SVERI's
College of Engineering, Pandharpur

Action Taken Report of the Institution on Feedback Report of A. Y. 2022-23

- **Letter to BOS in Mechanical Engineering, Punyashlok Ahilyadevi Holkar Solapur University about incorporating different suggestions collected from various stakeholders regarding curriculum.**

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P. B. No. 54, Gopalpur - Ranjani Road, Gopalpur, **Tal.**: Pandharpur - 413 304, **Dist.**: Solapur (MH)
Contact No.: 9545553888, 9545553737, **E-mail** : coe@sveri.ac.in, **Website** : www.sveri.ac.in
Approved by **A.I.C.T.E.**, New Delhi and Affiliated to Punyashlok Ahilyadevi Holkar Solapur University, Solapur
NBA Accredited all eligible UG Programmes, **NAAC** A+ Accredited Institute, ISO 9001 : 2015 Certified Institute
Accredited by Institution of Engineers (India) & TCS.

Ref.:- COEPR/2022-2023/1073 Date:- 7/3/2023

To,
The Chairman,
BOS in Mechanical Engineering,
Punyashlok Ahilyadevi Holkar Solapur University,
Solapur.

Subject: Suggestions to be incorporated in the syllabus of Final Year B. Tech. (Mechanical Engineering) w.e.f. 2023-2024.

Respected sir,

Throughout the year, we collect suggestions from various stakeholders regarding the curriculum. We have also received number of suggestions for curriculum improvement from industrial experts. Accordingly, suggestions were discussed in the department meeting.

Our Mechanical Engineering Department has recommended the following suggestions for incorporation in Course Curriculum of Final Year B. Tech. (Mechanical Engineering) w.e.f. 2023-2024 to enrich students learning experience and making them more employable.

Name of Program: Mechanical Engineering.

Suggestions for the Modifications in the Curriculum:

1. Introduction of Hourly Analysis Program (HAP) software/E20 form for heat load calculation should be added in the syllabus of Refrigeration & Air conditioning.
2. To bridge the gap between academic and industry, the subject of Automobile Engineering should include electric vehicle and fuel cell technology.
3. In view of implementation of NEP 2020 education policy, Mechanical Engineering curriculum should include more inter-disciplinary topics.
4. To give more industrial exposure at final year level, industrial visits should be required for maximum subjects.
5. At least one micro/mini project and case study should be included as Assignment/Tutorial/Laboratory for all courses preferably with an industry focus.
6. The subject of robotics should include Demonstration of Models/Some experiments in the Practical.
7. The experiments in Refrigeration and Air conditioning are required to be updated.
8. Introduction of Hourly Analysis Program (HAP) software/E20 form for heat load calculation should be added in the syllabus of Refrigeration & Air conditioning.
9. To bridge the gap between academic and industry, the subject of Automobile Engineering should include electric vehicle and fuel cell technology.
10. In view of implementation of NEP 2020 education policy, Mechanical Engineering curriculum should include more inter-disciplinary topics.

B.S. 8/3/23

B. Range

11. To give more industrial exposure at final year level, industrial visits should be required for maximum subjects.
12. At least one micro/mini project and case study should be included as Assignment/Tutorial/Laboratory for all courses preferably with an industry focus.
13. The subject of robotics should include Demonstration of Models/Some experiments in the Practical.
14. The experiments in Refrigeration and Air conditioning are required to be updated.
15. As per changing technological scenario, contents of syllabus for all the subjects is required to be updated by adding one/two topics.
16. Case studies are required to be added in Research Methodology subject as Assignments.
17. Some Product Design Concepts should be added in the Analysis and synthesis of Mechanisms course.
18. For Honors in Electric Vehicles Engineering, the appropriate books to the framed syllabus are required to be updated in the curriculum.
19. Business plan or proposal submission related topics are required to be added in Entrepreneurship Development course.
20. Significance of Artificial Intelligence and Machine Learning with some case studies/examples required to be included in the syllabus.
21. Maximum case studies should be included as Assignments for the subjects like Production and Operations Management, Supply Chain Management, Entrepreneurship Development, etc.
22. The ethical values, technical standards and professional responsibilities related to Robotics and Automation should be included in the syllabus of the subject.
23. Field work based on industrial sectors should be included in the Internal Continuous Assessment (ICA) of some subjects.
24. In view of implementation of NEP 2020 education policy, there is need to add some contents or topics or syllabus to cover inculcation of the aspects of life skills, transferable skills, cross cutting issues, gender equality, environment and sustainability, human rights and social security, to the extent possible.

You are requested to kindly put suggestions to the notice of Board of Studies, Mechanical Engineering.

We will be happy to interact for clarification, if any.

Thanking you.

Regards,

B. Ronge

(Dr. B. P. Ronge)
PRINCIPAL

COLLEGE OF ENGINEERING PANDHARPUR

PRINCIPAL
SVERI's College of Engineering
Pandharpur

8/3/23

सहायक कुलसचिव
शैक्षणिक, संशोधन व विकास
सोलापूर विद्यापीठ, सोलापूर

Minutes of the meeting of the Board of Studies in the Subject of Mechanical Engineering was held in the University office on 20/06/2023

Action Taken Report of the Institution on Feedback Report

मेकॅनिकल इंजिनिअरिंग अभ्यास मंडळाच्या बैठकीचा कार्यवृत्तांत

शैक्षणिक वर्ष 2023-24 पासून तंत्रज्ञान शाखेतर्गत येणाऱ्या Mechanical Engineering या ब्रांचचा अंतिम वर्षाचा पाठ्यक्रम निवड आधारित श्रेयांक प्रणालीनुसार (CBCS) सुधारित करण्यासाठी उप समितीची बैठक मंगळवार, दिनांक 20/6/23 रोजी दुपारी चार वाजता विद्यापीठ कार्यालयात आयोजित करण्यात आली होती. सदर बैठकीमध्ये करण्यात आलेले ठराव खालील प्रमाणे.

विषय क्र. 1. अभ्यास मंडळाच्या दिनांक 17/2/2023 रोजी च्या मागील बैठकीचे इतिवृत्त वाचून कायम करणे.
ठराव क्र. 1. अभ्यास मंडळाच्या दिनांक 17/2/2023रोजी च्या मागील बैठकीचे इतिवृत्त वाचून कायम केले

विषय क्र.2 शैक्षणिक वर्ष 2023-24 पासून तंत्रज्ञान शाखेतील Mechanical Engineering या ब्रांचचा B.Tech. अंतिम वर्षाचा पाठ्यक्रम सुधारित करण्याची बाब अभ्यासमंडळाच्या विचारार्थ
ठराव क्र. 2 शैक्षणिक वर्ष 2023-24 पासून तंत्रज्ञान शाखेतील Mechanical Engineering या ब्रांचचा B.Tech. अंतिम वर्षाचा पाठ्यक्रम सुधारित करण्यासाठी डॉ. स्वानंद कुलकर्णी आणि डॉ. श्याम कुलकर्णी यांची उप समिती काम करून घेईल आणि अभ्यासमंडळामार्फत दि. ३० जुलै २०२३ पर्यंत विद्यापीठास सादर केला जाईल असे ठरले.
प्राचार्य. स्वेरीज कॉलेज ऑफ इंजीनियरिंग, पंढरपूर यांचे ०७/०३/२०२३ रोजी चे पाठ्यक्रम सुधारित करण्यासाठी सूचनांचे पत्र, तसेच NBNSCOE सोलापूर येथील प्रा कौस्तुभ मंगरूळकर यांचे 'Business Economics' विषय पाठ्यक्रमा मध्ये घेण्यात यावा यासाठीचे अभ्यास मंडळाचे अध्यक्ष डॉ. भाग्येश देशमुख याना आलेला ई-मेल याची नोंद घेण्यात आली.

विषय क्र.3 शैक्षणिक वर्ष 2023-24 पासून तंत्रज्ञान शाखेतील मेकॅनिकल इंजिनिअरिंग Mechanical Engineering या ब्रांचचा Hons. अंतिम वर्षाचा पाठ्यक्रम करण्याची बाब अभ्यासमंडळाच्या विचारार्थ
ठराव क्र.3 शैक्षणिक वर्ष 2023-24 पासून तंत्रज्ञान शाखेतील Mechanical Engineering या ब्रांचचा Hons. अंतिम वर्षाचा पाठ्यक्रम करण्यासाठी डॉ. स्वानंद कुलकर्णी आणि डॉ. श्याम कुलकर्णी यांची उप समिती पाठ्यक्रम करून घेईल आणि अभ्यासमंडळामार्फत दि. ३० जुलै २०२३ पर्यंत विद्यापीठास सादर केला जाईल असे ठरले.

विषय क्र.4 शैक्षणिक वर्ष 2023 24 पासून तंत्रज्ञान शाखेतील Mechanical Engineering या ब्रांचचा M.Tech. Mechanical Design Engineering वर्षाचा पाठ्यक्रम सुधारित करण्याची बाब अभ्यास मंडळाच्या विचारार्थ
ठराव क्र. 4 शैक्षणिक वर्ष 2023-24 पासून तंत्रज्ञान शाखेतील Mechanical Engineering या ब्रांचचा M.Tech. Mechanical Design Engineering वर्षाचा पाठ्यक्रम सुधारित करण्यासाठी खालील उपसमितीची स्थापना केली आहे. डॉ. एस एस वांगीकर आणि डॉ. बी एस गंधारे यांची उप समिती पाठ्यक्रम सुधारित करून घेईल आणि अभ्यासमंडळामार्फत दि. ३० जुलै २०२३ पर्यंत विद्यापीठास सादर केला जाईल असे ठरले. यासंदर्भात स्वेरीज कॉलेज ऑफ इंजिनियरिंग पंढरपूर येथे १८ जुलै २०२३ रोजी कार्यशाळा घेण्याचे ठरले.

विषय क्र.5 महाराष्ट्र सार्वजनिक विद्यापीठ अधिनियम 2016 कलम 34 (4) (घ) नुसार विज्ञान व तंत्रज्ञान विद्या शाखेसाठी अभ्यास मंडळातील एक तज्ञ व्यक्तीचे नामनिर्देशन करण्याची बाब अभ्यास मंडळाच्या विचारार्थ
ठराव क्र. 5 महाराष्ट्र सार्वजनिक विद्यापीठ अधिनियम 2016 कलम 34 (4) (घ) नुसार विज्ञान व तंत्रज्ञान विद्या शाखेसाठी अभ्यास मंडळातील डॉ. आर टी व्यवहारे यांचे नामनिर्देशन अभ्यास मंडळाने केले आहे, डॉ. एस एस परदेशी यांनी डॉ. आर टी व्यवहारे यांचे नाव सुचविले आणि त्यास डॉ. एन के चौगुले यांनी अनुमोदन दिले.

20/6/23

विषय क्र. 6 महाराष्ट्र सार्वजनिक विद्यापीठ अधिनियम 2016 कलम 48 (3) (चार) नुसार विद्यापीठातील पेपर सेटिंग विभागास कार्यवाही करण्यासाठी अभ्यास मंडळाने त्यांच्या सदस्यांमधून दोन सदस्य नामनिर्देशित करण्याची बाब अभ्यास मंडळाच्या विचारार्थ (त्यापैकी किमान एक पदव्युत्तर अध्यापक असावा)

ठराव क्र. 6 महाराष्ट्र सार्वजनिक विद्यापीठ अधिनियम 2016 कलम 48 (3) (चार) नुसार विद्यापीठातील पेपर सेटिंग विभागास कार्यवाही करण्यासाठी सदस्य डॉ. एस एस कुलकर्णी आणि डॉ. एस एस वांगीकर यांचे नामनिर्देशन अभ्यास मंडळाने केले आहे, डॉ. स्वानंद कुलकर्णी यांनी डॉ. एस एस कुलकर्णी आणि डॉ. एस एस वांगीकर यांचे सुचविले नाव सुचविले आणि त्यास डॉ. आर टी व्यवहारे यांनी अनुमोदन दिले.

विषय क्र.7 विद्यापीठाकडून शिक्षकांच्या CAS अंतर्गत पदोन्नती कामी अभ्यास मंडळामार्फत विषय तज्ञांची अधिकृत यादी तयार करण्याची बाब अभ्यास मंडळाच्या विचारार्थ

ठराव क्र.7 CAS अंतर्गत पदोन्नती कामी अभ्यास मंडळामार्फत विषय तज्ञांची अधिकृत यादी तयार करण्यासाठी , डॉ. स्वानंद कुलकर्णी यांना जबाबदारी देण्यात आली आणि सदर यादी अभ्यासमंडळामार्फत दि. ३० जुलै २०२३ पर्यंत विद्यापीठास सादर केला जाईल असे ठरले.

