Shri Vile Parle Kelavani Mandal`s
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
Vile Parle (West), Mumbai-400 056

Department of **MECHANICAL ENGINEERING**
Three Years Full Time Diploma with Inplant Training
In
MECHANICAL ENGINEERING
CURRICULUM
Semester Pattern
(Effective from June' 2019)

Head of Department.....
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
VILE PARLE (WEST), MUMBAI-400 056.

HoD

Approved Copy

Curriculum Co-Ordinator / COE

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC MUMBAI 400 056.

PRINCIPAL
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
VILE PARLE (WEST), MUMBAI-400 056.

Shri Vile Parle Kelavani Mandal`s
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC

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CURRICULUM

THREE YEARS FULL TIME DIPLOMA COURSE WITH INPLANT TRAINING IN MECHANICAL ENGINEERING
(Semester Pattern)

Head Mech. Engineering Department
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC

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Curriculum Co-Ordinator / COE

PRINCIPAL
SHRI B. MAFATLAL POLYTECHNIC

Shri Vile-Parle Kelavani Mandal's
Shri Bhagubhai Mafatlal Polytechnic
Mumbai-400056

(AN ACADEMICALLY AUTONOMOUS GRANT-IN AID INSTITUTE)

CURRICULUM 2019

DIPLOMA PROGRAMME
IN
MECHANICAL ENGINEERING

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PREFACE

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC started three years diploma programs and was affiliated to the Board of Technical Examinations, Maharashtra State, in 1963. The institute has been conferred an academic autonomous status since 1969 by Government of Maharashtra because of excellent performance, which enabled it to design the curriculum and examination scheme and to introduce inplant training, which involved industry-institute interaction. Thus, four years semester sandwich pattern came into existence. Since 1978-79, academic freedom was extended to all the full-time diploma programs. In 1989-90 full autonomy was granted to all the seven full-time diploma programs.

As a further development to the above, the Multi Point Entry and Credit System (MPECS) was initiated in 1981 on progressive basis. In this scheme students can regulate their pace of studies within the rules prescribed.
From 1993-94, full academic autonomy was extended to all the nineteen programs, which includes full-time diploma, part-time diploma and post-diploma programs. The students have to qualify for appearing in the final examinations as per details given in the MPECS rules. The examinations are conducted by the institute and the final diploma is awarded by the institute at the convocation function.
From the academic year 2016-17, our curriculum is revised and is converted to three-year diploma program. Teaching learning is done at the institute up to V semester and inplant training is offered at VI semester.
To incorporate the latest developments in technology and to have better industry institute interaction, the curriculum is revised again to be implemented from the academic year 2019-2020 , which is Choice and Credit-Based System (CCBS) . This is a diploma program of three-year duration with inplant training in fifth semester.

The Vision of the institute is to be a premier Technical Training and Development institute catering to the skill and professional development in multi-domain for successful employment / self-employment by offering need-based curriculum and state of the art infrastructure. The institute shall be the center for excellence in skill development and community development through different training programmes, incubation center and Entrepreneurship Development. For this the institute is committed to provide education for skill development, engineering diploma and continuing education programmes for enhancement of employability skills of the aspirants in the job/self-employment through continually developing quality learning systems. The institute aims at holistic and student centric education in collaboration with industry and having practice-based education. To achieve this continuous efforts are made to design the curriculum considering the latest development in the industrial sector and technology.

Diploma Programme in MECHANICAL ENGINEERING (Aided)
For designing the curriculum, various domains have been identified like Thermal and Fluid Engineering, Design Engineering and Manufacturing Engineering. Feedback from all the stakeholders i.e industries, teachers, students and parents have been collected for shaping the need based curriculum. The entire scheme and content is compared with AICTE/MSBTE/Autonomous Polytechnic/and with SBMP 2016. The said syllabus has been discussed and finalized in the

subsequent Programme Board of Studies and Board of Studies and with final approval of Managing Council.

INPLANT TRAINING:

Students receive institutional training for the first four semesters. In fifth semester, to gain practical knowledge and industrial exposure, the students have to undergo inplant training. This scheme enables the students to enhance their psychomotor skills during the industrial training. The training also helps the student to better understand the different application-oriented courses and project covered in sixth semester.

In this Curriculum-2019, the student has to acquire 180 credits for successful completion of Diploma Programme. The courses of curriculum are structured at 4 different levels i.e. Basic Courses, Core Courses, Application Courses, and Management Courses.

The minimum entry level is 10th. However, the curriculum provides entry for the students opting admission after passing 12th, ITI.These students will get exemptions in certain courses as per the rules.

