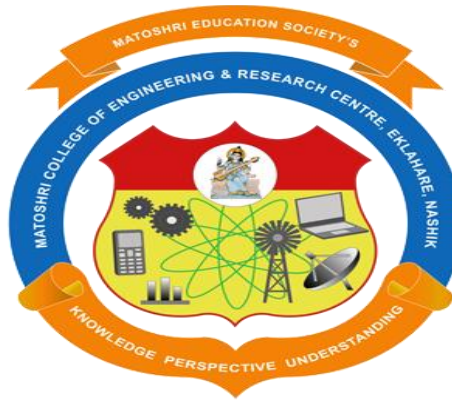


# Curriculum for Bachelor of Technology (Pattern 2024)

With Effect From A.Y. 2024-25



Matoshri Education Society's  
**Matoshri College of Engineering and Research  
Centre, Nashik  
(Autonomous)**

NBA and NAAC Accredited, Approved by All India Council for Technical Education, New Delhi,  
Affiliated to Savitribai Phule Pune University, College Code: 5177  
Website: <https://engg.matoshri.edu.in> Phone: +91 0253 2406600, 18002336602

**Eklahare, Near Odhagaon, Off Nashik-Aurangabad Highway, Nashik,  
Maharashtra 422105**

## Curriculum Structure and Syllabus for Bachelor of Technology (B.Tech.) Programme (Pattern 2024)

Matoshri College of Engineering and Research Centre, Nashik has been granted the academic autonomous status from academic year 2024-25 by University Grant Commission. The Academic autonomous status has been considered as an opportunity for imparting comprehensive education. The academic autonomous status can be utilized to implement the National Education Policy (NEP 2020) effectively. The institute has a prudent plan to incorporate necessary dynamism in academic structure to march towards the vision of the institute and develop the research and skill oriented human resources contributing to the development of the nation.

With a focus on staying at the forefront of educational innovation, the institution diligently prepares curricula that are both dynamic and industry-aligned. This process entails meticulous planning and collaboration to ensure the development of comprehensive programs catering to the evolving needs of students and industries alike. The highlights of BTech curriculum structure are:

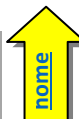
- Every B.Tech programme is of four years duration with eight semesters.
- The curricula have been designed adhering to the NEP guidelines and norms.
- Meticulous consideration has been observed to support multiple entries and multiple exits.
- The curricula design supports horizontal and vertical mobility of the learners with or without additional credits.
- Efforts have been taken to design the curricula which are unambiguous and self explanatory.
- Students have to earn 176 credits for the award of BTech degree in major discipline with multidisciplinary minor that are uniformly distributed among eight semesters.
- The Student has to earn the additional 18 credits for the award of BTech in major discipline with Honor and multidisciplinary minor. These credits are distributed among semesters-V, VI, VII, VIII.
- The Student has to earn the additional 18 credits for the award of BTech in major discipline Honor with research and multidisciplinary minor. These credits are uniformly distributed among semesters-VI, VII, VIII.
- The Student has to earn the additional 18 credits for the award of BTech in major discipline with double minors. These credits are distributed among semesters-V, VI, VII, VIII.
- The induction program is conducted for two weeks at the start of the first semester and one week at the start of second semester or three weeks in the first semester only. The guidelines and content of the induction program is declared well in advance.

### Credit Requirement and Eligibility for the B.Tech programme

Admissions eligibility for first year B.Tech will be as per guidelines provided by Admission Regulating Authority of Maharashtra and guidelines of NEP2020.

### This Document includes-

1. [Total Credits and Total Marks for Bachelor of Technology \(BTech\)](#)
2. [Nomenclature for Course Codes](#)
3. [Examination Heads and Assessment Schemes](#)
4. [Various Courses' Categories, Description and Abbreviation](#)
5. [Credit Requirements and Qualification Title with multiple entry and exit option](#)
6. [Credit Distribution Structure for Honour/ Honour with Research Degree](#)
7. [Eight Semesters Curriculum Structure for Bachelor of Technology \(BTech\) Programme](#)
8. [Various Courses' Categories and Credit Distribution](#)
9. [Program Outcomes](#)
10. [Course Contents \(detail syllabus\) for First Year of Bachelor of Technology](#)



**Matoshri College of Engineering and Research Centre (Autonomous)**  
**Curriculum for**  
**First Year Bachelor of Technology**

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**Table 1: Total Credits and Total Marks for Bachelor of Technology (BTech)**

Semester	Total Credits	Total Marks
I	22	700
II	22	700
III	22	700
IV	22	700
V	22	700
VI	22	700
VII	22	700
VIII	22	700
<b>Total</b>	<b>176</b>	<b>5600</b>

**Table 2: Nomenclature for Course Codes**

<b>YY</b>	<b>U/P/D</b>	<b>NN</b>	<b>MM</b>
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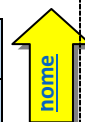
**Format for Course Codes-**
**YY - Year of Course launch**
**U/P/D- U : Undergraduate**
**P: Postgraduate**
**D- Doctoral**
**NN- Branch Code**
**MM- Course Number**

NN	Programme (UG)	NN	Programme (PG)
<b>01</b>	First Year B.Tech. (Common for all Disciplines )	<b>09</b>	B.Tech. Mechanical Engineering
<b>02</b>	B.Tech. Artificial Intelligence and Data Science	<b>10</b>	M.Tech. Geotechnical Engineering
<b>03</b>	B.Tech. Civil Engineering	<b>11</b>	M.Tech. Data Science
<b>04</b>	B.Tech. Computer Engineering	<b>12</b>	M.Tech. VLSI and Embedded System
<b>05</b>	B.Tech. Electronics and Telecommunication Engineering	<b>13</b>	M.Tech. Electrical Power Systems
<b>06</b>	B.Tech. Electronics and Computer Engineering	<b>14</b>	M.Tech. Heat Power Engineering
<b>07</b>	B.Tech. Electrical Engineering	<b>15</b>	Master of Computer Applications (MCA)
<b>08</b>	B.Tech. Information Technology		

Table 3: Examination Heads and Assessment Schemes


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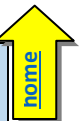
Exam Head	Abbreviation	In Semester Exam (40% of Total Curriculum and Marks)		End Semester Exam (60% of Total Curriculum and Marks)
		In_Sem_Exam_1 (20%)	In_Sem_Exam_2 (20%)	
<b>Theory</b>	<b>TH</b>	CAT/CCE based on 20% curriculum	CAT/CCE based on 20% curriculum	Theory examination based on 60% curriculum
<b>Project</b>	<b>PROJ</b>	Progress Review I with Demonstration, Presentation, Oral & Report	Progress Review II with Demonstration, Presentation, Oral & Report	Activity, Presentation, Demonstration, Oral & Report as applicable
<b>Internship</b>	<b>INT</b>	Progress Review I with Activity, Presentation, Demonstration, Oral & Report as applicable	Progress Review II with Activity, Presentation, Demonstration, Oral & Report as applicable	Activity, Presentation, Demonstration, Oral & Report as applicable
<b>Practical</b>	<b>PR</b>	Mid-semester exam based on experiment/ activity performance, demonstration, Presentation, Oral and Journal, Report as applicable		Experiment, activity performance, demonstration, Presentation, Oral & Report, journal as applicable
<b>Term work</b>	<b>TW</b>	Mid-semester exam based on experiment/ activity performance, demonstration, Presentation, Oral and Journal, Report as applicable		Activity, Experiment performance, demonstration, Presentation, Oral & Report, journal as applicable
<b>Continuous Assessment Test</b>	<b>CAT</b>	Class test examination to assess and evaluate a student's progress with descriptive or objective questions as measure of the student's knowledge and skills in online or offline mode.		
<b>Continuous and Comprehensive Evaluation</b>	<b>CCE</b>	Examinations that assess and evaluate learners' abilities based on various dimensions viz- academic performance, work experience, skills, coordination, agility, innovation, teamwork, public speaking, behavior, and similar as a measure of knowledge, skills and attitude.		



<b>Table 4: Various Courses' Categories, Description and Abbreviation</b>		
<b>Broad Category</b>	<b>Description</b>	<b>Abbreviations</b>
<b>Science or Engineering Science</b>	Basic Science Course	BSC
	Engineering Science Course	ESC
<b>Program Courses</b>	Programme Core Course	PCC
	Programme Elective Course	PEC
<b>Multidisciplinary Courses</b>	Multidisciplinary Minor	MDM
	Open Elective	OE
<b>Skill Courses</b>	Vocational and Skill Enhancement Course	VSEC
<b>Humanities Social Science and Management (HSSM)</b>	Ability Enhancement Course	AEC
	Entrepreneurship Development / Engineering Economics / Management	ED / EE / MGT
	Indian Knowledge System	IKS
	Value Education Course	VEC
<b>Experiential Learning Courses</b>	Research Methodology	RM
	Community Engineering Project / Field Project	CEP/ FP
	Project	PROJ
	Internship / On Job Training	INT / OJT
<b>Liberal Learning Courses</b>	Co-curricular Courses	CC
<b>Course Type/ Teaching Learning Schemes</b>	Practical	PR
	Internship	INT
	Theory	TH
	Tutorial	TUT
	Lecture	Lect
	Laboratory Course	Lab
<b>Examination Head</b>	Term work	TW
<b>In Semester Examination</b>	In_Sem_Exam	ISE
<b>Continuous Assessment Test</b>	Continuous Assessment Test	CAT
<b>End Semester Examination</b>	End_Sem_Exam	ESE
<b>Exit Courses for award of Certificate/Diploma/ Degree</b>	Skill Based Bridge Course	SBBC
<b>Continuous &amp; Comprehensive Evaluation</b>	Continuous & Comprehensive Evaluation	CCE
<b>Audit Course</b>	Non-Credit Audit Course	NCAC
<b>Exit Course</b>	Exit Course	EC
<b>Bloom's Taxonomy</b>	Bloom's Taxonomy	BL
<b>Course Outcome</b>	Course Outcome	CO
<b>Program Outcome</b>	Program Outcome	PO
<b>MOOC</b>	Massive Open Online Courses by NPTEL under SWAYAM	MOOC

Levels	Qualification Title	Credit Requirement			Exit Course(s) to be completed
		Minimum Credit	In Year & Semesters	Additional Credit	
4.5	One Year UG Certificate in Technology	44	1 Year, Semester I and II	8	a) 4-credit job specific internship /apprenticeship of minimum 8 weeks + b) 4-credit Bridge Course
5.0	Two Years UG Diploma in Technology	88	2 Year, Semester I, II, III and IV		
5.5	Three Years Bachelor's Degree in Vocation B. Voc. or B. Sc. Technology	132	3 Year, Semester I, II, III, IV, V, and VI		

Levels	Qualification Title	In addition to 176 credit distributed across I to VIII semesters			Courses and Credit per Semester			
		Additional Credit	In Semesters	Additional courses	V	VI	VII	VIII
6.0	B.Tech with Multidisciplinary Minor	-	-	-	-	-	-	-
6.0	B.Tech Honors (in major discipline) with Multidisciplinary Minor	18	V to VIII	Additional courses in major discipline	3 (TH)+ 1 (PR)	4 (TH)+ 1 (PR)	4 (TH)+ 1 (PR)	4 (TH)
6.0	B.Tech Honors and Research (in major discipline) with Multidisciplinary Minor	18	VI and VIII	Research Project in Major discipline	-	6	6	6
6.0	B.Tech in Major Engineering Discipline with Double Minor (Multidisciplinary and Specialization Minor)	18	V to VIII	Additional courses in another discipline/ emerging areas of specialization	3 (TH)+ 1 (PR)	4 (TH)+ 1 (PR)	4 (TH)+ 1 (PR)	4 (TH)



**Matoshri College of Engineering and Research Centre, Nashik**  
**Curriculum Structure for Bachelor of Technology (BTech) Programme (wef 2024-25)**

**Table 7: First Year Bachelor of Technology (FYBTech)**  
**(Common for all Branches)**

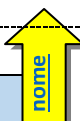
**Semester I**

Courses				Teaching Scheme Hrs/Week			Examination Scheme and Marks (% of Total Curriculum and Marks)				Credit			
							In_Sem Exam (40%)		End_Sem Exam (60%)	Marks				
Course Code	Course Type	Title of Course	Exam Head	Lect	TUT	PR	CAT_1	CAT_2	ESE	Total	TH	TUT	PR	Total
24U0101	BSC	Engineering Mathematics I	TH	3	1	-	20	20	60	100	3	1	-	4
24U0102/ 24U0112	BSC	Applied Physics/ Applied Chemistry #	TH	3	-	-	20	20	60	100	3	-	-	3
24U0103	ESC	Problem Solving and Programming	TH	3	-	-	20	20	60	100	3	-	-	3
24U0104	ESC	Basics of Electrical and Electronics Engineering	TH	3	-	-	20	20	60	100	3	-	-	3
24U0105	AEC	Business Communication Skills	TW	1	-	2	20		30	50	1	-	1	2
24U0106/ 24U0115	BSCL	Applied Physics Lab/ Applied Chemistry Lab #	TW	-	-	2	20		30	50	-	-	1	1
24U0107	VSEC	Problem Solving and Programming Lab	TW	-	-	2	20		30	50	-	-	1	1
24U0108	ESCL	Basics of Electrical and Electronics Engineering Lab	TW	-	-	2	20		30	50	-	-	1	1
24U0109	ESC	Engineering Drawing	PR	-	1	2	20		30	50	-	1	1	2
24U0110	CC	Liberal Learning_1*	TW	-	1	2	20		30	50	-	1	1	2
<b>Total</b>				<b>13</b>	<b>03</b>	<b>12</b>	<b>280</b>		<b>420</b>	<b>700</b>	<b>13</b>	<b>3</b>	<b>6</b>	<b>22</b>
<b>Total Hours/ Week</b>				<b>28</b>			<b>700</b>			<b>700</b>	<b>22</b>			<b>22</b>
<b>NCAC01: Non-Credit Audit Course_1 *</b>				<b>-</b>			<b>-</b>			<b>-</b>	<b>-</b>			<b>-</b>

# The First Year department will distribute the Teaching workload of subjects Applied Physics, Applied Chemistry and their respective labs in semester I and II dividing the number of FE divisions into two appropriate groups.

\* **Course Basket:** Select one



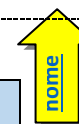


**Matoshri College of Engineering and Research Centre, Nashik**  
**Curriculum Structure for Bachelor of Technology (BTech) Programme (wef 2024-25)**

**Table 8: First Year Bachelor of Technology (FYBTech)**  
**(Common for all Branches)**  
**Semester II**

Courses				Teaching Scheme Hrs/Week			Examination Scheme and Marks (% of Total Curriculum and Marks)				Credit			
							In_Sem Exam (40%)		End_Sem Exam (60%)	Marks				
Course Code	Course Type	Title of Course	Exam Head	Lect	TUT	PR	CAT_1	CAT_2	ESE	Total	TH	TUT	PR	Total
24U0111	BSC	Engineering Mathematics II	TH	3	1	-	20	20	60	100	3	1	-	4
24U0112/ 24U0102	BSC	Applied Chemistry/ Applied Physics #	TH	3	-	-	20	20	60	100	3	-	-	3
24U0113	PCC	Internet of Things	TH	3	-	-	20	20	60	100	3	-	-	3
24U0114	ESC	Engineering Mechanics	TH	3	-	-	20	20	60	100	3	-	-	3
24U0115/ 24U0106	BSCL	Applied Chemistry Lab / Applied Physics Lab #	TW	-	-	2	20		30	50	-	-	1	1
24U0116	PCCL	Internet of Things Lab	TW	-	-	2	20		30	50	-	-	1	1
24U0117	ESCL	Engineering Mechanics Lab	TW	-	-	2	20		30	50	-	-	1	1
24U0118	VSEC	Engineering Workshop*	TW	-	-	4	20		30	50	-	-	2	2
24U0119	IKS	Indian Knowledge System*	TW	-	2	-	20		30	50	-	2	-	2
24U0120	CC	Liberal Learning_2*	TW	-	1	2	20		30	50	-	1	1	2
<b>Total</b>				<b>12</b>	<b>04</b>	<b>12</b>	<b>280</b>		<b>420</b>	<b>700</b>	<b>12</b>	<b>4</b>	<b>6</b>	<b>22</b>
<b>Total Hours/ Week</b>				<b>28</b>			<b>700</b>				<b>700</b>	<b>22</b>		
<b>NCAC02: Non-Credit Audit Course_2*</b>				<b>-</b>			<b>-</b>				<b>-</b>	<b>-</b>		

# The First Year department will distribute the Teaching workload of subjects Applied Physics, Applied Chemistry and their respective labs in semester I and II dividing the number of FE divisions into two appropriate groups.  
\* **Course Basket:** Select one



**Matoshri College of Engineering and Research Centre, Nashik**  
**Curriculum Structure for Bachelor of Technology (BTech) Programme (wef 2024-25)**  
**Table 9: First Year Bachelor of Technology (FYBTech)**  
**(Common for all Branches)**

Liberal Learning_1		Liberal Learning_2	
Course Code	Title of Course	Course Code	Title of Course
24U0110-A	Yoga	24U0120-A	Advanced Yoga Practices
24U0110-B	Art Forms	24U0120-B	Advanced Arts Techniques
24U0110-C	Gymnasium	24U0120-C	Advanced Gymnasium Techniques
24U0110-D	Cinematography	24U0120-D	Advanced Cinematography Techniques
Indian Knowledge System		Engineering Workshop	
Course Code	Title of Course	Course Code	Title of Course
24U0119-A	Music	24U0118-A	Computer Repairing and Maintenance
24U0119-B	Painting	24U0118-B	Electronics and Electrical Workshop
24U0119-C	Creative Practices -Various Art	24U0118-C	Mechanical Workshop Practices
24U0119-D	Ancient Food, Textile and Aromatic Practices	24U0118-D	Civil Engineering Drawing workshop
Non-Credit Audit Course_1		Non-Credit Audit Course_2	
Course Code	Title of Course	Course Code	Title of Course
NCAC01-A	Green Construction and Design	NCAC02-A	Water Management
NCAC01-B	Social Awareness and Governance Program	NCAC02-B	Intellectual Property Rights
NCAC01-C	Smart Cities	NCAC02-C	The Science of Happiness
NCAC01-D	Foreign Language (one of Japanese/Spanish/French/German/Arabic)	NCAC02-D	Foreign Language (one of Japanese/Spanish/French/German/Arabic)

**Matoshri College of Engineering and Research Centre, Nashik**  
**Curriculum Structure for Bachelor of Technology (BTech) Programme (wef 2024-25)**



**Table 10: Second Year Bachelor of Technology (SYBTech)**  
**Semester III**

Courses				Teaching Scheme Hrs/Week			Examination Scheme and Marks (% of Total Curriculum and Marks)				Credit				
							In_Sem Exam (40%)		End_Sem Exam (60%)	Marks					
Course Code	Course Type	Title of Course	Exam Head	Lect	TUT	PR	CAT_1	CAT_2	ESE	Total	TH	TUT	PR	Total	
24UNN21	MDM	Applied Mathematics/MDM1*	TH	3	-	-	20	20	60	100	3	-	-	3	
24UNN22	PCC	Program Core Course	TH	4	-	-	20	20	60	100	4	-	-	4	
24UNN23	PCC	Program Core Course	TH	3	-	-	20	20	60	100	3	-	-	3	
24UNN24	OE	Open Elective #	TH	3	-	-	20	20	60	100	3	-	-	3	
24UNN25	PCCL	Program Core Course Lab	PR	-	-	2	20		30	50	-	-	1	1	
24UNN26	PCCL	Program Core Course Lab	PR	-	-	2	20		30	50	-	-	1	1	
24UNN27	OEL	Open Elective Lab	PR	-	-	2	20		30	50	-	-	1	1	
24UNN28	EE	Finance Management	TW	-	1	2	20		30	50	-	1	1	2	
24UNN29	VEC	Environmental Science**	TW	1	1		20		30	50	1	1	-	2	
24UNN30	CEP/FP	Community/ Field Project@	TW	-	-	4	20		30	50	-	-	2	2	
<b>Total</b>				<b>14</b>	<b>02</b>	<b>12</b>	<b>280</b>		<b>420</b>		<b>700</b>	<b>14</b>	<b>2</b>	<b>6</b>	<b>22</b>
<b>Total Hours/ Week</b>				<b>28</b>			<b>700</b>				<b>700</b>	<b>22</b>			<b>22</b>
<b>NCAC03: Non-Credit Audit Course_3 *</b>				<b>-</b>			<b>-</b>				<b>-</b>	<b>-</b>			<b>-</b>

\*\* **Environmental Science:** Total of 5 modules syllabus of which first 4 modules are compulsory and fifth is optional

# **Open Elective:** Choose one course other than the major discipline from basket that has courses one each from each major discipline.

\* **Course Basket:** Select one

@ **Community/ Field Project:** Community Engagement Projects corresponding to the Major (Core) discipline



**Matoshri College of Engineering and Research Centre, Nashik**  
**Curriculum Structure for Bachelor of Technology (BTech) Programme (wef 2024-25)**

**Table 11: Second Year Bachelor of Technology (SYBTech)**  
**Semester IV**

Courses				Teaching Scheme Hrs/Week			Examination Scheme and Marks (% of Total Curriculum and Marks)				Credit			
							In_Sem Exam (40%)		End_Sem Exam (60%)	Marks				
Course Code	Course Type	Title of Course	Exam Head	Lect	TUT	PR	CAT_1	CAT_2	ESE	Total	TH	TUT	PR	Total
24UNN30	MDM	MDM2/MOOC*	TH	3	-	-	20	20	60	100	3	-	-	3
24UNN31	PCC	Program Core Course	TH	4	-	-	20	20	60	100	4	-	-	4
24UNN32	PCC	Program Core Course	TH	3	-	-	20	20	60	100	3	-	-	3
24UNN33	OE	Open Elective *	TH	3		-	20	20	60	100	3	-	-	3
24UNN34	PCCL	Program Core Course Lab1	TW+PR	-	-	4	20+20		30+30	50+50	-	-	2	2
24UNN35	PCCL	Program Core Course Lab2	PR	-	-	2	20		30	50	-	-	1	1
24UNN36	ED	Entrepreneurship Development	TW	-	1	2	20		30	50	-	1	1	2
24UNN37	VSEC	Digital Marketing	TW	1	1	-	20		30	50	1	1	-	2
24UNN38	VEC	Humanity and Social Science	TW	-	-	4	20		30	50	-	-	2	2
<b>Total</b>				<b>14</b>	<b>02</b>	<b>12</b>	<b>280</b>		<b>420</b>	<b>700</b>	<b>14</b>	<b>2</b>	<b>6</b>	<b>22</b>
<b>Total Hours/ Week</b>				<b>28</b>			<b>700</b>			<b>700</b>	<b>22</b>			<b>22</b>
<b>NCAC04: Non-Credit Audit Course_4 *</b>				<b>-</b>			<b>-</b>			<b>-</b>	<b>-</b>			<b>-</b>

\* **Course Basket:** Select one

# **Open Elective:** Choose one course other than the major discipline from basket that has courses one each from each major discipline.



**Matoshri College of Engineering and Research Centre, Nashik**  
**Curriculum Structure for Bachelor of Technology (BTech) Programme (wef 2024-25)**

**Table 12: Third Year Bachelor of Technology (TYBTech)**  
**Semester V**

Courses				Teaching Scheme Hrs/Week			Examination Scheme and Marks (% of Total Curriculum and Marks)				Credit				
							In_Sem Exam (40%)		End_Sem Exam (60%)	Marks					
Course Code	Course Type	Title of Course	Exam Head	Lect	TUT	PR	CAT	CCE	ESE	Total	TH	TUT	PR	Total	
24UNN39	MDM	MDM3/MOOC*	TH	3	-	-	20	20	60	100	3	-	-	3	
24UNN40	PCC	Program Core Course	TH	4	-	-	20	20	60	100	4	-	-	4	
24UNN41	PCC	Program Core Course	TH	4	-	-	20	20	60	100	4	-	-	4	
24UNN42	PEC	Program Elective Course_1	TH	3	-	-	20	20	60	100	3	-	-	3	
24UNN43	OE	Open Elective *	TH	2	-	-	10	10	30	50	2	-	-	2	
24UNN44	PCCL	Program Core Course Lab	PR	-	-	4	20		30	50	-	-	2	2	
24UNN45	PCCL	Program Core Course Lab	PR	-	-	4	40		60	100	-	-	2	2	
24UNN46	PECL	Program Elective Course_1 Lab	OR	-	-	2	20		30	50	-	-	1	1	
24UNN47	OEL	Open Elective Lab	TW			2	20		30	50		-	1	1	
<b>Total</b>				<b>16</b>	<b>00</b>	<b>12</b>	<b>280</b>		<b>420</b>		<b>700</b>	<b>16</b>	<b>0</b>	<b>6</b>	<b>22</b>
<b>Total Hours/ Week</b>				<b>28</b>			<b>700</b>				<b>700</b>	<b>22</b>			<b>22</b>
<b>NCAC05: Non-Credit Audit Course_5*</b>				<b>-</b>			<b>-</b>				<b>-</b>	<b>-</b>			<b>-</b>

\* **Course Basket:** Select one

# **Open Elective:** Choose one course other than the major discipline from basket that has courses one each from each major discipline.

**Matoshri College of Engineering and Research Centre, Nashik**  
**Curriculum Structure for Bachelor of Technology (BTech) Programme (wef 2024-25)**



**Table 13: Third Year Bachelor of Technology (TYBTech)**  
**Semester VI**

Courses				Teaching Scheme Hrs/Week			Examination Scheme and Marks (% of Total Curriculum and Marks)				Credit			
							In_Sem Exam (40%)		End_Sem Exam (60%)	Marks				
Course Code	Course Type	Title of Course	Exam Head	Lect	TUT	PR	CAT	CCE	ESE	Total	TH	TUT	PR	Total
24UNN48	MDM	MDM4/MOOC*	TH	4	-	-	20	20	60	100	2	-	-	2
24UNN49	PCC	Program Core Course	TH	5	-	-	20	20	60	100	3	-	-	3
24UNN50	PEC	Program Elective Course_3	TH	4	-	-	20	20	60	100	2	-	-	2
24UNN51	PCCL	Program Core Course Lab	PR	-	-	8	20		30	50	-	-	2	2
24UNN52	PECL	Program Elective Course_3 Lab	OR	-	-	4	20		30	50	-	-	1	1
24UNN53	INT	<b>Internship#</b>	INT	-	-	30	100		200	300	-	-	12	12
<b>Total</b>				<b>13</b>	<b>00</b>	<b>12</b>	<b>340</b>		<b>410</b>	<b>700</b>	<b>07</b>	<b>0</b>	<b>15</b>	<b>22</b>
<b>Total Hours/ Week</b>				<b>30/25</b>			<b>700</b>			<b>700</b>	<b>22</b>			
<b>NCAC06: Non-Credit Audit Course_6 *</b>				-			-				-			

\* **Course Basket:** Select one

# **Internship:**

- Internship corresponding to major courses is to be completed after semester V and before commencement of semester VI of at least 180 hours/ 6 weeks; and it is to be assessed and evaluated in semester VI. As per the guidelines the duration of internship is 180 hours/6 weeks after completion of semester V and before commencement of semester VI, so it is apparent that the contact hours of the TE students need to be managed meticulously.
- It becomes mandatory as per the structure that 12 credits for internship must be earned by the students. Per semester, 15 weeks duration will eventually reduce to a fruitful 12 weeks. With the evaluatory introduction of internship in the structure, semester six remains with 12 weeks instead of traditional 15 weeks. To balance the credits and to achieve the minimum required contact hours, it is the reasonable choice to allot 4 or 5 hours / week for each theory course and 4 to 8 hours/ week for the lab course of the sixth semester of Third year of Engineering. The additional lecture/ lab session per week will definitely be instrumental in achieving the largest minimum contact hours.
- As such there is no correspondence of weekly load and credits earned, the credit allotted per course remains intact despite the change. So it is almost imperative that the commencement of Semester VI needs to be approx. 3 weeks beyond the schedule.

