pollution, Role of an individual in prevention of pollution, case studies, Disaster management
- **6.** Social Issues and the Environment

Urban problems, Resettlement problems, Climatic change, Global warming, Acid rain, Ozone layer depletion, Nuclear accidents, Air Act, Environmental Protection Act, Water, Forest, Wild Life Act, Public Awareness

7. Human Population and Environment Population Explosion, Family Welfare Programme, Environment and Human Health, Human rights, Value Education, HIV/ AIDS, Role of IT in Environment and Human Health- case Studies

- 1. Water Pollution: Causes, Treatments and Solutions, by Dr. Luxmy Begum, P. Eng., First Edition, October, 2015.
- 2. Water trivia Facts (March 6, 2012).Information obtained on May 1, 2012.
- 3. Water Contamination Effects. Information obtained on May 10, 2012 .
- 4. Health. Information obtained on May 10, 2012.

Third Year : Semester –V

Paper Code : EAT51Title: Entrepreneurship DevelopmentCredit : 4

1. Entrepreneur and Entrepreneurship :

Definition, meaning and functions of an entrepreneur Need and importance of entrepreneurship, Problem of unemployment & importance of wealth creation. Enterprise v/s Entrepreneurship, Self – employment v/s Entrepreneurship.

- 2. Business Opportunity Identification and Preliminary Project Report (PPR): Opportunity search : Divergent Thinking Mode : Meaning and Objectives – Tools and Techniques : Environmental Scanning for business opportunity identification Opportunity Selection : Convergent Thinking Mode : Tools and Techniques : Market Survey – Preparation of Questionnaire – Concept of Survey – Data collection – Analysis and Interpretation – Preliminary Project Report (PPR)
- 3. Business Plan : Meaning and Importance Objectives Selections Contents Marketing and Technical Feasibility – Financial Viability – Precautions to be taken by entrepreneur while preparing Business Plan Project Appraisal – Break – even Analysis and Ratio Analysis : Debt Service Coverage Ratio – Gross Profit : Net Profit Ration and Return on Investment (ROI)
- **4. Institutional Support to New Venture :** (Student are expected to study the assistance scheme of the following Institutions) District Industries Center (DIC) Maharashtra Center for Entrepreneurship Development (MCED) National Small Industries Corporation of India (NSIC) Maharashtra Industrial Development Corporation (MIDC) Micro Small and Medium Enterprises (MSME)
- **5. Financial Assistance for small Enterprise :** Non-Institutional : own Fund Family and Friends Institutional :Bank Loans Co-operative Banks- Nationalized Bank Scheduled Banks. Angel Funding, Venture Funding
- 6. Self-employment Scheme of Government of Maharashtra: Government Financial Institutions : Khadi and Village Industries Board (KVIB) – Micro, Small and Medium Enterprises (MSME) Rajeev Gandhi Udyami MItra Yojana (RUGMY) – District Industries Center (DIC),Prime Minister Employment Generation Programme (PMEGP) (g) For urban – Seed Capital Scheme+

7. Study of Entrepreneurs Biographies :

- 1. Narayan R. Murthy
- 2. Pramod Choudhari
- 3. Vitthal Kamat
- 4. Hanumant Ramdas Gaikwad

References:-

1. "Entrepreneurial Development" by Khanka S S

2. "Entrepreneurial Development and Small Business Management" by Dr P T Vijayashree & M Alagammai

3. "Entrepreneurial Finance, Third Edition: Finance and Business Strategies for the Serious Entrepreneur" by Steven Rogers and Roza E Makonnen

4. Business Planning for New Ventures by David F. Butler

5. Anderson, T., Curley M.G. and Formica, P., 2010. Knowledge-Driven Entrepreneurship: The Key to Social and Economic Transformation. Springer Verlag: Heidelberg.