विषय क्र.8 शिक्षण संचालनालय, उच्च शिक्षण, पुणे या कार्यालयाचे विषयाच्या समक्षतेबाबत माहिती सादर करणे संदर्भातील पत्र क्रमांक उशिस-२०२३/संकीर्ण/प्रशा-१/६११४ दि. १०/५/२०२३ रोजीचे पत्र विचारार्थ

ठराव क्र.8

AICTE Approval Process Handbook 2022-23, Annexure-6 (Major Disciplines, their corresponding Courses and Relevant/ Appropriate Branch of Under Graduate Degree in Engineering and Technology), Page 269 प्रमाणे Mechanical Engineering विषयाच्या समक्षतेबाबतचे विषय खालील प्रमाणे

Mechanical Engineering

Mechanical Engineering	• Electrical and Mechanical Engineering • Mechanical Engineering (Industry Integrated) • Mechanical Engineering • Mechanical Engineering (Repair and Maintenance) • Power Engineering
Production Engineering	• Industrial and Production Engineering • Machine Engineering • Manufacturing Engineering • Manufacturing Engineering and Automation • Manufacturing Engineering and Technology • Manufacturing Process and Automation Engineering • Manufacturing Science and Engineering • Manufacturing Technology • Mechanical Engineering (Production) • Precision Manufacturing • Production and Industrial Engineering • Production Engineering • Tool Engineering
Automobile Engineering	• Automobile Engineering • Automobile Maintenance Engineering • Automotive Technology • Mechanical Engineering (Automobile) • Mechanical Engineering Automobile
Industrial Engineering	• Industrial and Production Engineering • Industrial Engineering

MBhagat 20/7/23

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	• Industrial Engineering and Management
Mechatronics Engineering	• Mechanical and Automation Engineering • Mechatronics • Mechatronics Engineering

विषय क्र.9 शैक्षणिक वर्ष 2023 पासून सुधारित झालेल्या पदवी व पदव्युत्तर अभ्यासक्रमाकरिता महाराष्ट्र सार्वजनिक विद्यापीठ अधिनियम कलम 41 (च) नुसार Paper Setter, Examiner, Moderator Panel देण्याची बाब अभ्यास मंडळाचे विचारार्थ

ठराव क्र. 9 अभ्यास मंडळाचे अध्यक्ष डॉ. भाग्येश देशमुख यांनी शैक्षणिक वर्ष 2023 पासून सुधारित झालेल्या पदवी व पदव्युत्तर अभ्यासक्रमाकरिता महाराष्ट्र सार्वजनिक विद्यापीठ अधिनियम कलम 41 (च) नुसार Paper Setter, Examiner, Moderator Panel अभ्यासमंडळ तसेच परीक्षा विभागास ई-मेल केलेले आहेत.

विषय क्र. 10 राज्यातील रस्ते सुरक्षा जीवितवित्तहानी टाळण्यासाठी ची उपाययोजना व नवीन सुधारित धोरण ठरवणे बाबत तंत्रशिक्षण संचलनालयाचे दिनांक 6/12/2022 रोजी चे पत्र विचारार्थ

ठराव क्र. 10 अभ्यास मंडळाने विषयाची नोंद घेऊन अंतिम वर्षाच्या Automobile Engineering या विषयामध्ये रोड सेफ्टी विषयासंदर्भाचा अंतर्भाव केला आहे

विषय क्र. 11 राज्यातील सर्व विद्यापीठे व स्वायत्त महाविद्यालयाच्या अभ्यासक्रमात पेटंट बौद्धिक संपदा हक्क विषयासंदर्भात मूळ संकल्पना समाविष्ट होण्याचे होणे बाबतचे उच्च व तंत्र शिक्षण विभागाचे दिनांक 22/2/2023 रोजी चे पत्र विचारार्थ

ठराव क्र. 11 अभ्यास मंडळाने विषयाची नोंद घेऊन अंतिम वर्षाच्या Research Methodology या विषयामध्ये अभ्यासक्रमात पेटंट बौद्धिक संपदा हक्क विषयासंदर्भाचा अंतर्भाव केला आहे

विषय क्र.12 माननीय अध्यक्ष यांच्या पूर्वपरवानगीने येणाऱ्या आयत्या वेळेचे विषय

ठराव क्र. 12 अभ्यास मंडळाचे सदस्य डॉ.बी.पी.रोंगे यांनी सभेस गैर हजर राहण्याबद्दल फोनवर पूर्व कल्पना दिली याची नोंद घेण्यात आली .

आयत्या वेळेस चा कोणताही विषय नसल्यामुळे सर्वांच्या आभार मानून सभा समाप्त केली.

20/1/23

Dr.B.B.Deshmukh

Chairman, BoS Mechanical Engineering

PAH Solapur University, Solapur

3 0 7 3

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY

FACULTY OF SCIENCE AND TECHNOLOGY

MECHANICAL ENGINEERING

Syllabus Structure for

FINAL YEAR B.TECH. MECHANICAL ENGINEERING

w.e.f.

ACADEMIC YEAR 2023-24

Choice Based Credit System

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Faculty of Science and Technology

Credit System structure of Final Year B. Tech. Mechanical Engineering W.E.F. 2023-2024 [Semester VII]

Semester VII - Theory Courses

Course code	*Name of Theory Course*	*Hrs./week*				*Credits*	*Examination Scheme*			
		L	*T*	*P*	*D*		*ISE*	*ESE*	*ICA*	*Total*
ME 411	Refrigeration and Air Conditioning	3	-	-	-	3	30	70	-	100
ME 412	Automobile Engineering	3	-	-	-	3	30	70	-	100
ME 413	Automation and Robotics	3	-	-	-	3	30	70	-	100
ME 414 P	Professional Elective-V	3	-	-	-	3	30	70	-	100
ME 415 O	Open Elective-I	3	-	-	-	3	30	70	-	100
	Sub Total	**15**	**-**	**-**	**-**	**15**	**150**	**350**	**-**	**500**

Semester VII - Laboratory / Tutorial Courses

Course code	*Name of Laboratory / Tutorial Course*	*Hrs./week*				*Credits*	*ISE*	*Examination Scheme*			
		L	*T*	*P*	D			*ESE*		*ICA*	*Total*
								POE	*OE*		
ME 411	Refrigeration and Air Conditioning	-	-	2	-	1	-	-	25	25	50
ME 412	Automobile Engineering	-	-	2	-	1	-	-	25	25	50
ME 413	Automation and Robotics	-	-	2	-	1	-	-	-	25	25
ME 414 P	Professional Elective-V	-	-	2	-	1	-	-	-	25	25
ME 415 O	Open Elective-I	-	-	2	-	1	-	-	-	25	25
ME 416	Industrial Training	-	1	-	-	1	-	-	25	50	75
ME 417	Project Phase – I	-	-	4	-	2	-	-	-	50	50
	Sub Total	**-**		**14**	**-**	**08**	**-**	**75**		**225**	**300**
	Grand Total	**15**	**1**	**14**	**-**	**23**	**150**	**425**		**225**	**800**

Abbreviations: *L- Lectures, P –Practical, T- Tutorial, ISE- In-Semester Examination, ESE - End Semester Examination (University Examination for Theory & / POE & / Oral), ICA- Internal Continuous Assessment.*

Professional Elective – V: *A. Production and Operations Management, B. Artificial Intelligence & Machine Learning, C. Railway Systems Management D. Analysis and Synthesis of Mechanisms E. Business Economics*

Open Elective – I: *A. Entrepreneurship Development, B. Operations Research, C. Research Methodology D. Supply Chain Management E. Finite Element Method*

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Faculty of Science and Technology

Credit System structure of Final Year B. Tech. Mechanical Engineering W.E.F. 2023-2024 [Semester VIII]

Semester VIII – Courses

Course code	*Name of Course*	*Hrs./week*				*Credits*	*ISE*	*Examination Scheme*			*ICA*	*Total*
		L	*T*	*P*	D			*ESE*				
								Theory	*POE*	*OE*		
ME 421	A. Self-Learning Technical (Swayam / NPTEL)	-	-	-	-	4	-	-	-	-	100*	100*
	B. Self-Learning Technical Course offered by institute	-	-	-	-		-	-	-	-		
	C. Apprenticeship/Internship	-	-	-	-		-	-	-	-		
ME 422	Project Phase – II (Progress Presentation - I)	-	-	2	-	1	-	-	-	-	50	50
ME 423	Project Phase – III (Progress Presentation - II)	-	-	2	-	1	-	-	-	-	50	50
ME 424	Project Phase – IV (Report Submission & Final Presentation)	-	-	4	-	2	-	-	50	-	50	100
	Grand Total			**08**		**08**			**50**		**250**	**300**

Abbreviations: *L_ Lectures, P –Practical, T_ Tutorial, ISE_ In Semester Examination, ESE _ End Semester Examination (University Examination for Theory & / POE & / Oral), ICA_ Internal Continuous Assessment.*

* Students shall opt for any one of the two courses (i.e. out of ME 421-A, ME 421-B), and obtain 4 credits of 100 marks.

ME 422, ME423 & ME424 are compulsory.

* Students are encouraged to undergo Apprenticeship/internship (ME 421-C) in any industry for obtaining 4 credits of 100 marks and should complete a project sponsored by the Industry/Organisation **as a part of ME422, ME423 & ME424.** However such students should submit Internship and project report separately.

❖ **M421A-Self Learning Technical Course (Swayam/NPTEL**):

- **ICA** 100 Marks, Credits: 4, Assessment of the student based on assignment during the course / quiz conducted on selected course and evaluated as part of ICA.
- Student should complete certified self-learning technical course before end of Semester-VIII.

❖ **M421B Self Learning Technical Course offered by institute:**

- **ICA** 100 Marks, Credits: 4, Course shall be designed by the Institute and Assessment of the student based on assignment during the course / quiz conducted on selected course and evaluated as part of ICA.

Note for M421A& M421B: Student may select any one course of minimum eight weeks **or** two self-learning technical Courses of four weeks based on content in the following areas:

- Electric Vehicles
- Advanced Manufacturing Processes
- Renewable energy
- Automation and Robotics
- Artificial Intelligence
- Machine Learning
- CAD/CAM/CAE
- Thermal Engineering
- Design Engineering
- Industrial Engineering

❖ **M421C Apprenticeship/Internship:**

- **ICA** 100 Marks, Credits: 4, Students may opt for semester long internship/apprenticeship (minimum 60 days).
- Apprenticeship/Internship may be of the following type:
  - Offered by industry at their premises.
  - Offered by industry at the institute campus.
  - Offered by institute jointly with the research funded agency/ industry.

Punyashlok Ahilyadevi Holkar Solapur University
Final Year B.TECH. (Mechanical Engineering)
Semester-VII
ME411 : Refrigeration and Air Conditioning

***Teaching Scheme**
Lectures : 03 Hours/week, 03 Credits
Practical : 02Hours/week, 01 Credit

***Examination Scheme**
ESE : 70 Marks
OE : 25 Marks
ISE : 30 Marks
ICA : 25 Marks

Course Introduction:

The **course** consists of different **refrigeration** cycles such as Air refrigeration cycle, Vapour Compression cycle, Vapour absorption cycle. It also covers properties of refrigerants and various alternative refrigerantsand understanding of psychrometric chart and psychrometric processes used for the purpose of **air- conditioning**. Further, the comfort **air-conditioning** and cooling load calculations are also addressed in this **course**.

Course Objectives:
During this course, student is expected to

1	Learning the fundamental principles and different methods of refrigeration and air conditioning.
2	To understand basic refrigeration processes
3	Comparative study of different refrigerants with respect to properties, applications and environmental issues.
4	Understand the basic air conditioning processes on psychometric charts, calculate cooling load forits applications in comfort and industrial air conditioning.
5	To acquire the skills required to design and analyze refrigeration and air conditioning componentsand systems.

Course Outcomes:
At the end of this course, student will be able to:

1	Evaluate performance of various types of refrigeration systems
2	Select appropriate refrigerant considering necessary properties
3	Use Psychrometric chart and tables and analyze psychrometric process for obtaining required air conditions.
4	Identify the factors of cooling load and its calculation
5	Describe comfort chart and compare duct design methods.

Section I

Unit-1: Basic Refrigeration Cycles and Refrigerants **No. of lectures-7**

A) Thermodynamics:

Principles and fundamentals of heat transfer, Refrigeration, Units of refrigeration, Applications of refrigeration, Reversed Carnot cycle with vapour as refrigerant, Calculation of COP (Numerical Treatment).

