Punyashlok Ahilyadevi Holkar Solapur University, Solapur

NAAC Accredited-2022
'B^{++}' Grade (CGPA 2.96)

Name of the Faculty: Science & Technology

New Education Policy 2020

Structure: F.Y. B. Tech. (All Branches)

Name of the Course: First Year B. Tech. I (Sem.– I & II)

(Syllabus to be implemented from June 2023)

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

FACULTY OF SCIENCE & TECHNOLOGY

CBCS Curriculum for First Year B. Tech. (All Branches)

With effect from 2023-2024

Semester I:

Course Type	*Course Code*	*Name of the Course*	*Engagement Hours*		*Credits*	*FA*	*SA*		*Total*
			L	*P*		*ESE*	*ISE*	*ICA*	
BSC	BSC-01/ BSC-02	Engineering Physics / Engineering Chemistry $	3	2	4	70	30	25	125
	BSC-03	Engineering Mathematics-I	3	2	4	70	30	25	125
ESC	ESC-01/ ESC-02	Basics of Civil and Mechanical Engineering / Basic Electrical & Electronics Engineering #	3	2	4	70	30	25	125
	ESC-03	Engineering Mechanics	3	2	4	70	30	25	125
AEC	AEC-01	Communication Skills	1	2	2	-	25	25	50
CC	CC-01	Sports and Yoga or NSS / NCC / UBA (Liberal Learning Course-I)	1	2	2	-	-	25	25
SEC	SEC-01	Workshop Practices	-	2	1	-	-	25	25
Total			**14**	**14**	**21**	**280**	**145**	**175**	**600**
Student Induction Program**									

Semester II

Course Type	*Course Code*	*Name of the Course*	*Engagement Hours*		*Credits*	*FA*	*SA*		*Total*
			L	*P*		*ESE*	*ISE*	*ICA*	
BSC	BSC-01/ BSC-02	Engineering Physics / Engineering Chemistry $	3	2	4	70	30	25	125
	BSC-04	Engineering Mathematics - II	3	2	4	70	30	25	125
ESC	ESC-01/ ESC-02	Basics of Civil and Mechanical Engineering / Basic Electrical & Electronics Engineering #	3	2	4	70	30	25	125
	ESC-04	Engineering Graphics and CAD	-	4	2	-	25	50	75
SEC	SEC-02	Data Analysis and Programming Skills	1	2	2	-	25	25	50
CC	CC-02	Professional Personality Development (Liberal Learning Course-II)	1	2	2	-	25	25	50
IKS	IKS-01	Introduction to Indian Knowledge System	2	-	2	-	25	25*	50
Total			**13**	**14**	**20**	**210**	**190**	**200**	**600**
Democracy, Elections and Good Governance *			**1**			**50**			

***For IKS activity report should be submitted**

BSC- Basic Science Course **ESC-** Engineering Science Course, **PCC-** Programme Core Course ,
AEC- Ability Enhancement Course, **IKS-** Indian Knowledge System, **CC-** Co-curricular Courses ,
VSEC-Vocational and Skill Enhancement Course

- Notations used–

L : Lecture **P :** Lab Sessions
FA : Formative Assessment **SA :** Summative Assessment
ESE : End Semester Examination **ISE :** In Semester Evaluation
ICA : Internal Continuous Assessment

- **Notes-**

1. $ - Indicates student may choose Engineering Physics or Engineering Chemistry in either first or second semester. Those who have taken Engineering Physics in first semester will take Engineering Chemistry in second semester. Those who have taken Engineering Chemistry in first semester will take Engineering Physics in second semester.
2. # - Indicates student may choose Basics of Civil and Mechanical Engineering or Basic Electrical & Electronics Engineering in either first or second semester. Those who have taken Basics of Civil and Mechanical Engineering in first semester will take Basic Electrical & Electronics Engineering in second semester. Those who have taken Basic Electrical & Electronics Engineering in first semester will take Basics of Civil and Mechanical Engineering in second semester.
3. For the Course Basic Electrical & Electronics Engineering, practical of Basic Electrical Engineering and Basic Electronics Engineering will be conducted in alternate weeks.
4. For the Course Basics of Civil and Mechanical Engineering, practical of Basics of Civil Engineering and Basics of Mechanical Engineering will be conducted in alternate weeks.
5. In Semester Evaluation (ISE) marks shall be based upon student's performance in three tests conducted & evaluated at institute level.
6. Internal Continuous Assessment Marks (ICA) is calculated based upon student's performance during practical sessions.
7. *- Democracy, Elections & Good Governance is mandatory course. The marks earned by student with this course shall not be considered for calculation of SGPA/CGPA. However, student must complete End Semester Examination (ESE) of 50 marks (as prescribed by university) for fulfillment of this course. This course is not considered as a passing head for counting passing heads for ATKT. However, student must pass this subject for award of the degree.
8. Student must complete induction program of minimum five days before commencement of the regular academic schedule at the first semester.

**** GUIDELINES FOR STUDENT INDUCTION PROGRAM**

New entrants into an Engineering program come with diverse thoughts, mind set and different social, economic, regional and cultural backgrounds. It is important to help them adjust to the new environment and inculcate in them the ethos of the institution with a sense of larger purpose.

An induction program for the new UG entrant students is proposed at the commencement of the first semester. It is expected to complete this induction program before commencement of the regular academic schedule.

Its purpose is to make new entrants comfortable in their new environment, open them up, set a healthy daily routine for them, create bonding amongst the peers as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

The Induction Program shall encompass (but not limited to) below activity –

1. Physical Activities
2. Creative Arts
3. Exposure to Universal Human Values
4. Literary Activities
5. Proficiency Modules
6. Lectures by Experts / Eminent Persons
7. Visit to Local Establishments like Hospital /Orphanage
8. Familiarization to Department

Induction Program Course do not have any marks or credits however performance of students for Induction Program is assessed at institute level using below mandatory criteria –

1. Attendance and active participation
2. Report writing

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

NAAC Accredited-
2015'B'Grade
(CGPA2.62)

Name of the Faculty: Science & Technology

CHOICE BASED CREDIT SYSTEM (CBCS)

Structure of

Second Year B. Tech. (Mechanical Engineering)

w.e.f. Academic Year : 2021-2022

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science & Technology
Mechanical Engineering
S. Y. B. Tech. Semester-III

Choice Based Credit System (CBCS) Structure w.e.f. Academic Year 2021-2022

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
ME215x	Professional Elective-I	3	-	-	-	3	30	70	-	100
	Sub Total	**15**	**-**	**-**	-	**15**	**150**	**350**		**500**
MEV21	**Environmental Sciences**	**1**	**-**	**-**	-	**-**	**-**	**-**	**-**	**-**

Laboratory / Tutorial Courses

Course Code	Name of Laboratory/Tutorial Course	Hrs./week					Examination Scheme				
		L	T	P	D	Credits	ISE	ESE		ICA	Total
								POE	OE		
ME211	Applied Thermodynamics	-	-	2	-	1	-	-	-	25	25
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
ME215x	Professional Elective-I	-	-	2	-	1	-	-	-	25	25
	Sub Total	-	1	6	-	6	-	75		150	200
	Grand Total	**15**	**1**	**6**	**4**	**21**	**150**	**425**		**150**	**725**

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: ME2151 Microprocessors in Automation, ME2152 Internal Combustion Engines, ME2153 Composite Materials

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science & Technology
Mechanical Engineering
S. Y. B. Tech. Semester-IV

Choice Based Credit System (CBCS) Structure w.e.f. Academic Year 2021-2022

Theory Courses

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
ME225y	Professional Elective-II	3	-	-	-	3	30	70	-	100
	Sub Total	**15**	**-**	**-**	-	**15**	**150**	**350**		**500**
MEV22	**Environmental Sciences**	**1**	**-**	**-**	-	**-**	**-**	**-**	**-**	**-**

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
ME225y	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	-	1	**12**	**-**	**7**	**-**	**50**		**200**	**250**
	Grand Total	**15**	**1**	**12**		**22**		**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: ME2251 Mechatronic Systems, ME2252 Power Plant and Energy Engineering,ME2253 Solid Mechanics

1. Batch size for the practical / tutorial shall be of 20 students. On forming the batches, if the strength of remaining student exceeds 9, then a new batch shall be formed.

2 Student is required to study Environmental Science subject in Second Year and passing in the same to become eligible for award of degree.

3 Industrial Training/Internship (evaluated at B. Tech Semester-VII) of minimum 30 days shall be completed in any vacation after S.Y. B. Tech. Semester-III, but before B. Tech. Semester-VII & the report shall be submitted and evaluated in B. Tech. Semester-VII.

4 ICA assessment shall be a continuous process based on student's performance in – class tests, assignments, homework, seminars, quizzes, and laboratory books and their interaction and attendance for theory and lab sessions, as applicable.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Faculty of Science and Technology

Credit System structure of T.Y. B. Tech. Mechanical Engineering W.E.F. 2022-2023 [Semester V]

Semester V: Theory Courses

Course code	*Name of Theory Course*	Hrs./week				Credits	Examination Scheme			
		L	T	P	D		ISE	ESE	ICA	Total
ME 311	Design of Machine Elements	3	-	-	-	3	30	70	-	100
ME 312	CAD-CAM-CAE	3	-	-	-	3	30	70	-	100
ME 313	Metallurgy	3	-	-	-	3	30	70	-	100
ME 314	Industrial Engineering	3	-	-	-	3	30	70	-	100
ME 315 P	Professional Elective -III	3	-	-	-	3	30	70	-	100
ME 316	Advanced Programming Concepts – I(Python)	1	-	-	-	1				
SLH31	Self Learning -HSS	-	-	-	-	#2	-	50	-	50
	Sub Total	16	-	-	-	16	150	400	-	550

Semester V: 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*		
ME 311	Design of Machine Elements	-	-	2	-	1	-	-	-	25	25
ME 312	CAD CAM CAE	-	-	2	-	1	-	-	-	25	25
ME 313	Metallurgy	-	-	2	-	1	-	-	25	25	50
ME 315 P	Professional Elective -III	-	-	2	-	1	-	-	-	25	25
ME 316	Advanced Programming Concepts - I(Python)	-	-	2	-	1	-	-	-	25	25
Me 317	Workshop Practice - II	-	-	2	-	1	-	-	-	50	50
ME 318	Metrology	-	-	2	-	1	-	25	-	25	50
	Sub Total	-	-	14	-	07	-	50		200	250
	Grand Total	**16**	-	14	-	23	150	450		200	800

Note:# Indicates credits over and above

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

Professional Elective –III: A. Gas Turbines, B. Tool Engineering, C. Industrial Hydraulics Pneumatics D. Mechanical Vibrations

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Faculty of Science and Technology

Credit System structure of T.Y. B. Tech. Mechanical Engineering W.E.F. 2022-2023 [Semester VI]

Semester VI : Theory Courses

Course code	*Name of Theory Course*	Hrs./week				Credits	Examination Scheme			
		L	T	P	D		ISE	ESE	ICA	Total
ME 321	Transmission System Design	3	-	-	-	3	30	70	-	100
ME 322	Instrumentation and Control Engineering	3	-	-	-	3	30	70	-	100
ME 323	Heat Transfer	3	-	-	-	3	30	70	-	100
ME 324	Industrial & Quality Management	3	-	-	-	3	30	70	-	100
ME 325 P	Professional Elective - IV	3	-	-	-	3	30	70	-	100
ME 327	Advanced Programming Concepts – II(Java)	1	-	-	-	1	-	-	-	-
	Sub Total	**16**	**-**	**-**	**-**	**16**	**150**	**350**	**-**	**500**

Semester VI : 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*		
ME 321	Transmission System Design	-	-	2	-	1	-	-	25	25	50
ME 322	Instrumentation and Control Engineering	-	-	2	-	1	-	-	-	25	25
ME 323	Heat Transfer	-	-	2	-	1	-	25	-	25	50
ME 324	Industrial & Quality Management	-	1	-	-	1	-	-	-	25	25
ME 325 P	Professional Elective - IV	-	-	2	-	1	-	-	-	25	25
ME 326	Workshop Practice - III	-	-	2	-	1	-	-	-	50	50
ME 327	Advanced Programming Concepts – II (Java)	-	-	2	-	1	-	-	-	25	25
ME 328	Mini Project	-	1	-	-	1	-	-	-	50	50
	Sub Total		02	12	-	08	-	50		250	300
	Grand Total	**16**	02	12	-	24	150	400		250	800

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

Professional Elective – IV: A. Project Management, B. Industrial Product Design C. Plastic Engineering, D. Railway Transportation System.

- **Note** –

1. Batch size for the practical /tutorial shall be of 15 students. On forming the batches, if the strength of remaining students exceeds 07, then a new batch shall be formed.
2. Industrial Training (evaluated at Final Year Sem.-I) of minimum 30 days shall be completed in any vacation after S.Y. Sem.-IV but before Final Year Sem.VII & the report shall be submitted and evaluated in Final Year Sem.-VII.
3. Students shall select one Self Learning Module at T.Y. Sem. V from Humanities and Social Sciences.
4. Curriculum for Humanities and Social Sciences Self Learning Modules is common for all under graduate programmes of faculty of Engineering and Technology.

5. **For T. Y. Sem. V**

A. Student can select a Self Learning Course from PAH Solapur University, Solapur HSS Course List and appear for its examination as and when conducted by PAH Solapur University, Solapur

OR

B. Student can enroll for National Programme on Technology Enhanced Learning (NPTEL) course, complete its assignments and Appear for certificate examination as and when conducted by NPTEL.

For more details about Self Learning Course (HSS), please refer to separate rule document available from PAH Solapur University, Solapur (http://sus.ac.in/uploads/engineering/Eng%20Revised%20Semester%20Pattern/Self%20Learning-%20H.S.S.%20courses%20All%20Engg.Branches_2014-15.pdf). More details about NPTEL are available at http://nptel.ac.in

6. ICA assessment shall be a continuous process based on student's attendance and performance in class tests, assignments, homework, seminars, quizzes, case studies and journals, as applicable.

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY

FACULTY OF SCIENCE AND TECHNOLOGY

MECHANICAL ENGINEERING

Syllabus Structure for

FINAL YEAR B.TECH. MECHANICAL ENGINEERING

w.e.f.

ACADEMIC YEAR 2023-24

Choice Based Credit System

PUNYASHLOK AHILYADEVI HOLKAR
SOLAPUR UNIVERSITY
FACULTY OF SCIENCE & TECHNOLOGY
MECHANICAL ENGINEERING

Programme Educational Objectives and Outcomes

A. Program Educational Objectives (PEOs)

- **PEO1:** To make students competent for professional career in Mechanical and allied interdisciplinary areas
- **PEO2:** To build strong fundamentals required to pursue higher education and continue professional development in Mechanical and other fields
- **PEO3:** To imbibe professional ethics, develop team spirit and effective communication skills to be successful leaders with a holistic approach.
- **PEO4 :** To nurture students to be sensitive to ethical, societal and environmental issues while serving at their professional work

B. Program Outcomes (POs)

A Mechanical Engineering Graduate will be able to –

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Faculty of Science and Technology

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

Semester VII - Theory Courses

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

Semester VII - Laboratory / Tutorial Courses

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

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

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

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

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Faculty of Science and Technology

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

Semester VIII – Courses

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

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

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

ME 422, ME423 & ME424 are compulsory.

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

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

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

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

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

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

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

❖ **M421C Apprenticeship/Internship:**

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

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

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

Name of the Faculty: Engineering & Technology

CHOICE BASED CREDIT SYSTEM

Syllabus: ELECTRICAL ENGINEERING

Name of the Course: S.Y. B.Tech

(Syllabus to be implemented from w.e.f. June 2021)

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Engineering & Technology
B.Tech (Electrical Engineering)
PROGRAMME: BACHELOR OF ELECTRICAL ENGINEERING
PROGRAMME OBJECTIVES

A. PROGRAM EDUCATIONAL OBJECTIVES

1. Deliver fundamental as well as advanced knowledge with research initiatives in the field of electrical engineering with emphasis on state-of-the-art technology.
2. Graduates will demonstrate measurable progress in the fields they choose to pursue.
3. Design and develop technically feasible solutions for real world applications which are economically viable leading to societal benefits.
4. To nurture Graduates to be sensitive for ethical, societal and environmental issues while conducting their professional work.

B. PROGRAMME OUTCOMES

Students attain the following outcomes: -

1 **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2 **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3 **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4 **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5 **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6 **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7 **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8 **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9 **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10 **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11 **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12 **Lifelong learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

C. PROGRAMME SPECIFIC OUTCOMES

1 An ability to specify, design and analyze Power System, Electrical Machinery, Electronic Circuits, Drive Systems, Lightning Systems and deliver technological solution by adapting advances in allied disciplines.

2 Apply knowledge of electrical engineering to meet the desired needs within realistic constraints viz. economical, ethical, and environmental and safety.

3 Apply modern software tools for design, simulation and analysis of electrical systems to successfully adapt in multi-disciplinary environments.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Engineering & Technology
S.Y. B Tech. (Electrical Engineering

Choice Based Credit System Syllabus Structure of S.Y. B. Tech. Electrical Engineering W.E.F. 2021-22 ***Semester I***

Course Code	***Theory Course Name***	***Hrs./week***			***Credits***	***Examination Scheme***			
		L	***T***	***P***		***ISE***	***ESE***	***ICA***	***Total***
EL 211	Engineering Mathematics-III	2	1		3	30	70	25	125
EL 212	Electrical Machines-I	3	-		3	30	70	-	100
EL 213	Electrical Measurement and Instrumentation	3	-		3	30	70	-	100
EL 214	Power System I	3	1		4	30	70	25	125
EL 215	Electronic Devices and Circuits	3	-		3	30	70	-	100
EL 216	Object Oriented Programming with C++	1	-		--	--	--	-	--
Sub Total		**15**	**2**	**-**	**16**	**150**	**350**	**50**	**550**
Environmental Science		1							
Laboratory Course Name									
							ESE		
							POE	OE	
EL 212	Electrical Machines-I	-	-	2	1	-	50	-	25	75
EL 213	Electrical Measurement and Instrumentation	-	-	2	1	-	50	-	25	75
EL 215	Electronic Devices and Circuits	-	-	2	1	-		-	25	25
EL 216	Object Oriented Programming with C++	-	-	2	1	-	50	-	25	75
Sub Total		**-**	**-**	**8**	**4**		**150**		**100**	**250**
Grand Total		**15**	**2**	**8**	**20**	**150**	**500**		**150**	**800**

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

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Engineering & Technology
S. Y. B. Tech. (Electrical Engineering)

Choice Based Credit System Structure of S.Y.B.Tech. Electrical Engineering W.E.F. 2021-2022 ***Semester II***

Course Code	***Theory Course Name***	***Hrs./week***			***Credits***	***Examination Scheme***			
		L	***T***	***P***		***ISE***	***ESE***	***ICA***	***Total***
EL 221	Numerical Methods and Linear Algebra	2	1	-	3	30	70	25	125
EL 222	Electrical Machines-II	3	-	-	3	30	70	-	100
EL 223	Power System II	3	1	-	4	30	70	25	125
EL 224	Analog & Digital Integrated circuits	3	-	-	3	30	70	-	100
EL 225	Network Analysis	3	-	-	3	30	70	-	100
Sub Total		**14**	**2**	**-**	**16**	**150**	**350**	**50**	**550**
Environmental Science		1	-	-	-	-	-	-	-
Laboratory Course Name									
							ESE		
							POE	OE		
EL 222	Electrical Machines-II	-	-	2	1	-	50	-	25	75
EL 225	Network Analysis	-	-	2	1	-	50	-	25	75
EL 224	Analog & Digital Integrated circuits	-	-	2	1	-	-	-	25	25
EL 226	Computer Aided Design and Simulation	-	-	2	1	-	50	-	25	75
Sub Total		**-**	**-**	**8**	**4**	**-**	**150**		**100**	**250**
Grand Total		**14**	**2**	**8**	**20**	**150**	**500**		**150**	**800**

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

Note –

- Batch size for the SE practical /tutorial shall be of 20 students. On forming the batches, if the strength of remaining student exceeds 9, then a new batch shall be formed.
- Vocational Training (evaluated at B.E. Part-I) of minimum 15 days shall be completed in any vacation after S.E. Part-II but before B.E. Part-I & and evaluated on the basis of presentation as well as training report.
- Student shall select one Self Learning Module at T.E. Part I and T.E. Part II each from Technical and Humanities and Social
- Sciences Group with at least one Self Learning Module from the Humanities and Social Sciences Group
- Curriculum for Humanities and Social Sciences Self Learning Modules is common for all under graduate programmes of faculty of Engineering and Technology
- Minimum four assignments for Self-Learning Modules at T.E. Part I and T.E. Part II shall be submitted by the students which shall be evaluated by a Module Coordinator assigned by institute / department
- Project group for T.E.(Electrical) Part II Mini Project shall not be of more than three student
- Project group for B.E. (Electrical) Part I and Part II shall not be of more than FOUR students.
- ICA shall be a continuous process based on student's performance in – class tests, assignments, homework, subject seminars, quizzes, laboratory books and their interaction and attendance for theory and lab sessions as applicable

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

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

Name of the Faculty: Science and Technology

CHOICE BASED CREDIT SYSTEM

Structure and Syllabus: Computer Science & Engineering

Name of the Course: S.Y. B. Tech. Sem III and Sem IV

(Syllabus to be implemented from w.e.f. June 2021)

Programme Educational Objectives and Outcomes

A. Program Educational Objectives

1. To make students competent for professional career in Computers, IT & allied fields.
2. To build strong fundamental knowledge amongst student to pursue higher education and continueprofessional development in Computers, IT & other fields
3. To imbibe professional ethics, develop team spirit and effective communication skills to besuccessful leaders and managers with a holistic approach.
4. To nurture students to be sensitive to ethical, societal & environmental issues while conductingtheir professional work.