6. <u>http://di.maharashtra.gov.in/_layouts/15/doistaticsite/English/investors_guide_dic.html</u>

7. Small scale industries and entrepreneurship, Dr. Vasant Desai, Himalayan Publishing House

Third Year : Semester –V

Paper Code : EAT52Title: Lab Instruments- IICredit : 4

- **1. CRT :** Principle , Working **CRO :** Principle , working, study of controls on front panel , types of CRO, specification, maintenance and trouble shooting
- **2. Function generator:** Principle , working, study of controls on front panel , types, specification, maintenance and trouble shooting
- **3. Projector :** Principle , working, operation , types, specification, maintenance and trouble shooting
- **4. Gas sensing unit:** Principle , working, various parts and their use, specification, maintenance and trouble shooting
- **5.** Centrifuge system : Principle , working, various parts and their use, types, specification, maintenance and trouble shooting
- **6. Spin coater :** Principle , working, various parts and their use, types, specification, maintenance and trouble shooting
- 7. Laminar Air Flow Cabinet (Air purifier): Principle, working, various parts and their use, types, specification, maintenance and trouble shooting
- 8. Autoclave : Principle , working, various parts and their use, types, specification, maintenance and trouble shooting

- 1. Troubleshooting your Oscilloscope: Getting down to Basics-TEKTRONIX,INC.Test &Measurement Training.
- 2. Tektronix AFG3000Series Function Generator Service manual
- **3.** Hansen Technology GAS DETECTIONSENSORS, MONITORS & ALERT SYSTEMS Specifications, Applications, Service Instructions & Parts
- 4. https://en.wikipedia.org
- 5. Centrifugation Techniques by Shalinee Naidoo
- 6. https://www.ossila.com/pages/spin-coating
- 7. LAMINAR FLOW EQUIPMENT Overview and Guide for a safe employment Davide Simone
- 8. Autoclave & Sterilizer by Rkv Murugan

Third Year : Semester –V

Paper Code : EAT53Title: Lab Instruments- IIICredit : 4

- **1. UV Spectrophotometer** : Block diagram, Principle , working, various parts and their use, types, specification, maintenance and trouble shooting
- **2. Muffle Furnace** : Principle , working, various parts and their use, types, specification, maintenance and trouble shooting
- **3. G. M. Counter** : Principle , working, various parts and their use, types, specification, maintenance and trouble shooting
- **4. Inverter :** Battery principle, Block diagram, Principle , working, various parts and their use, types, specification, maintenance and trouble shooting
- **5. UPS :** Block diagram, Principle , working, various parts and their use, types, specification, maintenance and trouble shooting
- **6. Intercom Machine :** Principle , working, EPABX, types, specification, maintenance and trouble shooting
- 7. CCTV : Principle, working, various parts and their use, types, specification, maintenance, trouble shooting and installation

- 1. https://en.wikipedia.org/wiki/Ultraviolet%E2%80%93visible_spectroscopy
- 2. https://www.sentrotech.com/resources/choosing-a-muffle-furnace/
- **3.** Modern Digital Inverter Basic, Servicing & Fault Finding by Manahar Lotia Publisher:BPB Publications
- 4. Modern UPS Introduction, Servicing & Troubleshooting by Manahar Lotia (Author)

Third Year : Semester –V

Paper Code : EAP51Title: Entrepreneurship DevelopmentCredit : 6

Objectives of Business Project : Enable the students to develop

- 1. The ability to identify entrepreneurial opportunities that exist, those that represent untapped markets and underserved markets, and those that can be created by applying existing technologies to new fields and new markets; and,
- 2. The ability to create entrepreneurial opportunities through the invention, development and exploitation of entirely new ideas, products and services, and/or the creation of new industries, infrastructures, and ways of doing business.

Note : Students should refer the following guideline while writing the business project report.

Item	Description	
1. Executive Summary	Objectives, Mission and Vision, Keys to Success, Start-up costs and funding, Company ownership, Products and Services, Market, Strategy, Management, Financials, Investor Considerations, Disclaimer	
2. Business Profile	Administrative, ownership details Outcome of business activity Mission (vision) statement	
3. Market Focus and Performance	Target markets Market research Marketing partners Market performance	
4. Strategic Planning	SWOT analysis Goals/Objectives Strategic action plan	
5. Human Resources Management	Policies and procedures that influence employee behavior Training and induction program	
6. Operational Procedures Manual	A separate document which outlines the day to day procedures for the VIC	
7. Sustainable and Environmental Considerations	Environmental practices and goals Risk management strategies	
8. Action Plan and Budgets	List of planned actions and strategies Budget for each action or strategy Communicating the plan Include a yearly review of the Business Plan	

References:-

1. "Entrepreneurial Development" by Khanka S S

2. "Entrepreneurial Development and Small Business Management" by Dr P T Vijayashree & M Alagammai

3. "Entrepreneurial Finance, Third Edition: Finance and Business Strategies for the Serious Entrepreneur" by Steven Rogers and Roza E Makonnen

4. Business Planning for New Ventures by David F. Butler

5. Anderson, T., Curley M.G. and Formica, P., 2010. Knowledge-Driven Entrepreneurship: The Key to Social and Economic Transformation. Springer Verlag: Heidelberg.