B) Refrigerant: Classification, Desirable Properties, Nomenclature of Refrigerants, Selection of refrigerant, ASHRAE std. 34 for refrigerant safety classification, Secondary refrigerants, Effect on Ozone depletion and Global warming, Total equivalent warming impact (TEWI), Alternative Refrigerant.

Unit-2: Vapour Compression Refrigeration Systems **No. of lectures-8**

Working of simple vapour compression system, representation of different vapour compression cycle (VCC) on T-s and P-h diagram, Vapour compression cycle, Sub cooling, Superheating, Analysis and Performance calculations of above cycles. Effect of operating parameters on performance of VCC, actual VCC, methods of improving COP, Flash gas removal, Flash inter cooling, Compound compression with intercooling, Multiple evaporator systems (Numerical Treatment).

Unit-3: Vapour Absorption Refrigeration Systems and Cryogenics **No. of lectures-5**

A) Limitations of VCRS, Working of simple vapour absorption system (VAS), Practical vapour absorption system, desirable properties of binary mixture (aqua-ammonia), COP of an ideal Vapour Absorption Refrigeration System, Li-Br absorption system, three fluid system (Electrolux refrigeration), applications of VARS, comparison between VCRS and VARS.

B) Introduction to cryogenics Limitations of vapour compression systems for the production of low temperature, Cascade Refrigeration System, Linde System for liquefaction of air. Applications of Cryogenics. (Descriptive Treatment).

Section II

Unit-4: Psychrometry **No. of lectures-7**

A) Introduction: Psychometrics terms, Dalton's law of partial pressure, Psychometrics relations, Enthalpy of moist air, Use of psychometric tables and Charts, Psychometrics Processes, Combinations And Calculations, SHF, BPF, ADP Coil condition line, **(Numerical Treatment)**

B) Comfort Conditions: Human Comfort Thermodynamics of human body, comfort and comfort chart, factors affecting human comfort, concept of infiltration and ventilation, indoor air quality requirements.

Unit-5: Heating and Cooling Load Calculations **No. of lectures-8**

Enumeration and brief explanation of the factors forming load on refrigeration and air conditioning systems, Ventilation requirements according to ASHRAE std. 62.1, Inside and Outside Design conditions, U-value for different building materials, CLTD, SCL, Cooling load calculations using E20 format/ software, Load analysis by RSHF, GSHF **(Numerical Treatment).**

Unit-6: Air Conditioning and Air Distribution Systems **No. of lectures-5**

A) Room air conditioning, Chilled water systems, DX systems, Comparison between Chilled water and DX systems, Air handling unit, Fan coil unit, Desert coolers, Air-washer, Industrial applications

B) Classification of ducts, pressure in ducts, flow through duct, equivalent diameter, Methods of duct system design: equal friction, velocity reduction, static regain method, types of fans used air conditioning applications, fan laws, External Static Pressure (ESP), grills, registers, diffusers.

Internal Continuous Assessment (ICA):

List of Experiments/Assignments/Case Studies, etc.

Group I (Study, Demonstration of any four assignments on following)

1. Study of Refrigeration methods
2. Study of Refrigeration Equipment's
3. Study of Refrigeration Systems–Domestic refrigerator, Split air conditioner, Ice Plant, Deep freezer etc.
4. Study of charging, leak testing of refrigeration systems
5. Case Study (Any One of the following)
   A. Refrigeration and Air-Conditioning systems used in Space Station/ Satellites/ Rockets/ Submarines/ Automobiles
   B. ASHRAE standards in Refrigeration and Air-Conditioning
   C. Application of Phase change materials in refrigeration

Group II (Any three experiments out of the following)

1. Trial on Refrigeration primer / bench
2. Trial on mini ice plant
3. Trial on Vapour Absorption system
4. Trial on Air conditioning tutor
5. Calculation of cooling load for given space drawing

Group III(Any one out of the following)

1. Visit to Refrigeration plant or Central Air Conditioning plant
2. Usage of software for cooling load calculation

Text Books:

1. 'Refrigeration and Air Conditioning' by R.S. Khurmi & J.K. Gupta
2. 'Refrigeration & Air Conditioning' by C. P. Arora
3. 'Refrigeration & Air Conditioning' by Arora & Domkundwar
4. 'Refrigeration and Air-conditioning' by S. N. Sapali

Reference Books

1. Basic Refrigeration and Air Conditioning by P. N. Ananthnarayanan
2. Principles of Refrigeration 'by Roy J Dossat
3. Air Conditioning Applications & design' by W. P. Jones
4. Refrigeration & Air Conditioning by Stocker
5. Refrigeration & Air Conditioning by Manohar Prasad

Punyashlok Ahilyadevi Holkar Solapur University
Final Year B.TECH. (Mechanical Engineering)
Semester-VII
ME412: Automobile Engineering

***Teaching Scheme**
Lectures:03 Hours/week, 03 Credits
Practical: 02Hours/week, 01 Credit

***Examination Scheme**
ESE: 70 Marks
OE : 25 Marks
ISE : 30 Marks
ICA: 25 Marks

Course Introduction:

An automobile is a self-propelled vehicle which contains the power source for its propulsion and is used for carrying passengers and goods on the ground, such as cars, buses, trucks, etc.,

Automobile engineering plays a vital role in engineering and the day-to-day modern world. It gained so much recognition and importance since vehicles became a fundamental mode of transportation. People want their own mode of transportation. Public transportation is present as a mode of transportation, making automobile engineering an important and rapidly growing field of engineering. Automobile engineering has great career scope and broad scope in engineering. It offers wide opportunities for students who want to become automobile engineers and want to build successful careers in the field. It includes automobile components manufacturing industries, vehicle manufacturing companies, production plants, transport companies, research and development departments, service stations, motor vehicle departments, private transport companies and many more.

Course Objectives:

1) To understand the need and role of chassis construction in the function of an automobile.
2) To understand the function of various parts of the automobile.
3) To identify the merits and demerits of the various components of the transmission and suspension systems.
4) To understand the working of different braking and steering systems.

Course Outcomes:

At the end of this course, the student will be able to:

1. Differentiate the types of vehicle chassis and transmission layouts.
2. Examine the various parameters influencing the vehicle's performance characteristics.
3. Select and explain the different transmission system components for efficient power transmission.
4. Analyse the different parameters influencing automobile steering systems.
5. Analyse the different parameters influencing automobile braking systems.
6. Compare the different suspension systems used in automobiles.

Section I

Unit-1: Introduction to Automobiles **No. of lectures-06**

Broad classification of Automobiles, Major components, and their functions. Types of vehicle drive layouts, Front engine front wheel drive, Front engine rear wheel drive, Rear engine rear wheel drive, All wheel drive.

Unit-2: Performance of Automobiles **No. of lectures-06**

Resistance to vehicle motion, Air, Rolling and Gradient resistance, Acceleration, Grade ability and draw bar pull, Traction and Tractive effort, Power required for vehicle propulsion, (Numerical treatment).

Unit-3: Transmission System **No. of lectures-08**

Requirements of transmission system, Requirements of automobile clutch, functions of clutch, Types of clutches: single plate, multi-plate, centrifugal, electromagnetic. Types of automotive gearboxes: sliding mesh gearbox, constant mesh gearbox and synchromesh gearbox, Automatic transmission, Overdrive, Propeller shaft, Universal and slip joint, Final drive and its types, Differential, Construction, and types of rear axles.

Section II

Unit-4: Steering System **No. of lectures-06**

Function of steering, Steering system layout, Types of steering gearboxes, Steering Geometry: Camber angle, Caster angle, Kingpin inclination, included angle, Toe-in and Toe-out, Wheel alignment, slip angle, Under steer & Over steer, Types and working of power steering.

Unit-5: Braking System **No. of lectures-06**

Function of the automotive brake system, Types of braking mechanism: internal expanding & Disc brake. Types of braking systems: Mechanical, Hydraulic & Air brake systems, Power brakes, Anti-lock braking system (ABS), Braking force and stopping distance (numerical treatment).

Unit-6: Suspension System **No. of lectures-08**

Requirements of the suspension system, Sprung and Un-sprung mass, Leaf springs, Coil springs, Shock absorber, Types of automotive suspension systems: Conventional suspension and Independent, Types of independent suspension systems: Double wishbone and MacPherson strut-type suspension systems, Rear axle drives: Hotch-kiss and Torque tube drive, Reaction Members: Antiroll/Sway/ Stabilizer bar.

Internal Continuous Assessment (ICA):

List of Experiments/Assignments/Case Studies (Any eight).

1. Study and demonstration of four-wheeler drive layout (2WD & 4WD).
2. Study and demonstration of working of single plate automobile clutch.
3. Study and demonstration of synchromesh gearbox, final drive and differential.
4. Study and demonstration of hydraulic braking system.
5. Study and demonstration of steering system layout and types of steering gearbox.
6. Study and demonstration of suspension system of a four-wheeler.
7. Demonstration/Experiment on wheel balancing & front wheel alignment.
8. Visit to servicing station for study of vehicle maintenance, repairs and report.
9. Study of awareness and practice of Road Safety Rules

Text Books:

1. Automobile Engineering by Kripal Singh
2. Automobile Mechanics by N. K. Giri
3. Automobile Mechanics by S. K. Gupta

Reference Books

1. Motor Vehicle by T. K. Garrett, K. Newton, W. Steeds
2. Handbook of Automotive Engineering by Hans-Hermann Braess, Ulrich Seiffert
3. Automotive Mechanics by William H. Crouse
4. Automotive Mechanics by Joseph Heitner

Punyashlok Ahilyadevi Holkar Solapur University

Final Year B.TECH. (Mechanical Engineering)
Semester-VII

ME413: Automation and Robotics

Teaching Scheme

Lectures: 03 Hours/week, 03 Credits

Practical: 02 Hours/week, 01 Credit

Examination Scheme

ESE: 70 Marks

ISE: 30 Marks

ICA: 25 Marks

Course Introduction:

This course is designed to give the student an in depth understanding of Automation and Robotics. It covers the following topics: Basics of Automation, Automation types, Material handling and Identification Technologies, introduction to industrial robotics, Anatomy of an industrial robot, robot history, AGVs, service robots, Cobots, configurations, sensors and actuators, end effectors. Kinematics of multi-degree-of-freedom systems, Jacobean matrices, kinematics, and dynamics. Robot trajectories.

Course Objectives:

During this course, student is expected to:

1. Understand the basic construction of an industrial robot.
2. Acquaint with existing market distribution and future trends.
3. Understand the technology behind a modern robot such as sensors, actuators, grippers, Controllers.
4. Understand and bridge the gap (regarding industrial robots) between text books & industry
5. Understand the scope and applications of modern machine vision systems.
6. Understand the scope of AGVs and other mobile robots for industrial applications

Course Outcomes:

At the end of this course, student will be able to:

1. Solve simple kinematics and dynamics problems on robot motion.
2. Select appropriate robot specifications for industrial applications.
3. Use suitable software toolboxes to demonstrate machine vision concepts.
4. Use any suitable software to simulate a robot and its work cell.
5. Select mobile configuration based on applications.
6. Evaluate and compare robots based on their specifications.

Section I

Unit 1: – Introduction to Robotics **No. of lectures – 06**

History and fundamentals of Industrial Robots, Definition as per ISO & IFR, components of industrial robots, classification of robots. Collaborative Robots, Service Robots, AGVs, classification, navigation techniques, applications, Mobile robots, wheeled and tracked robots

Unit 02: Sensors, Actuators & End Effectors **No. of lectures - 09**

Sensors: Sensor classification; Internal Sensors: Position Sensors, Velocity Sensors Acceleration sensors & Force sensors External Sensors: Non-contact type- Proximity sensor,

Actuators: Compare Hydraulic, Pneumatic and Electric drives; Linear Actuators; Stepper motors, DC Motors, DC Servo Motors, AC Motors, Variable Frequency Drives, Selection of Actuator for given Application

End Effectors: End effectors & grippers, classification, applications, design, and selection criteria for end effectors.

Unit-3: Kinematics, Dynamics & Control **No. of lectures – 05**

Forward kinematics, Inverse Kinematics for 2 DOF and 3 DOF planar manipulators; Dynamics: Velocity Jacobian, singularities; Control architecture of robots, Overview of advanced control techniques such as force control, PID control adaptive control,

Section II

Unit 4 – Robot Vision/Machine Vision **No. of lectures – 08**

Machine Vision definition and system components, lighting techniques, Image processing fundamentals: Edge detection, shape analysis, segmentation, object identification,template matching, Cameras (CCD, CMOS, Area Scan, Line Scan), camera specification and selection, camera calibration.