There is a flexibility for opting the courses as per the choice of students. The curriculum provides **"Sample Path"** as a guideline for selection of courses in each term for entry level as 10th. The List of Courses for Award of Class after completion of Diploma Programme is prescribed separately in this curriculum.

The fulfillment of programme outcome as stated in the Curriculum-2019 will depend on its effective implementation. The teachers who are implementing the curriculum were also involved in the design process of curriculum, hence, I hope that the Curriculum-2019 will be implemented in effective way and the pass outs will acquire the requisite knowledge and skills to satisfy the industrial needs.

(Dr. M.Z.SHAIKH)
Principal
Shri Bhagubhai Mafatlal Polytechnic,Mumbai

Shri Vile-Parle Kelavani Mandal's

Shri Bhagubhai Mafatlal Polytechnic

Vile Parle (W), Mumbai-400056

VISION

"SBM Polytechnic aspires to be the Lead Institute in providing need based Technical Education "

MISSION

- To provide state of art infrastructure and latest equipment for providing a stimulating learning environment.
- To prepare students to meet the dynamic needs of the industry by periodic reviewing and up gradation of curriculum through an interactive process with industry.
- To inculcate a spirit of excellence in terms of academic performance, research and innovation in faculty by providing appropriate support and incentive systems.
- To promote and support co- curricular, extra-curricular activities and industry interaction to make students socially sensitive and employable.

MECHANICAL ENGINEERING DEPARTMENT

VISION

"To become a center of excellence in the field of mechanical engineering through need-based value education"

MISSION

M1 - To impart quality education through continuous up-gradation of curriculum and faculty development

M2 - To encourage students to solve mechanical engineering and real-life problems through industry-institute interaction

M3 - To develop entrepreneur qualities and concern for the society

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC MUMBAI 400 056.

JOB PROFILE OF MECHANICAL DIPLOMA PASSOUTS

We hope this outcome-based curriculum 2019-21 will fulfill the requirements of all the stakeholders through effective implementation and satisfy the industrial and academic need of the students and Student with Diploma in Mechanical Engineering get good opportunities to carry out various activities in various areas like

- Automobile Industry
- Manufacturing and Production
- Design and Tool Room
- Public Sector
- Private Sector
- Entrepreneurship
- Technical Education

After successful completion of Diploma Programme in Mechanical Engineering students can work as

1. Technician
2. Supervisor
3. Designer
4. R& D Specialist
5. Consultant for Small Scale Industries
6. Service Engineer
7. Quality Assurance Supervisor
8. Production supervisor
9. Test Engineer
10. Store/Purchase Officer
11. Sales and Marketing Engineer
12. Entrepreneur
13. Lab Assistant in Various Diploma Engineering Colleges.

DIPLOMA PROGRAMME IN MECHANICAL ENGINEERING

RATIONALE

Mechanical Engineering Programme is the unique branch of Engineering, which emphasizes on the courses like Engineering drawing, Design of machine elements, Thermal and Power engineering, Manufacturing processes and materials, etc. In addition of these students are acquainted with courses like Automation, Automobile Engineering, Production management, entrepreneurship development etc.

To develop the overall personality of the students courses like Development of life skills and Entrepreneurship Development are being offered.

In the curriculum students need to earn 180 i.e (160 +20 Inplant) credits for successful completion of Diploma Programme

The courses of the curriculum are grouped at 4 levels viz. Basic, Core, Management and Application courses and Industrial Training is incorporated at 5th semester for enhancing the practical skills

The minimum entry level is 10th, However the curriculum provides "Single Point Entry Credit System (SPEC)" for the students opting admission as a lateral entry i.e 12th . ITI, where in students are entitled to get the exemption in certain courses as per the rules. Also there is flexibility of opting the courses as per the choice of the student.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

After completing the program successfully, candidates will be able to;

PEO1 - Contribute to technological advancement through continuous learning in the field of mechanical engineering

PEO2 - Apply technical knowledge and skills to find effective solutions for the problems in mechanical engineering and other related disciplines

PEO3 - Develop skills in diploma graduates to address the concerns of society and environment by communicating effectively to lead an interdisciplinary diverse team

PROGRAMME OUTCOMES (POs)

On Successful Completion of Diploma Programme in Mechanical Engineering, the pass outs will be able to,

1. **Basic and Discipline specific knowledge:** Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the engineering problems.

2. **Problem analysis:** Identify and analyse well-defined engineering problems using codified standard methods.

3. **Design/ development of solutions:** Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs.

4. **Engineering Tools, Experimentation and Testing:** Apply modern engineering tools and appropriate technique to conduct standard tests and measurements.

5. **Engineering practices for society, sustainability and environment:** Apply appropriate technology in context of society, sustainability, environment and ethical practices.

6. **Project Management:** Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities.