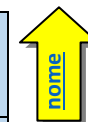


**Matoshri College of Engineering and Research Centre, Nashik**  
**Curriculum Structure for Bachelor of Technology (BTech) Programme (wef 2024-25)**

**Table 14: Fourth Year Bachelor of Technology (BTech)**  
**Semester VII**

Courses				Teaching Scheme Hrs/Week			Examination Scheme and Marks (% of Total Curriculum and Marks)				Credit			
							In_Sem Exam (40%)		End_Sem Exam (60%)					
Course Code	Course Type	Title of Course	Exam Head	Lect	TUT	PR	CCE_1	CCE_2	ESE	Total	TH	TUT	PR	Total
24UNN54	MDM	MDM5/MOOC*	TH	3	-	-	20	20	60	100	3	-	-	3
24UNN55	PCC	Program Core Course	TH	4	-	-	20	20	60	100	4	-	-	4
24UNN56	PCC	Program Core Course	TH	3	-	-	20	20	60	100	3	-	-	3
24UNN57	PEC	Program Elective Course_4	TH	3	-	-	20	20	60	100	3	-	-	3
24UNN58	PEC	Program Elective Course_5	TH	3	-	-	20	20	60	100	3	-	-	3
24UNN59	PCCL	Program Core Course Lab	PR	-	-	2	20		30	50	-	-	1	1
24UNN60	PCCL	Program Core Course Lab	PR	-	-	2	20		30	50	-	-	1	1
24UNN61	PECL	Program Elective Course_4&5 Lab	OR	-	-	4	20		30	50	-	-	2	2
24UNN62	VSEC	Skill Enhancement Course Lab *	TW	-	-	4	20		30	50	-	-	2	2
<b>Total</b>				<b>16</b>	<b>00</b>	<b>12</b>	<b>280</b>		<b>420</b>	<b>700</b>	<b>16</b>	<b>0</b>	<b>6</b>	<b>22</b>
<b>Total Hours/ Week</b>				<b>28</b>			<b>700</b>			<b>700</b>	<b>22</b>			<b>22</b>
<b>NCAC07: Non-Credit Audit Course_7 *</b>				<b>-</b>			<b>-</b>			<b>-</b>	<b>-</b>			<b>-</b>

\* **Course Basket:** Select one



**Matoshri College of Engineering and Research Centre (Autonomous)**  
**Curriculum Structure for Bachelor of Technology (BTech) Programme (wef 2024-25)**

**Table 15: Fourth Year Bachelor of Technology (BTech)**  
**Semester VIII**

Courses				Teaching Scheme Hrs/Week			Examination Scheme and Marks (% of Total Curriculum and Marks)				Credit				
							In_Sem Exam (40%)		End_Sem Exam (60%)	Marks					
Course Code	Course Type	Title of Course	Exam Head	Lect	TUT	PR	CCE_1	CCE_2	ESE	Total	TH	TUT	PR	Total	
24UNN63	MDM	MDM6/MOOC*	TH	2	-	-	10	10	30	50	2	-	-	2	
24UNN64	PCC	Program Core Course	TH	3	-	-	20	20	60	100	3	-	-	3	
24UNN65	PEC	Program Elective Course_5	TH	3	-	-	20	20	60	100	3	-	-	3	
24UNN66	PEC	Program Elective Course_6	TH	3	-	-	20	20	60	100	3	-	-	3	
24UNN67	RM	Research Methodology	TH+TW	3	1	-	20+10	20+10	60+30	150	3	1	-	4	
24UNN69	PCCL	Program Core Course Lab	PR	-	-	4	20		30	50	-	-	2	2	
24UNN70	PECL	Program Elective Course Lab	PR	-	-	2	20		30	50	-	-	1	1	
24UNN71	PROJ	Project	PROJ			8	20	20	60	100	-	-	4	4	
<b>Total</b>				<b>14</b>	<b>01</b>	<b>14</b>	<b>280</b>		<b>420</b>		<b>700</b>	<b>14</b>	<b>1</b>	<b>7</b>	<b>22</b>
<b>Total Hours/ Week</b>				<b>29</b>			<b>700</b>					<b>22</b>			
<b>NCAC08: Non-Credit Audit Course_8 *</b>				<b>-</b>			<b>-</b>					<b>-</b>			

\* **Course Basket:** Select one





**Matoshri College of Engineering and Research Centre (Autonomous)  
Curriculum Structure for Bachelor of Technology (BTech) Programme (wef 2024-25)**

**Table 16: On Exit after One/Two/Three Year completion additional 08-credit to be earned for UG Certificate (level 4.5)/ Diploma (level 5.0)/ BTech ( level 5.5) respectively**

Courses				Teaching Scheme Hrs/Week **			Award of Credit	Credit			
Course Code	Course Type	Title of Course	Exam Head	Lect	TUT	PR		TH	TUT	PR	Total
EC01	SBBC	Skill Based Bridge Course (Blended Mode)	TW	02	01	02	Completion of assignments Based on course certified by the concerned guide	2	1	1	4
EC02	INT	Internship or apprenticeship relevant to chosen course	INT	-	-	08		Completion of internship satisfactorily certified by concerned authority	-	-	4
<b>Total</b>				<b>02</b>	<b>01</b>	<b>10</b>		<b>4</b>	<b>-</b>	<b>4</b>	<b>08</b>
<b>Total Hours/ Week</b>				<b>13</b>				<b>08</b>			

\*\* Total span of conduction of courses will be for 2 months

**Note:** The certificate, diploma, BTech certificate is issued on demand to the candidate after earning additional credits as appropriate within a year after exit.

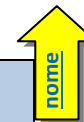


Table 17: Various Courses' Categories and Credit Distribution

Broad Category	Description	Abbreviations	NEP Credit	MCERC Credit	MCERC Total	%
<b>Basic Science and Engineering Science</b> <b>NEP= 30</b> <b>MCERC= 29</b> <b>16.48%</b>	Basic Science Course	BSC	14-18	14	16	9.09 %
	Basic Science Course Lab	BSCL		02		
	Engineering Science Course	ESC	16-12	11	13	7.39 %
	Engineering Science Course Lab	ESCL		02		
<b>Program Core Courses</b> <b>NEP= 64 to74</b> <b>MCERC= 76</b> <b>43.18%</b>	Programme Core Course	PCC	44-54	38	54	30.68 %
	Programme Core Course Lab	PCCL		16		
	Programme Elective Course	PEC	20	17	22	12.5 %
	Programme Elective Course Lab	PECL		05		
<b>Multidisciplinary Courses</b> <b>NEP= 22</b> <b>MCERC= 26</b> <b>14.77%</b>	Multidisciplinary Minor	MDM	14	16	16	9.09 %
	Open Elective	OE	08	08	10	5.68 %
	Open Elective Lab	OEL		02		
<b>Skill Courses</b> <b>NEP= 08, MCERC= 07</b> <b>3.98%</b>	Vocational and Skill Enhancement Course	VSEC	07	07	07	3.98 %
<b>Humanities Social Science and Management</b> <b>NEP= 14, MCERC=12</b> <b>6.82%</b>	Ability Enhancement Course	AEC	04	02	02	1.14 %
	Entrepreneurship Development / Engineering Economics / Management	ED / EE / MGT	04	04	04	2.27 %
	Indian Knowledge System	IKS	02	02	02	1.14 %
	Value Education Course	VEC	04	04	04	2.27 %
<b>Experiential Learning Courses</b> <b>NEP= 22, MCERC=22</b> <b>12.5%</b>	Research Methodology	RM	04	04	04	2.27 %
	Community Project / Field Project	CEP/ FP	02	02	02	1.14 %
	Project	PROJ	04	04	04	2.27 %
	Internship / On Job Training	INT / OJT	12	12	12	6.82 %
<b>Liberal Learning Courses</b> <b>NEP= 04, MCERC=04</b> <b>2.27%</b>	Co-curricular Courses	CC	04	04	04	2.27 %
<b>Total</b>			<b>164-174</b>	<b>176</b>	<b>176</b>	<b>100%</b>

### Program Outcomes (POs)

Learners are expected to know and be able to–

<b>PO1</b>	<b>Engineering knowledge</b>	Apply the knowledge of mathematics, science, Engineering fundamentals, and an Engineering specialization to the solution of complex Engineering problems.
<b>PO2</b>	<b>Problem analysis</b>	Identify, formulate, review research literature and analyze complex Engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and Engineering sciences.
<b>PO3</b>	<b>Design / Development of Solutions</b>	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.
<b>PO4</b>	<b>Conduct Investigations of Complex Problems</b>	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.
<b>PO5</b>	<b>Modern Tool Usage</b>	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.
<b>PO6</b>	<b>The Engineer and Society</b>	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 practices.
<b>PO7</b>	<b>Environment and Sustainability</b>	Understand the impact of the professional Engineering solutions in societal and Environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
<b>PO8</b>	<b>Ethics</b>	Apply ethical principles and commit to professional ethics and responsibilities and norms of Engineering practice.
<b>PO9</b>	<b>Individual and Team Work</b>	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
<b>PO10</b>	<b>Communication Skills</b>	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.
<b>PO11</b>	<b>Project Management and Finance</b>	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.
<b>PO12</b>	<b>Lifelong learning</b>	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.

Matoshri College of Engineering & Research Centre, Nashik First Year Bachelor of Technology		
24U0101: Engineering Mathematics I		
Teaching Scheme	Credit	Examination Head: TH
		Examination Scheme & Marks
<b>TH: 03 Hours/Week</b> <b>TUT: 01 Hour/Week</b>	<b>04</b>	<b>ISE:</b> <b>CAT_1: 20 Marks</b> <b>CAT_2: 20 Marks</b> <b>ESE: 60 Marks</b>

**Prerequisite Courses:** Determinant, Matrices, Linear System, Diagonalization, Calculus, Derivatives, Euler's Method, Collection of Data, Grouped and Ungrouped Data.

**Companion Course, if any: ----**

**Course Objectives:**

- To understand rank of matrix, solution of linear equations by using rank and, determine relationship among vectors.
- To learn basic concept of Eigen values and Eigen vectors, properties of Eigen values and Eigen vectors and diagonalization of matrix.
- To understand concepts of Differential Calculus techniques, Taylor series & indeterminate forms.
- To learn Derivative functions of several variables, Jacobian, Errors and Approximations, Maxima and Minima.
- To understand Measure of central tendencies, mean, deviations, dispersion, moments, skewness, Kurtosis, correlation, regression, curve fitting.

**Course Outcomes:**

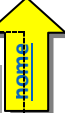
**BL**

On completion of the course, learner will be able to–

<b>CO1</b> Apply the matrices as a tool to <b>solve</b> linear simultaneous equations, find the relations among vectors for Linear dependence & Independence and perform linear and orthogonal transformations.	3
<b>CO2</b> Discuss the significance of Eigen values, Eigen vectors and, Use it for Reduction of quadratic form to canonical form.	2,3
<b>CO3</b> Discuss Differential Calculus theorems techniques and its generalizations leading to Taylors and Maclaurin's series and <b>Apply</b> it for analysis of engineering problems.	3
<b>CO4</b> Illustrate the concept of Jacobian to find partial derivatives of implicit function and Functional dependency.	3
<b>CO5</b> Explain the measure of central tendencies, deviations and moments for statistical analysis. <b>Apply</b> statistical methods like correlation and regression analysis for data analysis to solve engineering problems.	2,3
<b>CO6</b> Apply advanced mathematical concepts- matrix operations, eigenvalues, series expansions, Jacobian functions, and statistical methods, to analyze and solve complex engineering problems.	2,3

**Course Contents**

Unit Number	Unit Title	Hours
<b>I</b>	<b>Linear Algebra I</b>	<b>11</b>
Basics of matrices, Rank of matrix, Solution of system of linear equations by rank, Linear dependence and independence of vectors, Linear and orthogonal transformations.		
<b>Exemplars/ Case Studies</b>	● Applications to Engineering Problems.	
<b>II</b>	<b>Linear Algebra II</b>	<b>11</b>
Eigen values and Eigen vectors, Cayley-Hamilton's theorem, Diagonalization of matrix, Reduction of Quadratic form to Canonical form by linear and orthogonal transformation, Orthogonal system and Sylvester's law.		
<b>Exemplars/ Case Studies</b>	● Applications to Engineering Problems.	
<b>III</b>	<b>Differential Calculus</b>	<b>11</b>



Rolle's Theorem, Lagrange's Mean Value Theorem, Cauchy's Mean Value Theorem, Taylor's Series and Maclaurin's Series expansion, Maclaurin Series Expansion of some elementary functions, Indeterminate Forms by L' Hospital's Rule.

**Exemplars/ Case Studies** ● Applications to Engineering Problems.

<b>IV</b>	<b>Partial Differentiation and its Applications</b>	<b>11</b>
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Introduction, Partial derivative of function of several variables, Laplacian operator, Chain rule, Change of independent variables, Euler's theorem on homogeneous functions.

Jacobians of transformation, Functional dependence and independence, Errors and approximations, Maxima and Minima, Lagrange's method of undermined multipliers.

**Exemplars/ Case Studies** ● Applications to Engineering Problems

<b>V</b>	<b>Statistics</b>	<b>11</b>
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Introduction to Statistics, measure of central tendencies, measures of dispersion: calculation of mean deviation and standard deviation, Coefficient of variation, Moments, Measure of skewness and kurtosis, coefficient of skewness and kurtosis, Karl Pearson's coefficient of correlation(r).

Regression analysis: Introduction, regression lines, regression equation of Y on X, regression equation of X on Y.

Curve fitting by the method of least square: Fitting of straight lines, second degree parabolas and more general curves.

**Exemplars/ Case Studies** ● Applications to Engineering Problems

#### Learning Resources

##### Text Books:

- Higher Engineering Mathematics by B.V. Ramana (Tata McGraw Hill Publishing Limited)
- Advanced Engineering mathematics by Erwin Kreyszig, 8<sup>th</sup> edition (Wiley Eastern Ltd.)
- Statistical Methods by Dr. S.P. Gupta (Sultan Chand & Sons).

##### Reference Books:

- Advanced Engineering Mathematics by M. D. Greenberg (Pearson Education)
- Advanced Engineering Mathematics by Peter V.O' Neil (Thomson Learning)
- Thomas' Calculus by George B. Thomas, (Addison-Wesley, Pearson)
- Applied Mathematics (VoII & Vol II) by PN Wartikar, (Vidarthi Griha Prakashan Pune)
- Linear Algebra –An Introduction ,Ron Larson David C.Falvo (Ceange Learning Indian edition)

##### e-Books:

- <https://ebooksecure.com/download/engineering-mathematics-i>
- <https://www.scribd.com/document/373405597/B-S-Grewal-Higher-Engineering-Mathematics-42nd-Ed>
- <https://www.scribd.com/document/439716787/Engineering-Mathematics-by-N-P-Bali-Pdf-for-Semester-3-or-4-pdf>
- <https://www.scribd.com/document/321483066/Higher-Engineering-Mathematics-B-V>

##### MOOC Courses:

- <https://www.my-mooc.com/en/mooc/linear-algebra-refresher-course--ud953>
- <https://www.my-mooc.com/en/mooc/linear-algebra-iii-determinants-and-eigenvalues>
- <https://www.my-mooc.com/en/mooc/matrix-algebra-for-engineers>

#### CO-PO Correlation Matrix

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	1
CO2	3	2	-	-	-	-	-	-	-	-	-	1
CO3	3	2	-	-	-	-	-	-	-	-	-	1
CO4	3	2	-	-	-	-	-	-	-	-	-	1
CO5	3	2	-	-	-	-	-	-	-	-	-	1
CO6	3	2	-	-	-	-	-	-	-	-	-	1



Matoshri College of Engineering & Research Centre, Nashik First Year Bachelor of Technology		
24U0102: Applied Physics		
Teaching Scheme	Credit	Examination Head: TH Examination Scheme & Marks
TH: 03 Hours/Week	03	ISE: CAT_1: 20 Marks CAT_2: 20 Marks ESE: 60 Marks
<b>Prerequisite:</b> Students are expected to have a good understanding of Fundamentals of Optics, Wave-particle duality, Semiconductors, Sound waves		
<b>Companion Course, if any:</b> 24U0106: Applied Physics Lab		
<b>Course Objective:</b> To impart the knowledge of basic concepts and principles of physics, relate them to laboratory experiments and their applications.		
<b>Course Outcomes:</b>		<b>BL</b>
On completion of the course, learner will be able to–		
<b>CO1 Understand</b> the fundamentals of lasers, types of laser, optic fiber and their applications.		1,2
<b>CO2 Understand</b> and <b>apply</b> the knowledge of physics to study basics of Acoustics and Ultrasonic.		3
<b>CO3 Assimilate</b> the concepts and principles in Quantum Mechanics and extend it to few applications.		3
<b>CO4 Summarize</b> theory of Semiconductors and extend the concept for various applications in semiconductor devices.		2
<b>CO5 Summarize</b> and apply the knowledge of superconductivity and Nanotechnology by relating them to some technological applications.		2
<b>CO6 Understand</b> and <b>apply</b> principles of lasers, optic fiber, acoustics, ultrasonic, quantum mechanics, semiconductors, superconductivity, and nanotechnology, and their applications in various technological fields.		2,3
Course Contents		
Unit Number	Unit Title	Hours
I	Photonics	09
<b>LASER-</b> <b>Introduction:</b> Directionality, Intensity, Monochromaticity, Coherence. Basic Principles of laser: Population inversion, Laser Pumping-two level, three level systems, Resonators. <b>Solids state laser:</b> A Ruby laser and Nd-YAG laser (Qualitative). <b>Gas laser:</b> Neutral atom gas laser-Helium Neon Laser, Molecular gas laser-CO <sub>2</sub> Laser, <b>Holography:</b> Principle, Recording of hologram, reconstruction of the image. Applications of lasers: Astronomy, Biology, Medicine, Industry.3 <b>Optic Fiber-</b> Introduction, Ray theory transmission: Total Internal Reflection, Acceptance Angle, Numerical Aperture, Multimode step index fibers, Multimode graded index fibers, single mode fibers, General (communication) system, Advantages of optic fiber communication.		
<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>• Study of Laser Interferometer Gravitational-Wave Observatory (LIGO) detector</li> <li>• Study of various optic fiber communication system</li> </ul>	
II	Acoustics and Ultrasonic	09

**Acoustics-**

Basic requirements for the acoustically good Halls, Reverberation, Time of Reverberation, Sabin's formula, Absorption Coefficient and its measurements, Factors affecting the architectural acoustics and their remedies, Sound absorbing materials.

**Ultrasonic-**

Ultrasonic waves, Production of ultrasonic waves, Properties of ultrasonic, Applications of ultrasonic waves: Detection of flaws in metals, SONAR, Soldering and metal cutting, cleaning and clearing, Treatment of neurologic pain.

<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>Explore and analyze coefficients of absorption of various absorbing materials.</li> </ul>
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**III****Quantum Mechanics****09**

Failure of classical mechanics, Wave-particle duality of radiations, de-Broglie concepts of matter Waves, de-Broglie wavelength in terms of kinetic energy and accelerating potential, Numericals, Wave velocity of de-Broglie wave, Properties of matter waves, Heisenberg Uncertainty Principle, Physical interpretation of wave function, Properties of wave function. Equation of motion of matter waves: Schrodinger's time independent equations, Schrodinger's time dependent equations, Energy levels of particle enclosed in 1-D potential box of infinite height, Electron microscope: Scanning Tunneling Microscope. Introduction to quantum computing, Qubits, Single Qubit logic gates, superposition, quantum entanglement.

<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>Explore the use of various terminologies in quantum computing.</li> </ul>
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**IV****Semiconductor Devices****09**

Classification of solids: Conductors, semiconductors, Insulators, Density of states in semiconductor, Fermi level in intrinsic & extrinsic semiconductor at 0°K and room temperature, Conductivity in intrinsic semiconductor, Conductivity in extrinsic semiconductor. Applications: Light emitting diode (LED), Solar cell as a pn junction diode: Construction, working mechanism, I-V characteristics of solar cell, Parameters of solar cells: Short circuit current, Open circuit voltage, Fill factor, Efficiency, Solar cell generations: First, second, third, fourth. Hall effect: Derivation for Hall voltage, Hall coefficient, Numericals, Applications of Hall effect.

<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>Explore recent power conversion efficiency of different generations of solar cell.</li> </ul>
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**V****Superconductivity and Nanotechnology****09****Superconductivity**

Difference between ideal conductor and superconductor, zero resistance, Persistent currents, Perfect diamagnetism-Meissner effect, Critical field-Type I and Type II superconductors, Isotopic effect, Josephson tunneling- Josephson effect-AC & DC, Applications.

**Nanotechnology**

Introduction, Electron confinement: Density of states, 0D, 1D, 2D, 3D. Synthesis of nano-materials: Physical-Sputter deposition, Chemical method- Synthesis of colloids, Properties of nano-particles: mechanical, electrical, optical. Applications of nano-particles: electronics, automobile, Medical, space and defense.

<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>Explore various synthesis routes to grow nano-particles using vacuum and non-vacuum based techniques.</li> </ul>
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**Learning Resources****Text Books:**

1. Engineering Physics, Avadhanulu, Kshirsagar, S. Chand Publications
2. A textbook of optics, N Subrahmanyam and BriLal, S. Chand Publications
3. Engineering Physics, Gaur, Gupta, DhanpatRai and Sons Publications

**Reference Books:**

1. B. B. Laud, Laser and Non-Linear Optics, Oscar publication, 5<sup>th</sup> Edition, ISBN No: ISBN-10. 8122430562. ISBN-13. 978-8122430561.
2. J Senior, optical fibre communication, Pearson Publication 3<sup>rd</sup> Edition, ISBN 978-81-265-1386-4
3. J. P. Shriwastava, Elements of Solid State Physics, 2<sup>nd</sup> Edition, PHI publication, ISBN No-978-81-203-2847-1
4. S. K. Kulkarni, Nanotechnology: Principles and Practices, Capital Publishing Company, 3<sup>rd</sup> edition, ISBN No. 10: 8185589291 - ISBN 13: 9788185589299
5. R.K.Gaur ,S.L.Gupta, Engineering Physics, 1<sup>st</sup> Edition , Dhan pat Rai Publications.
6. S.Arya, P.Mahajan, Solar cell, Types and Applications, Springer, ISBN 9789819973330.

**e-Books:**

- <http://www.issp.ac.ru/ebooks/books/open/Superconductivity - Theory and Applications.pdf>
- <https://porlhews.tripod.com/sitebuildercontent/sitebuilderfiles/solidstatephysics.pdf>

**MOOC Courses:**

- [https://onlinecourses.nptel.ac.in/noc24\\_mm05](https://onlinecourses.nptel.ac.in/noc24_mm05)
- [https://onlinecourses.nptel.ac.in/noc24\\_ph02](https://onlinecourses.nptel.ac.in/noc24_ph02)
- [https://onlinecourses.nptel.ac.in/noc24\\_ee59](https://onlinecourses.nptel.ac.in/noc24_ee59)
- [https://onlinecourses.swayam2.ac.in/aic21\\_ge16](https://onlinecourses.swayam2.ac.in/aic21_ge16)
- [https://onlinecourses.nptel.ac.in/noc24\\_ph14](https://onlinecourses.nptel.ac.in/noc24_ph14)

**CO-PO Correlation Matrix**

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	2	2	-	-	-	-	-	-	1	1	-	1
<b>CO2</b>	2	2	-	-	-	-	-	-	1	1	-	1
<b>CO3</b>	2	2	-	-	-	-	-	-	1	1	-	1
<b>CO4</b>	2	2	-	-	-	-	1	-	1	1	-	1
<b>CO5</b>	2	2	-	-	-	-	1	-	1	1	-	1
<b>CO6</b>	2	2	-	-	-	-	1	1	1	1	-	1





Matoshri College of Engineering & Research Centre, Nashik First Year Bachelor of Technology		
24U0103: Problem Solving and Programming		
Teaching Scheme	Credit	Examination Head: TH Examination Scheme & Marks
TH: 03 Hours/Week	03	ISE: CAT_1: 20 Marks CAT_2: 20 Marks ESE: 60 Marks
<b>Prerequisite:</b> Students are expected to have a good understanding of basic computer organization, working principles and programming.		
<b>Companion Course, if any:</b> 24U0107: Problem Solving and Programming Laboratory		
<b>Course Objectives:</b> Python is one of the emerging languages used in almost every engineering discipline. Looking at the importance and popularity, Python Language is included as one of the courses in the first year of engineering. Objectives include- <ul style="list-style-type: none"> <li>• Understand problem solving, problem solving aspects, problem solving with computers</li> <li>• Learn programming and various program design tools</li> <li>• learn basics, features and programming constructs of Python language</li> <li>• acquaint with data types, input output, decision making, looping and functions in Python</li> <li>• learn features of Object Oriented Programming using Python</li> <li>• acquaint with the use and benefits of classes and objects in Python</li> </ul>		
<b>Course Outcomes:</b>		<b>BL</b>
On completion of the course, learner will be able to–		
<b>CO1</b> Apply problem-solving skills for providing efficient solutions for the computational problem and effectively utilize program design tools- algorithm and flowchart to present the solutions.		3
<b>CO2</b> Recognize and Demonstrate proficiency in using expressions, and decision control statements to implement effective codes with conditional branching in Python programs.		1,3
<b>CO3</b> Use functions to improve code modularity and reusability in python programs.		1,2
<b>CO4</b> Extend skills to effectively manipulate and utilize strings in Python, to write robust and versatile programs that involve string operations.		2,3
<b>CO5</b> Proficiently apply compound data types in Python- lists, sets, tuples, and dictionaries for efficient management and manipulation of data to develop robust and scalable applications.		3
<b>CO6</b> Demonstrate proficiency in Python programming by applying problem-solving skills and implementing various programming constructs and data types for developing efficient and scalable applications.		3
Course Contents		
Unit Number	Unit Title	Hours
I	Problem Solving, Programming and Basics of Python	08
<b>Introduction:</b> Problem Solving in Everyday Life, Types of Problems, Problem Solving with Computers, Difficulties with Problem Solving. Problem Solving Strategies, Program Design Tools: Algorithms, Flowcharts and Pseudo-codes.		
<b>Basics of Python Programming:</b> Features of Python, History and Future of Python, Writing and executing first Python program, Literal constants, variables and identifiers, Data Types, Input operations, Comments, Reserved words, Indentation, Operators and expressions, Expressions in Python.		