Unit 5 – Robot Workcells & Programming **No. of lectures - 06**

Robot cell layout, considerations in workcell design, workcell control, cell safety, human machineinterface, robot cell controller.

Lead through programming, walk through programming, offline programming.

Unit 6 – Industrial Robot Applications **No. of lectures – 06**

General considerations for selecting robots (including layout and workcell) for material handling, Pick and place robot and machine tending, spot welding, continuous welding, sealant application, spray painting, assembly,inspection, electronics assembly, ASRS System.

Internal Continuous Assessment (ICA):

List of Assignments

1. Assignment on Sensors, Actuators and grippers used in Robotics
2. Forward Kinematics of 2 DOF and 3 DOF supported by suitable software.
3. Assignment on Robot cell layout
4. Assignment on Automated Storage/Retrieval Systems (ASRS).
5. Assignment on Navigation Techniques of AGV
6. Assignment on Survey of different robots – specifications, manufacturers and applications used in Robotics
7. Assignment on Basic Elements of Machine Vision system.
8. Assignment on Applications of Robots for Spray painting, pick & place, Welding etc.

Text Books:

1. S.K Saha - Introduction to Robotics, McGraw-Hill.
2. Mikell Groover- Automation, Production Systems and Computer Integrated Manufacturing, Pearson Education.

Reference Books:

1. Amber G.H & Amber P.S. - Anatomy of Automation, PrenticeHall.
2. Asitava Ghosal, Robotics: Fundamental Concepts and Analysis, Oxford Press.
3. Frank Lamb - Industrial Automation_ Hands On, McGraw-Hill Professional.

Punyashlok Ahilyadevi Holkar Solapur University
Final Year B.TECH. (Mechanical Engineering)
Semester-VII
ME414P: Production and Operations Management

***Teaching Scheme**
Lectures:03 Hours/week, 03Credits
Practical :02 Hours/week, 01Credit

***Examination Scheme**
ESE: 70 Marks
ISE: 30 Marks
ICA: 25 Marks

Course Introduction:
Strategic growth & competiveness of organizations are depending upon the effective utilization of the critical production resources of the organization. Production / operations function is concerned with design & control systems responsible for the productive use of raw materials, human resources, equipment and facilities in the development of a product or services. The syllabus is divided into two sections, each section contains three chapters.

Course Objectives:
During this course, student is expected to:

1. Develop knowledge about the principles of production and operations management.
2. Solve organizational problems related to production as well as operations management.
3. Empower students to handle case studies related to industrial problems.

Course Outcomes:
At the end of this course, student will be able to:

1. Explain the scope and need of production and operation management and evaluate the future demands using different forecasting methods.
2. Apply the concept of capacity planning and aggregate planning to various types of manufacturing systems
3. Explain the importance and functions of production planning and control
4. Apply the inventory control models in production processes
5. Apply the concept of plant maintenance
6. To get acquainted with various advanced techniques such as Lean manufacturing, value engineering, six sigma, Kanban, Supply chain management

Section I

Unit-1: Introduction to Production and Operation Management and Forecasting **No. of lectures- 09**

Introduction to POM- Definitions, objectives, Scope and History of Production Management, Manufacturing system and their types

Forecasting- Need, types of Forecasting, Statistical method, Moving average method, exponential smoothing method, Least square method, Regression and Co-relation method. (Numerical Treatment)

Unit-2: Capacity Planning **No. of lectures- 05**

Concept, measurement and measures of capacity, factor affecting, capacity planning procedure, Aggregate planning, Investment decision and replacement analysis. (Numerical Treatment)

Unit-3: Production Planning and Control **No. of lectures-06**

Objectives, Functions, Co-ordination of PPC with other Department, Routing Scheduling, Loading and Sequencing, Line balancing, Production Control – Dispatching, Function and documents, Follow up, Evolution

Section II

Unit-4: Inventory Management **No. of lectures- 06**

Inventory concepts, objectives, types of Inventory, different costs of Inventory, EOQ model, Economic batch quantity (EBQ) model, Inventory control techniques, ABC analysis, MRP, Fixed period and fixed quantity system. (Numerical Treatment).

Unit-5: Plant Maintenance **No. of lectures-06**

Definition, Need, Importance, Functions, scope and organization of maintenance department Types of maintenance- preventive, break down, Identification of break down using fishbone diagram, and TPM, Reliability and life testing

Unit-6: Value Engineering and Value Analysis and Advanced manufacturing System **No. of lectures-08**

Value Engineering and Value Analysis - Definition, objectives and use of value analysis, reason of unnecessary cost, value analysis procedure.

Advanced manufacturing System - Lean Manufacturing Basics , Just- in Time (JIT), Kanban System, KAIZAN, Zero defect, six sigma , Supply chain Management.

Internal Continuous Assessment (ICA):

List of Experiments/Assignments/Case Studies, etc. (Any six)

1. A micro project on categorization of industries based on production type and production system (Categorize any (minimum) six industries by type of production and production system and justify the categorization. This micro project is based on the Industry, products of the industry and further their categorization)
2. Numerical treatment on different forecasting techniques by using suitable software tool
3. Numerical treatment on capacity planning by using suitable software tool.
4. Numerical treatment on inventory management
5. A Case study on plant maintenance or TPM preferably from the research paper from reputed peer reviewed journal
6. A Case study on value analysis
7. A Case study on Six Sigma
8. A Case study/online course (minimum 2 hrs.) on Supply chain Management

Text Books:

1. Industrial engineering and Production management by Martand Telsang. (S. Chand)
2. Elements of Production Planning and Control by Samuel. (Universal Pub.)
3. Modern Production/Operation Management by BuffaSarin. (Wiley)
4. Industrial Engineering and Management by O. P. Khanna

Reference Books

1. Production and Operation Management by M. E. Thukaram Rao. (New Age International Pub)
2. Sunil Chopra and Peter Meindl "Supply Chain Management – Strategy, Planning, and Operation ",6th Edition, Pearson Education Asia , 2016.

Punyashlok Ahilyadevi Holkar Solapur University
Final Year B.TECH. (Mechanical Engineering)
Semester-VII
ME 414 P : Artificial Intelligence and Machine Learning

***Teaching Scheme**
Lectures: 03 Hours/week, 03 Credits
Practical : 02 Hours/week, 01 Credit

***Examination Scheme**
ESE: 70Marks
ISE: 30Marks
ICA: 25Marks

Course Introduction:

This course is designed to give the students of Mechanical Engineering a flavor of the buzz words of present and applications of future viz. 'Artificial Intelligence' and 'Machine Learning'. The course covers fundamental branches of Artificial Intelligence such as Problem Solving, Fuzzy Logic, Expert Systems, Natural Language Processing, Vision Processing, Machine Learning and so on. It further focuses on the advancements of Machine Learning including Supervised, Un-supervised and Reinforcement Learning models, Artificial Neural Networks, etc. The course puts forth the relevance of these AI and ML techniques in Mechanical Engineering by encompassing the major application areas of these techniques in Mechanical Industries through its various units.

Course Objectives:

During this course, learners are expected to:

1. Understand fundamentals of AI, its types, and applications.
2. Define Artificial Intelligence and explain of AI
3. Explain Applications of fuzzy logic, expert systems, Language and Vision Processing
4. Outline steps involved in development of machine learning model
5. Familiarize with concepts of supervised, un-supervised and reinforcement learning.
6. Analyze Artificial Neural Network models used for different applications

Course Outcomes:

At the end of this course, learners will be able to:

1. Describe need of Artificial Intelligence (AI) and problem-solving approaches in AI
2. Demonstrate fuzzy logic and expert systems
3. Outline the Language Processing and Vision Processing Systems
4. Describe Machine Learning (ML) and fundamental steps involved in ML.
5. Develop a machine learning model suitable to solve a given problem
6. Simulate an Artificial Neural Network to solve a particular problem

Section I

Unit-1: Fundamentals of Artificial Intelligence (AI) **No. of lectures- 07**

Introduction to Artificial Intelligence, History of AI, General Applications of AI, Need of Artificial Intelligence in Mechanical Engineering, Problem Solving Approaches in AI : General Problem Solving (Production Systems, State Space Search), Exhaustive Searching Methods (search space control - Depth First Search, Breadth First Search), Heuristic Approaches (Hill climbing, best-first search, branch and bound) [Approaches to be dealt with relevant practical examples]

Unit-2: Fuzzy Logic and Expert Systems **No. of lectures- 06**

Introduction to Fuzzy Logic: Basic concepts, history, and fuzzy set theory. Processes in a fuzzy logic system, Applications of Fuzzy Logic in Mechanical Engineering (Mechatronics)
Introduction to expert systems: Definition of expert systems, Inference mechanisms in expert systems, Case studies of expert systems in mechanical engineering, applications of expert systems in mechanical engineering

Unit-3 Natural Language Processing and Vision Processing **No. of lectures- 07**

Introduction to Natural Language Processing: Definition and goals of NLP, Applications of NLP (in Mechanical Engineering and in General), Text Preprocessing, Sentiment Analysis, Information Retrieval, Dialogue Systems, Chatbots.
Introduction to Vision Processing: Definition and goals of vision processing, Applications of Vision Processing (in Mechanical Engineering and in General), Image Processing Techniques steps and fundamentals, Case study in image processing.

Section II

Unit-4: Fundamentals of Machine Learning (ML) **No. of lectures- 06**

Introduction to Machine Learning, Types of Machine Learning, Applications of ML in Mechanical Engineering (Predictive Maintenance and Health Management, Fault Detection, Image based part classification, Process Optimization, Inspection, Improving control algorithms)
Data preprocessing in Machine Learning : Data cleaning and preparation, Feature selection and extraction, Data normalization and scaling

Unit-5: Supervised, Un-supervised and Reinforcement Learning **No. of lectures- 09**

Supervised Learning: Introduction to Supervised Learning, Classification and Regression (with examples)
Un-supervised learning : Introduction to Un-Supervised Learning, Clustering, Dimensionality reduction and Anomaly detection (with examples)
Reinforcement Learning : Introduction to Reinforcement Learning, Markov Decision Processes (MDPs), Policy Iteration, Value Iteration, Q-Learning (with examples)

Unit-6: Artificial Neural Networks **No. of lectures- 05**

Introduction to Artificial Neural Networks (ANNs) : Definition and history of ANNs, Basic architecture of ANNs, Definition and working of perceptron, Backpropagation algorithm Activation functions, Working of Multi Layered Perceptron, Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs), Applications of ANNs in Mechanical engineering

Internal Continuous Assessment (ICA):

ICA shall include following assignments

1. Fundamentals of Artificial Intelligence and its Applications
2. Problem Solving Approaches in AI
3. Demonstration of Fuzzy Logic with relevant examples
4. Case Study on 'Chatbots used in any relevant application'
5. Steps in Vision Processing and Applications of Vision Processing
6. Pre-processing in Machine Learning
7. Demonstration of Supervised, Un-supervised and Reinforcement learning with suitable examples
8. Demonstration of different Artificial Neural Networks with suitable examples

** Suitable open source software, online tools and facilities like Virtual Labs may be used for demonstration of different techniques mentioned in above assignments*

Text Books:

1. Stuart Russel& Peter Norvig, Artificial Intelligence a Modern Approach.
2. E. Rich and K. Knight, "Artificial intelligence",TMH.
3. N.J. Nilsson, "Principles of AI", Narosa Publ. House, 2000.
4. Deisenroth, Faisal, Ong, Mathematics for Machine Learning, Cambridge University Press, 2020.
5. B Joshi, Machine Learning and Artificial Intelligence, Springer, 2020.

Reference Books

1. Robert Babuška, Fuzzy Modeling for Control, Springer.
2. Dan Patterson, Introduction to Artificial Intelligence and Expert Systems, Prentice-Hall.
3. Solanki, Kumar, Nayyar, Emerging Trends and Applications of Machine Learning, IGI Global, 2018.
4. Mohri, Rostamizdeh, Talwalkar, Foundations of Machine Learning, MIT Press, 2018.