7. **Life-long learning**: Ability to analyse individual needs and engage in updating in the context of technological changes.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

On successful completion of Diploma Programme in Mechanical Engineering, the student will be able to,

Graduates will be able

PSO1- Diploma graduates will be able to apply basic principles in the area of Design and Manufacturing Engineering.

PSO2- Equip diploma graduates with technical skills to provide solutions in the field of Thermal Engineering.

MAPPING OF MISSION AND PROGRAMME EDUCATIONAL OBJECTIVES

Sr. No.	Mission	Component of Mission Statement	PEO1	PEO2	PEO3
1	M1	To impart quality education through continuous up-gradation of curriculum and faculty development	3	3	2
2	M2	To encourage students to solve mechanical engineering and real-life problems through industry-institute interaction	3	3	2
3	M3	To develop entrepreneur qualities and concern for the society	2	2	3

MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES AND PROGRAMME OUTCOMES

Sr. No.	Programme Educational Objectives (PEOs)	Programme Outcomes (POs)
1	Contribute to technological advancement through continuous learning in the field of mechanical engineering	I, II, III, IV,V, VI,VII
2	Apply technical knowledge and skills to find effective solutions for the problems in mechanical engineering and other related disciplines	I, II, III,VI,VII
3	Develop skills in diploma graduates to address the concerns of society and environment by communicating effectively to lead an interdisciplinary diverse team	V,VI

MAPPING OF PROGRAMME SPECIFIC OUTCOMES AND PROGRAMME OUTCOMES

Sr. No.	Programme Specific Outcomes (PSOs)	Programme Outcomes (POs)
1	Diploma graduates will be able to apply basic principles in the area of Design and Manufacturing Engineering.	I,II,III,IV,V,VI,VII
2	Equip diploma graduates with technical skills to provide solutions in the field of Thermal Engineering	I,II,III,VI,V,VI,VII

MAPPING OF PROGRAMME OUTCOME AND COURSES

PO No.	Program Outcome (POs)	Course Name
1	**Basic and Discipline specific knowledge:** Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the engineering problems.	Basic Mathematics Applied Chemistry Communication Skills Engineering Drawing Development of life Skills Basics of Electrical & Electronics Basic of Mould Design Applied Physics
2	**Problem analysis:** Identify and analyse well-defined engineering problems using codified standard methods.	Applied Mechanics Engineering Drawing Workshop Practice Applied Mathematics Strength of Materials Metrology & Quality Control Inplant Training
3	**Design/ development of solutions:** Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs.	Mechanical Engineering Drawing Applied Mathematics Strength of Materials Automation Project Tool Design and Process Planning

4	**Engineering Tools, Experimentation and Testing:** Apply modern engineering tools and appropriate technique to conduct standard tests and measurements.	Strength of Materials Metrology & Quality Control Industrial Fluid Power Tool Design Process Planning
5	**Engineering practices for society, sustainability and environment:** Apply appropriate technology in context of society, sustainability, environment and ethical practices.	Environmental Studies Development of Life skills Workshop Practice Inplant Training
6	**Project Management:** Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities.	Communication Skills Development of Life skills Entrepreneurship Development Production Management Project Inplant Training
7	**Life-long learning:** Ability to analyse individual needs and engage in updating in the context of technological changes.	Basic Mathematics, Applied Mathematics Engineering Mathematics Communication Skills Development of Life skills Stress Management Project Inplant Training

PROGRAMME- DIPLOMA IN MECHANICAL ENGINEERING

SAMPLE PATH SCHEME – 2019

ENTRY LEVEL= 10^{th} +

Nature of Course	**SEM I**	**SEM II**	**SEM III**	**SEM IV**	**SEM V**	**SEM VI**	**Total**
Compulsory	BMT (05)	EMT (05)	AMT (04)	AUT (05)	IPT (24 Weeks)	MQC (05)	
	ACH (06)	APH (06)	FMH (05)	TOM (05)		DME (06)	
	EVS (02)	CMS (04)	MED (06)	IFP (05)		MPP (04)	
	DLS (03)	ENG (06)	THE (05)	PER (05)		PMT (05)	
	APM(06)	MPM (06)	SOM (06)	MPR (06)		PRO (06)	
	EDG(6)		--	--		--	
	WSP (04)		--	--		--	
Total Credits	**32**	**27**	**26**	**26**	**20**	**26**	**157**
Optional/ Elective	---	PIC (05) STM (02)	**Optional** BEE (06)	**Optional** MMC (05) HVA (05) **Elective –I (Any One)** AEG (05) MEC (05) MHS (05) ECA (05)	-	**Optional** EDP (04) **Elective –II (Any One)** WCM (05) CAD (05) TDP (05) PPE (05)	
Total Optional Credits	-	07	06	10	-	04	27
Total Credits Electives	-	-	-	05	-	05	10
Total Courses	07	06	06	08	-	07	34
Total Credits (C+O+E)	**32**	**34**	**32**	**41**	**20**	**35**	**194**
						Grand Total of Credits	**194**