6. <u>http://di.maharashtra.gov.in/_layouts/15/doistaticsite/English/investors_guide_dic.html</u>

7. Small scale industries and entrepreneurship, Dr. Vasant Desai, Himalayan Publishing House

Third Year : Semester –V

Paper Code : EAP52Title: Lab Instruments- IICredit : 6

Objectives : Enable the students to

- 1. Understand the working principle, construction, and uses of different domestic electrical appliances such as Cathode Ray Tube, Cathode Ray Oscilloscope, Function generator, Projector, Gas sensing unit, Centrifuge system, Spin coater, Magnetic Stirrer, Laminar Air Flow Cabinet, Autoclave
- 2. Acquire skills of testing and repairing electrical appliances.

Experiments:

- 1. Study of Cathode Ray Tube
- Study & use of Cathode Ray Oscilloscope for the measurement of frequency, AC/DC voltage etc.
- 3. Testing, Repairing & Maintenance of CRO
- 4. Study & use of Function generator for the measurement of frequency
- 5. Testing, Repairing & Maintenance of function generator
- 6. Testing, Repairing & Maintenance of Projector
- 7. Testing, Repairing & Maintenance of Gas sensing unit
- 8. Testing, Repairing & Maintenance of Centrifuge system
- 9. Testing, Repairing & Maintenance of Spin coater
- 10. Testing, Repairing & Maintenance of Laminar Air Flow Cabinet
- 11. Testing, Repairing & Maintenance of Autoclave
- 12. Market survey on cost, size and specifications of Lab Instruments

- 1. Troubleshooting your Oscilloscope: Getting down to Basics-TEKTRONIX,INC.Test &Measurement Training.
- 2. Tektronix AFG3000Series Function Generator Service manual
- Hansen Technology GAS DETECTIONSENSORS, MONITORS
 & ALERT SYSTEMS Specifications, Applications, Service Instructions & Parts
- 4. https://en.wikipedia.org
- 5. Centrifugation Techniques by Shalinee Naidoo
- 6. https://www.ossila.com/pages/spin-coating
- 7. LAMINAR FLOW EQUIPMENT Overview and Guide for a safe employment Davide Simone
- 8. Autoclave & Sterilizer by Rkv Murugan

Third Year : Semester –V

Paper Code : EAP53Title: Lab Instruments- IIICredit : 6

Objectives : Enable the students to

- 1. Understand the working principle, construction, and uses of different domestic electrical appliances such as UV Spectrophotometer, Muffle Furnace, G. M. Counter, Battery, Inverter, UPS, Intercom, CCTV
- 2. Acquire skills of testing and repairing electrical appliances.

Experiments:

- 1. Testing, Repairing & Maintenance of UV Spectrophotometer
- 2. Testing, Repairing & Maintenance of Muffle Furnace
- 3. Testing, Repairing & Maintenance of G. M. Counter
- 4. Testing, Recharging & Preventive maintenance of Battery
- 5. Testing, Repairing & Maintenance of Inverter
- 6. Testing, Repairing & Maintenance of UPS-offline / online
- 7. Testing, Repairing & Maintenance of Intercom, EPABX
- 8. Feasibility study and installation of Intercom Machine in organisation
- 9. Testing, Repairing & Maintenance of CCTV
- 10. Feasibility study and installation of CCTV system in organisation
- 11. Market survey on cost, size and specifications of Lab Instruments 1 to 6
- 12. Market survey on cost, size and specifications of CCTV and Intercom machine.