Punyashlok Ahilyadevi Holkar Solapur University
Final Year B.TECH. (Mechanical Engineering)
Semester-VII
ME415 O: Entrepreneurship Development

***Teaching Scheme**

Lectures : 03 Hours/week, 03 Credits

Practical : 02Hours/week, 01 Credit

***Examination Scheme**

ESE : 70 Marks

ISE : 30 Marks

ICA : 25 Marks

Course Introduction:

Entrepreneurship education in India has gained relevance in today's context. Education in the area of entrepreneurship helps students to develop skills and knowledge, which could benefit them for starting, organizing and managing their own enterprises. Entrepreneurship education encourages innovation, fosters job creation, and improves global competitiveness. This course will focus on key attributes of Entrepreneurship: Qualities required to become a successful entrepreneur, Entrepreneurship DevelopmentProgrammers, Ideation Techniques, Business Plan Formulation and its Appraisal, Problems faced by Entrepreneurs and ways to get through, Different Government Agencies and Policies, Taxation, Accounting, Marketing, Export-Import and so on. To sum up, the course will make students to have an understanding of the complete entrepreneurial ecosystem.

Course Objectives:

During this course, student is expected to:

1. To familiarize with entrepreneurship and its significance in national development
2. To develop skills required to establish and run a successful enterprise
3. To acquaint with the options available with new entrepreneurs
4. To formulate business plan/project report for a startup
5. To acquaint with Government policies and agencies associated with entrepreneurial development

Course Outcomes:

At the end of this course, student will be able to:

1. Identify the qualities required to become a successful entrepreneur
2. Identify the business opportunities that fit the individual or the group
3. Explain factors influencing on entrepreneurial development
4. Analyze various options available for deciding entrepreneurial career
5. Explain various methods and sources for idea generation
6. Select financial institutions for establishing new enterprise and Develop a feasible project report suitable for individual or group.

Section I

Unit-1: Entrepreneurship **No. of lectures-10**

Concept, meaning and definitions of entrepreneur and entrepreneurship, Importance and significance of growth of entrepreneurial activity, History of entrepreneurship development in India, Corporate entrepreneurship (intrapreneurship), Social entrepreneurship, Characteristics and qualities of entrepreneurs, Factors influencing entrepreneurial development and motivation, Role of culture in entrepreneurial development, Classification and types of entrepreneurs.

Unit-2: Entrepreneurship Development **No. of lectures- 10**

Entrepreneurial development programmes (EDP): Introduction, Curriculum, Phases, Problemsfaced by EDPs, Managerial, marketing, financial & technological problems faced by new entrepreneurs and their probable solutions, Options available to entrepreneurs - ancillarisation, franchising and outsourcing (characteristics,advantages, limitations, suitability of each option).

Section II

Unit-3: Entrepreneurial Project Development **No. of lectures- 10**

Idea generation – sources and methods, Identification and classification of ideas, Environmental Scanning, SWOT analysis and Tools for Exploring Change, Business model formulation, lean canvas model, Preparation of a project report/business plan including: market plan, financial plan, operational plan, HR plan, Working capital management, Break Even Analysis, etc, Significance of project report, Project appraisal (feasibility study) – Aspects and methods: Economic oriented appraisal, Financial appraisal, Market oriented appraisal, Technological appraisal, Managerial competency appraisal

Unit-4: Small-Medium Enterprises and Support Systems **No. of lectures- 10**

Meaning and definition (evolution) of micro, small & medium enterprises, Steps in setting up a small unit, Ownership patterns : sole proprietorship, partnership, private limited company, Policies governing SMEs, Funding options available : angel investors, venture capitalists, commercial banks, financial institutions, Support agencies: SIDBI, SISI, NABARD, DIC, MCED, EDII, NIESBUD, EPC etc. – Their role in the development of SMEs, Technology business incubation (TBI) centers, Export Potential of SMEs, Export procedure, Taxation benefits for SME sector, Prospects and Turnaround strategies for SMEs

Internal Continuous Assessment (ICA):

Students of a batch may be divided into groups (consisting of maximum four members) to carry out the following tasks:

A. Case studies

1. Case study on male entrepreneur
2. Case study on female entrepreneur
3. Case study on Product/Service and business model innovation
4. SWOT analysis of existing enterprises (minimum 2) and also used tools for exploring change and uncover the resulting commercial opportunities
5. Case Study on Managing risk in the entrepreneurial organization

B. Preparation of project report/business plan for starting a small unit and presentation on the same (includingdetails of business idea, market survey, business model, different plans, etc)

Text Books:

1. Management of small scale industries - J.C. Saboo, Megha Biyani, Himalaya Publishing House
2. Small-Scale Enterprises and Entrepreneurship - Vasant Desai, Himalaya Publishing House
3. Entrepreneurial Development, S. S. Khanka, SChand Publications

Reference Books

1. Dynamics of Entrepreneurial Development and Management - Dr. Vasant Desai, HimalayaPublishing House
2. Entrepreneurship - Robert D Hisrich, Michael P Peters and Dean A. Shepherd, McGraw HillEducation
3. Social Entrepreneurship For The 21st Century: Innovation Across The Nonprofit, Private, AndPublic Sectors - Georgia Levenson Keohane, McGraw Hill Education
4. Corporate Entrepreneurship and Innovation 4th Edition, Paul Burns, Macmillan International Higher Education ISBN 978-1-352-00879-1

Punyashlok Ahilyadevi Holkar Solapur University
Final Year B.TECH. (Mechanical Engineering)
Semester-VII
ME415 O : Operations Research

***Teaching Scheme**
Lectures : 03 Hours/week, 03 Credits
Tutorial : 01Hours/week, 01 Credit

***Examination Scheme**
ESE : 70 Marks
ISE : 30 Marks
ICA : 25 Marks

Course Introduction:

Industries across the globe are facing the problems of global unrest due to multiple reasons. Hence, they continuously try to adopt various optimization techniques in their organizations. Which help them to reduce the time and cost of production. This course covers different optimization techniques assisting the Organizations in managing their resources optimally had better decision making, transportation issues, effective planning, replacement policies and allied issues in conducting their activities. These optimization techniques are expected to offer maximum profit and reduced cost and time.

Course Objectives:

During this course, student is expected to:

1. Acquire knowledge of various techniques under operations research.
2. Study quantitative techniques in management decision-making and its applications.
3. Apply maximization and minimization techniques for real life problems.
4. Create awareness about preparation of Project Plan
5. Solve problems of waiting line and average time
6. Acquire knowledge of various financial terms.

Course Outcomes:

At the end of this course, student will be able to:

1. Apply LPP theory to solve the industrial problems
2. Apply the concept of Assignment models to maximize profit and minimize time for production.
3. Apply the concept of Transportation models to optimize available resources.
4. Apply the sequencing and waiting line theory to solve real life problems.
5. Determine project duration & different floats & probability of project completion
6. Apply the financial concept for real life problems.

Section I

Unit-1: Introduction to OR & LPP **No. of lectures- 08**

History and development of OR, methodology in operation research, O.R. models and their applications. Introduction to LPP, Formulation of problem, Graphical solution, Simplex method, Duality in LPP (No numerical problems).

Unit-2: Assignment Model **No. of lectures- 06**

Mathematical statement, Methods to solve balanced and unbalanced assignment problems,

Maximization problems, Assignment with restrictions,

Unit-3: Transportation Model **No. of lectures- 06**

Mathematical formulation, methods to obtain initial basic feasible solution (IBFS), NWCR, LCM, VAM method for balanced and unbalanced problem.

Section II

Unit-4: Job sequencing and Queuing or waiting line theory **No. of lectures- 06**

Job sequencing, Johnson's Rule for optimal sequence of n jobs on two machines, process Jobs on three Machines. Applications, Characteristics, Waiting Time and Idle Time costs, Single channel Queuing Problems for calculating average number of customers and average time in system and queue.

Unit-5: CPM & PERT **No. of lectures-08**

Fundamentals of CPM / PERT networks, CPM – construction of networks, critical path, forward and backward pass, floats & their significance. PERT – Time Estimates, Construction of Networks, Probability of completing projects by scheduled date.

Unit-6: Engineering Economics **No. of lectures-06**

Importance, demand and supply, types of costs, Interest- Simple, compound, continuous, and effective interest. Value of money - time and equivalence, tangible and intangible factors, Introduction to inflation. Cash flow diagram. Interest factors – Uniform series factors, derivations.

Internal Continuous Assessment (ICA): List of Assignments/Case Studies, etc.

1. Numerical problems on LPP.
2. Numerical problems on Assignment model.
3. Numerical problems on Transportation model.
4. Case study of one of the application of waiting line theory.
5. Case study of one of the project report.
6. Case study of one of the financial report.

Text Books:

1. Hira and Gupta, "Operation Research", S. Chand and Co.
2. S. D. Sharma, "Operation Research", Kedarnath and Rannalt Pub.
3. Hamdy Taha, "Operations Research – An Introduction", 7th edition PHI (2003)
4. N. D. Vohra, "Quantitative Techniques in Management", TMGH

Reference Books

1. Operations Research by Hillier and Lieberman TMGH
2. R. Panneerselvam, "Operations Research", PHI (2002)
3. Swarop Kanti Gupta P.K. & Manmohan- OR - S.Chand & Sons, New Delhi
4. Shrinath L.S.: PERT & CPM –Affiliate East West Press

Punyashlok Ahilyadevi Holkar Solapur University
Final Year B.TECH. (Mechanical Engineering)
Semester-VII
ME415 O: Research Methodology

***Teaching Scheme**

Lectures : 03 Hours/week, 03 Credits

Practical : 02Hours/week, 01 Credit

***Examination Scheme**

ESE : 70 Marks

ISE : 30 Marks

ICA : 25 Marks

Course Introduction:

Research is searching for and gathering information, usually to answer a particular question or problem. The word research is derived from the French word 'recherché' which means "to go about seeking". The word research consists of two syllables, "re" and "search". Research includes creative work which is undertaken on an organized basis in order to increase the bank of knowledge, including knowledge of humans, culture and society, and the use of this bank of knowledge to formulate new applications. It is used to create or confirm facts, reconfirm the results of previous work, solve new or existing problems, support theorems, or develop new theories. A research project may also be an extension on past work in the related field. Research is a continuous process and is useful in decision making.

Course Objectives:

During this course, student is expected to:

1. Develop an understanding of fundamental Research Process.
2. Identify the sources of information for literature review and data collection.
3. Develop an understanding of various Research Methods and its use.
4. Develop an understanding of various Research Design and its techniques.
5. Understand applications of statistical tools and methods.
6. Develop an ethical understanding and sense of technical writing.

Course Outcomes:

At the end of this course, student will be able to:

1. Understand the psychology of research which includes different perspectives and necessity of research.
2. Perform Literature Reviews using print and online databases.
3. Apply the research knowledge to formulate a suitable problem statement by adopting different research methods and models.
4. Apply different Research Design Techniques as per different applications.
5. Analyze the research outcome by using suitable statistical tool.
6. Write or present a scientific report and research proposal by adopting copyright based ethical values.

Section I

Unit-1: Introduction to Research Methodology **No. of lectures- 08**

Research - Meaning and Importance, Objectives, Motivation. Types of Research – Descriptive, Analytical, Applied, Fundamental, Quantitative, Qualitative, Conceptual, And Empirical. Research methods and Methodology. Selection and formulation of Research Problem. Research Design Motivation and objectives. Defining and formulating the research problem. Selecting the problem. Necessity of defining the problem.

Unit-2: Literature Review **No. of lectures- 04**

Importance of literature review in defining a problem. Primary and secondary sources - reviews, treatise, monographs, patents, web as a source, searching the web, Critical literature review. Identifying gap areas from literature review.

Unit-3: Research Methods **No. of lectures- 08**

Traditional Methods – Historical, Institutional, Legal, Philosophical, Comparative, Ethical methods. Modern Methods – Survey of Literature, Sampling method, Questionnaire, Schedule etc, Interview method and Focus Group discussion, Observation Method, Case Study method, Content analysis, Delphi method, Statistical Method, Experimental method, Brainstorming Techniques, Rating Scale. Ethnographic methods. Documentation methods.

Section II

Unit-4: Research Design **No. of lectures-06**

Basic Principles- Need of research design, features of good design important concepts relating to research design, Observation and Facts, Laws and Theories, Prediction and explanation, Induction, Deduction. Development of Models. The nature of research design, formulation of research design, classification of research designs - Descriptive, experimental, exploratory, diagnostic, correlative, action and evaluation. Developing a research plan. Determining experimental and sample designs. Pilot Study.

Unit-5: Statistical Tools & Methods **No. of lectures- 08**

Execution of the research, observation and Collection of data, diagrammatic & graphical presentation of data, sampling methods, tools & software, data Processing and analysis strategies, data analysis with statistical tools like mean, median, mode; dispersion: variance and deviation, analysis of variance: ANOVA and ANOCOVA, correlation, regression, hypothesis testing (Introductory Treatment)

Unit-6: Report and Technical Paper Writing **No. of lectures- 06**

Structure and components of scientific reports, types of report, Significance, Different steps in the preparation, layout, structure and language of typical reports, illustrations and tables, bibliography, Webliography, referencing, Appendices, plagiarism. Conference papers, Survey papers, Poster papers, Review papers Comparison, Structure of a survey, conference and journal paper. Research proposal: preparation, budgeting, presentation, funding agencies for engineering research.