C: Compulsory, O: Optional, E: Elective courses

Shri Vile Parle Kelavani Mandal`s
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CURRICULUM

THREE YEARS FULL TIME DIPLOMA COURSE WITH INPLANT TRAINING IN **MECHANICAL ENGINEERING** (Semester Pattern)

Head Mech. Engineering Department
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC

Approved Copy

Curriculum Co-Ordinator / COE

PRINCIPAL
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
VILE PARLE (W.), MUMBAI 400 056.

Shri Vile Parle Kelavani mandal's

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC

TEACHING AND EXAMINATION SCHEME

PROGRAMME : MECHANICAL ENGINEERING **w.e.f. batch admitted June, 2019 (Progressively)**

SEMESTER : I **DURATION: 16 WEEKS**

Sr no	COURSE NAME (CODE)	SCEME OF INSTRUCTIONS & PERIODS PER WEEK					NO. OF PAPERS, DURATION & MARKS (ESE)		SCHEME OF EXAMINATION AND MAXIMUM MARKS							GR	Scheme L/P/Cr.
		L	P	D	T	Cr (L+P+D+T)	HRS	Mks	SSL	TA	TH	TW	PR.	OR	TOTAL		
1.1	Basic Mathematics BMT190001	3	-	-	2	5	3	70	20	10	70	25	-	-	125	B*	325
1.2	Applied Chemistry ACH190002	4	2	-	-	6	1	@70	20	10	70	25	50	-	175	B*	426
1.3	Environmental studies EVS190003	2	-	-	-	2	-	-	-	-	-	50	-	-	50	B*	202
1.4	Development of Life skills DLS190004	2	-	-	1	3	-	-	-	-	-	50	-	50	100	B*	213
1.5	Applied Mechanics APM190005	3	2	-	1	6	3	70	20	10	70	50	-	-	150	C*	336
1.6	Engineering Drawing EDG190201	2	-	4	-	6	3	70	20	10	70	50	-	50	200	C*	246
1.7	Workshop Practice WSP190008	-	4	-	-	4	-	-	-	-	-	50	-	-	50	C*	044
	TOTAL	16	8	04	04	32	No. of Papers = 04		80	40	280	300	50	100	850		16/16/32
		Total periods (32)							Total Marks =850								

Theory and practical periods of 1 Hour duration each * Compulsory, # Award Winning, @Online Examination L- Lecture, P- Practical, D-Drawing Practice, T- Tutorial, Cr- Credit, ESE-End Semester Examination, SSL- Sessional, TA-Teachers assessment, TH-Theory, TW- Term Work, PR- Practical, OR- Oral, Gr- Group, B - Basic, C - Core, A - Application, M - Management

TA- Based on attendance, MCQ/ seminar/mini project/assignment/model making etc.

PR/OR- Assessed by Internal and External Examiners Jointly, TW- Assessed by Internal Examiner Only

Head of Department **Controller of Examination** **Secretary CDC** **Principal**

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC MUMBAI 400056

Shri Vile Parle Kelavani mandal's

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC

TEACHING AND EXAMINATION SCHEME

PROGRAMME : MECHANICAL ENGINEERING **w.e.f. batch admitted June, 2019 (Progressively)**

SEMESTER : II **DURATION: 16 WEEKS**

Sr no	COURSE NAME (CODE)	SCEME OF INSTRUCTIONS & PERIODS PER WEEK					NO. OF PAPERS, DURATION & MARKS (ESE)		SCHEME OF EXAMINATION AND MAXIMUM MARKS							GR	Scheme L/P/Cr.
		L	P	D	T	Cr (L+P+D+T)	HRS	Mks	SSL	TA	TH	TW	PR.	OR	TOTAL		
2.1	Engineering Mathematics EMT190009	3	-	-	2	5	3	70	20	10	70	25	-	-	125	B*	325
2.2	Applied Physics APH190010	4	2	-	-	6	1	@70	20	10	70	25	50	-	175	B*	426
2.3	Communication skills CMS190011	3	-	-	1	4	3	70	20	10	70	25	-	-	125	B*	314
2.4	Engineering Graphics ENG190202	1	2	3	-	6	3	70	20	10	70	50	50	-	200	C*	156
2.5	Manufacturing Processes and Materials MPM190203	2	4	-	-	6	3	70	20	10	70	50	-	25	175	C*	246
2.5	Programming in C++ PIC190204	2	3	-	-	5	-	-	-	-	-	50	50	-	100	A	235
2.6	Stress Management STM190012	-	2	-	-	2	-	-	-	-	-	-	-	-	-	M	022
	TOTAL	15	13	03	03	34	No. of Papers = 05		100	50	350	225	150	25	900		15/19/34
		Total Periods = 34							Total Marks =900								