- 1. https://en.wikipedia.org/wiki/Ultraviolet%E2%80%93visible_spectroscopy
- 2. https://www.sentrotech.com/resources/choosing-a-muffle-furnace/
- 3. Modern Digital Inverter Basic, Servicing & Fault Finding by Manahar Lotia Publisher:BPB Publications
- 4. Modern UPS Introduction, Servicing & Troubleshooting by Manahar Lotia (Author)

Third Year : Semester –VI

Paper Code : EAT61	Title: Research Methodology	Credit : 4
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- 1) **Definition of the Problem**: Identifying and formulating the problem. **Techniques involved in solving the problem:**
 - (a) Exact analytical solution of equations involved.
 - (b) Numerically solving equations.
 - (c) Simulating the problem on a computer. Monte Carlo or molecular dynamics approach.
 - (d) Experimental observations and theoretical modeling
- 2) Developing a research plan: Research objective: information required for solving the problem: defining each major concept in operational terms: an overall description of approach, clearly stating any assumptions; details of techniques.
- 3) Methods of data collection: Experimental data, field data, data from other sources.
- 4) Analyzing data: Error analysis, statistical analysis

5) Using computers in research:

Basics of operating systems - handling different operating systems

- a) Literature survey using web, handling search engines
- b) Computer usage for collecting/analyzing data simulations using Fortran/ C/ Mathematical/ Matlab/Mathcad.
- c) Preparing presentations:
 - Research hpapers : Using word processing software MSWord/Latex/others, Drawing graphs and diagrams – Origin/Xmgrace/Excel/others.
 - ii) Seminar presentations Power point for oral and poster presentations
- 6) **Review of Research Work :** The relevance of the research from perspective of the subject. Detailed review of state of the art. Scope of the work.

- 1. Research Methodology C R Kothari
- 2. Research Methodology: A Step-by-Step Guide for Beginners by Dr. Ranjit Kumar

Third Year : Semester –VI

Paper Code : EAT62	Title: Professional Practices	Credit : 4
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- Field Visits : Structured field visits (minimum three) be arranged and report of the same should be submitted by the student, as part of the term work. The field visits may be arranged in the following areas / industries :
 - i) Visit to Electric Power Generation Station
 - ii) Visit to Wind Mill and/or Hybrid Power Station of Wind and Solar
 - iii)Multi Storied Building for Power Distribution Scheme

iv)Visit to a Multi Plex

- v) Visit to a Captive Power Plant (Thermal)
- **2.** Market Survey : A group of four students is expected to collect information from the market regarding specifications, availability , maintenance and cost.

3. Lectures by Professional / Industrial Expert to be organized from of the following areas (any four)

- i) Business Communication
- ii) Entrepreneurship Development
- iii) Banking & Finance
- iv) Shop Act
- v) Accounting Practices, Use of Tally
- vi) GST
- vii) Income Tax & Return filing
- viii) Modern Techniques in Power Generation
- ix) Various government schemes such as EGS,
- x) Industrial hygiene
- xi) Special purpose wiring in chemical/hazardous industries

4. Seminar :

- **i.** Students will have to deliver a seminar for 10 minutes.
- **ii.** Students (Group of 4 to 5 students) have to search /collect information about the topic through literature survey, visits and discussions with experts.
- **iii.** Student can select the topic for seminar from their curriculum.

Reference:

1. Managing the Professional Practice: In the Built Environment Editor(s): Hedley Smyth

2.Nursing and Multi-Professional Practice **Edited by:** <u>Janet McCray</u> **Publisher:** SAGE Publications Ltd

3. Professional Practice By Roshan Namavati

4.https://www.questionpro.com/blog/market-survey/

Third Year : Semester –VI

Paper Code : EAT63 Title: Renewable Energy Sources Credit : 4

- 1. An Introduction to Energy Sources: Conventional and non-conventional sources of energy, Structure and characteristics of sun, Solar Constant, Electromagnetic energy spectrum, Solar radiations outside earth atmosphere, Solar radiation at the earth surface, problems.
- 2. Photothermal Applications: Liquid flat plate collector, construction and working, Energy balance equation (without thermal analysis), Concentrating collectors, Advantage and disadvantage, Solar distillation, Solar drying, Solar cooker(box type), Solar water heating systems.
- **3. Photovoltaic systems:** Introduction, Photovoltaic principle, Power output and conversion efficiency, Limitation to photovoltaic efficiency, Basic photovoltaic system for power Generation, Advantages and disadvantages, Types of solar cells, Application of solar photovoltaic systems.
- **4.** Energy from Biomass: Introduction , Bio -mass conversion technologies , Bio-gas generation Factors affecting bio-digestion (list of factors) , Working of biogas plant, Advantages and disadvantage of floating and fixed dome type plant, Bio-gas from plant wastes , Methods for obtaining energy from biomass , Thermal gasification of biomass , Working of downdraft gasifier , Advantages and disadvantages of biological conversion of solar energy
- 5. Wind Energy: Introduction, Classification and description of wind machines