B. Program Outcomes Engineering Graduate will be able to –

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities withan understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7.Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

C. Program Specific Outcomes (PSOs)

1. Graduate has an ability to use technical skills necessary for design, maintenance, developmentand implementation of database systems and networking applications.
2. Graduate has an ability to provide IT solutions, develop mobile applications in multidisciplinaryareas using standard tools and techniques.
3. Graduate has an ability to utilize and apply software engineering tools for design and realizationof projects in various domains of Computer Science and Engineering.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
FACULTY OF SCIENCE AND TECHNOLOGY
Structure of S.Y. B.Tech.(CSE) wef. 2021-2022

Semester – III

Course Code	Theory Course Name	Engagement Hours			Credits	FA	SA		Total
		L	T	P		ESE	ISE	ICA	
CS211	Applied Mathematics-I	3	1		4	70	30	25	125
CS212	Discrete Mathematical Structures	3	1		4	70	30	25	125
CS213	Data structures	3			3	70	30		100
CS214	Computer Graphics	3			3	70	30		100
CS215	Microprocessors	3			3	70	30		100
CS216	Python Programming	2			2		25		25
	Sub Total	**17**	**2**		**19**	**350**	**175**	**50**	**575**
	Environmental studies	2				50			50
	Laboratory/Workshop					**ESE / POE**			
CS213	Data structures			2	1	50		25	75
CS214	Computer Graphics			2	1			25	25
CS215	Microprocessors			2	1			25	25
CS216	Python Programming			2	1	50		25	75
	Sub Total			**8**	**4**	**100**		**100**	**200**
	Grand Total	**19**	**2**	**8**	**23**	**450**	**175**	**150**	**775**

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
FACULTY OF SCIENCE AND TECHNOLOGY
Structure of S.Y. B.Tech.(CSE) wef. 2021-2022

Semester – IV

Course Code	Theory Course Name	Engagement Hours			Credits	FA	SA		Total
		L	T	P		ESE	ISE	ICA	
CS221	Applied Mathematics-II	3	1		4	70	30	25	125
CS222	Theory of Computation	3	1		4	70	30	25	125
CS223	Computer Organization and Architecture	3			3	70	30		100
CS224	Computer Networks	3			3	70	30		100
CS225	OOP using Java	2			2		25		25
	Total	**14**	**2**		**16**	**280**	**145**	**50**	**475**
	Environmental studies	2				50			50
	Laboratory/Workshop					**ESE** / **POE**			
CS223	Computer Organization and Architecture			2	1			25	25
CS224	Computer Networks			2	1	50		25	75
CS225	OOP using Java			4	2	50		25	75
	Total			**8**	**4**	**100**		**75**	**175**
	Grand Total	**16**	**2**	**8**	**20**	**380**	**145**	**125**	**650**

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

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

Name of the Faculty: Science and Technology

CHOICE BASED CREDIT SYSTEM

Structure & Syllabus

Name of the Course: B. Tech. (Computer Science & Engineering)

(Syllabus to be implemented from June 2022)

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
FACULTY OF SCIENCE AND TECHNOLOGY
Structure of T.Y. B. Tech. (CSE) w.e.f. 2022-2023 Semester-I

Course Code	Theory Course Name	Engagement Hours			Credits	FA	SA		Total
		L	T	P		ESE	ISE	ICA	
CS311	Artificial Intelligence	3			3	70	30		100
CS312	Operating Systems	3			3	70	30		100
CS313	Database Engineering	3			3	70	30		100
CS314	Design and Analysis of Algorithm	3			3	70	30		100
CS315	Mobile Application Development	2			2		25		25
SL31	Self-Learning Module I (HSS)				1	50			50
	Sub Total	**14**			**15**	**330**	**145**		**475**
	Laboratory/Workshop					**ESE** / **POE**			
CS311	Artificial Intelligence			2	1			25	25
CS312	Operating Systems			2	1			25	25
CS313	Database Engineering			2	1	50		25	75
CS314	Design and Analysis of Algorithm			2	1	50		25	75
CS315	Mobile Application Development			2	1	50		25	75
	Sub Total			**10**	**5**	**150**		**125**	**275**
	Grand Total	**14**		**10**	**20**	**480**	**145**	**125**	**750**

Note :

1. Batch size for the practical/tutorial shall be of 15 students. On forming the batches, if the strength of remaining student exceeds 7, then a new batch shall be formed.
2. Vocational Training (evaluated at Final Year B. Tech. Semester VII) of minimum 15 days shall be completed in vacation/s after S.Y. B. Tech. Semester IV but before Final Year B.Tech. Semester VII & the report shall be submitted and evaluated in Final Year B.Tech. Semester VII
3. ICA assessment shall be a continuous process based on student's performance in – class tests, assignments, homework, subject seminars, quizzes, laboratory books and their interaction and attendance for theory and lab sessions as applicable.

4. **Self-Learning Module I at T.Y. B.Tech. – I**
   Curriculum for Humanities and Social Sciences, Self Learning Module - I is common for all under graduate engineering programs.

A. Student can select & enroll a Self Learning Module I Course from PAH Solapur University, Solapur HSS Course List (SL31-A) and appear for university examination.

SL31-A: P. A. H. Solapur University, Solapur: HSS Course List

1. Economics	4. Stress and Coping
2. Intellectual Property Rights for Technology Development and Management	5. Professional Ethics & Human Value
3. Introduction to Sociology	

OR

B.Student can select and enroll for university approved minimum eight weeks NPTEL HSS course (SL31-B), complete its assignments and appear for certificate examination conducted by NPTEL. The list of courses as shown in Table SL31-B will be updated from time to time by University authorities. Latest updated list will be valid for selection of self learning Module-I (HSS) courses.
More details about NPTEL are available at http://nptel.ac.in

SL31-B: University approved NPTEL- HSS course List

1. Soft skills	15. Management of Inventory Systems
2. Introduction to Modern India Political Thought	16. Economic Growth and Development
3. Intellectual Property	17. Ethic in Engineering Practice
4. Technical English for Engineers	18. Corporate Social Responsibility
5. Developing Soft Skills and Personality	19. Marketing Management –I
6. Educational Leadership	20. Marketing Research and Analysis
7. Microeconomics: Theory & Applications	21. Selected Topics in Decision Modeling
8. Engineering Economics	22. Innovation, Business Models and Entrepreneurship
9. Human Resource Development	23. Simulation of Business Systems: An Applied Approach
10. Project Management for managers	24. Sustainability through Green Manufacturing Systems: An Applied Approach
11. Data Analysis and Decision Making - I	25. Total Quality Management - I
12. E-Business	26. Introduction to Operations Research
13. Working Capital Management	27. Knowledge Management
14. Industrial Safety Engineering	

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
FACULTY OF SCIENCE AND TECHNOLOGY
Structure of T.Y. B. Tech. (CSE) w.e.f. 2022-2023Semester-II

Course Code	Theory Course Name	Engagement Hours			Credits	FA	SA		Total
		L	T	P		ESE	ISE	ICA	
CS321	System Programming	3			3	70	30		100
CS322	Internet of Things	3			3	70	30		100
CS323	Software Engineering	3	2		5	70	30	25	125
CS324	Professional Elective-I	3			3	70	30		100
CS325	Web UI and UX Technology	2			2		25		25
CSO326	Open Elective	2			2	50			50
	Sub Total	**16**	**2**		**18**	**330**	**145**	**25**	**500**
	Laboratory/Workshop					**ESE / POE**			
CS321	System Programming			2	1			25	25
CS322	Internet of Things			2	1			25	25
CS324	Professional Elective-I			2	1			25	25
CS325	Web UI and UX Technology			2	1	50		25	75
CS327	Mini Project			2	1	50		25	75
	Sub Total			**10**	**5**	**100**	**0**	**125**	**225**
	Grand Total	**16**	**2**	**10**	**23**	**430**	**145**	**150**	**725**

Professional Elective – I	**Open Elective**
Cloud Computing	Principles of Management: Practicing Ethics, Responsibility,Sustainability
Augmented Reality/Virtual Reality	Engineering Economics and Management
Network Security	Disaster Management

Note

1. Batch size for the practical /tutorial shall be of 15 students. On forming the batches, if the strength of remaining student exceeds 7, then a new batch shall be formed.
2. Vocational Training (evaluated at Final Year B. Tech. Semester VII) of minimum 15 days shall be completed in vacation/s after S.Y. B.Tech. Semester IV but before Final Year B.Tech. Semester VII & the report shall be submitted and evaluated in Final Year B.Tech. Semester VII
3. ICA assessment shall be a continuous process based on student's performance in – class tests, assignments, homework, subject seminars, quizzes, laboratory books and their interaction and attendance for theory and lab sessions as applicable.
4. Mini Project shall consist of developing software, based on various tools & technologies.
5. Project groups shall not be of more than **five** students.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

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

Name of the Faculty: Science and Technology

CHOICE BASED CREDIT SYSTEM

Syllabus : Computer Science and Engineering

Name of the Course: Final Year B.Tech (CSE)

(Syllabus to be implemented from w.e.f. June 2023)

Programme Educational Objectives and Outcomes

A. Program Educational Objectives

1. Graduate will exhibit strong fundamental knowledge and technical skills in the field of ComputerScience & Engineering to pursue successful professional career, higher studies and research.
2. Graduate will exhibit capabilities to understand and resolve various societal issues through theirproblem solving skills.
3. Graduate will be sensitive to ethical, societal and environmental issues as a software engineeringprofessional and be committed to life-long learning.

B. Program Outcomes

Engineering Graduate will be able to –

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities withan understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

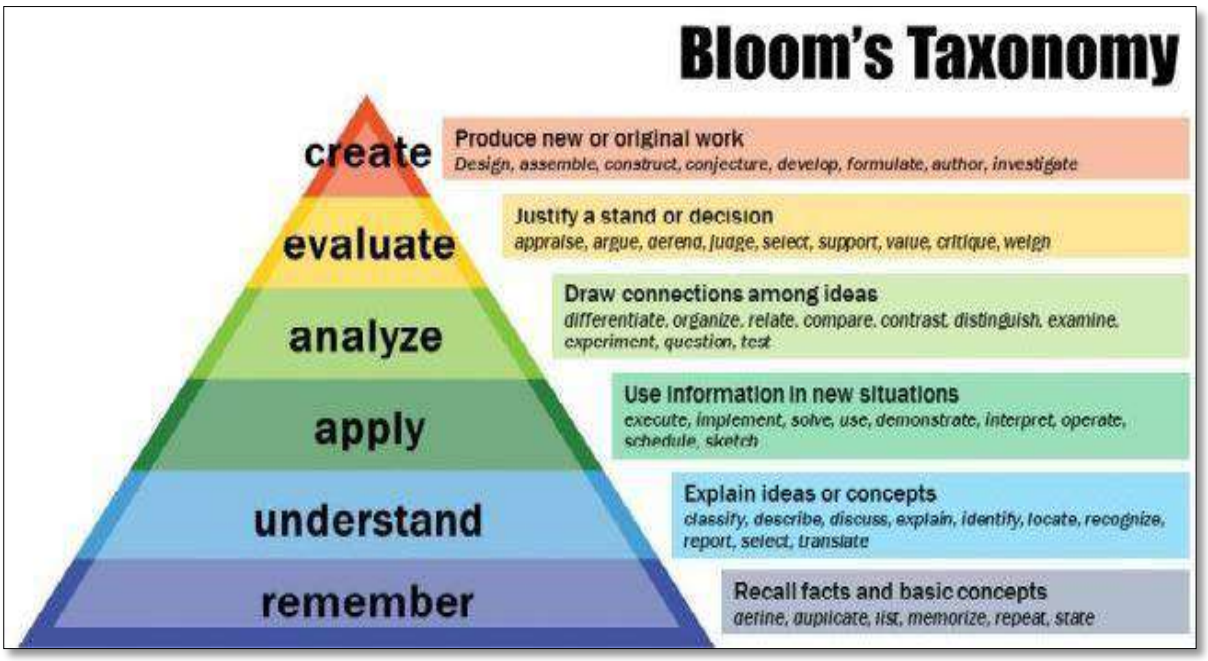
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

C. Program Specific Outcomes (PSOs)

1. Apply the principles of computational mathematics, computer systems and programming paradigms to solve computational problems.

2. Design and develop application software with functionalities applicable for desktop, web and mobile applications with due consideration of system software constraints.

3. Apply software engineering methods, cutting edge technologie and ICT, using appropriate tools and FOSS alternatives for designing ,developing & testing application software


Bloom's Taxonomy
create
Produce new or original work
Design, assemble, construct, conjecture, develop, formulate, author, investigate
evaluate
Justify a stand or decision
appraise, argue, defend, judge, select, support, value, critique, weigh
analyze
Draw connections among ideas
differentiate, organize, relate, compare, contrast, distinguish, examine, experiment, question, test
apply
Use information in new situations
execute, implement, solve, use, demonstrate, interpret, operate, schedule, sketch
understand
Explain ideas or concepts
classify, describe, discuss, explain, identify, locate, recognize, report, select, translate
remember
Recall facts and basic concepts
define, duplicate, list, memorize, repeat, state

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
FACULTY OF SCIENCE AND TECHNOLOGY
Structure of Final Year B.Tech.(CSE) wef. 2023-2024
Semester-I

Course Code	Theory Course Name	Engagement Hours			Credits	FA	SA		Total
		L	T	P		ESE	ISE	ICA	
CS411	Software Testing and Quality Assurance	3	--	--	3	70	30		100
CS412	Compiler Construction	3	--	--	3	70	30		100
CS413	Professional Elective-II	3	--	--	3	70	30		100
CS414	Professional Elective-III	3	--	--	3	70	30		100
CS415	DevOps	2	--	--	2		25		25
SL41	Self Learning (Technical)				1	50			50
	Sub Total	**14**	**0**	**0**	**15**	**330**	**145**		**475**
	Laboratory/Workshop					**ESE POE**			
CS411	Software Testing and Quality Assurance	--	--	2	1			25	25
CS412	Compiler Construction	--	--	2	1			25	25
CS413	Professional Elective-II	--	--	2	1			25	25
CS414	Professional Elective-III	--	--	2	1			25	25
CS415	DevOps	--	--	2	1	50		25	75
CS416	Project Phase-I	--	--	2	1	25		25	50
CS417	Vocational Training	--	--	--	1			25	25
	Sub Total			**12**	**7**	**75**		**175**	**225**
	Grand Total	**14**	**0**	**12**	**23**	**405**	**145**	**175**	**700**

Professional Elective-II		**Professional Elective-III**	
CS413A	Business Intelligence	CS414A	Human Computer Interaction
CS413B	Data Mining	CS414B	Big Data Analytics
CS413C	Distributed Systems	CS414C	Information Retrieval
CS413D	Management Information System		

Self Learning (Technical)	
SL41A	UI or UX Technology
SL41B	Software Licenses and Practices

Note :

1. Vocational Training (evaluated at Final Year B.Tech Semester VII) of minimum 15 days shall be completed in any vacation after S.Y. B.Tech Semester IV but before Final Year B.Tech Semester VII& the report shall be submitted and evaluated in Final Year B.Tech. Semester VII.
2. Appropriate Professional Elective II & III Subjects may be added when required.
3. Project group for Final Year B.Tech. Semester VII and Semester VIII shall comprise of 3 to 5 students
4. ICA assessment shall be a continuous process based on student's performance in – class tests, assignments, homework, subject seminars, quizzes, laboratory books and their interaction and attendance for theory and lab sessions as applicable.

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
FACULTY OF SCIENCE AND TECHNOLOGY
Structure of Final Year B.Tech.(CSE) wef. 2023-2024
Semester-II

Course Code	Theory Course Name	Engagement Hours			Credits	FA	SA		Total
		L	T	P		ESE	ISE	ICA	
SL42A	Self-Learning Technical (MOOC/Swayam / NPTEL)				4	100*			100*
SL42B	Self Learning Technical Course offered by Institute				4	100*			100*
SL42C	Apprenticeship/Internship				4	100*			100*
	Sub Total				**4**	**100**			**100**
	Laboratory/Workshop					**ESE** / **POE**			
CS421	Project Phase-II			20	10	100		100	200
	Sub Total			**20**	**10**	**100**			**200**
	Grand Total			**20**	**14**	**200**		**100**	**300**

* Students shall opt for any one of the three courses (i.e. out of CS 421-A, CS 421-B and CS 421-C, students can select any one course for obtaining 4 credits of 100 marks).

Note:

1. Project group for Final Year B.Tech. Semester VII& VIII shall comprise of 3 to 5 students.
2. ICA assessment shall be a continuous process based on student's performance in class tests, assignments, homework, subject seminars, quizzes, laboratory books and their interaction and attendance for theory and lab sessions as applicable
3.

- SL42A - Self Learning Technical Course (MOOC/Swayam/NPTEL):

- ESE 100 Marks, Credits: 4, transferrable from Online Examinations conducted by approved MOOC platform.

- SL42B Self Learning Technical Course offered by institute:

- ESE 100 Marks, Credits: 4, Course shall be designed by the Institute
  Institute level examination to be conducted by Institute offering the course.

- SL42C Apprenticeship/Internship (Self Learning):
  - Students shall opt for semester long internship/apprenticeship (minimum 60 days).
  - ESE 100 Marks, Credits: 4 (Oral Examination based on the report of Apprenticeship/Internship)
  - Apprenticeship/Internship may be of the following type:
    1. Offered by industry at their premises.
    2. Offered by industry at the institute campus.
    3. Offered by institute jointly with the industry.

Punyashlok Ahilyadevi Holkar Solapur University,Solapur

NAAC Accredited-2015'B'Grade(CGPA2.62)

Name of the Faculty: Science&Technology

Choice Based Credit System

ELECTRONICS & TELECOMMUNICATION ENGINEERING

Structure for

S.Y. B.Tech (Electronics & Telecommunication Engineering) w.e.f.

Academic Year 2021-22

T.Y. B.Tech (Electronics & Telecommunication Engineering) w.e.f.

Academic Year 2022-23

Final Year B.Tech (Electronics & Telecommunication Engineering) w.e.f. Academic Year 2023-24

PUNYASHLOK AHILYADEVI HOLKARSOLAPUR UNIVERSITY, SOLAPUR

FACULTY OF SCIENCE& TECHNOLOGY

Electronics & Telecommunication Engineering

Programme Educational Objectives and Outcomes

A. Program Educational Objectives

1. To make students competent for professional career in Electronics & allied fields.
2. To build strong fundamental knowledge amongst student to pursue higher education and continue professional development in Electronics & other fields
3. To imbibe professional ethics, develop team spirit and effective communication skills to be successful leaders and managers with a holistic approach.
4. To nurture students to be sensitive to ethical, societal & environmental issues while conducting their professional work.

B. Program Outcomes

Electronics & Telecommunication Engineering Graduate will be able to –

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

C. Program Specific Outcomes

1. **Solid foundation** : Graduates will be able to attain a **solid foundation** in Electronics and Tele-Communication Engineering with an ability to function in multidisciplinary environment.
2. **Techniques and Skills**: Graduates will be able to use **techniques and skills** to design, analyze, synthesize, and simulate Electronics and Communication Engineering components and systems.
3. **Developing Programs:** Graduate will be capable of **developing programs** in Assembly, High level and HDL languages using contemporary tools for software development.

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

FACULTY OF SCIENCE & TECHNOLOGY

Credit System structure of S.Y. B.Tech. Electronics & Telecommunication Engineering ***W.E.F. 2021-22***

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	3	--	--	3	30	70	25	125
ET213	Network Theory and Analysis	3	--	--	3	30	70	--	100
ET214	Digital Techniques	3	--	--	3	30	70	25	125
ET215	Analog Communication	3	--	--	3	30	70	25	125
Sub Total		15	1	--	16	150	350	100	600
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	--	--	--	25	25
ET214	Digital Techniques	--	--	2	1	--	25	--	--	25
ET215	Analog Communication	--	--	2	1	--	25	--	--	25
E216	Electronics Software Lab-I	--	1	2	2	--	--	--	25	25
Sub Total		--	1	10	6	--	100		50	150
Grand Total		**15**	**2**	**10**	**22**	**150**	**450**		**150**	**750**

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 Circuit Analysis and Design include some of the practical from Network Theory and Analysis

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

FACULTY OF SCIENCE & TECHNOLOGY

Credit System structure of S.Y. B.Tech. Electronics & Telecommunication Engineering ***W.E.F. 2021-22***

Semester II

Course Code	***Theory Course Name***	***Hrs./week***			***Credits***	***Examination Scheme***			
		L	***T***	***P***		***ISE***	***ESE***	***ICA***	***Total***
ET221	Control System	3	1	_	4	30	70	25	125
ET222	Analog Integrated Circuits	3	_	_	3	30	70	25	125
ET223	Principles of Digital Communication	3	--	--	3	30	70	25	125
ET224	Signals and Systems	3	1	_	4	30	70	25	125
ET225	Data Structures	3	_	_	3	30	70	--	100
Sub Total		15	2	--	17	150	350	100	600
ENV22	Environmental Science	1	-	--	--	--	--	--	--
Course Code	***Laboratory Course Name***								
							ESE		
							POE	***OE***	
ET222	Analog Integrated Circuits	_	_	2	1	_	25	_	--	25
ET223	Principles of Digital Communication	--	--	2	1	--	25	--	--	25
ET225	Data Structures	_	_	2	1	--	--	--	25	25
ET226	Electronic Software Lab-II	1	--	4	3	_	50	--	25	75
Sub Total		--	--	10	6	--	100		50	150
Grand Total		**16**	**2**	**10**	**23**	**150**	**450**		**150**	**750**

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:

1. Student is required to study and pass Environmental Science subject in Second Year to become eligible for award of degree.
2. Batch size for the practical /tutorial shall be of 18 students. On forming the batches, if the strength of remaining students exceeds 9, then a new batch shall be formed.
3. Vocational Training (evaluated at Final Year Part-I) of minimum 15 days shall be completed in any vacation after S.Y. Part-I but before Final Year Part-I & the report shall be submitted and evaluated in Final Year Part-I.
4. ICA assessment shall be a continuous process based on student's performance in – class tests, assignments, homework, subject seminars, quizzes, laboratory books and their interaction and attendance for theory and lab sessions as applicable.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Name of the Faculty: Science & Technology

CHOICE BASED CREDIT SYSTEM

Syllabus: ELECTRONICS & TELECOMMUNICATION ENGINEERING

Name of the Course: Third Year B. Tech (Sem. – I & II)

(Syllabus to be implemented from Academic Year 2022-23)

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

FACULTY OF SCIENCE & TECHNOLOGY

Credit System structure of T.Y. B.Tech. Electronics & Telecommunication Engineering ***W.E.F. 2022-23***

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	Microcontrollers and Applications	3	--	--	3	30	70	25	125
ET313	Digital Signal Processing	3	-	--	3	30	70	25	125
ET314	Open Elective-I	3	1	--	4	30	70	25	125
SLM31	Self Learning Module–I (HSS Course)	--	--	--	2	--	50	--	50
Sub Total		12	2	--	16	120	330	100	550
Course Code	***Laboratory Course Name***								
							ESE		
							POE	***OE***	
ET312	Microcontrollers and Applications	--	--	2	1	--	50	--	--	50
ET313	Digital Signal Processing	--	--	2	1	--	50	--	--	50
ET315	Electronic Software Lab-III	1	--	4	3	--	50	--	50	100
Sub Total		--	--	8	5	--	150		50	200
Grand Total		**13**	**2**	**8**	**21**	**120**	**480**		**150**	**750**

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. 2022-23***

Semester II

Course Code	***Theory Course Name***	***Hrs./week***			***Credits***	***Examination Scheme***			
		L	***T***	***P***		***ISE***	***ESE***	***ICA***	***Total***
ET321	Antenna & Wave Propagation	3	1	--	4	30	70	25	125
ET322	Embedded System	3	--	--	3	30	70	25	125
ET323	Electronic System Design	3	--	--	3	30	70	25	125
ET324	Professional Elective-I	3	--	--	3	30	70	25	125
ET325	Open Elective-II	3	--	--	3	30	70	25	125
Sub Total		15	1	--	16	150	350	125	625
Course Code	***Laboratory Course Name***								
							ESE		
							POE	***OE***	
ET322	Embedded System	--	--	2	1	--	25	--	--	25
ET323	Electronic System Design	--	--	2	1	--	--	25	--	25
ET324	Professional Elective-I	--	--	2	1	--	--	--	--	--
ET325	Open Elective-II	--	--	2	1	--	--	--	--	--
ET327	Mini Project	--	--	2	1	--	50	--	25	75
Sub Total		--	--	10	5	--	100		25	125
Grand Total		**15**	**1**	**10**	**21**	**150**	**450**		**150**	**750**

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 –

1. Batch size for the practical /tutorial shall be of 16 students. On forming the batches, if the strength of remaining student exceeds 8, then a new batch shall be formed.