<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>Study Generations of programming languages and Comparative analysis of top 10 programming languages including Python.</li> <li>Study Practice tools for flowchart drawing- draw.io, lucid chart, die, pencil project, and plant UML</li> </ul>	
<b>II</b>	<b>Decision Control Statements</b>	<b>08</b>
<p><b>Decision Control Statements-</b> Decision control statements, Selection/conditional branching Statements- if, if-else, nested if, if-elif-else statements.</p> <p><b>Basic loop Structures/Iterative statements:</b> while loop, for loop, selecting appropriate loop. Nested loops, The break, continue, pass, else statement used with loops.</p>		
<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>Study and understand power of decision control and loops in Python efficient and effective code development eg. Program for Calculator and Calendar generation at GitHub.</li> </ul>	
<b>III</b>	<b>Functions and Modules</b>	<b>08</b>
<p><b>Functions-</b> Need for functions, Function definition, function calling- function parameters, variable scope and lifetime- local and global variables, using global statements, resolution of names, the return statement, documentation string, good programming practices. Introduction to modules, Introduction to packages in Python, Introduction to standard library modules.</p>		
<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>Explore the power of Python module that makes the code easier to understand, use, logically organized, efficient, and scalable</li> <li>Explore built-in modules in Python</li> </ul>	
<b>IV</b>	<b>Strings</b>	<b>08</b>
<p><b>Strings and Operations-</b> concatenation, appending, multiplication, slice a string, Strings are immutable, strings formatting operator, built in string methods and functions. Slice operation, ord() and chr() functions, in and not in operators, comparing strings, Iterating strings, the string module.</p>		
<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>Study Regular Expressions in Python and its use in Python programs to extract Email.</li> </ul>	
<b>V</b>	<b>Compound Data Types in Python</b>	<b>08</b>
<p><b>Introduction to compound data types-</b> Tuples, Lists and Dictionary.</p> <p><b>List-</b> sequence, access values, updating values, nested lists, cloning lists, basic list operations, list method</p> <p><b>Tuple-</b> creating tuple, utility of tuples, accessing values, updating tuple, deleting elements in tuple, basic tuple operations, tuple assignments</p> <p><b>Sets-</b> creating sets</p> <p><b>Dictionaries-</b> creating dictionaries, accessing values, adding and modifying an item in a dictionary, modifying an entry, deleting items, sorting items, looping over, nested dictionaries, built in dictionary functions and methods, difference between list and dictionary.</p>		
<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>Write an essay on “Selection of list or set or tuple or dictionary for appropriate application”</li> <li>Compare List vs Tuple vs Dictionary vs Set.</li> </ul>	
<b>Learning Resources</b>		
<b>Text Books:</b>		
<ol style="list-style-type: none"> <li>1. ReemaThareja, “Python Programming Using Problem Solving Approach”, Oxford University Press, ISBN 13: 978-0-19-948017-6</li> <li>2. Maureen Spankle, “Problem Solving and Programming Concepts”, Pearson; 9th edition, ISBN-10: 9780132492645, ISBN-13: 978-0132492645</li> </ol>		
<b>Reference Books:</b>		
<ol style="list-style-type: none"> <li>1. R. G. Dromey, “How to Solve it by Computer”, Pearson Education India; 1<sup>st</sup> edition, ISBN-10: 8131705625, ISBN-13: 978-8131705629</li> <li>2. Romano Fabrizio, “Learning Python”, Packt Publishing Limited, ISBN: 9781783551712, 1783551712</li> <li>3. Martin C. Brown, “Python: The Complete Reference”, McGraw Hill Education, ISBN-10: 9789387572942, ISBN-13: 978-9387572942, ASIN: 9387572943</li> <li>4. Ashok NamdevKamthane, “Programming and Problem Solving with Python”, McGraw Hill Education, ISBN-10: 9387067572, ISBN-13: 978-9387067578</li> </ol>		

**e-Books:**

- <https://pythonbooks.org/think-python-how-to-think-like-a-computer-scientist>
- <https://pythonbooks.org/python-for-everybody-exploring-data-in-python-3>
- <https://pythonbooks.org/learn-more-python-3-the-hard-way-the-next-step-for-new-python-programmers-zed-shaws-hard-way-series>

**MOOC Courses:**

- [Python 3.4.3 - Course \(swayam2.ac.in\)](https://swayam2.ac.in/courses/python343)
- [Programming in Python - Course \(swayam2.ac.in\)](https://swayam2.ac.in/courses/python-programming)
- [The Joy of Computing using Python - Course \(nptel.ac.in\)](https://nptel.ac.in/courses/python-joy)
- <https://www.edx.org/course/introduction-to-computer-science-and-programming-7>
- <https://ocw.mit.edu/courses/6-0001-introduction-to-computer-science-and-programming-in-python-fall-2016/>

**CO-PO Correlation Matrix**

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>C01</b>	2	2	2	-	2	-	-	-	-	-	-	2
<b>C02</b>	-	2	2	-	2	-	-	-	-	-	-	2
<b>C03</b>	-	2	2	-	2	-	-	-	-	-	-	2
<b>C04</b>	-	2	2	-	2	-	-	-	-	-	-	2
<b>C05</b>	-	2	2	-	2	-	-	-	-	-	-	2
<b>C06</b>	-	2	2	-	2	-	-	-	-	-	-	2

Matoshri College of Engineering & Research Centre, Nashik		
First Year Bachelor of Technology		
24U0104: Basics of Electrical and Electronics Engineering		
Teaching Scheme	Credit	Examination Head: TH
		Examination Scheme & Marks
TH: 03 Hours/Week	03	ISE: CAT_1: 20 Marks CAT_2: 20 Marks ESE: 60 Marks
<b>Prerequisite: Intermediate Physics and Mathematics.</b>		
<b>Companion Course, if any:</b> Basics of Electrical & Electronics Engineering Lab (24U0108)		
<b>Course Objectives:</b> Objectives include-		
<ul style="list-style-type: none"> <li>Understand the types of wires and cables, safety measures, protective devices, batteries, inverters and UPS for different application</li> <li>Introduce the working mechanism and design guidelines of different sequential circuits and their role in the digital system design.</li> <li>Impart knowledge on construction, working and applications of single phase induction motors, transformers and DC motors.</li> <li>Give basic concepts and knowledge relating to communication systems.</li> <li>Know the methods for the measurement of physical parameters using sensors.</li> </ul>		
<b>Course Outcomes:</b>		<b>BL</b>
On completion of the course, learner will be able to–		
<b>CO1 Explore</b> the use of wires, cables, protective devices, electrical safety measures and concept of batteries, inverter and UPS.		2
<b>CO2 Design</b> the digital circuit using gates, Flip-Flop, Shift Registers and Synchronous Counters.		5
<b>CO3 Compute</b> the efficiency and regulation of a single-phase Transformers and, to <b>understand</b> the operations and applications of motors.		1,2,3
<b>CO4 Understand</b> various communication systems, cellular concepts and GSM systems.		1,2
<b>CO5 Understand</b> working of various Electrical, Electronic Instruments, <b>and Use</b> sensors for particular application		3
<b>CO6 Understand</b> and <b>apply</b> concepts related to electrical safety, digital circuits, transformers, communication systems, and electronic instruments to effectively manage and utilize electrical and electronic systems.		3
Course Contents		
Unit Number	Unit Title	Hours
I	Electrical Wiring and Safety	08
<b>Electrical Wiring:</b> Difference between wires and cables, Parts of cable, Types of cables, conductor sizes and current rating of cable, Types of wires, conductor sizes and current rating of wires.		
<b>Electrical safety:</b> Electrical safety measures, Earthing and its importance, Types of earthing. Fuses: Types, Selection, Advantages, Disadvantages and Applications, Miniature Circuit Breaker (MCB), Difference between Fuse and MCB, Earth Leakage Circuit Breaker (ELCB), Lightning protection.		
<b>Batteries:</b> Construction, Working principle, Applications, Charging and discharging of Lithium ion and Lead acid batteries, Concept of depth of discharging, Series Parallel Connection of batteries, battery selection, Inverter, UPS.		
<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>Household wiring diagram.</li> <li>Selection of UPS / Inverter.</li> </ul>	



II	Digital Electronics	08
Logic gates, Flip-Flops, shift registers and synchronous counters, Analog to Digital and Digital to Analog converters (ADC/DAC). Recording and playback concepts, Digital audio and video formats Concepts of Microprocessor, Micro controller.		
<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>• Implement Full Adder by using Logic Gates.</li> <li>• Implement a four Bit Synchronous Counter.</li> </ul>	
III	Electrical Machines	08
<b>Transformers:</b> Working Principle, construction, e.m.f. equation, losses, voltage regulation and Efficiency of single phase transformer. Introduction to Auto-transformer.		
<b>Induction Motor:</b> Single phase induction motors, working principle, characteristics and applications.		
<b>D.C Motors:</b> Construction, working principle, types, characteristics and applications of DC motor.		
<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>• Three Phase Transformer connections</li> <li>• Selection of Motor</li> </ul>	
IV	Communication Systems	08
Block Diagram of communication system, Modes of Transmission, Need for Modulation, Communication Media: Wired and Wireless, Electromagnetic Spectrum, Allotment of frequency band for different applications, Wireless communication, Mobile Communication System: Cellular concept, Simple block diagram of GSM system. Concepts of Wi-Fi, Bluetooth, 4G, 5G technology.		
<b>Mapping Course Outcome(s): CO4</b>		
<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>• Connectivity and data transmission between different digital gadgets</li> </ul>	
V	Instrumentation	08
Sensors, Types, selections- Sensors for Temperature, Pressure, Light, Proximity, Displacement, Humidity. Laboratory measuring instruments: Digital multimeters, Cathode ray oscilloscopes, function generator, DSO, DC Power supply. Features, safety parameters of smart phones and smart television.		
<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>• Use of Digital Multimeter to measure Electrical parameters and component testing</li> <li>• Working of regulator power supply.</li> </ul>	
Learning Resources		
<b>Text Books:</b>		
<ol style="list-style-type: none"> <li>1. Electrical Wiring Estimating and Costing by S.L.Uppal and G.C.Garg ,Khanna Publications.</li> <li>2. Electrical Machines Third edition by Ashfaq hussain and Haroon Ashfaq</li> <li>3. Power system Engineering by A.Chakrabarti,M.LSoni,P.V.Gupta and U.S.Bhatnagar</li> <li>4. Bharti Dwivedi, Anurag Tripathi, “Fundamentals of Electrical Engineering”, 2nd Edition, Wiley Publication</li> <li>5. “Modern Digital Electronics” by R.P. Jain, 4th Edition, Tata McGraw Hill</li> <li>6. “Electronic Communication Systems” by Kennedy &amp; Davis, 4th Edition, Tata McGraw Hill</li> <li>7. “Mobile Wireless communication” by M. Schwartz, Cambridge University Press.</li> <li>8. Sensors and Transducers by D.Patrnabis, 2nd Edition , PHI</li> </ol>		
<b>Reference Books:</b>		
<ol style="list-style-type: none"> <li>1. Sunil S.Rao,”Switchgear Protection and Power System.,Khanna Publishers.</li> <li>2. E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.</li> <li>3. H. Cotton, “Electrical Technology”, 7th Edition, CBS Publications and distributors.</li> <li>4. Dr. G.K. Kharate ,”Digital Electronics ”Oxford University Press 2010</li> <li>5. “Digital Fundamentals” by Thomas. L. Floyd, 11th Edition, Pearson</li> <li>6. “Mobile Communication” by J. Schiller, 2nd Edition, Pearson</li> <li>7. “Electronic Instrumentation” by H.S. Kalsi, 3rd Edition, Tata McGraw Hill</li> </ol>		

**e-Books:**

- <https://www.shahucollegelatur.org.in/Department/Studymaterial/sci/it/BCA/FY/digielec.pdf>
- <https://www.scribd.com/document/331381692/Switchgear-and-Protection-By-Sunil-S-Rao-pdf>

**MOOC Courses**

- <https://archive.nptel.ac.in/courses/108/105/108105112/>
- [https://onlinecourses.nptel.ac.in/noc21\\_ee55/preview](https://onlinecourses.nptel.ac.in/noc21_ee55/preview)
- <https://archive.nptel.ac.in/courses/108/105/108105132>
- <https://nptel.ac.in/courses/117102059>
- <https://archive.nptel.ac.in/courses/108/105/108105155/>

**CO-PO Correlation Matrix**

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	-	-	-	-	-	-	-	-	1
CO2	2	2	-	-	-	-	-	-	-	-	-	1
CO3	2	2	-	-	-	-	-	-	-	-	-	1
CO4	2	2	-	-	-	-	-	-	-	-	-	1
CO5	2	2	-	-	-	-	-	-	-	-	-	1
CO6	2	2	-	-	-	-	-	-	-	-	-	1

**Matoshri College of Engineering & Research Centre, Nashik**  
**First Year Bachelor of Technology**

**24U0105: Business Communication Skills**

<b>Teaching Scheme</b>	<b>Credit</b>	<b>Examination Head: TW</b>	
		<b>Examination Scheme &amp; Marks</b>	
<b>TH: 01 Hours/Week</b> <b>PR: 02 Hours/Week</b>	<b>02</b>	<b>ISE</b>	<b>20 Marks</b>
		<b>ESE:</b>	<b>30 Marks</b>

**Companion Course, if any: ---**

**Course Objectives:**

This course is designed to give students a comprehensive view of communication, its scope and importance in business, and the role of communication in establishing a favorable outside the firm environment, as well as an effective internal communications program.

- To facilitate Holistic growth ;
- To make the engineering students aware, about the importance, the role and the content of business communication skills ;
- To develop the ability of effective communication through individual and group activities;
- To expose students to right attitudinal and behavioral aspects and to build the same through various activities.
- To provide experiential learning through community service with academic learning

**Course Outcomes:**

**BL**

On completion of the course, learner will be able to–

<b>CO1</b>	<b>Express</b> effectively through verbal/oral communication and improve listening skills	1,2
<b>CO2</b>	<b>Demonstrate skills at</b> group discussion / meetings / interviews and presentations.	1,2,3
<b>CO3</b>	<b>Write</b> precise briefs or reports and technical documents.	1,2,3
<b>CO4</b>	<b>Explore</b> goal/target setting, self-motivation and practicing creative thinking.	1,2
<b>CO5</b>	<b>Operate</b> effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership qualities.	1,2,3
<b>CO6</b>	<b>Develop and enhance</b> communication skills through experiential learning by participating in discussions and presentations, goal setting, self-motivation, and teamwork, with a focus on interpersonal relationships, conflict management, and leadership qualities at various activities in and outside campus.	2,3

**Suggested List of Laboratory Experiments/Assignments**

<b>Sr. No.</b>	<b>Suggested List of Laboratory Experiments/Assignments (Any 10 Assignments)</b>	<b>Mapping CO(s)</b>
1	<b>SWOT analysis</b> The students should be made aware of their goals, strengths and weaknesses, attitude, moral values, self-confidence, etiquettes, non-verbal skills, achievements. Through this activity. SWOT Analysis, Confidence improvement, values, positive attitude, positive thinking and self-esteem. The concern teacher should prepare a questionnaire which evaluate students in all the above areas and make them aware about these aspects	CO1, CO2
2	<b>Personal and Career Goal setting – Short term and Long term</b> The teacher should explain to them on how to set goals and provide template to write their short term and long term goals.	CO1, CO4

3	<p><b>Public Speaking</b> Any one of the following activities may be conducted :</p> <p><b>1. Prepared speech</b> (Topics are given in advance, students get 10 minutes to prepare the speech and 5 minutes to deliver.) <b>2. Extempore speech</b> (Students deliver speeches spontaneously for 5 minutes each on a given topic) <b>3. Story telling</b> (Each student narrates a fictional or real life story for 5 minutes each) <b>4. Oral review</b> ( Each student orally presents a review on a story or a book read by them)</p>	CO1, CO3
4	<p><b>Reading and Listening skills</b> The batch can be divided into pairs. Each pair will be given an article (any topic) by the teacher. Each pair would come on the stage and read aloud the article one by one. After reading by each pair, the other students will be for correct answers and also for their reading skills. This will evaluate their reading and listening skills. The teacher should give them guidelines on improving their reading and listening skills. The teacher should also give passages asked questions on the article by the readers. Students will get marks on various topics to students for evaluating their reading comprehension.</p>	CO1, CO3, CO5
5	<p><b>Group discussion</b> Group discussions could be done for groups of 5-8 students at a time Two rounds of a GD for each group should be conducted and teacher should give them feedback.</p>	CO1, CO5
6	<p><b>Letter/Application writing</b> Each student will write one formal letter, and one application. The teacher should teach the students how to write the letter and application. The teacher should give proper format and layouts.</p>	CO1, CO2
7	<p><b>Report writing</b> The teacher should teach the students how to write report .The teacher should give proper format and layouts. Each student will write one report based on visit / project / business proposal.</p>	CO1, CO2
8	<p><b>Resume writing-</b> Guide students and instruct them to write resume</p>	CO1, CO2
9	<p><b>Presentation Skill</b> Students should make a presentation on any informative topic of their choice. The topic may be technical or non-technical. The teacher should guide them on effective presentation skills. Each student should make a presentation for at least 10 minutes.</p>	CO1, CO3
10	<p><b>Team games for team building</b> - Students should make to participate in team activity.</p>	CO1, CO5
11	<p><b>Situational games for role playing as leaders</b></p>	CO1, CO5
12	<p><b>Faculty may arrange one or more sessions from following:</b> Yoga and meditation. Stress management, relaxation exercises, and fitness exercises. Time management and personal planning sessions.</p>	CO1, CO4
13	<p><b>Mock interviews-</b> guide students and conduct mock interviews</p>	CO1, CO3
14	<p><b>Telephonic etiquettes</b> -To teach students the skills to communicate effectively over the phone. Students will be divided into pairs. Each pair will be given different situations, such as phone call to enquire about job vacancy, scheduling a meeting with team members, phone call for requesting of urgent leave from higher authorities. Students will be given 10 min to prepare. Assessment will be done on the basis of performance during the telephone call.</p>	CO1, CO5
15	<p><b>Email etiquettes</b> -To provide students with an in-depth understanding of email skills. Students will be made to send e-mails for different situations such as sending an e-mail to the principal for a leave, inviting a friend for a party, e-mail to enquire about room tariff of a hotel. Students will be assessed on the basis of e-mail such as clarity, purpose and proof reading of e-mail.</p>	CO1, CO5





16	Community services such as to identify real life problems.	CO6
17	Experiential Learning (Learning through direct experience, reflection, and active engagement.): (At least two of the following related to the course) 1. Technical Event Organization/ Participation (State/ National/International Level) 2. Community service with academic learning	

### Learning Resources

#### Text Books:

1. Quintanilla, Kelly M, (2021), Business and Professional Communication, 4e, Sage Textbook

#### Reference Books:

2. C.B.Gupta (2019). Essentials of Business Communication, Sultan Chand & Sons.
3. Kaul, A. Effective Business Communication, 2nd ed. PHI learning
4. Lesikar, R.V. & Flatley, M.E. (2001). Basic Business Communication Skills for Empowering the Internet Generation, Tata McGraw Hill.
5. Ludlow, R. & Panton, F.(1992). The Essence of Effective Communications, Prentice Hall of India Pvt. Ltd.
6. Meyer C, Dev(2021). Communicating for Results, Oxford University Press
7. R. C. Bhatia (2008), Business Communication, Ane Books Pvt Ltd.
8. Raman and Singh(2012). Business Communication, Oxford University Press
9. Scot, O., Contemporary Business Communication, Biztantra

#### e-Books:

- [Business Communication for Success – Open Textbook \(umn.edu\)](https://openstax.org/r/business-communication-for-success)

#### MOOC at Swayam:

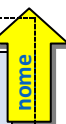
- [https://swayam.gov.in/nd2\\_imb19\\_mg14/preview](https://swayam.gov.in/nd2_imb19_mg14/preview)

#### Virtual Laboratory:

- <https://ve-iitg.vlabs.ac.in/>

### CO-PO Correlation Matrix

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	2	3	-	2
CO2	-	-	-	-	-	-	-	2	2	3	-	2
CO3	-	-	-	-	-	-	-	-	2	3	-	2
CO4	-	-	-	-	-	-	-	-	2	3	-	2
CO5	-	-	-	-	-	-	-	-	2	3	-	2
CO6	-	-	-	-	-	2	1	1	1	2	-	1



<b>Matoshri College of Engineering &amp; Research Centre, Nashik</b>		
<b>First Year Bachelor of Technology</b>		
<b>24U0106: Applied Physics Lab</b>		
Teaching Scheme	Credit	Examination Head: TW
		Examination Scheme & Marks
<b>PR: 02 Hours/Week</b>	<b>01</b>	<b>ISE: 20 Marks</b> <b>ESE: 30 Marks</b>
<b>Companion Course, if any: 24U0102: Applied Physics</b>		
<b>Course Objectives:</b>		
<ul style="list-style-type: none"> <li>• To teach basic concepts and principles of physics, relate them to laboratory experiments and their applications</li> <li>• To provide an experimental foundation for the theoretical concepts introduced in the lectures</li> <li>• To teach how to make careful experimental observations and how to think about and draw conclusions from such data</li> <li>• To help students to understand the role of direct observation in physics and to distinguish between inferences based on theory and the outcomes of experiments</li> <li>• To introduce the concepts and techniques which have a wide application in experimental science</li> <li>• To teach how to write a technical report and communicates scientific information in a clear and concise manner</li> <li>• To provide experiential learning through field visit and mini project.</li> </ul>		
<b>Course Outcomes:</b>		<b>BL</b>
On completion of the course, learner will be able to–		
<b>CO1 Practical Application in Photonics:</b> <b>Explore</b> the optical properties of light to estimate the values of number of lines on grating surface and wavelength of Laser source.		2
<b>CO2 Sound Engineering:</b> <b>Apply</b> basics of acoustics and ultrasonic to determine the coefficient of viscosity of liquid and absorption coefficient of sound.		3
<b>CO3 Semiconductor devices factors:</b> <b>Deduce</b> the solar cell efficiency and study its various parameters and to <b>explore</b> the electric properties of semiconductor materials by determining energy gap, Hall coefficient of semiconductors		3
<b>CO4 Use of basics of Nanotechnology:</b> <b>Apply the knowledge of</b> nanotechnology to synthesize various nano-particles.		2
<b>CO5 Documentation and Timely Submission:</b> Document their experimentation effectively, providing clear explanations and comments to facilitate understanding and maintainability in theoretical and experimental knowledge, commitment to ethics, punctuality and time management skills for record submissions.		2
<b>CO6 Apply</b> theoretical knowledge to real-world scenarios by engaging in experiential learning activities such as high-end equipment demonstrations, participating in industry visits, and organizing or participating in technical events so as to imbibe <b>problem-solving skills</b> , foster <b>innovation</b> , and <b>build</b> professional competencies necessary for successful careers in engineering.		2,3
<b>Course Contents</b>		
<b>Suggested List of Laboratory Experiments/Assignments</b> <b>(Any 10 laboratory Experiments)</b>		
<b>Study Assignment</b>		



	<ol style="list-style-type: none"> <li>1. Study basic phenomenon related to photonics.</li> <li>2. Brief knowledge of various sound waves.</li> <li>3. Explore basics of semiconductor materials.</li> <li>4. Classification of solids.</li> </ol>	CO1, CO2, CO3, CO5										
<b>SN</b>	<b>List of Laboratory Experiments</b>	<b>Mapping CO(s)</b>										
1.	Any Experiment based on Laser (determination of number of lines on grating surface, thickness of wire)	CO1, CO5										
2.	To determine the divergence of Laser beam or to determine the diameter of thin wire or to perform beam profile analysis of a laser beam.											
3	To find the numerical aperture of given optic fiber											
4.	Temperature dependence characteristics of semiconductor laser											
5.	Ultrasonic Interferometer: Determination of viscosity of given liquid sample.	CO2, CO5										
6.	Determination of absorption coefficient of sound of given material	CO5										
7.	To study IV characteristics of Solar Cell and determine parameters (fill factor and efficiency)	CO3, CO5										
8.	To determine energy band gap of given semiconductor	CO5										
9.	To determine Hall coefficient and charge carrier density	CO4, CO5, CO6										
10.	To synthesize metal/semiconductor nanoparticle/thin film	CO5, CO6										
11.	To study X-ray diffraction (XRD) spectra of a given sample.	CO6										
12.	Study Tour/ visit to and submit a report.											
<b>Beyond Scope of Syllabus</b>												
1	Light related demonstration in laboratory Recent scenario related to Quantum Computing Any experiment through virtual lab platform	CO1, CO3, CO5										
<b>Mini-Projects</b>												
2	<ol style="list-style-type: none"> <li>1. Estimation of coefficient of absorption of different absorbing materials.</li> <li>2. Estimation of viscosity of various liquid materials.</li> <li>3. LASER security systems</li> <li>4. Study of size dependent optical properties of nano particles.</li> </ol>	CO1, CO4, CO5, CO6										
3	Experiential Learning (Learning through direct experience, reflection, and active engagement.): (At least two of the following related to the course) <ol style="list-style-type: none"> <li>1. Planning a High-End Equipment/Application Demonstration</li> <li>2. Industry Visit/Field Trips /Site Visits</li> <li>3. Technical Event Organization/ Participation (State/ National/International Level)</li> <li>4. Internships and Apprenticeships</li> <li>5. Project-Based Learning/Mini project</li> <li>6. Community service with academic learning</li> </ol>											
<b>CO-PO Correlation Matrix</b>												
<b>CO\ PO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>
<b>CO1</b>	2	2	-	-	-	-	-	-	1	1	-	1
<b>CO2</b>	2	2	-	-	-	-	-	-	1	1	-	1
<b>CO3</b>	2	2	-	-	-	-	-	-	1	1	-	1
<b>CO4</b>	2	2	-	-	-	-	1	-	1	1	-	1
<b>CO5</b>	-	-	-	-	-	-	-	2	2	2	1	2
<b>CO6</b>	1	-	-	-	-	-	1	1	1	1	1	1



**Matoshri College of Engineering & Research Centre, Nashik**  
**First Year Bachelor of Technology**

**24U0107: Problem Solving and Programming Lab**

Teaching Scheme	Credit	Examination Head: TW
		Examination Scheme & Marks
PR: 02 Hours/Week	01	ISE: 20 Marks ESE: 30 Marks

**Companion Course: 24U0103: Problem Solving and Programming**

**Learning Objectives:** Objectives include- To

- **Understand** and **apply** problem-solving methodologies, programming concepts, and program design tools.
- **Learn** computer-based problem-solving techniques and programming principles.
- **Explore** the fundamentals, unique characteristics, and future potential of the Python programming language.
- Get familiarized with Python's data types, input-output operations, decision-making structures, looping mechanisms, and functions.
- **Develop** into Object-Oriented Programming (OOP) concepts in Python, including its features and application in software development.
- **Grasp** the utility and benefits of classes and objects within the Python programming paradigm.
- **Provide** experiential learning for the students through Application Demonstration and mini project.

**Course Outcomes:**

**BL**

On completion of the course, learner will be able to–

<b>CO1 Problem Solving and Programming:</b> Apply the programming concepts and problem-solving strategies to design, develop, and execute programs that effectively solve real-world problems by understanding the impact of the professional engineering solutions in societal and environmental contexts.	2,3
<b>CO2 Proficiency in Programming Tools and Environments:</b> Demonstrate proficiency in utilizing programming tools, Python integrated development environments (IDEs), effectively navigate and utilize the features provided by these tools to write program codes.	1,2
<b>CO3 Debugging and Troubleshooting Skills:</b> Identify and fix common programming errors, understand and interpret error messages, and utilize debugging tools and techniques to diagnose and resolve issues in their programs.	1,2
<b>CO4 Use of Programming Constructs:</b> Demonstrate proficiency in using statements and expressions, and decision control statements, functions, manipulate and utilize strings, classes and objects to implement effective code with conditional branching in Python programs.	2,3
<b>CO5 Documentation and Timely Submission:</b> Document their code effectively, providing clear explanations and comments to facilitate understanding and maintainability keeping in mind the importance of meeting deadlines and commitment to ethics, punctuality and time management skills for record submissions.	2
<b>CO6 Apply</b> theoretical knowledge to real-world scenarios by engaging in experiential learning activities such as high-end equipment demonstrations, participating in industry visits, and organizing or participating in technical events so as to imbibe <b>problem-solving skills</b> , foster <b>innovation</b> , and <b>build</b> professional competencies necessary for successful careers in engineering.	2,3

## Suggested List of Laboratory Experiments/Assignments

## Study Assignment

- Download and Install the latest version of Python
- Register at GitHub.com; GitHub.com is home to millions of open-source software projects that you can copy, customize, and use for your own purposes.
- Understand the differences between downloading, cloning, and forking.
- Download Python code of at least 10,000 lines, clone it and run it.

Sr. No.	Problem Statements (Any 2 to 3 laboratory assignments from each group)	Mapping CO(s)
	Group A(Assignments based on Unit I)	
1	Write program in Python to read a list of N numbers from the user; compute and display the maximum in list, minimum in list, sum of all numbers in the list and average of numbers.	CO1, CO2, CO3
2	Write program in Python to simulate a simple calculator that performs basic tasks such as addition, subtraction, multiplication and division with special operations like computing $x^y$ and $x!$ .	CO4, CO5
3	Write program in Python to accept the number, compute and display the following- a) square root of number, b) Square of number, c) Cube of number d) check for prime, d) factorial of number e) prime factors	
4.	Write program in Python to accept two numbers from the user and compute the smallest divisor and Greatest Common Divisor of these two numbers.	
5.	Write program in Python to accept a number from the user and print digits of the number in a reverse order.	
	Group B(Assignments based on Unit II)	
6.	Write Program in Python to calculate the salary of an employee given his Basic Pay. Let DA be 80% of Basic Pay, HRA be 10 % of basic pay and TA be 5% of basic pay. Calculate gross salary of employee. Professional tax is to be deducted from gross salary as 2% of gross salary. Calculate salary payable after deductions.	CO1, CO2, CO3, CO4, CO5
7.	Write Program in Python to accept an object mass in kilograms and velocity in meters per second. Calculate and display momentum. Calculate $p=m*v$ , where: $p$ = momentum, $m$ =mass, and $v$ =velocity.	
8.	Write Program in Python to accept student's five courses' marks, compute and display result and grade. Student is pass if he/she scores marks equal to and above 40 in each course. If student scores aggregate greater than 75%, then the grade is distinction. If aggregate is $60 \geq$ and $<75$ then the grade is first division. If aggregate is $50 \geq$ and $<60$ , then the grade is second division. If aggregate is $40 \geq$ and $<50$ , then the grade is third division.	
9.	Write Program in Python to read the number, and check whether the number is the Armstrong number or not. An Armstrong number is an integer with three digits such that the sum of the cubes of its digits is equal to the number itself. Ex. 371.	
10.	Write Program in Python to test whether input number is negative, positive or equal to zero.	
	Group C(Assignments based on Unit III)	
11.	Write program in Python to accept integer between 1 and 12 to represent the month number and function to display corresponding month in words.	CO1, CO2,
12.	Write program in Python to check leap year. Write function with year as argument and return whether year is leap year or not.	CO3, CO4,
13.	Write program in Python to accept the number of terms and x from user and compute $\sin(x)$ . Write functions for power and factorial computation	CO5

14.	Write program in Python with function that returns surface area and volume of the sphere.	
15.	Write a menu driven Python program using functions to perform calculator operations such as adding, subtracting, multiplying, and dividing two integers	
<b>Group D(Assignments based on Unit IV)</b>		
16.	Write a Python program that accept string from user and perform following operations- i. Calculate length of string ii. Reverse the string	CO1, CO2, CO3 CO4, CO5
17.	Write a Python program that accepts two strings from user and check equality of two strings	
18.	Write a Python program that accept string from user and perform following operations ii. Check palindrome iii. Check substring	
19.	Write a Python program to concatenate two strings in a third string. Do not use + operator.	
20.	Write a Python program to count the number of characters, words, and lines in the given text	
<b>Group E(Assignments based on Unit V)</b>		
21.	Write a Python program to create a dictionary to store class test marks of 15 students. And print the highest and lowest score in a dictionary.	CO1, CO2, CO3 CO4, CO5
22.	Write a Python program that finds the sum of all the numbers in a list using a while loop.	
23.	Write a Python program to find whether a particular element is present in the list using a loop.	
24.	Write a Python program for creating a list of first ten letters of the alphabet, then using the slice operation do the following operations a. Print the first three letters from the list b. Print any three letters from the middle c. Print the letters from any particular index to the end of the list.	
25.	Write a Python program that has a dictionary of your friend's name (as keys) and their birthdays. Print the items in the dictionary in a sorted order. Prompt the user to enter a name and check if it is present in the dictionary. If the name does not exist, then ask the user to enter Date of Birth. Add the details in the dictionary.	
26	Demonstration of application software/module working on python programming.	CO6
<b>Beyond Scope of Syllabus</b>		
	Write a Python program for calculator with basic functions. Add more functionality such as graphic user interface and complex calculations.	
<b>Mini-Projects (Optional)</b>		
1.	Program that simulates rolling dice. When the program runs, it will randomly choose a number between 1 and 6 (Or other integer you prefer). Print that number. Request user to roll again. Set the min and max number that dice can show. For the average die, that means a minimum of 1 and a maximum of 6.	CO1, CO2, CO3, CO4, CO5
2.	Use raspberry pi/or similar kit and python for- <ul style="list-style-type: none"> <li>• Room Temperature Monitoring System</li> <li>• Motion Detection System</li> </ul> <ul style="list-style-type: none"> <li>• Smart mirror or a smart clock.</li> <li>• Smile Detection using Raspberry Pi Camera</li> <li>• Soil Moisture Sensor</li> <li>• Home Automation System</li> </ul>	

3.	<p>Guess Number: Randomly generate a number unknown to the user. The user needs to guess what that number is. If the user's guess is wrong, the program should return some sort of indication as to how wrong (e.g. the number is too high or too low). If the user guesses correctly, a positive indication should appear. Write functions to check if the user input is an actual number, to see the difference between the inputted number and the randomly generated numbers, and to then compare the numbers.</p>	CO5
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### Experiential Learning

4.	<p>(Learning through direct experience, reflection, and active engagement.): (At least two of the following related to the course)</p> <ol style="list-style-type: none"> <li>1. Planning a High-End Equipment/Application Demonstration</li> <li>2. Industry Visit/Field Trips /Site Visits</li> <li>3. Technical Event Organization/ Participation (State/ National/International Level)</li> <li>4. Internships and Apprenticeships</li> <li>5. Project-Based Learning/Mini project</li> <li>6. Community service with academic learning</li> </ol>	CO6
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### CO-PO Correlation Matrix

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	2	2	1	1	-	2	1	1	2	1	1	2
<b>CO2</b>	1	-	1	1	2	-	1	1	2	-	-	2
<b>CO3</b>	2	-	-	-	2	-	-	-	2	-	-	2
<b>CO4</b>	1	1	1	-	-	-	-	-	2	-	-	2
<b>CO5</b>	-	-	-	-	-	-	-	2	2	2	1	2
<b>CO6</b>	1	-	-	-	-	-	1	1	1	1	1	1

Matoshri College of Engineering & Research Centre, Nashik		
First Year Bachelor of Technology		
24U0108: Basics of Electrical and Electronics Engineering Lab		
Teaching Scheme	Credit	Examination Head: TW
		Examination Scheme & Marks
PR: 02 Hours/Week	01	ISE: 20 Marks ESE: 30 Marks

**Companion Course, if any:** 24U0104: Basics of Electrical and Electronics Engineering

**Course Objectives:** Objectives include-

- Introduce fundamental concepts, various laws, principles and theorems associated with electrical systems.
- Impart basic knowledge of all electrical quantities such as current, voltage, power, energy, frequency along with different types of fields.
- Provide knowledge about fundamental parameters such as resistance, inductance and capacitance, AC and DC Circuits.
- Provide knowledge of concepts of transformer and Electrical Machines
- Design and test Sequential circuits.
- Evaluate performance characteristics of different types of sensors and transducers.
- To provide experiential learning through industrial visit and mini project.