Theory and practical periods of 1 Hour duration each * Compulsory, # Award Winning, @Online Examination L- Lecture, P- Practical, D-Drawing Practice, T- Tutorial, Cr- Credit, ESE-End Semester Examination, SSL- Sessional, TA-Teachers assessment, TH-Theory, TW- Term Work, PR- Practical, OR- Oral, Gr- Group, B - Basic, C - Core, A - Application, M - Management

TA- Based on attendance, MCQ/ seminar/mini project/assignment/model making etc.

PR/OR- Assessed by Internal and External Examiners Jointly, TW- Assessed by Internal Examiner Only

Head of Department **Controller of Examination** **Secretary CDC** **Principal**

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC MUMBAI 400056.

Shri Vile Parle Kelavani mandal's

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC

TEACHING AND EXAMINATION SCHEME

PROGRAMME : MECHANICAL ENGINEERING **w.e.f. batch admitted June, 2019 (Progressively)**

SEMESTER : III **DURATION: 16 WEEKS**

Sr no	COURSE NAME (CODE)	SCEME OF INSTRUCTIONS & PERIODS PER WEEK					NO. OF PAPERS, DURATION & MARKS (ESE)		SCHEME OF EXAMINATION AND MAXIMUM MARKS							GR	Scheme L/P/Cr.
		L	P	D	T	Cr (L+P+D+T)	HRS	Mks	SSL	TA	TH	TW	PR.	OR	TOTAL		
3.1	Applied Mathematics AMT190013	3	-	-	1	4	3	70	20	10	70	25	-	-	125	C*	314
3.2	Fluid Mechanics & Hydraulic Machines FMH190205	3	2	-	-	5	3	70	20	10	70	50	50	-	200	C*	325
3.3	Mechanical Engineering Drawing MED190206	1	-	5	-	6	4	70	20	10	70	50	-	50	200	C*	156
3.4	Thermal engineering THE190207	3	2	-	-	5	3	70	20	10	70	25	-	25	150	C*	325
3.5	Strength of materials SOM190015	4	2	-	-	6	3	70	20	10	70	50	-	-	150	C*	426
3.6	Basics of electrical and electronics BEE190016	4	2	-	-	6	3	70	20	10	70	25	-	25	150	B	426
	TOTAL	18	8	5	1	32	Papers = 06		120	60	420	225	50	100	975		18/14/32
		Total Periods (32)							Total Marks =975								

Theory and practical periods of 1 Hour duration each * Compulsory, # Award Winning, @Online Examination L- Lecture, P- Practical, D-Drawing Practice, T- Tutorial, Cr- Credit, ESE-End Semester Examination, SSL- Sessional, TA-Teachers assessment, TH-Theory, TW- Term Work, PR- Practical, OR- Oral, Gr- Group, B - Basic, C - Core, A - Application, M - Management

TA- Based on attendance, MCQ/ seminar/mini project/assignment/model making etc.

PR/OR- Assessed by Internal and External Examiners Jointly, TW- Assessed by Internal Examiner Only

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SHRI BHAGUBHAI MAFATLAL POLYTECHNIC MUMBAI 400056.

Shri Vile Parle Kelavani mandal's

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC

TEACHING AND EXAMINATION SCHEME

PROGRAMME : MECHANICAL ENGINEERING — **w.e.f. batch admitted June, 2019 (Progressively)**

