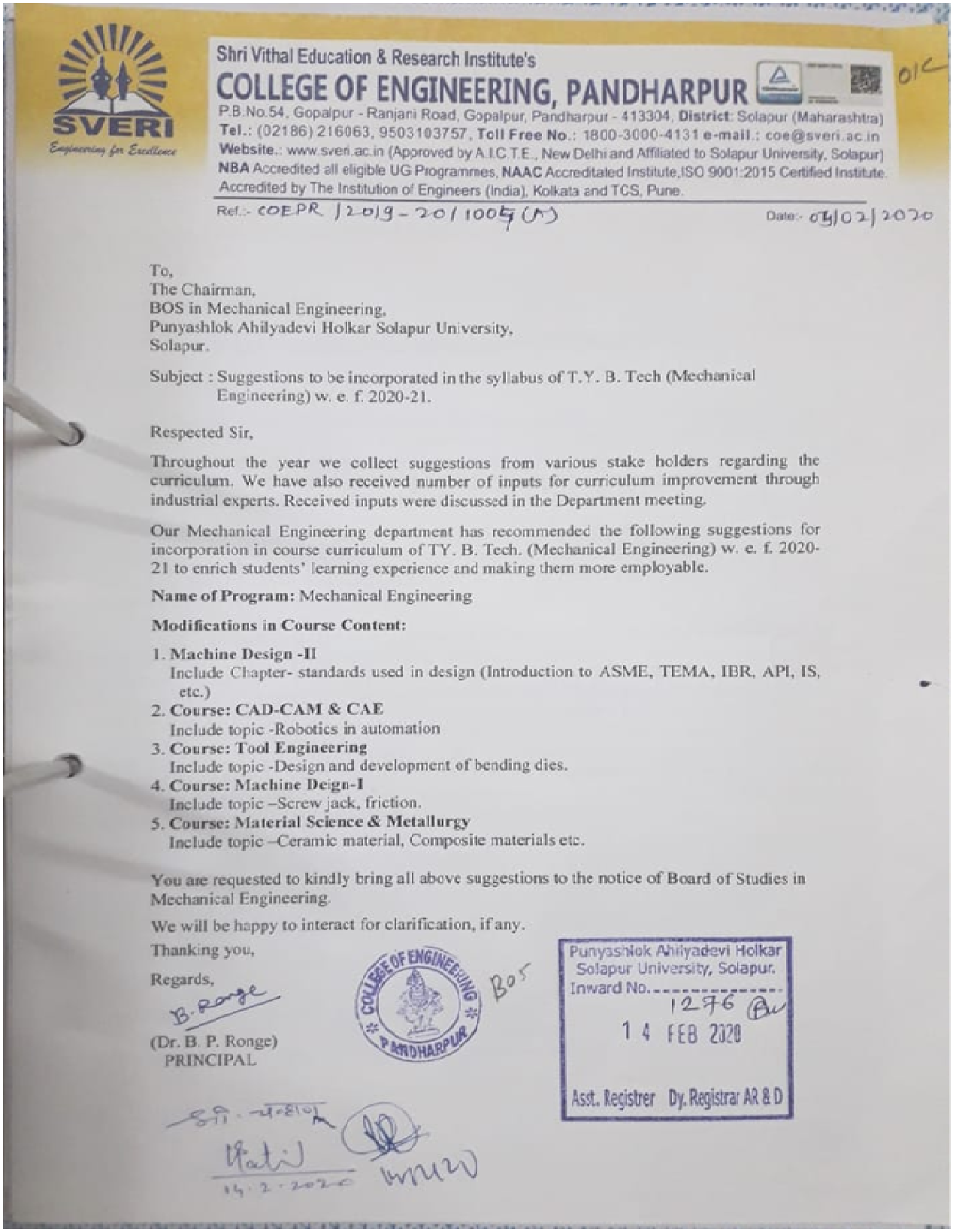
SVERI's
College of Engineering, Pandharpur

Action Taken Report of the Institution on Feedback Report

- **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, Pandharpur - 413304, District: Solapur (Maharashtra)
Tel.: (02186) 216063, 9503103757, Toll Free No.: 1800-3000-4131 e-mail.: coe@sveri.ac.in
Website.: www.sveri.ac.in (Approved by A.I.C.T.E., New Delhi and Affiliated to Solapur University, Solapur)
NBA Accredited all eligible UG Programmes, NAAC Accreditated Institute,ISO 9001:2015 Certified Institute.
Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune.

Ref.:- COEPR /2019-20/1005 (A) Date:- 05/02/2020

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

Subject : Suggestions to be incorporated in the syllabus of T.Y. B. Tech (Mechanical Engineering) w. e. f. 2020-21.

Respected Sir,

Throughout the year we collect suggestions from various stake holders regarding the curriculum. We have also received number of inputs for curriculum improvement through industrial experts. Received inputs were discussed in the Department meeting.

Our Mechanical Engineering department has recommended the following suggestions for incorporation in course curriculum of TY. B. Tech. (Mechanical Engineering) w. e. f. 2020-21 to enrich students' learning experience and making them more employable.

Name of Program: Mechanical Engineering

Modifications in Course Content:

1. **Machine Design -II**
   Include Chapter- standards used in design (Introduction to ASME, TEMA, IBR, API, IS, etc.)
2. **Course: CAD-CAM & CAE**
   Include topic -Robotics in automation
3. **Course: Tool Engineering**
   Include topic -Design and development of bending dies.
4. **Course: Machine Deign-I**
   Include topic –Screw jack, friction.
5. **Course: Material Science & Metallurgy**
   Include topic –Ceramic material, Composite materials etc.

You are requested to kindly bring all above suggestions to the notice of Board of Studies in 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

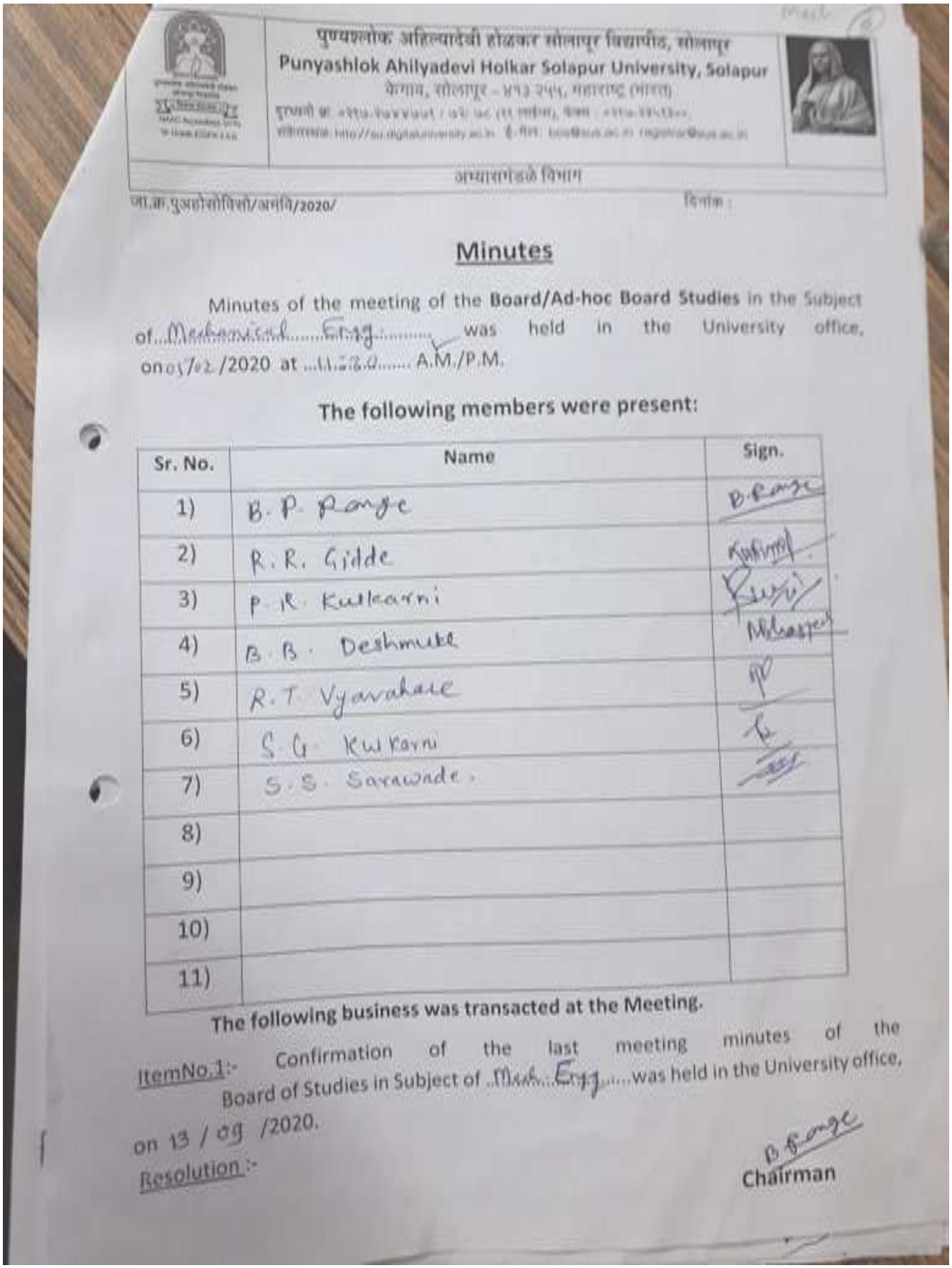
BOS

Punyashlok Ahilyadevi Holkar Solapur University, Solapur.
Inward No. 1276
14 FEB 2020
Asst. Registrer Dy. Registrar AR & D

14.2.2020

Minutes of the meeting of the Board of Studies in the Subject of Mechanical Engineering was held in the University office on 05/02/2020

Action Taken Report of the Institution on Feedback Report



पुण्यश्लोक अहिल्यादेवी होळकर सोलापूर विद्यापीठ, सोलापूर
Punyashlok Ahilyadevi Holkar Solapur University, Solapur
केगाव, सोलापूर - ४१३ २५५, महाराष्ट्र (भारत)

अभ्यासमंडळे विभाग

जा.क्र.पुअहोसोविसो/अमंवि/2020/ दिनांक :

Minutes

Minutes of the meeting of the **Board/Ad-hoc Board Studies** in the Subject of Mechanical Engg. was held in the University office, on 03/02/2020 at 11:30 A.M./P.M.

The following members were present:

Sr. No.	Name	Sign.
1)	B. P. Ronge	B.Ronge
2)	R. R. Gidde	
3)	P. R. Kulkarni	
4)	B. B. Deshmukh	
5)	R. T. Vyavahare	
6)	S. G. Kulkarni	
7)	S. S. Sarawade.	
8)		
9)		
10)		
11)		

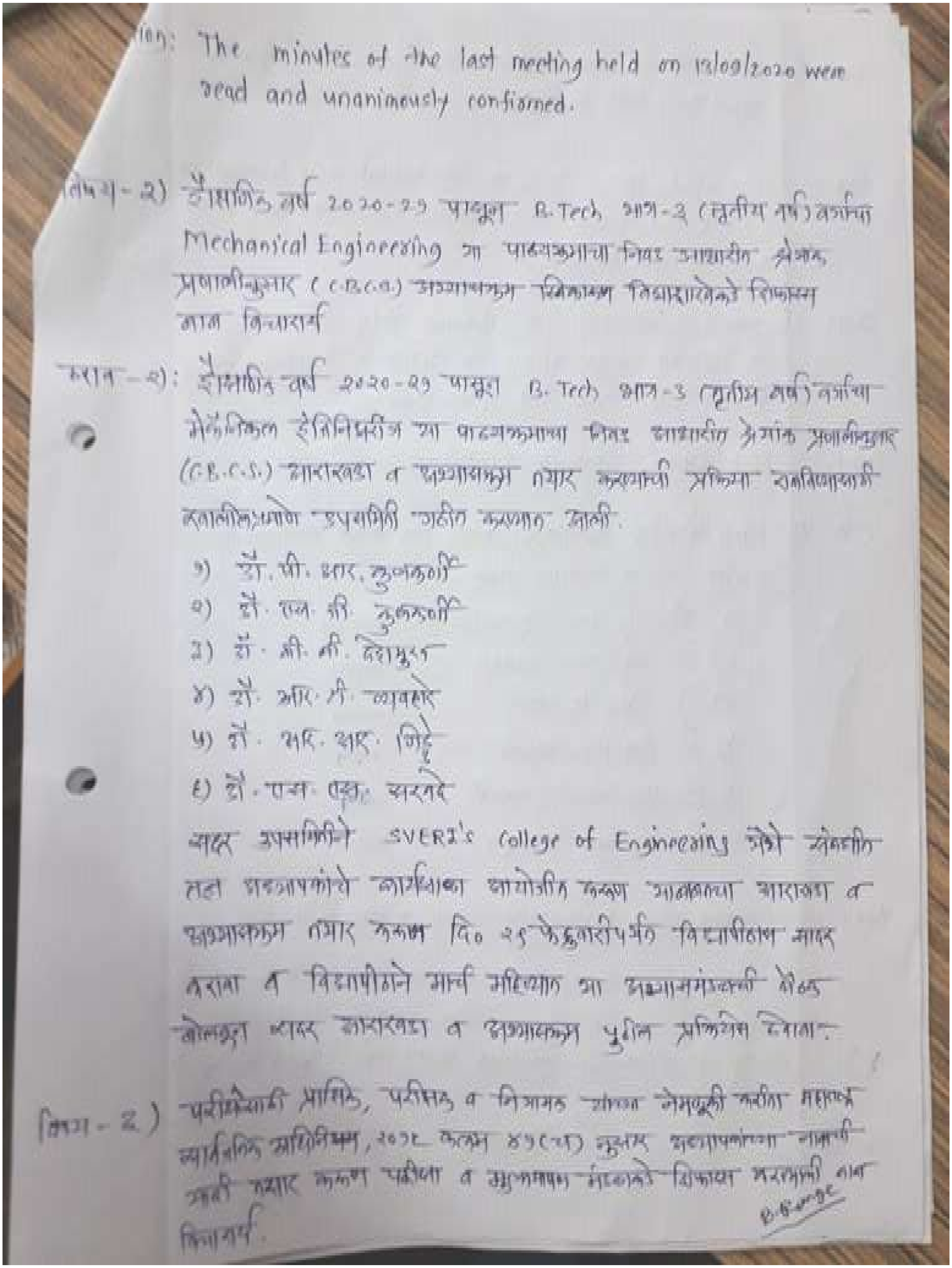
The following business was transacted at the Meeting.

ItemNo.1:- Confirmation of the last meeting minutes of the Board of Studies in Subject of Mech. Engg. was held in the University office, on 13 / 09 /2020.

Resolution :-

B.Ronge
Chairman

Action Taken Report of the Institution on Feedback Report



...ion: The minutes of the last meeting held on 13/08/2020 were read and unanimously confirmed.

विषय - २) शैक्षणिक वर्ष 2020-21 पासून B.Tech भाग-3 (तृतीय वर्ष) वर्गांच्या Mechanical Engineering या पाठ्यक्रमाचा निवड आधारित श्रेयांक प्रणालीनुसार (C.B.C.S.) अभ्यासक्रम विकसन विद्याशाखेकडे शिफारस करणे बाब विचारार्थ

ठराव - २): शैक्षणिक वर्ष 2020-21 पासून B.Tech भाग-3 (तृतीय वर्ष) वर्गांच्या मेकॅनिकल इंजिनिअरिंग या पाठ्यक्रमाच्या निवड आधारित श्रेयांक प्रणालीनुसार (C.B.C.S.) आराखडा व अभ्यासक्रम तयार करण्याची प्रक्रिया राबविण्यासाठी खालीलप्रमाणे उपसमिती गठीत करण्यात आली.

1) डॉ. पी. आर. कुलकर्णी
2) डॉ. एल. डी. कुलकर्णी
3) डॉ. डी. बी. देशमुख
4) डॉ. आर. टी. व्यवहारे
5) डॉ. एस. आर. शिंदे
6) डॉ. एम. एस. सरवदे

सदर उपसमितीने SVERI's College of Engineering येथे संबंधित सर्व अध्यापकांचे कार्यशाळा आयोजित करून आवश्यक आराखडा व अभ्यासक्रम तयार करून दि. २५ फेब्रुवारीपर्यंत विद्यापीठास सादर करावा व विद्यापीठाने मार्च महिन्यात या अभ्यासमंडळाची बैठक बोलवून सादर आराखडा व अभ्यासक्रम पुढील प्रक्रियेस द्यावा.

विषय - ३) परीक्षेसाठी प्राश्निक, परीक्षक व नियामक यांच्या नेमणुकी करीता महाराष्ट्र सार्वजनिक अधिनियम, २०१६ कलम ४८(२५) नुसार अध्यापकांच्या नावांची यादी तयार करून परीक्षा व मूल्यमापन मंडळाकडे शिफारस करण्याची बाब विचारार्थ.

Action Taken Report of the Institution on Feedback Report

ठराव ३) सदर बाबी या अभ्यासमंडळाच्या वतीने डॉ. वी. बी. देशमुख हे १४/०८/२०२० पर्यंत विद्यापीठाला सादर करतील.

विषय ४) S.E., M.E. Part-I या जुन्या अभ्यासक्रमासाठी नवीन अभ्यासक्रमानुसार (S.Y. B.Tech, M.Tech - Part-I) समकक्ष (Equivalence) विषय तयार करण्याविषयी बाब विचारार्थ.

ठराव ४) अभ्यास दि. ०३/०८/२०२० च्या बैठकीमध्ये निर्णय झालेल्या विषयानुसार त्या अनुषंगाने समकक्ष ज्यादा या अगोदरच विद्यापीठाला सादर केलेल्या आहेत याची नोंद घेण्यात आली.

विषय ५) Ph.D कोर्सवर्क अभ्यासक्रम उपसमिती गठीत करणेबाबत.

ठराव ५): PhD कोर्सवर्क अभ्यासक्रम तयार करण्यासाठी खालीलप्रमाणे उपसमिती गठीत करण्यात आली.

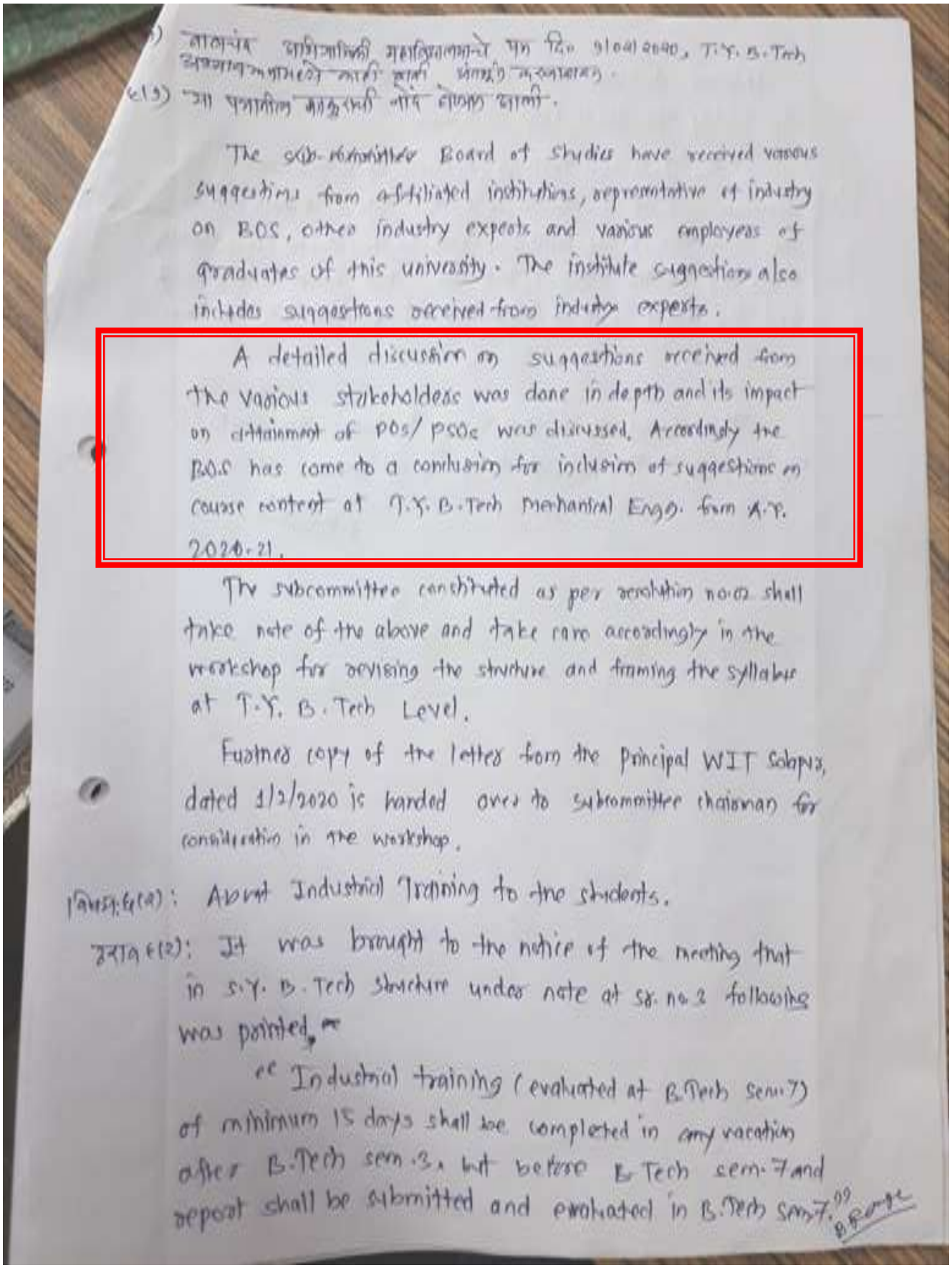
१) डॉ. पी. आर. कुलकर्णी — अध्यक्ष
२) डॉ. आर. बी. व्यवहारे — सदस्य
३) डॉ. आर. आर. गिडे — सदस्य
४) डॉ. सि. लि. [illegible] — सदस्य
५) डॉ. एल. बी. कुलकर्णी — सदस्य
६) डॉ. वी. बी. देशमुख — सदस्य

विषय ६) मा. अध्यक्ष यांच्या पूर्वपरवानगीने येणाऱ्या आयत्या वेळेचे विषय.

६(१) शैक्षणिक वर्ष २०२१-२२ पासून B.Tech Part III Mechanical Engineering या पाठ्यक्रमाच्या निवड आधारित श्रेयांक प्रणालीनुसार (C.B.C.S) अभ्यासक्रमाचे निवडलेल्या विद्यालयाकडे शिफारस करण्याची बाब विचारार्थ.

ठराव ६(१):

Action Taken Report of the Institution on Feedback Report



The sub-committee Board of Studies have received various suggestions from affiliated institutions, representative of industry on B.O.S, other industry experts and various employees of graduates of this university. The institute suggestions also includes suggestions received from industry experts.

A detailed discussion on suggestions received from the various stakeholders was done in depth and its impact on attainment of POs/PSOs was discussed. Accordingly the B.O.S has come to a conclusion for inclusion of suggestions on course content at T.Y. B.Tech Mechanical Engg. from A.Y. 2020-21.

The subcommittee constituted as per resolution no.02 shall take note of the above and take care accordingly in the workshop for revising the structure and framing the syllabus at T.Y. B.Tech Level.

Fustner copy of the letter from the Principal WIT Solapur, dated 1/2/2020 is handed over to subcommittee chairman for consideration in the workshop.

Resolution 6(2): About Industrial Training to the students.

Discussion 6(2): It was brought to the notice of the meeting that in S.Y. B.Tech Structure under note at Sr. no 2 following was printed,-

"Industrial training (evaluated at B.Tech Sem.7) of minimum 15 days shall be completed in any vacation after B.Tech sem.3. but before B.Tech sem.7 and report shall be submitted and evaluated in B.Tech Sem.7."

Thorough discussion was made and it was resolved unanimously to modify the above note as follows:

3. Industrial Training (evaluated at B. Tech. sem-7) of minimum 30 days at a streach or in two slots of 15 days each at the discreation of the institute, shall be completed by every student during any vacation after B.Tech sem-3, but before B.Tech Sem-7 and the report shall be submitted and evaluated in B.Tech Sem-7.

There being no further issues to discuss, the meeting is concluded with the vote of thanks to all present.

B Ranga

Minutes of the meeting of the Board of Studies in the Subject of Mechanical Engineering was held in the University office on 12/02/2020

Action Taken Report of the Institution on Feedback Report

पुण्यश्लोक अहिल्यादेवी होळकर सोलापूर विद्यापीठ, सोलापूर
Punyashlok Ahilyadevi Holkar Solapur University, Solapur
केगाव, सोलापूर - ४१३ २५५, महाराष्ट्र (भारत)
दूरध्वनी क्र. ०२१७-२७४४७०१ / ७१/ ७८ (१९ लाईन्स), फॅक्स : ०२१७-२३५१३००,
संकेतस्थळ: http://su.digitaluniversity.ac.in ई-मेल: bos@sus.ac.in registrar@sus.ac.in

अभ्यासमंडळे विभाग

पा.क्र.पुअहोसोविसो/अमंवि/2020/ दिनांक :

Minutes

The meeting of the **Board/Ad-hoc Board of Studies** in the Subject of Mechanical Engineering was held in the University office, on 12/03/2020 at 03.00 ~~A.M./P.M.~~

The following members were present:

Sr. No.	Name	Sign.
1)	Dr. B. P. Ronge	B.Ronge
2)	Dr. P. R. Kulkarni	
3)	Dr. R. R. Gidde	
4)	Dr B. B. Deshmukh	
5)	Dr. R. T. Vyavahare	
6)	Ms Chandanshive Sarata Anil	
7)	Divya Pradip Kulkarni	
8)	Dr. S. G. Kulkarni	
9)		
10)		
11)		

The following business was transacted at the Meeting.

ItemNo.1:- Confirmation of the last meeting minutes of the Board of Studies in Subject of Mech. Engg. was held in the University office, on 05/02/2020

Resolution:-

B.Ronge
Chairman

1/5

Resolution No. 01: The minutes of the last meeting held 05/02/2020 were read and unanimously confirmed.