**Course Outcomes:** **BL**

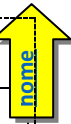
On completion of the course, learner will be able to–

<b>CO1</b> <b>Observe</b> electrical safety measures, understand the use of various measuring instruments and protective equipment.	1,2
<b>CO2</b> <b>Design and test</b> digital circuits using universal/basic gates and flip flops.	1,2
<b>CO3</b> <b>Compute</b> efficiency and regulation of single-phase transformer at different loading conditions.	1,2,3
<b>CO4</b> <b>Understand the use of</b> sensors for specific applications.	2,3
<b>CO5</b> <b>Design</b> electronic circuits utilizing knowledge and skills and to test using electronic test and measurement instruments.	2
<b>CO6</b> <b>Apply</b> theoretical knowledge to real-world scenarios by engaging in experiential learning activities such as high-end equipment demonstrations, participating in industry visits, and organizing or participating in technical events so as to imbibe <b>problem-solving skills</b> , foster <b>innovation</b> , and <b>build</b> professional competencies necessary for successful careers in engineering.	2,3

**Suggested List of Laboratory Experiments/Assignments**  
(Any 10 laboratory assignments)

Sr. No.	Name of the Experiment	CO Mapping
1	List Safety precautions while working on Electrical System and Measuring Instruments	C01
2	To study and calculate electricity bill	CO1
3	To find efficiency and regulation of single-phase transformer at different Loading conditions.	CO3
4	To demonstrate the working of electrical machines.	CO3
5	Speed control of DC Shunt motor by varying armature voltage and field current	CO3
6	To study running (starting) and reversing of 3-phase induction motors.	CO3

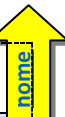




7	1) Test and verify the truth table of Flip Flops: SR Flip Flop using IC 74LS279 JK Flip Flop using IC 74LS76 T Flip Flop using JK Flip Flop D Flip Flop using SR Flip Flop.	CO2
8	Implement ADC Circuit that converts analog input signal to corresponding binary output values using ADC0809.	CO2
9	Implement Shift registers using IC 7474 and verify the operation of SISO, SIPO, PISO, PIPO	CO2
10	To measure displacement using LVDT and plot the graph between the displacement and voltage.	CO4
11	Implement resistance temperature detector for temperature measurement	CO4
12	Design and Implement darkness detector circuit using LDR.	CO4, CO6
13	Design and Implement Obstacles detector using IR sensor.	CO4, CO6
14	Measurements using various measuring equipment. <ul style="list-style-type: none"> <li>To measure voltage and resistance using Digital Multimeters.</li> <li>To study and understand Function Generator and CRO.</li> <li>To measure ac voltage, frequency of ac signal.</li> <li>Observe the Lissajous patterns.</li> <li>Measure voltage using regulated power supply.</li> </ul>	CO5
15	<b>Experiential Learning-</b> 1. Industrial visit –Power Station, Transformer Manufacturing Industry, Wire Manufacturing, Electronic Industry.	CO2, CO3, CO4, CO5, CO6

#### CO-PO Correlation Matrix

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1.	2	2	-	-	2	-	-	-	2	2	2	2
CO2.	2	2	-	-	2	-	-	-	2	2	2	2
CO3.	2	2	-	-	2	-	-	-	2	2	2	2
CO4.	2	2	-	-	2	-	-	-	2	2	2	2
CO5.	2	2	-	-	2	-	-	-	2	2	2	2
CO6.	1	-	-	-	-	-	1	1	1	1	1	1



Matoshri College of Engineering & Research Centre, Nashik		
First Year Bachelor of Technology		
24U0109: Engineering Drawing		
Teaching Scheme	Credit	Examination Head: PR
		Examination Scheme & Marks
TUT: 01 Hour/Week PR: 02 Hours/Week	02	ISE : 20 Marks ESE: 30 Marks
<b>Prerequisite:</b> Basic geometrical measurements (linear and angular), Construction and deviation of line, circle and polygon, Co-ordinate geometry, computer literacy.		
<b>Companion Course, if any: ...</b>		
<b>Course Objectives: To</b>		
<ul style="list-style-type: none"> <li>Acquire basic knowledge about line types, dimension methods, and simple geometrical construction.</li> <li>Familiarize the construction and applications of Engineering Curves</li> <li>Visualize and draw the projection of point, line, planes</li> <li>Draw projection of solids</li> <li>Provide the basic knowledge and develop the skills for creating 2 D drawings.</li> <li>Visualize three dimensional engineering objects and shall be able to draw their isometric views</li> <li>Experiential learning for the students through applications/industrial visit and mini project</li> </ul>		
<b>Course Outcomes:</b>		<b>BL</b>
On completion of the course, learner will be able to–		
<b>CO1 Understand</b> computerized graphical tools and <b>Construct</b> various types of Engineering Curves		1,2,3
<b>CO2 Utilize the</b> fundamentals of Engineering Drawing to draw and interpret Projection Planes.		1,2,3
<b>CO3 Draw</b> Projection of different types of Solids resting on Horizontal Plane (HP).		1,2,3
<b>CO4 Draw</b> Orthographic views of given 3D object <b>by using</b> the concept of orthographic projection of an object.		1,2,3
<b>CO5 Apply</b> the visualization skill to draw an isometric view from given orthographic views.		1,2,3
<b>CO6 Apply</b> theoretical knowledge to real-world scenarios by engaging in experiential learning activities such as high-end equipment demonstrations, participating in industry visits, and organizing or participating in technical events so as to imbibe <b>problem-solving skills</b> , foster <b>innovation</b> , and <b>build</b> professional competencies necessary for successful careers in engineering.		2,3
Course Contents		
Unit Number	Unit Title	Hours
I	Engineering Curves	5
<b>Introduction to Engineering drawing:</b> Prerequisite for engineering drawing, drawing instruments & accessories , BIS Standards <b>Lines and Lettering:</b> Lines, Types of Lines, Lettering <b>Dimensioning :</b> Elements of dimensioning, Rules of dimensioning <b>Geometrical Constructions:</b> Basic geometrical shapes, to construct regular polygons <b>Engineering Curves:</b> Conic sections, Ellipse, Parabola, Hyperbola, (Rectangle Method only). Cycloid , Archimedean Spiral, Involute of circle and Helix on cone (Only for one convolution)		
<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>Explore applications of conic sections in engineering field.</li> </ul>	
II	Projections of a Point , Line and Plane	5



**Projections of Points:** Positions of a Point, Notation System  
**Projections of Lines :** Positions of Straight Lines ,Terms Used in Projections of Lines, Line Parallel to Both the RPs , Line Perpendicular to Either of the RPs, Line Inclined to One RP and Parallel to the Other, **Projections of Planes:** Positions of Planes, Terms used in Projections of Planes ,Plane Parallel to an RP , Plane Inclined to One RP and Perpendicular to the Other RP

<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>• Generate model of reference plane using projection of plane.</li> </ul>
<b>III</b>	<b>Projections of solids</b>

**Projections of Solids :** Basic Solids, Positions of the Solids ,Solid with Axis Perpendicular to an RP, Solid with Axis Inclined to One RP and Parallel to the Other, Rules for Deciding the Hidden Lines (Problems on Solids resting on Horizontal plane only).

<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>• Explore applications of solids in engineering field</li> </ul>
<b>IV</b>	<b>Orthographic Projections</b>

**Theory of Projection:** Projection System, Projection Methods, Principal Planes  
**Multiview Orthographic Projections :** Multiview Projection System, Orthographic view, Methods of Multiview ,Projection Projecting the SVs, Orthographic Views: Systematic Approach, Sectional Views ( problems on first angle projections method and full sectioning only)

<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>• Explore orthographic views of workshop jobs</li> </ul>
<b>V</b>	<b>Isometric Views</b>

**Isometric Projection:** Principle of Isometric Projection, Terminology, Isometric Scale, Isometric Projections and Isometric Views, Isometric Views of Standard Shapes, Isometric Views: Systematic Approach

<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>• Explore Isometric views of workshop jobs</li> </ul>
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### Learning Resources

#### Text Books:

1. N.D.Bhatt and V. M. Panchal, Engineering Drawing, Plane and Solid Geometry, charotar Publication House.

#### Reference Books:

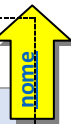
1. Basudeb Bhattacharya Machine Drawing Includes AutoCadSupplements,Oxford University Press,India.
2. Dhananjay A. Jolhe, Engineering Drawing with an Introduction to AutoCAD, Tata McGraw-Hill \ Publishing Co. Ltd.

#### e-Learning:

1. Introduction to Engineering Drawing.  
[https://www.youtube.com/playlist?list=PLbMVogVj5nJRgBjyxu0PfH3Ucdq\\_mDo4o](https://www.youtube.com/playlist?list=PLbMVogVj5nJRgBjyxu0PfH3Ucdq_mDo4o)
2. Theory of Projections. <http://nptel.ac.in/courses/112103019/14>
3. Projection of Points. <http://nptel.ac.in/courses/112103019/17>
4. Projection of Lines <http://nptel.ac.in/courses/112103019/19>
5. Projection of Planes <http://nptel.ac.in/courses/112103019/24>
6. Projections of Solids. <http://nptel.ac.in/courses/112103019/28>
7. AUTO CAD Software <https://www.youtube.com/user/AutoCADEXchange/videos>

#### MOOC Courses:

- 1) <https://nptel.ac.in/courses/112103019>
- 2) <https://www.mooc-list.com/tags/engineering-drawing>
- 3) <https://www.mooc-list.com/tags/technical-drawing>
- 4) <https://www.mooc-list.com/tags/drawing>



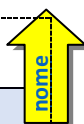
### Suggested List of Laboratory Experiments/Assignments

#### CO Mapping: CO1 to CO5 for all Lab Assignments

Sr. No.	Lab Assignments	CO Mapping
1.	Introduction to 2D and 3D computer aided drafting packages Evolution of CAD, Importance of CAD, Basic Commands - Edit, View, Insert, Modify, Dimensioning Commands, setting and tools etc. and its applications to construct the 2D and 3D drawings	CO1
2.	Construct Engineering Curve like Conic sections, Cycloid , Archimedean Spiral, Involute of circle and Helix on cone.	CO1
3.	Draw the projections of the plane.	CO1, CO2
4.	Draw the projections of given solid resting on HP and axis inclined to VP.	CO1, CO3
5.	Orthographic view of given object with sectional view.	CO1, CO4
6.	Draw Isometric view for given orthographic views.	CO1, CO5
7.	Industrial Visit to thermal power plant/ST workshop.	CO6
8.	Project based learning /mini project	CO6

#### CO-PO Correlation Matrix

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1.	1	1	-	-	2	-	-	-	-	1	-	1
CO2.	1	1	-	-	2	-	-	-	-	1	-	1
CO3.	1	1	-	-	2	-	-	-	-	1	-	1
CO4.	1	1	2	-	2	-	-	-	-	1	-	1
CO5.	1	1	2	-	2	-	-	-	-	1	-	1
CO6.	1	-	-	-	2	-	-	1	1	1	1	1



**Matoshri College of Engineering & Research Centre, Nashik**  
**First Year Bachelor of Technology**

**24U0110: Liberal Learning 1**

**24U0110A: Yoga and Mental Health**

Teaching Scheme	Credit (02)	Examination Head: TW	
		Examination Scheme & Marks	
TUT: 01 Hour/Week	01	ISE	20 Marks
PR: 02 Hours/Week	01	ESE:	30 Marks

**Prerequisite: Basic information and importance of yoga**

**Companion Course, if any:**

**Course Objectives:**

- **Historical and Philosophical Understanding:** Enable students to comprehend the historical roots and philosophical foundations of yoga, including its evolution and key concepts from Hindu, Buddhist, and Jain traditions.
- **Practical Application of Yoga:** Equip students with the knowledge and skills to practice basic asanas, focusing on correct posture, breathing techniques, and relaxation methods for physical and mental well-being.
- **Enhancing Concentration and Stress Management:** Teach techniques and practices aimed at improving concentration, enhancing mental clarity, and reducing stress through specific yoga exercises and mindfulness practices.
- **Managing Anxiety:** Provide students with yoga tools and practices designed to alleviate symptoms of anxiety, promoting mental calmness and emotional stability.
- **Supporting Emotional Balance:** Guide students in learning yoga techniques and postures that foster emotional resilience, aiding in the relief of depression and promoting overall mental health.
- To provide Experiential Learning through community service with academic learning

**Course Outcomes:**

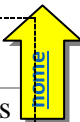
**BL**

On completion of the course, learner will be able to–

<b>CO1 Understand Yoga's History and Philosophy:</b> Students will comprehend the origins of yoga and its philosophical principles from various traditions	<b>1</b>
<b>CO2 Practice Basic Yoga Techniques:</b> Students will be able to perform basic yoga poses with correct posture, practice breathing techniques, and use relaxation exercises effectively	<b>1,2,3</b>
<b>CO3 Enhance Concentration and Reduce Stress:</b> Students will improve their ability to focus and manage stress through specific yoga practices	<b>1,2</b>
<b>CO4 Manage Anxiety:</b> Students will learn and apply yoga exercises to reduce anxiety and promote mental calmness	<b>1,2</b>
<b>CO5 Support Mental Well-being:</b> Students will develop skills in using yoga postures and techniques to support emotional balance and alleviate symptoms of depression	<b>1,2,3</b>
<b>CO6 Comprehend</b> the history and philosophy of yoga, practice basic techniques and postures, <b>enhance</b> concentration and stress management, manage anxiety, and support mental well-being through effective use of yoga exercises.	<b>2,3</b>

**Course Contents**

Unit Number	Unit Title	Hours
<b>I</b>	<b>Introduction to Yoga</b>	<b>7</b>



**Historical Overview:** Explore the origins of yoga in ancient India, its development through various historical periods, and its global evolution.

**Philosophical Foundations:** Study key texts and concepts from Hindu, Buddhist, and Jain traditions that shape yoga philosophy.

**Practical Benefits:** Examine the physical, mental, and emotional advantages of regular yoga practice.

**Modern Practices and Applications:** Understand contemporary yoga styles, practices, and their applications in daily life.

<b>II</b>	<b>Basic Asanas</b>	<b>7</b>
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**Posture:** Practice holding your body correctly in different yoga poses.

**Breathing Techniques:** Learn how to breathe properly while doing yoga.

**Relaxation:** Do exercises that help you relax and feel calm.

<b>III</b>	<b>Yoga for Concentration</b>	<b>7</b>
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**Focus Enhancement:** Practices and techniques to improve mental clarity and concentration.

**Stress Reduction:** Practice yoga and mindfulness to feel more relaxed and less stressed.

<b>IV</b>	<b>Yoga and Mental Health</b>	<b>7</b>
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**Anxiety Management:** Learn yoga exercises that help reduce anxiety.

**Depression Relief:** Techniques and postures to support emotional balance and mental well-being.

#### Learning Resources

#### Text Books:

1. "The Complete Illustrated Book of Yoga" by Swami Vishnudevananda , HarperCollins India.
2. "Light on Yoga" by B.K.S. Iyengar - Published by HarperCollins India.
3. "Yoga for Concentration and Meditation" by BijoylaxmiHota - Published by Orient Paperbacks.
4. "Yoga for Mental Health" by Ira Trivedi - Published by HarperCollins India.

#### Reference Books:

1. Contemporary Yoga Education : Transforming the body, Mind and Soul,ESI,9786084642602
2. "Easy steps to Yoga by Shri Swami Sivananda", A divine Life society publication, 8170520983
3. 'The Complete book of Yoga, Swami Vivekananda , Fingerprint Publication, 9789389178784

#### e-Books:

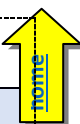
- <https://www.barnesandnoble.com/w/ten-minute-yoga-for-stress-relief-focus-and-renewal-lisa-shea/1122687958?ean=2940152196221>
- <https://www.barnesandnoble.com/w/yoga-and-health-visionary-monk/1125098592?ean=2940153837352>
- <https://www.barnesandnoble.com/w/the-essential-yogi-training-alanna-kaivalya/1124127673?ean=2940153375762>

#### MOOC Courses:

- [https://onlinecourses.nptel.ac.in/noc24\\_mg136/preview](https://onlinecourses.nptel.ac.in/noc24_mg136/preview)
- [https://onlinecourses.swayam2.ac.in/aic24\\_ge31/preview](https://onlinecourses.swayam2.ac.in/aic24_ge31/preview)
- [https://onlinecourses.swayam2.ac.in/aic24\\_ge24/preview](https://onlinecourses.swayam2.ac.in/aic24_ge24/preview)

#### CO-PO Correlation Matrix

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	-	-	-	-	-	1	-	-	1	-	-	1
<b>CO2</b>	-	-	-	-	-	1	-	-	1	-	-	1
<b>CO3</b>	-	-	-	-	-	1	-	-	1	-	-	1
<b>CO4</b>	-	-	-	-	-	1	-	-	1	-	-	1
<b>CO5</b>	-	-	-	-	-	1	-	-	1	-	-	1
<b>CO6</b>	-	-	-	-	-	1	1	1	1	1	-	1



**Matoshri College of Engineering & Research Centre, Nashik**  
**First Year Bachelor of Technology**

**24U0110: Liberal Learning 1**  
**24U0110B: Art Forms**

Teaching Scheme	Credit (02)	Examination Head: TW	
		Examination Scheme & Marks	
TUT: 01 Hour/Week PR: 02 Hours/Week	01 01	ISE: 20 Marks ESE: 30 Marks	

**Prerequisite: Basic information of arts**

**Companion Course, if any:**

**Course Objectives:**

- **Skill Development:** Enable students to acquire proficiency in various art forms such as painting, sculpture, photography, and sketching through hands-on practice and guidance.
- **Creativity Enhancement:** Foster creativity and self-expression by engaging in workshops and exploring diverse artistic techniques to effectively convey personal thoughts and emotions.
- **Project-based Learning:** Encourage students to conceptualize and execute their own art projects, integrating multiple techniques learned throughout the course.
- **Critical Analysis and Reflection:** Facilitate critical thinking and self-assessment by providing feedback on artwork and guiding students in reflecting on their creative processes and achievements.
- **Presentation Skills:** Develop presentation skills as students showcase their completed artworks, articulating their creative journey, inspirations, and technical approaches to peers and instructors.
- To provide Experiential Learning field visit to coin museum.

**Course Outcomes:**

**BL**

On completion of the course, learner will be able to–

<b>CO1 Explore Various Art Forms:</b> Students will able to perform painting, sketching, photography, and sculpture.	<b>1,2</b>
<b>CO2 Express Creativity:</b> Students will learn diverse artistic techniques to express their thoughts and emotions effectively through art.	<b>1,2</b>
<b>CO3 Create Artworks:</b> Students will be able to design and produce their own artworks, integrating multiple artistic techniques and styles learned during the course.	<b>1,2,3</b>
<b>CO4 Present Artwork:</b> Students will showcase their completed artworks, articulating their creative process, inspirations, and the techniques used to peers and instructors.	<b>1,2,3</b>
<b>CO5 Receive and Apply Feedback:</b> Students will receive constructive feedback on their artwork and use it to improve their artistic skills and techniques	<b>1,2,3</b>
<b>CO6 Explore and perform</b> various art forms, express creativity through diverse techniques, create and design original artworks, present and articulate the creative process, and apply feedback to refine artistic skills and techniques	<b>2,3</b>

**Course Contents**

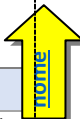
Unit Number	Unit Title	Hrs
<b>I</b>	<b>Introduction to Art Forms</b>	<b>7</b>

**Painting:** Learn techniques in acrylics, watercolors, and oils.

**Idol Making:** Create sculptures using clay and other materials.

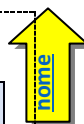
**Photography:** Explore basic camera operations and composition.

**Sketching:** Develop skills in pencil, charcoal, and ink drawings.



II	Creativity and Expression	7										
<p><b>Workshops:</b> Engage in sessions focusing on expressing personal thoughts and emotions through various art forms.</p> <p><b>Artistic Techniques:</b> Learn different methods to convey feelings and ideas effectively.</p> <p><b>Feedback and Reflection:</b> Receive feedback on your artwork and reflect on how to enhance your expressive abilities</p>												
III	Project Work	7										
<p><b>Art Creation:</b> Students will design and produce their own artwork using the techniques learned.</p> <p><b>Integration of Techniques:</b> Apply skills from painting, sketching, photography, and idol making into their projects.</p> <p><b>Presentation:</b> Showcase their completed artwork, explaining their creative process and inspirations.</p>												
Learning Resources												
<p><b>Text Books:</b></p> <ol style="list-style-type: none"> <li>"Indian Art and Culture" by NitinSinghania - Published by McGraw Hill Education</li> <li>The Art of Indian Asia: Its Mythology and Transformations" by Heinrich Zimmer - Published by Princeton University Press</li> <li>"Indian Art: Forms, Concerns and Development in Historical Perspective" by PranNath - Published by D. K. Printworld (P) Ltd"</li> </ol>												
<p><b>Reference Books:</b></p> <ol style="list-style-type: none"> <li>"Handbook of Art Therapy" by CATHY A. MALCHIODI, THE GUILFORD PRESS, ISBN 1-57230-809-5</li> <li>The Thames &amp; Hudson Introduction to Art by Debra J. DeWitte</li> <li>An Introduction To Indian Art Part 1 : Textbook In Fine Arts For Class 11 - 11144 by NCERT</li> </ol>												
<p><b>e-Books:</b></p> <ul style="list-style-type: none"> <li><a href="https://www.infobooks.org/free-pdf-books/art/painting/">https://www.infobooks.org/free-pdf-books/art/painting/</a></li> <li><a href="https://materialdeconsultaib.wordpress.com/wp-content/uploads/2016/05/arte-digital-art-masters-vol-1.pdf">https://materialdeconsultaib.wordpress.com/wp-content/uploads/2016/05/arte-digital-art-masters-vol-1.pdf</a></li> </ul>												
<p><b>MOOC Courses:</b></p> <ul style="list-style-type: none"> <li><a href="https://onlinecourses.swayam2.ac.in/cec24_ge20/preview">https://onlinecourses.swayam2.ac.in/cec24_ge20/preview</a></li> <li><a href="https://onlinecourses.nptel.ac.in/noc24_hs136/preview">https://onlinecourses.nptel.ac.in/noc24_hs136/preview</a></li> <li><a href="https://onlinecourses.nptel.ac.in/noc24_hs111/preview">https://onlinecourses.nptel.ac.in/noc24_hs111/preview</a></li> </ul>												
CO-PO Correlation Matrix												
CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	1	-	-	1	1	-	1
CO2	-	-	-	-	-	1	-	-	1	1	-	1
CO3	-	-	-	-	-	1	-	-	1	1	-	1
CO4	-	-	-	-	-	1	-	-	1	1	-	1
CO5	-	-	-	-	-	1	-	-	1	1	-	1
CO6	-	-	-	-	-	1	1	1	1	1	-	1





Matoshri College of Engineering & Research Centre, Nashik First Year Bachelor of Technology		
24U0110: Liberal Learning 1 24U0110C: Gymnasium		
Teaching Scheme	Credit (02)	Examination Head: TW
		Examination Scheme & Marks
TUT: 01 Hour/Week PR: 02 Hours/Week	01 01	ISE 20 Marks ESE: 30 Marks

**Prerequisite: Basic information of Gymnasium and importance of nutrition.**

**Companion Course, if any:**

**Course Objectives:**

- Demonstrate understanding of basic principles in fitness, including anatomy, exercise physiology, and the benefits of regular physical activity for overall well being.
- Apply knowledge of different muscle groups, gym instruments, and exercise techniques to develop and improve strength and endurance effectively.
- Improve cardiovascular health through various cardio exercises, utilizing gym instruments such as treadmills, stationary bikes, etc., to increase stamina and heart health.
- Utilize gym instruments effectively, including dumbbells, Smith machines, etc., demonstrating proper usage and technique for strength training and muscle development.
- Evaluate the role of nutrition in achieving fitness goals, making informed dietary choices to support optimal physical performance, recovery, and overall health
- To provide Experiential Learning through field visit to sports academy.

**Course Outcomes:**

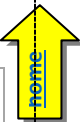
**BL**

On completion of the course, learner will be able to–

<b>CO1 Understand Body Mechanics:</b> Students will grasp the basics of human anatomy and how muscles and bones function together for movement and strength.	<b>1</b>
<b>CO2 Value Physical Fitness:</b> Students will appreciate the importance of regular exercise and diet in maintaining overall health and well-being.	<b>1,2</b>
<b>CO3 Engage in Physical Activities:</b> Students will explore various exercises and activities that promote physical fitness, including strength training and cardiovascular exercises.	<b>1,2,3</b>
<b>CO4 Develop Strength and Safety Skills:</b> Students will learn to identify major muscle groups, execute proper exercise techniques, and prioritize safety during workouts.	<b>1,2</b>
<b>CO5 Promote Cardiovascular Health:</b> Students will acquire knowledge of different cardio exercises, enhance their endurance, and understand the benefits of cardiovascular fitness for overall well-being.	<b>1,2</b>
<b>CO6 Understand</b> body mechanics and human anatomy, value and engage in physical activities to promote fitness, develop strength and safety skills, and enhance cardiovascular health through various exercises and techniques.	<b>2,3</b>

#### Course Contents

Unit Number	Unit Title	Hrs
<b>I</b>	<b>Introduction to Fitness and Wellbeing</b>	<b>7</b>
<b>Basic Anatomy:</b> Learn about the human body's structure and how muscles and bones work together. <b>Importance of Fitness:</b> Understand why staying active and fit is crucial for overall health. <b>Physical Activities:</b> Explore different exercises and activities that promote fitness and well-being.		
<b>II</b>	<b>Strength Training</b>	<b>7</b>



**Muscle Groups:** Identify and study major muscle groups in the body.  
**Exercise Techniques:** Learn various strength training exercises targeting different muscles.  
**Safety and Form:** Emphasize proper technique and safety precautions during workouts.  
**Progression:** Understanding gradual increase in intensity and resistance for continuous improvement.

<b>III</b>	<b>Cardiovascular Health</b>	<b>7</b>
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**Cardio Exercises:** Learn different types of exercises that improve heart and lung health.  
**Stamina Improvement:** Practice activities that enhance stamina and cardiovascular endurance.  
**Benefits:** Understand how cardio exercises contribute to overall fitness and well-being.

<b>IV</b>	<b>Gym Instruments and Their Uses</b>	<b>7</b>
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**Treadmill:** Learn how to use this machine for walking or running indoors to improve cardiovascular endurance.  
**Dumbbells:** Understand their role in strength training exercises targeting various muscle groups.  
**Stationary Bike:** Practice cycling for cardio workouts and lower body strength building.  
**Smith Machine:** Explore its use for guided weightlifting exercises to enhance muscle strength and endurance.