SEMESTER : IV — **DURATION: 16 WEEKS**

Sr no	COURSE NAME (CODE)	SCEME OF INSTRUCTIONS & PERIODS PER WEEK					NO. OF PAPERS, DURATION & MARKS (ESE)		SCHEME OF EXAMINATION AND MAXIMUM MARKS							GR	Scheme L/P/Cr.
		L	P	D	T	Cr (L+P+D+T)	HRS	Mks	SSL	TA	TH	TW	PR.	OR	TOTAL		
4.1	# Automation AUT190208	3	2	-	-	5	3	70	20	10	70	50	-	50	200	A*	325
4.2	Theory of machines TOM190209	3	2	-	-	5	3	70	20	10	70	50	-	25	175	C*	325
4.3	#Industrial Fluid Power IFP190210	3	2	-	-	5	3	70	20	10	70	50	-	50	200	A*	325
4.4	Power Engineering & Refrigeration PER190211	3	2	-	-	5	3	70	20	10	70	25	-	25	150	C*	325
4.5	Machining processes MPR190212	2	4	-	-	6	-	-	-	-	-	50	-	50	100	C*	246
4.6	# Elective-I (Any One)																
	(i)Automobile Engineering AEG190213	3	2	-	-	5	3	70	20	10	70	50	-	50	200	A*	325
	(ii) Mechatronics MEC190214	3	2	-	-	5	3	70	20	10	70	50	-	50	200	A*	325
	(iii) Material Handling Systems MHS190215	3	2	-	-	5	3	70	20	10	70	50	-	50	200	A*	325
	(iv)Energy Conservation and Audit ECA190216	3	2			5	3	70	20	10	70	50	-	50	200	A*	325
4.7	Mechanical Measurements & Control MMC190217	3	2	-	-	5	3	70	20	10	70	25	-	25	150	A	325
4.8	Heating, Ventilation & Air conditioning HVA190218	3	2	-	-	5	3	70	20	10	70	25	-	25	150	A	325
	TOTAL	23	18	-	-	41	Papers = 07		140	70	490	325	--	300	1325		23/18/41
		Total periods 41							Total Marks =1325								

Theory and practical periods of 1 Hour duration each * Compulsory, # Award Winning, @Online Examination L- Lecture, P- Practical, D-Drawing Practice, T- Tutorial, Cr- Credit, ESE-End Semester Examination, SSL- Sessional, TA-Teachers assessment, TH-Theory, TW- Term Work, PR- Practical, OR- Oral, Gr- Group, B - Basic, C - Core, A - Application, M - Management

TA- Based on attendance, MCQ/ seminar/mini project/assignment/model making etc.

PR/OR- Assessed by Internal and External Examiners Jointly, TW- Assessed by Internal Examiner Only

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Shri Vile Parle Kelavani mandal's

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC

TEACHING AND EXAMINATION SCHEME

PROGRAMME : MECHANICAL ENGINEERING **w.e.f. batch admitted June, 2019 (Progressively)**

SEMESTER : V **# INPLANT TRAINING**

Sr. No.	Course Name (Code)	Training Duration (Code)	Credit		Weekly Report	Quiz Test Marks	Dissertation (Report)	Oral/ Viva	Total	GR
5.1	# Inplant Training (IPT190228)	26 Weeks **	20	Maximum Marks	50	50	50	50	200	A*
				Minimum Marks	20	20	20	20	80	

***** Total Inplant training duration 26 weeks equal to 24 weeks actual training plus two weeks examination and processing.**

*Compulsory, # Award Winning, Weekly report*Compulsory, # Award Winning, Weekly Report and Quiz Test are assessed by Internal Examiner Only, Dissertation and Oral/Viva are Assessed by Internal and External Examiner Jointly

Gr- Group, **B**- Basic, **C**- Core, **A**- Application, **M**- Management

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Shri Vile Parle Kelavani mandal's

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC

TEACHING AND EXAMINATION SCHEME

PROGRAMME : MECHANICAL ENGINEERING **w.e.f. batch admitted June, 2019 (Progressively)**

SEMESTER : VI **DURATION: 16 WEEKS**

Sr no	COURSE NAME (CODE)	SCEME OF INSTRUCTIONS & PERIODS PER WEEK					NO. OF PAPERS, DURATION & MARKS (ESE)		SCHEME OF EXAMINATION AND MAXIMUM MARKS							GR	Scheme L/P/Cr.
		L	P	D	T	Cr (L+P+D+T)	HRS	Mks	SSL	TA	TH	TW	PR.	OR	TOTAL		
6.1	# Metrology & quality control MQC190219	3	2	-	-	5	3	70	20	10	70	50	50	-	200	A*	325
6.2	# Design of machine elements DME190220	3	3	-	-	6	4	70	20	10	70	50	-	50	200	A*	336
6.3	Modern Production Processes MPP190221	2	2	-	-	4	3	70	20	10	70	25	-	25	150	A*	224
6.4	# Production Management PMT190222	3	2	-	-	5	3	70	20	10	70	50	-	50	200	M*	325
6.5	# Project PRO190223	-	6	-	-	6	-	-	-	-	-	50	-	50	100	A*	066
6.6#	Elective-II (Any One)																
	(i) World class Manufacturing Systems WCM190224	2	3	-	-	5	3	70	20	10	70	50	-	50	200	A*	235
	(ii)Computer Aided Design/Computer Aided Manufacturing/ Computer Aided Engineering CAD190225	2	3	-	-	5	3	70	20	10	70	50	-	50	200	A*	235
	(iii)Tool design & process planning TDP190226	2	3	-	-	5	3	70	20	10	70	50	-	50	200	A*	235
	(iv)Power Plant Engineering PPE190227	2	3	-	-	5	3	70	20	10	70	50	-	50	200	A*	235
6.7	Entrepreneurship Development EDP190018	2	2	-	-	4	3	70	20	10	70	50	-	-	150	M	224
	TOTAL	15	20	-	-	35	Papers = 06		120	60	420	325	50	225	1200		15/20/35
		Total periods (35)							Total Marks =1200								