2. Vocational Training (evaluated at Final Year Part-I) of minimum 15 days shall be completed in any vacation after S.Y. Part-I but before Final Year Part-I & the report shall be submitted and evaluated in Final Year Part-I.

3. Self-Learning Module I at T.Y. B.Tech.– Semester-I

   - Student shall select & enroll a Self Learning Module-I Course from PAH Solapur University, Solapur HSS Course List (SLM31). Student must appear and pass university examination.
   - Curriculum for Humanities and Social Sciences (HSS), Self Learning Module-I is common for all undergraduate engineering programs.
   - Minimum four assignments for Self Learning Module (SLM31) shall be submitted by the students which shall be evaluated by a Module Coordinator assigned by institute/department.

   OR

   - Student shall select and enroll for university approved minimum eight weeks MOOC based HSS course (SLM31), and complete its assignments. Student must appear and pass certificate examination conducted through MOOC courses.

4. 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.

5. Student shall select Professional Elective-I from given course list. Student must appear and pass university examination.

6. Project group for T.Y. B.Tech. - Semester II – Mini Project shall not be of more than three students. This mini project may include simulation and/or Software and/or Hardware. Report of this work should be submitted at the end of semester.

8. 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.

- **List of Open Electives -**

Sr.	Branch Offering Elective	Open Elective I	Open Elective II
1.	Electronics &Telecommunication Engineering	1. Managerial Economics 2. Project Management and Operation Research	1. Sensors and Applications 2. Open Source Technologies
2.	Electronics Engineering	Information Technology & Management	Operating Systems
3.	Electrical Engineering	Business Ethics	Power System Planning

- **List of Professional Elective I–**
  1. Optical Fiber Communication
  2. Image and Video Processing
  3. Multimedia Communication Technology
- **List of Self Learning Modules (HSS Course) (SLM 31)–**
  1. MOOC/University Defined Courses

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

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

Name of the Faculty: Science & Technology

CHOICE BASED CREDIT SYSTEM

Syllabus: ELECTRONICS & TELECOMMUNICATION ENGINEERING

Name of the Course: Final Year B. Tech (Sem.– I & II)

(Syllabus to be implemented from w.e.f. Ay-2023-24)

PUNYASHLOK AHILYADEVI HOLKARSOLAPUR UNIVERSITY, SOLAPUR

FACULTY OF SCIENCE& TECHNOLOGY

Electronics & Telecommunication Engineering

Programme Educational Objectives and Outcomes

A. Program Educational Objectives

1. To make students competent for professional career in Electronics & allied fields.
2. To build strong fundamental knowledge amongst student to pursue higher education and continue professional development in Electronics & other fields
3. To imbibe professional ethics, develop team spirit and effective communication skills to be successful leaders and managers with a holistic approach.
4. To nurture students to be sensitive to ethical, societal & environmental issues while conducting their professional work.

B. Program Outcomes

Electronics & Telecommunication Engineering Graduate will be able to –

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

C. Program Specific Outcomes

1. **Solid foundation** : Graduates will be able to attain a **solid foundation** in Electronics and Tele-Communication Engineering with an ability to function in multidisciplinary environment.
2. **Techniques and Skills**: Graduates will be able to use **techniques and skills** to design, analyze, synthesize, and simulate Electronics and Communication Engineering components and systems.
3. **Developing Programs:** Graduate will be capable of **developing programs** in Assembly, High level and HDL languages using contemporary tools for software development.

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

FACULTY OF SCIENCE & TECHNOLOGY

Credit System structure of Final Year B.Tech. Electronics & Telecommunication Engineering W**.E.F. 2023-24**

Semester I

Course Code	***Theory Course Name***	***Hrs./week***			***Credits***	***Examination Scheme***			
		L	***T***	***P***		***ISE***	***ESE***	***ICA***	***Total***
ET411	Microwave Engineering	3	--	--	3	30	70	25	125
ET412	Data Communication	3	--	--	3	30	70	25	125
ET413	VLSI Design	3	--	--	3	30	70	25	125
ET414	Professional Elective-II	3	1	--	4	30	70	25	125
ET415	Research Methodology	3	--	--	3	30	70	25	125
Sub Total		15	1	--	16	150	350	125	625
Course Code	***Laboratory Course Name***								
							ESE		
							POE	***OE***	
ET411	Microwave Engineering	--	--	2	1	--	--	25	--	25
ET412	Data Communication	--	--	2	1	--	25	--	--	25
ET413	VLSI Design	--	--	2	1	--	25	--	--	25
ET416	Project Phase-I	_	_	4	2	_	_	--	25	25
ET417	Vocational Training	--	--	--	1	--	--	--	25	25
Sub Total		--	-	10	6	--	75		50	125
Grand Total		**15**	**1**	**10**	**22**	**150**	**425**		**175**	**750**

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 Final Year B.Tech. Electronics & Telecommunication Engineering W**.E.F. 2023-24**

Semester II

Course Code	***Theory Course Name***	***Hrs./week***			***Credits***	***Examination Scheme***			
		L	***T***	***P***		***ISE***	***ESE***	***ICA***	***Total***
ET421	Professional Elective-III	--	--	--	2	--	50	--	50
SLM41	Self Learning Module–II (Professional Course)	--	--	--	2	--	50	--	50
Sub Total		--	--	--	4	--	100	--	100
Course Code	***Laboratory Course Name***								
							ESE		
							POE	***OE***	
ET421	Project Phase-II (Capstone Project / Internship)	--	--	20	10	--	--	100	100	200
Sub Total		--	--	--	10	--	100		100	200
Grand Total			-	**20**	**14**	**--**	**200**		**100**	**300**

Note –

1. Batch size for the practical /tutorial shall be of 15 students. On forming the batches, if the strength of remaining students exceeds 8, then a new batch shall be formed.
2. Vocational Training (evaluated at Final Year Part-I) of minimum 15 days shall be completed in any vacation after S.Y. Part-I but before Final Year Part-I & the report shall be submitted and evaluated in Final Year Part-I.
3. Project group for Final Year (Electronics & Telecommunication Engineering) Part I and Part II shall not be of more than **three** students.
4. ICA assessment shall be a continuous process based on student's performance in – class tests, assignments, homework, subject seminars, quizzes, laboratory books and their attendance for theory and lab sessions as applicable.

5. Self-Learning Module II at Final Year B.Tech. – Semester II

   - Student shall select a Self Learning Module II (Professional Course) from Course List (SLM 41). Student must appear and pass university examination.
   - Minimum four assignments for Self Learning Modules (SLM 41) shall be submitted by the students which shall be evaluated by a Module Coordinator assigned by institute / department.

   OR

   - Student can select & enroll for university approved minimum eight week technical course from various MOOC technical courses, and complete its assignments. Student must appear and pass certificate examination conducted by MOOC courses.

6. Student shall select Professional Elective-II and III from course list. Student must appear and pass university examination.

- List of Professional courses–

Sr. No	B.Tech part I Professional Elective-II	B.Tech part II Professional Elective-III
1	PLC and Industrial Controllers	Wireless Sensor Networks
2	Mobile Communication	Satellite Communication
3	DSP Processor and application	Software Defined Radio

- **Self Learning Module-II**

  1. Electric Vehicles
  2. Mechatronics
  3. Biomedical Instrumentation
  4. MOOC / University Defined Courses

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

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

Name of the Faculty: Science and Technology

CHOICE BASED CREDIT SYSTEM

Syllabus: Civil Engineering

Name of the Course: S. Y. B. Tech

(Syllabus to be implemented from w.e.f. June 2021)

PUNYASHLOK AHILYADEVI HOLKARSOLAPUR UNIVERSITY, SOLAPUR
FACULTY OF SCIENCE & TECHNOLOGY
B. Tech. Civil Engineering

Program Educational Objectives (PEOs)
B. Tech. Civil Engineering

The Program Educational Objectives for B. Tech. Civil Engineering program are designed to produce competent civil engineers who are ready to contribute effectively to the advancement of civil engineering and to fulfill the needs of the community. These objectives are as follows:

PEO1: Practice civil engineering in construction industry, public sector undertaking or as an entrepreneur for successful professional career.

PEO2: Pursue higher education for professional development.

PEO3: Exhibit leadership qualities with demonstrable attributes in lifelong learning tocontribute to the societal needs.

Program Outcomes (POs)
B. Tech. Civil Engineering

The program outcomes of B. Tech. Civil Engineering Program are as following:

i) **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

ii) **Problem Analysis:** Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

iii) **Design/Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

iv) **Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions for complexproblems:

v) **Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

vi) **The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

vii) **Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

viii) **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

ix) **Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

x) **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and

write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

xi) **Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

xii) **Life-long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)
B. Tech. Civil Engineering

The program specific outcomes of B. Tech. Civil Engineering Program are as following:

1) Students will be able to survey, conduct geo-technical investigations, plan, analyze, design, estimate and construct residences, public buildings, industrial buildings, townships and infrastructural projects by adopting appropriate construction methods.

2) Students will be able to analyze and design the water resources systems, municipal and industrial waste treatment plants with due consideration to pollution free environment.

3) Students will be able to use appropriate application software, develop skills necessary for professional practice as a Civil Engineer and prepare themselves for education & for Public service commissions

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
Faculty of Science & Technology
Credit System structure of S. Y. B. Tech. Civil Engg. - I, Semester- III, (W.E.F. 2021-2022)

Course Code	Theory Course Name	Hrs./week				Credits	Examination Scheme				
		L	T	P	D		ISE	ESE		ICA	Total
CE 31 C	Surveying & Geomatics	3	-	-	-	3	30	70		-	100
CE32C	Fluid Mechanics and Fluid Machines	3	-	-	-	3	30	70		-	100
CE33C	Concrete Technology, Material Testing & Evaluation	2	-	-	-	2	30	70		-	100
CE34C	Building Construction & Drawing	2	-	-	-	2	30	70		-	100
CE35C	Structural Mechanics-I	3	-	-	-	3	30	70		-	100
	Total	**13**	**-**	**_**	**-**	**13**	**150**	**350**		**-**	**500**
	Laboratory/Drawings							**POE**	**OE**		
CE36L	Surveying & Geomatics	-	-	2	-	1	-	50	-	25	75
CE37L	Fluid Mechanics and Fluid Machines	-	-	2	-	1	-	25	-	25	50
CE38L	Concrete Technology, Material Testing & Evaluation	-	-	2	-	1	-	-	-	25	25
CE39L	Building Construction & Drawing	-	-	-	2	1	-	-	-	25	25
CE 410 L	Lab Practice	-	-	2	-	1	-	-	-	25	25
	Total	**-**	**-**	**8**	**-**	**5**	**-**	**75**		**125**	**200**
	Grand Total	**13**	**1**	**8**	**2**	**18**	**150**	**425**		**125**	**700**
	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.

Note:

(1) The number of students in a practical/Tutorial batch shall be 20. New batch shall be formed if the number of remaining students (after forming batches of 20) exceeds 9.

(2) Internal Continuous Assessment (ICA): ICA shall be a continuous process based on the performance of the student in assignments, class tests, quizzes, attendance and interaction during theory and lab sessions, journal writing, report presentation etc., as applicable

(3) Student is required to study and pass Environmental Science subject in Second Year of B. Tech. Civil Engineering to become eligible for award of degree.

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
Faculty of Science & Technology

Credit System structure of S. Y. B. Tech. Civil Engg.- II, Semester – IV, W. E.F. 2021-2022

Course Code	Theory Course Name	Hrs./week				Credits	Examination Scheme				
		L	T	P	D		ISE	ESE		ICA	Total
CE41C	Environmental Engineering-I	3	-	-	-	3	30	70		-	100
CE42C	Building Planning & Design	2	-	-	-	2	15	35		-	50
CE43C	Structural Mechanics-II	3	1	-	-	4	30	70		25	125
CE44B	Engineering Mathematics-III	3	1	-	-	4	30	70		25	125
CE45B	Engineering Geology	2	-	-	-	2	30	70		-	100
	Total	**13**	**2**	**-**	**-**	**15**	**135**	**315**		**50**	**500**
	Laboratory/Drawings:							**POE**	**OE**		
CE46L	Environmental Engineering-I	-	-	2	-	1	-	-	-	25	25
CE47L	Building Planning & Design	-	-	-	2	1	-	50	-	25	75
CE48L	Computer Programming & Numerical Methods	2	-	2	-	3	-	50	-	25	75
CE49L	Engineering Geology	-	-	2	-	1	-	25	-	25	50
	Total	**2**	**0**	**6**	**2**	**7**	**-**	**125**		**100**	**225**
	Grand Total	**15**	**2**	**6**	**2**	**22**	**135**	**440**		**150**	**725**
	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.

Note:

(1) The number of students in a Practical/Tutorial batch shall be 20. New batch shall be formed if the number of remaining students (after forming batches of 20) exceeds 9.

(2) Internal Continuous Assessment (ICA): ICA shall be a continuous process based on the performance of the student in assignments, class tests, quizzes, attendance and interaction during theory and lab sessions, journal writing, report presentation etc., as applicable.

(3) Student is required to study and pass Environmental Science subject in Second Year of B. Tech. Civil Engineering to become eligible for award of degree

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

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

Name of the Faculty: Science & Technology

CHOICE BASED CREDIT SYSTEM

Syllabus Structure: B. Tech. (Civil Engineering)

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

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
Faculty of Science & Technology

Credit System structure of T. Y. B. Tech. Civil Engg.- I, Semester- V,
(Revised from 2022-2023)

Course Code	Theory Course Name	Hrs./week				Credits	Examination Scheme				
		L	T	P	D		ISE	ESE		ICA	Total
CE51C	Design of Steel Structures	3	-	-	-	3	30	70		-	100
CE52C	Geotechnical Engineering	3	-	-	-	3	30	70		-	100
CE53C	Highway and Tunnel Engineering	3	-	-	-	3	30	70		-	100
CE54C	Hydrology and Water Resources Engineering	3	-	-	-	3	30	70		-	100
CE55C	Design of Concrete Structures I	3	-	-	-	3	30	70		-	100
CE56C	Environmental Engineering-II	3	-	-	-	3	30	70		-	100
SL-5	HSS Course – Elective (Self Learning mode)	-	-	-	-	1	-	50		-	50
	Total	**18**	**-**	**-**	**-**	**19**	**180**	**470**		**-**	**650**
	Laboratory/Drawings							**POE**	**OE**		
CE57L	Geotechnical Engineering	-	-	2	-	1	-	25	-	25	50
CE58L	Highway & Tunnel Engineering	-	-	2	-	1	-	-	-	25	25
CE59L	Planning & Design of Public Building	1	-	-	2	2	-	50	-	25	75
CE510L	Environmental Engineering-II	-	-	2	-	1	-	-	25	25	50
	Total	**1**	**-**	**6**	**2**	**5**	**-**	**100**		**100**	**200**
	Grand Total	**19**	**-**	**6**	**2**	**24**	**180**	**570**		**100**	**850**

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

Note:- Students shall undergo a field training of 15 days in the winter vacation after T.Y. B. Tech Part I and submit the field training report, which shall be assessed by faculty associated with 'Principles of Management and Quantitative Techniques', in T.Y. B. Tech. Part II.

1) Self-Learning Module- I at T.Y. B. Tech. Civil Engineering, Semester – I:

(A) Student can select & enroll a 'Self Learning Module- I' (HSS) Course from following list

SL5- A:- Self Learning Module – I (HSS)

No	Course title
1	Economics
2	Intellectual Property Rights for Technology Development and Management
3	Introduction to Sociology
4	Stress and Coping
5	Professional Ethics & Human Value

OR

(B) Student can select and enroll for minimum eight weeks NPTEL HSS course SL31-(B), complete its assignments, and appear for certificate examination conducted by NPTEL. The list of courses as shown in Table SL31-(B) will be updated from time to time by Institute. Latest updated list will be valid for selection of self learning Module-I (HSS) courses.

More details about NPTEL are available at http://nptel.ac.in

SL31-(B): Self Learning Module-I (HSS)

University approved NPTEL- HSS course List (SL31-B)

No	Course title	No	Course title
1	Soft skills	15	Management of Inventory Systems
2	Introduction to Modern India Political Thought	16	Economic Growth and Development
3	Intellectual Property	17	Ethic in Engineering Practice
4	Technical English for Engineers	18	Corporate Social Responsibility
5	Developing Soft Skills and Personality	19	Marketing Management –I
6	Educational Leadership	20	Marketing Research and Analysis
7	Microeconomics: Theory & Applications	21	Selected Topics in Decision Modeling
8	Engineering Economics	22	Innovation, Business Models and Entrepreneurship
9	Human Resource Development	23	Simulation of Business Systems: An Applied Approach
10	Project Management for managers	24	Sustainability through Green Manufacturing Systems: An Applied Approach
11	Data Analysis and Decision Making - I	25	Total Quality Management - I
12	E-Business	26	Introduction to Operations Research
13	Working Capital Management	27	Knowledge Management
14	Industrial Safety Engineering		

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
Faculty of Science & Technology
Credit System structure of T. Y. B. Tech. Civil Engg. –II, Semester –VI, W. E.F. 2022-2023

Course Code	Theory Course Name	Hrs./week				Credits	Examination Scheme				
		L	T	P	D		ISE	ESE		ICA	Total
CE61C	Foundation Engineering	3	-	-	-	3	30	70		-	100
CE62C	Hydraulic Structures and Water Power Engg.	3	-	-	-	3	30	70		-	100
CE63E	Professional Elective Course-I *(Refer list at the end)*	3	-	-	-	3	30	70		-	100
CE64C	Design of Concrete Structures II	3	-	-	-	3	30	70		-	100
CE65C	Principles of Management and Quantitative Techniques	3	-	-	-	3	30	70		-	100
CE66C	Railway, Airport & Harbour Engineering	3	-	-	-	3	30	70		-	100
	Total	**18**	**-**	**-**	**-**	**18**	**180**	**420**		**-**	**600**
	Laboratory/Drawings:							**POE**	**OE**		
CE67L	Project on Steel Structures	-	-	-	2	1	-	-	25	25	50
CE68L	Principles of Management and Quantitative Techniques	-	-	2	-	1	-	-	25	25	50
CE69L	*Mini Project using Application Software	-	-	2	-	1	-	-	-	25	25
	Total	**-**	**-**	**4**	**2**	**3**	-	**50**		**75**	**125**
	Grand Total	**18**	**-**	**4**	**2**	**21**	**180**	**470**		**75**	**725**

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' in any one of the using suitable application software. The Mini project shall be assessed by the concerned subject teachers for ICA.

Note:

1) Students shall undergo a field training of 15 days in the summer vacation after T.Y. B. Tech. Part II. The training report shall be assessed in Final Year B.Tech. Part -I by the concerned 'Seminar' guides.
2) Internal Continuous Assessment (ICA): ICA shall be a continuous process based on the performance of the student in assignments, class tests, quizzes, attendance and interaction during theory and lab sessions, journal writing, report presentation etc., as applicable
3) The batch size for the practical/tutorial is of 15 students. On forming the batches, if the number of remaining students exceeds 7 students, then a new batch be formed.