विषय (2) शैक्षणिक वर्ष 2020-21 पासून B.Tech भाग-3 (तृतीय वर्ष) वर्गाच्या Mechanical Engineering या पाठ्यक्रमाच्या निवड आधारित श्रेयांक प्रणालीनुसार (CBCS) अभ्यासक्रम विद्याशाखेकडे शिफारस करण्याची बाब विचारार्थ.

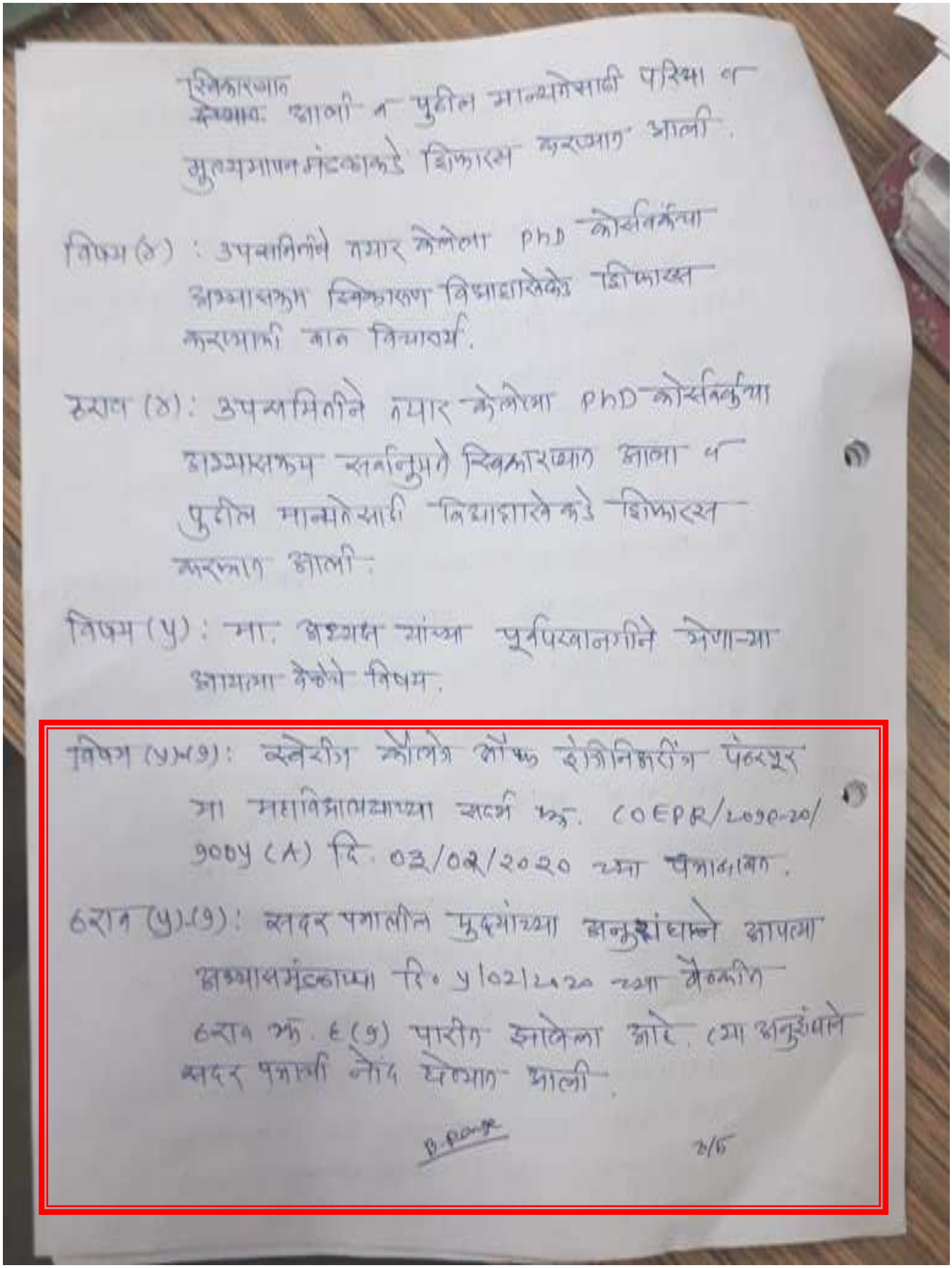
ठराव (२): शैक्षणिक वर्ष 2020-21 पासून B.Tech भाग-3 (तृतीय वर्ष) वर्गाच्या Mechanical Engineering या पाठ्यक्रमाच्या निवड आधारित श्रेयांक प्रणालीनुसार (CBCS) सुधारीत आराखडा व अभ्यासक्रम सर्वानुमते स्विकारण्यात आले व पुढील मान्यतेसाठी सदर आराखडा व अभ्यासक्रमाची विद्याशाखेकडे शिफारस करण्यात आली.

विषय (3): परीक्षेसाठी प्राश्निक, परीक्षक व नियामक यांच्या नेमणूकी करीता महाराष्ट्र सार्वजनिक अधिनियम, २०१६ कलम ४९(५) नुसार अध्यापकांच्या नावाची यादी तयार करून परीक्षा व मुल्यमापन मंडळाकडे शिफारस करण्याची बाब विचारार्थ.

ठराव-(3): परीक्षेसाठी प्राश्निक, परीक्षक व नियामक यांच्या नेमणूकी करीता महाराष्ट्र सार्वजनिक अधिनियम २०१६ कलम ४९(५) नुसार अध्यापकांच्या नावाची यादी तयार करण्यात आली (यास सर्वानुमते ~~मान्यता~~ 2/5

D.Bange

Action Taken Report of the Institution on Feedback Report



विकास करण्यात आली व पुढील मान्यतेसाठी परिषद व मुख्यमापन मंडळाकडे शिफारस करण्यात आली.

विषय (४) : उपसमितीने तयार केलेला PhD कोर्सवर्क चा अभ्यासक्रम विकास विद्यापीठाकडे शिफारस करण्याची बाब विचारार्थ.

ठराव (४): उपसमितीने तयार केलेला PhD कोर्सवर्क चा अभ्यासक्रम सर्वानुमते विकास करण्यात आला व पुढील मान्यतेसाठी विद्यापीठाकडे शिफारस करण्यात आली.

विषय (५) : मा. अध्यक्ष यांच्या पूर्वपरवानगीने घेण्यात आलेला विषय.

विषय (५)-७): व्हेरॉक कॉलेज ऑफ इंजिनिअरिंग पंढरपूर या महाविद्यालयाचा सन २०. COEPR/2020-20/ 9004 (A) दि. 03/02/2020 चा प्रस्ताव.

ठराव (५)-७): सदर पत्रातील मुद्द्यांच्या अनुषंगाने अभ्यासमंडळाच्या दि. 5/02/2020 च्या बैठकीत ठराव क्र. E(9) पारीत झालेला आहे. त्या अनुषंगाने सदर पत्राची नोंद घेण्यात आली.

P.P.

उपाय (4)-(2): To consider Institution of Honors degree in emerging area in the existing Mechanical Engineering degree with honors degree in the specialization as shown in

उपाय (4)-(2):

AICTE Approval Process Handbook 2020-21 has come out with various emerging areas in Engineering and Technology. Accordingly, Mechanical Engineering Under Graduate course in emerging areas of Mechanical Engineering shall offer Honors degree of Specialization by earning 18 to 20 credits in a selected specialization as mentioned below.

Therefore, it is resolved to recommend to the university authority to institute and offer following mentioned degree as specialization by earning 18 to 20 credits in a selected specialization in existing Mechanical Engineering Degree offered by P.A.H. Solapur University, Solapur.

Sr.no	Honors degree as a Specialization	To be offered as Honors for the following major Disciplines
1)	Robotics	Mechanical Engineering
2)	Energy Engineering	Mechanical Engineering
3)	3-D printing	Mechanical Engineering
4)	Electrical Vehicles	Mechanical Engineering

4/5

The meeting took the note of the letter, in this respect, ~~from~~ WIT/2019-20/1582 dated 11/03/2020 from WIT Solapur.

विषय ५(३): About letter no. SKNSCOE/2019-20/842 dated 24/02/2020 from SKN Sinhgad college of Engg. Korti.

ठराव:५(३): The meeting took note of the above letter.

विषय ५(४): About letter no WIT/1772 dated 07/03/2020 from WIT Solapur.

ठराव ५(४): The meeting took note of the above letter.

विषय ५(५): About letter NBNSCOE/MECH/19-20/482 dated 15/02/2020 from NBN Sinhgad college of Engineering, Solapur.

ठराव ५(५): The meeting took note of the above letter.

विषय ५(६): About letter from International Research Journal of India dated 5/03/2020.

ठराव ५(६): The meeting took note of the above letter.

5/5

Action Taken (New Content / Topic Added) in the Curriculum

Action Taken Report of the Institution on Feedback Report

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Faculty of Science & Technology

*Credit System **MODIFIED** structure of T.Y. B. Tech. **Mechanical Engineering** W.E.F. 2020-21*

Semester -VI

Theory Courses

Course code	Name of Theory Course	Hrs./week				Credits	Examination Scheme			
		L	T	P	D		ISE	ESE	ICA	Total
ME321	Machine Design –II	3	-	-	-	3	30	70	-	100
ME322	Instrumentation & Control	3	-	-	-	3	30	70	-	100
ME323	Heat Transfer	3	-	-	-	3	30	70	-	100
ME324	Industrial & Quality Management	3	-	-	-	3	30	70	-	100
ME325	Professional Elective –IV	3	-	-	-	3	30	70	-	100
ME326	Mini Project	-	-	-	-	-	-	-	-	-
ME327	Metrology	-	-	-	-	-	-	-	-	-
SLH 32	Self-Learning Technical	-	-	-	-	2#	-	50	-	50
	Sub Total	**15**	-	-	-	**15**	**150**	**400**	-	**550**

Semester 6 Laboratory / Tutorial Courses

Course code	*Name of Laboratory / Tutorial Course*	*Hrs./week*				*Credits*	*Examination Scheme*				
		L	*T*	*P*	D		*ISE*	*ESE*		*ICA*	*Total*
								POE	*OE*		
ME321	Machine Design –II	-	-	2	-	1	-	-	--	25	25
ME322	Instrumentation & Control	-	-	2	-	1	-	-		25	25
ME323	Heat Transfer	-	-	2	-	1	-	25	-	25	50
ME324	Industrial & Quality Management	-	1	-	-	1	-	-	-	25	25
ME325	Professional Elective –IV	-	-	2		1	-	-	-	25	25
ME326	Mini Project	-	1	-	-	1	-	-	-	25	25
ME327	Metrology			2		1			25	25	50
ME328	Mechanical Workshop –III	-	-	2	-	1				25	25
	Sub Total	-	**02**	**12**	-	**08**	-	**50**		**200**	**250**
	Grand Total	**15**	**02**	**12**	-	**23**	**150**	**450**		**200**	**800**

Abbreviations: L-Lectures, T-Tutorials, P-Practical, D-Drawing, ISE- In-Semester Exam, ESE- End Semester Exam, ICA- Internal Continuous Assessment , Professional Elective –IV: A. Project Management B. Industrial Product Design *C. Plastic Engineering D. Mechanical Vibrations E. Railway Transportation.* ***# indicates credits over and above***

Action Taken Report of the Institution on Feedback Report

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science & Technology

*Credit System **MODIFIED** structure of T.Y. B. Tech. **Mechanical Engineering** W.E.F. 2020-21*

Semester -VI

Theory Courses

Course code	Name of Theory Course	Hrs./week				Credits	Examination Scheme			
		L	T	P	D		ISE	ESE	ICA	Total
ME321	Machine Design –II	3	-	-	-	3	30	70	-	100
ME322	Instrumentation & Control	3	-	-	-	3	30	70	-	100
ME323	Heat Transfer	3	-	-	-	3	30	70	-	100
ME324	Industrial & Quality Management	3	-	-	-	3	30	70	-	100
ME325	Professional Elective –IV	3	-	-	-	3	30	70	-	100
ME326	Mini Project	-	-	-	-	-	-	-	-	-
ME327	Metrology	-	-	-	-	-	-	-	-	-
SLH 32	Self-Learning Technical	-	-	-	-	2#	-	50	-	50
	Sub Total	**15**	-	-	-	**15**	**150**	**400**	-	**550**

Semester 6 Laboratory / Tutorial Courses

Course code	*Name of Laboratory / Tutorial Course*	*Hrs./week*				*Credits*	*Examination Scheme*				
		L	*T*	*P*	D		*ISE*	*ESE*		*ICA*	*Total*
								POE	*OE*		
ME321	Machine Design –II	-	-	2	-	1	-	-	--	25	25
ME322	Instrumentation & Control	-	-	2	-	1	-	-		25	25
ME323	Heat Transfer	-	-	2	-	1	-	25	-	25	50
ME324	Industrial & Quality Management	-	1	-	-	1	-	-	-	25	25
ME325	Professional Elective –IV	-	-	2		1	-	-	-	25	25
ME326	Mini Project	-	1	-	-	1	-	-	-	25	25
ME327	Metrology			2		1			25	25	50
ME328	Mechanical Workshop –III	-	-	2	-	1				25	25
	Sub Total	-	**02**	**12**	-	**08**	-	**50**		**200**	**250**
	Grand Total	**15**	**02**	**12**	-	**23**	**150**	**450**		**200**	**800**

Abbreviations: L-Lectures, T-Tutorials, P-Practical, D-Drawing, ISE- In-Semester Exam, ESE- End Semester Exam, ICA- Internal Continuous Assessment , Professional Elective –IV: A. Project Management B. Industrial Product Design *C. Plastic Engineering D. Mechanical Vibrations E. Railway Transportation.* ***# indicates credits over and above***

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
T.Y. B.Tech (Mechanical Engineering) Semester- VI w.e.f Year 2020-2021
ME 321 MACHINE DESIGN-II

Teaching Scheme	*Examination Scheme*
Lectures – 3 Hours/week,	**ESE– 70 Marks**
Practical – 2 Hour/week,	**ISE –30 Marks**
	ICA- 25 Marks

- **Course Introduction:**

This course seeks to provide an introduction to design of various machine elements and discusses various design procedures, requirements, and design methods. It introduces the design procedure for various types of gears like spur gears, helical gears, bevel gears and worm gears along with the introduction to AGMA standard. A further content explains in detail the significance of pressure vessels, design procedure, and introduction to various standards used for pressure vessels. The different types of bearings, their significance and the selection of the rolling contact bearings from Manufacturer's Catalogue and the design considerations for sliding contact bearing are also included in the course content.

- **Course Pre-requisite:** Student shall have knowledge of function of different machine elements such as different types of gears, bearings, shafts, keys, etc. A sound background of Mechanics of material and fundamentals of design of machine elements essential for successful completion of this course.

- **Course Objectives: During this course, student is expected**

1. To design gears and pressure vessels.
2. To select bearing from Manufacturer's catalogue
3. To use standards in design of machine elements.

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

1. Design gears and pressure vessels.
2. Calculate the load acting on shaft to select bearing from Manufacturer's catalogue.
3. Use standards in design of machine elements.

Section I

Unit 1– Spur and Helical Gears **No of lectures – 11**

Spur Gear

- **Unit Content:**

Design considerations of gears, gear materials, types of gear tooth failures, hunting tooth, gear tooth loads, minimum number of teeth, face width, Lewis equation, Spott's equation, Buckingham's' Equation (Introductory treatment), gear design for maximum power transmission, Introduction to AGMA code.

Helical Gear:

Virtual number of teeth, force analysis, beam and wear strength, effective load on gear tooth.

Unit 2– Pressure vessel **No of lectures – 06**

- **Unit Content:**

Thin cylinders-Types of stresses, design of thin cylinders. (Numerical)
Thick cylinders- Types of stresses, failure criteria– Lame's equation, Clavarino's equation, Birnies equation. (Numerical, No derivations).
Introduction to compound cylinders, autofrettage, unfired pressure vessels (code), types of end closures (No Numerical).
Effect of opening and nozzle in shell and covers. (Numerical)
Introduction to ASME codes used for design of pressure vessels (Introductory treatment).

Unit 3– Statistical Considerations in Design **No of lectures –03**

- **Unit Content:**

Frequency distribution, probability distribution, normal curve, design and natural tolerances.

Section II

Unit 4– Bevel Gear **No of lectures – 06**

- **Unit Content:**

Terminology and geometrical relation, force analysis, mounting of bevel gears, beam strength and wear strength, dynamic tooth load.

Unit 5– Worm Gear **No of lectures – 06**

- **Unit Content:**

Terminology and geometrical relations, materials, standard dimensions and recommendations of worm gearing, force analysis of worm drive, friction in worm gear, efficiency and design

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science & Technology

*Credit System **MODIFIED** structure of T.Y. B. Tech. **Mechanical Engineering** W.E.F. 2020-21*

Semester -V

Theory Courses

Course code	Name of Theory Course	Hrs./week				Credits	Examination Scheme			
		L	T	P	D		ISE	ESE	ICA	Total
ME311	Machine Design –I	3	-	-	-	3	30	70	-	100
ME312	CAD-CAM & CAE	3	-	-	-	3	30	70		100
ME313	Metallurgy	3	-	-	-	3	30	70	-	100
ME314	Industrial Engineering and Operation Research	3	-	-	-	3	30	70	-	100
ME315	Professional Elective –III	3	-	-	-	3	30	70	-	100
SLH	*Self Learning: HSS*					2#		50		50
	Sub Total	**15**	**-**	**-**	**-**	**15**	**150**	**400**	-	**550**

Semester5 Laboratory / Tutorial Courses

Course code	Name of Laboratory /Tutorial Course	Hrs./week				Credits	Examination Scheme				
		L	T	P	D		ISE	ESE		ICA	Total
								POE	OE		
ME311	Machine Design –I	-	-	2	-	1	-	-	-	25	25
ME312	CAD-CAM & CAE	-	-	2	-	1		25	-	25	50
ME313	Metallurgy	-	-	2	-	1	-	-	25	25	50
ME314	Industrial Engineering and Operation Research	-	-	2	-	1	-	-	-	25	25
ME315	Professional Elective –III	-	-	2	-	1	-	-	-	25	25
ME316	Advanced ProgrammingConcepts	1		2		2	-	-	-	50	50
ME317	Mechanical Workshop –II	-	-	2	-	1	-	-	-	25	25
	Sub Total	01	-	14	-	08	-	50		200	250
	Grand Total	**16**	**-**	**14**	**-**	**23**	**150**	**450**		**200**	**800**

Action Taken Report of the Institution on Feedback Report

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Faculty of Science & Technology

*Credit System **MODIFIED** structure of T.Y. B. Tech. **Mechanical Engineering** W.E.F. 2020-21*

Semester -VI

Theory Courses

Course code	Name of Theory Course	Hrs./week				Credits	Examination Scheme			
		L	T	P	D		ISE	ESE	ICA	Total
ME321	Machine Design –II	3	-	-	-	3	30	70	-	100
ME322	Instrumentation & Control	3	-	-	-	3	30	70	-	100
ME323	Heat Transfer	3	-	-	-	3	30	70	-	100
ME324	Industrial & Quality Management	3	-	-	-	3	30	70	-	100
ME325	Professional Elective –IV	3	-	-	-	3	30	70	-	100
ME326	Mini Project	-	-	-	-	-	-	-	-	-
ME327	Metrology	-	-	-	-	-	-	-	-	-
SLH 32	Self-Learning Technical	-	-	-	-	2#	-	50	-	50
	Sub Total	**15**	**-**	**-**	**-**	**15**	**150**	**400**	**-**	**550**

Semester 6 Laboratory / Tutorial Courses

Course code	Name of Laboratory / Tutorial Course	Hrs./week				Credits	Examination Scheme				
		L	T	P	D		ISE	ESE		ICA	Total
								POE	OE		
ME321	Machine Design –II	-	-	2	-	1	-	-	--	25	25
ME322	Instrumentation & Control	-	-	2	-	1	-	-		25	25
ME323	Heat Transfer	-	-	2	-	1	-	25	-	25	50
ME324	Industrial & Quality Management	-	1	-	-	1	-	-	-	25	25
ME325	Professional Elective –IV	-	-	2		1	-	-	-	25	25
ME326	Mini Project	-	1	-	-	1	-	-	-	25	25
ME327	Metrology			2		1			25	25	50
ME328	Mechanical Workshop –III	-	-	2	-	1				25	25
	Sub Total	**-**	**02**	**12**	**-**	**08**	**-**	**50**		**200**	**250**
	Grand Total	**15**	**02**	**12**	**-**	**23**	**150**	**450**		**200**	**800**

Abbreviations: L-Lectures, T-Tutorials, P-Practical, D-Drawing, ISE- In-Semester Exam, ESE- End Semester Exam, ICA- Internal Continuous Assessment , Professional Elective –IV: A.** Project Management* B. Industrial Product Design ***C.** Plastic Engineering **D.** Mechanical Vibrations E. Railway Transportation.* ***# indicates credits over and above

T.Y. B.Tech (Mechanical Engineering) Semester- V w.e.f Year 2020-2021
ME313 METALLURGY

Teaching Scheme	*Examination Scheme*
	ESE: 70 Marks
Theory: 3Hrs/week	**ISE** – 30Marks
Practical: 2Hrs/week	**ICA:** 25Marks
	OE: 25Marks

Course Introduction:

Course Introduction: Metallurgy is an art of extracting the pure metals from its ore. Its full scope is in:

a) Mixing two or more metals to form an Alloy.
b) Shaping the metals & alloys by different processes such as Casting, Forming, and Joining etc.
c) Undergoing suitable Heat treatment for modifying the properties.
d) And finally, in Inspecting & testing before putting the products in to use.

Course Prerequisites: Engineering Chemistry, Work shop practices, Manufacturing processes.

Course Objectives: To make the students proficient in:

1. Structures, composition, properties, applications of materials and their selection for design purpose.
2. Testing of materials and its significance.
3. Heat treatment processes for different engineering materials.
4. Powder metallurgy process and composite materials with its applications.

Course Outcomes: At the end of course, students will be able to-

1. Select of ferrous alloys and demonstrate the significance of heat treatment processes for engineering applications.
2. Establish the characteristics of nonferrous alloys and Composite materials.
3. Select suitable testing method & implication of Powder metallurgy for manufacturing of products.

SECTION-I

UNIT-1 Introduction to ferrous alloys **No. of lectures-06**

Brief classification of Metals, Concept of alloying, Classification of cooling curves, Types of equilibrium diagram, Lever rule, phase rule, Solid solution & its types, Intermetallic compounds, allotropy.

UNIT-2 Ferrous metals and alloys **No. of lectures-11**

Fe-Fe3C equilibrium diagram, critical temperatures, Plain carbon steels: composition, applications & properties, Effect of alloying elements on steels, Eutectic, Eutectoid and Peritectic transformations, Plain carbon steels, classification, composition, properties &

applications, Types of cast irons, composition, properties, applications. Alloy steels, alloying elements added to steels and their purpose.
Study of composition, properties and applications of following alloying steels.

1. HSLA steels	2. Spring steels	3. Silicon steels
4. Hadfield 'Mn' steels	5. HCHC steels	6. Water hardening steels
7. Oil hardening steel	8. Air hardening steel	9. Hot working tool and Die steel
10. Chisel steels	11. HSS	12. ONHS
13. Stainless steels and its types	14. Invar	15. Steels for subzero applications

UNIT-3 Non-ferrous alloys, composites and Nano materials **No. of lectures-04**

Non-ferrous alloys
Copper alloys: brasses, bronzes. Aluminum alloys: Al-Si alloy, Al-Cu alloy.
Steps in precipitation hardening (Steps only), Pb-Sn alloys, Study of Babbits. Introduction to Ni alloys.
Composite materials: Classification, properties and Applications
Nano materials – Concept, effect of particle size on mechanical properties.

SECTION II

UNIT-4 Heat treatments of steel **No. of lectures-9**
Objectives of Heat Treatment, TTT and CCT diagram for eutectoid Steel (Introductory treatment only)
Annealing - purposes, types, applications, limitations.
Normalizing- purposes, types, applications, limitations.
Hardening & Tempering: purposes, types, applications. Types of Tempering, structural changes during tempering, Subzero treatment.
Methods of hardening such as Austempering, Martempering, limitations of these process, Surface hardening treatments.
Carburising – types, Nitradiing.
Cyaniding and carbinitriding – Purposes, chemistry of process, applications, limitations.
Induction hardening -, Flame hardening – Concept process, advantages, limitations and applications.

UNIT-5 Destructive and Non Destructive testing **No. of lectures-06**
A. Destructive testing methods, test procedure in brief, significance of
i) Tensile testing ii) Hardness testing iii) Impact testing iv) Creep v) Fatigue testing.

B. Study of Non Destructive Testing methods (NDT) such as
i) dye penetrant test ii) magnetic Particle test iii) Ultrasonic test iv) Radiography test v) Eddy current test. Introduction to advanced NDT methods.