<b>V</b>	<b>Nutrition and Fitness</b>	<b>7</b>
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**Role of Diet:** Explore how diet affects fitness and overall health.  
**Healthy Eating Basics:** Learn fundamental principles of balanced nutrition and making nutritious food choices.  
**Fitness Goals:** Understand how proper nutrition supports fitness goals and enhances performance.

#### Learning Resources

##### Text Books:

1. Fitness: The Complete Guide" by Namita Jain - Published by Random House India,
2. "Cardiovascular Diseases: Causes, Symptoms, and Treatment" by NiharRanjanNayak - Published by Jaypee Brothers Medical Publishers
3. "A Complete Guide to Gym Equipment" by Kiran A. Sapkal - Published by Atlantic Publishers
4. "Nutrition for Sport and Exercise" by P. S. Phadke

##### Reference Books:

1. The Fitness Mindset: Eat for Energy, Train for Tension, Manage Your Mindset, Reap the Results by Brian Keane.
2. Principles of Health Education by Dr. Sita Ram Sharma, Friends Pub., ISBN: 81-7216-111-5
3. The mens fitness exercise Bible" by Sean Hyson ISBN 978-0-9895940-1-1

##### e-Books:

- <https://archive.org/details/FitnessBooksCollection/19%20Tips%20To%20Build%20Muscle/page/n7/mode/2up>
- <https://benessair.com/wp-content/uploads/2020/06/Benessere-PreWorkout-EBook-1-1.pdf>

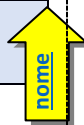
##### MOOC Courses:

- <https://nptel.ac.in/courses/109106406>
- [https://onlinecourses.nptel.ac.in/noc24\\_hs83/preview](https://onlinecourses.nptel.ac.in/noc24_hs83/preview)
- [https://onlinecourses.nptel.ac.in/noc24\\_hs87/preview](https://onlinecourses.nptel.ac.in/noc24_hs87/preview)

#### CO-PO Correlation Matrix

CO\ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	1	-	-	1	-	-	1
CO2	-	-	-	-	-	1	-	-	1	-	-	1
CO3	-	-	-	-	-	1	-	-	1	-	-	1
CO4	-	-	-	-	-	1	-	-	1	-	-	1
CO5	-	-	-	-	-	1	-	-	1	-	-	1
CO6	-	-	-	-	-	1	1	1	1	1	-	1

**Matoshri College of Engineering & Research Centre, Nashik**  
**First Year Bachelor of Technology**



**24U0110: Liberal Learning 1**  
**24U0110D: Cinematography**

Teaching Scheme	Credit (02)	Examination Head: TW	
		Examination Scheme & Marks	
TUT: 01 Hour/Week PR: 02 Hours/Week	01 01	ISE : 20 Marks ESE: 30 Marks	

**Prerequisite: Basic information of Cinema**

**Companion Course, if any:**

**Course Objectives:**

- To introduce students to the fundamental concepts of cinematography and visual storytelling.
- To develop an understanding of camera operation, framing, and composition techniques.
- To explore lighting techniques and their impact on mood and narrative.
- To familiarize students with the basics of shot planning, storyboarding, and visual continuity and editing.
- To provide Experiential Learning through field visit.

**Course Outcomes:**

**BL**

On completion of the course, learner will be able to–

<b>CO1 Understand and apply</b> basic cinematography principles to create compelling visual stories.	<b>1,2,3</b>
<b>CO2 Demonstrate</b> knowledge of lighting setups and their influence on the visual mood of a scene	<b>1,2</b>
<b>CO3 Operate</b> a camera proficiently, utilizing various framing and composition techniques	
<b>CO4 Apply</b> foundational video editing techniques such as cutting, transitioning, and sequencing, utilize post-production software	<b>1,2</b>
<b>CO5 Create</b> storyboards and plan shots effectively for a cohesive visual narrative.	<b>1,2,3</b>
<b>CO6 Apply</b> theoretical knowledge to real-world scenarios by engaging in experiential learning activities such as high-end equipment demonstrations, participating in industry visits, and organizing or participating in technical events so as to imbibe <b>problem-solving skills</b> , foster <b>innovation</b> , and <b>build</b> professional competencies necessary for successful careers in engineering.	<b>2,3</b>

**Course Contents**

Unit Number	Unit Title	Hrs
<b>I</b>	<b>Introduction to Cinematography</b>	<b>7</b>
Overview of cinematography and its role in storytelling. Basics of camera operation: types of cameras, lenses, and accessories. Understanding the exposure triangle: ISO, aperture, and shutter speed. Introduction to framing and composition: rule of thirds, leading lines, and symmetry.		
<b>II</b>	<b>Lighting Techniques</b>	<b>7</b>
Fundamentals of lighting in cinematography. Types of lighting: natural vs. artificial, hard vs. soft light. Key lighting techniques: three-point lighting, high-key vs. low-key lighting. Understanding color temperature and its effect on mood. Practical exercises on setting up basic lighting for scenes.		
<b>III</b>	<b>Shot Composition and Visual Continuity</b>	<b>7</b>



Exploring different types of shots: wide, medium, close-up, and their narrative significance.  
 Camera movements: pan, tilt, dolly, zoom, and handheld techniques.  
 Basics of visual continuity: the 180-degree rule, match cuts, and eyeline matching.  
 Introduction to storyboarding and shot planning.  
 Practical exercises in creating shot lists and visual storyboards.

<b>IV</b>	<b>Introduction to Post-Production and Editing</b>	<b>7</b>
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Basics of video editing: cutting, transitioning, and sequencing.  
 Introduction to post-production software: Adobe Premiere, Final Cut Pro.  
 Understanding color grading and its impact on the final visual output.  
 Basics of sound design and its integration with visual storytelling.  
 Final project: creating a short film or visual story demonstrating learned techniques.

### Learning Resources

#### Text Books:•

1. "Cinematography: Theory and Practice" by Blain Brown
2. "The Filmmaker's Eye: Learning (and Breaking) the Rules of Cinematic Composition" by Gustavo Mercado

#### Reference Books:

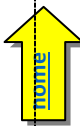
1. "Cinematography: Theory and Practice" by Blain Brown
2. "The Five C's of Cinematography: Motion Picture Filming Techniques" by Joseph V. Mascelli
3. "Master Shots Vol 1: 100 Advanced Camera Techniques to Get an Expensive Look on Your Low-Budget Movie" by Christopher Kenworthy
4. "Lighting for Cinematography: A Practical Guide to the Art and Craft of Lighting for the Moving Image" by David Landau
5. "Digital Cinematography: Fundamentals, Tools, Techniques, and Workflows" by David Stump

#### e-Books:

- <https://digilib.stekom.ac.id/assets/dokumen/ebook>
- <https://www.infobooks.org/free-pdf-books/art/cinema/>

### CO-PO Correlation Matrix

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	1	1	1	-	1
CO2	-	-	-	-	-	-	-	1	1	1	-	1
CO3	-	-	-	-	-	-	-	1	1	1	-	1
CO4	-	-	-	-	-	-	-	1	1	1	-	1
CO5	-	-	-	-	-	-	-	1	1	1	-	1
CO6	-	-	-	-	-	-	-	1	1	1	-	1



**Matoshri College of Engineering & Research Centre, Nashik**  
**First Year Bachelor of Technology**

**NCAC01: Non-Credit Audit Course\_1                      Options**

Course Code	Course Title
NCAC01-A	Green Construction and Design
NCAC01-B	Social Awareness and Governance Program
NCAC01-C	Smart Cities
NCAC01-D	Foreign Language (one of Japanese/Spanish/French/German). Course contents for <b>Japanese (Module 1)</b> are provided. For other languages institute may design suitably.

**NCAC01-A: Green Construction and Design**

**Prerequisites:** General awareness of environment and eco system.

**Course Objectives:**

- To motivate students for undertaking green construction projects, technical aspects of their design, obstacles to getting them done, and future directions of the field.
- To increase awareness of green construction issues, so that students will know the range of existing knowledge and issues.
- Proper use of energy, water and other resources without harming environment.
- To reduce waste pollution and Environment Degradation.

**Course Outcomes:**

On completion of the course, learner will be able to–

**CO1 Understand** the importance of an environmental friendly society.

**CO2 Apply** primary measures to reduce carbon emissions from their surroundings.

**CO3 Learn** role of IT solutions in design of green buildings.

**CO4 Understand** the use of software systems to complete statutory compliances involved in the design of a new home or office building through green construction.

**Course Contents**

1. Introduction to Green Construction, need of green construction, Importance, Government Initiatives, your role in the Green Environment.
2. How to do Green Construction, Project Definition, Team Building, Education and Goal Setting, Documents and Specification.
3. Elements of Green Construction, Materials Construction Waste Management, Indoor Air Quality, Energy Efficiency.
4. Indian Green Building Council (IGBC), Introduction to IGBC, IGBC rating system, Green building projects in India, Benefits of green building, effects on natural resources.

**Team Projects:**

Students will be formed into groups to research green construction and design in a particular construction context and report their results to the class. What are the particular obstacles and opportunities to integrating green construction techniques into the following sectors? Be sure to consider technical, social, political and economic issues:

Hotels (economy, luxury, resorts ), Hospitals, Retail( big box, malls, small scale downtown retail), Office, Government, ,Schools, Universities, Housing, Transportation Stations (Airport Terminals, Train Stations).

**References :**

1. Kibert, C. (2008) Sustainable Construction: Green Building Design and Delivery, 2nd edition(Hoboken, NJ: John Wiley and Sons.
2. Handbook of Green Building Design and Construction 1st Edition, by Sam Kubba, eBook ISBN:9780123851291.
3. IGBC Green New Buildings Rating System, Ver 3.0, Abridged Reference Guide Sept 2014.
4. [https://igbc.in/igbc/html\\_pdfs/abridged/IGBC%20Green%20New%20Buildings%20Rating%20System%20 \(Version%203.0\).pdf](https://igbc.in/igbc/html_pdfs/abridged/IGBC%20Green%20New%20Buildings%20Rating%20System%20(Versio%203.0).pdf)

**The CO-PO Mapping Matrix**

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	2	-	-	3	3	-	-	-	-	-
CO2	-	-	2	-	-	3	3	-	-	-	-	-
CO3	-	-	-	-	3	-	2	-	-	-	-	-
CO4	-	-	1	-	3	-	2	-	-	-	-	-

**NCAC01-B: Social Awareness and Governance Program****Prerequisites:**

Awareness about basic terms in Social Science and Governance

**Course Objectives:**

1. To Increase community awareness about social issues and to promote the practice of good governance in both private and public institutions, through policy advocacy and awareness creation in order to ensure proper utilization of public resources and good service delivery.
2. Increase community awareness on health, education, and human rights.
3. Transferring costs of social activities to other various segments of society.
4. To enhance youth participation in decision-making, democracy and economic development.

**Course Outcomes:**

On completion of the course, learner will be able to–

**CO1 Understand** social issues and responsibilities as member of society.

**CO2 Apply** social values and ethics in decision making at social or organizational level

**CO3 Promote** obstacles in national integration and role of youth for National Integration

**CO4 Demonstrate** basic features of Indian Constitution.

**Course Contents**

1. Indian Society as Pluralistic, Fundamentals of unity in diversity, diversity and disparity in Indian society, women in mass media, disparities due to disability.
2. The Indian constitution as unifying factor, Introduction Making of Indian Constitution, Basic features of Indian Constitution, Strengths of Indian Constitution, and Fundamental Duties.
3. National Integration: Introduction, The Value of Tolerance, Minority Classes And Constitution, Pre-Requisites of National Integration, Obstacles To National Integration, Promotion of National Integration, Role of Youth In Promoting Communal Harmony.
4. Socialization, Ethics, Values and Prejudices, Meaning of Socialization, Functions of Socialization, Agents of Socialization, Importance of Socialization, Role of Ethics In Individual Development, Role of Basic Human Values In Individual Development, Relative Value System.

**Activities:**

1. Conducting training/workshops/debates on HIV/AIDS prevention and stigma reduction.
2. Public shows on girls' education and empowerment.
3. Conducting campaigns on adult/disabled education.

**References:**

1. Devidas M. Muley , S Chand, " Social Awareness and Personality Development", ISBN: 812193074X.
2. BhagabatiProsad Banerjee, Durga Das Basu, Shakeel Ahmad Khan, V. R. Manohar, "Introduction to the Constitution of India", ISBN : 9788180385599.

**@The CO-PO Mapping Matrix**

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	2	-	-	-	-
CO2	-	-	-	-	-	-	-	3	2	-	-	-
CO3	-	-	-	-	-	-	-	2	2	-	-	-
CO4	-	-	-	-	-	-	-	1	1	-	-	-

## NCAC01-C: Smart Cities

We breathe in a world defined by urbanization and digital ubiquity, where mobile broadband connections outnumber fixed ones, machines dominate a new "internet of things," and more people live in cities than in the countryside. This course enables us to take a broad historical look at the forces that have shaped the planning and design of cities and information technologies from the rise of the great industrial cities of the nineteenth century to the present. This course considers the motivations, aspirations, and shortcomings of them all while offering a new civics to guide our efforts as we build the future together, one click at a time.

### Course Objectives

- To identify urban problems
- To study Effective and feasible ways to coordinate urban technologies.
- To study models and methods for effective implementation of Smart Cities.
- To study new technologies for Communication and Dissemination.
- To study new forms of Urban Governance and Organization.

### Course Outcomes

On completion of the course, learner will be able to–

- CO1 Understand** the dynamic behavior of the urban system by going beyond the physical appearance and by focusing on representations, properties and impact factors
- CO2 Explore** the city as the most complex human-made organism with a metabolism that can be modeled in terms of stocks and flows
- CO3 Knowledge** about data-informed approaches for the development of the future city, based on crowd sourcing and sensing
- CO4 Knowledge** about the latest research results in for the development and management of future cities and **Understand** how citizens can benefit from data-informed design to develop smart and responsive cities

### Course Contents

Urbanization and Ubiquity - The slow emergence of learning cities in an urbanizing world. Cities as collective learners, what do we know?- Framing a view -A gamut of learning types - Secrets of knowing and accelerating change - Why some cities learn and others do not.

### Activities:

1. Conducting training/workshops/debates on rural and urban cities.
2. Public shows on education and empowerment.
3. Conducting campaigns on adult/disabled education.
4. To support the government to develop policy that encourages youth participation in decision-making through government agencies.

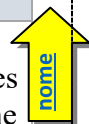
### References:

1. Anthony M. Townsend, W. W. Norton and Company "Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia", ISBN: 0393082873, 9780393082876.
2. Tim Campbell, Routledge, "Beyond Smart Cities: How Cities Network, Learn and Innovate", Routledge, ISBN: 9781849714266.
3. StanGeertman, JosephFerreira, Jr.RobertGoodspeed, JohnStillwell, "Planning Support Systems and Smart Cities", Lecture notes in Geo information and Cartography, Springer.

### @The CO-PO Mapping Matrix

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	-	2	2	-	-	2	2	1	-	-	-	-
<b>CO2</b>	1	2	1	-	-	1	1	-	-	-	-	-
<b>CO3</b>	2	1	3	3	2	-	1	-	1	1	1	-
<b>CO4</b>	-	3	2	-	-	-	-	-	-	-	1	2

## NCAC01-D: Foreign Language- Japanese (Module 1)



### About course:

With changing times, the competitiveness has gotten into the nerves and “Being the Best” at all times is only the proof of it. Nonetheless, ‘being the best’ differs significantly from ‘Communicating the best’! The best can merely be communicated whilst using the best... suited Language!!

Japanese is the new trend of 21st century. Not only youngsters but even the professionals seek value in it. It is the engineer’s companion in current times with an assertion of a thriving future. Pune has indisputably grown to become a major center of Japanese Education in India while increasing the precedence for Japanese connoisseurs.

Japanese certainly serves a great platform to unlock a notoriously tough market and find a booming career. While the companies prefer candidates having the knowledge of the language, it can additionally help connect better with the native people thus prospering in their professional journey.

Learning Japanese gives an extra edge to the ‘resume’ since the recruiters consciously make note of the fact it requires real perseverance and self-discipline to tackle one of the most complex languages.

It would be easy for all time to quit the impossible; however it takes immense courage to reiterate the desired outcomes, recognize that improvement is an ongoing process and ultimately soldier on it.

The need of an hour is to introduce Japanese language with utmost professionalism to create awareness about the bright prospects and to enhance the proficiency and commitment. It will then prove to be the ultimate path to the quest for professional excellence!

### Course Objectives:

- To meet the needs of ever growing industry with respect to language support.
- To get introduced to Japanese society and culture through language.

### Course Outcomes:

On completion of the course learner will able to-

**CO1 Upgrade** the ability of basic communication.

**CO2 Apply** the knowledge of Japanese script.

**CO3 Enhance** reading, writing and listening skills

**CO4 Develop** interest to pursue professional Japanese Language course.

### Course Contents

1. Introduction to Japanese Language. Hiragana basic Script, colors, Days of the week
2. Hiragana : modified Kana, double consonant, Letters combined with ya, yu, yo Long vowels, Greetings and expressions
3. Self Introduction, Introducing other person, Numbers, Months, Dates, Telephone numbers, Stating on’sage.

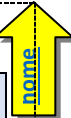
### Reference:

1. Minna No Nihongo, “Japanese for Everyone”, Elementary Main Text book 1-1 (Indian Edition), Goyal Publishers and Distributors Pvt.Ltd.
2. <http://www.tcs.com> ([http://www.tcs.com/news\\_events/press\\_releases/Pages/TCS-Inaugurates-Japan-centric-Delivery-Center-Pune.aspx](http://www.tcs.com/news_events/press_releases/Pages/TCS-Inaugurates-Japan-centric-Delivery-Center-Pune.aspx))

### @The CO-PO Mapping Matrix

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	-	-	-	-	-	-	-	-	1	3	1	1
<b>CO2</b>	-	-	-	-	1	-	-	-	-	3	1	1
<b>CO3</b>	-	-	-	-	1	-	-	-	-	3	2	2
<b>CO4</b>	-	-	-	-	-	-	-	-	-	1	-	-





<b>Matoshri College of Engineering &amp; Research Centre, Nashik</b> <b>First Year Bachelor of Technology</b>		
<b>24U0111: Engineering Mathematics II</b>		
Teaching Scheme	Credit	Examination Head: TH
		Examination Scheme & Marks
<b>TH: 03 Hours/Week</b> <b>TUT: 01 Hour/Week</b>	<b>04</b>	<b>ISE:</b> <b>CAT_1: 20 Marks</b> <b>CAT_2: 20 Marks</b> <b>ESE: 60 Marks</b>
<b>Prerequisite:</b> Differentiation, integration, mean, mode, median, frequency distribution, understanding the use of numbers logically and systematically.		
<b>Companion Course, if any:</b>		
<b>Course Objectives:</b> To learn <ul style="list-style-type: none"> <li>● Advanced techniques of integration, gamma and beta function, reduction formulae.</li> <li>● Differential equations, Exact and non-exact differential equations, Linear and reducible differential equations and applications of differential equations.</li> <li>● Finite differences, Interpolation, Numerical methods for ordinary differential equations.</li> <li>● Algebraic and transcendental equations system of linear equations by numerical methods.</li> <li>● Basic probability concept, theorem of total probability, Bayes' theorem, probability, binomial, Poisson, normal distributions, sampling distributions.</li> </ul>		
<b>Course Outcomes:</b>		<b>BL</b>
On completion of the course, learner will be able to–		
<b>CO1 Discuss and Apply</b> advanced integration techniques such as Reduction formulae, Beta functions, Gamma functions, Differentiation under integral sign and Error function.		<b>2,3</b>
<b>CO2 Solve</b> first order ordinary differential equations and model the physical systems by using ordinary differential equations.		<b>3</b>
<b>CO3 Illustrate</b> the concept of interpolation, numerical differentiation and numerical integration and, find numerical solution of ordinary differential equations.		<b>3</b>
<b>CO4 Understand and solve</b> algebraic and transcendental equations and system of linear equations using numerical techniques.		<b>3</b>
<b>CO5 Understand</b> basic probability concepts, including sample spaces, events, probability axioms.		<b>2,3</b>
<b>CO6 Apply</b> advanced integration techniques, solve first-order ordinary differential equations, illustrate numerical methods for interpolation and integration, examine algebraic and transcendental equations using numerical techniques, and explain fundamental probability concepts and rules.		<b>3</b>
<b>Course Contents</b>		
Unit Number	Unit Title	Hrs
<b>I</b>	<b>Integral Calculus: Improper Integrals and Special Functions</b>	<b>10</b>
Reduction Formulae, Euler's integral of second kind, Beta function, Differentiation Under Integral Sign(Leibnitz's rule), Error function, Relation between Error function and probability integral.		
<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>● Applications to Engineering Problems</li> </ul>	
<b>II</b>	<b>Ordinary Differential Equations</b>	<b>10</b>

Basics of differential Equations, Exact differential equation, Reduction to exact form by integrating factor, Linear differential equations and reducible to linear differential equations.

Applications of differential equations to engineering problems: Mathematical modeling, solving and interpretation of orthogonal trajectories, Newton's law of cooling, electrical circuits, one dimensional heat conduction.

<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>Applications to Engineering Problems</li> </ul>
<b>III</b>	<b>Numerical Methods I</b>

Finite Difference operators, Interpolation and extrapolation, Newton-Gregory forward and backward difference formula, Lagrange's interpolation formula.

Numerical solution of ordinary differential equations, Modified Euler's method, 4<sup>th</sup> order Runge-Kutta method, Error and stability, Predictor-Corrector method (Adam's and Milne's methods).

<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>Applications to Engineering Problems</li> </ul>
<b>IV</b>	<b>Numerical Methods II</b>

Numerical solution of algebraic and transcendental equations: Bisection, Secant, Regula-Falsi, Newton-Raphson and Successive Approximation Methods, Convergence and stability.

Numerical solution of System of Linear Equations: Gauss Elimination, LU Decomposition, Cholesky, Jacobi and Gauss-Seidel Methods.

<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>Applications to Engineering Problems</li> </ul>
<b>V</b>	<b>Probability and Probability Distribution</b>

Introduction to probability, Theorems of probabilities, Conditional probability, Baye's theorem, Random variables.

Probability distribution: Discrete and continuous probability distribution, Binomial distribution, Poisson distribution, Normal distribution.

Test of hypothesis: Chi-square distribution.

<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>Applications to Engineering Problems</li> </ul>
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#### e-Books:

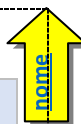
- <https://www.cis.upenn.edu/~jean/discmath-root-b.pdf>
- <https://www.cs.yale.edu/homes/aspnes/classes/202/notes.pdf>
- <http://discrete.openmathbooks.org/pdfs/dmoi-tablet.pdf>

#### MOOC Courses:

- <https://www.my-mooc.com/en/categorie/statistics-and-probability>
- <https://www.my-mooc.com/en/categorie/statistics-and-probability>
- <https://www.my-mooc.com/en/mooc/introduction-differential-equations-mitx-18-031x>

#### CO-PO Correlation Matrix

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	-	-	-	-	-	-	-	-	1
CO2	2	2	-	-	-	-	-	-	-	-	-	1
CO3	2	2	-	-	-	-	-	-	-	-	-	1
CO4	2	2	-	-	-	-	-	-	-	-	-	1
CO5	2	2	-	-	-	-	-	-	-	-	-	1
CO6	2	2	-	-	-	-	-	-	-	-	-	1



Matoshri College of Engineering & Research Centre, Nashik First Year Bachelor of Technology		
24U0112: Applied Chemistry		
Teaching Scheme	Credit	Examination Head: TH
		Examination Scheme & Marks
TH: 03 Hours/Week	03	<b>ISE:</b> <b>CAT_1: 20 Marks</b> <b>CAT_2: 20 Marks</b> <b>ESE: 60 Marks</b>
<b>Prerequisite:</b> Types of Titrations, structure property relationship, periodic table, classification & properties of polymers, electromagnetic radiation, electrochemical series.		
<b>Companion Course, if any:</b> 24U115: Applied Chemistry Lab		
<b>Course Objectives:</b>		
<ul style="list-style-type: none"> <li>To understand technology involved in analysis and improving the quality of water as a commodity.</li> <li>To study conventional and alternative fuels with respect to their properties and applications.</li> <li>To understand structure, properties and applications of specialty polymers and nano-material.</li> <li>To understand corrosion mechanisms and preventive methods for corrosion control.</li> <li>To acquire the knowledge of electro-analytical techniques that facilitates rapid and precise understanding of materials.</li> </ul>		
<b>Course Outcomes:</b>		<b>BL</b>
On completion of the course, learner will be able to–		
<b>CO1</b>	<b>Apply</b> the different methodologies for analysis of water and techniques involved in softening of water as a commodity.	1,2,3
<b>CO2</b>	<b>Analyze</b> fuel and suggest use of alternative fuels.	1,2,3,4
<b>CO3</b>	<b>Select</b> appropriate engineering materials for various engineering applications	1,2,3
<b>CO4</b>	<b>Explain</b> causes of corrosion and methods for minimizing corrosion.	1,2,3
<b>CO5</b>	<b>Select</b> appropriate electro-technique and method of material analysis.	1,2,3
<b>CO6</b>	<b>Apply</b> methodologies for water analysis and softening, analyze and suggest alternative fuels, select suitable engineering materials, explain corrosion causes and mitigation methods, and <b>choose</b> appropriate electro-techniques for material analysis.	4
<b>Course Contents</b>		
Unit Number	Unit Title	Hours
<b>I</b>	<b>Water Technology</b>	<b>09</b>
Introduction, Sources, impurities in water, Hardness of water: Formation of hard water, Types of hardness, degree of hardness, Units of hardness and Numerical, Determination of hardness of water complexometric titration method using EDTA and its numerical, Alkalinity of water: Types of alkalinity, estimation of alkalinity and its numerical. Potable Water : Disinfection-Chlorination Desalination of brackish water :Reverse osmosis, Electrodialysis Boiler feed water : Boiler Troubles/Problems - priming and foaming, scale and sludge, its causes ,effects and methods of prevention Techniques of water softening : External Treatment- Zeolite method and numerical Internal treatment-Calgon, carbonate, colloidal and Phosphate conditioning		
<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>Analysis of different water samples</li> </ul>	

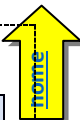
<b>II</b>	<b>Fuels and Combustion</b>	<b>09</b>
<p>Introduction, definition, classification of fuel based on physical state, and based on occurrence ,characteristics of an good fuel,            Calorific value (CV): units, Gross calorific value and Net calorific value            Determination of calorific value: Experimental determination -Principle, construction and working of Bomb calorimeter            Solid fuel: Coal-Analysis of Coal-Proximate analysis and its numerical            Liquid fuel: Petroleum - Composition, Refining of crude oil, fractional distillation.            Gaseous fuel: Composition, properties and applications of CNG, Hydrogen gas as a future fuel            Combustion: Concept ,Chemical reaction, calculation for air required, numerical            Biofuel : Biodiesel- production and advantages,            Power Alcohol :Production, advantages and disadvantages</p>		
<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>• Comparison of calorific value of solid, liquid and gaseous fuel</li> </ul>	
<b>III</b>	<b>Engineering Materials</b>	<b>09</b>
<p>A) Speciality polymers: Introduction, preparation, properties and applications of the following polymers            1.Plastics : Polycarbonate            2.Biodegradable polymers: Poly (hydroxybutyrate- hydroxyvalerate)            3.Conducting Polymer: Polyacetylene            4.Electroluminescent polymer: PolyphenyleneVinylene            5.Polymer composites: Fiber reinforced plastic (FRP)- Glass reinforced and Carbon reinforced polymer composite            B) Nanomaterials: Introduction, structure, properties and applications of graphene, carbonnanotubes, quantum dot.</p>		
<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>• Explore the application of engineering material in your branch</li> </ul>	
<b>IV</b>	<b>Corrosion &amp; its preventions</b>	<b>09</b>
<p>Types of corrosion – Dry and wet corrosion, mechanism of dry corrosion, nature of oxide films, wet corrosion: mechanism-hydrogen evolution and oxygen absorption, Factors influencing rate of corrosion.            Corrosion control methods : i) Using inhibitors, ii) Cathodic protection- sacrificial anode and impressed current methods iii) Protective coatings-metal coatings- galvanizing and tinning, electroplating ,powder coating.</p>		
<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>• Observe the corrosion of iron in different medium(Acid, Base, Neutral)</li> </ul>	
<b>V</b>	<b>Instrumental methods of Analysis And Battery Technology</b>	<b>09</b>
<p>Reference Electrodes: Calomel Electrode-Construction, chemical reaction and representation            Glass Electrode: Construction, glass electrode potential, advantages and limitations, determination pH using glass electrode.            Conductometry: Introduction, conductivity cell, conductometric titrations of strong acid versus strong base with titration curve, application            UV-visible Spectroscopy: Introduction, statement of Beer's law and Lambert's law, electronic transitions in organic molecule, terms involved in UV-visible Spectroscopy -chromophore, auxochrome, bathochromic shift, hypsochromic shift, hyperchromic shift and hypochromic shift,Instrumentation (double beam) and its applications.            Batteries : Discharging and charging of a battery, characteristics of battery, nickel metal hydride battery, lithium batteries            Fuel Cells: Hydrogen oxygen fuel cell</p>		