Internal Continuous Assessment (ICA):
List of Experiments/Assignments/Case Studies, etc. (Any eight)

1. Assignment on Introduction to Research Methodology
2. Assignment on Literature Review
3. A case study on Research Method
4. Assignment on Research Design
5. Assignment on use and applications of Statistical Tools
6. Assignment based on use of Statistical Methods (theory and simple numerical)
7. A case study on Regression Analysis
8. A case study on Report Writing and Research Proposal
9. Assignment on Introduction, requirement, type and importance of Intellectual Property rights in research.

Text Books:

1. Research Methodology: Methods and Techniques, Kothari C.R., 2011.. New Age International
2. An introduction to Research Methodology; Garg B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002. RBSA Publishers.
3. Research Methodology; Panneerselvam R., PHI, Learning Pvt. Ltd., New Delhi - 2009
4. Research Methodology: Concepts and cases, Chawala D. and N. Sondhi ; Vikas Publishing House Pvt. Ltd.

Reference Books

1. Research Methods: A Process of Inquiry Anthony, M., Graziano, A.M. and Raulin, M.L., 2009, Allyn and Bacon.
2. Proposal Writing; Coley, S.M. and Scheinberg, C. A., 1990, Sage Publications.
3. Research Methodology: A practical and scientific Approach, Vinayak Bairagi and Mousami V Munot, CRC Press.

Punyashlok Ahilyadevi Holkar Solapur University
Final Year B.TECH. (Mechanical Engineering)
Semester-VII
ME415 O : Supply Chain Management

***Teaching Scheme**
Lectures : 03 Hours/week, 03 Credits
Practical : 02Hours/week, 01 Credit

***Examination Scheme**
ESE : 70 Marks
ISE : 30 Marks
ICA : 25 Marks

Course Introduction:

Supply chain management is a process that involves the planning, organizing, directing, and controlling of the flow of goods and services from the point of origin to the point of consumption. It is a vital process for companies that want to ensure that their products are delivered on time and in the right quantities. It is a complex process, and you may be wondering how to get started with it. It is not as difficult as you might think though. To begin, you will need to decide what your goals are in supply chain management, is your goal to learn supply chain management, or is it to be a successful supply chain manager? Both are great. The course will teach you the essentials of supply chain management and give you the tools for success. This course on supply chain management can teach you how to effectively manage their supply chains and improve their overall operations.

Course Objectives:

During this course, student is expected to:

1. To introduce students with basic concepts of Logistics and supply chain Management
2. To teach students practical application of the subject for enhancing business efficiency.
3. To expose students to contemporary business concepts.
4. To learn about the latest trends and developments in the field
5. To develop strategies for improving supplier relationships
6. To learn how to cut costs without compromising quality or delivery times

Course Outcomes:

At the end of this course, student will be able to:

1. Explain the basic concept of supply chain management.
2. Explain the importance of coordination in supply chain management.
3. Explain the global supply chain strategy
4. Solve the problems on inventory models.
5. Evaluate the Performance in global supply chains.
6. Explain the recent trends in supply chain management.

Section I

Unit-1: Basics of Supply Chain Management **No. of lectures-07**

Introduction, Definition of Supply Chain Management, Evolution of the Concept of Supply Chain Management, Key Drivers of Supply Chain Management, Typology of Supply Chains, Cycle View of Supply Chain, Types of SCM, Problems in SCM and Suggested Solutions.

Unit-2: Coordination in Supply Chain **No. of lectures- 07**

Importance of Coordination in Supply Chain, Bullwhip Effect, Effect of lack of Coordination on performance, Obstacles to Coordination, Strategies to achieve coordination, Building Strategic Partnership and Trust In Supply Chain.

Unit-3: Supply Chain Strategy **No. of lectures- 06**

Supply chain as a competitive advantage, Global Supply chain strategy, Structuring supply chain capabilities, Business matching supply chain design with business strategy

Section II

Unit-4: Inventory Flow modeling **No. of lectures- 07**

Approaches to Inventory Management in Global Supply Chain Management;; Distribution Resource Planning; Symptoms of poor Inventory Management, Modeling in Supply chain: inventory models, safety stock determination for service level, and lead time; forecasting models, routing problem

Unit-5: Performance Measurement and Trends **No. of lectures- 07**

Dimensions of Performance Metrics, Approaches/tools for Performance Measurement, Measuring logistics cost and performance. Benchmarking the supply chain, Performance measurement and evaluation in global supply chains, Impediments to improve Performance, Trends in International supply chain management

Unit-6: Recent Trends in Supply Chain Management **No. of lectures- 06**

Introduction, New Developments in Supply Chain Management, Outsourcing Supply Chain Operations, Co-Maker ship, The Role of E-Commerce in Supply Chain Management, Green Supply Chain Management, Distribution Resource Planning, World Class Supply Chain Management.

Internal Continuous Assessment (ICA):

List of Experiments/Assignments/Case Studies, etc. (Any six)

1. Case study on problems in SCM
2. Case study on supply chain strategy
3. Assignment/ Case study on supply chain performance measurement and trends
4. Solve the problems related to inventory models
5. Case study on World Class Supply Chain Management
6. Case study on E-Commerce in Supply Chain Management
7. Case study on Green Supply Chain Management

Text Books:

1. Supply Chain Logistics Management - Bowersox, Closs & Cooper – McGrawHill, 2nd Indian Ed.
2. Sridhar R. Tayur (Editor), Michael J. Magazine (Editor), RAM Ganeshan (Editor) Quantitative Models for Supply Chain Management Kluwer Academic.

Reference Books

1. Douglas Long International Logistics: Global Supply Chain Management Springer Verlag New York, LLC;2004
2. Philippe-Pierre Dornier, Panos Kouvelis, Michel Fender Global Operations and Logistics: Text and Cases Wiley, John & Sons, Incorporated 1998
3. Alan Branch Global Supply Chain Management in International Logistics Routledge 2007
4. Kent N. Gourdin Global Logistics Management: A Competitive Advantage for the New Millennium Blackwell Publishing 2006

SVERI's
College of Engineering, Pandharpur

Action Taken Report of the Institution on Feedback Report

Action Taken Report of the Institution on Feedback Report

- **Letter to BOS in E&T Engineering, Punyashlok Ahilyadevi Holkar Solapur University about incorporating different suggestions collected from various stakeholders regarding curriculum.**

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P. B. No. 54, Gopalpur - Ranjani Road, Gopalpur, **Tal.**: Pandharpur - 413 304, **Dist.**: Solapur (MH)
Contact No.: 9545553888, 9545553737, **E-mail** : coe@sveri.ac.in, **Website** : www.sveri.ac.in
Approved by **A.I.C.T.E.**, New Delhi and affiliated to Punyashlok Ahilyadevi Holkar Solapur University, Solapur
NBA Accredited all eligible UG Programmes, **NAAC** Accredited Institute, ISO 9001 : 2015 Certified Institute.
Accredited by Institution of Engineers (India) & TCS.

Ref.:- COEPR/2022-2023/766 Date:- 29/11/2022

To,
The Chairman,
BOS ,
Punyashlok Ahilyadevi Holkar Solapur University,
Solapur.

Subject: Suggestions to be incorporated in the syllabus of Final Year B. Tech. (Electronics and Telecommunication Engineering) w.e.f. 2023-2024.

Respected sir,

Throughout the year, we collect suggestions from various stakeholders regarding the curriculum. We have also received a number of suggestions for curriculum improvement from industrial experts and eminent professors. Accordingly, suggestions were discussed in the departmental meeting.

Our Electronics and Telecommunication Engineering Department has recommended the following suggestions for incorporation in Course Curriculum of Final year B. Tech. (Electronics and Telecommunication Engineering) w.e.f. 2023-2024 to enrich students' learning experience and make them more employable.

Name of Program: Electronics and Telecommunication Engineering

Suggestions for the Modifications in the Curriculum:

1. Introduction of new and updated Software (beyond prescribed syllabus).
   a. MatLab **b.** NI LabView **c.** Simulink **d.** Multisim **e.** Proteus **f.** AWR **g.** HFSS
2. In addition to **VLSI Design** (As per the syllabus if we see then DDH and VLSI design both subjects are important, so according to me there should be one subject which is combination of these two subjects., In section I there should be some part of VLSI design and in section II VHDL programming, so the students can take the advantage of both subjects.
3. In addition to **PLC and Industrial Controllers**:Types of PLC, SCADA, Ladder Diagram, Applications: Bottle filling plant, elevator controller.
4. In addition to Mobile Communication(Mobile IP, Security in Wireless Network, Higher modulation techniques for 5G)
5. In addition to **DSP Processor** and application(Architectures for Programmable DSP Devices, Programmable Digital Signal Processors, Implementations of Basic DSP Algorithms)

COLLEGE OF ENGINEERING PANDHARPUR

P Naikwadi 30/11/2022
लिपीक
आवक विभाग
पुण्यश्लोक अहिल्यादेवी होळकर
सोलापूर विद्यापीठ, सोलापूर.

6. In addition to **Research Methodology**(Introduction to Research, Research Formulation, Data Collection and Analysis, Reporting and Thesis writing, Ethics)
7. In addition to **Satellite Communication** (Propagation effects: Introduction, Atmospheric Absorption, Cloud Attenuation, Tropospheric and Ionosphere Scintillation and Low angle fading, Rain Induced attenuation, rain induced cross polarization interference.)
8. In addition to Professional practice schools for effective training of the students and enabling them to acquire the necessary skills for the industry.
9. In addition to **Microwave Engineering** Addition of new experiments in Microwave Engineering lab related to recent trend in micro strip antennas.
10. In addition to **Data Communication** (Guided and Unguided Transmission Media,,HDLC MODE transition, Network Security-Introduction, Security services, Need of Security, Key Principles of Security, Threats and Vulnerabilities, Types of Attacks)
11. In addition to the syllabus prescribed, the respective teachers try to highlight the advances in their area of specialization and the following facilities and activities help us in the attainment of the POs and PSOs.

You are requested to kindly put suggestions to the notice of the Board of Studies, Electronics and Communication Engineering.

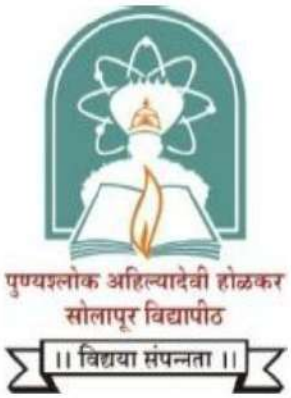
We will be happy to interact for clarification, if any.

Thank you.
Regards,

(Dr. B. P. Ronge)
PRINCIPAL

COLLEGE OF ENGINEERING
PANDHARPUR

Punyashlok Ahilyadevi Holkar Solapur University, Solapur



NAAC Accredited-2015
'B' Grade (CGPA 2.62)

Name of the Faculty: Science & Technology

CHOICE BASED CREDIT SYSTEM

Syllabus: ELECTRONICS & TELECOMMUNICATION ENGINEERING

Name of the Course: T.Y.B. Tech (Sem.– I & II)

(Syllabus to be implemented from w.e.f. June 2020)

PUNYASHLOK AHILYADEVI HOLKAR

SOLAPUR UNIVERSITY, SOLAPUR

Faculty of Science & Technology

Credit System structure of T.Y. B.Tech. Electronics & Telecommunication Engineering ***W.E.F. 2020-21***

Semester I

Course Code	***Theory Course Name***	***Hrs./week***			***Credits***	***Examination Scheme***			
		L	***T***	***P***		***ISE***	***ESE***	***ICA***	***Total***
ET311	Electromagnetic Field Theory	3	1	--	4	30	70	25	125
ET312	Digital Design & HDL	4	--	--	4	30	70	25	125
ET313	Digital Signal Processing	4	--	--	4	30	70	25	125
ET314	Microcontrollers and Applications	4	--	--	4	30	70	25	125
ET315	Open Elective-I	3	1	--	4	30	70	25	125
SLH31	Self Learning Module-I	--	--	--	2	--	50	--	50
Sub Total		18	2	--	22	150	400	125	675
Course Code	***Laboratory Course Name***								
							ESE		
							POE	***OE***	
ET312	Digital Design & HDL	--	--	2	1	--	50	--	--	50
ET313	Digital Signal Processing	--	--	2	1	--	50	--	--	50
ET314	Microcontrollers and Applications	--	--	2	1	--	50	--	--	50
ET316	Electronic Software Lab-III	--	1	2	2	--	--	--	25	25
Sub Total		--	1	8	5	--	150		25	175
Grand Total		**18**	**3**	**8**	**27**	**150**	**550**		**150**	**850**

Abbreviations: L- Lectures, P –Practical, T- Tutorial, ISE- In Semester Exam, ESE - End Semester Exam, OE-Oral Examination, POE- Practical Oral Examination

ICA- Internal Continuous Assessment ESE - University Examination (Theory &/ POE &/Oral examination)

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

T. Y. B.Tech (Electronics& Telecommunication Engineering)

Semester-I

ET312 : DIGITAL DESIGN & HDL

Teaching Scheme:	**Examination Scheme:**
Lectures– 4 Hours/week, 4 Credits	**ESE – 70 Marks**
Practical– 2 Hour/week, 1 Credit	**ISE – 30 Marks**
	ICA- 25 Marks
	POE- 50 Marks

This course introduces how to design, simulate and test digital logic circuits using hardware description languages (HDL) VHDL and Verilog HDL. It also describes the CPLD, FPGA and ASIC architectures used to implement the digital logic circuits.