Theory and practical periods of 1 Hour duration each * Compulsory, # Award Winning, @Online Examination L- Lecture, P- Practical, D-Drawing Practice, T- Tutorial, Cr- Credit, ESE-End Semester Examination, SSL- Sessional, TA-Teachers assessment, TH-Theory, TW- Term Work, PR- Practical, OR- Oral, Gr- Group, B - Basic, C - Core, A - Application, M - Management

TA- Based on attendance, MCQ/ seminar/mini project/assignment/model making etc.

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Shri Vile Parle Kelavani mandal's

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC

TEACHING AND EXAMINATION SCHEME

LIST OF AWARD WINNING COURSES

PROGRAMME : MECHANICAL ENGINEERING **w.e.f. batch admitted June, 2019 (Progressively)**

Sr no	COURSE NAME (CODE)	SCEME OF INSTRUCTIONS & PERIODS PER WEEK					NO. OF PAPERS, DURATION & MARKS (ESE)		SCHEME OF EXAMINATION AND MAXIMUM MARKS							GR	Scheme L/P/Cr.
		L	P	D	T	Cr (L+P+D+T)	HRS	Mks	SSL	TA	TH	TW	PR.	OR	TOTAL		
1	# Automation AUT190208	3	2	-	-	5	3	70	20	10	70	50	-	50	200	A*	325
2	#Industrial Fluid Power IFP190210	3	2	-	-	5	3	70	20	10	70	50	-	50	200	A*	325
3	# Elective-I (Any One)																
	(i)Automobile Engineering AEG190213	3	2	-	-	5	3	70	20	10	70	50	-	50	200	A*	325
	(ii) Mechatronics MEC190214																
	(iii) Material Handling Systems MHS190215																
	(iv)Energy Conservation and Audit ECA190216																
4	# Metrology & quality control MQC190219	3	2	-	-	5	3	70	20	10	70	50	50	-	200	A*	325
5	# Design of machine elements DME190220	3	3	-	-	6	4	70	20	10	70	50	-	50	200	A*	336
6	# Production Management PMT190222	3	2	-	-	5	3	70	20	10	70	50	-	50	200	M*	325
7	# Project PRO190223	-	6	-	-	6	-	-	-	-	-	50	-	50	100	A*	066
8	Elective-II (Any One)																
	(i) World class Manufacturing Systems WCM190224	2	3	-	-	5	3	70	20	10	70	50	-	50	200	A*	235
	(ii)Computer Aided Design/Computer Aided Manufacturing/ Computer Aided Engineering CAD190225																
	(iii)Tool design & process planning TDP190226																
	(iv)Power Plant Engineering PPE190227																
9	Inplant Training (IPT190228)	-	-	-	-	20	-	-	-	-	-	50	-	50	100	A*	-/-/20
	Total	20	22			62	No. of papers = 07		140	70	490	450	50	400	1600		20/22/ 42+20
		Total Periods = 42							Total Marks =1500+100=1600								

Theory and practical periods of 1 Hour duration each * Compulsory, # Award Winning, @Online Examination L- Lecture, P- Practical, D-Drawing Practice, T- Tutorial, Cr- Credit, ESE-End Semester Examination, SSL- Sessional, TA-Teachers assessment, TH-Theory, TW- Term Work, PR- Practical, OR- Oral, Gr- Group, B - Basic, C - Core, A - Application, M - Management TA- Based on attendance, MCQ/ seminar/mini project/assignment/model making etc.PR/OR- Assessed by Internal and External Examiners Jointly, TW- Assessed by Internal Examiner Only

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SHRI BHAGUBHAI MAFATLAL POLYTECHNIC MUMBAI 400056.

Credit Summary for 2019 Scheme

Gr	SEMESTER I		SEMESTER II		SEMESTER III		SEMESTER IV		SEMESTER V		SEMESTER VI		Total
	C*	O	C*	O	C*	O	C*	O	C*	O	C*	O	
B	16	-	15	-	-	06	-	-	-	-	-	-	37
C	16	-	12	-	26	-	16	-	-	-	-	-	70
A	-	-	-	05	-	-	15	10	20	-	26	-	76
M	-	-	-	02	-	-	-	-	-	-	05	04	11
	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	32	-	27	07	26	06	31	10	20	-	31	04	194

C*-compulsory, O-optional, Gr -Group, B - Basic, C - Core, A - Application, M - Management

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SHRI BHAGUBHAI MAFATLAL POLYTECHNIC * MUMBAI 400056.