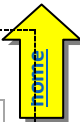
<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>Analysis of pH of various acids and bases present in households.</li> </ul>
<b>Learning Resources</b>	
<b>Text Books:</b>	
<ol style="list-style-type: none"> <li>Engineering Chemistry by O .G. Palanna, Tata Magraw Hill Education Pvt. Ltd.</li> <li>Textbook of Engineering Chemistry by Dr. S. S. Dara, Dr. S. S. Umare, S. Chand &amp; Company Ltd.</li> <li>Textbook of Engineering Chemistry by Dr. Sunita Rattan, S. K. Kataria&amp; Sons Publisher</li> </ol>	
<b>Reference Books:</b>	
<ol style="list-style-type: none"> <li>Engineering Chemistry, Dr,Subha Ramesh et al.,Wiley India Pvt. Ltd.</li> <li>Inorganic Chemistry, 5 ed by Shriver and Atkins, Oxford University Press</li> <li>Basic Concept of Analytical Chemistry, 2ed , S. M. Khopkar, New Age-International Publisher</li> <li>Instrumental Methods of Chemical Analysis, G. R. Chatwal&amp; S. K. Anand, Himalaya Publishing House</li> <li>Spectroscopy of organic compounds, 2 ed, P. S. Kalsi, New Age-International Ltd., Publisher</li> <li>Polymer Science, V. R. Gowarikar, N. V. Viswanathan, jayadevSreedhar, Wiley Eastern</li> <li>Engineering Chemistry, B. Sivasankar, Tata Mcgraw-Hill Education Publishing company Limited</li> <li>Fundamentals of Nanotechnology, G. L. Hornyak, J. J. Moone, H. F. Tihhale, J. Dutta, CRC press.</li> </ol>	
<b>e-Books:</b>	
<ul style="list-style-type: none"> <li><a href="https://chem.nju.edu.cn/_upload/article/files/b5/6f/01f0f2434d708df797208aea2613/83f2b441-65ee-44a6-ac47-ed21db462c5d.pdf">https://chem.nju.edu.cn/_upload/article/files/b5/6f/01f0f2434d708df797208aea2613/83f2b441-65ee-44a6-ac47-ed21db462c5d.pdf</a>.</li> <li><a href="https://edisciplinas.usp.br/pluginfile.php/5955761/mod_resource/content/1/CORROSION_ANDCORROSION_CONTROL_An_Intro%20%20Revie%20and%20Uhlig.pdf">https://edisciplinas.usp.br/pluginfile.php/5955761/mod_resource/content/1/CORROSION ANDCORROSION CONTROL An Intro%20%20Revie%20and%20Uhlig.pdf</a></li> </ul>	
<b>MOOC Courses:</b>	
<ul style="list-style-type: none"> <li><a href="https://archive.nptel.ac.in/courses/105/106/105106119/">https://archive.nptel.ac.in/courses/105/106/105106119/</a></li> <li><a href="https://archive.nptel.ac.in/courses/103/105/103105110/">https://archive.nptel.ac.in/courses/103/105/103105110/</a></li> <li><a href="https://nptel.ac.in/courses/113104082">https://nptel.ac.in/courses/113104082</a></li> <li><a href="https://nptel.ac.in/courses/103108124">https://nptel.ac.in/courses/103108124</a></li> <li><a href="https://archive.nptel.ac.in/courses/122/101/122101001/">https://archive.nptel.ac.in/courses/122/101/122101001/</a></li> <li><a href="https://archive.nptel.ac.in/courses/104/106/104106137/">https://archive.nptel.ac.in/courses/104/106/104106137/</a></li> <li><a href="https://archive.nptel.ac.in/courses/113/105/113105102/">https://archive.nptel.ac.in/courses/113/105/113105102/</a></li> </ul>	

### CO-PO Correlation Matrix

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	-	-	-	1	-	1	1	-	1
CO2	2	2	-	-	-	-	1	-	1	1	-	1
CO3	2	2	-	-	-	-	1	-	1	1	-	1
CO4	2	2	-	-	-	-	1	-	1	1	-	1
CO5	2	2	-	-	-	-	1	-	1	1	-	1
CO6	2	2	-	-	-	-	1	-	1	1	-	1



Matoshri College of Engineering & Research Centre, Nashik		
First Year Bachelor of Technology		
24U0113: Internet of Things		
Teaching Scheme	Credit	Examination Head: TH
		Examination Scheme & Marks
TH: 03 Hours/Week	03	ISE: CAT_1: 20 Marks CAT_2: 20 Marks ESE: 60 Marks
<b>Prerequisite:</b> Students are expected to have Basic knowledge of computer and internet		
<b>Companion Course, if any:</b> 24U116: Internet of Things (IoT) Laboratory		
<b>Course Objectives:</b>		
<ul style="list-style-type: none"> <li>To familiarize students with the components and architecture of IoT systems.</li> <li>To explore various communication protocols used in IoT.</li> <li>To understand the role of sensors and actuators in IoT applications.</li> <li>To analyze data processing techniques for IoT environments.</li> <li>To demonstrate the applications of IoT in different domains such as healthcare, smart cities, agriculture, and industrial automation.</li> </ul>		
<b>Course Outcomes:</b>		<b>BL</b>
On completion of the course, learner will be able to–		
<b>CO1</b>	<b>Explain</b> the concept of the Internet of Things (IoT) and its significance in modern technology.	2
<b>CO2</b>	<b>Identify and describe</b> the components and architecture of IoT systems.	1,2
<b>CO3</b>	<b>Design and implement</b> basic IoT solutions using sensors and actuators.	3
<b>CO4</b>	<b>Apply</b> data processing techniques to handle data generated by IoT devices.	3
<b>CO5</b>	<b>Utilize</b> IoT development tools and platforms to prototype and deploy IoT solutions.	3
<b>CO6</b>	<b>Understand</b> the significance and components of the Internet of Things (IoT), design and implement basic IoT solutions using sensors and actuators, apply data processing techniques for IoT data, and utilize development tools and platforms for prototyping and deploying IoT solutions	4
Course Contents		
Unit Number	Unit Title	Hours
<b>I</b>	<b>Introduction to IoT</b>	<b>09</b>
Introduction, History of IoT, Definition & Characteristics of IoT, Key components of IOT System Things/Device, Gateway, Cloud/Server, Analytics, User Interface, , IoT Architecture, IOT applications, IOT challenges		
<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>Explore various automatic appliance control systems</li> </ul>	
<b>II</b>	<b>Sensors and Actuators</b>	<b>09</b>
Introduction, Selection Criteria for Sensors, Working and applications of sensors-IR sensor, LDR sensor, PIR motion sensor, Ultrasonic Distance Sensor, Gyro sensors, Digital Humidity and Temperature sensor, Analog to Digital Conversion, Sensor data acquisition and processing, Working and application of actuators, Servo Motors, Solenoid, Stepper Motor, DC motor, Need of Relay with actuators		
<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>Understanding and Mitigating Security Risks of General Messaging Protocols on IoT Clouds</li> </ul>	
<b>III</b>	<b>Machine-to-Machine communications</b>	<b>09</b>



Machine-to-Machine Communications, Difference Between IoT and M2M, Interoperability in IoT, Introduction to Arduino Programming, Integration of Sensors and Actuators with Arduino

**Exemplars/ Case Studies**

- smart home, wearable devices

**IV**

**Communication Protocols for IoT**

**09**

Messaging Protocols- MQTT (Message Queuing Telemetry Transport), COAP (Constrained Application Protocol), HTTP (Hypertext Transfer Protocol), Comparison and selection criteria for protocols, Transport Protocols- Bluetooth Low Energy (BLE), Li-Fi, Difference between Li-Fi and Wi-Fi

**Exemplars/ Case Studies**

- Smart Transportation
- Smart Healthcare

**V**

**Applications of IoT**

**09**

Smart Home, IoT in Agriculture, IoT in Healthcare, Wearable Devices, IoT in Environmental Monitoring, IoT in Transportation and Logistics, IoT in smart grid systems, Smart Cities

**Exemplars/ Case Studies**

- Industrial IoT

### Learning Resources

#### Text Books:

1. Getting Started with the Internet of Things: Connecting Sensors and Microcontrollers to Cloud, Cuno Pfister, O'Reilly (Shroff), ISBN-10: 9350234130, 2021
2. Fundamentals of Internet of Things, Sudhir Kumar, CRC Press, 1<sup>st</sup> Edition, ISBN-10: 1032126442, 2021

#### Reference Books:

1. Internet of Things: A Hands-On Approach, Arshdeep Bahga, Vijay Madisetti, ISBN-10: 0996025529, Vijay Madisetti, 2014.

#### e-Books:

- <https://content.e-bookshelf.de/media/reading/L-11641173-164dcdc345.pdf>
- <https://www.amazon.in/Internet-Things-Systems-Architectures-Methodologies/dp/3319697145>
- <https://www.amazon.com/Internet-Things-Do-Yourself-BeagleBone/dp/0071835202>
- [https://books.google.co.in/books?id=WqmSDgAAQBAJ&printsec=frontcover&redir\\_esc=y#v=onepage&q&f=false](https://books.google.co.in/books?id=WqmSDgAAQBAJ&printsec=frontcover&redir_esc=y#v=onepage&q&f=false)

#### MOOC Courses:

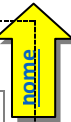
- [https://onlinecourses.swayam2.ac.in/ntr24\\_ed01/preview](https://onlinecourses.swayam2.ac.in/ntr24_ed01/preview)
- [Introduction To Internet Of Things - Course \(nptel.ac.in\)](https://www.nptel.ac.in/courses/106101001)
- [https://onlinecourses.nptel.ac.in/noc24\\_cs34/preview](https://onlinecourses.nptel.ac.in/noc24_cs34/preview)

### CO-PO Correlation Matrix

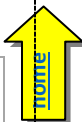
CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	-	2	-	-	-	-	-	-	2
CO2	-	2	2	-	2	-	-	-	-	-	-	2
CO3	-	2	2	-	2	-	-	-	-	-	-	2
CO4	-	2	2	-	2	-	-	-	-	-	-	2
CO5	-	2	2	-	2	-	-	-	-	-	-	2
CO6	2	2	2	-	2	-	-	-	-	-	-	2

Matoshri College of Engineering & Research Centre, Nashik		
First Year Bachelor of Technology		
24U0114: Engineering Mechanics		
Teaching Scheme	Credit	Examination Head: TH
		Examination Scheme & Marks
TH: 03 Hours/Week	03	<b>ISE:</b> <b>CAT_1: 20 Marks</b> <b>CAT_2: 20 Marks</b> <b>ESE: 60 Marks</b>
<b>Prerequisite:</b> Students are expected to have a good understanding of basic engineering, 12th physics and mathematics		
<b>Companion Course, if any: Engineering Mechanics (ME24U114)</b>		
<b>Course Objectives:</b> Engineering mechanics applies the principle of mechanics to analyze, taking into account the effects of forces. Statics deal with the condition of equilibrium of bodies acted upon by forces. Dynamics deals with the motion of object. <ul style="list-style-type: none"> <li>To impart knowledge about force systems and methods to determine resultant of force system</li> <li>To impart knowledge to determine reaction of beams and calculate friction</li> <li>To impart knowledge of centroid, moment of inertia and teach space force system</li> <li>To train students to solve problems related to particle mechanics using principle of kinematics, kinetics and work power energy.</li> </ul>		
<b>Course Outcomes:</b> On completion of the course, learner will be able to–		BL
<b>CO1 Understand</b> and Determine resultant of various force systems.		2,3
<b>CO2 Understand</b> reactions of beams and, <b>solve</b> problems related to friction using principles of equilibrium.		1,3
<b>CO3 Determine</b> centroid, moment of inertia and <b>apply</b> principles of equilibrium to forces in space.		1,2,3
<b>CO4 Illustrate and apply</b> the concept of position, velocity and acceleration of particle using principles of kinematics.		2,3
<b>CO5 Illustrate and apply</b> the concept of position, velocity and acceleration of particles using principles of kinetics and work, power, energy.		2,3
<b>CO6 Determine</b> and analyze force systems, reactions of beams, and friction problems using equilibrium principles; calculate centroids, moments of inertia, and forces in space; and illustrate kinematic and kinetic concepts, including position, velocity, acceleration, work, power, and energy.		4
Course Contents		
Unit Number	Unit Title	Hours
I	Fundamentals of Engineering Mechanics	09
<ul style="list-style-type: none"> <li><b>Introduction : Definitions of Mechanics, Statics, Dynamics, Rigid Bodies</b></li> <li><b>System of Force:</b> Definition, Classification of force system according to plane &amp; line of action.</li> <li><b>Principle of statics:</b> Law of Parallelogram of forces, Resolution of a Force. Definition, Method of Resolution, Law of transmissibility.</li> <li><b>Composition of Forces:</b> Definition, Resolution of a Force, Method of composition of forces, such as Analytical Method ,Resultant of concurrent, non-concurrent &amp; parallel force system</li> <li><b>Moment of Force:</b> Definition, Geometrical meaning of moment of a force, measurement of moment of a force &amp; its S.I units. Law of moments, Varignon's Theorem of a coplanar, non-concurrent force system, resultant of parallel force system, Couple, Resultant of parallel general force system.</li> </ul>		





<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>To provide practical models of how the principles of mechanics of forces are applied in engineering practice, helping first-year students grasp the importance and real-world implications of the concepts they're learning.</li> </ul>	
<b>II</b>	<b>Equilibrium</b>	<b>09</b>
	<ul style="list-style-type: none"> <li><b>Introduction:</b> Definition, condition of equilibrium, Analytical conditions of equilibrium for concurrent, non-concurrent &amp; Free Body Diagram</li> <li><b>Beam:</b> Type of supports, Type of loading, Types of beams, and determination of reaction for simply supported, overhanging beams and fixed beams.</li> <li><b>Friction:</b> Definition of friction, Frictional forces, Limiting frictional force, Coefficient of Friction. Angle of Friction &amp; Repose, Laws of Friction, Advantages &amp; Disadvantages of Friction. Equilibrium of bodies on level plane – Force applied on horizontal &amp; inclined plane (up &amp; down), Ladder Belt friction- Analysis of flat belt</li> </ul>	
<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>To solve numerical on inclined beam.</li> </ul>	
<b>III</b>	<b>Moment of Inertia and Space Forces</b>	<b>09</b>
	<ul style="list-style-type: none"> <li><b>Centroid:</b> Definition, Moment of an area about an axis, centroid of geometrical figures such as squares, rectangles, triangles, circles, semicircles &amp; quarter circles, centroid of composite figures.</li> <li><b>Moment of Inertia:</b> Definition, Parallel axis &amp; Perpendicular axis Theorems. M.I. of plane lamina &amp; different engineering sections</li> <li><b>Forces in space:</b> Resultant of concurrent and parallel forces in a space, Equilibrium of concurrent and, parallel forces in a space</li> </ul>	
<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>To calculate Moment of Inertia of composite section (top flange steel material and web wooden material.)</li> </ul>	
<b>IV</b>	<b>Kinematics of Particle</b>	<b>09</b>
	<ul style="list-style-type: none"> <li><b>Linear motion:</b> Basic concepts, Equation of motion for straight line, Equation of motion for final velocity, constant acceleration Motion under gravity, Variable acceleration</li> <li><b>Kinematics of curvilinear motion:</b> Basic Concepts Equation of motion in Cartesian coordinates,</li> <li><b>Motion of projectile:</b> Introduction, velocity of projection, Angle of projection, Time of flight, Horizontal range, Equation of path for projectile, Maximum height attained by projectile, Time to reach the highest point</li> </ul>	
<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>To demonstrate Projectile motion of baseball</li> </ul>	
<b>V</b>	<b>Kinetics of Particle</b>	<b>09</b>
	<ul style="list-style-type: none"> <li>Newton's Laws of Motion, Motion of Particles acted upon by a constant force, Equations of motion, De Alembert's Principle.</li> <li>Work, Power, Energy &amp; its Engineering Applications, Kinetic &amp; Potential energy &amp; its application.</li> <li>Momentum &amp; impulse, conservation of energy &amp; linear momentum, collision of elastic bodies, and Coefficient of Restitution</li> </ul>	
<b>Exemplars/ Case Studies</b>	<ul style="list-style-type: none"> <li>To demonstrate kinetics of particle in a spring mass system</li> </ul>	
<b>Learning Resources</b>		
<b>Text Books:</b>		
<ol style="list-style-type: none"> <li>Vector Mechanics for Engineers, by F. P. Beer and E. R. Johnson, McGraw-Hill Publication.</li> <li>Engineering mechanic, by PB Rammanutham, DHANPAT RAI PUBLISHING COMPANY</li> <li>Engineering Mechanics by R. C. Hibbeler, Pearson Education</li> </ol>		

**Reference Books:**

1. Engineering Mechanics by S. P. Timoshenko and D. H. Young, McGraw- Hill publication
2. Engineering Mechanics by J. L. Meriam and Craige, John Willey
3. Engineering Mechanics by F L Singer, Harper and Rowe publication
4. Engineering Mechanics by A. P. Boresi and R. J. Schmidt, Brooks/Cole Publication

**e-Books:**

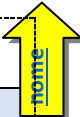
- [https://www.academia.edu/65512601/Engineering\\_Mechanics\\_by\\_R\\_K\\_BANSAL](https://www.academia.edu/65512601/Engineering_Mechanics_by_R_K_BANSAL)
- [://www.academia.edu/37205283/Engineering\\_Mechanics\\_by\\_Timoshenko\\_140715045011\\_Phttpshpapp01](://www.academia.edu/37205283/Engineering_Mechanics_by_Timoshenko_140715045011_Phttpshpapp01)
- <https://elearning.sist.ac.ke/ebooks/ebooks/a-textbook-of-engineering-mechanics-by-r-s-khurmi/>
- <https://automaterials.files.wordpress.com/2019/01/engineering-mechanics-statics-and-dynamics-shames.pdf>
- <https://oxvard.files.wordpress.com/2018/05/engineering-mechanics-dynamics-7th-edition-j-l-meriam-l-g-kraige.pdf>
- <https://sctevtodisha.nic.in/wp-content/uploads/2021/03/Engineering-Mechanics-1st-yr-LM.pdf>

**MOOC Courses:**

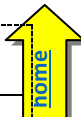
- <https://edurev.in/test/5555/Engineering-Mechanics>
- <https://www.prep.youth4work.com/general-online-test/online-engineering-mechanics-test-test/free-online-engineering-mechanics-test-test>
- <https://edurev.in/test/11212/Engineering-Mechanics-2>
- <https://testbook.com/super-coaching/engineering-mechanics-for-mechanical-complete-syllabus-by-online-engineering-course>

**CO-PO Correlation Matrix**

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	-	-	-	-	-	-	1	-	1
CO2	2	2	-	-	-	-	-	-	-	1	-	1
CO3	2	2	-	-	-	-	-	-	-	1	-	1
CO4	2	2	-	-	-	-	-	-	-	1	-	1
CO5	2	2	-	-	-	-	-	-	-	1	-	1
CO6	2	2	-	-	-	-	-	-	-	1	-	1



Matoshri College of Engineering & Research Centre, Nashik		
First Year Bachelor of Technology		
24U0115: Applied Chemistry Lab		
Teaching Scheme	Credit	Examination Head: PR
		Examination Scheme & Marks
PR: 02 Hours/Week	01	<b>ISE:</b> CAT_1: 20 Marks CAT_2: 20 Marks <b>ESE:</b> 60 Marks
<b>Prerequisite:</b> Types of Titrations, structure property relationship, periodic table, classification & properties of polymers, pH and conductance of solution		
<b>Companion Course, if any: 24U0112: Applied Chemistry</b>		
<b>Course Objectives:</b> Objectives include- <ul style="list-style-type: none"> <li>To get hands-on experience on the principles discussed in theory sessions and to understand the applications of chemistry in engineering.</li> <li>To provide an experimental foundation for the theoretical concepts introduced in the lectures.</li> <li>To help students to understand the role of direct observation in chemistry and to distinguish between inferences based on theory and the outcomes of experiments.</li> <li>To introduce practical applications of chemistry concepts to engineering problems.</li> <li>To teach how to write a technical report and communicates scientific information in a clear and concise manner</li> <li>To provide experiential learning through industrial visit and application Demonstration</li> </ul>		
<b>Course Outcomes:</b>		<b>BL</b>
On completion of the course, learner will be able to–		
<b>CO1</b>	<b>Determine</b> the parameters like hardness and alkalinity of water.	<b>1,2,3</b>
<b>CO2</b>	<b>Prepare</b> biodiesel to measure its density, <b>Estimate</b> the % values of moisture, volatile matter, ash and carbon of fuel by Proximate analysis	<b>1,2,3</b>
<b>CO3</b>	<b>Prepare</b> polymer materials widely used in industry and determine its viscosity.	<b>1,2,3</b>
<b>CO4</b>	<b>Demonstrate</b> a few instrumental methods of chemical analysis	<b>1,2,3</b>
<b>CO5</b>	<b>Document</b> their experimentation effectively, providing clear explanations and comments to facilitate understanding and maintainability in theoretical and experimental knowledge, Commitment to ethics, punctuality and time management skills for record submissions.	<b>1,2,3</b>
<b>CO6</b>	<b>Apply</b> theoretical knowledge to real-world scenarios by engaging in experiential learning activities such as high-end equipment demonstrations, participating in industry visits, and organizing or participating in technical events so as to imbibe <b>problem-solving skills</b> , foster <b>innovation</b> , and <b>build</b> professional competencies necessary for successful careers in engineering.	<b>2,3</b>
<b>Suggested List of Lab Experiments/Assignments</b> (Any 8 lab assignments)		
Sr. No	List of Lab Experiments	CO Mapping
1	Estimation of total temporary and permanent hardness present in a given water sample.	CO1, CO5

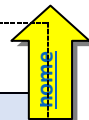


2	Estimation of type and amount of alkalinities present in water sample	CO1, CO5
3	Proximate analysis of coal samples and Comment on its quality	CO2, CO5
4	Preparation of biodiesel from oil.	CO2, CO5
5	Determination of density of liquid fuel.	CO2, CO5
6	Preparation of polystyrene/phenol-formaldehyde/urea-formaldehyde resin	CO3, CO5
7	Colloidal synthesis of 2-6 or 3-5 semiconductor quantum dot nanoparticles.	CO3, CO5
8	To determine molecular weight/radius of macromolecule polystyrene/ polyvinyl alcohol by viscosity measurement.	CO3, CO5
9	To coat copper and zinc on iron plate using electroplating	CO4, CO5
10	To determine strength of strong acid using pH meter	CO4, CO5
11	Titration of a mixture of weak acid and strong acid with strong base using digital conductivity meter.	CO4, CO5
12	To determine maximum wavelength of absorption of $\text{CuSO}_4/\text{FeSO}_4/\text{KMnO}_4$ and find unknown concentration of the given solution	CO4, CO5
13	Industrial Visit at Thermal Power Station	CO5
14	Application demonstration of determination of calorific value of solid fuel using Bomb calorimeter.	CO2, CO6

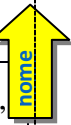
### Course Contents

### CO-PO Correlation Matrix

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	-	-	-	1	-	1	1	-	1
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CO3	2	2	-	-	-	-	-	-	1	1	-	1
CO4	2	2	-	-	-	-	-	-	1	1	-	1
CO5	-	-	-	-	-	-	-	2	2	2	1	2
CO6	1	-	-	-	-	1	1	1	1	1	-	1



Matoshri College of Engineering & Research Centre, Nashik		
First Year Bachelor of Technology		
24U0116: Internet of Things Lab		
Teaching Scheme	Credit	Examination Head: TW
		Examination Scheme & Marks
PR: 02 Hours/Week	01	ISE: 20 Marks ESE: 30 Marks
<b>Prerequisite:</b>		
<b>Companion Course, if any: 24U0113: Internet of Things</b>		
<b>Course Objectives:</b> Objectives include- <ul style="list-style-type: none"> <li>● Introduce students to the fundamental concepts of the Internet of Things, including sensors, actuators, connectivity, data collection, and data analytics.</li> <li>● Provide hands-on experience with IoT hardware and software components, allowing students to build simple IoT systems and understand their functionalities.</li> <li>● Develop problem-solving skills by presenting students with simple IoT-related challenges and guiding them through the process of designing and implementing solutions.</li> <li>● Foster interdisciplinary learning by integrating concepts from various engineering disciplines such as electronics, computer science, and data analysis within the context of IoT.</li> <li>● Encourage critical thinking and creativity in designing IoT solutions by emphasizing the importance of considering factors such as usability, scalability, and security.</li> <li>● Experiential Learning for the students through industrial visit and mini project.</li> </ul>		
<b>Course Outcomes:</b>		<b>BL</b>
On completion of the course, learner will be able to–		
<b>CO1</b>	<b>Gain</b> a basic understanding of IoT concepts, terminology, and technologies.	<b>2</b>
<b>CO2</b>	<b>Acquire</b> practical skills in working with IoT hardware and software components, including sensors, microcontrollers, and communication protocols.	<b>3</b>
<b>CO3</b>	<b>Develop</b> problem-solving abilities and the capability to apply engineering principles to solve real-world challenges in the context of IoT.	<b>2</b>
<b>CO4</b>	<b>Improve</b> their collaborative skills through group projects, including communication, teamwork, and task allocation.	<b>3</b>
<b>CO5</b>	Have <b>hands-on experience</b> in <b>designing, implementing, and testing</b> IoT systems.	<b>2</b>
<b>CO6</b>	<b>Apply</b> theoretical knowledge to real-world scenarios by engaging in experiential learning activities such as high-end equipment demonstrations, participating in industry visits, and organizing or participating in technical events so as to imbibe <b>problem-solving skills</b> , foster <b>innovation</b> , and <b>build</b> professional competencies necessary for successful careers in engineering.	<b>2,3</b>
Suggested List of Laboratory Experiments/Assignments		
Study Assignment		
Sr. No.	Problem Statements (Any 6 laboratory assignments )	CO Mapping
1.	Write a report on three real-world IoT applications in different industries, explaining how IoT adds value.	CO1
2.	Build a simple circuit using a breadboard those lights up an LED when a certain temperature is reached.	CO1, CO2, CO3, CO4, CO5



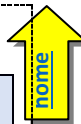
3.	Program an Arduino to read data from a temperature sensor and display the output on the serial Monitor.	CO1, CO2, CO3, CO4, CO5
4.	Establish a Bluetooth connection between an Arduino and a smartphone to send sensor data.	CO1, CO2, CO3, CO4, CO5
5.	Create a simple MQTT client on the Raspberry Pi that publishes sensor data to an MQTT broker.	CO1, CO2, CO3, CO4, CO5
6.	Connect a microcontroller to an IoT cloud platform and send sensor data to the cloud.	CO1, CO2, CO3, CO4, CO5
7.	Analyze sensor data stored in the cloud using basic data analytics tools.	CO1, CO2, CO3
8.	Design and prototype a simple IoT application that collects sensor data and provides insights to the user through a web interface.	CO1, CO2, CO3, CO4, CO5
9.	Design a simple IoT system that uses at least two sensors to collect data, processes this data, and performs an action based on a certain condition (e.g., turning on a fan when a certain temperature is reached).	CO1, CO2, CO3, CO4, CO5
10	Industrial visit to electronics/IoT industry	CO6

#### Mini-Projects (Optional)

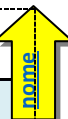
1.	Smart Home Automation- ON- OFF Electronic appliances like Bulbs, Tube light, Fan, AC etc	CO1, CO2, CO3, CO4, CO5
2.	Smart Dustbin using ultrasonic sensor and Arduino Uno	
3.	Smart City- Automatic street light Control	
4.	Using Rpi Door security system using face detection	

#### CO-PO Correlation Matrix

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	-	2	-	-	-	1	1	-	1	2
CO2	2	1	-	2	-	-	-	1	1	-	1	2
CO3	2	1	-	2	-	-	-	1	1	-	1	2
CO4	2	1	-	2	-	-	-	1	1	-	1	2
CO5	2	1	-	2	-	-	-	1	1	-	1	2
CO6	1	1	-	-	-	1	1	1	2	1	2	1