- D.P.Kothari, K.C.Singal, Rakesh Rajan, "Renewable Energy Sources and Emerging Technologies", PHI Second Edition
- S. Rao, Dr. B. B. Parulekar, "Energy Technology Non Conventional, Renewable and Conventional", Khanna Publication.
- 3. S.P. Sukhatme, "Solar Energy", Tata McGraw Hill
- Chetan Singh Solanki, "Solar Photovoltaics-Fundamentals, Technologies and Applications", PHI Second Edition

Third Year : Semester –VI

Paper Code : EAP64Title: Electrical Work Shop

Credit : 3

Objectives :

- **1.** Acquire technical and manipulative skills in using laboratory equipment, tools, and materials.
- **2.** Demonstrate an understanding of laboratory procedures including safety, and scientific methods.
- **3.** Acquire the complementary skills of collaborative learning and teamwork in laboratory settings.
- 4. To train people to design and build domestic electrical/electronic equipment using modern digital techniques
- 5. To know the applications of Solar energy

Experiments:

Note: Experiment No. 1 to 4 will be performed by using casing, capping or conduit wiring. Prepare schedule of material for each wiring work.

- 1. Wire up one lamp controlled by one SPT switch
- 2. Wire up a callbell/buzzer
- **3.** Wire lighting circuit for a go down wiring
- **4.** Wire up consumer's main board with ICDP & distribution fuse box & With LCB / MCB
- **5.** Fuel value of wood/charcoal.
- 6. Study of Solar water heater
- 7. Study of box type solar cooker.
- 8. Efficiency and fill factor of solar cells.
- 9. Electrical power generation using Solar panel.

- 1. Electrical workshop Technology Vol-I & II by Anwari
- 2. Home Appliances servicing Anwari
- 3. Electrical Technology- II B.L.Thareja
- 4. Study of Home Appliances K.B. Bhatiya

Third Year : Semester –VI

Paper Code : EAP65Title: Industrial Training

Credit : 15

Objectives :

- 1. To provide comprehensive learning platform to students where they can enhance their employability skills and become job ready along with real corporate exposure.
- 2. To enhance students' knowledge in one particular technology.
- **3.** To Increase self-confidence of students and helps in finding their own proficiency
- 4. To cultivate student's leadership ability and responsibility to perform or execute the given task.
- 5. To provide learners hands on practice within a real job situation.

It is expected that :

- **1.** The Industrial Training Course is a practical course and it is intended to develop a set of skills.
- **2.** The student must have a clear and strong understanding of the electrical appliances on which he/ she works.
- **3.** The theme chosen should be such that it promotes better understanding of concepts and brings out the creativity in the students.
- **4.** The evaluation of the work must give due credit to the amount of the work actually done by a student, skills shown by the student, understanding of the concepts involved and the presentation of the final report at the time of viva voce.
- **5.** Any ready-made material used in the report (such as downloaded pages from the web) must be clearly referred to and acknowledged.
- **6.** Any non-adherence to this norm should attract a penalty by way of deduction in the marks awarded to a student.

Industrial Training Progress Report

1. Student Information :

Name of the Student :	
Name of the Company / Organization :	
Name of the Company / Organization Head:	

2. Month wise Progress Report :

Month	Details of work done	Skills acquired	Remark & Sign of supervisor

Head of Company / Organization

FORMAT FOR PREPARATION OF PROJECT REPORT

Student should submit the report on their Industrial training in the following format. The material in the project report should be properly bound and submitted in 2 copies.

- Cover Page and Title Page
- Bonafide Certificate
- Acknowledgement
- Abstract
- Table of Contents
- List of Tables
- List of Figures
- List of Symbols, Abbreviations and Nomenclature
- Chapters
- Appendices