Professional Elective Courses: Student shall choose any one course of the following

Elective No	Semester	(I) Structural Engineering	(II) Geotechnical Engineering & Transportation Engg.	(III) Construction Engineering & Management	(IV) Environmental Engineering &Hydraulics, Hydrology & Water Resources Engineering
Prof Elective-I	**Semester-VI**	Structural Analysis by Matrix Methods	Airport Planning and Design	Construction Engineering Materials	Open Channel flow & River Hydraulics
		Structural Dynamics	Pavement Design	Systems Engineering & Economics	Solid and Hazardous Waste Management
		Design of Bridges		Advanced Concrete Technology	Urban Hydrology and Hydraulics
		Design of Pre stressed concrete structures			

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

पुण्यश्लोक अहिल्यादेवी होळकर
सोलापूर विद्यापीठ
।। विद्यया संपन्नता ।।

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

Name of the Faculty: Science & Technology

CHOICE BASED CREDIT SYSTEM

Syllabus Structure: B. Tech. (Civil Engineering)

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

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

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

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

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

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

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

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

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

.**Note:**

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

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

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

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

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

Name of the Faculty: Science & Technology

CHOICE BASED CREDIT SYSTEM

Syllabus: ELECTRICAL ENGINEERING

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

(Syllabus to be implemented from w.e.f. June 2022)

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Engineering & Technology
T.Y. B.Tech. (Electrical Engineering)

Choice Based Credit System Syllabus Structure of T. Y. B.Tech. Electrical Engineering W.E.F. 2022-2023

Semester I

Course Code	***Theory Course Name***	***Hrs./week***			***Credits***	***Examination Scheme***			
		L	***T***	***P***		***ISE***	***ESE***	***ICA***	***Total***
EL 311	Power System III	3	-	-	3	30	70	-	100
EL 312	Linear Control System	3	-	-	3	30	70	-	100
EL 313	Advanced Microcontroller System	3	-	-	3	30	70	-	100
EL 314	Electromagnetic Engineering	3	1	-	4	30	70	25	125
EL 315	Open Elective-I	2	1	-	3	30	70	25	125
EL 316	Self-Learning Module-I			-	2		50		50
Sub Total		**14**	**2**	**-**	**18**	**150**	**400**	**50**	**600**
Laboratory Course Name							***ESE***		
							POE	***OE***	
EL 311	Power System III	-	-	2	1	-	-	25	25	50
EL 312	Linear Control System	-	-	2	1	-	-	25	25	50
EL 313	Advanced Microcontroller System	-	-	2	1	-	50	-	25	75
EL 317	Electrical Workshop	-	-	2	1	-	-	-	25	25
Sub Total		**-**	**-**	**8**	**4**	**-**	**100**		**100**	**200**
Grand Total		**14**	**2**	**8**	**22**	**150**	**500**		**150**	**800**

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

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Engineering & Technology
T.Y. B.Tech. (Electrical Engineering)

Choice Based Credit System Syllabus Structure of T.Y.B. Tech. Electrical Engineering W.E.F. 2022-2023

Semester II

Course Code	***Theory Course Name***	***Hrs./week***			***Credits***	***Examination Scheme***			
		L	***T***	***P***		***ISE***	***ESE***	***ICA***	***Total***
EL 321	Electrical Machine Design	3	-	-	3	30	70	-	100
EL 322	Electrical Utilization	3	1	-	4	30	70	25	125
EL 323	Power Electronics & Industrial Drives	3	-	-	3	30	70	-	100
EL 324	Advanced Control Systems	3	-	-	3	30	70	-	100
EL 325	Open Elective-II	2	1	-	3	30	70	25	125
EL 326	Self-Learning Module-II	-	-	-	2	--	50	-	50
Sub Total		**14**	**2**	**-**	**18**	**150**	**400**	**50**	**600**
Laboratory Course Name							***ESE***		
							POE	***OE***	
EL 321	Electrical Machine Design	-	-	2	1	-	-	25	25	50
EL 323	Power Electronics & Industrial Drives	-	-	2	1	-	50	-	25	75
EL 324	Advanced Control Systems	-	-	2	1	-	-	-	25	25
EL 327	Mini Hardware Project	-	-	2	1	-	-	25	25	50
Sub Total		**-**	**-**	**8**	**4**	**-**	**100**		**100**	**200**
Grand Total		**14**	**2**	**8**	**22**	**150**	**500**		**150**	**800**

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

Self-Learning Module-II:

1. Hybrid Electric Vehicle Design
2. Electrical Safety
3. Solar Photovoltaic System Design & Installation
4. NPTEL Course/MOOC/University Defined Courses

Note –

- Batch size for the TE practical /tutorial shall be of 15 students. On forming the batches, if the strength of remaining student exceeds 7, then a new batch shall be formed.
- Vocational Training (evaluated at B.E. Part-I) of minimum 15 days shall be completed in any vacation after S.E. Part-II but before B.E. Part-I & and evaluated based on presentation as well as training report.
- Student shall select one as Self Learning Module at T.E. Part I and T.E. Part II each from Technical and Humanities and Social
- Sciences Group with at least one as Self Learning Module from the Humanities and Social Sciences Group
- Curriculum for Humanities and Social Sciences Self Learning Modules is common for all undergraduate programmes of faculty of Engineering and Technology
- Minimum four assignments for Self-Learning Modules at T.E. Part I and T.E. Part II shall be submitted by the students which shall be evaluated by a Module Coordinator assigned by institute / department
- Project group for T.E.(Electrical) Part II Mini Project shall not be of more than three students
- Project group for B.E.(Electrical) Part I and Part II shall not be of more than FOUR students.
- ICA shall be a continuous process based on student's performance in – class tests, assignments, homework, subject seminars, quizzes, laboratory books and their interaction and attendance for theory and lab sessions as applicable
- 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 will be same for all these branches.

List of Open Electives

Sr. No.	Open Elective I	Open Elective II
1	Information Technology & Management	Operating Systems
2	Advanced Electrical Machines	Renewable Energy Sources
3	Business Ethics	Fiber Optic Communication
4	Managerial Economics	Sensors and Applications

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

NAAC Accredited-2022
'B^{++}' Grade (CGPA 2.96)

Name of the Faculty: Science & Technology

CHOICE-BASED CREDIT SYSTEM

SYLLABUS: ELECTRICAL ENGINEERING

Name of the Course: Final Year B. Tech

(Syllabus to be implemented June 2023-24)

	Punyashlok Ahilyadevi Holkar Solapur University, Solapur **Faculty of Science & Technology** **B. Tech (Electrical Engineering)** **PROGRAMME: BACHELOR OF ELECTRICAL ENGINEERING**

PROGRAMME OBJECTIVES

A. PROGRAM EDUCATIONAL OBJECTIVES

1.	Deliver fundamental as well as advanced knowledge with research initiatives in the field of electrical engineering with an emphasis on state-of-the-art technology.
2.	Graduates will demonstrate measurable progress in the fields they choose to pursue.
3.	Design and develop technically feasible solutions for real-world applications that are economically viable leading to societal benefits.
4.	To nurture graduates to be sensitive to ethical, societal, and environmental issues while conducting their professional work.

B. PROGRAMME OUTCOMES

Students attain the following outcomes: -

1.	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2.	**Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3.	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.
4.	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5.	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6.	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequentresponsibilities relevant to the professional engineering practice.
7.	**Environment and sustainability:** Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8.	**Ethics:** Apply ethical principles and commit to professional ethics, responsibilities,and norms of the engineering practice.
9.	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10.	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11.	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12.	**Lifelong learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technologicalchange.

C. PROGRAMME SPECIFIC OUTCOMES

1.	An ability to specify, design, and analyze Power Systems, Electrical Machinery,Electronic Circuits, Drive Systems, and Lightning Systems and deliver technological solutions by adapting advances in allied disciplines.
2.	Apply knowledge of electrical engineering to meet the desired needs within realistic constraints viz. economical, ethical, environmental, and safety.
3.	Apply modern software tools for the design, simulation, and analysis of electrical systems to successfully adapt in multi-disciplinary environments.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science & Technology
B. Tech (Electrical Engineering)

Choice-Based Credit System Syllabus Structure of B. Tech Electrical Engineering W.E.F. 2023-2024 ***Semester I***

Course Code	***Theory Course Name***	***Hrs./week***			***Credits***	***Examination Scheme***			
		L	***T***	***P***		***ISE***	***ESE***	***ICA***	***Total***
EL 411	Power Quality and FACTS	3	-	-	3	30	70	-	100
EL 412	Signals and System	2	1	-	3	30	70	25	125
EL 413	Switchgear and Protection	3	-	-	3	30	70	-	100
EL 414	Professional Elective-I	4	-	-	4	30	70	-	100
EL 415	Professional Elective-II	3	1	-	4	30	70	25	125
Sub Total		**15**	**2**	**-**	**17**	**150**	**350**	**50**	**550**
Laboratory Course Name									
							ESE		
							POE	**OE**	
EL 411	Power Quality and FACTS	-	-	2	1	-	-	25	25	50
EL 413	Switchgear and Protection	-	-	2	1	-	50	-	25	75
EL 414	Professional Elective-I	-	-	2	1	-	-	-	25	25
EL 416	Seminar on Industrial Training	-	-	-	-	-	-	-	25	25
EL 417	Project Phase-I	-	-	4	2	-	-	50	25	75
Sub Total		**--**	**-**	**10**	**5**	**-**	**125**		**125**	**250**
Grand Total		**15**	**2**	**10**	**22**	**150**	**475**		**175**	**800**

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

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science & Technology
B. Tech (Electrical Engineering)

Choice-Based Credit System Syllabus Structure of B. Tech Electrical Engineering W.E.F. 2023-2024 ***Semester II***

Course Code	***Theory Course Name***	***Hrs./week***			***Credits***	***Examination Scheme***			
		L	***T***	***P***		***ISE***	***ESE***	***ICA***	***Total***
# EL 421	**Self-Learning Module - III**	-	-	-	2	-	50	-	50
# EL 422	**Self-Learning Module – IV**	-	-	-	2	-	50	-	50
Sub Total		**-**	**-**	**-**	**4**	**-**	**100**	**-**	**100**
Laboratory Course Name									
							ESE		
							POE	***OE***		
EL 423	Project Phase-II (Capstone Project)	-	-	20	10	-	-	100	100	200
*EL 424	Internship				4	-		100	-	100
Sub Total		**-**	**-**	**20**	**14**	**-**	**200**		**100**	**300**
Grand Total		**-**	**-**	**20**	**18**	**-**	**200**		**100**	**300**

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

Students shall select Self-Learning Modules - III and IV from the course list. Students must appear and pass university examinations.

OR

Students can take NPTEL/SWAYAM/MOOC courses which shall be of a minimum of eight weeks duration from the approved platform and appear for examination or equivalent certification.

OR

* Students should undergo a three-month internship. Students undergoing internship and completing a project sponsored by the same Industry/Organization have to submit an internship and project report separately to obtain four credits for EL 424.

Note –

1. The batch size for the practical /tutorial shall be 15 students. On forming the batches, if the strength of the remaining students exceeds 8, then a new batch shall be formed.
2. Vocational Training (evaluated at Final Year Part-I) of a minimum of 15 days shall be completed in any vacation after S.Y. Part-I but before Final Year Part-I. The report shall be submitted and evaluated in Final Year Part I through a presentation on the activities carried out during training.
3. Project group for Final Year (Electrical Engineering) Part I and Part II shall not be of more than **four** students.
4. ICA assessment shall be a continuous process based on students' performance in – class tests, assignments, homework, subject seminars, quizzes, open book test, laboratory test and their interaction, and attendance for theory and lab sessions as applicable.
5. **Students should undergo three-month internship (For the Entire 8th Semester) or shall select Self Learning Module-III & IV from the course list and must appear and pass for university examination or can take NPTEL/SWAYAM/MOOC courses which shall be of minimum of eight weeks duration from the approved platform and submit certificate of completion along with the assessment marks instead of University and Institute Examination.**
6. In Project Phase-I students shall select Sponsored / Industry oriented / In –House projects which should cover the Literature survey, Problem statement finalization, and Synopsis submission of proposed work. Students shall submit a hard copy of the synopsis and progress report only after delivering the seminar.
7. Project phase II can be a Capstone project/Industry sponsored project which shall be the implementation of the problem statement decided as in phase-I. A hard copy of the final report shall be submitted to the department after the successful completion of the project. Students can carry out project phase II as a sponsored/ House project.
8. Students can avail of semester-long internship/ apprentice/ industrial training and the report submitted by the student will be accepted as the project work only if, the project guide accepts this work and the examination panel approves the same. (Student should continuously report their work to the project guide and should be periodically evaluated by the internal examiners at the college level).
9. Minimum one Industrial Visit for Professional Elective-I based on the given syllabus.

Professional Elective Courses: Student shall choose any one course of the following

Elective No	Semester	Course Code	Electrical Power System	Course Code	Control System & Drives	Course Code	Recent trends
Professional Elective I	**VII**	EL 414.1	High Voltage Engineering	EL 414.3	Programmable Logic Control and SCADA	EL 414.5	Neural Networks & Fuzzy Logic Control
		EL 414.2	Power System and Operation Control	EL 414.4	Instrumentation Process Control & Robotics	EL 414.6	Smart Grid Technology
Professional Elective II	**VII**	EL 415.1	Power System Planning	EL 415.3	Special Purpose Machines and their control	EL 415.5	Advanced Applications in Solar Energy Technology
		EL 415.2	Extra High Voltage AC Transmission	EL 415.4	Advanced Electrical Drives	EL 415.6	Electric and Hybrid Vehicle
Self-Learning Module-III	**VIII**	EL 421.1	Electrical Estimation, Installation, and Testing	EL 421.2	Mechatronics	EL 421.3	Alternate Energy Systems
		EL 421.4	Students can select & enroll for an approved minimum eight-week technical course from various NPTEL/SWAYAM technical courses, or any other approved MOOC platform, complete its assignments, and appear for a certification examination conducted by NPTEL, SWAYAM, or respective MOOC platform. BOS Chairman / Coordinator will announce the list of approved NPTEL/MOOC online courses/areas of a minimum eight weeks duration for 'Self Learning Module-III' from the available NPTEL/SWAYAM/MOOC courses and will make them available to students through the University website.				
Self-Learning Module-IV	**VIII**	EL 422.1	Electrical Energy Audit and Management	EL 422.2	High Voltage DC Transmission	EL 422.3	Illumination Engineering
		EL 422.4	Students can select & enroll for an approved minimum eight-week technical course from various NPTEL/SWAYAM technical courses, or any other approved MOOC platform, complete its assignments, and appear for certificate examination conducted by NPTEL, SWAYAM, or respective MOOC platforms. BOS Chairman / Coordinator will announce the list of approved NPTEL/MOOC online courses/areas of a minimum eight weeks duration for 'Self Learning Module-III' from the available NPTEL/SWAYAM/MOOC courses and will make them available to students through the University website.				

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

NAAC Accredited-2022
'B++' Grade (CGPA 2.96)

Name of the Faculty: Science & Technology

Revised Structure and Syllabus

CHOICE BASED CREDIT SYSTEM (CBCS)

Syllabus: Mechanical-Design Engineering

Name of the Course: M. Tech. - Semester I, II, III & IV

(Syllabus to be implemented with effect from (WEF)
June 2023-24 & 2024-25)

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

FACULTY OF SCIENCE & TECHNOLOGY

Curriculum for M. Tech. (Mechanical-Design Engineering)

Four Semester Course

Choice Based Credit System (CBCS) - (WEF 2023-24)

Semester I: Theory /Tutorial/ Lab Courses

Course Code	*Name of the Course*	*Engagement Hours*			*Credits*	*SA*	*FA*		*Total*
		L	*T*	*P*		*ESE*	*ISE*	*ICA*	
MDE111	Advanced Stress Analysis	3	-	-	3	70	30	-	100
MDE112	Advanced Vibrations and Acoustics	3	-	-	3	70	30	-	100
MDE113	Industrial Instrumentation	3	-	-	3	70	30	-	100
MDE114	**Elective- I** 1. Computational Techniques in Design Engineering 2.Reliability Engineering 3.Mechanical System Design 4. Computer Aided Design	3	1	-	4	70	30	-	100
MDE115	Research Methodology and IPR	3	-	-	3	70	30	-	100
MDE112	Advanced Vibrations and Acoustics Lab	-	-	2	1	-	-	50	50
MDE113	Industrial Instrumentation Lab	-	-	2	1	-	-	50	50
MDE116	Seminar –I		2		2			50	50
	Total	**15**	**3**	**4**	**20**	**350**	**150**	**150**	**650**

L Lecture
T Tutorial
P Lab Session

FA Formative Assessment
SA Summative Assessment
ESE End Semester Examination
ISE In Semester Evaluation
ICA Internal Continuous Evaluation

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

FACULTY OF SCIENCE & TECHNOLOGY

Curriculum for M. Tech. (Mechanical-Design Engineering)

Four Semester Course

Choice Based Credit System (CBCS) - (WEF 2023-24)

Semester II: Theory /Tutorial/ Lab Courses

Course Code	*Name of the Course*	*Engagement Hours*			*Credits*	*SA*	*FA*		*Total*
		L	*T*	*P*		*ESE*	*ISE*	*ICA*	
MDE121	Finite Element Method	3	-	-	3	70	30	-	100
MDE122	Advanced Design Engineering	3	-	-	3	70	30	-	100
MDE123	Industrial Product Design	3	-	-	3	70	30	-	100
MDE124	**Elective- II** 1. Theory and Analysis of Composite Materials 2. Engineering Design Optimization 3. Industrial Tribology 4. Advanced Engineering Materials	3	1	-	4	70	30	-	100
MDE125	**Elective- III** 1. Engineering Fracture Mechanics 2. Project Management 3. Design for Manufacture and Assembly 4. Analysis and Synthesis of Mechanisms and Machine	3	-	-	3	70	30	-	100
MDE121	Finite Element Method Lab	-	-	2	1	-	-	50	50
MDE123	Industrial Product Design Lab	-	-	2	1	-	-	50	50
MDE126	Seminar-II	-	2	-	2	-	-	50	50
	Total	**15**	**3**	**4**	**20**	**350**	**150**	**150**	**650**

L Lecture
T Tutorial
P Lab Session

FA Formative Assessment
SA Summative Assessment
ESE End Semester Examination
ISE In Semester Evaluation
ICA Internal Continuous Evaluation

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

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

Name of the Faculty: Science & Technology

CHOICE BASED CREDIT SYSTEM

Syllabus: ELECTRONICS & TELECOMMUNICATION ENGINEERING

Name of the Course: M.Tech.- Semester I, II, III & IV

(Syllabus to be implemented from w.e.f. 2018-19 & 2019-20)

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

FACULTY OF SCIENCE & TECHNOLOGY

STRUCTURE OF M.Tech.(ELECTRONICS and TELECOMMUNICATION ENGINEERING)

Four Semester Course

Choice Based Credit System Syllabus

Semester-III

Sr. No.	*Subject*	*Teaching Scheme*		*Credits*			*Evaluation Scheme*			
		L	*P*	*Credits (L)*	*Credits (P)*	*Total Credits*	*Scheme*	*Theory Marks*	*ICA Marks*	*Total Marks*
1	Self Learning Course	$	-	3.0	-	3.0	ISE	30	--	100
							ESE	70		
2	Open Elective Course#	3		3.0		3.0	ISE	30		100
							ESE	70		
3	Dissertation Phase I : Synopsis Submission Seminar*		@4		3.0	3.0	ISE	--	100	100
							ESE	--	--	
4	Dissertation Phase II : ICA*		-		3.0	3.0	ISE	--	100	100
							ESE	--	--	
5	Dissertation Phase II Progress Seminar*		-		3.0	3.0	ISE	--		100
							ESE	--	100	
Total		**3**	**4**	**6.0**	**9.0**	**15.0**		**200**	**300**	**500**

L- Lectures, P-Practical, T-Tutorial, ISE- In Semester Evaluation, ESE- End Semester Evaluation, ICA- Internal Continuous Assessment

Note -

- $- Being a Self Learning Course, student shall prepare for examination as per specified syllabus
- *- For all activities related to dissertation Phase I (synopsis submission seminar and progress seminar) student must interact regularly every week with the advisor.

- # - This course is common for all branches of Technology (i.e. for all M.Tech. Programs)

- Synopsis submission seminar shall cover detailed synopsis of the proposed work. Student shall submit synopsis of the dissertation work only after delivering this seminar.
- Progress seminar shall be delivered capturing details of the work done by student for dissertation
- Student shall deliver all seminars using modern presentation tools. A hard copy of the report shall be submitted to the department before delivering the seminar. A PDF copy of the report must be submitted to the advisor along with other details if any
- @ Indicates contact hours of students for interaction with advisor.
- Details of modes of assessment of seminar and dissertation shall be as specified in 7(III) of PG Engineering Ordinance of Solapur University, Solapur

List Self Learning Courses -

Sr.	*Self Learning Subject*
1	Programmable System on Chip (PSoC)
2	Remote Sensing
3	Multimedia Network

List of Open Elective Courses-

Sr.	*Self LearningSubject*
1	Business Analytics
2	Operation Research
3	Cost Management of Engineering Projects
4	Non conventional Energy

- New Self Learning Courses and New Open Elective Courses may be added as and when required

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

FACULTY OF SCIENCE & TECHNOLOGY

STRUCTURE OF M.Tech.(ELECTRONICS and TELECOMMUNICATION ENGINEERING)

Four Semester Course

Choice Based Credit System Syllabus

Semester-IV

Sr. No.	*Subject*	*Teaching Scheme*			*Credits*			*Evaluation Scheme*		
		L	*P*	*Total*	*Credits (L)*	*Credits (P)*	*Total Credits*	*Scheme*	*ICA Marks*	*Total Marks*
1	Dissertation Phase III : Progress Seminar #	-	4@	4	-	3.0	3.0	ISE	100	100
2	Dissertation Phase IV: #	-	2@	2	-	6.0	6.0	--	200	200
3	Final Submission of the Dissertation and Viva –Voce	-	-	-	-	6.0	6.0	ESE	200	200
Total		**-**	**-**	**6**	**--**	**15.0**	**15.0**	**-**	**500**	**500**

Note –

- #- For all activities related to dissertation Phase III & IV student must interact regularly every week with the advisor.
- Progress seminar shall be delivered capturing details of the work done by student for dissertation
- Student shall deliver all seminars using modern presentation tools. A hard copy of the report shall be submitted to the Department before delivering the seminar. A PDF copy of the report must be submitted to the advisor along with other details if any.
- Student must submit a hard copy of Project Report to the department
- @ indicates contact hours of the student for interaction with the advisor
- Details of modes of assessment of seminar and dissertation shall be as specified in 7 (III) of PG Engineering Ordinance of Solapur University, Solapur.