UNIT–6 Introduction to powder metallurgy **No. of lectures-04**

Significance, steps in powder metallurgy process, Applications, Methods of powder manufacture, mixing / blending, compaction methods, sintering processes & types, advantages & limitations, Typical powder metallurgy applications and their flow chart: - Self lubricated bearings, cemented carbide cutting tools, friction materials, etc

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Faculty of Science & Technology

*Credit System **MODIFIED** structure of T.Y. B. Tech. **Mechanical Engineering** W.E.F. 2020-21*

Semester -V

Theory Courses

Course code	Name of Theory Course	Hrs./week				Credits	Examination Scheme			
		L	T	P	D		ISE	ESE	ICA	Total
ME311	Machine Design –I	3	-	-	-	3	30	70	-	100
ME312	CAD-CAM & CAE	3	-	-	-	3	30	70		100
ME313	Metallurgy	3	-	-	-	3	30	70	-	100
ME314	Industrial Engineering and Operation Research	3	-	-	-	3	30	70	-	100
ME315	Professional Elective –III	3	-	-	-	3	30	70	-	100
SLH	*Self Learning: HSS*					2#		50		50
	Sub Total	**15**	-	-	-	**15**	**150**	**400**	-	**550**

Semester5 Laboratory / Tutorial Courses

Course code	Name of Laboratory /Tutorial Course	Hrs./week				Credits	Examination Scheme				
		L	T	P	D		ISE	ESE		ICA	Total
								POE	OE		
ME311	Machine Design –I	-	-	2	-	1	-	-	-	25	25
ME312	CAD-CAM & CAE	-	-	2	-	1		25	-	25	50
ME313	Metallurgy	-	-	2	-	1	-	-	25	25	50
ME314	Industrial Engineering and Operation Research	-	-	2	-	1	-	-	-	25	25
ME315	Professional Elective –III	-	-	2	-	1	-	-	-	25	25
ME316	Advanced ProgrammingConcepts	1		2		2	-	-	-	50	50
ME317	Mechanical Workshop –II	-	-	2	-	1	-	-	-	25	25
	Sub Total	01	-	14	-	08	-	50		200	250
	Grand Total	**16**	-	**14**	-	**23**	**150**	**450**		**200**	**800**

Abbreviations: L-Lectures, T-Tutorials, P-Practicals, D-Drawing, ISE- In-Semester Exam, ESE- End Semester Exam, ICA- Internal Continuous Assessment

***Professional Elective –III:** A. Gas turbines **B.** Industrial Hydraulics and Pneumatics **C.** Non Conventional Machining D. Tool Engineering*

 # indicates credits over and above.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Faculty of Science & Technology

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Semester -VI

Theory Courses

Course code	Name of Theory Course	Hrs./week				Credits	Examination Scheme			
		L	T	P	D		ISE	ESE	ICA	Total
ME321	Machine Design –II	3	-	-	-	3	30	70	-	100
ME322	Instrumentation & Control	3	-	-	-	3	30	70	-	100
ME323	Heat Transfer	3	-	-	-	3	30	70	-	100
ME324	Industrial & Quality Management	3	-	-	-	3	30	70	-	100
ME325	Professional Elective –IV	3	-	-	-	3	30	70	-	100
ME326	Mini Project	-	-	-	-	-	-	-	-	-
ME327	Metrology	-	-	-	-	-	-	-	-	-
SLH 32	Self-Learning Technical	-	-	-	-	2#	-	50	-	50
	Sub Total	**15**	**-**	**-**	**-**	**15**	**150**	**400**	**-**	**550**

Semester 6 Laboratory / Tutorial Courses

Course code	Name of Laboratory / Tutorial Course	Hrs./week				Credits	Examination Scheme				
		L	T	P	D		ISE	ESE		ICA	Total
								POE	OE		
ME321	Machine Design –II	-	-	2	-	1	-	-	--	25	25
ME322	Instrumentation & Control	-	-	2	-	1	-	-		25	25
ME323	Heat Transfer	-	-	2	-	1	-	25	-	25	50
ME324	Industrial & Quality Management	-	1	-	-	1	-	-	-	25	25
ME325	Professional Elective –IV	-	-	2		1	-	-	-	25	25
ME326	Mini Project	-	1	-	-	1	-	-	-	25	25
ME327	Metrology			2		1			25	25	50
ME328	Mechanical Workshop –III	-	-	2	-	1				25	25
	Sub Total	**-**	**02**	**12**	**-**	**08**	**-**	**50**		**200**	**250**
	Grand Total	**15**	**02**	**12**	**-**	**23**	**150**	**450**		**200**	**800**

Abbreviations: L-Lectures, T-Tutorials, P-Practical, D-Drawing, ISE- In-Semester Exam, ESE- End Semester Exam, ICA- Internal Continuous Assessment , Professional Elective –IV: A. Project Management B. Industrial Product Design C. Plastic Engineering D. Mechanical Vibrations E. Railway Transportation. # indicates credits over and above

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
T.Y. B.Tech (Mechanical Engineering) Semester- V w.e.f Year 2020-2021

ME 316 ADVANCED PROGRAMMING CONCEPTS

Teaching Scheme	*Examination Scheme*
Lectures – 1 Hours/week	
Practical – 2 Hour/week	**ICA - 50 Marks**

Course Introduction

By the end of this course, students will have gained a fundamental understanding of programming in **Python** by creating a variety of scripts and applications for the Web and for systems development. Python is a versatile programming language, suitable for projects ranging from small scripts to large systems. The course emphasizes best practices such as version control, unit testing and recommended styles and idioms. Students will explore the large standard library of Python, which supports many common programming tasks.

Course Prerequisites

This course is intended for absolute beginners in programming, but includes review of elementary features. Students are expected to be able to open command prompt window or terminal window, edit a text file, download and install software, and understand basic programming concepts.

COURSE OBJECTIVES:

1. Introduce procedural and object-oriented style for writing Python scripts.
2. Introduce standard library packages and modules in Python.
3. To teach debugging and profiling of Python scripts.

COURSE OUTCOME:

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

1. Use Python standard library modules in writing Python scripts for problem solving.
2. Write Python scripts in procedural and object-oriented style.
3. Write Python scripts to perform database, network and web related operations.
4. Debug and profile Python scripts.

SECTION I

Unit 1 - Introduction to Python and Computer Programming

1.1 What is Python?
1.2 Types of Python
1.3 A basic program in python

Unit 2 - Data Types, Variables, Basic Input-Output Operations, Basic Operators

2.1 Sample python program
2.2 Python literals
2.3 Operators - data manipulation tools
2.4 Variables - data-shaped boxes
2.5 How to talk to computer?

Unit 3 - Boolean Values, Conditional Execution, Loops, Lists and List Processing, Logical and Bitwise Operations

3.1 Making decisions in Python
3.2 Python's loops
3.3 Logic and bit operations in Python
3.4 Lists - collections of data
3.5 Sorting simple lists - the bubble sort algorithm
3.6 Lists - some more details
3.7 Lists in advanced applications

SECTION II

Unit 4 - Functions, Tuples, Dictionaries, and Data Processing

4.1 Writing functions in Python
4.2 How functions communicate with their environment?
4.3 Returning a result from a function
4.4 Scopes in Python
4.5 Tuples and dictionaries

Unit 5 - Modules, Packages, String and List Methods, and Exceptions

5.1 Using modules
5.2 Some useful modules
5.3 What is package?
5.4 Errors
5.5 The anatomy of exception
5.6 Some of the most useful exceptions
5.7 Characters and strings vs. computers
5.8 Python's nature of strings
5.9 String methods

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Faculty of Science & Technology

*Credit System **MODIFIED** structure of T.Y. B. Tech. **Mechanical Engineering** W.E.F. 2020-21*

Semester -VI

Theory Courses

Course code	Name of Theory Course	Hrs./week				Credits	Examination Scheme			
		L	T	P	D		ISE	ESE	ICA	Total
ME321	Machine Design –II	3	-	-	-	3	30	70	-	100
ME322	Instrumentation & Control	3	-	-	-	3	30	70	-	100
ME323	Heat Transfer	3	-	-	-	3	30	70	-	100
ME324	Industrial & Quality Management	3	-	-	-	3	30	70	-	100
ME325	Professional Elective –IV	3	-	-	-	3	30	70	-	100
ME326	Mini Project	-	-	-	-	-	-	-	-	-
ME327	Metrology	-	-	-	-	-	-	-	-	-
SLH 32	Self-Learning Technical	-	-	-	-	2#	-	50	-	50
	Sub Total	**15**	**-**	**-**	**-**	**15**	**150**	**400**	**-**	**550**

Semester 6 Laboratory / Tutorial Courses

Course code	Name of Laboratory / Tutorial Course	Hrs./week				Credits	Examination Scheme				
		L	T	P	D		ISE	ESE		ICA	Total
								POE	OE		
ME321	Machine Design –II	-	-	2	-	1	-	-	--	25	25
ME322	Instrumentation & Control	-	-	2	-	1	-	-		25	25
ME323	Heat Transfer	-	-	2	-	1	-	25	-	25	50
ME324	Industrial & Quality Management	-	1	-	-	1	-	-	-	25	25
ME325	Professional Elective –IV	-	-	2		1	-	-	-	25	25
ME326	Mini Project	-	1	-	-	1	-	-	-	25	25
ME327	Metrology			2		1			25	25	50
ME328	Mechanical Workshop –III	-	-	2	-	1				25	25
	Sub Total	**-**	**02**	**12**	**-**	**08**	**-**	**50**		**200**	**250**
	Grand Total	**15**	**02**	**12**	**-**	**23**	**150**	**450**		**200**	**800**

Abbreviations: L-Lectures, T-Tutorials, P-Practical, D-Drawing, ISE- In-Semester Exam, ESE- End Semester Exam, ICA- Internal Continuous Assessment , Professional Elective –IV: A.** Project Management* B. Industrial Product Design ***C.** Plastic Engineering **D.** Mechanical Vibrations E. Railway Transportation.* ***# indicates credits over and above

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

T.Y. B.Tech (Mechanical Engineering) Semester- V w.e.f Year 2020-2021

ME 317 MECHANICAL WORKSHOP – III

Teaching Scheme: **Practical: 2 Hours / week**

***Examination Scheme*:** **ICA: 25 marks**

Course Prerequisite

This course is important to understand fundamentals of machine shop starts from safety measures, practical use of measuring tools, use of all conventional machine tools, operations of all conventional machines, use of tolerances, fits and finally their practical use and applications.

Course Objectives

1. To learn and understand different machining operations practically studied in theory subjects.
2. To get hands on experience of machining operations such as grinding, drilling, shaping, turning etc.
3. To develop skills to operate different machine tools.

Course Outcomes

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

1. To grind the tools.
2. To operate different machine tools such as grinders, lathes, milling, drilling machines etc.
3. To machine the component as per specified dimensions.

ICA

Course Contents

1. Tool Grinding Demonstration and actual grinding to understand the tool geometry (01 turns)
2. One composite job in M.S. consisting of one component and inclusive of following operation shall be performed by students (Any 5 Operations)

Facing, Turning, Step turning, Chamfering, Grooving, drilling, Knurling. At least one dimension of the job shall carry close tolerance (04turns)

4. Preparation of process sheet for the above job (01 turns)

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

Faculty of Engineering & Technology

Credit System structure of S.Y. B. Tech. ***Mechanical Engineering*** *W.E.F. 2019-20*

Semester 3

Theory Courses

Course code	Name of Theory Course	Hrs./week				Credits	Examination Scheme			
		L	T	P	D		ISE	ESE	ICA	Total
ME211	Applied Thermodynamics	3	-	-	-	3	30	70	-	100
ME212	Mechanics of Materials	3	-	-	-	3	30	70	-	100
ME213	Manufacturing Processes	3	-	-	-	3	30	70	-	100
ME214	Machine Drawing & CAD	3	-	-	-	3	30	70	-	100
ME215	Professional Elective-I	3	-	-	-	3	30	70	-	100
	Sub Total	**15**	**-**	**-**	**-**	**15**	**150**	**350**	**-**	**500**
MEV21	Environmental Sciences	1	-	-	-	-	-	-	-	-

Semester 3: Laboratory / Tutorial Courses

Course code	Name of Laboratory / Tutorial Course	Hrs./week				Credits	Examination Scheme				
		L	T	P	D		ISE	ESE		ICA	Total
								POE	OE		
ME211	Applied Thermodynamics	-	-	-	-	-	-	-	-	-	-
ME212	Mechanics of Materials	-	1	-	-	1	-	-	-	25	25
ME213	Manufacturing Processes	-	-	2	-	1	-	-	25	25	50
ME214	Machine Drawing & CAD	-	-	-	4	2	-	50	-	50	100
ME215	Professional Elective-I	-	-	2	-	1	-	-	-	25	25
	Sub Total	**-**	**-**	**-**	**-**	**5**	**-**	**50**	**25**	**125**	**200**
	Grand Total	**15**	**01**	**04**	**04**	**20**	**150**	**425**		**125**	**700**

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-I: A. Microprocessors in Automations **B.** Internal Combustion Engines **C**. Composite Materials

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

Faculty of Engineering & Technology

Credit System structure of S.Y. B. Tech. ***Mechanical Engineering*** *W.E.F. 2019-20*

Semester 4

Course code	*Name of Theory Course*	*Hrs./week*				*Credits*	*Examination Scheme*			
		L	T	P	D		ISE	ESE	ICA	Total
ME221	Engineering Mathematics –III	3	-	-	-	3	30	70	-	100
ME222	Manufacturing Technology	3	-	-	-	3	30	70	-	100
ME223	Fluid Mechanics & Fluid Machines	3	-	-	-	3	30	70	-	100
ME224	Kinematics & Theory of Machines	3	-	-	-	3	30	70	-	100
ME225	Professional Elective-II	3	-	-	-	3	30	70	-	100
	Sub Total	**15**	**-**	**-**	**-**	**15**	**150**	**350**	**-**	**500**
MEV22	Environmental Sciences	1	-	-		-	-	-	-	-

Semester 4: Laboratory / Tutorial Courses

Course code	*Name of Laboratory / Tutorial Course*	*Hrs./week*				*Credits*	*Examination Scheme*				
		L	*T*	*P*	D		*ISE*	*ESE*		*ICA*	*Total*
								POE	*OE*		
ME221	Engineering Mathematics –III	-	1	-	-	1	-	-	-	25	25
ME222	Manufacturing Technology	-		2	-	1	-	-	-	25	25
ME223	Fluid Mechanics & Fluid Machines	-	-	2	-	1	-	-	-	25	25
ME224	Kinematics & Theory of Machines	-	-	2	-	1	-	-	25	25	50
ME225	Professional Elective-II	-	-	2	-	1	-	-	-	25	25
ME 226	Mechanical Workshop-I	-	-	2	-	1	-	-	-	50	50
ME 227	Electrical Technology	-	-	2		1	-	-	25	25	50
	Sub Total	**-**	**01**	**12**	**-**	**07**	**-**	**50**		**200**	**250**
	Grand Total	**15**	**01**	**12**	**-**	**22**	**150**	**400**		**200**	**750**

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-II: **A.** Mechatronic Systems **B.** Power Plant Engineering **C.** Solid Mechanics

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

S.Y. B. Tech.–(MechanicalEngineering) Semester-III

ME212- MECHANICS OF MATERIALS

Teaching Scheme Examination Scheme

Theory/Lectures – 3 Hrs. /Week
Tutorial– 1Hr. /Week

ESE: 70 Marks
ISE: 30 Marks
ICA: 25 Marks

Course Introduction: This course consists of topics from the course Strength of Materials which are helpful for mechanical engineers. It consists of basic concepts of stresses &strains induced due to various types of loads which are vital in Design engineering. It includes the topics of simple stresses & strains, strain energy and impact load, Principal stresses & strains and torsion of circular shafts, in the first section. In second section, the topics covered are SFD & BMD for beams, bending stresses in beams, shear stresses in beams and slope & deflection of beams. This course emphasizes the fundamentals of various topics under strength of materials necessary for practicing mechanical engineers in design and inculcates problem solving skill amongst the students.

Course Objectives:

After successfully completion of this course, student will have an ability to:

1. Understand concepts of various types of stresses & strains, elastic constants & their relations.
2. Understand concept of strain energy and its significance.
3. Determine principal stresses, shear stresses on structural member under various loading combination analytically and graphically using Mohr's circle method.
4. Calculate the stresses and strains in circular torsion members, and members subject to flexural loadings.
5. Draw shear force and bending moment diagram for supported beam under various types of transverse loading.
6. Calculate bending and shear stresses in beam and determine distribution at any location along the section of beam.
7. Analyze simple bars, beams, and circular shafts for allowable stresses and loads.

Course Outcomes:

At the end of course students will be able to:

ME212.1 Determine the stresses, strains and deformation under various axial, torsional and flexural loading.
ME212.2 Determine strain energy in axially loaded members
ME212.3 Calculate principal stresses & position planes in a member subjected to various types of stress system by analytical & graphical method.
ME212.4 Determine torsional shear stress, angle of twist & design dimensions of shaft.
ME212.5 Draw S.F.D, B.M.D and determine shear & bending stresses, slope and

SECTION – I

Unit No 01: Simple Stresses and Strains **No. of lectures-06**

• Unit content: Concept of stress and strain (tensile, compressive & shear), linear & lateral strains, Volumetric strain, Hooke's law, Elastic constants and their relationships, stresses and strains in three dimensions (only numerical treatment), Stress-Strain diagram for ductile and brittle materials, Stresses and deformation in homogeneous and composite bars under concentrated loads.

Unit No 02: Strain Energy and Impact Load **No. of lectures-04**

Unit content-Concept of strain energy or resilience, proof resilience and modulus of resilience, determination of strain energy in tension and compression for axially loaded members due to gradual, sudden and impact loads.

Unit No 03: Principal Stresses and Strains **No. of lectures-06**

.• Unit content: Normal and shear stresses on any oblique planes, concept of principal planes, principal stresses and maximum shear stress (2-D cases only), positions of principal planes and planes of maximum shear for various cases of loading (2-D only), maximum shear stress, Use of graphical method (Mohr's circle) for determination of principal stresses and maximum shear stresses.

Unit No 04: Torsion of Circular Shafts **No. of lectures-04**

• Unit content: Theory of torsion of circular shafts, assumptions, derivation of torsion equation, determination of torsional shear stress and angular twist for solid and hollow shafts in power transmission applications.

SECTION II

Unit No 05: Shear Force and Bending Moment Diagrams for Beams **No. of lectures-06**

• Unit content: Concept of shear force and bending moment in determinate beams due to concentrated loads, UDL, UVL and couples (analytical method only for cantilevers, simply supported and overhanging beams), determination of points of contra shear and contra flexure.

Unit No 06: Bending Stresses in Beams **No. of lectures-05**

• Unit content: Introduction, theory of pure bending of beams, assumptions and sign Conventions, bending stress distribution diagram, Flexure's formula derivation, moment of resistance and section modulus, determination of bending stresses for commonly used cross sections (rectangular, I-sections and T-sections).

Unit No 07: Shear Stresses in Beams **No. of lectures-04**

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
S.Y.B. Tech.(Mechanical Engineering) Semester-III
ME214 MACHINE DRAWING & CAD

Teaching Scheme
Lectures – 3 Hours/week
Practical – 4 Hour/week

Examination Scheme
ESE– 70 Marks
ISE – 30 Marks
ICA –50 Marks
OE – 50 Marks

Course Introduction: Drawing is called as language of engineers. This course emphasizes the fundamentals of various topics under machine drawing necessary for practicing mechanical engineers and inculcates problem solving skill amongst the students. Machine drawing on the other hand is the scientific representation of an object, according to certain national and international standards of practice. This course consists of selected topics from the subject Machine Drawing and Engineering Graphics which are helpful for mechanical engineers. It contains BIS convention, free hand sketching & Production drawing which are vital in Design engineering. It covers the topics of BIS conventions, free hand sketching, Production drawing, isometric projections along with assembly and details drawing. Also a very basic step in the process is to model the machine component accurately in the available CAD software packages. This course introduces the commands, procedures, for 2D as well 3D drawing used in such software. Use of software in the engineering design & manufacturing increases the productivity of the designer, improves the quality of design, improves communications through documentation, and creates a database for manufacturing. The course helps in skill development as per the need of the modern day industry & thus, enhances the employability.

Course Prerequisite: For this course, student is expected to have-

Knowledge of Engineering Drawing.
Knowledge of geometry.
Basic knowledge of computer operating

Course Objectives: During this course, student is expected to

1 To understand & use the principles and requirements of drawing practices as per BIS standards
2 To interpret and apply technique for making assembly from the detail/components
3 To interpret and apply, limits, fits and tolerances to the various machine elements
4 To operate the drafting software

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

At the end of this course, the student will be
1. Able to create drawings as per BIS standards
2. Able to apply technique for assembly drawing from the detail/components

Related Features such as Parallelism, Perpendicularity, Angularity, Concentricity, Tolerance Symbol and Value, Indicating Geometrical Tolerances on drawings.

Surface Finish:- Surface Texture, Surface Roughness Number, Roughness Symbols, Range of Roughness obtainable with different manufacturing processes.

*(**Note** : Numerals /calculations/problems/tasks/examples/theoretical questions on UNIT NO.3)*

Unit 4– Details and Assembly Drawing No of lectures – 6

To prepare detail drawings from given assembly drawing. To prepare assembly drawing from given drawing of details. Preparation of detailed drawing from the given details such as: Tools post of center lathe, Tail stock, Cross head Assembly, Jigs and fixtures, connecting rod and piston of I.C. Engines, Gland and stuffing box and many more suitable/considerations with moderate difficulty level, etc.

- Selection and showing of all the symbols & surface finish symbols, fits, tolerances for dimensions to details and assembly drawings.

Section II

Unit 5– Introduction to Computer Aided Drafting No of lectures – 7

(To be completed using suitable drafting package)

The treatment on 2D Drawing with-

1. Basic commands to draw 2-D objects like line, circle, arc, ellipse, polygon etc.
2. Edit & Modify commands: Erase, extension, break, fillet, chamfer, trim, scale, hatching etc.
3. Dimensioning & text commands
4. Viewing and other : Zoom , pan, block etc.

Unit 6– 2D drafting – Part Drawing & Isometric Drawing No of lectures – 4

Introduction to Computer aided drafting for Isometric Drawing. All necessary draw and edit and modify commands. Computer aided drafting (2D) of simple component part drawing & Isometric Drawing of machine components and plotting of drawings (printing process).

Unit 7– 2D drafting – Assembly & part Drawing No of lectures – 4

Commands required for Computer aided drafting (2D) and print out of –to draw details drawing from given assembly & assembly drawing from the given details drawing (With limits, fits, tolerances)

Unit 8– Computer aided drafting (3D) No of lectures – 5

Introduction to Computer aided drafting (3D), Introduction to modeling: Wireframe, Solid, Surface Modeling, Three dimensional drawing: UCS & three dimensional co-ordinates, Viewing in three dimensions, Solid modeling commands: primitive solids, extrude, revolve, sweep, loft, press pull, etc, Solid editing commands: 3D-rotate, 3D-Move, 3D-Scale, Boolean operations, Slice, Sections, etc.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
S.Y.B. Tech.(Mechanical Engineering) Semester-IV
ME221 ENGINEERING MATHEMATICS-III

Teaching Scheme	**Examination Scheme**
Lectures – 3 Hours/week	**ESE** – 70 Marks
Tutorials – 1 Hour/week	**ISE** –30 Marks
	ICA- 25 Marks

Course Objectives:

1. To introduce partial differential equations of first order.
2. To introduce to students Fourier series of periodic functions
3. To introduce numerical methods for evaluating definite integrals.
4. To introduce numerical methods for solving linear and non-linear equations.
5. To introduce concepts of Probability distribution.

Course Outcomes:

1. Student can solve partial differential equation of first order
2. Student can express a function in terms of sine and cosine components so as to model simple periodic functions.
3. Student can use numerical methods for evaluating definite integrals.
4. Student can use numerical methods for solving linear and non-linear equations.
5. Student can sketch and explain various probability distribution functions.

SECTION – I

Unit 1: First Order Partial Differential equations **No. of lectures- 07 Hrs**

Non-linear partial differential Equations of *Type I f(p, q)=0, Type II f(p, q, z) = 0, Type III* $f_1(p, x) = f_2(q, y)$, Linear partial differential equations – Lagranges method, Solution of partial differential equation by method of separation of variables.

Unit 2: Fourier series: **No. of lectures- 06 Hrs**

Introduction, Definition, Euler's formula, Fourier series of periodic functions with period 2Π and 2L, Dirichlet's theorem (only statement), even and odd functions, half range sine and cosine series.

Unit 3: Numerical Integration: **No. of lectures- 07 Hrs**

Newton Cotes Integration Formula: Trapezoidal rule, Simpson's Rule (1/3rd and 3/8th), Double integration, Integration of Equation: Gauss Quadrature 2 point and 3 point method.

Section II

Unit 4: Solution of Algebraic and Transcendental Equations: **No. of lectures- 08 Hrs**

Introduction, Basic properties of equations. Bisection Method, False position Method, Newton-Raphson Method, Multiple Roots, Newton's iterative formula for obtaining square root, Muller's Method. System of non linear equations by Newton Raphson Method

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
S. Y. B. Tech. (Mechanical Engg.) Semester-IV
ME223 FLUID MECHANICS & FLUID MACHINES

Teaching Scheme
Theory – 3 Hrs. /Week
Laboratory– 2 Hrs. /Week

Examination Scheme
Theory – ESE -70 Marks
ISE – 30 Mark
ICA – 25 Marks

Course outcomes: At the end of course, students will be able to

- Solve issues related to fluid statics & kinematics
- Apply Bernouilli's theorem in real world situations
- Perform dimensional analysis for research problems in fluid mechanics
- Solve problems related to drag, lift , drag & lift
- Select / design Pelton, Francis & Kaplan turbines
- Select/design centrifugal pump

Section - I

Unit No. 01: Fluid statics **No. of lectures-05**

•Center of pressure, Total pressure on immersed surfaces – horizontal, vertical & inclined The principle of buoyancy, Archimedes' principle, conditions of equilibrium for submerged & floating bodies, discussions on stability, Meta-center & metacentric height. (No numerical treatment to Metacentric height)

Unit No. 02: Fluid kinematics **No. of lectures-05**

• Langrangian & Eulerian method of description of fluid flow, Types of flow with examples, Streamlines, path lines & streak lines, velocity components, local & convective acceleration, velocity potential function, equi-potential lines, Laplace equation governing potential flow, stream function, continuity equation in Cartesian co-ordinates

Unit No. 03: Fluid dynamics **No. of lectures-05**

• Euler's equation along a stream line & Bernoulli's equation, applications of Bernoulli's Theorem: Venturi meter, Orifice meter & Pitot tube, Flow through sharp edged small circular orifices, Determination of hydraulic coefficients of an orifice. (No numerical treatment to Orificemeter & Pitot tube)

Unit No. 04: Flow through pipes **No. of lectures-05**

Major & minor Energy losses, Darcy-Weisbach equation, loss of head in pipe connections & fittings, equivalent pipe, Hydraulic Gradient Line (HGL) & Total Energy Line (TEL), Siphon (No numerical treatment to HGL, TEL & Siphon), flow through pipes in series &parallel, efficiency of power transmission, maximum transmission of fluid power through

Section - II

Unit No. 05: Dimensional Analysis, Similitude and Forces on Immersed Bodies.

No. of lectures-05

Dimensions of Commonly Encountered Fluid Properties , Dimensional Analysis, Rayleigh Theorem , Buckingham's Π theorem, similitude, modeling, Drag & Lift on immersed bodies, Drag & Lift forces on stationary body.