<b>Matoshri College of Engineering &amp; Research Centre, Nashik</b>		
<b>First Year Bachelor of Technology</b>		
<b>24U0117: Engineering Mechanics Laboratory</b>		
Teaching Scheme	Credit	Examination Head: TW
		Examination Scheme & Marks
<b>PR: 02 Hours/Week</b>	<b>01</b>	<b>ISE: 20 Marks</b> <b>ESE: 30 Marks</b>
<b>Prerequisite:</b> Students are expected to have a good understanding of basic of Engineering Mechanic		
<b>Companion Course, if any: 24U0114: Engineering Mechanics</b>		
<p><b>Course Objectives:</b> Objectives include-</p> <p>Engineering mechanics laboratory aims to equip first year engineering students with practical skills, analytical mindset, and foundational knowledge necessary for success in their academic and professional endeavors.</p> <ul style="list-style-type: none"> <li>● Enable students to apply the Parallelogram Law of Forces to solve engineering problems involving the equilibrium of concurrent forces, including both static and dynamic situations.</li> <li>● To enable students to apply the Polygon Law of Forces to solve engineering problems involving the equilibrium of concurrent forces, including both static and dynamic situations.</li> <li>● Teach students the principles of belt friction and the factors influencing the coefficient of friction in flat belts and V-belts, including belt tension, pulley diameter, wrap angle, and belt material.</li> <li>● Teach students the different types of loads that act on beams, including concentrated loads, distributed loads, and moments, and their effects on beam behavior and support reactions.</li> <li>● Teach students the definition and significance of the coefficient of restitution in collisions, explaining how it quantifies the relative velocity of separation between colliding objects compared to their relative velocity of approach.</li> <li>● Experiential learning for the students through industrial visit and demonstration of high end software.</li> </ul>		
<b>Course Outcomes:</b>		<b>BL</b>
On completion of the course, learner will be able to –		
<b>CO1</b>	<b>Apply</b> theoretical concepts from engineering mechanics (such as forces, moments and equilibrium) to solve practical problems in a laboratory setting.	2,3
<b>CO2</b>	<b>Understand</b> the key mechanics principles such as static and dynamic equilibrium through hands-on experiments.	1,2
<b>CO3</b>	<b>Apply</b> theoretical knowledge with practical experimentation to solve real-world engineering problems.	1,2
<b>CO4</b>	<b>Understand</b> the principle of moments applies to real-world engineering problems and designs.	2,3
<b>CO5</b>	<b>Understand, perform</b> and <b>validate</b> experimental results by collecting data, using various software and comparing them with theoretical values and discussing any discrepancies.	2,3
<b>CO6</b>	Apply theoretical knowledge to real-world scenarios by engaging in experiential learning activities such as high-end equipment demonstrations, participating in industry visits, and organizing or participating in technical events so as to imbibe problem-solving skills, foster innovation, and build professional competencies necessary for successful careers in engineering.	2,3



Suggested List of Laboratory Experiments/Assignments		
CO Mapping: CO1 to CO5 for all Lab Assignments		
Group A		
Sr. No.	Problem Statement	CO Mapping
1	Verification of law of parallelogram of force	CO1, CO2
2	Verification of law of polygon of forces.	CO1, CO2
3	Determination of coefficient friction of belt.(V belt & Flat belt)	CO2, CO3
4	Determine the support reaction of simply supported beams.	CO1, CO2
5	Determination of coefficient of restitution.	CO2
6	Determination of forces in the members of the space force system.	CO1, CO2
7	To study the curvilinear motion	CO2
8	Verification of centroid of different laminae	CO3
9	Verification of condition of equilibrium of a system of forces	CO1, CO2
10	Verification of the Principle of Moments using the Bell Crank Lever apparatus.	CO1, CO4
11	Industrial visit to railway bridge, sports ground and steel construction site	CO3, CO4
Group B		
Analysis using MD Solid Software		
1	Analysis of Beam using Software.	CO5
2	Analysis of Truss using Software.	CO5
Group C		
1	Assignment on each unit (At least 5 numericals)	CO1 to CO5

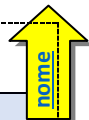
**MOOC Courses:**

- <https://edurev.in/test/5555/Engineering-Mechanics>
- <https://www.prep.youth4work.com/general-online-test/online-engineering-mechanics-test-test/free-online-engineering-mechanics-test-test>
- <https://edurev.in/test/11212/Engineering-Mechanics-2>
- <https://testbook.com/super-coaching/engineering-mechanics-for-mechanical-complete-syllabus-by-online-engineering-course>

**CO-PO Correlation Matrix**

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	-	-	-	-	-	1	1	-	1
CO2	2	2	-	-	-	-	-	-	1	1	-	1
CO3	2	2	-	-	-	-	-	-	1	1	-	1
CO4	2	2	-	-	-	-	-	-	1	1	-	1
CO5	2	2	-	-	-	-	-	-	1	1	-	1
CO6	-	-	-	-	-	1	1	1	1	1	-	1





<b>Matoshri College of Engineering &amp; Research Centre, Nashik</b> <b>First Year Bachelor of Technology</b>		
<b>24U0118: Engineering Workshop</b> <b>24U0118-A: Computer Repairing and Maintenance</b>		
<b>Teaching Scheme</b>	<b>Credit</b>	<b>Examination Head: TW</b>
		<b>Examination Scheme &amp; Marks</b>
<b>PR: 02 Hours/Week</b>	<b>01</b>	<b>ISE 20 Marks</b> <b>ESE: 30Marks</b>

**Prerequisite:** Students are expected to have a good understanding of basic computer and working principles.

**Companion Course, if any:** -----

**Course Objectives:**

- To understand the fundamentals of computer components and their functions.
- To learn about various devices and their applications in the industry.
- To gain practical knowledge in computer cables and connectors.
- To comprehend the dismantling and assembling desktop computer.
- To learn installations of Linux Ubuntu operating system
- To Install antivirus software, scan the system and explore the options in the antivirus software.

<b>Course Outcomes:</b> On completion of the course, learner will be able to–	<b>BL</b>
<b>CO1 Identify</b> devices, connectors and cables; dismantling and assemble desktop computer system.	1
<b>CO2 Create</b> partitions and format the hard disk drive.	1
<b>CO3 Install</b> and configure Operating system, and application software	2
<b>CO4 Install</b> and Configure different types of peripheral devices and software	2
<b>CO5 Use</b> various network components, Setup a small Local Area Network.	3
<b>CO6 Apply</b> theoretical knowledge to real-world scenarios by engaging in experiential learning activities such as high-end equipment demonstrations, participating in industry visits, and organizing or participating in technical events so as to imbibe <b>problem-solving skills</b> , foster <b>innovation</b> , and <b>build</b> professional competencies necessary for successful careers in engineering.	2,3

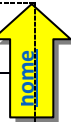
Sr. No.	Problem Statement	CO Mapping
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**Study Assignments**

- |   |          |
|---|----------|
| <p>a. Know about the Desktop in the laboratory and list its specifications. Similarly for laptop and server type identification and its specification</p> <p>b. List safety measures to be followed while handling computer, peripherals and in computer labs</p> <p>c. List typical e-waste generated in computing labs and how to manage it-reuse/recycle/dispose/decompose</p> | CO1, CO2 |
|---|----------|

**The computer hardware, peripherals and Software**

1.	Locate various indicators, cables, connectors and ports on the computer cabinet. Open PC Panel and Identify Components. Identify various parts of the system unit and motherboard components, Boards and Slots. Connect/disconnect power socket and controller socket to disk drives and motherboard.	CO1, CO2
2.	Configure different BIOS settings in computer system, Partition and manage hard disk, Format hard drives with different file systems, use external HDD, replace the HDD of a desktop PC.	CO1, CO2



3.	Install Operating System –Unix family (such as Linux/Ubuntu/Centos), Choose various booting options to boot the computer system. Learn to install Linux Ubuntu Operating system.	CO1, CO3
4.	Install local printer by applying various types of configuration settings, Remove and mount cartridge, troubleshoot paper jam, Share the printer, devices, folders on a network	CO1, CO4
5.	Install and configure scanner, Set and configure monitor/display, Speaker, Microphone and LCD Projector	CO1, CO4
6.	Clean and learn Preventive Maintenance of PC, Replace internal components of PC, Use diagnostic software for PC fault finding, Install Antivirus and Configure various settings, scan the system and explore the options in the antivirus software.	CO1, CO6

### Local Area Network

#### Study Assignments

- Study computer network in campus- topology, components and specifications, internet service provider and bandwidth,
- Visit network components display lab of department of Computer Engineering

7.	Identify and learn different types of cables and network components e.g. Hub, switch, router, modem etc.	CO1, CO5
8.	Prepare and test crossover and straight cable, CAT5, CAT6 Cable, using connector, crimping tools, splicer	
9.	Connection of Hub/Switches/routers and verify the connections, Connect/disconnect LAN Cable, External Hard disk, Modem, LCD/DLP Projector	
10	Learn different types of fiber optic cable's construction and connectivity	
11	Connection two Switches/Hubs using normal and uplink port	
12	Configure devices to setup Wi-Fi environment	
13	Create a small wired network environment,	
14	Set and configure Bluetooth based wireless mouse, keyboard and other devices	

#### Experiential Learning:

- Industry Visit/Field Trips /Site Visits
- Technical Event Organization/ Participation (State/ National/International Level)
- Internships and Apprenticeships
- Community service with academic learning

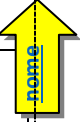
CO1,  
CO2,  
CO4,  
CO5,  
CO6

#### Books

1.	James, K.L. The computer hardware installation, interfacing, troubleshooting and maintenance PHI Learning, New Delhi, 2014 ISBN: 978-81-203-4798-4
2.	Minasi, Mark The Complete PC Upgrade And maintenance Guide BPB Publication, New Delhi ISBN:978- 81-265-0627-9
3.	James Bernstein , Networking Made Easy: Get Yourself Connected (Computers Made Easy), ISBN-10 : 1720034109, ISBN-13 : 978-1720034100
4.	Craig Zacker, John Rourke The Complete Reference PC Hardware McGraw Hill

#### CO-PO Correlation Matrix

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	-	-	-	-	-	-	-	-	1
CO2	2	2	-	-	-	-	-	-	-	-	-	1
CO3	2	2	-	-	-	-	-	-	-	-	-	1
CO4	2	2	-	-	-	-	-	-	-	-	-	1
CO5	2	2	-	-	-	-	-	-	-	-	-	1
CO6	-	-	-	-	1	1	1	1	1	1	-	1



**24U0118: Engineering Workshop**  
**24U0118-B: Electrical and Electronics Workshop**

<b>Teaching Scheme</b>	<b>Credit</b>	<b>Examination Head: TW</b>
		<b>Examination Scheme &amp; Marks</b>
<b>PR: 02 Hours/Week</b>	<b>01</b>	<b>ISE : 20 Marks</b> <b>ESE: 30 Marks</b>

**Prerequisite:** Students are expected to have a good understanding of Electrical and Electronics components.

**Companion Course, if any:**

**Course Objectives:**

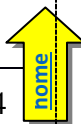
- To understand the fundamentals of electronic components and their functions.
- To learn about various sensors and their applications in the industry.
- To gain practical knowledge in electrical wiring and safety.
- To comprehend the working principles of different types of motors.
- To explore the basics of Electronics gadgets.
- To develop the skills for creating basic electronic circuits and troubleshooting.
- To provide experiential learning through mini project and application demonstration of high end equipment.

<b>Course Outcomes:</b> On completion of the course, learner will be able to–	<b>BL</b>
<b>CO1 Identify</b> and utilize various electronic components.	<b>1,2</b>
<b>CO2 Understand</b> of sensor integration and data acquisition.	<b>1,2</b>
<b>CO3 Deal Proficiently</b> in basic electrical wiring and adherence to safety standards.	<b>1,2</b>
<b>CO4 Understand</b> the operational mechanisms of AC/DC motors.	<b>1,2</b>
<b>CO5 Develop</b> the skills to build the applications for electronic gadgets.	<b>1,2,3</b>
<b>CO6 Apply</b> theoretical knowledge to real-world scenarios by engaging in experiential learning activities such as high-end equipment demonstrations, participating in industry visits, and organizing or participating in technical events so as to imbibe <b>problem-solving skills</b> , foster <b>innovation</b> , and <b>build</b> professional competencies necessary for successful careers in engineering.	<b>3</b>

Sr. No.	Problem Statement	CO Mapping
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**Study Assignments**

1.	<b>Testing and measurement of Basic Electronic Components:</b> Introduction to resistors, capacitors, diodes, transistors, and LEDs. Testing with a multimeter.	CO1
2.	<b>Applications electronics Sensors :</b> Application of temperature sensors, light sensors, pressure sensors, humidity sensors and proximity sensors, displacement sensors.	CO2
3.	<b>Basic Electrical Wiring Practices:</b> This experiment provides hands-on experience with electrical wiring, fostering an understanding of electrical safety, techniques, and the practical skills needed for basic home wiring projects.	CO3
4.	<b>Assembly and Testing of a DC regulated Power Supply</b> Constructing a linear power supply using transformers, diodes, capacitors and integrated circuit (IC) regulator	CO5



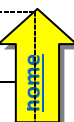
5.	<b>Motor Control Circuitry:</b> Exploring different types of motors (DC/stepper/ servo) and their speed control.	CO4
6.	<b>Use of Oscilloscope and Signal Generator:1</b> <ul style="list-style-type: none"> <li>•Measuring signal amplitude, frequency, and period.</li> <li>•Using the oscilloscope's measurement functions to determine peak-to-peak voltage, RMS voltage, and observing phase differences, lissajous patterns.</li> <li>•Introduction to the Signal Generator</li> <li>•Identifying key functions and controls: waveform selection, frequency adjustment, amplitude control, etc.</li> <li>•Observing and measuring the characteristics of different waveforms on the oscilloscope</li> </ul>	CO1
7	<b>Application of Digital ICs :</b> Implementation of applications like object counter/ timers/ token display using digital ICs	CO5
8	<b>Basic Soldering and de-soldering techniques on PCB</b> Practice the soldering and de-soldering the different active and passive components	CO5
9	<b>Disassembly and assembly of various components of android cell phones</b> Identify the parts and assemble different types of smart phones Interface the smart phone to the PC	CO5
10	<b>Installation of Domestic solar panel</b> Assemble and install solar panel Observe the functionality of solar panel	CO5, CO6
11	<b>Experiential Learning</b> (Learning through direct experience, reflection, and active engagement.): (At least two of the following related to the course) <ol style="list-style-type: none"> <li>1. Planning a High-End Equipment/Application Demonstration</li> <li>2. Industry Visit/Field Trips /Site Visits</li> <li>3. Technical Event Organization/ Participation (State/ National/International Level)</li> <li>4. Internships and Apprenticeships</li> <li>5. Project-Based Learning/Mini project</li> <li>6. Community service with academic learning</li> </ol>	CO1, CO2, CO3, CO4, CO5, CO6

#### Books

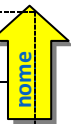
1	D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2	E. Hughes, "Electrical and Electronics Technology", Pearson, 2010
3	Dr. G.K. Kharate , "Digital Electronics" Oxford University Press 2010
4	Thomas. L. Floyd , "Digital Fundamentals", 11th Edition, Pearson
5	H. Cotton, "Electrical Technology", 7th Edition, CBS Publications and distributors.
6	H.S. Kalsi , "Electronic Instrumentation", 3rd Edition, Tata McGraw Hill

#### CO-PO Correlation Matrix

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	1	-	-	1	1	2	1	1
CO2	2	-	-	-	1	-	-	1	1	2	1	1
CO3	2	-	-	-	1	-	-	1	1	2	1	1
CO4	2	-	-	-	1	-	-	1	1	2	1	1
CO5	2	-	-	-	1	-	-	1	1	2	1	1
CO6	2	-	-	-	1	1	1	-	1	1	1	1



<b>24U0118: Engineering Workshop</b>		
<b>24U0118-C: Mechanical Workshop Practices</b>		
Teaching Scheme	Credit	Examination Head: TW
		Examination Scheme & Marks
<b>PR: 02 Hours/Week</b>	<b>01</b>	<b>ISE 20 Marks ESE: 30 Marks</b>
<b>Prerequisite:</b> Basic Science, Drawing		
<b>Companion Course, if any:</b>		
<b>Course Objectives:</b>		
<ul style="list-style-type: none"> <li>● To acquire the basic knowledge of workshop safety, Measurements and Machine Tools</li> <li>● To impart practical aspects of Machine Tools and Manufacturing processes used in industrial applications</li> <li>● To introduce the skills required for assembly &amp; disassembly of mechanical systems and various home appliances To introduce to recent manufacturing technology such as 3D Printing, robotics</li> <li>● To provide experiential learning through application demonstration, industrial visit and mini project</li> </ul>		
<b>Course Outcomes:</b> On completion of the course, learner will be able to–		<b>BL</b>
<b>CO1 Understand</b> the importance of workshop safety and measurement tools and apply general workshop safety rules and guidelines		<b>2</b>
<b>CO2 Apply</b> 3D Printing Technology including setup, operation, and post-processing to print simple mechanical component.		<b>3</b>
<b>CO3 Describe</b> the applications, advantages and operation of advanced computerized machine tools and robotic technology in modern manufacturing.		<b>3</b>
<b>CO4 Demonstrate</b> simple operations on a center lathe, milling, shaper and grinding machine		<b>3</b>
<b>CO5 Evaluate</b> fault with diagnosis on the machines, machine tools and home appliances by assembly & disassembly of various machines.		<b>3</b>
<b>CO6 Apply</b> theoretical knowledge to real-world scenarios by engaging in experiential learning activities such as high-end equipment demonstrations, participating in industry visits, and organizing or participating in technical events so as to imbibe <b>problem-solving skills</b> , foster <b>innovation</b> , and <b>build</b> professional competencies necessary for successful careers in engineering.		<b>3</b>
Sr. No.	Problem Statement	CO Mapping
<b>Study Assignments</b>		
<b>List of Laboratory Experiments/Assignments</b>		
1	<b>Safety in Workshop :</b> Fire hazards, electric short circuit –causes and remedies, Machine protection, Human protection, Accident prevention methods, developing ability to observe safe working habits. Introduction to measuring equipment's used in Quality Control..	CO1
2	<b>Basics of 3D Modelling Software&amp; its applications</b> Introductory skills of 3D modelling software with introduction to commands and tool bar to draw simple 3D mechanical objects	CO1, CO2
3	<b>Hands on Practice of Various Workshop Tools and its applications</b> (Fitting, Carpentry, Machine Shop, plumbing)	CO1, CO2
4	<b>Hands on Practice of Measurement tools</b> (Vernier caliper, micrometer, gauges. etc.)	CO1 CO3



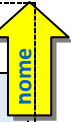
5	<b>Demonstration of</b> a) 3-D Printing Technology b) CNC Machine Robots & making its prototype	CO1 CO3
6	<b>Demonstration of Machine Shop :</b> a.Lathe operations: Step turning and facing, drilling operation on a Mild Steel cylindrical job on centre lathe. Understanding the concept of speed, feed and depth of cut. b.Milling machine Demonstration on construction, table movements, indexing and tooling of milling machine. c.Shaper and Grinding machine Shaper: Crank and slotted link mechanism, Work feed mechanism Grinding: Surface grinder/Cylindrical grinding machine, Mounting of grinding wheel d.Welding Machines Understanding concepts of types of welding, welding joints and its applications	CO1, CO3
7	<b>Assembly and Disassembly</b> of any of the following <b>mechanical systems and Home appliances:</b> industrial gear box, IC engines, valves, Air conditioning, refrigerator, compressor. grinder and mixer, ceiling fan, electric motor	CO1, CO4
8	<b>Mini project</b> The students should plan, manage and complete a project which addresses the real-world challenges and problems. There should be team/group of 4 students. It is expected to make a working model	CO1, CO6
9	<b>Industrial visit on CNC/VMC job Industry</b>	CO1, CO2, CO3, CO6
10	<b>Industrial visit on Automobile workshop</b>	

#### Books

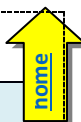
1. John, K. C., (2010), "Mechanical Workshop Practice, Prentice Hall Publication, New Delhi
2. Hazra and Chaudhary, Workshop Technology-I & II, Media promoters & Publisher Pvt. Ltd.
3. Chapman W. A. J., Workshop Technology Parts 1 & 2, Viva Books P. Ltd., 4 Edition, 1998.
4. Ram K. Gupta , 3D Printing: Fundamentals to Emerging Applications, Ram K. Gupta, 2023
5. Groover, Mikell P., (2006), "Fundamentals of Modern Manufacturing: Materials, Processes, and Systems", Prentice Hall, USA

#### CO-PO Correlation Matrix

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	1	-	-	-	1	1	1	1
CO2	2	-	-	-	1	-	-	-	1	1	1	1
CO3	2	1	1	-	1	-	-	-	1	1	1	1
CO4	2	2	2	-	1	-	-	-	1	1	1	1
CO5	2	1	-	-	-	-	-	-	1	1	1	1
CO6	-	-	-	-	-	1	-	1	1	1	1	1



<b>24U0118: Engineering Workshop</b>		
<b>24U0118-D: Civil Engineering Drawing Workshop</b>		
Teaching Scheme	Credit	Examination Head: TW
		Examination Scheme & Marks
<b>PR: 02 Hours/Week</b>	<b>01</b>	<b>ISE 20 Marks ESE: 30 Marks</b>
<b>Course Objectives:</b>		
<ul style="list-style-type: none"> <li>● To understand the fundamentals of various components of building and their functions.</li> <li>● To learn about various drawings and their applications on the site.</li> <li>● To gain practical knowledge surveying.</li> <li>● To develop the skills for communication and team management.</li> <li>● To provide experiential learning through field visit and application demonstration.</li> </ul>		
<b>Course Outcomes:</b> On completion of the course, learner will be able to–		<b>BL</b>
<b>CO1. Identify</b> and utilize various building components.		<b>2</b>
<b>CO2. Understand</b> drawings and their detailing.		<b>2</b>
<b>CO3. Deal</b> proficiently in basic field surveying.		<b>3</b>
<b>CO4. Develop</b> skills to manage team with effective communication		<b>3</b>
<b>CO5 Understand</b> how plumbing system integrate with other building system such as heating, ventilation and air conditioning.		<b>3</b>
<b>CO6 Apply</b> knowledge to real-world scenarios by engaging in experiential learning activities such as high-end equipment demonstrations, participating in industry visits, and organizing or participating in technical events so as to imbibe problem-solving skills, foster innovation, and build professional competencies.		
Sr. No.	Problem Statement	CO Mapping
<b>Study Assignments</b>		
<b>List of Laboratory Experiments/Assignments</b>		
1.	Draw in free hand sketches of hand tools used in civil work	CO1
2.	Draw plane figure applying drawing instruments with proper layout and the method of folding drawing sheets	CO1, CO2
3.	Construct plain scale, comparative scale, diagonal scale and vernier scale	CO3
4.	Draw orthographic projections of different objects with proper lines, lettering and dimensioning	CO2, CO3
5.	Draw component parts of a single storied residential building with suitable symbols and scales.	CO1, CO2
6.	Draw different types of stone and brick masonry	CO2
7.	Perform site survey with chain / tape and prepare site plan	CO3, CO4
8.	Draw different types of doors and windows according to manner of construction, Arrangement of component, and working operation	CO2, CO4
9.	Prepare the detailed drawing of electrical wiring system	CO2, CO4
10.	Prepare the detailed drawing of plumbing system	CO2, CO4
11.	Field visit to construction site	CO5
12.	Application demonstration of brick masonry.	CO5



### Books

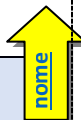
1. Draftsman Civil Practical- MohanishBatra, NK Publication

2. Draftsman Civil Trade Theory and Practical- R.S. Malika and G. S. Meo, NK, Computech Publication

### CO-PO Correlation Matrix

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	-	-	-	1	1	-	2
CO2	2	-	-	-	-	-	-	-	1	1	-	2
CO3	2	-	-	-	-	-	-	-	1	1	-	1
CO4	2	-	-	-	-	-	-	-	2	2	-	1
CO5	2	1	1	-	1	-	-	-	1	1	1	1
CO6	1	-	-	-	-	1	1	1	1	1	1	1





**Matoshri College of Engineering & Research Centre, Nashik**  
**First Year Bachelor of Technology**

**24U0119: Indian Knowledge System**

Teaching Scheme	Credit	Examination Head: TW	
		Examination Scheme & Marks	
PR: 02 Hours/Week	01	ISE: 20 Marks	ESE: 30 Marks

**Prerequisite:** Basic history of Indian arts, music etc.

**Companion Course, if any: ...**

**Course Objectives:** Objectives include-

- To sensitize the students about context in which they are embedded i.e. Indian culture and civilization including its Knowledge System and Tradition.
- To help students to understand the knowledge, art and creative practices, skills and values in the ancient Indian system.
- To help to study the enriched scientific Indian heritage.
- To introduce the contribution from Ancient Indian system & tradition to modern science & Technology

**Course Outcomes:**

**BL**

On completion of the course, learner will be able to–

<b>CO1 Explore</b> the foundations of Indian Knowledge Systems, understand the significance and historical context culture, and scientific advancements	<b>1</b>
<b>CO2 Understand</b> the principles of Indian architecture, including temple construction and town planning, alongside philosophical systems and creative arts.	<b>1,2</b>
<b>CO3 Gain</b> knowledge of classical Indian music, including vocal, instrumental, dance, and theatrical arts.	<b>1,2</b>
<b>CO4 Learn</b> ancient Indian creative and recognize the role of engineering in ancient India and its impact on architecture and materials.	<b>1,2,3</b>
<b>CO5 Comprehend</b> Indian philosophical concepts, scientific achievements, and their interplay.	<b>1,2,3</b>
<b>CO6 Apply</b> ancient Indian engineering principles in modern practices while considering cultural and environmental aspects	<b>1,2,3</b>

**Course Contents**

Unit Number	Unit Title	Hours
<b>I</b>	<b>Introduction to IKS (Mandatory Unit)</b>	<b>5</b>
Indian Knowledge System, Indian Culture & Civilization, Ancient Indian Chemistry, Ancient Indian Metallurgy, Ancient Indian Mathematics, Ancient Indian Astronomy, Indian Astronomical Instruments, Indian Knowledge System (Upveda: Ayurveda), Indian Knowledge System (Upveda: Gandharveda), Indian Knowledge System (Vedangas: Shiksha, Kalpa, Vyakrana), Indian Knowledge System (Vedangas: Jyotisha, Nirukta, Chandas), Indian Architecture I: Sthapatya-Veda, Indian Architecture II: Temples, Indian Architecture III: Town & Planning, Indian Philosophical System		
<b>II</b>	<b>Creative Practices- Music</b>	<b>4</b>
Vadyavidya: art of playing on musical instruments, Geetvidya : art of singing, Nrityavidya: art of dancing, Natyavidya: art of theatricals		
<b>III</b>	<b>Creative Practices-Painting</b>	<b>5</b>
Alekyavidya: art of painting, Viseshakachedyavidya: art of painting the face and body with color Udakavadya: art of playing on music in water, Manasikavyakriya: art of composing verse		
<b>IV</b>	<b>Creative Practices- Various Arts</b>	<b>5</b>

Dhatuvada: art of metallurgy, Akarajnana: art of mineralogy, Vastuvidya: art of engineering, Yantramatrika: art of mechanics, Takshana: art of carpentry, Chalitakayoga: art of practicing as a , builder of shrines, Raupyaratnapariksha: art of testing silver and jewels, Maniragajnana: art of tinging jewels, Sucivayakarma: art of needleworks and weaving

V

**Ancient Food, Textile and Aromatic Practices**

5

Bhushanayojana: art of applying or setting ornaments, Citra sakapupabhakshyavikarakriya: art of preparing varieties of delicious food, Dasanavasanangaraga: art of applying preparations for cleansing the teeth, cloths and painting the body, Utsadana: art of healing or cleaning a person with perfumes, Vastragopana: art of concealment of cloths, Balakakridanaka: art of using children's toys

Tandulakusumabalivikara: art of preparing offerings from rice and flowers, Pushpastarana: art of making a covering of flowers for a bed.

**Books****Text Books:**

1. Textbook on IKS by Prof. B Mahadevan, IIM Bengaluru
2. Kapur K and Singh A.K (Eds) 2005). Indian Knowledge Systems, Vol. 1. Indian Institute of Advanced Study, Shimla. Tatvabodh of sankaracharya, Central chinmay mission trust, Bombay, 1995.

**Reference Books:**

1. The Cultural Heritage of India. Vol.I. Kolkata:Ramakrishna Mission Publication, 1972.
2. Nair, Shantha N. Echoes of Ancient Indian Wisdom. New Delhi: Hindology Books, 2008.
3. Dr. R. C. Majumdar, H. C. Raychaudhuri and Kalikinkardatta: An Advanced History of India (Second Edition) published by Macmillan & Co., Limited, London, 1953.
4. Rao, N. 1970. The Four Values in Indian Philosophy and Culture. Mysore: University of Mysore.
5. Avari, B. 2016. India: The Ancient Past: A History of the Indian Subcontinent from c. 7000 BCE to CE 1200. London: Routledge.