SOLAPUR UNIVERSITY, SOLAPUR

FACULTY OF ENGINEERING & TECHNOLOGY

COMPUTER SCIENCE AND ENGINEERING

CBCS Syllabus for

First Year M.Tech.
w.e.f. Academic Year 2023-24

SOLAPUR UNIVERSITY, SOLAPUR
FACULTY OF ENGINEERING & TECHNOLOGY
STRUCTURE OF M.Tech. (COMPUTER SCIENCE & ENGINEE ING)
Four Semester Course
Choice Based Credit System Syllabus wef 2023-24
Semester-I

Sr. No.	*Subject*	*Teaching Scheme*				*Credits*				*Evaluation Scheme*				
		L	*T*	*P*	*Total*	*Credits (L)*	*Credits (T)*	*Credits (P)*	*Total Credits*	*Scheme*	*Theory Marks*	*ICA- P Marks*	*ICA-T Marks*	*Total Marks*
1	Applied Algorithms	3	-	2	5	3.0	-	1.0	4.0	ISE	30	25	--	125
										ESE	70	--	--	
2	Theory of Computation	3	1	-	4	3.0	1.0		4.0	ISE	30	--	25	125
										ESE	70	--	--	
3	Data Mining	3	-	2	5	3.0	-	1.0	4.0	ISE	30	25	--	125
										ESE	70	--	--	
4	Machine Learning©	3	-	2	5	3.0	-	1.0	4.0	ISE	30	25	--	125
										ESE	70	--	--	
5	Elective I	3	1	-	4	3.0	1.0	-	4.0	ISE	30	--	25	125
										ESE	70	--	--	
6	Seminar- I	-	-	2	2	-	-	2.0	2.0	ISE	--	50	--	50
										ESE	--	--	--	
Total		**15**	**2**	**8**	**25**	**15.0**	**2.0**	**5.0**	**22.0**		**500**	**125**	**50**	**675**

Note : *L- Lectures, P-Practical, T-Tutorial, ISE- In* Semester *Evaluation, ESE- End Semester Evaluation, ICA- Internal Continuous Assessment*

© - This Course is common for M.Tech. (Electronics Engineering) and M.Tech. (Computer Science & Engineering)

SOLAPUR UNIVERSITY, SOLAPUR
FACULTY OF ENGINEERING & TECHNOLOGY
STRUCTURE OF M.Tech. (COMPUTER SCIENCE & ENGINEERING)
Four Semester Course
Choice Based Credit System Syllabus wef 2023-24
Semester-II

Sr. No.	*Subject*	*Teaching Scheme*				*Credits*				*Evaluation Scheme*				
		L	*T*	*P*	*Total*	*Credits (L)*	*Credits (T)*	*Credits (P)*	*Total Credits*	*Scheme*	*Theory Marks*	*ICA- P Marks*	*ICA-T Marks*	*Total Marks*
1	Research Methodology & IPR©	3	1	-	4	3.0	1.0	-	4.0	ISE	30	--	25	125
										ESE	70	--	--	
2	Internet of Things	3	-	2	5	3.0	-	1.0	4.0	ISE	30	25	--	125
										ESE	70	--	--	
3	Internet Routing Algorithm	3	-	2	5	3.0	-	1.0	4.0	ISE	30	25	--	125
										ESE	70	--	--	
4	Elective – II	3	-	2	5	3.0	-	1.0	4.0	ISE	30	25	--	125
										ESE	70	--	--	
5	Elective – III	3	1	-	4	3.0	1.0	-	4.0	ISE	30	--	25	125
										ESE	70	--	--	
6	Seminar- II	-	-	2	2	-	-	2.0	2.0	ISE	--	50	--	50
										ESE	--	--	--	
Total		**15**	**2**	**8**	**25**	**15.0**	**2.0**	**5.0**	**22.0**		**500**	**125**	**50**	**675**

Note : *L- Lectures, P-Practical, T-Tutorial, ISE- In Semester Evaluation, ESE- End Semester Evaluation, ICA- Internal Continuous Assessment*
© - This Course is common for M.Tech. (Electronics Engineering) and M.Tech. (Computer Science & Engineering)

- Seminar I shall be delivered on a topic related to student's broad area of interest for dissertation work selected in consultation with the advisor after compiling the information from the latest literature. Student shall deliver seminar using modern presentation tools. A hard copy of the report (as per format specified by the department) shall be submitted to the Department before delivering the seminar. A PDF copy of the report must be submitted to the advisor along with other details if any.

- Seminar II shall be delivered on a topic related to student's particular area of interest for dissertation work selected in consultation with the advisor after compiling the information from the latest literature. Student shall deliver seminar using modern presentation tools. A hard copy of the report (as per format specified by the department) shall be submitted to the Department before delivering the seminar. A PDF copy of the report must be submitted to the advisor along with other details if any.

- **List of elective courses for semester I and II -**

Sr. No.	***Elective - I***	***Elective – II***	***Elective – III***
1	Natural Language Processing	Deep Learning	Wireless Sensor Network
2	Soft Computing	Advanced Cloud Computing	Infrastructure Management
3	Computer Vision	High Performance Computing	Real Time Operating System
4	Object Oriented Software Engineering	Software Defined Network	Advances in Database Systems

- Courses may be added in the list of Elective I, Elective II and Elective III as and when required.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

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

Name of the Faculty: Science & Technology

CHOICE BASED CREDIT SYSTEM

Syllabus: COMPUTER SCIENCE ENGINEERING

Name of the Course: M.Tech.- Semester I, II, III & IV

(Syllabus to be implemented from w.e.f. 2018-19 & 2019-20)

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

FACULTY OF SCIENCE & TECHNOLOGY

M.Tech. (COMPUTER SCIENCE & ENGINEERING)

Four Semester Course

Choice Based Credit System

Semester-III

Sr. No.	Subject	Teaching Scheme		Credits			Evaluation Scheme			
		L	P	Credits (L)	Credits (P)	Total Credits	Scheme	Theory Marks	ICA-P Marks	Total Marks
1	Self Learning Course	$	--	3.0	--	3.0	ISE	30	--	100
							ESE	70	--	
2	Open Elective Course#	3	--	3.0	--	3.0	ISE	30	--	100
							ESE	70	--	
3	Dissertation Phase-I : Synopsis Submission Seminar*		@4	--	3.0	3.0	ISE	--	100	100
							ESE	--		
4	Dissertation Phase-II : ICA*	--	--	--	3.0	3.0	ISE	--	100	100
							ESE	--		
5	Dissertation Phase-II : Progress Seminar*	--	--	--	3.0	3.0	ISE	--		100
							ESE	--	100	
	Total	**3**	**4**	**6.0**	**9.0**	**15.0**		**200**	**300**	**500**

L- Lectures, P-Practical, T-Tutorial, ISE- In Semester Evaluation, ESE – End Semester Evaluation, ICA- Internal Continuous Assessment

Note -

- **$-** Being a Self Learning Course, student shall prepare for examination as per specified syllabus
- ***-** For all activities related to dissertation Phase I (synopsis submission seminar and progress seminar) student must interact regularly every week with the adviser.
- # - This course is common for all branches of Technology (i.e. for all M.Tech. Programs)
- Synopsis submission seminar shall cover detailed synopsis of the proposed work. Student shall submit synopsis of the dissertation work only after delivering this seminar.
- Progress seminar shall be delivered capturing details of the work done by student for dissertation
- Student shall deliver all seminars using modern presentation tools. A hard copy of the report shall be submitted to the department before delivering the seminar. A PDF copy of the report must be submitted to the adviser along with other details if any
- @ Indicates contact hours of students for interaction with adviser.
- Details of modes of assessment of seminar and dissertation shall be as specified in 7(III) of PG Engineering Ordinance of P.A.H. Solapur University, Solapur

Self Learning Course	
Sr. No.	Subject
1	Big Data
2	Computer Network Administration
3	Open Source Technologies
4	Usability Engineering

Open Elective Course	
Sr. No.	Subjects
1	Business Analytics
2	Operation Research
3	Cost Management of Engineering Projects
4	Non Conventional Energy

- New Self Learning Courses and New Open Elective Courses may be added as and when required

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
FACULTY OF SCIENCE & TECHNOLOGY
M.Tech. (COMPUTER SCIENCE & ENGINEERING)
Four Semester Course
Choice Based Credit System
Semester-IV

Sr. No.	Subject	Teaching Scheme		Credits			Evaluation Scheme		
		L	P	Credits (L)	Credits (P)	Total Credits	Scheme	ICA-P Marks	Total Marks
1	Dissertation Phase-III : Progress Seminar #	--	@4	--	3.0	3.0	ISE	100	100
2	Dissertation Phase-IV : #	--	@2	--	6.0	6.0	--	200	200
3	Final Submission of the Dissertation and Viva-voce	--	--	--	6.0	6.0	ESE	200	200
	Total	**--**	**6**	**--**	**15.0**	**15.0**		**500**	**500**

Note –

- #- For all activities related to dissertation Phase III and Phase IV student must interact regularly every week with the adviser.
- Progress seminar shall be delivered capturing details of the work done by student for dissertation.
- Student shall deliver all seminars using modern presentation tools. A hard copy of the report shall be submitted to the Department before delivering the seminar. A PDF copy of the report must be submitted to the adviser along with other details if any.
- Student must submit a hard copy of Project Report to the department
- @ indicates contact hours of the student for interaction with the adviser.
- Details of modes of assessment of seminar and dissertation shall be as specified in 7 (III) of PG Engineering Ordinance of P.A.H. Solapur University, Solapur.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

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

Name of the Faculty: Science & Technology

CHOICE BASED CREDIT SYSTEM (CBCS)

Syllabus: ELECTRONICS & TELECOMMUNICATION ENGINEERING

Name of the Course: M.Tech.- Semester I, II, III & IV

(Syllabus to be implemented w.e.f. 2023-24 & 2024-25)

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
FACULTY OF SCIENCE & TECHNOLOGY
STRUCTURE OF M.Tech. (ELECTRONICS & TELECOMMUNICATION ENGINEERING)
Four Semester Course
Choice Based Credit System Syllabus w.e.f. 2023-24

Semester-I

Course Code	*Subject*	*Teaching Scheme*				*Credits*				*Evaluation Scheme*				
		L	***T***	***P***	***Total***	***Credits (L)***	***Credits (T)***	***Credits (P)***	***Total Credits***	***Scheme***	***Theory Marks***	***ICA- P Marks***	***ICA-T Marks***	***Total Marks***
EC 111	Research Methodology & IPR	3	1	-	4	3.0	1.0	-	4.0	ISE	30	--	25	125
										ESE	70	--	--	
EC 112	Antenna Theory & Techniques	3	-	2	5	3.0	-	1.0	4.0	ISE	30	25	--	125
										ESE	70	--	--	
EC 113	Advanced Embedded System	3	-	2	5	3.0	-	1.0	4.0	ISE	30	25	--	125
										ESE	70	--	--	
EC 114	Elective I	3	-	2	5	3.0	-	1.0	4.0	ISE	30	25	--	125
										ESE	70	--	--	
EC 115	Elective II	3	1	-	4	3.0	1.0	-	4.0	ISE	30	--	25	125
										ESE	70	--	--	
EC 116	Seminar- I	-	-	2	2	-	-	2.0	2.0	ISE	--	50	--	50
										ESE	--	--	--	
Total		**15**	**2**	**8**	**25**	**15.0**	**2.0**	**5.0**	**22.0**		**500**	**125**	**50**	**675**

***Note :** L- Lectures, P-Practical, T-Tutorial, ISE- In Semester Evaluation, ESE- End Semester Evaluation, ICA- Internal Continuous Assessment.*

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
FACULTY OF SCIENCE & TECHNOLOGY
STRUCTURE OF M.Tech. (ELECTRONICS & TELECOMMUNICATION ENGINEERING)
Four Semester Course
Choice Based Credit System Syllabus w.e.f. 2023-24

Semester-II

Course Code	*Subject*	*Teaching Scheme*				*Credits*				*Evaluation Scheme*				
		L	***T***	***P***	***Total***	***Credits (L)***	***Credits (T)***	***Credits (P)***	***Total Credits***	***Scheme***	***Theory Marks***	***ICA- P Marks***	***ICA-T Marks***	***Total Marks***
EC 121	Advanced Light Wave Communication	3	-	2	5	3.0	-	1.0	4.0	ISE	30	25	--	125
										ESE	70	--	--	
EC 122	RF & Microwave Engineering	3	-	2	5	3.0	-	1.0	4.0	ISE	30	25	--	125
										ESE	70	--	--	
EC 123	Advanced IoT	3	-	2	5	3.0	-	1.0	4.0	ISE	30	25	--	125
										ESE	70	--	--	
EC 124	Elective – I	3	1	-	4	3.0	1.0	-	4.0	ISE	30	--	25	125
										ESE	70	--	--	
EC 125	Elective – II	3	1	-	4	3.0	1.0	-	4.0	ISE	30	--	25	125
										ESE	70	--	--	
EC 126	Seminar- II	-	-	2	2	-	-	2.0	2.0	ISE	--	50	--	50
										ESE	--	--	--	
Total		**15**	**2**	**8**	**25**	**15.0**	**2.0**	**5.0**	**22.0**		**500**	**125**	**50**	**675**

***Note :** L- Lectures, P-Practical, T-Tutorial, ISE- In Semester Evaluation, ESE- End Semester Evaluation, ICA- Internal Continuous Assessment.*

- Seminar-I should be delivered on a topic related to student's broad area of interest for dissertation work selected in consultation with the advisor after compiling the information from the latest literature. Student should deliver seminar using modern presentation tools. A hard copy of the report (as per format specified by the department) should be submitted to the Department before delivering the seminar. A PDF copy of the report must be submitted to the advisor along with other details if any.

- Seminar II should be delivered on a topic related to student's particular area of interest for dissertation work selected in consultation with the advisor after compiling the information from the latest literature. Student should deliver seminar using modern presentation tools. A hard copy of the report (as per format specified by the department) should be submitted to the Department before delivering the seminar. A PDF copy of the report must be submitted to the advisor along with other details if any.

- **List of Elective Courses for semester I -**

Course Code	***Elective - I***	***Course Code***	***Elective – II***
EC 114.A	Biomedical Signal Processing	EC 115.A	Digital VLSI Design
EC 114.B	Soft Computing Methods	EC 115.B	Satellite Communication

- **List of Elective Courses for semester II -**

Course Code	***Elective - I***	***Course Code***	***Elective – II***
EC 124.A	Wireless Communication Systems	EC 125.A	Cryptography and Network Security
EC 124.B	Information and Coding Theory	EC 125.B	Automation and Industrial Robotics

***Note:** Courses may be added in the list of Elective I and II as and when required.*

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: M.Tech.- Semester I, II, III & IV

(Syllabus to be implemented from w.e.f. 2018-19 & 2019-20)

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

FACULTY OF SCIENCE & TECHNOLOGY

STRUCTURE OF M.Tech.(ELECTRONICS and TELECOMMUNICATION ENGINEERING)

Four Semester Course

Choice Based Credit System Syllabus

Semester-III

Sr. No.	*Subject*	*Teaching Scheme*		*Credits*			*Evaluation Scheme*			
		L	*P*	*Credits (L)*	*Credits (P)*	*Total Credits*	*Scheme*	*Theory Marks*	*ICA Marks*	*Total Marks*
1	Self Learning Course	$	-	3.0	-	3.0	ISE	30	--	100
							ESE	70		
2	Open Elective Course#	3		3.0		3.0	ISE	30		100
							ESE	70		
3	Dissertation Phase I : Synopsis Submission Seminar*		@4		3.0	3.0	ISE	--	100	100
							ESE	--	--	
4	Dissertation Phase II : ICA*		-		3.0	3.0	ISE	--	100	100
							ESE	--	--	
5	Dissertation Phase II Progress Seminar*		-		3.0	3.0	ISE	--		100
							ESE	--	100	
Total		**3**	**4**	**6.0**	**9.0**	**15.0**		**200**	**300**	**500**

L- Lectures, P-Practical, T-Tutorial, ISE- In Semester Evaluation, ESE- End Semester Evaluation, ICA- Internal Continuous Assessment

Note -

- $- Being a Self Learning Course, student shall prepare for examination as per specified syllabus
- *- For all activities related to dissertation Phase I (synopsis submission seminar and progress seminar) student must interact regularly every week with the advisor.

- # - This course is common for all branches of Technology (i.e. for all M.Tech. Programs)

- Synopsis submission seminar shall cover detailed synopsis of the proposed work. Student shall submit synopsis of the dissertation work only after delivering this seminar.
- Progress seminar shall be delivered capturing details of the work done by student for dissertation
- Student shall deliver all seminars using modern presentation tools. A hard copy of the report shall be submitted to the department before delivering the seminar. A PDF copy of the report must be submitted to the advisor along with other details if any
- @ Indicates contact hours of students for interaction with advisor.
- Details of modes of assessment of seminar and dissertation shall be as specified in 7(III) of PG Engineering Ordinance of Solapur University, Solapur

List Self Learning Courses -

Sr.	*Self Learning Subject*
1	Programmable System on Chip (PSoC)
2	Remote Sensing
3	Multimedia Network

List of Open Elective Courses-

Sr.	*Self LearningSubject*
1	Business Analytics
2	Operation Research
3	Cost Management of Engineering Projects
4	Non conventional Energy

- New Self Learning Courses and New Open Elective Courses may be added as and when required

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

FACULTY OF SCIENCE & TECHNOLOGY

STRUCTURE OF M.Tech.(ELECTRONICS and TELECOMMUNICATION ENGINEERING)

Four Semester Course

Choice Based Credit System Syllabus

Semester-IV

Sr. No.	*Subject*	*Teaching Scheme*			*Credits*			*Evaluation Scheme*		
		L	*P*	*Total*	*Credits (L)*	*Credits (P)*	*Total Credits*	*Scheme*	*ICA Marks*	*Total Marks*
1	Dissertation Phase III : Progress Seminar #	-	4@	4	-	3.0	3.0	ISE	100	100
2	Dissertation Phase IV: #	-	2@	2	-	6.0	6.0	--	200	200
3	Final Submission of the Dissertation and Viva –Voce	-	-	-	-	6.0	6.0	ESE	200	200
	Total	**-**	**-**	**6**	**--**	**15.0**	**15.0**	**-**	**500**	**500**

Note –

- #- For all activities related to dissertation Phase III & IV student must interact regularly every week with the advisor.
- Progress seminar shall be delivered capturing details of the work done by student for dissertation
- Student shall deliver all seminars using modern presentation tools. A hard copy of the report shall be submitted to the Department before delivering the seminar. A PDF copy of the report must be submitted to the advisor along with other details if any.
- Student must submit a hard copy of Project Report to the department
- @ indicates contact hours of the student for interaction with the advisor
- Details of modes of assessment of seminar and dissertation shall be as specified in 7 (III) of PG Engineering Ordinance of Solapur University, Solapur.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

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

Name of the Faculty: Science & Technology

CHOICE BASED CREDIT SYSTEM

Syllabus: CIVIL STRUCTURAL ENGINEERING

Name of the Course: M.Tech - Semester I, II, III & IV

(Syllabus to be implemented from w.e.f. 2023-24 & 2024-25)

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
FACULTY OF SCIENCE & TECHNOLOGY
STRUCTURE OF M.Tech. CIVIL (STRUCTURAL ENGINEERING)
Four Semester Course
Choice Based Credit System Syllabus wef 2023-24
Semester-I

Sr. No	Course Code	*Subject*	*Teaching Scheme*				*Credits*				*Evaluation Scheme*				
			L	*T*	*P*	*Total*	*Credits (L)*	*Credits (T)*	*Credits (P)*	*Total Credits*	*Scheme*	*Theory Marks*	*ICA- P Marks*	*ICA-T Marks*	*Total Marks*
1	ST101	Advanced Structural Analysis	3	1	-	4	3	1	-	4	ISE	30	--	25	125
											ESE	70	--	--	
2	ST102	Advanced Solid Mechanics	3	1	-	4	3	1	-	4	ISE	30	--	25	125
											ESE	70	--	--	
3	ST103	Dynamics & Earthquake Engineering	3	1	-	4	3	1	-	4	ISE	30	--	25	125
											ESE	70	--	--	
4	ST104	Elective- I	3	1	-	4	3	1	-	4	ISE	30	--	25	125
											ESE	70	--	--	
5	ST105	Research Methodology and IPR©	3	-	-	3	3	-	-	3	ISE	30	--	--	100
											ESE	70	--	--	
6	ST106	Structural Design Lab	-		4	4	-	-	2	2	ISE	50	50	--	100
											ESE	--	--	--	
		Total	**15**	**4**	**4**	**23**	**15**	**4**	**2**	**21**		**550**	**50**	**100**	**700**

Note : *L- Lectures, P-Practical, T-Tutorial, ISE- In Semester Evaluation, ESE- End Semester Evaluation, ICA- Internal Continuous Assessment*
© - This Course is common for M.Tech. (Civil- Structural Engineering) and M.Tech. (Mechanical-Design Engineering)

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
FACULTY OF SCIENCE & TECHNOLOGY
STRUCTURE OF M.Tech. CIVIL (STRUCTURAL ENGINEERING)
Four Semester Course
Choice Based Credit System Syllabus wef 2023-24
Semester-II

Sr. No.	Course Code	*Subject*	*Teaching Scheme*				*Credits*				*Evaluation Scheme*				
			L	*T*	*P*	*Total*	*Credits (L)*	*Credits (T)*	*Credits (P)*	*Total Credits*	*Scheme*	*Theory Marks*	*ICA- P Marks*	*ICA-T Marks*	*Total Marks*
1	ST111	FEM in Structural Engineering	3	1	-	4	3	1	-	4	ISE	30	--	25	125
											ESE	70	--	--	
2	ST112	Advanced Design of Concrete Structures	3	1	-	4	3	1	-	4	ISE	30	--	25	125
											ESE	70	--	--	
3	ST113	Special Concrete & Concrete Composite	3	1	-	4	3	1	-	4	ISE	30	--	25	125
											ESE	70	--	--	
4	ST114	Elective – II	3	1	-	4	3	1	-	4	ISE	30	--	25	125
											ESE	70	--	--	
5	ST115	Elective – III	3	1	-	4	3	1	-	4	ISE	30	--	25	125
											ESE	70	--	--	
6	ST116	Advanced Concrete Lab	-	-	2	2	-	-	1	1	ISE		25	--	25
											ESE	--	--	--	
7	ST117	Mini Project	-	-	2	2	-		2	2	ISE	--	50	--	50
											ESE	--	--	--	
		Total	**15**	**5**	**4**	**24**	**15**	**5**	**3**	**23**		**500**	**75**	**125**	**700**

Note : *L- Lectures, P-Practical, T-Tutorial, ISE- In Semester Evaluation, ESE- End Semester Evaluation, ICA- Internal Continuous Assessment*