Unit No.6: Impulse Water Turbines **No. of lectures – 05**

Euler's equation for rotodynamic machines, Classification of water turbines, Pelton wheel, Work done and efficiencies of Pelton wheel, working proportions of Pelton wheel, Design of Pelton Turbine runner, governing of Pelton turbine.

Unit No.07: Reaction Water Turbines: **No of lectures – 05**

Construction and Working of Francis, Kaplan turbine. Work done and efficiencies of Francis & Kaplan turbine, Working Proportions of Francis & Kaplan turbine, Draft tube (Theoretical treatment only for draft tube), Types and function, governing of reaction turbines.

Unit No. 8: Centrifugal Pumps **No of lectures – 05**

Working principle, construction, types, various Heads, multistage pumps, Velocity triangles, Minimum starting speed, Maximum Suction Height & Net Positive Suction Head, Methods of priming, Calculations of efficiencies, Discharge, blade angles, Heads, Power required, impeller dimensions, specific speed of pumps, Performance characteristics of pumps.

Internal Continuous Assessment (ICA)

Compulsory:

1. Numerical & theoretical assignments on basics of fluid mechanics (Properties of fluids & related laws)
2. Numericals on Piezometer, Simple & inverted U tube manometer

Any seven out of the following

1. Determination of meta centric height for a ship
2. Determination of Coefficient of friction for Pipes
3. Verification of Bernoulli's theorem.
4. Calibration of Venturimeter / Orifice meter.
5. Determination of Hydraulic Coefficient of an Orifice.
6. Trial on a Pelton wheel.
7. Trial on a Francis/ Kaplan turbine.
8. Trial on a centrifugal pump.
9. Two problems using CFD software

SVERI's

College of Engineering, Pandharpur

Department of Civil Engineering

Action Taken Report of the Institution on Feedback Report

- **Letter to the Director, 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, Pandharpur - 413304, District: Solapur (Maharashtra)
Tel.: (02186) 216063, 9503103757, Toll Free No.: 1800-3000-4131 e-mail.: coe@sveri.ac.in
Website.: www.sveri.ac.in (Approved by A.I.C.T.E., New Delhi and Affiliated to Solapur University, Solapur)
NBA Accredited all eligible UG Programmes, NAAC Accreditated Institute,ISO 9001:2015 Certified Institute
Accredited by The Institution of Engineers (India), Kolkata and TCS, Pune

Ref.: COEP/ 2019-20/858(1) Date: 14/12/2019

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.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur.
Inward No. 1669/Bm
18 DEC 2019
Asst. Registrar Dy. Registrar (A & D)

Yours faithfully,

(Dr. B. P. Ronge)
PRINCIPAL

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

19-12-2019

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.

(Dr. B. P. Ronge)
PRINCIPAL

Minutes of the meeting of the Board of Studies in the Subject of Civil Engineering was held in the University office on 04/02/2020

पुण्यश्लोक अहिल्यादेवी होळकर सोलापूर विद्यापीठ, सोलापूर

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

केगाव, सोलापूर – ४१३ २५५, महाराष्ट्र (भारत)

[illegible]

[illegible] ई-मेल: bos@sus.ac.in registrar@sus.ac.in

अभ्यासमंडळे विभाग

जा.क्र. पुअहोसोविसो/अमंवि/2020/ दिनांक :

Minutes

Minutes of the meeting of the **Board/Ad-hoc Board Studies** in the Subject of CIVIL ENGINEERING was held in the University office, on 4 / 12/2020 at 11:30 A.M./~~P.M.~~

The following members were present:

Sr. No.	Name	Sign.
1)	Dr. S. A. Halkude	[signature]
2)	Dr. Prashant Maruti Pawar	[signature]
3)	Dr. S. S. Patil	[signature]
4)	Dr. S. S. Koshti	[signature]
5)	Dr. Rajendrakumar Harsoor	[signature]
6)	Dr. M. G. Kalyanshetti	[signature]
7)	Dr Ms. V. S. Kshirsagar	[signature]
8)	Dr. C. P. Pise	[signature]
9)		
10)		
11)		

The following business was transacted at the Meeting.

ItemNo.1:- Confirmation of the last meeting minutes of the Board of Studies in Subject of Civil Engg. was held in the University office, on 4 / 2 /2020. The following members (i) Mr. S. M. Shaikh (ii) Mr. S. P. Mohulkar (iii) Dr. A. J. Bhosale (iv) Dr. S. S. Gokhale

Resolution :- requested for leave of absence, and it is granted to them.

Chairman

Action Taken Report of the Institution on Feedback Report

(2)

१. मागील बैठकीचे इतिवृत्त वाचून कायम करणे.

दि. ११/६/२०१६ रोजी झालेल्या मागील बैठकीचे इतिवृत्त वाचून कायम करण्यात आले

२. शैक्षणिक वर्ष २०२०-२१ पासून B.Tech Part- II ~~Information Technology~~ Civil Engg या पाठ्यक्रमाचा निवड आधारित श्रेयांक प्रणालीनुसार (CBCS) अभ्यासक्रम स्विकारून विद्यापीठाकडे शिफारस करण्याची बाब विचारार्थ.

सविस्तर ठराव
सोबत जोडला आहे
(Page No-

३. परीक्षेसाठी प्राश्निक, परीक्षक व नियामक यांच्या नेमणुकी करिता महाराष्ट्र सार्वजनिक अधिनियम, २०१६ कलम ४०(अ) नुसार अध्यापकांच्या नावाची यादी तयार करून परीक्षा व मूल्यमापन मंडळाकडे शिफारस करण्याची बाब विचारार्थ.

सदरच्या याद्या B.O.S. विभागाकडे १३ सप्टेंबर २०१६ रोजी [illegible] सादर केलेल्या आहेत

४. B.E., M.E. Part-I या जुन्या अभ्यासक्रमासाठी नवीन अभ्यासक्रमानुसार (S.Y. B. Tech, M.Tech- Part-I) समकक्ष (Equivalence) विषय तयार करण्याची बाब विचारार्थ.

सदरच्या याद्या B.O.S. विभागाकडे १३ सप्टेंबर २०१६ रोजी [illegible] सादर केलेल्या आहेत.

५. कॉलेज ऑफ इंजि. पंढरपूर यांचे १४/१२/२०१९ रोजीचे पत्र विचारार्थ - COEP/R/2019-20/858 (1) - 14.12.

ठराव : पत्रातील मजकुराची योग्य ती नोंद घेतली आहे.

६. Ph. D. कोर्सवर्क अभ्यासक्रम उपसमिती गठीत करणे बाबत.

पी.एच.डी. कोर्सवर्क अभ्यासक्रम समिती पुढीलप्रमाणे गठीत करण्यात आली.

1) प्रा. डॉ. सतीशकुमार श. कारंदे

2) प्रा. डॉ. प्रशांत पवार

3) प्रा. डॉ. राजेंद्रकुमार हरसूरे

या समितीने अभ्यासक्रम (Ph.D. course work) तयार करावयाचा असून; तो अभ्यासक्रम पुढील B.O.S. मीटिंग मध्ये मान्यतेसाठी ठेवावा.

७. मा. अध्यक्ष यांच्या पूर्वपरवानगीने येणाऱ्या आयत्या वेळेचे विषय.

(i) वालचंद अभियांत्रिकी महाविद्यालय सोलापूरचे पत्र क्र. WIT/Civil/2019-20/1348 दि. 27-1-2020

ठराव : या पत्रातील मजकुराची नोंद घेऊन त्याप्रमाणे योग्य ते बदल अभ्यासक्रमात केले आहेत.

(ii) IETE Journals सवलतीदरात बाबत आलेली Email

ठराव - आलेल्या मेल ची नोंद घेतली.

Page-(4)

विषय (2) शैक्षणिक वर्ष 2020-21 पासून B.Tech part Civil Engg च्या पाठ्यक्रमात निवड आधारित श्रेयांक प्रणाली नुसार (CBCS) अभ्यासक्रम स्वीकृत नियमावलीचे निकषान करण्याची बाब विचारार्थ.

ठराव

The 'Board of studies' have received various suggestions from; affiliated institutions, Representatives of Industry on B.O.S, other Industry experts and various employers of graduates of this University. The Institute suggestions also includes suggestions received from Industry Experts.

A detailed discussion on suggestions received from the various stakeholders was done in depth and its impact on attainment of POs/PSOs was discussed. Accordingly the B.O.S. has come to a conclusion for inclusion of suggestions on course content at T.Y. B.Tech. Civil Engg from A.Y. 2020-21.

Accordingly, the structure of T.Y. B Tech. is revised from assessment perspective.

Upon inclusion of suggestions as discussed, the Chairman B.O.S. shall submit 'Structure and Syllabus' for T.Y. B Tech, Civil Engg from Acadic Year 2020-21, within week time with the recommendations for further action to University authorities.

Minutes of the meeting of the Board Studies in the Subject of Civil Engineering was held in the University office on 11/09/2019

Action Taken Report of the Institution on Feedback Report

पुण्यश्लोक अहिल्यादेवी होळकर सोलापूर विद्यापीठ, सोलापूर
Punyashlok Ahilyadevi Holkar Solapur University, Solapur
केगाव, सोलापूर - ४१३ २५५, महाराष्ट्र (भारत)
[illegible]
अभ्यासमंडळे विभाग

जा.क्र. पुअहोसोविसो/अमवि/२०१९/ दिनांक :

B.O.S. Section
Date :-13/09/2019

SUBMITTED

Placed below herewith the minutes of the ***Board of Studies / Ad-hoc Board/Sub-Committee/Faculty*** *in the subject of* Civil Engineering *......held on* 11/09/2019 *at* 12:00 *am/pm for information.*

(S.S.Chavan)
Sr. Clerk

Civil Engg- [illegible]

(V.S. Patil)
Section officer

(Dr. S. N. Kamble)
Dy Registrar

(Pro. Dr. S. I. Patil)
Hon. Pro-Vice Chancellor

Action Taken Report of the Institution on Feedback Report

पुण्यश्लोक अहिल्यादेवी होळकर सोलापूर विद्यापीठ, सोलापूर
Punyashlok Ahilyadevi Holkar Solapur University, Solapur
केगाव, सोलापूर - ४९३ २५५, महाराष्ट्र (भारत)

अभ्यासमंडळे विभाग

जा.क्र. पुअहोसोवि/अभमं/२०१९/ दिनांक: 12.9.2019
11/09/2019

Minutes

Minutes of the meeting of the Board/~~Ad-hoc~~ Board in the Subject of ..Civil Engineering.. was held in the University office, on 12/9/2019 at ..12 Noon.. A.M./P.M.

The following members were present:

Sr. No.	Name	Signature
१.	Dr. S.A. Halkude	
२.	Dr. S.S. Pahl	
३.	Dr. S.S. Kashid	
४.	Dr. M.G. Kalyanshetti	
५.	Dr. P.M. Powar	
६.	Mr. S.P. Mahoikar	
७.		
८.		
९.		
१०.		

The following business was transacted at the Meeting.

Item No. 1:- Confirmation of the last meeting minutes of the Ad-hoc Board in the Subject of ..Civil Engg.. was held in the University office, on / /2019.

Resolution:- Above minutes of previous meeting were read and confirmed

Chairman

विषय क्र. 2 सोबत इंडियनिअरिंग च्या विद्यार्थ्यांनी दिलेले पत्र विचारार्थ.

ठराव : सदरहू पत्राची नोंद घेतली.

इंडियनिअरिंग ऑर्डिनन्स (अे-ई-ई-बी-१) मॉडर्न एज्यु. एन्ड सोलापूर युनिव्हर्सिटी ऑर्डिनन्स नंबर - २७ प्रमाणे कार्यवाही करावी असे सर्वानुमते ठरले.

विषय क्र - 3 :

S.Y. B Tech. M-Tech. Part-I व B.E या मुदत अभ्यासक्रमाची नवीन अभ्यासक्रमाशी तिची नवीन अभ्यासक्रमातील समकक्षता (Equivalence) विषय तसाच करण्याची बाब विचारार्थ.

ठराव :

S.Y. B Tech., M.Tech. Part-I व B.E या मुदत अभ्यासक्रमाची नवीन अभ्यासक्रमातील समकक्षता (Equivalence) विषयांची यादी सोबत जोडली आहे.

(5)

विषय : [illegible]

(A) [illegible]

(B) [illegible]

[illegible] (CGPA-Pattern) [illegible] 2019-20 [illegible] (CBCS) [illegible] पत्रे आहेत.

In this connection the following guidelines be followed

(1) These students shall clear all T.E. Civil - Part-I and T.E. Civil - Part-II subjects according to prevailing T.E. Civil curriculum in 2017-18 and complete 'Third Year Civil Engineering' in total.

(2) These students shall appear for all B.E. Civil Part-I and B.E. Civil Part-II subjects of current (2019-20) ongoing syllabus and complete 'Final year B.E. Civil Engineering' in total.

(3) In view of the subject 'Water Resources Engineering - II' - CGPA missed by these repeater students (admitted in T.E. in or before 2017-18) due to change in syllabus structure (from 2018-19 for T.E. Civil) in the meanwhile, the

Action Taken Report of the Institution on Feedback Report

(4)

Institute shall arrange training of the same subject, carry out appropriate ISE and ICA from the students, conduct End Semester Examination at college level and communicate the result to the University at the end of the semester.

Upon completion and certification by the Institute as mentioned in (3), University shall issue a certificate to the student stating candidate has completed the course in Water Resources Engineering-II, as issued in the past.

विषय - 4 (B)

श्रीराम इन्स्टिट्यूट ऑफ इंजिनिअरिंग अँड टेक्नॉलॉजी यांचे विद्यार्थ्यांना संस्था / विद्यापीठ / महाविद्यालय [illegible] बदलाबाबत

ठराव

सदरहू [illegible] शैक्षणिक वर्ष 2015-16 पासून [illegible] बंद केलेले आहे. [illegible]

DBATU चे विद्यार्थीच संलग्न आहे.

सदरहू महाविद्यालयाने महाराष्ट्र शासनाच्या महाविद्यालय / विद्यापीठ बदलाबाबतच्या नियमानुसार कार्यवाही करावी.

विषय (5) मा. अध्यक्ष यांच्या [illegible] पूर्वपरवानगीने ऐनवेळी आयत्या वेळचे विषय

ठराव :- आयत्या वेळचे कोणतेही विषय नाहीत.

Minutes of the meeting of the Board Studies in the Subject of Civil Engineering was held in the University office on 10/05/2019

Action Taken Report of the Institution on Feedback Report

पुण्यश्लोक अहिल्यादेवी होळकर सोलापूर विद्यापीठ, सोलापूर
Punyashlok Ahilyadevi Holkar Solapur University,Solapur

B.O.S. Section
Date :-11/05/2019

SUBMITTED

Placed below herewith the minutes of the **Board of Studies/Ad-hoc Board/Sub-Committee/Faculty** in the subject mentioned in the following table.

Sr. No.	Name of BOS / Ad-hoc BOS/Sub-Committee	Date of Meeting
1.	Civil Engineering BOS	10/05/2019
2.	General Engineering BOS	10/05/2019
3.	B.Sc.,B.A. B.Com- I Geography BOS	28/03/2019
4.	B.Sc. B.A- I. I Geography (S.T.D.) Sub-committee	11/05/2019

सहा. कुलसचिव
(प.अ.वेदपुरुष)
सहा. अधिकारी

(वि.श.पाटील)
कक्ष अधिकारी

(मा.प्रा.डॉ.श.ई.पाटील)
कुलसचिव

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Minutes

Minutes of the m eeting of the **Board/Ad-hoc** Board in the Subject of ..Civil Engineering..... was held in the University office, on 10/ 5 /2019 at..11.30 A.M./P.M.

The following members were present:

Sr. No.	Name	Signature
1.	Dr. S.S Patil	
2.	Dr. S.S. Kashid	
3.	Dr. C.S. Pise	
4.	Dr. M.G. Kalyanshetti	
5.	Mr. S.P. Moholkar	
6.	Dr. Prashant M. Pawar	
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		

The following business was transacted at the Meeting.

Item No. 1: Confirmation of the last meeting minutes of the ~~Ad-hoc~~ Board in the Subject of.....Civil Engineering..... was held in the University office, on ~~10/5/2019~~ 28-12-18

Resolution: Minutes of last BOS meeting were read and confirmed

Chairman

Principal Dr. S.A. Halkude, Chairman B.O.S. Communicated his inability to attend this meeting due to some official work.

Hence Dr. S.S. Patil, Member B.O.S was requested to chair this meeting. Hence he chaired this meeting.

(2) Submission of B.E Civil Engineering Syllabus (CBC wef 2019-20.

→ B.E. Civil Engineering syllabus (CBCS) pattern with effect from 2019-20 is submitted and accepted. It is now recommended to Academic council for further process

(3) Submission & acceptance of S.Y. B Tech. Civil Engg syllabus (CBCS) w.e.f. 2019-20.

→ S.Y. B. Tech. Civil Engg (CBCS) syllabus w.e. from 2019-20 is submitted and accepted. It is now recommended to Academic council for further process.

(4) M. Tech - I, Semester II - Civil Engineering (CBCS pattern) structure & syllabus submission & acceptance.

→ M. Tech. Semester II - Civil Engineering (Structural Engg.) (CBCS pattern) structure and syllabus is submitted and accepted. It is recommended to Academic council for further process.

(5) M.Tech.- Second year - Civil structural Engg (CBCS pattern) syllabus & structure to be submitted & accepted.-

→ M. Tech. Second year. Civil structural Engg (CBCS pattern) Syllabus & structure is submitted and accepted.

It is now recommended to academic council for further process.

(6) Panel of examiners, moderators & paper-setters to be submitted -

→ Panel of paper setters, examiners & moderators as per MUA, 2016 (41 CC) is already submitted.

(7) Equivalence of new syllabus with old syllabus -

→ ~~Please write~~ The equivalence revised course curriculum of previous course curriculum is submitted.

(8) Subject with permission of chairman.-

→ There was no such subject.

Note; All syllabi viz. B.E Civil (CBCS), M.Tech (CBCS) Civil Struct. Engg, B.Tech. Civil Engg. are formulated based on feedbacks received from various stakeholders viz. Industry experts, subject experts from faculty, Alumni, current students, parents etc.

Signatures of members,

1) Dr. S.S. Pathi —

2) Dr. S.S. Kashid —

3) Dr. S.P. Rise —

4) Dr. M.G. Kalyanshetti —

5) Mr. S.P. Mokalkar —

6) Dr. P.M. Pawar —

Read & Confirm

Action Taken (New Content / Topic Added) in the Curriculum

PUNYASHLOK AHILYADEVI HOLKARSOLAPUR UNIVERSITY, SOLAPUR
Faculty of Science & Technology
Credit System structure of S. Y. B. Tech. Civil Engg.- I, Semester- III, (W.E.F. 2019-2020)

Course Code	Theory Course Name	Hrs./week				Credits	Examination Scheme			
		L	T	P	D		ISE	ESE	ICA	Total
CV211	Concrete Technology, Material Testing & Evaluation	3	-	-	-	3	30	70	-	100
CV212	Surveying & Geomatics	3	-	-	-	3	30	70	-	100
CV213	Building Construction & Drawing	2	-	-	-	2	30	70	-	100
CV214	Introduction to Fluid mechanics	3	-	-	-	3	30	70	-	100
CV215	Engineering Geology	2	-	-	-	2	30	70	-	100
CV216	Introduction to Solid Mechanics	3	1*	-	-	4	30	70	-	100
CV217	Energy Science & Engineering	1	-	-	-	1	25	-	-	25
	Total	**17**	**1**	_	-	**18**	**205**	**420**	**-**	**625**
	Laboratory/Drawings							**POE** **OE**		
CV211	Concrete Technology, Material Testing & Evaluation	-	-	2	-	1	-	- -	25	25
CV212	Surveying & Geomatics	-	-	2	-	1	-	25 -	25	50
CV213	Building Construction & Drawing	-	-	-	2	1	-	- -	25	25
CV214	Introduction to Fluid mechanics	-	-	2	-	1	-	25 -	25	50
CV215	Engineering Geology	-	-	2	-	1	-	25 -	25	50
CV218	Lab practice	-	-	2	-	1	-	- -	25	25
	Total	**-**	**-**	**10**	**-**	**6**	**-**	**75**	**150**	**225**
	Grand Total	**17**	**1**	**10**	**2**	**24**	**205**	**495**	**150**	**850**
	Environmental Science	1	–	–	-	–	–	–	–	–

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 S. Y. B. Tech. Civil Engg., Semester – IV, W. E.F. 2019-2020

Course Code	Theory Course Name	Hrs./week				Credits	Examination Scheme			
		L	T	P	D		ISE	ESE	ICA	Total
CV221	Water Supply Engineering	3	-	-	-	3	30	70	-	100
CV222	Building Planning & Design	3	-	-	-	3	15	35	-	**50**
CV223	Hydraulic Engineering	3	-	-	-	3	30	70	-	**100**
CV224	Open Elective-I: ICT for development	2	-	-	-	2	50	-	-	**50**
CV225	Structural Analysis	3	-	-	-	3	30	70	25	**125**
CV226	Engineering Mathematics-III	3	1	-	-	4	30	70	25	**125**
	Total	**17**	**1**	**-**	**-**	**18**	**185**	**315**	**50**	**550**
	Laboratory/Drawings:							**POE** / **OE**		
CV221	Water Supply Engineering	-	-	2	-	1	-	- / -	25	25
CV222	Building Planning & Design	-	-	-	2	1	-	75 / -	50	**125**
CV223	Hydraulic Engineering	-	-	2	-	1	-	- / -	25	**25**
CV224	Open Elective- I : ICT for development	-	-	2	-	1	-	- / -	50	**50**
CV227	Computer Programming & Numerical Methods	2	-	2	-	3	-	50 / -	25	75
	Total	**2**	**0**	**8**	**2**	**7**	**-**	**125**	**175**	**300**
	Grand Total	**19**	**1**	**8**	**2**	**25**	**185**	**415**	**225**	**850**
	Environmental Science	**1**	–	–		–	–	–	–	–

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
S. Y. B. Tech. (Civil Engineering) – I, Semester- III
CV211: CONCRETE TECHNOLOGY, MATERIAL TESTING & EVALUATION

Teaching Scheme	**Examination Scheme**
Lectures – 3 Hrs/Week, 3 Credits	**ISE –** 30 Marks
Practical – 2 Hr/Week, 1 Credit	**ESE –**70 Marks
	ICA – 25 Marks

Course Objectives:

1) To acquaint students with properties of various ingredients of concrete
2) To introduce students to properties of fresh and hardened concrete
3) To educate students about admixtures in concrete & construction chemicals
4) To impart knowledge of various methods of concrete mix design.
5) To educate students about testing of various construction materials.

Course Outcomes:

On completion of the course students will be able to:

1) Carry out testing of various ingredients of concrete for mix design of concrete
2) Select appropriate type of concrete, admixture and chemicals for specific requirements.
3) Design a concrete mix of required strength and durability, for given field conditions, using suitable ingredients
4) To evaluate properties of construction materials viz. steel, bricks, timber, tiles etc. in laboratory for the quality assurance

Unit 1: Ingredients of Concrete:- Cement (5 Hrs)

Hot and dry manufacturing process, significance of physical properties of cement such as fineness, consistency test, initial & final setting time, soundness, compressive strength, specific gravity. Hydration of cement, chemical compounds in cement & their properties. Types of cement- ordinary Portland, Portland pozzolana, rapid hardening Portland cement, quick setting cement, sulphur resisting cement.

Unit 7: Concrete Mix Design **(10 Hrs)**

Design Mix Concrete, nominal Mix Concrete, objectives of mix design, factors governing mix design, methods of expressing proportions ACI method, IS 10262:2009 code method, road Note No.4 method, trial mixes, and Acceptance criteria.

Quality control of concrete – Factors causing variations, field control.

Unit 8: Testing of Materials **(5 Hrs)**

Tension test on Mild and Tor Steel, Compression test on Mild Steel & Cast Iron, Compression test on Timber (Parallel and across the grains), Shear test on Mild Steel, Brinell or Rockwell Hardness test on different metals. Flexural test & Abrasion test on flooring tiles, Water absorption, Efflorescence and Compression test on burnt Bricks

INTERNAL CONTINUOUS ASSESSMENT (ICA)

A. **Testing of cement**

(1) Consistency, (2) Fineness, (3) Setting time,(4) Specific Gravity (5) Soundness (6) Strength

B. Testing of aggregates

1. Specific Gravity & Water absorption of Coarse Aggregate & Fine Aggregate
2. Sieve analysis of Coarse Aggregate & Fine Aggregate
3. Bulk density of Coarse Aggregate & Fine Aggregate
4. Flakiness index of Coarse Aggregate
5. Elongation index of Coarse Aggregate
6. Bulking of Fine aggregate
7. Silt Content of Fine Aggregate

C. Tests on Concrete:

Workability tests:

(1) Slump test (2) Compaction Factor test (3) Vee-bee test (4) Flow table test

Strength tests:

(1) Compressive strength test (2) Flexural strength test

b) **Computation of Coordinates:-** Transformation from Global to Local Datum , Geodetic Coordinates to map coordinates , G.P.S. Heights and mean sea level Heights. Applications of G.P.S.

Unit 5: Remote Sensing Techniques (RST) (7 Hrs)

a) **Terrestrial and Aerial Photogrammetry**: Principles, Phototheodolite, Aerial Camera. Vertical aerial Photogrammetry: Scale, Relief Displacement, flight planning, Ground control Stereoscopy and photo interpretation: stereoscopes, Parallax Bar, Plotting instruments

b) **Unmanned Aerial Vehicle (Drone)** -Introduction

c) **Electromagnetic remote sensing**: Physics of radiant energy: Nature of Electromagnetic radiation, Electromagnetic spectrum. Energy sources and its characteristics. Atmospheric influences: Absorption, Scattering. Energy interaction with Earth Surfaces: Spectral reflectance Curve. Image Acquisition: Photographic sensors, Digital Data, Earth Resource satellites, Image resolution. Image Interpretation. Applications of Remote Sensing.