**e-Books:**

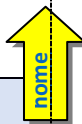
- <https://archive.org/details/indianknowledges0001unse/page/n335/mode/2up>

**MOOC Courses:**

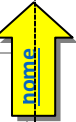
- Indian Knowledge System(IKS): Concepts and Applications in Engineering  
[https://onlinecourses.swayam2.ac.in/imb23\\_mg53/preview](https://onlinecourses.swayam2.ac.in/imb23_mg53/preview)

**CO-PO Correlation Matrix**

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	1	-	-	1	-	-	1
CO2	-	-	-	-	-	1	-	-	-	-	-	1
CO3	-	-	-	-	-	1	-	-	1	-	-	1
CO4	-	-	-	-	-	1	-	-	1	-	-	1
CO5	-	-	-	-	-	1	-	-	1	-	-	1
CO6	-	-	-	-	-	1	-	-	1	-	-	1



<b>Matoshri College of Engineering &amp; Research Centre, Nashik</b>		
<b>First Year Bachelor of Technology</b>		
<b>24U0120: Liberal Learning 2</b>		
<b>24U0120A: Advanced Yoga Practices and Mental Health</b>		
<b>Teaching Scheme</b>	<b>Credit (02)</b>	<b>Examination Head: TW</b>
		<b>Examination Scheme &amp; Marks</b>
<b>TUT: 01 Hour/Week</b>	<b>01</b>	<b>ISE 20 Marks</b>
<b>PR: 02 Hours/Week</b>	<b>01</b>	<b>ESE: 30 Marks</b>
<b>Prerequisite: basic yoga asanas</b>		
<b>Companion Course, if any: Yoga and Mental Health</b>		
<b>Course Objectives:</b>		
<ul style="list-style-type: none"> <li>● Deepen understanding of advanced yoga philosophy and techniques.</li> <li>● Master advanced yoga postures and breathing techniques.</li> <li>● Apply advanced yoga practices to enhance mental focus and stress resilience.</li> <li>● Utilize advanced yoga methods for managing anxiety and emotional balance.</li> <li>● Integrate advanced yoga practices into daily life for sustained mental health.</li> <li>● To Aware importance of Asanas and Pranayam for peaceful and healthy life through experiential learning.</li> </ul>		
<b>Course Outcomes:</b>		
<b>On completion of the course, learner will be able to–</b>		
<b>CO1</b>	<b>Understand</b> and integrate advanced philosophical concepts from various yoga traditions in practice.	<b>1</b>
<b>CO2</b>	<b>Perform</b> and master complex yoga poses and advanced pranayama techniques	<b>2</b>
<b>CO3</b>	<b>Enhance</b> their mental clarity and resilience against stress using advanced yoga and mindfulness practices.	<b>2</b>
<b>CO4</b>	<b>Reduce</b> anxiety and promote emotional balance through advanced yoga methods.	<b>2</b>
<b>CO5</b>	<b>Sustain</b> mental health and well-being by incorporating advanced yoga practices into their daily lives.	<b>2</b>
<b>CO6</b>	<b>Integrate</b> advanced philosophical concepts from various yoga traditions, master complex yoga poses and pranayama techniques, enhance mental clarity and resilience against stress, reduce anxiety, and promote emotional balance through advanced practices, and sustain mental health by incorporating these practices into daily life.	<b>3</b>
<b>Course Contents</b>		
<b>I</b>	<b>Advanced Yoga Philosophy and Techniques</b>	<b>6</b>
Advanced Texts and Concepts: Explore deeper philosophical texts and concepts from various yoga traditions. Integration of Philosophy and Practice: Understand how advanced philosophical concepts are integrated into advanced yoga practices.		
<b>II</b>	<b>Advanced Asanas and Pranayama</b>	<b>6</b>
Advanced Postures: Practice and master more complex yoga poses. Advanced Breathing Techniques: Learn and practice advanced pranayama techniques. Deep Relaxation: Techniques for deep relaxation and mental clarity.		
<b>III</b>	<b>Advanced Yoga for Concentration and Stress Management</b>	<b>6</b>



Advanced Focus Techniques: Practices to enhance concentration and mental clarity. Advanced Stress Management: Use advanced yoga and mindfulness practices to build resilience against stress.

<b>IV</b>	<b>Advanced Yoga and Mental Health</b>	<b>6</b>
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Advanced Anxiety Management: Advanced yoga practices to reduce anxiety and promote calmness.  
Advanced Emotional Balance: Techniques and postures to support deeper emotional balance and mental well-being.

### Learning Resources

#### Text Books:

1 "Advanced Yoga Practices: Easy Lessons for Ecstatic Living" by Yogani - Published by AYP Publishing.

2 "The Heart of Yoga: Developing a Personal Practice" by T.K.V. Desikachar - Published by HarperCollins India.

#### Reference Books:

"Yoga for Mental Health" by Ira Trivedi - Published by Harper Collins India.

#### e-Books:

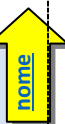
- <https://www.barnesandnoble.com/w/ten-minute-yoga-for-stress-relief-focus-and-renewal-lisa-shea/1122687958?ean=2940152196221>
- <https://www.barnesandnoble.com/w/yoga-and-health-visionary-monk/1125098592?ean=2940153837352>
- <https://www.barnesandnoble.com/w/the-essential-yogi-training-alanna-kaivalya/1124127673?ean=2940153375762>

#### MOOC Courses:

- [https://onlinecourses.nptel.ac.in/noc24\\_mg136/preview](https://onlinecourses.nptel.ac.in/noc24_mg136/preview)
- [https://onlinecourses.swayam2.ac.in/aic24\\_ge31/preview](https://onlinecourses.swayam2.ac.in/aic24_ge31/preview)
- [https://onlinecourses.swayam2.ac.in/aic24\\_ge24/preview](https://onlinecourses.swayam2.ac.in/aic24_ge24/preview)

### CO-PO Correlation Matrix

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	1	-	-	1	-	-	1
CO2	-	-	-	-	-	1	-	-	-	-	-	1
CO3	-	-	-	-	-	1	-	-	1	-	-	1
CO4	-	-	-	-	-	1	-	-	1	-	-	1
CO5	-	-	-	-	-	1	-	-	1	-	-	1
CO6	-	-	-	-	-	1	1	1	1	1	-	1



**Matoshri College of Engineering & Research Centre, Nashik**  
**First Year Bachelor of Technology**

**24U0120: Liberal Learning 2**  
**24U0120B: Advanced Art Techniques**

Teaching Scheme	Credit (02)	Examination Head: TW	
		Examination Scheme & Marks	
TUT: 01 Hour/Week	01	ISE: 20 Marks	
PR: 02 Hours/Week	01	ESE: 30 Marks	

**Prerequisite:** Basics of arts

**Companion Course, if any:** Liberal learning I-Arts

**Course Objectives:**

- Enhance proficiency in advanced techniques of painting, sculpture, photography, sketching, and performing arts through intensive practice.
- Deepen creative abilities and self-expression through advanced workshops and exploration of complex artistic methods.
- Encourage students to undertake and complete sophisticated art projects, integrating advanced techniques learned throughout the course.
- Promote higher-level critical thinking and self-assessment through detailed feedback on artwork and reflective practice.
- Develop professional presentation skills, enabling students to effectively communicate their artistic journey, inspirations, and technical approaches to a broader audience.
- To provide **experiential learning** through visits to art studios, galleries or workshops where participants can observe and engage with professional artists.

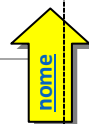
**Course Outcomes:** **BL**

**On completion of the course, learner will be able to–**

<b>CO1</b>	<b>Understand</b> advanced techniques in painting, sketching, photography, sculpture, and performing arts.	<b>2</b>
<b>CO2</b>	<b>Refine</b> creative abilities and <b>express</b> complex ideas through advanced artistic methods.	<b>2</b>
<b>CO3</b>	<b>Complete</b> sophisticated art projects by integrating advanced techniques and styles.	<b>2</b>
<b>CO4</b>	<b>Analyze</b> and reflect on their creative processes with greater depth, using detailed feedback to enhance their work.	<b>3</b>
<b>CO5</b>	<b>Communicate</b> artistic journey and techniques effectively to a broader audience.	<b>2</b>
<b>CO6</b>	<b>Understand</b> advanced techniques in various art forms, refine creative abilities to express complex ideas, complete sophisticated art projects using integrated techniques and styles, analyze and reflect on creative processes with detailed feedback, and effectively communicate their artistic journey and techniques to a broader audience	<b>3</b>

**Course Contents**

<b>I</b>	<b>Advanced Art Techniques</b>	<b>6</b>
Advanced Painting: Explore complex techniques in acrylics, watercolors, and oils. Advanced Sculpture: Create detailed sculptures using various materials and techniques. Advanced Photography: Study advanced camera operations, composition, and photo editing. Advanced Sketching: Develop intricate skills in pencil, charcoal, and ink drawings.		
<b>II</b>	<b>Advanced Creativity and Expression</b>	<b>6</b>



Intensive Workshops: Participate in advanced sessions focusing on expressing complex thoughts and emotions through art.

Advanced Artistic Techniques: Learn and apply sophisticated methods to convey intricate feelings and ideas.

Detailed Feedback and Reflection: Receive in-depth feedback on artwork and engage in reflective practice to enhance expressive abilities.

<b>III</b>	<b>Performing Arts</b>	<b>6</b>
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Dance: Learn advanced techniques in classical and contemporary dance forms.

Theater: Explore acting methods, script analysis, and performance techniques.

Music: Study vocal and instrumental music, focusing on advanced techniques and performance.

<b>IV</b>	<b>Complex Project Work</b>	<b>6</b>
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Sophisticated Art Creation: Design and produce complex artworks using advanced techniques.

Integration of Advanced Techniques: Apply advanced skills from painting, sketching, photography, sculpture, and performing arts into their projects.

Professional Presentation: Showcase completed artwork and performances professionally, explaining the creative process, inspirations, and advanced techniques used.

### Learning Resources

#### Text Books:

- **"Indian Art and Culture"** by NitinSinghaniania - McGraw Hill Education
- **"The Art of Indian Asia: Its Mythology and Transformations"** by Heinrich Zimmer - Princeton University Press
- **"Indian Art: Forms, Concerns and Development in Historical Perspective"** by PranNath - D. K. Printworld (P) Ltd

#### Reference Books:

- **"The Music of India"** by Reginald Massey - Abhinav Publications
- **"NatyaShastra"** by Bharata Muni (Translated by ManomohanGhosh) - Manohar Publishers

#### e-Books:

- <https://www.infobooks.org/free-pdf-books/art/painting/>
- <https://materialdeconsultaib.wordpress.com/wp-content/uploads/2016/05/arte-digital-art-masters-vol-1.pdf>

#### MOOC Courses:

- [https://onlinecourses.swayam2.ac.in/cec24\\_ge20/preview](https://onlinecourses.swayam2.ac.in/cec24_ge20/preview)
- [https://onlinecourses.nptel.ac.in/noc24\\_hs136/preview](https://onlinecourses.nptel.ac.in/noc24_hs136/preview)
- [https://onlinecourses.nptel.ac.in/noc24\\_hs111/preview](https://onlinecourses.nptel.ac.in/noc24_hs111/preview)

### CO-PO Correlation Matrix

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	1	-	-	1	-	-	1
CO2	-	-	-	-	-	1	-	-	-	-	-	1
CO3	-	-	-	-	-	1	-	-	1	-	-	1
CO4	-	-	-	-	-	1	-	-	1	-	-	1
CO5	-	-	-	-	-	1	-	-	1	-	-	1
CO6	-	-	-	-	-	1	1	1	1	1	-	1



Matoshri College of Engineering & Research Centre, Nashik		
First Year Bachelor of Technology		
24U0120: Liberal Learning 2		
24U0120C: Advanced Fitness and Gym Techniques		
Teaching Scheme	Credit (02)	Examination Head: TW
		Examination Scheme & Marks
TUT: 01 Hour/Week PR: 02 Hours/Week	01 01	ISE 20 Marks ESE: 30 Marks
<b>Prerequisite:</b> Basics information about gym instruments and nutrition and health		
<b>Companion Course, if any:</b> Liberal learning I-Gymnasium		
<b>Course Objectives:</b>		
<ul style="list-style-type: none"> <li>● Deepen understanding of advanced principles in fitness, including biomechanics, advanced exercise physiology, and the impact of physical activity on long-term health.</li> <li>● Implement advanced exercise techniques and routines to further develop strength and endurance, utilizing a wider range of gym equipment.</li> <li>● Enhance cardiovascular health through high-intensity cardio exercises and advanced use of gym instruments to maximize stamina and heart health.</li> <li>● Achieve proficiency in using a variety of gym instruments, demonstrating advanced techniques for optimal muscle development and injury prevention.</li> <li>● Develop a comprehensive understanding of nutrition, focusing on advanced dietary strategies to support intense physical training and recovery.</li> <li>● To organize visit to specialized gyms or fitness centers where participants can observe and engage with expert trainers and learn about cutting edge fitness practices and equipment.</li> </ul>		
<b>Course Outcomes:</b>		<b>BL</b>
<b>On completion of the course, learner will be able to–</b>		
<b>CO1 Analyze</b> advanced fitness principles and their impact on long-term health.		<b>3</b>
<b>CO2 Execute</b> advanced strength training routines targeting different muscle groups.		<b>3</b>
<b>CO3 Enhance</b> cardiovascular health through high-intensity cardio exercises.		<b>2</b>
<b>CO4 Understand</b> the use of various gym instruments, demonstrating advanced techniques and ensuring safety.		<b>2</b>
<b>CO5 Apply</b> advanced nutrition strategies to support intense physical training and recovery.		<b>3</b>
<b>CO6 Analyze</b> advanced fitness principles for long-term health, execute complex strength training routines, enhance cardiovascular health with high-intensity exercises, master gym instruments with advanced techniques and safety, and apply advanced nutrition strategies to support intensive training and recovery		<b>3</b>
<b>Course Contents</b>		
<b>I</b>	<b>Advanced Fitness Knowledge</b>	<b>6</b>
Biomechanics: Study the mechanics of human movement and its application in exercise.		
Advanced Exercise Physiology: Understand the body's responses and adaptations to high-intensity exercise.		
Long-term Health Impact: Examine the long-term benefits of sustained physical activity.		
<b>II</b>	<b>Advanced Strength Training</b>	<b>6</b>

Complex Routines: Design and implement advanced strength training routines.

Advanced Techniques: Learn advanced exercise techniques for different muscle groups.

Safety and Injury Prevention: Focus on advanced safety measures and injury prevention techniques.

High-Intensity Cardio: Engage in high-intensity interval training (HIIT) and other advanced cardio exercises.

Endurance Maximization: Develop strategies to maximize cardiovascular endurance.

Heart Health: Understand the advanced benefits of cardio exercises on heart health.

<b>III</b>	<b>Advanced Cardiovascular Health</b>	<b>6</b>
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Advanced Treadmill Workouts: Implement advanced treadmill workouts for cardio and strength.

Advanced Dumbbell Exercises: Perform advanced strength training with dumbbells.

Stationary Bike Techniques: Use advanced techniques on stationary bikes for cardio and lower body strength.

Smith Machine Mastery: Achieve proficiency in advanced weightlifting exercises using the Smith machine.

<b>IV</b>	<b>Advanced Nutrition and Fitness</b>	<b>6</b>
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Advanced Dietary Strategies: Learn advanced nutrition strategies to support high-intensity training.

Supplementation: Understand the role of supplements in enhancing physical performance.

Recovery Nutrition: Explore nutritional strategies for optimal recovery and muscle repair.

**Text Books:**

- "Fitness: The Complete Guide" by Namita Jain - Random House India
- "Cardiovascular Diseases: Causes, Symptoms, and Treatment" by NiharRanjanNayak - Jaypee Brothers Medical Publishers

**Reference Books:**

- "A Complete Guide to Gym Equipment" by Kiran A. Sapkal - Atlantic Publishers
- "Nutrition for Sport and Exercise" by P. S. Phadke - Notion Press

**e-Books:**

- <https://archive.org/details/FitnessBooksCollection/19%20Tips%20To%20Build%20Muscle/page/n7/mode/2up>
- <https://benessair.com/wp-content/uploads/2020/06/Benessere-PreWorkout-EBook-1-1.pdf>

**MOOC Courses:**

- <https://nptel.ac.in/courses/109106406>
- [https://onlinecourses.nptel.ac.in/noc24\\_hs83/preview](https://onlinecourses.nptel.ac.in/noc24_hs83/preview)
- [https://onlinecourses.nptel.ac.in/noc24\\_hs87/preview](https://onlinecourses.nptel.ac.in/noc24_hs87/preview)

**CO-PO Correlation Matrix**

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	1	-	-	1	-	-	1
CO2	-	-	-	-	-	1	-	-	-	-	-	1
CO3	-	-	-	-	-	1	-	-	1	-	-	1
CO4	-	-	-	-	-	1	-	-	1	-	-	1
CO5	-	-	-	-	-	1	-	-	1	-	-	1
CO6	-	-	-	-	-	1	1	1	1	1	-	1



**Matoshri College of Engineering & Research Centre, Nashik**  
**First Year Bachelor of Technology**

**24U0120: Liberal Learning 2**

**24U0120D: Advanced Cinematography Techniques**

Teaching Scheme	Credit (02)	Examination Head: TW	
		Examination Scheme & Marks	
TUT: 01 Hour/Week PR: 02 Hours/Week	01 01	ISE : ESE:	20 Marks 30 Marks

**Prerequisite: Cinematography**

**Companion Course, if any: ----**

**Course Objectives:**

1. To deepen students' understanding of advanced cinematography techniques and their application in complex visual narratives.
2. To explore the creative use of lighting, camera movements, and advanced composition techniques.
3. To provide practical experience in advanced shot design, including the use of special effects and green screen technology.
4. To introduce students to the intricacies of color grading, advanced editing, and post-production workflows.
5. To provide Experiential Learning through field visit.

**Course Outcomes:**

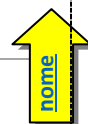
**BL**

On completion of the course, learner will be able to–

<b>CO1</b>	<b>Apply</b> advanced cinematography techniques to create visually sophisticated narratives.	<b>1,2,3</b>
<b>CO2</b>	<b>Understand</b> complex lighting setups and camera movements for enhanced storytelling.	<b>1,2</b>
<b>CO3</b>	<b>Design and execute</b> advanced shots, including special effects and green screen compositing.	<b>1,2,3</b>
<b>CO4</b>	<b>Perform</b> advanced color grading and editing to achieve a polished final visual product.	<b>1,2,3</b>
<b>CO5</b>	<b>Engage</b> in hands-on projects to apply advanced cinematography, lighting, and camera techniques, enhancing practical skills through real-world storytelling experiences.	<b>1,2,3</b>
<b>CO6</b>	<b>Collaboratively design and execute</b> complex visual narratives, including special effects and post-production processes, while refining technical and creative decision-making through experiential learning.	<b>1,2,3</b>

**Course Contents**

Unit Number	Unit Title	Hrs
<b>I</b>	<b>Advanced Camera Techniques and Movements</b>	<b>7</b>
Exploring advanced camera techniques: crane shots, Steadicam, drone cinematography. Understanding the psychological impact of camera movement on the audience. Complex framing techniques: deep focus, rack focus, and forced perspective. Practical exercises in executing complex camera movements and framing.		
<b>II</b>	<b>Creative Lighting Techniques</b>	<b>7</b>
Advanced lighting setups: chiaroscuro, motivated lighting, and practical lighting. Exploring the use of shadows and silhouettes for dramatic effect. Introduction to lighting in different genres: horror, noir, sci-fi, and fantasy. Practical exercises in creating mood and atmosphere through creative lighting.		
<b>III</b>	<b>Special Effects and Green Screen Cinematography</b>	<b>7</b>



Basics of green screen technology: setup, lighting, and shooting.  
 Integration of special effects in live-action cinematography.  
 Introduction to motion tracking and compositing techniques.  
 Practical exercises in shooting and editing green screen footage.

**IV****Introduction to Post-Production and Editing****7**

In-depth exploration of color theory and its application in cinematography.  
 Advanced color grading techniques: LUTs, curves, and secondary color correction.  
 Exploring dynamic editing techniques: parallel editing, montage, and rhythmic editing.  
 Introduction to sound design integration and its impact on visual storytelling.  
 Final project: creating a short film or scene incorporating advanced techniques.

**Learning Resources****Text Books:**

1. "Cinematography: Theory and Practice" by Blain Brown
2. "The Filmmaker's Eye: Learning (and Breaking) the Rules of Cinematic Composition" by Gustavo Mercado

**Reference Books:**

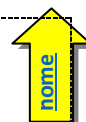
3. "The Filmmaker's Handbook: A Comprehensive Guide for the Digital Age" by Steven Ascher and Edward Pincus
4. "Digital Cinematography: Fundamentals, Tools, Techniques, and Workflows" by David Stump
5. "Cinematic Storytelling: The 100 Most Powerful Film Conventions Every Filmmaker Must Know" by Jennifer Van Sijll
6. "The Visual Story: Creating the Visual Structure of Film, TV, and Digital Media" by Bruce Block
7. "Lighting for Cinematography: A Practical Guide to the Art and Craft of Lighting for the Moving Image" by David Landau

**e-Books:**

- <https://www.infobooks.org/authors/classic>
- <https://oma.on.ca/en/contestpages/resources/free-report-cinematography.pdf>

**CO-PO Correlation Matrix**

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	1	1	1	-	1
CO2	-	-	-	-	-	-	-	1	1	1	-	1
CO3	-	-	-	-	-	-	-	1	1	1	-	1
CO4	-	-	-	-	-	-	-	1	1	1	-	1
CO5	-	-	-	-	-	-	-	1	1	1	-	1



**Matoshri College of Engineering & Research Centre, Nashik**  
**First Year Bachelor of Technology**

**NCAC02: Non-Credit Audit Course\_2 Options**

<b>Audit Course code</b>	<b>Audit Course Title</b>
NCAC01-A	Water Management
NCAC01-B	Intellectual Property Rights and Patents
NCAC01-C	The Science of Happiness
NCAC01-D	Foreign Language (one of Japanese/Spanish/French/German) Course contents for <b>Japanese( Module 2)</b> are provided. For other languages institute may design suitably.

**NCAC02-A: Water Management**

Water is a vital resource for all life on the planet. Only three percent of the water resources on Earth are fresh and two-thirds of the freshwater is locked up in ice caps and glaciers. One fifth of the remaining one percent is in remote, inaccessible areas. As time advances, water is becoming scarcer and having access to clean, safe, drinking water is limited among countries. Pure water supply and disinfected water treatment are prerequisites for the well-being of communities all over the world. One of the biggest concerns for our water-based resources in the future is the sustainability of the current and even future water resource allocation. This course will provide students a unique opportunity to study water management activities like planning, developing, distributing and optimum use of water resources.

**Course Objectives**

- To develop understanding of water resources.
- To study global water cycle and factors that affect this cycle.
- To analyze the process for water resources and management.
- To study the research and development areas necessary for efficient utilization and management of water resources.

**Course Outcomes**

On completion of the course, learner will be able to–

**CO1: Understand** the global water cycle and its various processes

**CO2: Understand** climate change and their effects on water systems

**CO3: Understand** Drinking treatment and quality of groundwater and surface water

**CO4: Understand** the Physical, chemical, and biological processes involved in water treatment and distribution.

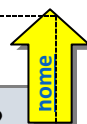
**Course Contents**

1. Understanding ‘water’-Climate change and the global water cycle, understanding global hydrology
2. Water resources planning and management-Water law and the search for sustainability: a comparative analysis, Risk and uncertainty in water resources planning and management
3. Agricultural water use -The role of research and development for agriculture water use
4. Urban water supply and management - The urban water challenge, Water sensitive urban design

**References:**

- 1.R. Quentin Graft, Karen Hussey, Quentin Graft, Karen Hussey, Publisher, "Water Resources Planning and Management", Cambridge University Press, ISBN: 9780511974304, 9780521762588.
- 2.P. C. Basil, "Water Management in India", ISBN: 8180690970, 2004.
- 3.C.A. Brebbia, "Water Resources Management", ISBN: 978-1-84564-960-9, 978-1-84564-961-6.

**CO-PO Correlation Matrix**



CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	1	-	-	-
CO2	-	-	-	-	-	-	-	-	2	-	-	1
CO3	-	-	-	-	-	-	-	-	1	-	-	-
CO4	-	-	-	-	-	2	-	-	2	-	-	2

### NCAC02-B: Intellectual property Rights

Intellectual property is the area of law that deals with protecting the rights of those who create original works. It covers everything from original plays and novels to inventions and company identification marks. The purpose of intellectual property laws is to encourage new technologies, artistic expressions and inventions while promoting economic growth.

#### Course Objectives:

- To encourage research, scholarship, and a spirit of inquiry
- To encourage students at all levels to develop patentable technologies.
- To provide environment to the students of the Institute for creation, protection, and commercialization of intellectual property and to stimulate innovation.

#### Course Outcomes:

On completion of the course, learner will be able to–

- CO1: Understand** the fundamental legal principles related to confidential information, copyright, patents, designs, trademarks and unfair competition
- CO2: Understand** principles of law relating to each of these areas of intellectual property
- CO3: Understand** the appropriate ownership rules to intellectual property you have been involved in creating

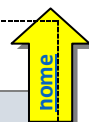
#### Course Contents

- 1. Introduction to Intellectual Property Law**–The Evolutionary Past-The IPR Tool Kit-Para-Legal Tasks in Intellectual Property Law
- 2. Introduction to Trade mark** – Trade mark Registration Process – Post registration Procedures - Trade mark maintenance - Transfer of Rights – Inter parts Proceeding – Infringement - Dilution Ownership of Trade mark
- 3. Introduction to Copyrights** – Principles of Copyright Principles -The subjects Matter of Copy right – The Rights Afforded by Copyright Law – Copy right Ownership, Transfer and duration – Right to prepare Derivative works
- 4. Introduction to Trade Secret**–Maintaining Trade Secret–Physical Security–Employee Limitation - Employee confidentiality agreement

#### Reference:

1. Debirag E. Bouchoux, “Intellectual Property” Cengage learning, New Delhi, ISBN-10:1111648573
2. Ferrera, Reder, Bird, Darrow, “Cyber Law. Texts and Cases”, South-Western’s Special Topics Collections, ISBN:0-324-39972-3
3. Prabhuddha Ganguli, “Intellectual Property Rights”, Tata Mc-Graw–Hill, New Delhi, ISBN-10:0070077177

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	1	-	-	-	-	-	-	-	1
CO2	-	-	-	1	-	-	-	-	-	-	-	2
CO3	-	-	-	-	-	-	1	-	1	-	-	2



### NCAC02-C: The Science of Happiness

Everybody wants to be happy. One can explore innumerable ideas about what happiness is and how we can get some. But not many of those ideas are based on science. That's where this course comes in. The subject "Science of Happiness" aims to teach the pioneering science of positive psychology, which explores the ancestry of a happy and meaningful life. Clinical psychologists have been dealing with miserable feelings since their discipline was established. In the last 30 years, neuroscientists have made major headway in the understanding of the sources of anger, depression, and fear.

Today, whole industries profit from this knowledge—producing pills for every sort of pathological mood disturbance. But until recently, few neuroscientists focused on the subject of happiness. This course focuses on discovering how cutting-edge research can be applied to their lives. Students will learn about the Intra-disciplinary research supporting this view, spanning the fields of psychology, neuroscience, evolutionary biology, and beyond. The course offers students practical strategies for tapping into and nurturing their own happiness, including trying several research-backed activities that foster social and emotional well-being, and exploring how their own happiness changes along the way.

#### Course Objectives

- To understand the feeling of happiness
- To study the sources of positive feelings
- To analyze the anatomy of the happiness system
- To study the effect of thoughts and emotions on the happiness system

#### Course Outcomes

On completion of the course, learner will be able to–

**CO1: Understand** what happiness is and why it matters to you

**CO2: Learn** how to increase your own happiness

**CO3: Understand** of the power of social connections and the science of empathy

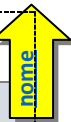
**CO4: Understand** what is mindfulness and its real world applications

#### Course Contents

1. Happiness: what is it? , 2. The secret of smiling
3. The autonomy of positive feelings
4. Positive feelings as a compass
5. The happiness system
6. Foundations: Emotions, Motivation and nature of Wellbeing
7. Subjective well being
8. Love and well being
9. Optimal well being
10. Religion, Spirituality and wellbeing

#### CO-PO Correlation Matrix

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	1	-	-	-	-	-	-	-	1
CO2	-	-	-	1	-	-	-	-	-	-	-	2
CO3	-	-	-	-	-	-	1	-	1	-	-	2
CO4	-	-	-	-	-	-	-	-	-	-	-	2



## NCAC02-D: Foreign Language ( Japanese) Module 2

With changing times, the competitiveness has gotten into the nerves and 'Being the Best at all times is only the proof of it. Nonetheless, 'being the best' differs significantly from 'Communicating the best'! The best can merely be communicated whilst using the best... suited Language!!

### Course Objectives:

- To meet the needs of ever growing industry with respect to language support.
- To get introduced to Japanese society and culture through language.

### Course Outcomes:

On completion of the course learner will-

1. have ability of basic communication.
2. have the knowledge of Japanese script.
3. get introduced to reading , writing and listening skills
4. develop interest to pursue professional Japanese Language course

### Course Contents

1. Katakana basic Script, Denoting things ( nominal and pre nominal demonstratives ), Purchasing at the Market / in a shop / mall (asking and stating price)
2. Katakana : Modified kana, double consonant, letters with ya, yu, yo, Long vowels, Describing time, describing starting and finishing time ( kara ~ made ), Point in time (denoting the time when any action or the movement occurs)
3. Means of transport (Vehicles), Places, Countries, Stating Birth date, Indicating movement to a certain place by a vehicle.

### References:

1. Minna No Nihongo, "Japanese for Everyone", (Indian Edition), Goyal Publishers and Distributors Pvt. Ltd.
2. <http://www.tcs.com> ([http://www.tcs.com/news\\_events/press\\_releases/Pages/TCS-Inaugurates- Japan-centric-Delivery-Center-Pune.aspx](http://www.tcs.com/news_events/press_releases/Pages/TCS-Inaugurates-Japan-centric-Delivery-Center-Pune.aspx))

### @The CO-PO Mapping Matrix

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	1	3	1	1
CO2	-	-	-	-	1	-	-	-	-	3	1	1
CO3	-	-	-	-	1	-	-	-	-	3	2	2
CO4	-	-	-	-	-	-	-	-	-	1	-	1