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
FACULTY OF SCIENCE & TECHNOLOGY
STRUCTURE OF M.Tech. CIVIL (STRUCTURAL ENGINEERING)
Four Semester Course
Choice Based Credit System Syllabus wef 2023-24

- **List of elective courses for semester I and II**

Course Code	*Elective - I*	*Course Code*	*Elective – II*	*Course Code*	*Elective – III*
ST104.a	Structural Audits	ST114.a	Theory of Plates and Shell	ST115.a	Theory of Structural Stability
ST104.b	Design of Prestressed Concrete Structures	ST114.b	Design of Formwork	ST115.b	Design of RCC Bridges
ST104.c	Advanced Design of Foundation	ST114.c	Repair and Rehabilitation of Structures	ST115.c	Advanced Steel Design
ST104.d	Structural Optimization	ST114.d	Design of Industrial Structures	ST115.d	Soil Structure Interaction

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

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

Name of the Faculty: Science & Technology

CHOICE BASED CREDIT SYSTEM

Syllabus: CIVIL STRUCTURAL ENGINEERING

Name of the Course: M.Tech.- Semester I, II, III & IV

(Syllabus to be implemented from w.e.f. 2018-19 & 2019-20)

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
FACULTY OF SCIENCE & TECHNOLOGY
STRUCTURE OF M.Tech. CIVIL (STRUCTURAL ENGINEERING)
Four Semester Course
Choice Based Credit System Syllabus w.e.f. 2019-20
Semester-III

Sr. No.	*Subject*	*Teaching Scheme*			*Credits*			*Evaluation Scheme*			
		L	*P*	*Total*	*Credits (L)*	*Credits (P)*	*Total Credits*	*Scheme*	*Theory Marks*	*ICA- P Marks*	*Total Marks*
1	Lab. Practice	-	4	4	-	2	2	ISE	--	50	50
								ESE	--	--	
2	Open Elective Course#	3	-	3	3		3	ISE	30	--	100
								ESE	70	--	
3	Dissertation Phase I : Synopsis Submission Seminar*		@4	4	-	2	2	ISE	--	50	50
								ESE	--	--	
4	Dissertation Phase II : ICA*				-	4	4	ISE	--	100	100
								ESE	--	--	
5	Dissertation Phase II Progress Seminar*				-	4	4	ISE	--	--	100
								ESE	--	100	
Total		**3**	**8**	**11**	**3**	**12**	**15**		**100**	**300**	**400**

L- Lectures, P-Practical, T-Tutorial, ISE- In Semester Evaluation, ESE- End Semester Evaluation, ICA- Internal Continuous Assessment

Note –

- Lab Practice shall include any of the below activities as recommended by Advisor and student shall submit a report after completion of the activity to Advisor along with other details if any. Software / hardware assignments, learning new software, literature survey, filed work, industrial training etc. related to dissertation work.
- *- For all activities related to dissertation Phase I (synopsis submission seminar and progress seminar) student must interact regularly every week with the advisor.
- # - This course is common for all branches of Technology (i.e. for all M.Tech. Programs)
- Synopsis submission seminar shall cover detailed synopsis of the proposed work. Student shall submit synopsis of the dissertation work only after delivering this seminar.
- Progress seminar shall be delivered capturing details of the work done by student for dissertation
- Student shall deliver all seminars using modern presentation tools. A hard copy of the report shall be submitted to the department before delivering the seminar. A PDF copy of the report must be submitted to the advisor along with other details if any
- @ Indicates contact hours of students for interaction with advisor.
- Details of modes of assessment of seminar and dissertation shall be as specified in 7(III) of PG Engineering Ordinance of Solapur University, Solapur

- **List of open Elective Courses-**

Sr.	***Subject***
1	Business Analytics
2	Operation Research
3	Cost Management of Engineering Projects
4	Non conventional Energy

- New Open Elective Courses may be added as and when required

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
FACULTY OF SCIENCE & TECHNOLOGY
STRUCTURE OF M.Tech. CIVIL (STRUCTURAL ENGINEERING)
Four Semester Course
Choice Based Credit System Syllabus w.e.f. 2019-20
Semester-IV

Sr. No.	*Subject*	*Teaching Scheme*			*Credits*			*Evaluation Scheme*		
		L	*P*	*Total*	*Credits (L)*	*Credits (P)*	*Total Credits*	*Scheme*	*ICA- P Marks*	*Total Marks*
1	Dissertation Phase III : Progress Seminar #	-	4@	4	-	3	3	ISE	100	100
2	Dissertation Phase IV: Final presentation and submission of report #	-	2@	2	-	6	6	--	200	200
3	Dissertation Viva – Voce	-	-	-	-	6	6	ESE	200	200
	Total	**-**	**6**	**6**	**--**	**15**	**15**	**-**	**500**	**500**

Note –

- #- For all activities related to dissertation Phase III & IV student must interact regularly every week with the advisor.
- Progress seminar shall be delivered capturing details of the work done by student for dissertation
- Student shall deliver all seminars using modern presentation tools. A hard copy of the report shall be submitted to the Department before delivering the seminar. A PDF copy of the report must be submitted to the advisor along with other details if any.
- Student must submit a hard copy of Project Report to the department
- @ indicates contact hours of the student for interaction with the advisor
- Details of modes of assessment of seminar and dissertation shall be as specified in 7 (III) of PG Engineering Ordinance of Solapur University, Solapur.

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

Ref :-

Date:-

1.2.1 List of programs in which Choice Based Credit System (CBCS)/elective course system has been implemented

Programme Name : Master of Business Administration (MBA)			
Programme Code: 1-1408968337			
Sr. No.	Class Name	Status of implementation of CBCS / elective course system (Yes/No)	Year of implementation of CBCS / elective course system
1	Master of Business Administration-I	Yes (CBCS & Elective)	2020-2021
2	Master of Business Administration-II	Yes (CBCS & Elective)	2021-2022

B. Range

PRINCIPAL
SVERI's College of Engineering,
Pandharpur

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

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

Name of the Faculty: Commerce & Management

Choice Based Credit System

Syllabus: Master of Business Administration (MBA)

(w. e. f. June 2020)

MASTER OF BUSINESS ADMINISTRATION
(M. B. A. Part I Sem. - I and II) Semester Pattern
(Choice Based Credit System) June 2020

1. Introduction:

Considering the current requirement and present scenario of globalization and emerging trends in the Industry, Information Technology, there is need to make students aware and synchronize with the skills required in the industry. It is necessary to make changes in present curriculum of MBA.

2. A. Basic objectives

The basic objectives of an M.B.A. course are-

1. To provide competent young men and women with necessary knowledge, skills, values and attitudes to occupy positions of management and administration in business.
2. To impart the students latest and relevant knowledge from the field of management theory and practice.
3. To provide opportunities to the students for developing necessary managerial skills.
4. To impart/ develop the right kind of values and attitude to function effectively in Managerial/ administrative positions.
5. The course is conducted with semester system which includes Four semesters with following purposes:
   a. **Hard core** subjects provide Foundation of Management.
   b. **Soft core** subjects focus on preliminary knowledge to enhance specific skills and a student gets an opportunity to choose amongst the group of subjects.
   c. **Skill core** subjects focus on in-depth knowledge and practical approach with the subjects. It aims to nurturing student's proficiency and skills.
   d. **Open Elective** A subject elective course chosen generally, with an intention to seek cross-functional exposures is called Open Elective.

B. Program Educational Outcomes

At the end of MBA program student should take of either of following.

1. Managerial decision making through the application of knowledge of management discipline
2. Set up business enterprise and manage diversified growth of entrepreneurship.

C. Program Outcomes:

At the end of MBA program students should be with following abilities.

1. Recognize the functioning of business opportunities involvement of business enterprises
2. and exploring the entrepreneurial opportunities.
3. Develop skills on analyzing the business data application of relevant analysis and problem solving.
4. Demonstrate a global outlook with the ability to identify aspects of the global business and cross cultural understanding
5. Identify the contemporary social problems, exploring the opportunities for social entrepreneurship, designing business solutions and demonstrate ethical standards in organizational decision making.
6. Develop effective and oral communication especially in business applications, with the use of appropriate technology.

3. Eligibility for Admission

1. Candidate should have passed with minimum 50% marks in aggregate (45% marks in case of Backward class candidates from Maharashtra State only) in any full time Bachelor's Degree of Minimum 3 years duration in any discipline recognized by Association of Indian Universities.
2. Obtained score in one of the following CET examinations conducted by the Competent Authority. CET conducted by the Competent Authority, MBA/MMS CET by Maharashtra State Competent Authority, Common Admission Test conducted by Indian Institute of Management (CAT) and Common Management Aptitude Test Conducted by All India Council for Technical Education (CMAT) or Any other CET exams conducted by National level Agencies / institutes and as notified by State CET Cell and DTE to be eligible for Admission to MBA/MMS in the state.
3. Candidate should have completed the admission related process as prescribed by the Competent Authority for Common Admission Process (CAP) in the state.

4. Choice Based Credit System

With the view to ensure worldwide recognition, acceptability, horizontal as well as vertical mobility for students completing post graduate degree, the Solapur University is implementing **Choice Based Credit System** (CBCS) of Evaluation at Postgraduate level.

CBCS offers wide ranging choice for students to offer courses based on their aptitude and their career goals. CBCS works on the fundamental premise where students are matured individuals capable of making their own decisions.

Credit is a numerical value that indicates student's work load (Lectures, Seminars, Assignments, Group Exercises, seminars, mini projects etc.) to complete a course unit. In most of the universities 15 contact hours constitute one credit. The contact hours are transformed into Credits. As per present norms, there are 4 contact hours per paper (subject) per week which works out to be 60 contact hours per paper (subject) per semester.

In PAH Solapur University, for M.B.A-I, there are 8 subjects for each semester and each subject has 4 contact hours per week. Therefore, total contact hours per week are 32 for each class. The evaluation process includes an 80 + 20 pattern wherein the candidate has to appear for University Evaluation for 80 marks and a Continuous Internal Evaluation of 20 marks. This format is applicable for theory as well as practical subjects.

1. MBA Course Structure:

MBA COURSE STRUCTURE FOR COLLEGE & UNIVERSITY CAMPUS
Choice Based Credit System w.e.f. 2020-21

First Semester

Paper Code	Title of the Paper	Semester Exam			No. of weekly lectures	Credits
		UP	IA	Total		
Hard Core						
101	Principles of Management	80	20	100	4	4
102	Financial Accounting	80	20	100	4	4
103	Managerial Economics	80	20	100	4	4
104	Organizational Behaviour	80	20	100	4	4
105	Business Statistics	80	20	100	4	4
Soft Core (Select Any Two Subjects)						
106	Computer Operations And Management	80	20	100	4	4
107	Business Law.	80	20	100	4	4
108	Disaster Management	80	20	100	4	4
109	Banking Operations & Services	80	20	100	4	4
Skill Core						
110	Enhancing Business Communication Skills	80	20	100	4	4

Hard Core and Skill core subjects are compulsory subjects while students can choose **Any Two** subjects **From Soft Core**.

Second Semester

Paper Code	Title of the Paper	Semester Exam			No. of weekly lectures	Credits
		UP	IA	Total		
Hard Core						
111	Marketing Management	80	20	100	4	4
112	Financial Management	80	20	100	4	4
113	Human Resource Management	80	20	100	4	4
114	Production Management and Operational Research	80	20	100	4	4
115	Research Methodology	80	20	100	4	4
Soft Core (Select Any One Subjects)						
116	Event Management	80	20	100	4	4
117	Hospitality & Tourism Management	80	20	100	4	4
118	Logistics and Supply Chain Management	80	20	100	4	4
Skill Core						
119	Employability Skills	80	20	100	4	4
Open Elective						
120	Digital Business	80	20	100	4	4

Hard Core, Skill core and open Elective subjects are compulsory subjects where as students can choose **Any One** subject **from Soft Core**.

Third Semester

Paper Code	Title of the Paper	Semester Exam			No. of weekly lectures	Credits
		UP	IA	Total		
Hard Core						
121	Strategic Management	80	20	100	4	4
122	Management Accounting	80	20	100	4	4
123	Project Report	50	50	100	4	4
Elective Core						
124	Elective Subject I (Paper – I)	80	20	100	4	4
125	Elective Subject I (Paper – II)	80	20	100	4	4
126	Elective Subject II (Paper – I)	80	20	100	4	4
127	Elective Subject II (Paper – II)	80	20	100	4	4
Open Elective						
128	Entrepreneurship Development	80	20	100	4	4

Fourth Semester

Paper Code	Title of the Paper	Semester Exam			No. of weekly lectures	Credits
		UP	IA	Total		
Hard Core						
129	Business Ethics & Corporate Governance	80	20	100	4	4
130	Total Quality Management	80	20	100	4	4
Elective Core						
131	Elective Subject I (Paper – III)	80	20	100	4	4
132	Elective Subject I (Paper – IV)	80	20	100	4	4
133	Elective Subject 1 (Paper – V)	80	20	100	4	4
134	Elective Subject II (Paper – III)	80	20	100	4	4
135	Elective Subject II (Paper – IV)	80	20	100	4	4
136	Elective Subject II (Paper – V)	80	20	100	4	4

Dual Specialization Groups.

- **Elective Specializations:** The University offers Dual specialization**.** Student has to select **ANY TWO** of the Three Groups **A, B, C** and **ANY ONE** specialization subject from a selected group

Group	Elective Specialization
A	• Marketing Management
B	• Financial Management • Tourism and Hospitality Management • Production and Materials Management
C	• Human Resource Management • International Business Management • Banking Management • Systems Management • Agriculture & Co-operative Management

- **Elective Specializations:** Student has to select **ANY TWO** of the Three Groups **A, B, C** and **ANY ONE** Specialization from the selected groups.

Elective Specialization Groups with Subjects Papers:

Group	Specialization	Paper	Subject
A	**Marketing Management**	I	Brand Management
		II	Sales and Distribution Management
		III	Integrated Marketing Communications & Digital Marketing
		IV	Services and Retail Marketing
		V	International Marketing
B	**Financial Management**	I	Corporate Tax Management
		II	Financial Decision Analysis
		III	Financial System of India, Markets & Service.
		IV	Investment Management
		V	International Finance
	Tourism and Hospitality Management	I	Fundamentals of Hospitality Management
		II	Tourism and Travel Management
		III	Accommodation Management
		IV	Facility and Security Management
		V	Hospitality and tourism Marketing.
	Production and Materials Management	I	Purchasing and Inventory Management
		II	Logistics and Supply Chain Management
		III	Industrial Engineering
		IV	Quality Management
		V	World Class Manufacturing
C	**Human Resource Management**	I	Strategic Human Resource Management
		II	Human Resource Initiatives
		III	Industrial Relations and Labour Laws
		IV	Competence based HRM.
		V	International Human Resource Management
	International Business Management	I	International Business Environment
		II	Export Policy, Procedures and Documents
		III	International Marketing
		IV	EXIM Management
		V	International Logistics
	Banking Management	I	Banking Operations Management
		II	Indian Banking Structure
		III	E-Banking
		IV	Marketing of Financial Services
		V	Retail & Universal Banking

Group	Specialization	Paper	Subject
C	**Systems Management**	I	Management Information System
		II	ERP and SPD
		III	Relational Database Management System
		IV	Security And Control Information System
		V	Programming Concepts and Practices
	Agriculture & Co-operative Management	I	Fundamentals of Agriculture & Co-Operative Management
		II	Agricultural Marketing
		III	Agricultural Production Management
		IV	Agro- Processing Industries & Rural Industrialization
		V	International Trade And Agriculture

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: Commerce & Management

CHOICE BASED CREDIT SYSTEM

Syllabus: Master of Business Administion

Name of the Course: M.B.A. Part- II (Sem. III & IV)
(Syllabus to be implemented from w.e.f. June 2021)

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

MBA Part II Syllabus (CBCS) w.e.f. 2021-22

Semester III						Semester IV					
Paper No.	**Subject**	**Weekly Theory**	**Internal Marks**	**Univ. Exam Marks**	**Total Marks**	**Paper No.**	**Subject**	**Weekly Theory**	**Internal Marks**	**Univ. Exam Marks**	**Total Marks**
17	Strategic Management	04	20	80	100	25	Business Ethics & Corporate Governance	04	20	80	100
18	Management Accounting	04	20	80	100	26	Quality Management	04	20	80	100
19	Entrepreneurship Development	04	20	80	100	*27	*Elective I - Paper III*	04	20	80	100
20	Project Report & Viva	--	50	50	100	*28	*Elective II - Paper-III*	04	20	80	100
*21	*Elective I - Paper I*	04	20	80	100	*29	*Elective I - Paper IV*	04	20	80	100
*22	*Elective II - Paper-I*	04	20	80	100	*30	*Elective II - Paper-IV*	04	20	80	100
*23	*Elective I - Paper II*	04	20	80	100	*31	*Elective I - Paper V*	04	20	80	100
*24	*Elective II - Paper-II*	04	20	80	100	*32	*Elective II - Paper-V*	04	20	80	100

Dual Specialization Groups.

Group	Elective Specialization
A	• Marketing Management
B	• Financial Management • Tourism and Hospitality Management • Production and Materials Management
C	• Human Resource Management • International Business Management • Banking Management • Systems Management • Agriculture & Co-operative Management

- **Elective Specializations:** The University offers Dual specialization**.** Student has to select **ANY TWO** of the Three Groups **A, B, C** and **ANY ONE** specialization subject from a selected group

Elective Specialization Groups with Subjects Papers:

Group	Specialization	Paper Code	Subject
A	**Marketing Management**	I	Brand Management
		II	Sales and Distribution Management
		III	Integrated Marketing Communications & Digital Marketing
		IV	Services and Retail Marketing
		V	International Marketing
B	**Financial Management**	I	Corporate Tax Management
		II	Financial Decision Analysis
		III	Financial System of India, Markets & Service.
		IV	Investment Management
		V	International Finance
	Tourism and Hospitality Management	I	Fundamentals of Hospitality Management
		II	Tourism and Travel Management
		III	Accommodation Management
		IV	Facility and Security Management
		V	Hospitality and tourism Marketing.
	Production and Materials Management	I	Purchasing and Inventory Management
		II	Logistics and Supply Chain Management
		III	Industrial Engineering
		IV	Quality Management
		V	World Class Manufacturing
C	**Human Resource Management**	I	Strategic Human Resource Management
		II	Human Resource Initiatives
		III	Industrial Relations and Labour Laws
		IV	Competence based HRM.
		V	International Human Resource Management
	International Business Management	I	International Business Environment
		II	Export Policy, Procedures and Documents
		III	International Marketing
		IV	EXIM Management
		V	International Logistics
	Banking Management	I	Banking Operations Management
		II	Indian Banking Structure
		III	E-Banking
		IV	Marketing of Financial Services
		V	Retail & Universal Banking

Elective Specialization Groups with Subjects Papers (*contd…*):

Group	Specialization	Paper	Subject
C	**Systems Management**	I	Management Information System
		II	ERP and SPD
		III	Relational Database Management System
		IV	Security And Control Information System
		V	Programming Concepts and Practices
	Agriculture & Co-operative Management	I	Fundamentals of Agriculture & Co-Operative Management
		II	Agricultural Marketing
		III	Agricultural Production Management
		IV	Agro- Processing Industries & Rural Industrialization
		V	International Trade And Agriculture

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

NAAC Accredited-2022
'B^{++}' Grade (CGPA 2.96)

Name of the Faculty: Science and Technology

CHOICE BASED CREDIT SYSTEM

Syllabus: Master of Computer Applications

Name of the Course: MCA – I (Sem. I & II)
(Two Year)

(Syllabus to be implemented from June. 2023)

MASTER OF COMPUTER APPLICATIONS (SCIENCE & Technology FACULTY)
DETAIL SYLLABUS OF SEMESTERS I AND II

1. **Introduction:** The Master of Computer Applications (M. C. A.) Programme has been designed with a semester approach in mind. It is a two years course and in each year there are two semesters. Courses in semester-I to semester-IV are aimed at skills development in computers using various technologies.

2. **Program Outcomes :**
   - Students are able to take up positions as systems analysts, systems designers, programmers and managers in any field related to information technology.
   - Students are able to apply knowledge of Mathematical Foundations in computing problems.
   - Students pass on their knowledge for planning, designing and building complex Application Software Systems as well as provide support to automated systems or application.
   - Produce entrepreneurs who can develop customized software solutions for small to large Enterprises.
   - Students are able to function as an effective communicator and team member through essential skills in multidisciplinary projects.

3. **Intake Capacity: 60**

4. **Ordinances and regulations**

5. **ELIGIBILIY:** The eligibility criteria for admission for the MCA course will be as decided by the All Indian Council of Technical Education (AICTE), New Delhi and Directorate of Technical Education (DTE), Government of Maharashtra. It will be published on their respective websites time to time.
   - Passed B.C.A. / Bachelor Degree in Computer Science (B.C.S) / B.Sc. (Entire Computer Science / Computer Science) / Bachelor Degree in Computer Science Engineering or equivalent Degree
     OR passed B.Sc. / B.Com. / B.A. with Mathematics at 10+2 Level or at Graduation Level (with additional bridge Courses as per the norms of the concerned University).
   - Obtained at least 50% marks (45 % marks in case of candidates belonging to reserved category) in the qualifying Examination.

6. **FEES STRUCTURE:** The tuition fees or laboratory fees and other fees have to be paid at the beginning of every semester. At present a student has to pay tuition fees Rs.14000/- per semester and laboratory fee Rs.7000/- per semester together with other fees. These fees may be revised from time to time. The fees once paid will not be refunded.

7. COURSE STRUCTURE: The MCA course is a FOUR semester course. The teaching for the semesters I and III will be during the first half of the academic year and for the semesters II and IV will be during the second half the academic year.

a) A candidate will be awarded a class or distinction as per the rules of other science subjects.
b) The Regulations / Ordinance not covered in this shall be followed from the Regulations / Ordinance laid down for the science faculty.