Unit 6: Geographical Information System (GIS) and Project Survey (7 Hrs)

a) **Geographical Information System (GIS):** Information systems, spatial and non- spatial Information, geographical concept and terminology, advantages of GIS, Basic component of GIS.GIS hardware and software. Field data, statistical data, maps, aerial Photographs, satellite data, points , lines, and areas features, vector and raster data, data entry through keyboard, digitizer and scanners, preprocessing of data rectification and registration, interpolation techniques.

b) **Project Surveys**

a) Building Lineout and layout
b) Route Survey
c) Culvert and Bridges
d) Tunnel, Mine: Centre line transfer, Level transfer, Weisbach triangle

PUNYASHLOK AHILYADEVI HOLKAR
SOLAPUR UNIVERSITY, SOLAPUR
S. Y. B. Tech. (Civil Engineering) – I, Semester- III
CV213: BUILDING CONSTRUCTION AND DRAWING

Teaching Scheme
Lectures – 2 Hours/week, 2 Credits
Drawings – 2 Hour/week, 1Credit

Examination Scheme
ESE – 70 Marks
(Theory Paper of 4 Hours duration)
ISE – 30 Marks
ICA- 25 Marks

Course Objectives:

1) To introduce students to functional requirements of buildings.
2) To introduce students to Scale and various types of Scale.
3) The impart knowledge of various building components such as door, windows, arches, floors etc along with its functions and method of construction.
4) To explain methodology adopted for design of various types of staircases.
5) To enable students to draw perspective view of a building.
6) To make the student conversant with various building finishes, ventilation and air conditioning principles

Course Outcomes:

After successful completion of this course the students will be able to:

1) Elucidate functional requirements of buildings and types of foundation and its suitability.
2) Draw neat drawings of different building components such as doors, windows, stairs etc with the suitable scale using CADD software.
3) Design different types of staircases commonly used in residential and public buildings.
4) Draw neat perspective view drawings of an object and given small residential building.
5) Select appropriate ventilation systems and building finishes.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

- For drawing session

(A) Sketching in sketchbook consisting of the following 9 drawing exercises:

1. Lettering, Symbols and line work.
2. Building structures (Load bearing & Framed structures)
3. Foundations- Isolated footing, combined footing, Strap footing and Pile footing.
4. Brick bonds
5. Arches and Roofs.
6. Doors
7. Windows
8. Staircases
9. Perspective drawing of object and one G+1 Residential building (Ready plan).

(B) Drawing using CADD software to be done:

1. Double leaf paneled doors
2. Double leaf paneled window
3. Open well staircase

Prints of these CADD drawings will form a part of 'Term work'.

- Site Visit for learning construction details of a residential building. A visit report to be drafted and submitted as a part of term work.

TEXT BOOKS

1) A text book of Building Construction- Arora & Bindra- Dhanpat Rai Publication, New Delhi.
2) Building Construction- Sushil Kumar- Standard Publishers, Delhi.
3) Building Construction – Arora & Gupta –Satya Prakashan, New Delhi.
4) Principles of Building Drawing- M.G. Shah and C.M. Kale.
5) A course in Civil Engineering Drawing- V.B. Sikka – S.K.Katariya & Sons, Delhi.
6) Civil Engineering Construction Materials, S.K. Sharma, KBP House
7) Engineering Drawing + AutoCAD , by K.Venugopal , New Age International Publishers
8) Mastering AutoCAD 2019 and AutoCAD LT 2019, George Omura and Brian C. Benton, SYBEX Publishers.

PUNYASHLOK AHILYADEVI HOLKAR
SOLAPUR UNIVERSITY, SOLAPUR
S. Y. B. Tech. (Civil Engineering) – II, Semester- IV
CV222: BUILDING PLANNING AND DESIGN

Teaching Scheme	**Examination Scheme**
Lectures – 3 Hours/week, 3 Credits	**ESE – 35** Marks (Theory Paper of 2 Hours duration)
Drawing – 2 Hour/week, 1 Credit	**ISE – 15** Marks
	ESE (POE) - 75 Marks
	ICA- 50 Marks

Course Objectives:

1) To impart knowledge of the principles of planning and building byelaws, rules and regulations
2) To enable students to draft 'Municipal building permission drawings' of a residential buildings
3) To impart knowledge of various building services.
4) To impart the knowledge of sustainable buildings, Green buildings, low cost housing and rain water harvesting techniques.
5) To introduce to the principles of acoustics, sound insulation and fire insulation

Course Outcomes:

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

1) Plan residential and public buildings, according to the prevalent building byelaws
2) Prepare 'Municipal building permission drawings' of a residential buildings using CADD software tools.
3) Plan appropriate building services for a building
4) Design a rain water harvesting system for a building.
5) Plan appropriate acoustics, sound insulation and fire fighting arrangements for a building

Unit 4: Building Permissions and its Procedure **(5 Hrs)**

- Procedure and list of document for Building Permission and significance of various certificates (Commencement Certificate, Plinth Completion Certificate and Occupancy certificate).

SECTION II

Unit 5: Building Services **(5 Hrs)**

- Plumbing Systems:- Significance of Plumbing and Drainage plan and layout, Water Supply Requirements for Buildings, various types of traps, Fittings, Chambers and various type of materials like PVC, GI, AC, CI, HDPE, Stoneware, CPVC with various gauges and thickness, Water Closet Pan: Types and sizes.
- Introduction to Concept and Design of Rain Water Harvesting.
- Electrification: - Concealed and open wiring system, requirements and locations of various Electrical points, Concept of Earthing.

Unit 6: Green Buildings and Low Cost Housing **(5 Hrs)**

- Computer aided design and drawing, Development of plan, Elevation and Section. Concepts of Green Building and energy efficient buildings.
- Low cost Housing, Materials & methods (Conceptual introduction only).

Unit 7: Acoustics and Sound Insulation **(6 Hrs)**

- Acoustics:- Sound Frequency, Intensity, sound decibel rating, absorption of sound-Various materials. Sabine's formula, optimum reverberation time, conditions for good acoustics, effect of reflectors, flat ceiling, design of an auditorium, defects in auditorium and remedies, acoustics of various buildings such as Auditorium hall, Classrooms, broadcasting room etc.
- Sound insulation:- Acceptable noise level – Noise prevention at its source, transmission of noise, Noise control- general Consideration.

(B) Report of Planning & Design of a building, selected for a project work –

The report shall include the Line plan, Principles of planning adopted, Byelaws, Rules and regulations followed while planning, Design calculations for Staircase, Sanitary requirements, etc.

END SEMESTER EXAMINATION

(1) Theory examination (35 marks, 2 Hours)

It will consist of theory and sketching questions based on full syllabus of the subject. However, it will ***not*** include development of residential/public building drawing on drawing sheets.

(2) Practical & Oral (50 marks)

a) Practical examination shall consist of planning of residential building and development of drawings using CADD drafting tool during practical examination. The assessment will be based on knowledge of student about building planning and CADD drafting skills depicted by the candidate during practical examination. Maximum two hours shall be allotted to the students to complete given task on CADD software tool during Practical examination.

b) In addition Oral examination shall be based on CADD drawing developed during practical examination and term work.

TEXT BOOKS

1) Building Design and Drawing: Y.S. Sane-Allies Book Stall, Pune
2) Building Design and Drawing : Shaha, Kale & Patki – T.M.H., New Delhi
3) Building Construction : Sushilkumar –Standard Publishers, Delhi
4) Building Construction : N.K.R. Murthy -Allies Book Stall, Pune
5) Building Construction: Arora and Gupta – Satya Prakash, New Delhi.
6) A Text book of building Construction: Bindra, Arora – Dhanpat Rai Publications.

PUNYASHLOK AHILYADEVI HOLKAR
SOLAPUR UNIVERSITY, SOLAPUR
S. Y. B. Tech. (Civil Engineering) – II, Semester- IV
CV224: ICT for Development (Open Elective-I)

Teaching Scheme	**Examination Scheme**
Lectures – 2 Hrs/Week, 2 Credits	**ISE – 50** Marks
Practicals – 2 Hr/Week, 1 Credit	**ICA-50 marks**

Course Objectives:

To make the students aware of Information Communication Technologies (ICT), E-services, Information processing tools, LaTex, Netiquettes & plagiarism.

Course Outcomes:

Students will be able to

1) Use Learning Management system like MOODLE
2) Prepare documents and Presentations using information processing tools.
3) Use spreadsheets & databases for problem solving in civil engineering
4) Prepare reports using LaTex.
5) Create basic website using Wordpress.
6) Get acquainted with Netiquettes and plagiarism.

1. **Basics of ICT :** **(2 Hrs)**

Introduction to ICT, World Wide Web, Web servers, Web Clients, Web sites, Web Pages, Web Browsers, Blogs, News groups, HTML, Web address, HTTP, FTP, downloading and uploading files from remote site, Web Services, Use of Google Drive, Docs and Forms, Free and open-source learning management system *(e.g. - Moodle)*

2. **e-Services:** **(2 Hrs)**

e-Commerce, e-Banking, e-Governance, ICT for sustainable development

3. **Information processing tools (MS-office/Libre Office)**

a. **Word processing:** **(4 Hrs)**

Creation/drafting of documents using shapes, smartart, charts, clipart, tables, equations etc. proofing and tracking changes in documents, mailmerge, inserting header, footer, page numbers, sections, watermarks etc.

b. **Spreadsheets:** **(4 Hrs)**

Collection and calculation of data, Use of functions (logical, mathematical, statistical etc.) Graphical Representation of data

c. **Presentation:** **(3 Hrs)**

Design of slides using shapes, table, smart art, clip art, charts, media clips, hyperlinks etc., Custom animations

d. **Database:** **(4 Hrs)**

Create database, create table, insert, update, delete records into tables, import/export data, Query execution

4. **Report writing (LaTeX)**: **(3 Hrs)**

LaTeX on Windows using TeXworks, report writing, letter writing, mathematical typesetting, Equations, tables and figures, Beamer, Bibliography, Feedback diagram with Maths

5. **Netiquettes:** **(3 Hrs)**

Internet Etiquettes, Netiquette Basics: Core Rules of Netiquette, Introduction to Electronic Mail, Netiquette for Discussion Groups , Netiquette for Information Retrieval, Egregious Violations of Netiquette

6. **Website design:** **(3 Hrs)**

Word press for website creation, creating blogs

7. **Plagiarism:** **(2 Hrs)**

Importance, prevention and detection, Tools

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Name of the Faculty: Science & Technology

CHOICE BASED CREDIT SYSTEM

Syllabus

T.Y. B. Tech (Civil Engineering)

w. e. f. Academic Year 2020-21

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

Faculty of SCIENCE & TECHNOLOGY

Credit System structure of T. Y. B. Tech. Civil Engineering, Semester- I, (W.E.F. 2020-2021)

Course Code	Theory Course Name	Hrs./week				Credits	Examination Scheme				
		L	T	P	D		ISE	ESE		ICA	Total
CV311	Design of Steel Structures	3	1	-	-	4	30	70		25	125
CV312	Geotechnical Engineering	4	-	-	-	4	30	70		-	100
CV313	Waste water Engineering & Air Pollution	3	-	-	-	3	30	70		-	100
CV314	Highway & Tunnel Engineering	4	-	-	-	4	30	70		-	100
CV315	Hydrology and Water Resources Engineering	3	1	-	-	4	30	70		25	**125**
CV316	Self Learning Module-I (H. S. S.)	-	-	-	-	2	-	50		-	50
	Total	**17**	**2**			**21**	**150**	**400**		**50**	**600**
	Laboratory/Drawings							**POE**	**OE**		
CV312	Geotechnical Engineering	-	-	2	-	1	-	25	-	25	50
CV313	Waste water Engg. & Air Pollution	-	-	2	-	1	-	-	25	25	50
CV314	Highway & Tunnel Engineering	-	-	2	-	1	-		-	25	25
CV317	Planning & Design of Public Buildings	**1**	-	-	2	2	-	50	**-**	25	75
CV318	Mini Project *	-	-	2	-	1	-	-	-	50	50
	Total	**1**	**-**	**8**	**2**	**6**	**-**	**100**		**150**	**250**
	Grand Total	**18**	**2**	**8**	**2**	**27**	**150**	**500**		**200**	**850**

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

*The students shall carry out 'Mini Project' using suitable application software /Carry out suitable Experimental work/ Carry out variety of Civil Engineering Surveys and present a report. The Mini project shall be assessed by the respective guide for ICA.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

T.Y. B. Tech Civil – Part I

CV- 314 HIGHWAY & TUNNEL ENGINEERING

.

Teaching Scheme	**Examination Scheme**
Lectures :- 4 Hrs/Week, 4 Credits	**ISE:** 30 Marks
Practical :- 2 Hrs/Week, 1 Credit	**ESE:** 70 Marks
	ICA: 25 Marks

Course Outcomes:

After completion of the course, students will be able to

1. Choose the ideal alignment for highways after thorough understanding of planning and different surveys.
2. Design various geometric elements of highway as per IRC standards.
2. Evaluate the pavement materials through various tests in the laboratory and design the crust thickness of pavements as per IRC standards.
4. Describe the different steps in highway construction and select appropriate drainage system.
5. Determine the highway economic cost by different methods of highway projects and explain highway financing.
6. Select appropriate method of tunnel construction in different types of soils.

SECTION- I

Unit 1: **(10)**

Introduction to Transportation engineering: Modes of transportations, their importance and limitations, the importance of highway transportation.

Highway Development and Planning: Principles of Highway planning, Road development in India, Classification of roads, road network patterns, Planning Surveys. Salient features of road development plan 2021 and present scenario of road development in India

Highway Alignment and Surveys: Requirements, Engineering Surveys.

Unit 2: **(10)**

Highway Geometric Design: Cross Section elements, carriageways, camber, stopping and overtaking sight distances, Sight distance at uncontrolled intersection Horizontal alignment-

Curves, design of super elevation, extra widening, transition curves, Set back distance and design of vertical curves.

Unit 3: **(9)**

Highway Materials: Properties of sub grade and pavement component materials, Tests on subgrade soils (CBR and Plate load tests), properties and requirements of road aggregates and bituminous materials, bituminous mix design by Marshall Method. Applications of Geosynthetics and Modified Binders in road construction.

SECTION- II

Unit 4: **(8)**

Pavement Design: Types of pavements, Design parameters, Axle and Wheel load, tyre pressure, ESWL concept, EWL factors, IRC method of flexible pavement design based on CSA method using IRC-37-2018. Analysis of wheel load and temperature stresses of rigid pavement, joints, Design of Rigid Pavement as per IRC-58-2015.

Unit 5: **(6)**

Highway Construction and Maintenance: Specifications, construction steps and quality control tests for Granular sub base course, Water Bound Macadam, Wet Mix macadam, bituminous concrete pavement, Cement Concrete pavement.

Unit 6: **(5)**

Highway Maintenance: Pavement failures (flexible and rigid), causes and remedies, Pavement evaluation, Functional and Structural evaluation.

Highway drainage: Surface and sub-surface drainage.

Unit 7: **(5)**

Highway Economics and Financing: Highway user benefits – VOC using charts only – Highway costs – Economic analysis by annual cost method and benefit cost ratio methods. Highway financing – BOT, DBFOT, BOOT and Hybrid Annuity concepts.

Unit 8: **(5)**

Tunnel Engineering: Introduction to tunneling, size and shape of tunnel and suitability, tunneling through soils, soft and hard rocks, tunnel lining, drainage and ventilation.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

Name of Tests:-

Test on Aggregates

1. Impact test on aggregate
2. Abrasion Test on aggregate
3. Crushing strength test on aggregate
4. Soundness test on aggregate
5. Shape test on aggregate

Test on Soil

1. CBR test on soil
2. Compaction test on soil

Test on Bitumen

1. Penetration test on bitumen
2. Ductility test on bitumen
3. Softening Point test on bitumen
4. Specific gravity test on bitumen 8.
5. Flash and Fire point test on bitumen
6. Viscosity Test on Bitumen.

Functional Evaluation of Pavement

1. Demonstration of Benkelman Beam Deflection Survey
2. Demonstration of road roughness survey by MERLIN and Bump Integrator

From the above tests, Minimum 10 Tests have to be performed and assignments on each unit based on syllabus.

Field visits to highway construction site, Hot Mix Plants, Pug Mill plants, RMC plants and quarry and crusher units

TEXT BOOKS

1. Highway Engineering By C.E.G.Justo, A. Veeraragavan& S.K.Khanna., *Nemchand Bros.*
2. Harbour, Dock and Tunnel engineering By R. Shrinivasan, *Charotar Publishing House.*
3. Transportation Engineering By Subramanian. K.P Scitech Publications, Chennai.
4. Principles of Transportation and Highway Engineering By Rao, G.V., McGraw – Hill Publishing Company Limited, New Delhi.
5. Highway Engineering, Kadiyali L.R, Khanna Publishers, New Delhi

REFERENCE BOOKS

1. Principles of Transportation Engineering, Partha Chakroborty and Animesh Das, PHI Publication.
2. Transportation Engineering – An Introduction, Khistry, C.J., PHI Publication.
3. Specifications of Road and Bridge Works (MoRTH) Publication – 5th Revision. New Delhi.
4. IRC: 37-2018, IRC: 58-2015 and other relevant IRC codes

SVERI's
College of Engineering, Pandharpur

Department of Electronics & Tele-Communication Engineering

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, Pandharpur - 413 304, Dist. Solapur (Maharashtra) Tel.: 7755990201
Toll Free No. : 1800-3000-4131, E-mail: coe@sveri.ac.in, Website: www.sveri.ac.in (Approved by A.I.C.T.E., New Delhi and Affiliated to Solapur University, Solapur)
Accredited by The Indian Institution of Engineers (India), Kolkata and TCS, Pune. ISO 9001:2008 Certified Institute

Ref.:- COEPR/2018-2019/2194 Date:- 31/03/2019

To,
The Director,
Board of University Examinations and Evaluation,
Solapur University, Solapur
Dnyanteerth Nagar, Kegaon,
Solapur-Pune National Highway,
Solapur-413255, Maharashtra (India)

Subject: About Curriculum Gaps under Electronics and Telecommunication Engineering

Dear 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 Electronics and Telecommunication Engineering Programme. We are submitting these identified Curriculum Gaps along with broader gap for your kind perusal and necessary action.

You are requested to kindly do further needful and oblige.

Thank You,

COLLEGE OF ENGINEERING PANDHARPUR

Yours faithfully,

B. Ranse

(PRINCIPAL)

Encl: Details of Curriculum Gaps for S.E, T.E. and B.E. (Electronics and Telecommunication Engineering) Part –I& II.

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, **Pandharpur** - 413 304, Dist. Solapur (Maharashtra) **Tel.**: 7755990201.
Toll Free No. :- 1800-3000-4131, **E-mail**: coe@sven.ac.in, **Website**: www.sven.ac.in (Approved by A.I.C.T.E., New Delhi and Affiliated to Solapur University, Solapur)
Accredited by The Indian Institution of Engineers (India), Kolkata and TCS, Pune. ISO 9001:2008 Certified Institute

Ref.:- COEPR/2018-2019/2194 Date:- 31/03/2019

To,
The Director,
Board of University Examinations and Evaluation,
Solapur University, Solapur
Dnyanteerth Nagar, Kegaon,
Solapur-Pune National Highway,
Solapur-413255, Maharashtra (India)

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You are requested to kindly do further needful and oblige.

Thank You,

Yours faithfully,

B Range

(PRINCIPAL)

COLLEGE OF ENGINEERING PANDHARPUR

Encl: Details of Curriculum Gaps for S.E, T.E. and B.E. (Electronics and Telecommunication Engineering) Part –I& II.

BROADER CURRICULUM GAP

G1 .CAD and EDA tools for Electronics Systems

Electronic design automation (EDA) also referred to as electronic computer-aided design (ECAD), is a category of software tools for designing electronic systems such as integrated circuits and printed circuit boards.

Creation of a device or instrument involves many stages, right from inception of the idea to getting the final product in hand. Many of these devices have been made simpler by using the free or licensed EDA tools available. Inclusion of such tools for practical will be added advantage for students to perform more hands on practice enhancing their skill.

G2. Product Development

Electronic Products is one of the most dynamic industries today. Products that were a distant dream few years ago are now changing rapidly with endless innovations getting added to them. Launching of new products in the market and gaining market share is the main strategy of every player in the industry.

Approach to create unique innovate designs include:

- Market research of end customer expectation and requirement
- Study of existing competition, if any
- Focus on end user experience
- Create a world class product design to make the product differentiate in the market

Syllabus doesn't take these factors into consideration, which is the need of hour.

G3. Advances in Network Communication

As the world continues to move, so does the advancement of technology. Every year sheds light on improvements to yesterday's devices and new inventions appearing on the horizon. At the center of it all is a desire to speed up communication across the globe, with the intention of making inconveniences a thing of the past. Latest technologies should be part of syllabus as students what they learn theoretically n what industry is having there is a huge gap. To cope up with such gap units on advances in communications must be introduced

G4. Projects on contemporary issues / multidisciplinary issues

Students should be encouraged to focus on getting real time projects viz. social or Industrial problems which will be solved through multidisciplinary/multifunctional approach. The need of society/ industry be indentified and put into problem solving approach from Second year onwards. Survey and literature review should be carried out at SE & TE level only, Design approach should be at TE & BE level.

Name of Subject:		BBC
Unit No.	Title of Unit	Gap in Curriculum
1	X.25 and Frame relay	SS-7 protocol Archetecture
2	ISDN overview	Line codes and Modems
3	ISDN Interface and Functions	ARQ strategies
4	B-ISDN Architecture and Services	Introduction to Queuing model
6	ATM switching	CSMA
Name of Subject:		**ES**
Unit No.	**Title of Unit**	**Gap in Curriculum**
1	Introduction to ES	Cost estimation hw and sw
2	Interfacing and programming	Hw sw codesign
3	Real Time Operating System	Case study Linux
4	Case study of ES	Fault tolerant sytems
Name of Subject:		**SC**
Unit No.	Title of Unit	Gap in Curriculum
1	Introduction to satellite communications	Orbit Mechanism
Name of Subject:		**VLSI DESIGN**
Unit No.	**Title of Unit**	**Gap in Curriculum**
1	CMOS Design	CMOS logic families including static, dynamic and dual rail logic
2	Introduction to EDA tool and VHDL programming	VLSI Design: Floor planning, Integrated circuit layout; design rules, parasites.
Name of Subject:		**CCN**
Unit No.	Title of Unit	Gap in Curriculum
1	Data Communication	Physical Layer & Media
2	LAN Standards	Wireless Protocol 802.11, bluetooth
3	Network Security	Introduction, Encryption, Decription, Digital Signature,

Class-TE

Name of Subject:		DSP
Unit No.	Title of Unit	Gap in Curriculum
1	Introduction	Parametric and non-parametric spectral estimation. Introduction to multirate signal processing. Application of DSP to Speech and Radar signal processing.
2	Discrete Fourier Transform	Introduction to signal space, orthogonal basis and signal representation using unitary transforms like DFT,DCT, Haar and Walsh Hadmard transform,
3	Linear Filtering Method Based on DFT	Application of transform in speech, audio, image
		and video coding, Karhunen-Loeve Transform, DCT, JPEG and
		MPEG coding standards
4	FFT Algorithm	optimum approximations of FIR filters
5	IIR Filter Design:	Adaptive Wiener filter and LMS algorithm; Applications of adaptive filtering to echo cancellation and equalization

Name of Subject:		MCOM
Unit No.	Title of Unit	Gap in Curriculum
1	Introduction	Wireless network topologies, infrastructure and ad-hoc networks
2	Mobile Radio Propagation	impulse response model of multipath channel, simulation model
3	Multiple access Technique in Wireless Communications	GMSK; OQPSK and p/4 QPSK;
4	GSM	Access techniques for WLAN, Bluetooth and mobile data networks;
		Quality of service enabled wireless access, access methods for integrated services.
5	CDMA digital cellular standard (IS-95)	Mobile IP, power saving mechanisms, energy efficient designs; Security in wireless networks.
6	IMT – 2000	Wireless local loop technologies.

Name of Subject:		EMER
Unit No.	Title of Unit	Gap in Curriculum
1	Electrostatic Field I	Plane Waves: Wave equation in an isotropic homogeneous medium and its solution, phasor notation, polarization of waves, reflection and refraction of plane waves at plane boundaries, Poynting vector.
2	Electrostatic Field I	Transmission Lines: Time-domain analysis of transmission lines; Bounce diagrams; Frequency-domain analysis of transmission lines; Standing waves; Smith chart; Transmission line matching: Single and double-stub matching, quarter-wave transformers
3	Magnetostatic Field I	Cavity Resonators: Elecromagnetic fields in rectangular and cylindrical resonators, degeneracy of modes, quality factor
4	Maxwells Equation	Solution of Laplace's Equation and Poisson's Equation in 1-D.

Name of Subject:		MCA
Unit No.	Title of Unit	Gap in Curriculum
1	The 8051 Architecture and Instructions	Overview of 8096 16 bit microcontroller
2	Interfacing of following with microcontroller	Interfacing of 7 segment display

Name of Subject:		PDC
Unit No.	Title of Unit	Gap in Curriculum
1	Pulse Code Modulation Techniques	Low bit rate coding, and compression standards for speech signals; Emerging digital & communication techniques including video compression and HDTV.
2	Optimum receiver for digital Modulation	Concept of probability, random variable and its characterization, probability density functions, transformations of random variables, statistical averages.

Name of Subject:		RME
Unit No.	Title of Unit	Gap in Curriculum
1	Rectangular waveguide	Study of excitation techniques for waveguides
2	Microwave Components	Study of two hole directional coupler
3	Microwave Solid State Devices	Study of Schottky barrier diode
4	Microwave Measurements	Study of multicavity klystron amplifier
5	Microwave Tubes	measurement of Q of Cavity resonator
6	Radar Fundamentals	Modern Techniques used in RADAR

Name of Subject:		OC
Unit No.	Title of Unit	Gap in Curriculum
1	Introduction	More details about ray theory
2	Transmission Characteristics of optical fiber	Dispersion Details
3	Optical fibers & joints	More Types of glass
4	Optical Sources (LASER)	LASER Types
5	Fibre Optics Communication System	Instruments in system
6	Optical Fiber Measurements	Meaurement of more losses

Name of Subject:		AC
Unit No.	Title of Unit	Gap in Curriculum
1	Introduction	Introduction to modern communication systems
2	Amplitude modulation Demodulation	Effect of noise on AM
3	Frequency modulation demodulation	PLL and its applications in carrier acquisition and FM demodulation;

Name of Subject:		DS
Unit No.	Title of Unit	Gap in Curriculum
1	Stack and Queue	Abstract data types, sequential and linked implementations, exception handling in classes, towers of Hanoi, wire routing in a circuit, finding path in a maze, simulation of queuing systems, equivalence problem.
2	Linked List	Comparison of insertion, deletion and search operations for sequential and linked lists, list and chain classes, exception and iterator classes for lists, linked lists through simulated pointers, lists in STL, skip lists, applications of lists in bin sort, radix sort, sparse tables.
3	Tree	Search efficiency, importance of balancing, AVL trees, searching insertion and deletions in AVL trees, red-black trees, comparison with AVL trees, search insert and delete operations. m-way search trees, B-trees, search insert and delete operations, height of B-tree, 2-3 trees, sets and multisets in STL, implementation– adjacency matrix and linked adjacency chains.
4	Searching Techniques	uses of hash tables in text compression, LZW algorithm,
5	Sorting Techniques	Heaps as priority queues, heap implementation, insertion and deletion operations, heap sort, heaps in Huffman coding, leftist trees, tournament trees, use of winner trees in merge sort as an external sorting algorithm, bin packing.