Course Prerequisite:

Student shall have knowledge of Digital components, combinational and sequential logic circuit design.

Course Objectives:

1. To make student learn EDA Tools for VHDL and Verilog programming and simulation.
2. To enable student to design HDL modules for combinational logic circuits.
3. To enable student to design VHDL modules for sequential logic circuits.
4. To acquaint students to CPLD and FPGA architecture, ASIC, SOC and fault testing of combinational and sequential circuits.

Course Outcomes:

At the end of this course, Students will be able to,

1. Explain different syntax of HDL language.
2. Design and analyze combinational logic circuits using VHDL and Verilog.
3. Design and analyze sequential logic circuits using VHDL.
4. Describe architecture and internal components of CPLD, FPGA, ASIC and SOC and compare them.
5. Explain different testing methods for combinational Logic, sequential logic, IC and write test bench for simple combinational circuits.

Section I

Unit 1: Introduction to EDA tool and VHDL programming (10)

About VHDL, Design Flow, EDA tools, Library declaration, entity, architecture, data types, operators, signals, variables, constants, attributes, concurrent code, sequential code, delays, architecture modeling, components, generate, Libraries, IEEE standard logic, packages, generic, functions, procedures, operator overloading, assert.

Unit 2 : VHDL modules for combinational and sequential logic design. (08)
Half & full Adder and Subtractor, multiplexer, demultiplexer, encoder, decoder, comparator, 4-bit adder, array multiplier, latches, flip flops, counter (Synchronous and asynchronous), shift register, static RAM, ROM.

Unit 3 : Verilog modules for combinational logic design. (06)
Introduction to Verilog HDL, Structure of Verilog module, Types of models, Data types, Operators, HDL Implementation of Half Adder, Full Adder, Half subtractor, Full subtractor, encoder, decoder, multiplexer, demultiplexer, comparator.

Section II

Unit 4 : State Machines (08)
State machine using Moore and Mealy model, VHDL model using state machine for sequence detector, Traffic light controller, coffee vending machine, multiplier using ADD and SHIFT method.

Unit 5 : Testing of Logic Circuits (08)
Testing combinational and sequential logic, Boundary scan, Built In Self-test, Test bench for Combinational design for binary adder, comparator, encoder, decoder, multiplexer and demultiplexer.

Unit 6 : Architecture of Commercial Devices: (08)
CPLD Architecture, Xilinx XC9500, Altera Max7000, FPGA organization and architecture, Altera Flex 10k, ASIC and System on Chip architecture.

- **Internal Continuous Assessment (ICA):**

ICA shall be based on minimum ten programs based on above curriculum using suitable EDA tools.

Suggested List of Practicals:

1. Design of half adder and full adder using VHD and Verilog.
2. Design of 4 bit adder using structural style modeling using VHD and Verilog.
3. Design of carry look ahead adder using VHDL.
4. Design of code converters using VHDL or Verilog.
5. Design of comparators using VHDL or Verilog
6. Design of encoder and decoder using VHDL or Verilog
7. Design of multiplexer and demultiplexer using VHDL or Verilog
8. Design of flip flops using VHDL.
9. Design of universal shift register using VHDL.
10. Design of asynchronous and synchronous counters using VHDL.
11. Design of sequence detector using state machine using VHDL.
12. Design of Traffic light controller using state machine editor using VHDL.

SVERI's College of Engineering, Pandharpur

Department of Civil Engineering

Action Taken Report of the Institution on Feedback Report

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P. B. No. 54, Gopalpur - Ranjani Road, Gopalpur, **Tal.:** Pandharpur - 413 304, **Dist.:** Solapur (MH)
Contact No.: 9545553888, 9545553737, **E-mail :** coe@sveri.ac.in, **Website :** www.sveri.ac.in
Approved by **A.I.C.T.E.**, New Delhi and Affiliated to Punyashlok Ahilyadevi Holkar Solapur University, Solapur
NBA Accredited all eligible UG Programmes, **NAAC** A+ Accredited Institute, ISO 9001: 2015 Certified Institute,
Accredited by Institution of Engineers (India) & TCS.

Ref.:- COEPR/2022-23/816 Date:- 22/12/2022

To
The Director,
Punyashlok Ahilyadevi Holkar Solapur University,
Dnyanteerth Nagar, Kegaon,
Solapur-Pune National Highway,
Solapur- 413255.

Sub.:- About Major Curriculum Gaps under Civil Engineering.

Respected Sir,

As per the requirement of National Board of Accreditation (NBA), it is required to identify the Curriculum Gaps for all Courses (Subjects), which are to be taught by subject teachers as content beyond syllabus. Accordingly, we have identified Curriculum Gaps for various Subjects under Civil Engineering Programme. We are submitting these identified Curriculum Gaps for your kind perusal and necessary action.

You are requested to kindly do further needful and oblige.

Thank you,

Yours faithfully,

COLLEGE OF ENGINEERING PANDHARPUR

B.P.Ronge

(Dr. B. P. Ronge)
PRINCIPAL

Encl.: Details of Major Curriculum Gaps for (Civil Engineering)

Civil Engineering Department

CURRICULUM

G1. Interior Design and Architectural Aspects

In the modern era, it is having more importance to interior design & architecture. By introducing this topic will made students more skillful and updated to modern techniques of aesthetic appearance, fascinating interior design and astonishing architectural drawing/design.

G2. Structural Health Auditing and Repair

With aging structures there will be great demand of structural health auditing experts. Based on their audit, there is need for suggesting repair strategies. This topic will cover various approaches of Non Destructive terms of civil engineering structures which further involve damage identification, sizing, localization and characterization of damage. This identification becomes useful for predicting the criticality of damage and assessing remaining life of structure.

G3. Civil Engineering Related Softwares

Most of the detailed analysis & design work for moderate and large structures is being performed using commercially available software. The efforts will be taken to introduce most frequently used softwares by industries in various domains of drawing, structural design, water resources etc.

G4. Practical Aspects of Construction Management

In the curriculum various sub courses of construction management viz, drawings, design, estimation, concrete technology, surveying etc are structured separately. However utilization of all these tools for completing a single project need to be introduced from stage one to final stage.

G5. Advanced Topics in Civil Engineering

In the curriculum stress is mainly given on fundamentals of Civil engineering topic. However for onsite implementation of mega projects its essential to get introduced with advanced topics like advanced construction processes and equipments, advanced materials, prefabricated structures etc.

COLLEGE OF ENGINEERING PANDHARPUR

B. Ronge

(Dr. B. P. Ronge)
PRINCIPAL

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

पुण्यश्लोक अहिल्यादेवी होळकर
सोलापूर विद्यापीठ
।। विद्यया संपन्नता ।।

NAAC Accredited-2015
'B' Grade (CGPA 2.62)

Name of the Faculty: Science & Technology

CHOICE BASED CREDIT SYSTEM

Syllabus Structure: B. Tech. (Civil Engineering)

S.Y. B.Tech (Civil Engineering) w.e.f. Academic Year 2021-22

T.Y. B.Tech (Civil Engineering) w.e.f. Academic Year 2022-23

Final Year B. Tech (Civil Engineering) w.e.f. Academic Year 2023-24

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
Faculty of Science & Technology
Credit System structure of Final Year B. Tech. Civil Engg. I; Semester – VII, W. E.F. 2023-2024

Course Code	Theory Course Name	Hrs./week				Credits	Examination Scheme				
		L	T	P	D		ISE	ESE		ICA	Total
CE71C	Estimating, Costing and Valuation	3	-	-	-	3	30	70		-	100
CE72C	Earthquake Engineering	2	-	-	-	2	30	70		-	100
CE73C	Construction Management and Practices	3	-	-	-	3	30	70		-	100
CE74E	Professional Elective Course- II	3	-	-	-	3	30	70		-	100
	Total	**12**	**-**	**-**	**-**	**11**	**120**	**280**		**-**	**400**
	Laboratory/Drawings:							**POE**	**OE**		
CE75L	Estimating , Costing and Valuation	-	-	4	-	2	-	50	-	25	75
CE76L	Construction Management and Practices	-	-	2	-	1	-	-	-	25	25
CE77P	Project on R. C. C. Structures	-	-	-	2	1	-	-	25	50	75
CE78S	Seminar	-	-	2	-	1	-	-	25	25	50
CE79V	Assessment of report on field training	-	-	-	-	1	-	-	-	25	25
	Total	**-**	**-**	**8**	**2**	**6**	**-**	**100**		**150**	**250**
	Grand Total	**12**	**-**	**8**	**2**	**17**	**120**	**380**		**150**	**650**

Abbreviations: L- Lectures, P –Practical, T- Tutorial, D- Drawing, ISE -Internal Tests, ESE - University Examination (Theory &/ POE &/Oral examination), ICA- Internal Continuous Assessment.

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
Faculty of Science & Technology
Credit System structure of Final Year B. Tech. Civil Engg. II, Semester– VIII, W. E.F. 2023-2024

Course Code	Theory Course Name	Hrs./week				Credits	Examination Scheme				
		L	T	P	D		ISE	ESE		ICA	Total
CE81H	Professional Practice, Law & Ethics	3	-	-	-	3		100		-	100
CE75E	Professional Elective Course- III	3	-	-	-	3		100		-	100
SL-2	Self Learning Technical Course (Elective)	3	-	-	-	3	-	100		-	100
	Total	**9**	**-**	**-**	**-**	**9**		**300**		**-**	**300**
	Laboratory/Drawings							**POE**	**OE**		
CE8P	Project work	-	-	10	10	10	-	-	150	150	300
	Total	**-**	**-**	**10**	**10**	**10**	**-**	**150**		**150**	**300**
	Grand Total	**9**		**10**	**10**	**19**		**450**		**150**	**600**

Abbreviations: L- Lectures, P –Practical, T- Tutorial, D- Drawing, ISE -Internal Tests, ESE - University Examination (Theory &/ POE &/Oral examination), ICA- Internal Continuous Assessment.