A Four Semester M.C.A. Course

Semester	No. of Papers / Practical / Project	Marks	Credits
Semester - I			
• Theory Papers	06	600	24
• Practical Papers	02	100	04
• Mini Project	01	50	02
Semester - II			
• Theory Papers	06	600	24
• Practical Papers	02	100	04
• Mini Project	01	50	02
Semester - III			
• Theory Papers	06	600	24
• Practical Papers	02	100	04
• Mini Project	01	50	02
Semester - IV			
• Major Project	01	250	10
Total marks and credits		**2500**	**100**

Bridge Course for B.Sc. / B.Com. / B.A. students

Semester	No. of Papers / Practical / Project	Marks	Credits
Semester - I			
• Theory : Programming using C	01	50	02
• Practical : Programming using C	01	50	02

MCA – I Semester I and II : Structure of the Syllabus

M. C. A. Part – I Semester – I						
Paper Code	**Title of the Paper**	**Contact hrs./week**	**Distribution of Marks for Exam.**			**Credits**
			Internal	**University**	**Total**	
	Hard Core – Theory					
HCT 1.1	Object Oriented Programming using C++	04	20	80	100	04
HCT 1.2	Data Structures	04	20	80	100	04
HCT 1.3	Advanced DBMS	04	20	80	100	04
HCT 1.4	Software Engineering	04	20	80	100	04
HCT 1.5	Operating Systems	04	20	80	100	04
Soft Core - Theory (Any One Group)						
SCT 1.1	Discrete Mathematical Structures	04	20	80	100	04
SCT 1.2	Operation Research					
Hard Core – Practical						
HCP 1.1	Practical-I based on HCT 1.1	04	10	40	50	02
HCP 1.2	Practical-II based on HCT1.2	04	10	40	50	02
HCP 1.3	Mini Project –I	02	10	40	50	02
	Total	-	**150**	**600**	**750**	**30**
M. C. A. Part – I Semester – II						
Paper Code	Title of the Paper	**Contact hrs./week**	**Distribution of Marks for Exam.**			**Credits**
			Internal	**University**	**Total**	
Hard Core – Theory						
HCT 2.1	Java Programming	04	20	80	100	04
HCT 2.2	Python Programming	04	20	80	100	04
HCT 2.3	Computer Communication Network	04	20	80	100	04
HCT 2.4	System Software	04	20	80	100	04
Soft Core - Theory (Any One)						
SCT 2.1	UML	04	20	80	100	04
SCT 2.2	Graph Theory					
Open Elective (Any One)						
OET 2.1	Office Automation	04	20	80	100	04
OET 2.2	SWAYAM course*	--	--	--	--	
Hard Core – Practical						
HCP 2.1	Practical-III based on HCT 2.1 and HCT 2.2	04	10	40	50	02
HCP 2.2	Mini Project - II	04	10	40	50	02
Open Elective - Practical (Any One)						
OEP 2.1	Practical Based on OET 2.1	02	10	40	50	02
OEP 2.2	Practical / Seminar / Viva based on SWAYAM course OET2.2					
	Total	-	**150**	**600**	**750**	**30**

* : The credits will be transferred as per university policy and UGC guidelines after submitting the completion certificate / mark list from the SWAYAM.

Bridge Course for B.Sc. / B.Com. / B.A. students M. C. A. Part – I Semester – I						
Paper Code	**Title of the Paper**	**Contact hrs./week**	**Distribution of Marks for Exam.**			**Credits**
			Internal	**University**	**Total**	
	Hard Core – Theory					
HCT-B1	Theory : Programming using C	02	50	--	50	02
HCP-B1	Practical : Programming using C	02	50	--	50	02

8. Passing Standard: Passing standard is same as that of other M.Sc. courses in the Punyashlok Ahilyadevi Holkar Solapur University. The candidate has to appear for internal evaluation of 20 marks and external evaluation (university exam) for 80 marks for each theory paper. The nature of internal evaluation of practical and project will be decided by the respective schools / departments. The internal evaluation is a process of continuous assessment.

A student who failed in Term End examination (theory) & passed in internal assessment of a paper (subject) shall be given FC (Failed in Term End Exam) Grade. Such student will have to appear for Term End examination only. A student who fails in Internal assessment and passed in Term End examination (Theory) shall be given FR (Failed in Internal Assessment) Grade. Such student will have to appear for Term End examination as well as internal assessment.

9. Nature of theory question paper

M.Sc. / M. C. A.____Sem.____*(Subject Name)*

Paper Name _____

Time : 3 hrs Marks : 80

Instructions :
1. Question No. 1 and 2 are compulsory
2. Attempt any 3 questions from Q. No. 3 to Q. No. 7
3. Figures to the right indicate full marks

Q. 1.	A) Choose correct alternatives (10 questions)	10
	B) Fill in the blanks or true / false (06 questions)	06
Q.2.	Answer the following A) B) C) D)	16
Q.3.	Answer the following A) B)	(10 + 6 **OR** 8 + 8)
Q.4.	Answer the following A) B)	(10 + 6 **OR** 8 + 8)
Q.5.	Answer the following A) B)	(10 + 6 **OR** 8 + 8)
Q.6.	Answer the following A) B)	(10 + 6 **OR** 8 + 8)
Q.7.	Answer the following A) B)	(10 + 6 **OR** 8 + 8)

MASTER OF COMPUTER APPLICATIONS
SEMESTER I

HCT 1.1: Object Oriented Programming using C++

Unit – I **[15]**

Introduction to programming : Algorithms and Flowcharts, Steps in problem solving., Variables and data types, Expressions, Constants, Operators, Type conversions

Branching and Looping constructs: If…else statements, Switch-Case construct while, do…while, for loops

Functions : Functions, Passing arguments, Function prototyping, Default argument initializers

Overview Of C++: Object Oriented Programming, Introducing C++ Classes, Concepts of Object Oriented Programming, C++ as a superset of C, New style comments, main function in C++, meaning of empty argument list, User defined data types: enumerated types, use of tag names, anonymous unions, scope of tag names.

Classes & Objects: Classes, Structure & Classes, Union & Classes, Inline Function, Scope Resolution operator, Static Class Members: Static Data Member, Static Member Function, Passing Objects to Function, Returning Objects, Object Assignment. Friend Function, Friend Classes.

Unit – II **[15]**

Array, Pointers References & The Dynamic Allocation Operators: Arrays, Array initialization, Multi-dimensional arrays, Character arrays, Working with character strings

Array of Objects, Pointer, Pointers to Object, Type Checking C++ Pointers, The This Pointer, Pointer to Derived Types, Pointer to Class Members, References: Reference Parameter, call by reference and return by reference Passing References to Objects, Returning Reference, Independent Reference, C++'S Dynamic Allocation Operators, Initializing Allocated Memory, Allocating Array, Allocating Objects.

Constructor & Destructor: Introduction, Constructor, access specifiers for constructors, and instantiation, Parameterized Constructor, Multiple Constructor in A Class, Constructor with Default Argument, Copy Constructor, Destructor.

Unit – III **[15]**

Overloading as polymorphism: Function & Operator Overloading: Function Overloading, Overloading Constructor Function Finding the Address of an Overloaded Function, Operator Overloading: Creating A Member Operator Function, CreatingPrefix & Postfix Forms of the Increment & Decrement Operation, Overloading The Shorthand Operation (I.E. +=,-= Etc), Operator Overloading Restrictions, Operator Overloading Using Friend Function, Overloading New & Delete, Overloading Some Special Operators, Overloading [ ], ( ), -, Comma Operator, Overloading << and >>.

Inheritance: Base Class Access Control, Inheritance and Protected Members, Protected Base ClassInheritance, Inheriting Multiple Base Classes, Constructors, Destructors and Inheritance, When Constructor and Destructor Function are Executed, Passing Parameters to Base Class Constructors, Granting Access, Virtual Base Classes.

Unit – IV **[15]**

Virtual Functions & Polymorphism: Virtual Function, Pure Virtual Functions, Early Vs. Late Binding.

Exception handling in C++: try, throw, catch sequence, multiple catch blocks, uncaught exceptions, catch-all exception handler

Templates: Reason for templates compactness and flexibility, function template examples explicit specialization, class templates, out of class definition of member functions.

The C++ I/O System Basics: C++ Streams, The Basic Stream Classes C++

PredefinedStreams, Formatted I/O: Formatting Using The Ios Members, Setting The Formal Flags, Clearing Format Flags, An Overloaded Form Of Setf(), Using Width() Precision() and Fill(), Using Manipulators to Format I/O, Creating Your own Manipulators.

Reference Books:

1. C++: The Complete Reference: Herbert Schildt, Tata McGraw Hill.
2. Object Oriented Programming with C++: E. Balguruswami, Tata McGraw Hill.
3. Programming with C++ made simple: M. Kumar, Tata McGraw Hill.

HCT 1.2: Data Structures

Unit – I **[15]**

Fundamental notions: Primitives and composite data types, choice of data structure and complexity of algorithms, Abstract Data Type.
Arrays: Single and Multidimensional Arrays, sparse matrices.
Stacks: Processing the stacks, Linked list implementation, Application of Stacks for expression solving, Non recursive implementation of recursive algorithms.

Unit – II **[15]**

Queues: Processing the queues, Linked list implementation, Dequeues, Priority queues and their applications.
Linked List: Processing linked list, circularly linked list, doubly linked list, Multilinked lists, String and characters manipulation using arrays and linked list.

Unit – III **[15]**

Trees: Representation of hierarchical relationships, Tree processing, Binary trees, linked list implementation, traversal algorithms, Graph theoretic solutions and tree traversals, Binary trees, Threaded binary trees, Height balanced trees, General Trees.

Design and analysis of algorithm for the implementation: Greedy methods, Dynamic programming, Backtracking, Branch and bound.

Unit – IV **[15]**

Sorting and searching: Various sorts viz. Insertion, Bubble sort, Selection sort, Quick sort, Merge sort, Radix / Bucket sort, Counting sort, searching algorithms and their complexities, Binary tree indexing, B-tree indexing, Hash indexing.

Reference Books:

1. Data structures and algorithms: Alfred Aho, John Hopcraft and Jeffrey Ullman, Addision – Wesley.
2. Introduction to data structures: Bhagat Singh and Thomas Nap, West Publishing Company.
3. The C Programming Language: Brian W. Kernighan, Dennis M. Ritchie, Prentice Hall, 1988.
4. Introduction to Data Structures with applications: J. P. Tremble, Tata McGraw Hill, 1984.
5. Data and file structures: Weiderberg.

HCT 1.3 : Advanced DBMS

Unit – I **[15]**

Introduction to Database Systems: Database – Definition, Limitations of traditional fileprocessing systems, Advantages of DBMS, Users of DBMS.

Database Architecture and Environment: Components of DBMS, Architecture, Physical, logical and view, DDL, DML, DCL, schemas, life cycle of Database System Development, Functions of DBMS.

Conceptual Database Modelling: Data Model – Concept, types of data models, ER model, concepts of entity, entity set, attributes, domains, existence dependency, Keys: candidate, primary, composite, strong and weak entities, cardinality, specialization, generalization, aggregation, Relational Algebra, Relational Calculus.

Unit – II **[15]**

Relational Database Systems: Characteristics, relation, attribute, tuple, domain, null, Normalization, Functional Dependencies, Multivalued Dependencies, 1NF, 2NF, 3NF, 4NF,5NF Boyce codd's normal form.

SQL and PL/SQL: DDL, DML, DCL, Select: From, Where, Order by, Group by, Having, Intersect, Union, Distinct, Between, In, Between, Different types of functions, Delete, Update, Insert, Nested queries, joins, create, alter and drop, constrains, index, views, Triggers, Grant, Revoke, Commit, RollBack, Savepoint, PL/SQL: %Type, %Rowtype, Exception, Cursor etc.

Unit – III **[15]**

Transaction Management and Concurrency Control: Transaction – properties (ACID),states, Concurrency – control, locks, two phase locking serialization.

Distributed Databases: Standalone v/s Distributed databases, Replication, Fragmentation, Client/Server architecture, types of distributed databases.

Unit – IV **[15]**

Database Recovery: Need for recovery, techniques – log based recovery, check point, differed and immediate updates, shadowing, Catastrophic and non- catastrophic failures, Recovery in multi-database environments, Two phase commit protocol.

Query Processing: Steps in query processing, advantages of optimization. [

Object – Relational Databases: Abstract Datatypes, Nested Tables, Varying Arrays, LargeObjects, Naming Conventions for Objects.

Reference Books:

1. Database System Concepts by Korth: Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill Higher Education, 2006.
2. Ramez Elmasri, Shamkant Navathe, Pearson Education India, 2011.
3. An Intro. to Database Systems: C. J. Date, Pearson Education India.
4. Oracle 8i – The Complete Reference: Kevin Loney, George Koch, Osborne / McGraw-Hill, 2000.

HCT 1.4: Software Engineering

Unit – I **[15]**

Introduction: Product and Process: Evolving role of software, software characteristic and components, crisis, myths, software engineering – a layered technology, software process, linear sequential model, prototyping model, RAD model, evolutionary software process model.

Software Process And Project Metrics: Measures, metric indicators, metric in process and the project domains, software measurement, metrics for software quality, software quality assurance.

Unit – II **[15]**

Analysis Concepts And Principles: Requirement analysis, communication techniques, analysis principles, software prototyping & Specification.

Analysis Modeling: Elements of the analysis model, data modeling, functional modeling, behavioral modeling, the mechanics of structured analysis, data dictionary, other classical analysis methods.

Unit – III **[15]**

Design Concepts & Principles: Software Design and software Engineering design process, Design principles, Design concepts, Design methods-Data design, Architectural design and process, Transform and Transaction mappings, Design post processing, Architectural design optimization, Interface design, Procedural design.

Unit – IV **[15]**

Software Testing Methods: Fundamentals, Test case design, White box testing, basis path testing, control structure testing, black box testing, Software testing strategies.

Object Oriented Software Engineering: Object oriented concepts, Identifying the elements of an object model, Management of object-oriented software projects, Object-oriented analysis, design and testing.

Reference Books:

1. Software Engineering: Roger S. Pressman, McGraw Hill, 1997.
2. Software Engineering: Shooman, McGraw Hill, 1987.
3. Software Engineering: Ian Sommerville, Addison Wesley, 1985.
4. Object Oriented Analysis and Design: Grady Booch, Pearson.
5. Object Oriented Modeling and Design: James Rambaugh, Michael Bluha, Prentice Hall India, 1991.
6. Fundamentals of Software Engineering: Carlo Ghezzi, Mehdi Jazayeri, Dino Mandrioli, Prentice Hall India, 2003.

HCT 1.5: Operating System

UNIT-I **[15]**

Introduction and structure of Operating System: Concept of multi – programming, Parallel, Distributed and real – time – sharing, Operating system structure - Operating system components and Services System Call System.

UNIT-II **[15]**

Process Management, Synchronization and Deadlocks: Process Concept, process scheduling, cooperating process, Threads, inter process communication, CPU scheduling Criteria, scheduling algorithms-FCFS, SJF, Priority, Round Robin, Multilevel feedback queue scheduling.

Process Synchronization and Deadlocks: Critical Section problem, Synchronization hardware, Semaphores, Critical region, Monitors, Deadlock system model, characterization of deadlocks and deadlock Prevention, Avoidance and detection, recovery from deadlock.

UNIT-III **[15]**

Memory Management: Memory Management, Logical and physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation.

Virtual, memory: demand paging and its performance, page replacement algorithm, allocation of frames, thrashing.

UNIT-IV **[15]**

File System: Secondary Storage Structure File Concept Access method, Directory Structure, Protection and consistency Semantics, File System Structure, Allocation Method, Free space Management, Directory implementation, Disk Structure, Disk Scheduling methods, Disk Management, Swap space Management.

Security and protection: goals of protection domain of protection, access matrix, security program threats, system threats.

CASE Study: Network Operating System, OS Environment, Comparison of Distributed Operating System, Multiprocessor Time Sharing Systems and Network Operating System.

Reference Books:

1. Operating System Principles: Abraham Silberschatz, Peter Galvin, Greg Gagne, 7th ed., Wiley Student Edition.
2. Operating System: Bawn.
3. Modern Operating Systems: Andrew S. Tanenbaum, Prentice Hall India.
4. Operating Systems: Stuart E. Madnick, John J. Donovan, McGraw-Hill, 1974.
5. Operating system: Peterson.

SCT 1.1: Discrete Mathematical Structures

Unit – I **[15]**

Combinatorics: Permutations and combinations, Distinct and non-distinct objects, Generating functions for combinations, Enumerators for permutations, Distribution of distinct objects.

Matrices: Basic concepts, Types of matrices, Arithmetic operations on matrices, Scalar Multiplication, Transpose of matrix, Symmetric matrix, Inverse of matrix, Solving simultaneous equation using matrices, Boolean matrices, Eigen values, Eigen vectors, Determinant.

Unit – II **[15]**

Mathematical Logic: Notations, Connectives, Normal forms, Theory of inference for statement calculus, Propositional logic, Predicate calculus, Inference theory of the predicate calculus.

Unit – III **[15]**

Relations and Functions: Elementary set theory, product sets, Relations, Closure properties and related algorithm, Functions, Types of functions, Computer representation of sets, Relations, functions and their manipulations, ordering functions, Recursion.

Unit – IV **[15]**

Graph Theory: Definition, walks, paths, trails, connected graphs, Di-graph representation of relations, regular and bipartite graphs, cycles and circuits, eccentricity of a vertex, radius and diameter of a graph, Central graphs, Hamiltonian and Eulerian graphs, and planar graphs.

Algebraic structures: Groups, Lattices, Applications of the Residue Arithmetic's to computers, Group Codes, Definition & examples of algebraic structures their applications to computer science.

Reference Books:

1. Applied Discrete Structure for Computer Science: Kenneth Levasseur, Alan Doerr, Galgotia Publications, 1986.
2. Discrete Mathematical Structures for Computer Science: B. Kolman and R. C. Busby, Prentice Hall, 1987.
3. Foundations of Discrete Mathematics: K. D. Joshi, Wiley Eastern.
4. Elements of Discrete Mathematics: C. L. Liu, D. P. Mahapatra, Tata McGraw Hill, 1977.
5. Concepts in Discrete Mathematics: S. K. Sahni, Camelot Publishing Co., USA.
6. Discrete Mathematics: Schaums series, McGraw Hill.
7. Discrete Mathematical Structures with applications to the Computer Science: Tremblay and Manohar, Tata McGraw Hill, 1977.

SCT 1.2: Operations Research

Unit – I **[15]**

Introduction of Linear Programming: Various definitions, statements of basic theorems and properties, Advantages, Limitations and Application areas of Linear Programming.

Linear Programming Problems: The Graphical method – Graphical Solution methods of Linear Programming problem, Phase II of the Simplex Method, Primal and Dual Simplex Method, Big –M method, Transportation Problem and its solution, Assignment Problem and its solutions by Hungarian Method.

Unit – II **[15]**

Non-Linear programming: Kuhn-Tucker conditions, Convex functions and convex regions, Convex programming problems, Algorithms for solving convex programming problems.

Unit – III **[15]**

PERT and CPM: Basic differences between PERT and CPM, Arrow Networks, time estimates, Earliest expected time, Latest – allowable occurrences time, Forward Pass Computation, Backward Pass Computation, Representation in Tabular Form, Critical Path, Probability of meeting scheduled date of completion, Calculation on CPM network. Various floats for activities, Critical path updating projects. Operation time cost trade off Curve project, Time cost – trade off Curve, Selection of schedule based on Cost.

Unit – IV **[15]**

Network Flow Problem: Formulation, Max-Flow Min-Cut theorem, Ford and Fulkerson's algorithm. Exponential behavior of Ford and Fulkerson's algorithm.

Matroids: Definition, Graphic and Cographic matroids, Matroid intersection problem.

Reference Books:

1. Linear Programming: G. Hadley, Addison Wesley, 1969.
2. Operations Research an Introduction: H. A. Taha, Macmillan N. Y., 1971.
3. Operations Research: Kanti Swaroop, Gupta and Manmohan, Sultan Chand and Co., 1985.
4. Operations Research Theory and Applications: J. K. Sharma, 2nd Ed. Macmillan India ltd, 2003.
5. Mathematical Models Operations Research: J. K. Sharma, McGraw Hill, 1986.

SEMESTER II

HCT 2.1: Java Programming

Unit – I

Introduction to Java: Importance and features of java, keywords, constants, variables and data types, Operators and expressions, Decision making, branching and looping: if..else, switch, ?: operator, while, do, for statements, labeled loops, jump statements: break, continue, return. [09]

Classes and Objects: defining a class, adding variables and methods, creating objects, constructors, class inheritance. [06]

Unit – II

Arrays and strings: creating an array, one and two dimensional arrays, string array and methods, String and StringBuffer classes, Wrapper classes. [05]

Inheritance: Basics types, using super, Multilevel hierarchy abstract and final classes, Object class, Packages and interfaces, Access protection, Extending Interfaces, packages. [06]

Exception Handling: Fundamentals, exception types, uncaught exceptions, throw, final, built in exception, creating your own exceptions. [04]

Unit – III

Multithreaded Programming: Fundamentals of Java thread model, priorities, synchronization, messaging, thread class, Runnable interface, interthread Communication, suspending, resuming and stopping threads. [08]

Input/Output: Basics, Streams, Byte and Character stream, predefined streams, Reading and writing from console and files. Using Standard Java Packages (lang, util, io, net). [07]

Unit – IV

Event Handling: Event Model, Event Classes, Event Listener Interfaces, Adapter and Inner Classes, Working with windows, graphics and text, using AWT controls, Layout managers and menus, handling Image, animation, sound and video, Java Applet.[08]

JDBC: JDBC API, JDBC Drivers, Products, JDBC Design considerations, Basic steps to JDBC, setting up a connection to database, Creating and executing SQL statements. [07]

Reference Books:

1. Java-2 the complete Reference: Patrick Naughton and Herbertz Schidt, Tata McGraw-Hill Education, 2002.
2. Programming with Java: Balaguruswamy, Tata McGraw-Hill Edn., 4th edition, 2006.
3. Computing Concepts with Java 2 E Essentials: Horstmann, John Wiley, 2nd edition, 1999.
4. Programming Java: Decker and Hirshfield, Vikas Publication, 2000.

HCT-2.2 : Python Programming

Unit -I **[15]**

String, List, Tuple ,Dictionary ,Function, Module, Set, Package

String -Declaring string ,String manipulation using string functions, formatting string literals List-Introduction to list ,list functions

Tuple- Introduction to tuple ,manipulating tuple.