Name of Subject:		DS
Unit No.	Title of Unit	Gap in Curriculum
1	Codes and Simplification technique	Quine – Mc Cluskey method;Prime implicants,
2	Combinational Circuit Design	Ripple carry.
3	Counters and State machines	Designing state machine using ASM charts.
4	PLDs	Sequential PLDs and their applications;
5	ntroduction to VHDL	Introduction to FPGA

Name of Subject:		ECAD-I
Unit No.	Title of Unit	Gap in Curriculum
1	PN Junction Diode	Schottkey Barrier Diode
2	Diode Application	Detector Circuit
3	Filter	Transient Protection Circuit
4	Design of Unregulated Power Supply	Analysis of Shunt Regulator using Zener Diode, Voltage Magnifier
5	Bipolar Junction Transistor	PNP Transistor
6	Field Effect Transistor	Inverter Using MOSFET

Name of Subject:		ECAD-II
Unit No.	Title of Unit	Gap in Curriculum
1	Multistage Transistor Amplifiers	BJT cascode amplifiers
2	Feed Back Amplifier	Stability in feedback amplifiers
3	Sinusoidal Oscillators	Ring Oscillator
4	IC Regulator	IC 723 Voltage Regulator
5	Multivibrators using Transistors	Emitter coupled Aastable Multivibrator

Name of Subject:		M-III
Unit No.	Title of Unit	Gap in Curriculum
1	Linear differential equations with constant coefficients	Method of variation of parameters,Cauchy's And Euler's equations, Initial and boundary value Problems
2	Statistics	Moments and moment generating functions. Negative binomial, Geometric.(Continuous): Uniform, Exponential, Gamma, and Beta, Lognormal. Marginal, conditional distribution. Statistical independence, product moment.
3	probability	Sampling theorems, Conditional probability, Random sample, law of large numbers, central limit theorem Estimation: maximum likelihood estimation, unbiasedness and efficiency, interval estimation for normal population with normal, t,$\chi 2$ Distribution.
4	Numerical Methods:	Solutions of non-linear algebraic equations, single and multi-step methods For differential equations.

Name of Subject:		NTA
Unit No.	Title of Unit	Gap in Curriculum
1	Circuit Analysis and Network Theorem	Basic nodal and mesh analysis, Introduction to SPICE in circuit analysis.
2	Transient Response	Concept of Source free RL and RC circuits The phasor concept, sinusoidal steady state analysis;

Name of Subject:		SS
Unit No.	Title of Unit	Gap in Curriculum
1	Signal and systems	No Gap
2	Contineous time system	power spectral density, signal bandwidth
3	Discrete time systems	Relationship of Laplace and Fourier transforms;

Name of Subject:		LIC
Unit No.	Title of Unit	Gap in Curriculum
1	Frequency Response of OP-AMP	Dominant Pole and Pole zero compensation
2	General linear applications of OP-AMP	Analog computers
3	OP-AMP as Comparators	Application of comparator as battery charger control circuit

Action Taken (New Content / Topic Added) in the Curriculum

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Faculty of Science & Technology

(Revised from 2018-19)

C.B.C.S. Structure of S.Y. B.Tech. Electronics & Telecommunication Engineering W.E.F. 2019-20

Semester I

Course Code	Theory Course Name	Hrs./week			Credits	Examination Scheme			
		L	T	P		ISE	ESE	ICA	Total
ET211	Engineering Mathematics – III	3	1	--	4	30	70	25	125
ET212	Electronic Circuit Analysis and Design	4	--	--	4	30	70	25	125
ET213	Network Theory and Analysis	4	--	--	4	30	70	25	125
ET214	Digital Techniques	4	--	--	4	30	70	25	125
ET215	Analog Communication	3	--	--	3	30	70	25	125
Sub Total		18	1	--	19	150	350	125	625
ENV21	Environmental Science	1	--	--	--	--	--	--	--
Course Code	**Laboratory Course Name**								
							ESE		
							POE	OE	
ET212	Electronic Circuit Analysis and Design	--	--	2	1	--	50*	--	--	50
ET213	Network Theory and Analysis	--	--	2	1	--	--	--	--	--
ET214	Digital Techniques	--	--	2	1	--	50	--	--	50
ET215	Analog Communication	--	--	2	1	--	25	--	--	25
E216	Electronics Software Lab-I	--	1	2	2	--	--	--	50	50
Sub Total		--	1	10	6	--	125		50	175
Grand Total		**19**	**2**	**10**	**25**	**150**	**475**		**175**	**800**

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

Note: *

- Practical and Oral Examination of Electronics Circuit Analysis and Design includes some of the practical from subject of Network Theory and Analysis

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Faculty of Science & Technology

(Revised from 2018-19)

C.B.C.S. Structure of S.Y. B. Tech. Electronics & Telecommunication Engineering W.E.F. 2019-20

Semester II

Course Code	Theory Course Name	Hrs./week			Credits	Examination Scheme			
		L	T	P		ISE	ESE	ICA	Total
ET221	Control System	3	--	--	3	30	70	25	125
ET222	Analog Integrated Circuits	4	--	--	4	30	70	25	125
ET223	Principles of Digital Communication	4	--	--	4	30	70	25	125
ET224	Signals and Systems	3	1	--	4	30	70	25	125
ET225	Data Structures	4	--	--	4	30	70	25	125
Sub Total		18	1	--	19	150	350	125	625
ENV22	Environmental Science	1	--	--	--	--	--	--	--
Course Code	**Laboratory Course Name**								
							ESE		
							POE	OE	
ET221	Control System	--	--	2	1	--	--	--	--	--
ET222	Analog Integrated Circuits	--	--	2	1	--	50	--	--	50
ET223	Principles of Digital Communication	--	--	2	1	--	25	--	--	25
ET225	Data Structures	--	--	2	1	--	50	--	--	50
ET226	Electronic Software Lab-II	--	1	2	2	--	--	--	50	50
Sub Total		--	1	10	6	--	125		50	175
Grand Total		**19**	**2**	**10**	**25**	**150**	**475**		**175**	**800**

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

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

S.Y. B.Tech (Electronics and Telecommunication Engineering) Part-I

ET211-Engineering Mathematics-III

Teaching Scheme:

Lecture- 3 Hours / week, 3 Credits

Tutorial - 1 Hours / week, 1 Credit

Examination Scheme:

ESE- 70 Marks

ISE - 30 Marks

ICA- 25 Marks

Course Objectives:

1. To introduce to student method of solving higher order linear differential equations
2. To introduce to student Fourier series.
3. To introduce to student various probability distributions
4. To introduce to student Laplace and inverse Laplace transforms and their properties.
5. To make student understand Z transform and its properties
6. To introduce to student Fourier Transform.

Course Outcomes:

1. Student can solve higher order linear differential equation related to electrical circuit theory
2. Student can express a function in terms of sine's and cosines components so as to model simple periodic functions
3. Student can find the relation between two variables for the given data using regression and can explain various probability distribution functions.
4. Student can apply Laplace and inverse Laplace transforms for analysis of simple electrical circuits.
5. Student can solve problems on Z transform and explain its properties
6. Student can solve the problems of Fourier integral and Fourier transform

Course Prerequisite:

Fundamentals of trigonometry, method of finding roots of algebraic equations, differentiation, integration, partial fraction, sum of sequence and methods of solving definite integrations, basics of statistics and probability theory

SECTION – I

Unit 1: Higher order linear differential equations and applications [07 Hrs]

Basic definition, differential operator, complimentary functions, particular integral, Shortcu methods for standard functions like e^{ax} ,sin(ax+ b), cos(ax+b), xm , e^{ax}V and xV , particular integral by general method (without method of variation of parameters) for other functions. Electrical Engineering Applications

Unit 2 : Fourier series [06 Hrs]

Introduction, Definition, Euler's formula, Fourier series of periodic functions with period 2□ and 2L, Dirichlet's theorem (only statement), even and odd functions, half range sine and cosine series.

Unit 3: Statistics and Probability: **[08 Hrs]**

Coefficient of correlation by Karl Pearson's method and lines of regression of bivariate data. Random variable, discrete and continuous random variable, Probability density function , Binomial, Poisson and Normal distributions.

SECTION II

Unit 4:Laplace transform: **[09Hr]**

Definition, Laplace transform of standard functions, properties- first shifting, change of scale, multiplication of power t and division by t, Laplace transform of derivative and integral, Laplace transform of periodic functions, unit step functions and unit impulse functions.

Definition, Inverse Laplace transform of standard functions, Properties of inverse Laplace transforms- linear property, first shifting theorem, partial fraction, inverse transform of logarithmic & inverse trigonometric functions and convolution theorem, solution of differential equations by Laplace transform.

Unit 5 Z-Transform: **[06Hr]**

Introduction, Z-Transform of standard sequence, properties of Z-transform – linearity, change of scale, shifting property, multiplication by k, division by k, inverse Z-transform –power series method, partial fraction method.

Unit 6: Fourier Transform: **[06Hr]**

Fourier integral, Fourier sine and cosine integral, Complex form of Fourier integral. Fourier Transform, Fourier sine and cosine transform and Inverse transform.

- Internal Continuous Assessment (ICA):
  ICA shall consist of minimum six to eight assignments based on entire curriculum
- Text books:
  1. A textbook of Applied Mathematics Vol. II and Vol. III, J.N. and P.N. Wartikar, Vidyarthi Grah Prakashan, Pune.
  2. Higher Engineering Mathematics, Dr.B.S.Grewal, Khanna Publications, Delhi.
  3. Numerical Methods, Dr.B.S.Grewal, Khanna Publications, Delhi
  4. A Textbook of Applied Mathematics, N.P. Bali, Ashok Saxena and N.Ch. S.N. Iyengar, Laxmi Publications, Delhi.
  5. Advanced Engineering Mathematics, Kreyzig-John Wiley & SMS, New York.

- Reference Books:
  1. Advanced Engineering Mathematics, Peter O'Neil , Cengage Learning.
  2. Engineering Mathematics, Srimanta Pal, Subodh Chandra Bhunia, Oxford University Press

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

S.Y. B.Tech (Electronics and Telecommunication Engineering) Part-I

ET212: Electronic Circuit Analysis And Design

Teaching Scheme:
Lecture : 4 Hrs/Week
Practical :2Hrs/Week

Examination Scheme:
ISE:30 Marks
ESE:70 Marks
ICA:25 Marks
POE: 50Marks

- **Course Objectives:**

1. To introduce to student working of FET and MOSFET and its applications.
2. To make student analyze transistorized multistage amplifier.
3. To make student design and analyze feedback amplifiers.
4. To make student analyze power amplifiers.
5. To make student design and analyze oscillators.

- **Course Outcomes: At the end of the course;**

1. Students will be able to analyze the working of JFET, MOSFET and applications of these devices.
2. Student can analyze multistage amplifier.
3. Student can analyze and design feedback amplifier.
4. Student can analyze power amplifiers.
5. Student can analyze and design oscillators.

SECTION– I

Unit 1: JFET: **[09Hrs]**
Introduction, Construction and working, JFET characteristics (Transfer and Drain), Schockley'sequation, JFET biasing and DC analysis, JFET as amplifier and its configurations (CS/CD/CG) and comparison, CS amplifier analysis. Designing of JFET CS Amplifier.

Unit 2: MOSFET: **[10Hrs]**
Two terminal MOS structure, EMOSFET-construction, symbols, EMOSFET V-I characteristics, additional MOSFET structures (DMOSFET and CMOS), V-I characteristics of EMOSFET (finite output resistance, body effect, break down effect, temperature effect, short channel effects), MOSFET biasing and DC circuit analysis, MOSFET small signal amplifier (CS configuration).

Unit 3: Multistage Transistor Amplifiers: **[05Hrs]**
Need of cascading, different coupling schemes with frequency response, h-model of BJT, Analysis of two stage RC coupled Amplifier, square wave testing for RC coupled amplifiers. Designing of two stage RC coupled Amplifier

SECTION-II

Unit 4: Feedback Amplifiers: **[08Hrs]**
Classification of amplifiers, feedback concept, General characteristics of negative feedback amplifiers, Feedback Topologies and analysis (with numerical examples), Effect of negative feedback on stability, Band width, noise, distortion, i/p resistance and o/p resistance. Darlington pair amplifier and its analysis.

Unit 5: Oscillators: **[08Hrs]**
Oscillator startup mechanism, Barkhausen's criteria , sinusoidal oscillators- RC phase shift Oscillator, Wein bridge oscillator, Colppits oscillator, Hartley oscillator Derivations for frequency of oscillations of above oscillators. Crystal oscillator- Piezo electric effect, electrical equivalent circuit of a crystal, UJT Relaxation oscillator. Designing of RC phase shift oscillator.

Unit 6: Power Amplifiers: **[08Hrs]**
Types (Class A, B, AB and C) and their comparison, crossover distortion, Second Harmonic distortion, Analysis of Class A, Class B and Class AB amplifiers, complementary symmetry push pull amplifier, Introduction to Class C amplifiers. Design of Class A& Class-B amplifier.

Note: For selection of components in design **Data Sheet** should be referred.

Internal Continuous Assessment (ICA):

Experiments: -

Minimum eight experiments from the following.

1. Frequency response of two stage RC coupled CE amplifier.
2. Effect of negative feedback on amplifiers.
3. V-I Characteristics of MOSFET
4. RC Phase shift oscillator.
5. Application of MOSFET as a switch.
6. V-I characteristics of JFET.
7. Implement JFET CS Amplifier and calculate Av, Ri and Ro.
8. Analysis of Class A power amplifier
9. Analysis Class B push pull Amplifier
10. Simulate two stage RC coupled CE amplifier with feedback
11. Simulate LC oscillator
12. Simulate MOSFET amplifier

- **Text books:**

1. Electronic Devices and Circuits Allen Mottershed PHI Publication.
2. Electronic Devices and Circuits- J.B.Gupta 3rd Edition KATSON Books.
3. A Practical approach to Electronic Circuit Design -D S Mantri& G P Jain,Nikita Publication
4. Electronics Devices and Circuits-S. Shalivahanan,N. SureshKumar, TMH Publication.

- **Reference Books:**

1. Electronic Devices Floyd Pearson Education
2. Microelectronics : Digital and Analog Circuits and Systems- Jacob Millman
3. Electronic Devices and Circuit Theory Boylestad Pearson Education
4. "Microelectronics Circuit" by Sedra Smith, Oxford University Press, 4thEdition.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

S.Y. B.Tech (Electronics and Telecommunication Engineering) Part-I

ET214: Digital Techniques

Teaching Scheme:
Lecture : 4 Hrs/Week
Practical : 2 Hrs/Week

Examination Scheme:
ISE:30 Marks
ESE:70 Marks
ICA:25 Marks
POE: 50Marks

- **Course Objectives:**

1. To understand principles, characteristics and operations of combinational and sequentialLogic circuits.
2. To develop design and implementation skills of combinational logic circuits.
3. To design, implement and analyze, asynchronous and synchronous sequential circuitsusing flip flops.
4. To design and verify VHDL modules for combinational logic circuits.

- **Course Outcomes: At the end of the course;**

1. Students will be able to design and realize combinational logic circuits using logic gates,MSI circuits and PLDs.
2. Students will be able to design, implement and analyze asynchronous andsynchronous Sequential circuits using flip flops.
3. Students will be able to apply digital concepts in industrial applications.

SECTION– I

Unit 1: Codes and Simplification technique: **[05Hrs]**
Codes- BCD and Gray codes, Seven segment, Principles of combinational logic: Standard representation for Logical Function, canonical forms, don't care conditions, minimization techniques (using K-map up to 4 variables only), static and dynamic Hazards.

Unit 2: Combinational Circuit Design: **[09Hrs]**
Adder, Subtractor, Code converters (binary to gray and gray to binary, BCD to 7 segment), IC 7447,MUX, DEMUX, encoder, priority encoder, decoder, Multiplexer (Tree) and Demultiplexer(Tree), magnitude comparator, adder with look ahead carry generator, Parallel adder(IC 7483), parity generator and checker.

Unit 3: Logic Families and flip flop: **[10Hrs]**
Logic Family-Introduction to logic families, Characteristics/Parameters of Digital ICs. Flip flop NAND Latch, Flip-Flop: D, SR, JK and T (Characteristic table, excitation table and characteristic equation), Race around condition, Master Slave J-K flip-flop, flip-flop conversion.

SECTION-II

Unit 4: Registers: **[07Hrs]**
Asynchronous and synchronous sequential circuits, Shift register (modes of operation), 4-bit bidirectional shift register, universal shift registers, Ring counter, Johnson counter, IC7495.

Unit 5: Counters and State machines: **[10Hrs]**

Design of ripple counter using flip-flop, 4 bit up/down counter, mod –N counter, Design of Synchronous counter using Flip-Flop, 4 bit up/down counter, mod –N counter, IC 7490, Moore and Mealy machines, representation techniques, state diagram, state assignment, state reduction, implementation using flip flops.

Unit 6: PLDs and VHDL: **[07Hrs]**

PLDs- PROM, PAL and PLA Architecture, CPLD, Implementing combinational circuits using PLDs.VHDL -Library, Entity, Architecture, VHDL code for adder, Subtractor and comparator.

Internal Continuous Assessment (ICA):

Experiments: -

Minimum Ten experiments from the following.

1. Implementation of SOP and POS logical functions using universal gates.
2. Implementation of full adder, and full subtractor using logic gates.
3. Code conversion using logic gates or logic ICs: BCD to Binary, Binary to Gray, Gray to Binary.
4. Design and implementation of 2 bit digital comparator using logic gates and functional Verification of 4 bit digital comparator using IC 7485.
5. Design and implementation of 1 decimal digit BCD adder using IC 7483.
6. (i) Verification of functionality of multiplexer.
(ii) Design and implement combinational logic function using multiplexer ICs.
7. (i) Verification of functionality of decoder.
(ii) Design and implement combinational logic function using decoder IC.
8. Verification of the functionality of BCD to Seven segment decoder/driver.
9. Implement S-R, D, J-K, T flip flops using logic gates.
10. Functional verification of universal shift registers using IC 7495.
11. Design and implementation of Ring counter using shift register.
12. Design and implementation of Johnson counter using shift register.
13. Design and implementation of Pulse train generator using IC 7495.
14. Functional verification of ripple counter using IC 7490
15. Design of half adder and half Subtractor using VHDL

- **Text books:**

1. Digital Design - M. Morris Mano - Pearson Education (3rd Edition)
2. Digital Principles – Leach, Malvino, TMH (6th Edition).
3. Fundamental of Digital Circuits- Anand Kumar- Prentice Hall of India Pvt. Ltd.
4. Digital Electronics – Dr. R. S. Sedha – S. Chand Publications (3rd Revised Edition).
5. Digital System, Principles and Applications, Ronald J. Tocci, PHI
6. Circuit Design using VHDL –VolneiPedroni, PHI Publications.
7. Digital Electronics- Anil K Maini, Wiley Publication.

- **Reference Books:**

1. Digital Design Principles and Application - Wakerly – Pearson Education
2. Digital Electronics - Gothman - (PHI)
3. Digital Logic and Computer Design - Morris Mano - Pearson Education
4. The Principles of Computer hardware- Alan Clements (Low Price 2000) (Third Edition),OxfordPress.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

S.Y. B.Tech (Electronics and Telecommunication Engineering) Part-I

ET215: Analog Communication

Teaching Scheme:
Lecture : 3Hrs/Week
Practical : 2 Hrs/Week

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

- **Course Objectives:**

The students are expected to demonstrate the ability to:

1. Describe and analyze the mathematical techniques of generation, transmission and reception of amplitude modulation (AM), frequency modulation (FM) and phase modulation (PM) signals.
2. Evaluate the performance levels (Signal-to-Noise Ratio) of AM, FM and PM systems in the presence of additive white noise.
3. Convert analog signals to digital format and describe Pulse and digital Modulation techniques.

- **Course Outcomes:**

On completion of the course, student will be able to:

1. Understand and identify the fundamental concepts and various components of analog communication systems.
2. Explain signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system.
3. Describe analog pulse modulation techniques and digital modulation technique.
4. Develop the ability to compare and contrast the strengths and weaknesses of various communication systems.

SECTION– I

Unit 1: Introduction: **[05Hrs]**

Introduction of Communication, Element of a communication systems, Base band & Carrier communication Modulation and Demodulation, Need of Modulation, Type of modulation, Type of communication Channels (Transmission line, Parallel wires, Coaxial cables, waveguides and optical fibers), Electromagnetic spectrum, Bandwidth, Concept of multiplexing (TDM and FDM), Application of communication.

Unit 2: Noise: **[06Hrs]**

Sources of Noise, Types of Noise, White Noise, Thermal noise, shot noise, partition noise, Low frequency or flicker noise, burst noise, avalanche noise, Signal to Noise Ratio, SNR of tandem connection, Noise Figure, Noise Temperature, Friss formula for Noise Figure, Noise Bandwidth, Behavior of Baseband systems and Amplitude modulated systems i.e.DSBSC and SSBSC in presence of noise.

Unit 3: AM Transmission: **[06Hrs]**

Base band & Carrier communication, Generation of AM (DSBFC) and its spectrum, Power relations applied to sinusoidal signals, DSBSC – multiplier modulator, Nonlinear generation, switching modulator, Ring modulator & its spectrum, Modulation Index. SSBSC, ISB & VSB, their generation methods & Comparison, Block Diagram of AM Transmitter and Broadcast technical standards.

SECTION-II

Unit 4: AM Reception: **[06Hrs]**

Block diagram of TRF AM Receivers, Super Heterodyne Receiver, Dual Conversion Super heterodyne Receiver, Concept of Series & Parallel resonant circuits for Bandwidth & Selectivity. Performance Characteristics: Sensitivity, Selectivity, Fidelity, Image Frequency Rejection and IFRR. Tracking, Mixers. AM Detection: Rectifier detection, Envelope detection; Demodulation of DSBSC: Synchronous detection; Demodulation of SSBSC: Envelope detection

Unit 5: FM Transmission and Reception: **[07Hrs]**

Mathematical analysis of FM and PM, Frequency spectrum analysis of FM, Modulation Index Bandwidth requirements, Narrow Band and wide band FM, Comparison of AM,FM and PM, Direct and indirect methods of FM generation, Need for Pre-emphasis, De-emphasis. FM detection Techniques - Slope Detector, Dual Slope Detector, Foster Seeley Discriminator, RatioDetector.

Unit 6: Pulse Analog Modulation: **[06Hrs]**

Sampling Theorem, Proof of Sampling Theorem, Nyquist Rate and Nyquist Interval, Sampling Techniques - Natural sampling, Flat Top Sampling, Comparison of Various Sampling Techniques, Analog Pulse Modulation/Demodulation Methods- Pulse Amplitude Modulation, Pulse Time Modulation. Introduction to Pulse Code Modulation.

ICA : List of Experiments for Analog Communication

Perform any eight experiments from following.

List of Practical

1. AM Generation (DSB-FC): Calculation of modulation index by graphical method, Power of AM Wave for different modulating signal.
2. Envelope Detector - Practical diode detector, Observe effect of change in RC time constant which leads to diagonal and negative clipping
3. Generation of DSB-SC & its detection
4. SSB modulator & its detection
5. Frequency modulator & demodulator, calculation of modulation index & BW of FM.
6. Study of AM & FM Spectrum: Observe Spectrum of AM & FM, Compare & comment on AM & FM spectrum.
7. Verification of Sampling Theorem, PAM Techniques, (Flat top & Natural sampling), reconstruction of original signal, Observe Aliasing Effect in frequency domain.

Following can be performed using suitable software (Any One)

8. Generate AM and FM waveform for given modulation index, signal frequency and carrier Frequency using suitable software.
9. Prove sampling Theorem. Reconstruct the analog signal from its samples. Observe aliasing effect by varying sampling frequency.

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S.Y. B.Tech (Electronics and Telecommunication Engineering) Part-II

ET221: Control Systems

Teaching Scheme:	**Examination Scheme:**
Lecture : 3 Hrs/Week	ISE:30 Marks
Practical : 2 Hrs/Week	ESE:70 Marks
	ICA:25 Marks

- **Course Objectives:**

1. To understand concepts of various control systems.
2. To represent control system using block diagram and signal flow graph and obtain transfer function of system.
3. To obtain stability of control systems.
4. To determine Time domain analysis of control systems.
5. To obtain Frequency domain analysis of control systems.

- **Course Outcomes:**

At the end of the course, the students will be able to:

1. Analyze various control systems.
2. Obtain transfer function of systems using signal flow graph and block diagram reduction.
3. Determine stability of systems.
4. Analyze control system in time domain.
5. Analyze control system in frequency domain

SECTION– I

Unit 1: Introduction: **[04Hrs]**

Types of control systems, examples of control systems: Liquid level control system, position control system, missile launching and guidance system and automatic aircraft landing system. Transfer function of closed loop system.

Unit 2: Mathematical modeling of systems: **[05Hrs]**

Mathematical modeling of basic mechanical elements: translational and rotational. Mathematical modeling of Electrical systems using R, L and C. Analogous system: force – voltage and Force – current analogy. Transfer function of RLC circuits.

Unit 3: System representation and components: **[07Hrs]**

Block diagram representation and reduction techniques, Signal Flow Graph- Construction, Mason's Gain formula. Working principle, construction, types and applications of Stepper motor and Tachogenerator.