.Note:

1) Project group be of maximum of 7 students.
2) Internal *Continuous* Assessment (ICA): ICA shall be a continuous process based on the performance of the student in assignments, class tests, quizzes, attendance and interaction during theory and lab sessions, journal writing, report presentation etc., as applicable
3) Self-Learning Module II at final year B. Tech. Civil Engineering, Semester- II. Student can select a _Self Learning Module II‘ (Technical Course) from Course List SL41-(A) and appear for examination.
4) Those students going outside the Institute for project / Internship / Training for entire 8 th Semester shall complete the theory subjects in Self learning mode and appear for examination OR can take MOOC which shall be of minimum twelve weeks duration. from approved platform and submit certificate of completion along with the assessment marks in lieu of University and Institute Examination. However, student needs to submit an application in this regard that they are opting for examination on MOOC platform with certification in lieu of University Examination. Also, they must appear for University examination for the course –Professional Practice, Law & Ethics‖ and also complete the Project report and appear for OE for the course of –Project work‖

Professional Elective Courses and Self Learning Technical Course (Elective): Student shall choose any one course of the following OR Respective NPTEL/MOOC Courses

Elective No	Semester	(I) Structural Engineering	(II) Geotechnical Engineering & Transportation Engg.	(III) Construction Engineering & Management	(IV) Environmental Engineering &Hydraulics, Hydrology & Water Resources Engineering
Prof. Elective-II	**Semester-VII**	Advanced Structural Analysis	Traffic Engineering and Management	Construction Productivity	Water Power Engineering
		Advanced Design of Concrete Structures	Geosynthetics and reinforced soil structures	Entrepreneurship	Air and Noise Pollution and Control
		Finite Element Method		Optimization Techniques	
Prof. Elective-III	**Semester-VIII**	Repairs & Rehabilitation of Structures	Urban Transportation Planning.	Cost Management of Engineering Projects	Water and Air Quality Modelling
		Industrial Structures	Ground improvement Techniques	Disaster Management	
		OR Student can select & enroll for approved minimum eight week technical course from various NPTEL technical courses, Or any other approved MOOC platform, complete its assignments and appear for certificate examination conducted by NPTEL Or respective MOOC platform BOS Chairman / Coordinator will announce the list of approved NPTEL/MOOC online courses of minimum eight weeks duration for _Professional Elective Course- III' from the available NPTEL/MOOC courses and will make available to student through institute website.			
Self Learning Technical course (Elective)		Concrete composites	Rural Roads	TQM and MIS in Civil Engineering	Planning for Sustainable Development
		OR Student can select & enroll for approved minimum eight week technical course from various NPTEL technical courses, Or any other approved MOOC platform, complete its assignments and appear for certificate examination conducted by NPTEL Or respective MOOC platform. BOS Chairman / Coordinator will announce the list of approved NPTEL/MOOC online courses of minimum eight weeks duration for _Self Learning Module-II (Technical)' from the available NPTEL/MOOC courses and will make available to student through institute website.			

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Final Year B. Tech Civil – Part I

CE71C ESTIMATING, COSTING & VALUATION

Teaching Scheme
Lectures:- 3 Hrs/Week, 3 Credits

Examination Scheme
ISE: 30 Marks
ESE: 70 Marks

Course Outcomes:

Upon successful completion of course the students will be able to:

1) Write technical specifications for civil engineering works.
2) Carry out rate analysis based on market rates, schedule of rates and other relevant standard documents and codes.
3) Take off quantities of items of construction for civil engineering works.
4) Prepare tender documents and explain contract procedures.
5) Prepare the valuation reports for land and buildings.
6) Analyze and evaluate economic alternatives for civil engineering projects.

SECTION –I

Unit 1: Specifications **(4 Hrs)**

Types, requirements and importance, detailed specifications for buildings, roads, minor bridges and industrial structures.

Unit 2 : Estimation / Measurements for various items **(5 Hrs)**

Introduction to the process of Estimation;, taking out quantities from the given requirements of the work, comparison of different alternatives, Bar bending schedules, Mass haul Diagrams, Estimating Earthwork and Foundations, Estimating Concrete andMasonry, Finishes, Interiors, MEP works; BIM and quantity take-offs

SVERI's
College of Engineering, Pandharpur
Department of Computer Science and Engineering

Action Taken Report of the
Institution on Feedback Report

Letter to BOS in Computer Science and Engineering, Punyashlok Ahilyadevi Holkar Solapur University about incorporating different suggestions collected from various stakeholders regarding curriculum.

Action Taken Report of the Institution on Feedback Report

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P. B. No. 54, Gopalpur - Ranjani Road, Gopalpur, Tal.: Pandharpur - 413 304, Dist.: Solapur (MH)
Contact No.: 9545553888, 9545553737, E-mail : coe@sveri.ac.in, Website : www.sveri.ac.in
Approved by A.I.C.T.E., New Delhi and Affiliated to Punyashlok Ahilyadevi Holkar Solapur University, Solapur
NBA Accredited all eligible UG Programmes, NAAC A+ Accredited Institute, ISO 9001: 2015 Certified Institute.
Accredited by Institution of Engineers (India) & TCS.

Ref:- COEPR/2022-2023/774 Date:- 30/11/2022

To,
The Chairman,
BOS in Computer Science and Engineering,
Punyashlok Ahilyadevi Holkar Solapur University,
Solapur.

Subject: Suggestions to be incorporated in the syllabus of Final year B. Tech. (Computer Science and Engineering) w.e.f. 2023-2024.

Respected sir / Madam,

Throughout the year, we collect suggestions from various stakeholders regarding the curriculum. We have also received number of suggestions for curriculum improvement from industrial experts. Accordingly suggestions were discussed in the department meeting.

Our Computer Science and Engineering Department has recommended the following suggestions for incorporation in Course Curriculum of Final year B. Tech. (Computer Science and Engineering) w.e.f. 2023-2024 to enrich students' learning experience and making them more employable.

Name of Program: Computer Science and Engineering.

Suggestions for the Modifications in the Curriculum:

With reference to the new structure of Final year B. Tech (Computer Science and Engineering), following are the suggestions for the modification of the curriculum:

1. For the subject **Distributed systems**, under Recovery and consensus following points can be included: checkpoint and rollback recovery, Algorithms for co-ordinated checkpoint, asynchronous check pointing, consensus and agreement, recovery in consensus.
2. As automation is current market need, following points may be included in **Software Testing and Quality Assurance**: Automation testing – tools for criteria selection, testing, Selenium IDE and test application, Load runner.
3. In **DevOps** following points may be included: DevOps methodology, Software Version Control, Docker, Jenkins, Puppet, Ansible, Maven, Kubernetes.
4. As **Block chain technology** is newly introduced the following points can be added: crypto currency and cyber security, bit coins and use cases, Building private block chains, block chain with AI and IoT.

B. Ronge

5. For newly introduced and essential subject **Cyber laws and Ethics** following points may be included: IT act 2000, Information production and access control, security mandate and legislation, computer security.
6. For the subject **Human Computer Interaction**, Case Study: Case Study of Modern Systems Group ware, Virtual Reality, Augmented Reality, HCI in the software process: The software life cycle Usability engineering Iterative design and prototyping Design Focus: Prototyping in practice Design rationale, Design rules Principles to support usability Standards Golden rules and heuristics HCI patterns Evaluation techniques, Goals of evaluation, Evaluation through expert analysis, Evaluation through user participation, Choosing an evaluation method. Universal design, Universal design principles Multi-modal interaction can be included.
7. For the elective subject **Data mining**, Category wise data mining applications can be added.
8. From honors subjects, **Reinforcement learning** subject can be removed as it is already included in third year honors subject.

You are requested to kindly put suggestions to the notice of Board of Studies, Computer Science and Engineering

We will be happy to interact for clarification, if any.

Thanking you.
Regards,

B.Ronge

(Dr. B. P. Ronge)
PRINCIPAL

COLLEGE OF ENGINEERING
PANDHARPUR

Action Taken Report of the Institution on Feedback Report

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P. B. No. 54, Gopalpur - Ranjani Road, Gopalpur, Tal.: Pandharpur - 413 304, Dist.: Solapur (MH)
Contact No.: 9545553888, 9545553737, E-mail : coe@sveri.ac.in, Website : www.sveri.ac.in
Approved by A.I.C.T.E., New Delhi and Afiliated to Punyashlok Ahilyadevi Holkar Solapur University, Solapur
NBA Accredited all eligible UG Programmes, NAAC A+ Accredited Institute, ISO 9001: 2015 Certified Institute.
Accredited by Institution of Engineers (India) & TCS.

Ref.:- COEPR/2022-2023/775 Date:- 30/11/2022

To,
The Chairman,
BOS in Computer Science and Engineering,
Punyashlok Ahilyadevi Holkar Solapur University,
Solapur.

Subject: Suggestions to be incorporated in the syllabus of T.Y. B. Tech. (Computer Science and Engineering) w.e.f. 2022-2023.

Respected sir / Madam,

Throughout the year, we collect suggestions from various stakeholders regarding the curriculum. We have also received number of suggestions for curriculum improvement from industrial experts. Accordingly suggestions were discussed in the department meeting.

Our Computer Science and Engineering Department has recommended the following suggestions for incorporation in Course Curriculum of T. Y. B. Tech. (Computer Science and Engineering) w.e.f. 2022-2023 to enrich students' learning experience and making them more employable.

Name of Program: Computer Science and Engineering.

Suggestions for the Modifications in the Curriculum:

1. Artificial Intelligence subject should be included in first semester
2. ICA Marks weightage of Mini Project can be increased in University Curriculum.
3. Mobile Application Development subject should be included in first semester.
4. Self-Learning Technical subject can be removed due to additional Honors subjects
5. System programming subject can be shifted to second semester.
6. Management and Economics related subjects may be added in self-learning or open elective subjects
7. Add on courses can be included in the curriculum.
8. Motivation should be given for interdisciplinary mini projects
9. Include any kind of practical exposure to industry practices and standards of work.
10. Include some contents related to latest trends across the global for each course.
11. Topics related to cross cutting issues such as gender; professional ethics, human values, environment and sustainability can be added into the curriculum.
12. Machine Learning & Artificial Intelligence should have more focus in the curriculum.

B. Ronge

13. Industrial exposure should be given at third year level by adding industrial visit to more subjects.
14. In ICA of Mini Project/Design Report drawing using any design software can be included.

You are requested to kindly put suggestions to the notice of Board of Studies, Computer Science and Engineering

We will be happy to interact for clarification, if any.

Thanking you.
Regards,

B-Ronge

(Dr. B. P. Ronge)
PRINCIPAL

COLLEGE OF ENGINEERING PANDHARPUR

Shri Vithal Education & Research Institute's
COLLEGE OF ENGINEERING, PANDHARPUR
P. B. No. 54, Gopalpur-Ranjani Road, Gopalpur, Tal.: Pandharpur, Pin: 413304, Dist-Solapur, (MH)
Contact No.: 9545553888, 9545553737, **E-mail:** coe@sveri.ac.in, **Website:** www.sveri.ac.in
Approved by **A.I.C.T.E.** New Delhi, Affiliated to Punyashlok Ahilyadevi Holkar Solapur University, Solapur
NBA Accredited all Eligible UG Programs, Accredited by **NAAC A+** with 3.46 CGPA out of 4.00,
An ISO 9001: 2015 Certified Institute, The Institution of Engineers, Kolkata & TCS Pune.
SVERI
Engineering for Excellence

Ref.: COEPR/2023-2024/110(A) Date: 22/05/2023

To,
The Chairman,
BOS in Electrical Engineering
Punyashlok Ahilyadevi Holkar Solapur University,
Solapur.

Subject: Recommendations for Curriculum Modifications in Electrical Engineering - Final Year B.Tech. w.e.f. Academic Year 2023-2024.

Respected Sir/Madam,

Throughout the year, our Electrical Engineering Department has diligently gathered suggestions from various stakeholders, including valuable inputs from industrial experts, to enhance the curriculum of Final Year B.Tech. (Electrical Engineering). These suggestions were thoroughly discussed in department meetings, and we are pleased to submit the following recommendations for incorporation into the Course Curriculum of Final Year B.Tech. (Electrical Engineering) from the academic year 2023-2024 to enrich the student's learning experience and make them more employable.

Name of Program: Electrical Engineering.

Suggestions for the Modifications in the Curriculum:

1. **Power Quality & FACTS:**
   a. Include IEEE & IEC standards related to harmonics.
2. **Signal & System:**
   a. Incorporate assessment methods focusing on properties of CT-LTI System.
   b. Include assessment methods related to Numerical on DFT, IDFT, and FFT algorithms.
3. **Switchgear and Protection:**
   a. Add content related to Earthing Switch.

HEAD
Dept. of Electrical Engg.
C.O.E. Pandharpur.

B. Ronge

Received,
05/06/2023
Incharge, BOS chairman
Electrical Engg.

4. **Internship:**
    a. Introduce a minimum three-month internship for the Eighth semester.

5. **Future Aspects:**
    a. Add content focusing on recent industrial aspects for continual enrichment.

6. **Professional Elective-I:**
    a. Include an Industrial Visit for real-time exposure.

7. **NPTEL/SWAYAM Course:**
    a. Introduce a minimum eight-week duration course from the approved list.

8. **Advanced Trends:**
    a. Add subjects related to advanced trends such as automation, robotics, and special purpose machines.

9. **Solar Technology:**
    a. Introduce subjects related to the application of Solar Technology.

10. **High Voltage Engineering:**
    a. Include a detailed list of experiments specifically for High Voltage Engineering.

We kindly request you to bring these recommendations to the attention of the Board of Studies, Electrical Engineering, for their consideration. We are open to discussions and would be delighted to provide any clarifications required.

Thank you and we look forward to the positive impact these modifications can have on our students' learning experience and employability.

Regards,

HEAD
Dept. of Electrical Engg.
C.O.E. Pandharpur.

(Dr. B. P. Ronge)
PRINCIPAL