Dictionary- Introduction, Accessing values in dictionaries, create,delete and update dictionary items.Function- Types of function, Defining function ,calling function, advantages of function function parameters, Anonymous function, Global and local variables, inbuilt functions- map,zip,reduce,filter ,any,chr ,ord etc. Modules-Importing module, creating and exploring modules ,math module, time module,random module, OS,calendar,sys etc. Set-Introduction to set, manipulate set. Package-Introduction, importing from package, json

File-File opening ,closing file, various types of file modes, reading and writing to file manipulating directories Exception handling - try,else, finally, raise keyword.

Regular Expression- various types of regular expression, using match and search function.

GUI -Introduction to GUI library, Advantages, Layout management, Events and binding Drawing on canvas(line, oval, rectangle etc) widget such as Frame, Label, Button, Checkbutton, Entry, Listbox, Radiobutton, Text, Spinbox etc.

Database-Introduction, Connections, Executing queries, Transactions, Error Handling

Unit –II **[15]**

OOPs Concept : Introduction to OOP, Classes and objects, Inheritance Method overloading and method overriding ,Abstract method and Abstract class, Interfaces in python ,Abstract class VS Interfaces,constructor,instance methods ,class methods, static methods.

Generators- Introduction, communicating with generators with send( )

Decorators –Introduction, simple function decoratoes, classes as decorators, chained decorators decorator arguments .

Threads – Introduction, Uses of Threads, creating Thread without using a class, creating a Thread by creating a Sub Class to Thread Class, creating a Thread without creating a Sub Class to Thread Class, Communication between Threads, Thread communication using notif() and wait() methods

Unit –III **[15]**

Data science using python

Data Frame-Creating Data Frame from an Excel Spreadsheet, Creating Data Frame from .csv file, Creating Data Frame from python Dictionary, Creating Data Frame from python List of Tuples, Operations on Data Frames.

Data visualization-Bar Graph, Histogram, Creating a pie chart, creating line graph

Unit – IV **[15]**

NumPY - Introduction, creating NumPYarrays, indexing and slicing in NumPy.

Pandas - Introduction, installation of panda, data frame, series, range data, slice data, drop a colomn,, concatenation.

Django-Introduction to django, ddjango templates, introduction to WSGI

References :

- INTRODUCTION TO COMPUTATION AND PROGRAMMING USING

PYTHON: WITH APPLICATION TO UNDERSTANDING DATA, John V. Guttag
- THINK PYTHON, by Allen B. Downey, O'Reilly
- INTRODUCING PYTHON: MODERN COMPUTING IN SIMPLE PACKAGES by Bill Lubanovic
- PYTHON PROGRAMMING: AN INTRODUCTION TO COMPUTER SCIENCE by John Zelle
- Core Python Programming, Dr. R. Nageshwara Rao, Dreamtech
- Introduction to Computer Science using Python, Charles Dierbach, Wiley

E-Resources: -

- Python Book (http://upload.wikimedia.org/wikipedia/commons/9/91/Python_Programmig.pdf)
- http://pythonbooks.revolunet.com/
- Python Threading: http://www.tutorialspoint.com/python/python_multithreading.htm GUI:
- https://wiki.python.org/moin/TkInter
- https://wiki.python.org/jython/LearningJython http://www.tutorialspoint.com/python/python_gui_programming.htm
- Database:
- Python MySQL API https://wiki.python.org/moin/DatabaseInterfaces http://www.tutorialspoint.com/python/python_database_access.htm
- Web Framework: http://webpy.org/docs/0.3/tutorial

HCT 2.3 : Computer Communication Network

Unit – I **[15]**

Introduction: Uses of Computer networks: Business Applications, Home Applications, Mobile Users, Social Issues; Network Hardware: Local Area Networks, Metropolitan Networks, Wide Area Networks, Wireless Networks, Home Networks, Internetworks; Network Software: Protocol Hierarchies, Design Issues for the Layers, Connection-Oriented and Connectionless Service Primitives, Relationship of Services to Protocols; Example of Networks: The Internet, The ARPANET, NSFNET, Internet usage, Architecture of the internet.

Data Link Layer: Data Link Layer Design Issues: Services Provided to the Network Layer, Framing, Error Control, Flow Control; Error Detection and Correction: Error-Correcting Codes, Error-Detecting Codes; Elementary Data Link Protocols: An Unrestricted Simplex Protocol, A Simplex Stop-and-Wait Protocol, A Simplex Protocol for a Noisy Channel; Sliding Window Protocols: A One-Bit Sliding Window Protocol, A Protocol Using Go Back N, A Protocol Using Selective Repeat; Example Data Link Protocols: HDLC—High-Level Data Link Control, The Data Link Layer in the Internet.

Unit – II **[15]**

Network Layer: Network Layer Design issues: Store and Forward packet Switching, Services Provided to the Transport Layer, implementation of Connectionless Service, Implementation of Connection-oriented Services, Comparison of Virtual Circuit and Datagram subnets; Routing algorithms: The Optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link state Routing, Hierarchical Routing, Broadcast Routing, Routing for Mobile Hosts; Congestion Control Algorithms: General Principles of Congestion Control, Congestion Prevention Policies, Congestion Control in Virtual-Circuit Subnets, Congestion Control in Datagram Subnet, Load Shedding, Jitter Control; Quality of Service: Requirements, Techniques for Achieving Good Quality of Service; Internetworking: Differences in Networks, Network Connection, Concatenated Virtual Circuits, Connectionless Internetworking; Tunneling; Internetwork Routing, Fragmentation; The Network Layer in the Internet: The IP Protocol, IP Addresses, Internet Control Protocols, Mobile IP; IPV6.

Unit – III **[15]**

The Transport Layer: The Transport Service: Services Provided to the Upper Layers, Transport Service Primitives, Berkeley Sockets; Elements of Transport Protocols: Addressing, Connection Establishment, Connection Release Flow Control and Buffering, Multiplexing, Crash Recovery; The Internet Transport Protocol – UDP: Introduction to UDP, Remote Procedure Call, The Real-Time Transport Protocol; The Internet Transport Protocols – TCP: Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release, Modeling TCP Connection Management TCP Transmission Policy, TCP Congestion Control, Wireless TCP and UDP.

Unit – IV **[15]**

The Application Layer: DNS – The Domain Name System: The DNS Name Space, Resource Records, Name Servers; Electronic Mail: Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery; The World Wide Web: Architectural Overview, Static Web Documents, Dynamic Web Documents, HTTP, Performance Enhancements, The Wireless Web.

Reference Books:

1. Computer Networks: Andrew S. Tanenbaum, 4th Edition, Pearson Education, Asia, 2002.
2. Communication Networks: Fundamental Concepts and Key Architectures, Alberto Leon-Garcia, Indra Widjaja, Tata McGraw Hill, 2006.
3. Data Communications and Networking: Behrouz A. Forouzan, Tata McGraw Hill, Second Edition, 2001.

HCT 2.4 : System Software

Unit I **[15]**

Introduction: System software and machine architecture, traditional (CISC) machines, RISC machines.

Assemblers: Basic assembler functions, machine dependent and machine independent assembler features, one-pass assemblers, multi-pass assemblers, MASM and SPARC assembler.

Unit II **[15]**

Loaders and Linkers: Basic loader functions, machine dependent and machine independent loader features, linkage editors, dynamic linking, bootstrap loaders, MS-DOS and SunOS Linkers.

Unit III **[15]**

Macro Processors: Basic macro processor functions, machine independent macro processor features, macro processor design options, MSAM macro processor, ANSI C macro language.

Unit IV **[15]**

Compilers: Basic compiler functions, machine-dependent compiler features, machine-independent compiler features, compiler design options, the YACC compiler-compiler.

Reference Books:

1. System Software – An Introduction to System Programming: Leland L. Beck, 3/e, Pearson Education.
2. Compilers – Principles, techniques and tools: A. V. Aho, R. Semi, J.D. Ullman, Pearson Education.
3. Systems Programming and Operating Systems: D.M. Dhamdhere, Tata McGraw Hill.
4. Compiler Design: Santanu Chattopadhyay, Prentice Hall India.

SCT 2.1: UML

Unit – I **[15]**

Object Oriented Design and Modeling: Object Oriented Fundamentals, Objects and object classes, object oriented design process, importance of modeling, principles of modeling, object oriented modeling, Rational Unified Process.

Introduction to UML: Conceptual model of UML, building blocks of UML, Mechanisms in UML, architecture, software development life cycle.

Unit – II **[15]**

Basic Structural Modeling: Classes, relationships, common mechanisms, class and object diagrams.

Advanced structural Modeling: Advanced classes, advanced relationships, Interfaces types and roles, packages, instances and object diagrams.

Unit – III **[15]**

Collaboration Diagrams and Sequence Diagrams: Terms, concepts and depicting a message in collaboration diagrams, Terms and concepts in sequence diagrams, Difference between collaboration and sequence diagram, Depicting synchronous messages with/without priority call back mechanism.

Basic behavioral modeling: Interactions, use cases, Use Case Diagrams, Interaction Diagrams and activity diagrams.

Unit – IV **[15]**

Advanced behavioral modeling: Events and signals, state machines, process and threads, time and space, state chart diagrams.

Architectural Modeling: Terms, Concepts, examples, Modeling techniques for component diagrams and deployment diagrams.

Reference Books:

1. The Unified Modeling Language User Guide: Grandy Booch, James Rumbough, Ivar Jacobson, Pearson Education 2002.
2. Software Engineering: Ian Sommerville, Sixth Edition, 2003.
3. Fundamentals of Object Oriented Design in UML: Meilir Page Jones, Addison Wesley, 2000.

SCT 2.2: Graph Theory

Unit – I **[15]**

Introducing graphs and algorithmic complexity: Introducing graphs, Introducing algorithmic complexity, Introducing data structures and Depth-first searching, Two linear –time algorithms.

Spanning – trees, branchings and connectivity:

Spanning-trees and branchings, Optimum weight spanning-trees, Optimum branchings, enumeration of spanning-trees, Circuits, cut-sets and connectivity, Fundamental circuits of a graph, Fundamental cut-sets of a graph, Connectivity.

Unit – II **[15]**

Planner graphs: Basic properties of planner graphs, Genus, crossing-number and thickness, Characterisations of planarity, Dual graphs, A planarity testing algorithm.

Networks and flows: Networks and flows, Maximising the flow in a network, Menger's theorem and connectivity, A minimum-cost flow algorithm, Summary and references, Exercises.

Unit – III **[15]**

Matchings: Definitions, Maximum-cardinality matchings, Perfect matchings, Maximum-weight matchings, Summary and references, Exercises.

Eulerain and Hamiltonian tours: Eulerain paths and circuits, eulerian graphs, Finding Eulerian circuits, Postman problems, counting Eulerain circuits, The Chinese postman problem for undirected graphs, The Chinese postman problem for digraphs, Hamiltonian tours, Some elementary existence theorems, Finding all Hamiltonian tours by metrical products, The traveling salesman problem, 2-factors of a graph. [18]

Unit – IV **[15]**

Colouring graphs: Dominating sets, independence and cliques, Colouring graphs, Edge-colouring, Vertex-colouring, Chromatic polynomials, Face- colouring of embedded graphs, The five-colour theorem, The four-colour theorem, Summary and references, Exercises.

Reference Books:

1. Algorithmic graph theory: Alan Gibbons, Cambridge University Press.
2. Graph theory: Harary, Addison Wesley, 1972.

OET 2.1: Office Automation

UNIT – I [15]

Introduction to Computer: Applications of Computer – Advantages of Computer – Terms related to Computer - Characteristics of Computer: Speed, Storage, Versatility and Diligence – Hardware & Software.

Windows: Desktop icons and their functions: My computer, My documents, Network neighborhood, Recycle Bin, Quick launch tool bar, System tray, Start menu, Task bar, Dialog Boxes: List Box, Spin Control Box, Slide, Drop-down list, Radio button, Check box, Text box, Task Bar - System Tray - Quick launch tool bar - Start button - Parts of Windows -Title bar-Menu bar - Scroll bar- Status bar, Maximize, Minimize, close and Resize & Moving a Window, Keyboard Accelerators: Key board short keys or hotkeys.

UNIT – II [15]

MS Word: Working with Documents -Opening & Saving files, Editing text documents, Inserting, Deleting, Cut, Copy, Paste, Undo, Redo, Find, Search, Replace, Formatting page & setting Margins, Converting files to different formats, Importing & Exporting documents, Sending files to others, Using Tool bars, Ruler, Using Icons, using help.

Formatting Documents: Setting Font styles, Font selection- style, size, colour etc, Type face - Bold, Italic, Underline, Case settings, Highlighting, Special symbols, Setting Paragraph style, Alignments, Indents, Line Space, Margins, Bullets & Numbering.

Setting Page style: Formatting Page, Page tab, Margins, Layout settings, Paper tray, Border & Shading, Columns, Header & footer, Setting Footnotes & end notes – Shortcut Keys; Inserting manual page break, Column break and line break, Creating sections & frames, Anchoring & Wrapping, Setting Document styles, Table of Contents, Index, Page Numbering, date & Time, Author etc., Creating Master Documents, Web page.

Creating Tables: Table settings, Borders, Alignments, Insertion, deletion, Merging, Splitting, Sorting, and Formula.

Drawing: - Inserting Clip Arts, Pictures/Files etc.

Tools: Word Completion, Spell Checks, Mail merge, Templates, Creating contents for books, Creating Letter/Faxes, Creating Web pages, Using Wizards, Tracking Changes, Security, Digital Signature. Printing Documents – Shortcut keys.

UNIT – III [15]

MS Excel: Spread Sheet & its Applications, Opening Spreadsheet, Menus - main menu, Formula Editing, Formatting, Toolbars, Using Icons, Using help, Shortcuts, Spreadsheet types. Working with Spreadsheets- opening, Saving files, setting Margins, Converting files to different formats (importing, exporting, sending files to others), Spread sheet addressing - Rows, Columns & Cells, Referring Cells & Selecting Cells – Shortcut Keys.

Entering & Deleting Data: Entering data, Cut, Copy, Paste, Undo, Redo, Filling Continuous rows, columns, Highlighting values, Find, Search & replace, Inserting Data, Insert Cells, Column, rows & sheets, Symbols, Data from external files, Frames,

Clipart, Pictures, Files etc, Inserting Functions, Manual breaks.
Setting Formula: finding total in a column or row, Mathematical operations (Addition, Subtraction, Multiplication, Division, Exponentiation), using other Formulae.
Formatting Spreadsheets: Labelling columns & rows, Formatting- Cell, row, column & Sheet, Category - Alignment, Font, Border & Shading, Hiding/ Locking Cells, Anchoring objects, Formatting layout for Graphics, Clipart etc., Worksheet Row & Column Headers, Sheet Name, Row height & Column width, Visibility - Row, Column, Sheet, Security, Sheet Formatting & style, Sheet background, Colour etc, Borders & Shading – Shortcut keys.
Working with sheets: Sorting, Filtering, Validation, Consolidation, and Subtotal.
Creating Charts: Drawing. Printing. Using Tools – Error checking, Formula Auditing, Creating & Using Templates, Pivot Tables, Tracking Changes, Security, Customization.

UNIT-IV [15]
MS Power point: Presentation – Opening new presentation, Different presentation templates, setting backgrounds, selecting presentation layouts.
Creating a presentation: Setting Presentation style, Adding text to the Presentation.
Formatting a Presentation: Adding style, Colour, gradient fills, Arranging objects, Adding Header & Footer, Slide Background, Slide layout. Adding Graphics to the Presentation- Inserting pictures, movies, tables etc into presentation, Drawing Pictures using draw.
Adding Effects to the Presentation: Setting Animation & transition effect. Printing Handouts, Generating Standalone Presentation viewer.
MS Access: Introduction, Planning a Database, Starting Access, Access Screen, Creating a New Database, Creating Tables, Working with Forms, Creating queries, Finding Information in Databases, Creating Reports, Types of Reports, Printing & Print Preview – Importing data from other databases viz. MS Excel etc.

Reference Books:

1. Information Technology in Business: Principles, Practices, and Opportunities by James A Senn, Prentice Hall.
2. Technology and Procedures for Administrative Professionals by Patsy Fulton-Calkins, Thomson Learning.
3. Computer Fundamental MS Office – Including Internet & Web Technology: Anupama Jain (Author), Avneet Mehra
4. The Complete Reference: Virginia Andersen, McGraw Hill
5. MS Office 2007 in a Nutshell: S. Saxena, Vikas Publications
6. MS-Office 2007 Training Guide: S. Jain, BPB Publications
7. Learning Computer Fundamentals, MS Office and Internet & Web Technology: D. Maidasani.

OET 2.2: SWAYAM Course

1. Student has to register one course of minimum 4 credits from SWAYAM
2. The selected course should not be from the syllabus.
3. After registration student has to report to the SWAYAM mentor of the dept.
4. Student should register for the online exam of the same course, pass the exam. and submit the marklist / certificate from SWAYAM to the mentor.

Bridge Course for B.Sc. / B.Com. / B.A. students
M. C. A. Part – I Semester – I

HCT-B1	**Theory : Programming using C**

Unit – I [15]

Introduction to problem solving: Algorithms and Flowcharts, pseudo code

Language Fundamentals: History, Character set, C Tokens, Keywords, Identifiers, Variables, Constant, Data Types Operators: Types of operators, Precedence and Associativity, Expression, Statement and types of statements, Structure of 'C' program. Console based I/O and related built-in I/O function: printf( ), scanf( ), getch(), getchar( ), putchar( )

Unit – II [15]

Control structures: Decision making structures (if, if-else, Nested if –else, Switch), Loop Control structures (while, do-while, for, Nested for loop), break, continue, goto, exit.

Functions: Basic types of function, Declaration and definition, Function call, Parameter passing, Call by value, Call by reference, Scope of variables, Storage classes, Recursion.

Arrays: Definition, declaration and initialization of one dimensional array, Accessing array elements, Displaying array elements, Sorting arrays, Arrays and function, Two-Dimensional array,

Unit – III [15]

Pointers: Definition and declaration, Initialization, indirection operator, address of operator, pointer arithmetic, dynamic memory allocation, arrays and pointers, function and pointers.

Unit – IV [15]

Strings: Definition, declaration and initialization of strings, standard library functions: strlen( ), strcpy( ), strcat( ), strcmp( ), implementation without using standard library functions.

Structures: Definition and declaration, structure variables initialization, Accessing fields and structure operations, Nested structures,

Reference Books:

1. Let us C: Yashwant Kanetkar, 12th Edn., B P B Publications.
2. Programming in ANSI C: E. Balguruswamy, Tata McGraw Hill, 2008.

HCP-B1	**Practical : Programming using C**

Minimum 20 practicals based on the above HCT-B1 syllabus.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

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

Name of the Faculty : Science and Technology

CHOICE BASED CREDIT SYSTEM

Syllabus

Name of the Course : **MCA – II (Sem. III and IV)**
(Two Year)

(Syllabus to be implemented from June. 2021)

MASTEROFCOMPUTER APPLICATIONS

(SCIENCE &TECHNOLOGY FACULTY)

DETAILSYLLABUS OF MCA-II SEMESTERS III AND IV

1. **Program Outcomes :**
   - Students are able to take up positions as systems analysts, systems designers, programmers and managers in any field related to information technology.
   - Students are able to apply knowledge of Mathematical Foundations in computing problems.
   - Students pass on their knowledge for planning, designing and building complex Application Software Systems as well as provide support to automated systems or application.
   - Produce entrepreneurs who can develop customized software solutions for small to large Enterprises.
   - Students are able to function as an effective communicator and team member through essential skills in multidisciplinary projects.

2. **COURSE STRUCTURE:** The MCA course is a FOUR semester course. The teaching for the semesters I and III will be during the first half of the academic year and for thesemesters II and IV will be during the second half the academic year.

A Four Semester M.C.A. Course

Semester	No. of Papers / Practical / Project	Marks	Credits
Semester - I			
• Theory Papers	06	600	24
• Practical Papers	02	100	04
• Mini Project	01	50	02
Semester - II			
• Theory Papers	06	600	24
• Practical Papers	02	100	04
• Mini Project	01	50	02
Semester - III			
• Theory Papers	06	600	24
• Practical Papers	02	100	04
• Mini Project	01	50	02
Semester - IV			
• Major Project	01	250	10
Total marks and credits		**2500**	**100**

Bridge Course for B.Sc. / B.Com. / B.A. students

Semester	No. of Papers / Practical	Marks	Credits
Semester - I			
• Theory : Programming using C	01	50	02
• Practical : Programming using C	01	50	02

MCA – II Semester III and IV : Structure of the Syllabus

M. C. A. Part – II Semester – III						
PaperCode	**Title of the Paper**	**Contact hrs./week**	**Distribution of Marks for Exam.**			**Credits**
			Internal	**University**	**Total**	
	Hard Core – Theory					
HCT3.1	NET Technology	04	20	80	100	04
HCT3.2	Digital Image Processing	04	20	80	100	04
HCT 3.3	Mobile Computing	04	20	80	100	04
HCT 3.4	Artificial Intelligence	04	20	80	100	04
Soft Core - Theory (Any One Group)						
SCT 3.1	Data Warehouse and Mining	04	20	80	100	04
SCT 3.2	Finite Automata					
Open Elective (Any One)						
OET 3.1	Fundamentals of Web Designing	04	20	80	100	04
OET 3.2	SWAYAM course*					
Hard Core –Practical						
HCP 3.1	Practical-I based on HCT 3.1, HCT3.2 and HCT3.3	08	10	40	50	02
HCP 3.2	Mini Project –III	02	10	40	50	02
Open Elective - Practical (Any One)						
OEP 3.1	Practical Based on OET 3.1	02	10	40	50	02
OEP 3.2	Practical / Seminar / Viva based on SWAYAM course OET3.2					
	Total	**36**	**150**	**600**	**750**	**30**
M. C. A. Part – II Semester – IV						
PaperCode	Title of the Paper	**Contact hrs./week**	**Distribution of Marks for Exam.**			**Credits**
			Internal	**University**	**Total**	
Hard Core –Practical						
HCP 4.1	Project – IV (Major Project)	02	50	200	250	10
	Total	**02**	**50**	**200**	**250**	**10**

* : The credits will be transferred as per university policy and UGC guidelines after submitting the completion certificate / mark list from the SWAYAM.