Unit 4: Stability analysis: **[03Hrs]**

Concept of stability, absolute and conditional stability, relative stability, Routh – Hurwitz criterion for stability.

SECTION-II

Unit 5: Time response of systems: **[05Hrs]**

Standard test signals, time response of first order systems to step, ramp and impulse input. Step response of second order system, time domain specifications, steady state errors and error constants of type0, type1 and type2 systems.

Unit 6: Root locus: **[04Hrs]**

Concept of root locus, construction of root locus and stability analysis using root locus.

Unit 7: Frequency domain analysis: **[05Hrs]**

Frequency response specifications, co-relation between time domain and frequency domain response, Bode plot: asymptotic bode plot, stability analysis using bode plot.

Unit 8: Compensators: **[03Hrs]**

Need of compensator, types (Lead, Lag & Lead Lag) and their selection.

Internal Continuous Assessment (ICA): - Minimum Ten experiments from the following.

1. To verify potentiometer as transducer and as error detector.
2. To verify Synchro as transducer.
3. To verify Synchro as error detector.
4. To verify operation of AC position control system.
5. To verify operation of DC position control system.
6. To obtain Effect of type of feedback on control system.
7. To obtain Time response of first order system.
8. To obtain Step response of second order system using R, L and C.
9. To obtain Frequency response of second order system using R, L and C.
10. To verify liquid level control system.
11. To obtain frequency response of Lead Lag compensator.
12. To obtain Root locus using MATLAB.
13. To obtain Bode plot using MATLAB.
14. To obtain time response of second order system using MATLAB

- **Text books:**

1. Control Systems Engineering I. J. Nagrath& M Gopal New Age Publication (Fifth Edition)
2. Feedback & Control Systems. Schaum's Outline Series McGraw Hill
3. Automatic Control Systems B. C. Kuo PHI Publication
4. Control Systems Engineering, R. Anandanatrajan,P.Ramesh Babu - Scitech Publication.

- **Reference Books:**

1. Modern Control Engineering K.Ogata Pearson Education
2. Principles of Control Systems S.C. Goyal & U. A. Bakshi Technical Publication, Pune.

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S.Y. B.Tech (Electronics and Telecommunication Engineering) Part-II

ET222: Analog Integrated Circuits

Teaching Scheme:	**Examination Scheme:**
Lecture : 4Hrs/Week	ISE:30 Marks
Practical : 2 Hrs/Week	ESE:70 Marks
	ICA:25 Marks
	POE: 50Marks

Course Objectives:

1. To make student understand principles, configurations and specifications of ideal and practical op amp
2. To make student understand frequency response of op amp
3. To make student understand linear and non linear applications of op amp
4. To enable student design active filters using op amp and analyze waveform generators
5. To introduce to student working of special Linear ICs and its applications

Course Outcomes: At the end of the course, students will be able to;

1. Describe fundamentals of op amp and compare characteristics of ideal and practical op amp
2. Understand and analyze frequency response of op amp
3. Build various Linear and Nonlinear applications of op amp
4. Design first order and second order filters
5. Understand and describe the concept of special ICs and its applications

SECTION– I

Unit 1: Fundamentals of Operational Amplifier: **[08Hrs]**

Concept of Differential amplifier- DIBO, AC & DC analysis, opamp fundamentals- block Diagram, equivalent circuit, Transfer curve, Electrical Parameters- practical & Ideal, Open loop configurations, closed loop configurations with negative feedback- Inverting &non inverting.

Unit 2: Practical opamp& frequency response: **[08Hrs]**

Input offset voltage, Input bias current, Input offset current, total output offset voltage, Thermal drift, PSRR, CMRR, SR & its importance, High frequency equivalent circuit and compensation techniques.

Unit 3: General Linear applications of Opamp: **[08Hrs]**

Summing, scaling and averaging amplifier, adder-subtractor, Instrumentation Amplifier, V to I and I to V convertors, Op-Amp as differentiator and Integrator including study of frequency response, AC amplifier.

SECTION-II

Unit 4: Non linear applications: **[08Hrs]**

Comparator- Basic, ZCD, Schmitt trigger, window detector, sample& hold circuit, peak detector, precision rectifiers, log-antilog amplifier, clipper & clamper, Peak detector.

Unit 5: Active filters & Oscillators: **[08Hrs]**

Basic filter definitions, Advantages of active filters, First and second order low pass and high pass Butterworth filters, astablemultivibrator, Triangular saw tooth wave generators using Op-Amp, Oscillators- principle, Phase shift, Wien Bridge, Quadrature oscillators.

Unit 6: Special ICS and its applications: **[08Hrs]**

Voltage regulators- 78xx,79xx, LM317, 723,basic switching regulator IC 555 Timer- basic, astable, monostable, PLL 565- operating principle, block diagram, IC 565, Applications of PLL as frequency multiplier and FSK demodulator, IC 8038.

Internal Continuous Assessment (ICA): ICA should be based on minimum eight experiments from the following list of experiments.

Experiments: -

1. Measurement of parameters – Vio, Iio, IB etc
2. Op-Amp as Inverting and Non-inverting amplifier, Voltage follower.
3. Frequency response of Inverting and Non-inverting amplifiers.
4. Implementation of Op-Amp as adder and subtractor.
5. Op-Amp as Integrator and Differentiator.
6. Op-Amp as Schmitt trigger.
7. Op-Amp as window detector.
8. Op-Amp as peak detector.
9. Op-Amp as waveform generators (Square, triangular, Saw tooth)
10. RC oscillator.
11. Op-Amp as Precision rectifier.
12. Phase Lock Loop 565.
13. Op-Amp as Clippers and Clampers.
14. V to I convertor with grounded load.
15. Implementation of first and second order low pass Butterworth filer.
16. Implementation of first and second order high pass Butterworth filer.

Note: Simulate results using simulation software for at least two experiments.

- **Text books:**

1. Op-Amps and Linear Integrated Circuits, Ramakant A. Gaikwad, PHI Learning Pvt. Ltd.,Third and Fourth edition
2. Linear Integrated Circuits, D. Roy Choudhary, Shail B. Jain, New age InternationalPublishers, Third edition

- **Reference Books:**

1. Operational Amplifiers, G.B. Clayton, English Language Book Society, Second edition
2. Operational amplifiers and Linear ICS by David Bell, oxford university press, 3rd edition
3. Linear Integrated circuits by S Salivahanan, Tata McGraw hill
4. Integrated Circuits by K R Botkar, Khanna Publication

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

S.Y. B.Tech (Electronics and Telecommunication Engineering) Part-II

ET223: Principles Of Digital Communication

Teaching Scheme:
Lecture : 4Hrs/Week
Practical : 2 Hrs/Week

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

Course Objectives:

1. To make student understand the significance of information theory, entropy coding, block coding techniques in communication system.
2. To introduce student basic components of digital communication system for different pulse, binary and M-ary digital modulation schemes with their performance analysis.
3. To explain various synchronizing techniques as well as coherent and non- coherent type of receivers used for demodulation techniques.
4. To introduce the concept and significance of multichannel and multicarrier system.
5. To introduce the concept and significance of Error Control Codes.

Course Outcomes:

1. Student will be able to explain, solve, and evaluate problems related to information theory, entropy coding and block coding techniques.
2. Student will be able to describe uniform and non-uniform quantization technique, design block diagram level digital communication system using PCM, DPCM, ADPCM, DM, ADM, binary and M-ary ASK, FSK, PSK, DPSK, QAM, MSK techniques, compare them and calculate the bandwidth requirement for different systems using PCM techniques
3. Student will be able to explain different bit and frame synchronization methods, coherent / non-coherent types of receivers used.
4. Student will be able to explain the concept and significance of multichannel and multicarrier system.
5. Student will be able to explain the concept and significance of Error Control Codes.

SECTION - I

Unit 1–Random and Information Theory **No of lectures – 08**

Introduction to information theory, average and mutual information, Entropy, Joint Entropy and conditional entropy, Rate of information, redundancy, channel capacity, Shannon's Theorem, Shannon – Hartley theorem, bandwidth, S/N trade off, entropy coding- Shannon Fano Coding, Huffman Coding

Unit 2–Pulse Code Modulation Techniques **No of lectures – 06**

Basic block diagram of digital communication system, Quantization – Uniform & Non uniform, Types of digital modulation system- PCM System, Differential PCM, TDM-PCM Telephone system, ADPCM, Delta Modulation – Noise in DM, ADM.

Unit 3–Binary Digital Modulations Techniques **No of lectures – 06**

Line Coder-Unipolar, Polar, AMI, Manchester. Binary ASK, FSK, PSK, DPSK Coherent and non-coherent Detection. Probability of error, Comparison of digital modulation schemes–Bandwidth, power requirements& Equipment complexity.

SECTION – II

Unit 4– M-ary Digital Modulations Techniques **No of lectures – 06**

QPSK concept and transmitter/Receiver, M–ary concept ,Types of M-ary , M-ary differential PSK transmitter and Receiver, M-ary wideband FSK, structure of the receiver for an orthogonal (widebabd FSK) signaling scheme, QAM modulation and demodulation, Minimum shift keying transmitter and receiver.

Unit 5–Optimum receiver for digital Modulation **No of lectures – 06**

Matched filter receiver, Correlation receiver, Synchronization- Symbol Synchronization, Frame synchronization, Carrier recovery circuits.

Unit 6–Multichannel and Multicarrier systems **No of lectures – 06**

Multichannel Digital Communication in AWGN channels, multicarrier Communication System, FFT Based multicarrier system, Minimizing Peak-to-average ratio in multicarrier system.

Unit 7–Error Control Codes **No of lectures – 06**

Introduction to linear block code, linear block code examples, generator matrix, systematic linear block codes, Parity-check matrix, Syndrome testing, Error correction, Decoder implementation.

Internal Continuous Assessment:

ICA consists of Minimum 10 experiments performed out of which at least 4 experiments must be using MATLAB / Scilab)

List of Practicals

1. PCM
2. DPCM /ADCM
3. PCM -TDM
4. Data Formats
5. Companding
6. DM
7. ADM
8. ASK
9. FSK
10. PSK
11. DPSK
12. QPSK
13. MATLAB Based Experiment.

Text Books:

1. Communication System Analog & Digital - Singh &Sapre.-TMH.
2. Digital Communication System Design – M.S. Roden.-PHI
3. Digital Communication -John G. Proakis- Pearson Education
4. Communication Systems (Analog and Digital) – Sanjay Sharma – Katsons

Reference Books:

1. Principles of Communication System – Taub & Schling-TMH
2. Digital & Analog Communication systems – K. Sam Shanmugan-Wiley
3. Digital communication Fundamentals and Applications–2nd edition by Bernard Sklar Pearson Education.
4. Contemporary Communication system using MATLAB by John G. Proakis, M AsonidSalehi, GenhardBauch.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur S.Y. B.Tech
(Electronics and Telecommunication Engineering) Part-II

ET225: Data Structure

Teaching Scheme:
Lecture : 4 Hrs/Week
Practical : 2 Hrs/Week

Examination Scheme:
ISE:30 Marks
ESE:70 Marks
ICA:25 Marks
POE: 50Marks

- **Course Objectives:**

1. To impart the basic concepts of data structures and algorithms.
2. To understand concepts about searching and sorting techniques
3. To understand basic concepts about stacks, queues, lists, trees and graphs.
4. To enable them to write algorithms for solving problems with the help of fundamental data structures

- **Course Outcomes:**

Upon completion of this course, students will be able to do the following:

1. For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.
2. For a given Search problem (Linear Search and Binary Search) student will able to implement it.
3. For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computation complexity.
4. Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.
5. Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.

SECTION– I

Unit 1: Introduction: **[08Hrs]**

Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. Searching: Linear Search and Binary Search Techniques and their complexity analysis.

Unit 2: Stacks: **[09Hrs]**

ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation (converting infix to postfix expression using algorithm, evaluating postfix expression using algorithm, recursive flow chart, programs using recursive functions - factorial, Fibonacci sequence). and complexity analysis.

Unit 3: Queues: **[07Hrs]**

ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis.

SECTION-II

Unit 4: Linked Lists: **[9Hrs]**

Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis.

Unit 5: Trees: **[07Hrs]**

Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.

Unit 6: Sorting and Hashing: **[08Hrs]**

Sorting and Hashing: Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing.

Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.

Internal Continuous Assessment (ICA):

Students should perform minimum twelve practicals based on the following preferably conducted on Unix / Linux platform

Practicals: -

Minimum twelve practicals from the following.

1. Implementation of stack using array.
2. Implementation of Queue using array.
3. Implementation of circular Queue using array.
4. Implementation of stack using Linked list.
5. Implementation of Queue using Linked list.
6. Implementation of Circular Queue using Linked list.
7. Implementation of singly Linked list.
8. Implementation of Josephus problem using Circular Linked list.
9. Find Factorial of a given no, by defining recursive function.
10. Fibonacci sequence implementation using recursive function.
11. Search element from list using linear search and Binary search method.
12. Write the program to Sort the given list using Bubble sort method
13. Write the program to Sort the given list using Selection sort method
14. Write a program to Sort the given list using Insertion sort method

- **Text books:**

1. Data Structures Using C and C++, Y.Langsam, M.J. Augenstein, A.M Tanenbaum Pearson Education Second Edition
2. Data structures using C, Rajani Jindal Umesh Publication
3. Data structures through C in Depth, S.K.Srivastava, Deepali Srivastava, BPB Publication.
4. Data Structures using C, ISRD Group, TMH
5. Data Structures- Venkatesan, Wiley Publication.

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: 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

Faculty of Science & Technology

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

Semester II

Course Code	*Theory Course Name*	*Hrs./week*			*Credits*	*Examination Scheme*			
		L	*T*	*P*		*ISE*	*ESE*	*ICA*	*Total*
ET321	Antenna & Wave Propagation	4	--	--	4	30	70	25	125
ET322	Embedded System	4	--	--	4	30	70	25	125
ET323	Electronic System Design	4	--	--	4	30	70	25	125
ET324	Advanced Mobile Communication	3	1	--	4	30	70	25	125
ET325	Open Elective-II	3	--	--	3	30	70	25	125
SLH32	Self Learning Module II	--	--	--	2	--	50	--	50
Sub Total		18	1	--	21	150	400	125	675
Course Code	*Laboratory Course Name*								
							ESE		
							POE	*OE*	
ET321	Antenna & Wave Propagation	--	--	2	1	--	--	25	--	25
ET322	Embedded System	--	--	2	1	--	50	--	--	50
ET323	Electronic System Design	--	--	2	1	--	#50	--	--	50
ET325	Open Elective-II	--	--	2	1	--	--	--	--	--
ET326	Mini Hardware Project	--	--	2	1	--	--	--	50	50
Sub Total		--	--	10	5	--	125		50	175
Grand Total		**18**	**1**	**10**	**26**	**150**	**525**		**175**	**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)

Note - # Practical and Oral Examination of Electronics System Design is combined with Mini Hardware Project.

7. ICA assessment shall be a continuous process based on student's performance in – class tests, assignments, homework, subject seminars, quizzes, and laboratory books and their interaction and attendance for theory and lab sessions as applicable.
8. Open Elective I & II shall be common and open for the students of the branches – Electronics Engineering, Electronics & Telecommunication Engineering and Electrical Engineering. Students of these branches can take any of these Open Electives. Syllabus and university examination question paper will be same for all these branches.

List of Open Electives -

Sr.	Branch Offering Elective	Open Elective I	Open Elective II
1.	Electronics &Telecommunication Engineering	1. Business Ethics 2. Managerial Economics	1. Optical Communication 2. Sensors & Applications
2.	Electronics Engineering	Information Technology & Management	Operating Systems
3.	Electrical Engineering	Hybrid Electric Vehicle Design	Advanced Control System

Self Learning Module II courses -

1. Computer Organization
2. Renewable Energy Systems
3. Soft Computing
4. NPTEL Courses

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
T. Y. B.Tech (Electronics& Telecommunication Engineering)
Semester-I

ET311: ELECTROMAGNETIC FIELD THEORY

Teaching Scheme:
Lectures – 3 Hours/week, 3 Credits
Tutorial – 1 Hour/week, 1 Credit

Examination Scheme:
ESE – 70 Marks
ISE – 30 Marks
ICA- 25 Marks

This course introduces electromagnetic field theory which deals with electric and magnetic field vectors. The course also introduces theoretical and analytical aspects of electromagnetic field, electromagnetic wave propagation and transmission lines.

Course Prerequisite:
Student shall have knowledge Electromagnetics.

Course Objectives:
1. To learn basic coordinate system, significance of divergence, gradient, curl and its applications to EM Waves.
2. To familiarize with the different concepts of electrostatic and magneto static fields. To aware students about boundary conditions to different media.
3. To expose the students to the ideas of EM waves and describe the Maxwell's equations.
4. To derive transmission line equations and parameters.
5. To determine transmission line parameters.

Course Outcomes:
At the end of this course, Students will be able to,
1. Define and recognize different co-ordinate systems and apply divergence, gradient, curl to EM waves.
2. Derive the laws of electrostatic, magneto static fields and electromagnetic wave equation.
3. Apply boundary conditions to different media for wave propagation and Maxwell's equations for analysis of wave propagation.
4. Derive transmission line equations, parameters.
5. Apply knowledge of Smith chart to determine transmission line parameters.

Section I

Unit 1: Vector calculus (04)

Scalars and vectors, vector algebra, coordinate system, differential length, surface and volume, point and vector transformations.

Unit 2: Electrostatics (08)

Coulomb's law & electric field intensity, electric field intensity due to distributed charges, flux density, Del operator, Gauss's law and its applications, divergence theorem, electrostatic potential, potential gradient, electric dipole, electrostatic energy density, boundary conditions for electrostatic field.

Unit 3: Static magnetic field (08)

Biot Savart's law, Ampere's circuital law and its applications, Stroke's theorem, magnetic flux density & vector magnetic potential, current carrying conductors in magnetic fields, torque on loop, energy stored in magnetic field, boundary condition for magneto static field.

Section II

Unit 4: Maxwell's equations (07)

Continuity equation for static conditions, displacement current and current density, Maxwell's equations in integral form and point form, Maxwell's equations for static case, time varying field, harmonically varying field.

Unit 5: Electromagnetic wave propagation (06)

Wave propagation in dielectric & conducting media, modification in wave equations for sinusoidal time variations, propagation in good conductor, skin effect, Poynting theorem, power flow in uniform plane wave

Unit 6: Transmission lines (07)

Transmission line sections as circuit elements, Transmission line equations using field theory and circuit theory, transmission line primary constant (R,L,C,G) and secondary (Z_0, γ) constant , the terminated uniform transmission line, reflection coefficient, transmission coefficient, VSWR, Impedance Transformation on Loss-less and Low loss Transmission line, Smith Chart and solution of transmission line problems using Smith Chart,.

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.

13. Frequency multipliers and dividers using VHDL.
14. Design of ALU using VHDL.
15. Design of RAM with read write control using VHDL.
16. Writing test bench for adder, encoder using VHDL.
17. Implement any VHDL module on CPLD or FPGA

- **Text books:**

1. Circuit Design and Simulation with VHDL, Volnei A. Pedroni, PHI
2. Fundamentals of Digital logic Design with VHDL, Brown,Vranesic – McGraw-Hill (2^{nd}edition).
3. Digital Systems Design using VHDL, Charles H. Roth, Lizy Kurian John- Cengage Learning, Second Edition
4. Digital Systems Design using Verilog, Charles H. Roth, Lizy Kurian John, Byeong Kil Lee- Cengage Learning
5. HDL Programming VHDL and Verilog, Nazeih M. Botros, Dreamtech Press.

- **Reference Books:**

1. Digital Design Principles and Practices, John F. Wakerly, Printice Hall, 3^{rd} Edition.
2. Datasheets of CPLDs and FPGAs.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
T. Y. B.Tech (Electronics& Telecommunication Engineering)
Semester-I
ET314: MICROCONTROLLERS AND APPLICATIONS

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

This course introduces Basics of microcontroller's theory which includes internal details of MCS51 series and PIC Microcontroller. The course also introduces Assembly level as well Embedded C Level programming aspects of both microcontrollers, Memory interfacing and Interfacing various I/O devices.

Course Prerequisite:
Student shall have knowledge of Digital Electronics.

Course Objectives:
1. To provide an introduction to microcontroller families and details of MCS51.
2. To describe Core features and Peripheral features of PIC16f877a
3. To explain and practice assembly language and Embedded C programming techniques
4. To demonstrate and perform hardware interfacing and design for various applications.

Course Outcomes:
At the end of this course, Students will be able to,
1. Expose the fundamental features and operation of contemporary microcontroller
2. Demonstrate and perform hardware interfacing.
3. Explore the students to the fundamentals of PIC Microcontroller 16F877 architecture
4. Introduce the various core and peripheral features in PIC Microcontroller 16F877.
5. Develop and practice assembly language and C language programming techniques

Section I

Unit 1: Introduction Microcontroller (04)
Introduction, Microprocessor and Microcontrollers, CISC & RISC Microcontroller, Harvard and von Neumann architecture, Development system for Microcontroller.

Unit 2: The 8051 Architecture and Instructions (08)
8051 Microcontroller Hardware, Addressing modes, Instruction set ,Input / Output Pins, ports and Circuits, External Memory, Counters and Timers, Serial Data Input/ output, interrupts.

Unit 3: Programming Microcontroller (8051) (06)
The mechanics of Programming, The assembly Language and C programming concepts, Serial Port Programming, Timer Programming and Interrupt Programming, Program for interfacing Switches, LED, Relay, Buzzer.

Unit 4: Interfacing with microcontroller (06)
LCD display, Matrix keyboard, ADC 0809, DAC 0808, Stepper Motor, Interfacing External Memory

Section II

Unit 5: PIC Microcontrollers: (04)
PIC Microcontrollers Introduction, Architecture, features, Configuration word and Instruction Set

Unit 6: PIC 16F877A Microcontroller Core Features :(08)
Functional pin description, various registers, Program memory and data memory organization, Input / output ports, Interrupts, various kinds of RESET

Unit 7: Peripheral Features and Programming: (06)
Timers, Capture/ compare / PWM (CCP) Modules in PIC 16F877, Internal ADC, The Watchdog Timer.

Unit 8: Serial Communication: (06)
Master synchronous serial port (MSSP) module: SPI, I2C, The Universal Synchronous Asynchronous Receiver Transmitter (USART) module.

- **Internal Continuous Assessment (ICA):**
  ICA consists of minimum ten Practical based upon above curriculum.
  Students should be introduced to embedded C programming and Minimum Four practical's should be taken using embedded C programming

Suggested List of Practical:

1. Arithmetic and Logic operations
2. Interfacing of Switches, LEDs and Buzzer.
3. Interfacing of Matrix Keyboard
4. Interfacing of LCD Display.
5. Interfacing of DAC 0808 and generation of various waveforms.
6. Interfacing of ADC 0809
7. Use of Timer for generation of time delays
8. Use of Timer as counter.
9. Interfacing of Stepper motor.
10. Speed control of DC Motor using PWM.
11. Use of ADC of PIC Microcontrollers.
12. Use of Interrupts for any Application.
13. Use of CCP Module of PIC Controller
14. Serial communication.
15. Study of any one Industrial application using Microcontroller.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
T. Y. B.Tech (Electronics& Telecommunication Engineering)
Semester-I
ET315.1: OPEN ELECETIVE-I
BUSINESS ETHICS

Teaching Scheme:
Lectures– 3Hours/week, 3 Credits
Tutorial – 1 Hour/week, 1 Credit

Examination Scheme:
ESE – 70 Marks
ISE –30Marks
ICA-25 Marks

This course introduces basics of business ethics and its related. The course also introduces theoretical aspects of ethical issues related to stakeholders

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Course Prerequisite:
Student shall have knowledge basic management principles.

Course Objectives:
1. To make students aware of basics of business ethics and related theories
2. To understand different tools for decision making and management in business ethics
3. To get acquainted with corporate and ethical issues related with it
4. To understand different ethical issues related to various stakeholders

Course Outcomes:
At the end of this course, Students will be able to,
1. Elaborate concepts of ethics and related theories
2. Describe and apply tools for decision making and management in business ethics
3. Understand and form the ethical issues in corporation
4. Understand and identify the ethical issues from various stakeholders' point of context

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Section-I

Unit 1: Introduction (06)
Business Ethics: An overview, importance of Business Ethics, Key context- Globalization, sustainability, Normative ethical theories and descriptive ethical theories and contemporary ethical theories

Unit 2: Decisions and management of business ethics (06)
Models of ethical decision making, Individual and situational influences on decision making, business ethics management, Setting standards of ethical behavior, Managing stakeholder relations, Assessing ethical performance, Organizing for Business Ethics management

Unit 3: Framing business Ethics (06)
Framing Business Ethics- CSR, stakeholders and Citizenship, Corporation- key features, CSR, Stakeholder theory of firm, Corporate accountability, Corporate citizenship, understanding

Section-II

Unit 4: Employees, consumers and business ethics (07)
Models of organization, Employees as stakeholders, Ethical issues in the firm-employee relation, Ethical challenges of globalization, corporate citizen and employee relations towards sustainable employment. Consumers as stakeholders, Ethical issues, marketing and the consumer, Globalization and consumers, Consumers and corporate citizenship, Sustainable consumption

Unit 5: Civil Society and Environment (07)
Civil society organizations as stakeholders, Ethical issues and CSOs, Globalization and CSOs, Corporate Citizenship and civil society, Civil society, business and sustainability, Business Ethics and Environmental values, The dimensions of pollution and resource depletion, Ethics of pollution control, Ethics of conserving depletable resources

Unit 6: IT and Government (07)
Information technology and its moral significance to business, IT code of conduct, Data identity and security, Crime and punishment, Government as stakeholder, Ethical issues in the relation between business and government, Globalization and business- government relations, Corporate Citizenship and regulation, Governments, business and sustainability

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

ICA consists of minimum eight tutorials based upon above curriculum. Tutorial shall include case studies related to context like employee, civil citizens, environment, consumer etc. It will be motivated to have seminars and role plays for various case studies related to ethical issues. Visits to various organizations and reports based on that can be considered.

- **Text Books:**

1. Business Ethics by Andrew Crane, Dirk Matten, Oxford University press

- **Reference Books:**

1. Business Ethics: Ethical Decision Making and Cases, O. C. Ferrell, John Fraedrich, Linda Ferrell, Cengage Publication
2. Business Ethics Methods and Application, Christian U. Becker, Taylor and Francis
3. Business & Society: Ethics and Stakeholder Management, Archie B. Carroll, Ann K. Buchholtz, Cengage Publication 7th Edition

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
T. Y. B.Tech (Electronics & Telecommunication Engineering)
Semester-I
ET316: ELECTRONIC SOFTWARE LAB-III

Teaching Scheme:
Practical – 2 Hours/week, 1 Credit
Tutorial – 1 Hour/week, 1 Credit

Examination Scheme:
ICA- 25 Marks

This course will introduce fundamental programming concepts including data structures, networked application program interfaces, and databases, using the Python programming language.

Course Prerequisite:
Basic knowledge of programming concepts like Variables, Loops, Control Statements, etc in any programming language like C.

Course Objectives:
1. Introduce procedural and object-oriented style for writing Python scripts.
2. Introduce standard library packages and modules in Python.
3. To teach testing, debugging and profiling of Python scripts.

Course Outcomes:
At the end of this course, Students will be able to,
1. Write Python scripts using procedure and object oriented approach of writing a computer program.
2. Exhibit ability to use Python's standard library packages to provide solution to a given problem.
3. Test and debug python script for a given problem.

Section – I

Unit 1: Introduction to Python (02)
Introducing the Python Interpreter, Program Execution, Execution Model Variations, TheInteractive Prompt, System Command Lines and Files. Syntactic and semantic differences between Python 2.x and Python3.x.

Unit 2: Introduction to Python Programming Constructs (04)
Data types and variables, Collection data types, Control structures, loops and functions, Lambdas, Generators, Exception Handling, String handling, Scope of variables, Modules, Packages, Command line arguments. Built-in: Functions, Constants, Types, Exceptions.

Unit 3: Introduction to Object Oriented Programming in Python (04)
Classes, Instance Objects, Method Objects, Class and Instance Variables, Attributes and methods, Inheritance and polymorphism

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
T. Y. B.Tech (Electronics& Telecommunication Engineering)
Semester-II
ET321: ANTENNA AND WAVE PROPOGATION

Teaching Scheme:
Lectures– 4 Hours/week, 4 Credits
Practical – 2 Hours/week, 1 Credit

Examination Scheme:
ESE – 70 Marks
ISE –30 Marks
ICA- 25 Marks
OE- 25 Marks

This course introduces Antenna and Wave Propagation which deals with different types of antenna, and propagation of wave over ground and through atmosphere. The course also introduces theoretical and analytical aspects of wave propagation and radiating system.

Course Prerequisite:

Student shall have knowledge of Electromagnetic Fundamentals.

Course Objectives:

The student will learn and understand
1. Basics of antenna
2. Various types of antenna and radiation mechanism of antenna
3. Techniques used for antenna parameters measurement
4. Wave propagation over ground, through troposphere and inosphere.

Course Outcomes:

At the end of this course, Students will be able to,
1. Identify basic antenna parameters.
2. Analyze radiation pattern of various antennas.
3. Illustrate techniques for antenna parameter measurements.
4. Identify the characteristics of radio wave propagation.
5. Understand the various applications of antenna.

Section-I

Unit 1:Antenna Fundamentals: (06)

Comparison between an antenna & transmission line, Radiation Principle, Antenna parameters: Beam area, Beam width, Polarization, Radiation Intensity, Beam Efficiency, Directivity and directive gain, radiation resistance, radiation efficiency, Antenna aperture-physical and effective apertures, effective height, antenna field zones.

Unit 2: Antenna Arrays: (08)

Arrays of two isotropic point sources, non isotropic Sources, principle of pattern multiplication, linear arrays of n elements, Broadside, End-fire radiation pattern, directivity, Beam-width and null directions, array factor.

Unit 3: HF, VHF and UHF Antennas: (10)

Radiation from Small Electric Dipole, Quarter Wave Monopole and Half Wave Dipole – Current Distributions, Radiated Power, Radiation Resistance.

Helical Antennas: Helical geometry, transmission and radiation modes, wide band characteristics of helical antenna.

Slot antenna: Patterns of slot antenna, Babinet's principle and complementary antennas, impedance of slot antennas. (Excluding mathematical derivations for Helical and Slot Antennas. The problems on Helical and Slot Antennas will be included.)

Section-II

Unit 4: UHF and Microwave Antennas: (08)

Important horn shapes, Design equation of horn antenna, Optimum Horn, Uses of horn antenna.

Reflector Antennas: Introduction, Plane Sheet and Corner Reflectors, Paraboloidal Reflectors – Geometry, Pattern Characteristics, Feed Methods.

Microstrip Antennas: Introduction, Advantages and Limitations, Various microstrip patch configurations, Radiation mechanism, Feeding techniques, Applications of microstrip antenna.

Unit 5: Special Antennas: (06)

Introduction of frequency independent antennas –Spiral antenna, Log periodic antenna, Modern antennas- Reconfigurable antenna, Active antenna, Smart antenna.

Antenna Measurements: Measurement of Gain, Radiation pattern and Polarization.

Unit 6: Radio Wave Propagation: (10)

Modes of propagation, structure of atmosphere, ground wave propagation, Tropospheric propagation, Duct propagation, Troposcatter propagation, flat earth and curved earth concept. Sky wave propagation- Virtual Height, Critical frequency, Maximum usable frequency, Skip distance, Fading, Multi hop propagation.

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

ICA consists of minimum eight practicals from given list

Suggested List of Practicals:

1. To plot radiation pattern of dipole antenna and calculate its parameters
2. To plot radiation pattern of monopole antenna and calculate its parameters
3. To plot radiation pattern of Helical antenna and calculate its parameters
4. To plot radiation pattern of Log periodic antenna and calculate its parameters
5. To plot radiation pattern of parabolic reflector and calculate its parameters
6. To plot radiation pattern of horn antenna and calculate its parameters
7. To plot radiation pattern of slot antenna and calculate its parameters
8. To plot radiation pattern of Broadside array and calculate its parameters
9. To plot radiation pattern of End fire array and calculate its parameters
10. To plot 2-dimensional and 3-dimensional radiation pattern of directional antenna using simulation software.

- **Text Books:**

1. Antennas for All Applications – John D. Kraus and R. J. Marhefka, and Ahmad S. Khan TMH, New Delhi, 4th ed., (Special Indian Edition) 2010. Electromagnetic field theory & Transmission Lines, GSN Raju, Pearson Education
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd edition 2000

- **Reference Books:**

1. Antenna Theory - C.A. Balanis, John Wiley & Sons, 3rd ed., 2005.
2. Antennas and Wave Propagation – K.D. Prasad, SatyaPrakashan, Tech India Publications, New Delhi, 2001.
3. Transmission and Propagation – E.V.D. Glazier and H.R.L. Lamont, The Services Text Book of Radio, vol. 5, Standard Publishers Distributors, Delhi.
4. Antennas – John D. Kraus, McGraw-Hill (International Edition), 2nd Ed. 1988.

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T. Y. B.Tech (Electronics& Telecommunication Engineering)
Semester-II

ET322: EMBEDDED SYSTEMS

Teaching Scheme:
Lectures– 4 Hours/week, 4 Credits
Practical – 2 Hours/week, 1 Credit

Examination Scheme:
ESE – 70 Marks
ISE –30Marks
ICA -25 Marks
POE - 50Marks

This course introduces Embedded System Design with software and hardware perspective. The course also introduces practical design aspects of embedded system.

Course Prerequisite:
Student shall have knowledge digital circuits, basic C programming, Microcontroller fundamentals.

Course Objectives:
1. To make student realize different aspects and application areas of embedded systems.
2. To make student understand ARM core architecture.
3. To make student understand interfacing of input & output devices
4. To introduce to student concepts of Real time operating system.

Course Outcomes:
At the end of this course, Students will be able to,
1. Student can describe hardware and software architecture of embedded system.
2. Student can describe ARM7TDMI core architecture and Controller based on this architecture
3. Student can write C program for different applications for LPC2148microcontroller.
4. Student can interface different peripherals with LPC2148 microcontroller.
5. Student can describe microcontroller based real time systems for different applications.

Section - I

Unit 1: Embedded System Introduction (06)
Introduction to Embedded System, History, Design challenges, optimizing design metrics, time to market, applications of embedded systems and recent trends in embedded systems, embedded design concepts and definitions.

Unit 2: System Architecture (10)
Introduction to ARM7TDMI core architecture, ARM extension family, Pipeline, LPC 2148, ARM instruction set, thumb instruction set, memory management, Bus architecture.

Unit 3: On Chip Peripherals (08)
Study of on-chip peripherals like I/O ports, PLL, timers / counters, interrupts, on-chip ADC, DAC,

Section – II

Unit 4: Interfacing and Programming (10)
Introduction to Embedded C Programming, Basic embedded C programs for on-chip peripherals studied in system architecture like PLL, timers, ADC, WDT, PWM. Interfacing of devices – LED, Switches (buttons),4 x 4 Matrix Keypad, 7-segment display, LCD display, DC motor.

Unit 5: Real Time Operating System (10)
Architecture of kernel, task scheduler, ISR, Semaphores, mailbox, message queues, pipes, events, timers, memory management, RTOS services in contrast with traditional OS, introduction to µcosII.

Unit 6: Case Studies (04)
Case studies like Digital Camera, Smart Card System based ATM and Mobile Internet Device.

Internal Continuous Assessment:
ICA consists of 8 to 10 practical's based upon above curriculum.
List of Practical's:

1. Arithmetic and Logic operations
2. Interfacing of Switch, LED / Buzzer / Relay
3. Interfacing of LCD Display.
4. Interfacing matrix Keypad and display key pressed on LCD / Seven Segment Display
5. Use of Timer for generation of time delays
6. Use of Interrupts for any Application
7. Use of ADC of Microcontroller.
8. Interfacing of Stepper motor.
9. Interfacing of DC Motor.
10. USART Serial communication.
11. Creating two tasks, which will print some characters on the serial port, Start the scheduler and
12. observe the behavior.
13. Implementing a semaphore for any given task switching using RTOS on microcontroller board.
14. Implementing a Mailbox for task communication.

- **Text books:**

1. Embedded Systems: Architecture, Programming And Design by Rajkamal Tata McGraw-Hill Education
2. Frank Vahid - Embedded Systems - Wiley India
3. ARM System Developer's Guide, Designing and Optimizing System Software - Andrew N. Sloss , Dominic Symes, Chris Wright - Morgan Kaufmann Publisher.
4. Embedded systems software primer - David Simon – Pearson
5. MicroC / OS-II, Jean J Labrose - Indian Low Price Edition

- **Reference Books:**

1. DR.K.V.K.K. Prasad - Embedded / real time system – Dreamtech
2. Embedded real systems Programming – Iyer, Gupta, TMH
3. Embedded systems: a contemporary design tool, James K. Peckol- Wiley India
4. Datasheet of LPC 2148.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
T. Y. B.Tech (Electronics& Telecommunication Engineering)
Semester-II
ET323 : ELECTRONIC SYSTEM DESIGN

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 construction, characteristics of power electronics devices and its applications. The course also introduces design of different electronics systems such as frequency synthesizer, frequency counter, time period measurement. This course also covers design of industrial controllers and aspects of PLC & automation.

Course Prerequisite:
Student shall have knowledge of Basic Electronics, Linear Integrated Circuits and Digital Electronics

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Course Objectives:
1. To describe the concept and applications of power electronic devices.
2. To design and analyze timer, frequency counters and digital voltmeters.
3. To design applications of Phase Locked Loop (PLL) and industrial process control.
4. To provide introduction of the concept of PLC and its applications.

Course Outcomes:
At the end of this course, Students will be able to,
1.Describe construction, working & analyze characteristics of thyristors.
2.Analyze AC and DC power control circuits using thyristors.
3. Design and implement timers, frequency counters, digital voltmeters and frequency synthesizers.
4.Design and simulate Communication system components for system design.
5.Design and analyze controllers for industrial applications.

Section I

Unit 1: Introduction to Power Semiconductor Devices (08)
SCR - construction, working, VI characteristics, turn on and turn off methods (Class A, B, C, D). TRIAC - construction, working, VI Characteristics. DIAC - construction, working, VI Characteristics.

Unit 2: Power Electronics Applications (08)
Single phase half wave controlled rectifier, center tapped full wave controlled rectifier, fully controlled bridge rectifier, AC power control using DIAC & TRIAC and its applications.

Unit 3: Modulator, Demodulator & PLL (09)
Balanced modulator principle, IC 1596, applications of IC 1596 as AM modulator & Mixer. PLL-Working Principle, design consideration, FM detector, FSK demodulator, PSK demodulator, design of frequency synthesizer using LM565.

Section II

Unit 4: Timer, Counters &Digital Voltmeter (09)
Design of Timer using XR 2240, Design of counter using IC 74C926 for the time & event counting, Design of 3 ½ digit Multi-range DVM using discrete components.

Unit 5: Design of Industrial Control (08)
Signal conditioning for sensors PT 100, LM 35, Thermocouples (J & K type), current loop Interface (4mA to 20mA), zero & span circuit, offset V to I & I to V converter, V to V converter.

Unit 6: Controllers (08)
Design of analog ON/OFF controller and proportional controller for controlling process, PLC architecture and applications, bottle filling plant & elevator control.

Note - # Practical and Oral Examination of Electronics System Design is combined with Mini Hardware Project.

• Internal Continuous Assessment:
ICA consists of minimum eight practical from following suggestive list.

Suggestive List of Practicals:
1. VI Characteristics of SCR.
2. VI characteristics of TRIAC & DIAC.
3. Single phase half wave controlled rectifier.
4. Lamp dimmer using TRIAC & DIAC.
5. AM simulation using MATLAB SIMULINK.
6. PLL application using MATLAB SIMULINK.
7. Implementation of frequency division circuit using IC.
8. Application implementation using PLC.
9. Temperature controller using OPAMP.

10. V to V Converter.
11. Simulation of Display design.
12. Design and simulate 3 ½ digit DVM.

- **Text Books:**

1. Power Electronics, circuits, devices & applications by M. H. Rashid, Pearson Education, 3rd edition.
2. Power Electronics by P. C. Sen, TATA Mc. Graw Hill, 2nd Edition.
3. Power Electronics by M. D. Singh & K. B. Khanchandani, TATA Mc. Graw Hill, 2nd Edition.
4. Introduction to System Design Using Integrated Circuits by B. S. Sonde, NewAge International Publishers, 2nd Edition.

• Reference Books:

1. Integrated Circuits by K. R. Botkar, Khanna publishers, 10th Edition.
2. Programmable Logic Controllers by Job Den Otter, Prentice Hall International Editions.
3. Programmable Logic Controllers by John Web & Ronald Reis, PHI Publications, 5th edition.
4. Process Control Instrumentation Technology by Curtis. D. Joshon, Pearson Education, 8th edition.
5. Data sheets of Analog and digital ICs used for design using Web resources.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
T. Y. B.Tech (Electronics& Telecommunication Engineering)
Semester-I
ET324: ADVANCED MOBILE COMMUNICATION

Teaching Scheme:	**Examination Scheme:**
Lectures– 3 Hours/week, 3 Credits	**ESE -70 Marks**
Tutorial – 1 Hour/week, 1 Credit	**ISE - 30 Marks**
	ICA -25 Marks

This course introduces Advanced ideas, design principles, architectures and technology standards used in advanced mobile communication systems.

Course Prerequisite:
Student shall have knowledge of basics of analog communication and digital communication.

Course Objectives:
1. To recognize cellular concept in mobile communication.
2. To examine the Mobile radio propagation, cellular system design, and to identify multiple access techniques used in mobile communication
3. To analyze mobile technologies like GSM
4. To categorize the mobile communication evolution of 2G to 5G technologies.
5. To describe overview of 4G & 5G next generation technology.

Course Outcomes:
At the end of this course, Students will be able to,
1. Students will be able to define cellular systems, working and hand off strategies implemented in mobile communication.
2. Students will be able to analyze various losses in mobile radio propagations and define multiple access schemes sharing radio spectrum.
3. Students will be able to define GSM - architecture, frame structure, system capacity and services provided.
4. Students will be able to describe mobile communication evolution of 2G to 5G technologies
5. Students will be able to analyze emerging technologies required for fourth generation mobile systems such as Long Term Evolution(LTE) & 5G next generation technology.

Section I

Unit 1: Introduction (08)
Introduction to wireless communication systems
The Cellular Engineering Fundamentals : Introduction, Frequency Re-use, Channel Assignment Strategies, Handoff Strategies, Interference and System Capacity, Trunking and Grade of service, Co-channel Interference (CCI), Adjacent Channel Interference (ACI), Cell Splitting, Sectoring, Microcell Zone concept, Repeaters.

Unit 2: Mobile Radio Propagation (07)
Large scale path loss, Free space propagation model, ground reflection model (two ray model), diffraction, Practical Link Budget using path loss model, Small scale fading and multipath small scale multipath propagation.

Unit 3: Multiple Access Technique in Wireless Communications (06)
Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Spread Spectrum Multiple Access (SSMA), Space Division Multiple Access (SDMA), Orthogonal Frequency Division Multiple Access (OFDMA)

Section II

Unit 4: GSM (07)
GSM Network architecture, signaling protocol architecture, identifiers, channels, Frame structure, speech coding, authentication and security, call procedure, handoff procedure, services and features. Mobile data networks, GPRS and higher data rates.

Unit 5: CDMA digital cellular standard (IS-95) & IMT – 2020 (07)
Frequency and channel specifications of IS-95, forward and reverse CDMA channel, packet and frame formats, mobility and radio resource management. IMT 2000 & IMT Advanced, IMT 2020, capabilities.

Unit 6: 4G (LTE) & 5G Next Generation Technology (07)
Introduction to 4G, LTE Architecture, Elements of LTE- EPS, LTE Radio / air interface- Modulation and features, LTE Channels, Introduction to 5G, 5G CN Architecture, Radio/air interface, features.

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

- ICA shall include minimum **eight tutorials** based on above syllabus.
- One visit to the **Mobile base station** & submission of report.

- **Text Books:**

1. Wireless Communications - Theodore S. Rappaport, Prentice Hall of India, PTR Publication.
2. Principles of Wireless Networks – Kaveh Pahlavan, Prashant Krishnamurthy, PHI.
3. Mobile Communication – G. K. Behera & Lopamudra Das, Scitech Publication.
4. Mobile Communications – Jochen Schiller, Pearson Education, Second Edition.

- **Reference Books:**

1. Wireless Communication – Singhal, TMH.
2. Mobile and Personal Communication Systems and Services – Raj Pandya, Prentice Hall of India.
3. Wireless Communication – D. P. Agarwal, Thomnson learning 2007, Second Edition.
4. Wireless Communication and Network –Upena Dalal, OXFORD higher Education
5. 4 G Roadmap and Emerging Communication Technologies – Young Kyun Kim and Ramjee Prasad –Artechhouse.
6. 5G NR: The Next Generation Wireless Access Technology- By Erik Dahlman, Stefan Parkvall, Johan Skold

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T. Y. B.Tech (Electronics& Telecommunication Engineering)
Semester-I

ET325.1: OPEN ELECTIVE-II
OPTICAL COMMUNICATION

Teaching Scheme:
Lectures– 3Hours/week, 3 Credits
Practical – 2 Hours/week, 1 Credit

Examination Scheme:
ESE – 70 Marks
ISE –30 Marks
ICA- 25 Marks

This course introduces the basic concept of optical communication. It explains the basic working principle of optical fiber. It covers the study of basic optical devices as optical source, optical detector, optical joints. It also introduces aspects of practical design of optical communication system.

Course Prerequisite:
Student should have knowledge of basic communication system, light reflection, refraction process.

Course Objectives:
1. To make students to understand basic working principle of optical fiber.
2. To introduce to student basic losses in optical fiber & reasons behind the losses.
3. To make students to understand the basics of optical sources(LASER & LED).
4. To make students to understand the basics of optical detectors.
5. To study the concepts of optical networks.

Course Outcomes:
At the end of this course, Students will be able to,
1. Demonstrate working of optical fiber.
2. Explain transmission characteristics of optical fibers & concept of optical joints.
3. Illustrate different optical sources & optical detectors.
4. Solve the numerical to calculate the various parameters of optical sources & detectors.
5. Explain the different types of optical amplifier & optical networks.
6. Analyze the functional blocks in optical communication system.

Section I

Unit 1 : Overview of Optical Fiber Communication (06)
Introduction, Historical development, general optical communication system, advantages, disadvantages, optical fiber waveguides, ray theory ,mode theory, Types of optical fibers, single mode ,multimode fiber, step index & graded index fibers, applications of optical fiber communication.

Unit 2 : Transmission Characteristics of Optical Fibers and Optical Joints (08)
Introduction, Attenuation, absorption- intrinsic & extrinsic, linear &non linear scattering losses, bending loss, dispersion- intermodal & intramodal, Fibers alignment and joint loss, fiber splices, connectors, fiber couplers& its types.

Unit 3 : Optical Source (08)
Laser: Requirements of optical source, basic concept of LASER, optical emission from semiconductors, heterojunction structure, Semiconductor injection laser and structures, Injection laser characteristics, LED: LED structures, LED characteristics, Light Modulation.

Section II

Unit 4 : Optical Detectors (06)
Introduction, requirements of optical detector, optical detection principles, performance parameters of detector- absorption, quantum efficiency, responsivity, cut off wavelength. Semiconductor photo diodes with and without internal gain, PN, PIN, Avalanche Photo diodes, Phototransistors.

Unit 5 : Optical Networks (06)
Optical Networks: Introduction, networking terminology, optical network modes, SONET / SDH, SONET/SDH rings, Optical Ethernet, data buses, Fiber Distributed Data Interface (FDDI).

Unit 6 : Fiber Optical Communication Systems (06)
Introduction, Transmitter Design, Receiver Design, Noise equivalent model of receiver, Link Design, Wavelength Division Multiplexing (WDM), DWDM, Optical Time Division Multiplexing.

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

ICA consists of minimum 8Practicals based upon above curriculum.

Suggested List of Practicals:

1. Setting up fiber optic analog& digital link.
2. Frequency modulation using fiber optic cable.
3. Pulse width Modulation using fiber optic cable.
4. Study of propagation loss in optical fiber.
5. Study of bending loss in optical fiber.
6. Measurement of optical power using optical power meter.
7. Measurement of Numerical Aperture.
8. Transmission of voice signal using FOC.
9. Study of WDM .
10. Study of LED output characteristics.

- **Text Books:**

1. Optical Fiber Communications, John M. Senior, Pearson Education. 3rd Impression, 2007
2. Optical Fiber Communications, Gerd Keiser, 4th Ed., MGH, 2008
3. Optical Fiber Communications ,D.C.Agarwal - S.Chand and company

- **Reference Books:**

1. Optical Communications, David Gover – PHI
2. Fiber Optics communication, HozoldKolimbiris - Pearson Education.
3. Fiber Optics Communication – 5th Edition, Palais-Pearson Education

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T. Y. B.Tech (Electronics& Telecommunication Engineering)
Semester-II
ET325.2: OPEN ELECTIVE-II
SENSORS & APPLICATIONS

Teaching Scheme:
Lectures– 3 Hours/week, 3 Credits
Practical – 2 Hours/week, 1 Credit

Examination Scheme:
ESE – 70 Marks
ISE –30 Marks
ICA- 25 Marks

This course provides good knowledge of working of different types of sensors used in various application areas. This course also provides knowledge of interfacing of electronic circuits with different sensors for its applications in different fields.

Course Prerequisite:
Concept of internal characteristics of passive elements like resistor, capacitor, inductor etc., Diode and transistor working, knowledge of basic fundamentals of mechanical terms like position, strain, stress etc.

Course Objectives:
1. To introduce students with the basics of various sensors and its characteristics.
2. To make students familiar with the working principle of different types of sensors and transducers.
3. To introduce various signal conditioning and smoothing circuits for sensors
4. To familiarize students with different sensor technologies and interfacing techniques.
5. To introduce students with the concept of actuators.

Course Outcomes:
At the end of this course, Students will be able to,
1. Elaborate the concept of sensors and its characteristics.
2. Describe the working principle of analog and digital sensors.
3. Design sensor interface circuits for a given engineering problem.
4. Select an appropriate sensor for a given engineering application based on interface technique, material and technology of a sensor.
5. Describe the working principle of different types of actuators.

Section I

Unit 1: Sensors Fundamentals and Characteristics (06)
Sensors, Signals and Systems, Sensor Classification, Units of Measurements, Sensor Characteristics

Unit 2: Physical Principles of Sensing (08)
Electric Charges, Fields, and Potentials, Capacitance, Magnetism, Induction, Resistance, Piezoelectric Effect, Hall Effect, Temperature and Thermal Properties of Material, Heat Transfer, Light, Dynamic Models of Sensor Elements

Unit 3 : Interface Electronic Circuits (10)
Input Characteristics of Interface Circuits, Amplifiers, Excitation Circuits, Analog to Digital Converters, Direct Digitization and Processing, Bridge Circuits, Data Transmission, Batteries for Low Power Sensors

Section II

Unit 4: Sensors in Different Application Area (09)
Occupancy and Motion Detectors, Position, Displacement, and Level, Velocity and Acceleration, Force, Strain, and Tactile Sensors, Pressure Sensors, Humidity and Moisture Sensors, Light Detectors, Temperature Sensors

Unit 5 : Sensor Materials and Technologies (08)
Materials, Surface Processing, Nano-Technology

Unit 6 : Actuators (07)
Introduction, Classification, Principle of Operation (Electrical Actuators, Electromagnetic Actuators, Electromechanical Actuators, Hydraulic and Pneumatic Actuators, Micro- and Nanoactuators), Selection Criteria.

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

ICA consists of minimum Ten Practical's and/or assignments based upon above curriculum.

- **Text Books:**

1. J. Fraden, Handbook of Modern Sensors:Physical, Designs, and Applications, AIP Press, Springer
2. Sensors and Actuators Engineering System Instrumentation By Clarence W de Silva
3. Electrical and Electronic Measurements and instrumentation R.K Rajput S. Chand

- **Reference Books:**

1. D. Patranabis, Sensors and Transducers, PHI Publication, New Delhi
2. A Course in Electronics and Electrical Measurements and Instruments J.B. Gupta Katson Books
3. A Course in Electrical and Electronic Measurements and Instrumentation A.K.Sawheny Dhanpat Rai