Credit Summary

Group	Max. Credit	Compulsory Credit	Optional Credit	Remark
B = Basic	37	31	06	
C = Core	70	70	-	
A= Application	56	41	15	
M = Management	11	05	06	
Total	**174**	147	27	

Compulsory Credit : 147

Optional Credit : 27

Inplant Training Credit : 20

TOTAL CREDIT : 194

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SHRI BHAGUBHAI MAFATLAL POLYTECHNIC MUMBAI 400056.

RATIO OF THEORY : PRACTICAL		
Total Theory Crédits Offered	**Total Practical Credits Offered**	**Theory : Practical**
87	**107**	**45 :55**
Total Theory Credits (Award Winning)	**Total Practical Credits (Award Winning)**	
20	**42 (22+20)**	**33 :67**
Total TH/SSL Exam Marks for Offered Courses	**Total TA/TW/PR/OR Exam Marks for Offered Courses**	
2160	**3190**	**40 :60**
Total TH/SSL Exam Marks for Award Winning Courses	**Total TA/TW/PR/OR Exam Marks for Award Winning Courses**	
630	970	39 :61

	Total Credits/Marks offered					**Award winning Credits/Marks**			
Semester	**Theory credits**	**Marks**	**Practical credits**	**Marks**		**Theory credits**	**Marks**	**Practical credits**	**Marks**
Semester I	**16**	**360**	**16**	**490**		**--**	**--**	**--**	**--**
Semester II	**15**	**450**	**19**	**450**		**--**	**--**	**--**	**--**
Semester III	**18**	**540**	**14**	**435**		**--**	**--**	**--**	**--**
Semester IV	**23**	**630**	**18**	**695**		**9**	**270**	**6**	**330**
Semester V	**--**	**--**	**20**	**100**		**-**	**-**	**20**	**100**
Semester VI	**15**	**540**	**20**	**660**		**11**	**360**	**16**	**540**
Total	**87**	**2160**	**107**	**3190**		**20**	**630**	**42**	**970**

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC * MUMBAI 400056.

1. COURSE DETAILS

Programme: CE/ME/EE/IE/PL/CH/DE	Semester: I
Course: Basic Mathematics	Group: B*
Course Code: BMT190001	Duration: 16 Weeks

2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per Week					Examination Scheme and Maximum Marks							
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D+T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
3	-	-	2	5	3	70	20	10	70	25	-	-	125

3. COURSE OBJECTIVE:

This Course is being introduced to provide mathematical background needed for any Diploma engineer. It intends to enable the students to apply basic facts, concepts and principles of algebra, trigonometry, Determinants, Matrices, functions and Limits as a tool to analyze engineering problems.

4. SKILL COMPETENCY

The aim of this course is to help the student to attain the following industry identified

Competency through various teaching learning experiences:

- Solve broad-based Engineering problems using the Basic Knowledge of mathematics

5. COURSE OUTCOMES (COs) At the end of the semester student will be able to: -

CO No.	COURSE OUTCOME	Bloom's LEVEL
1	Apply the concepts of algebra to solve engineering related problems.	R, U
2	Utilize basic concepts of trigonometry to solve elementary engineering problems.	R,U,A
3	Solve problems based on Determinants and Matrices.	U,A
4	Study the concept of function and limits and apply them into engineering	R,U,A

6. COURSE CONTENTS

Sr No.	TOPIC Sub-Topics	Hours	Marks	Cos
1	**Logarithm** 1.1 Concept 1.2 Basic Laws of logarithm (without proof) 1.3 Numerical on Change of Base (without proof)	03	04	CO1
2	**Partial Fraction** 2.1 Introduction: Proper and improper fractions 2.2 Type 1: Non-repeated linear factor 2.3 Type 2: Repeated linear factor 2.4 Type 3: Irreducible quadratic form 2.5 Examples using Substitution	04	07	CO1

3	**Straight Lines** 3.1 Revision: Slope of straight lines 3.2 Revision: Various form of Straight lines 3.3 General equation of line and its relation to standard form 3.4 Angle between two lines 3.5 Condition of parallel and perpendicular lines 3.6 Perpendicular distance from a point on the line 3.7 Perpendicular distance between two parallel lines.	**05**	**09**	**CO1**
4	**Trigonometry** 4.1 Revision of Trigonometry Formulas 4.2 Trigonometric ratios of Compound, allied, multiple and sub-multiple angles (without proofs) 4.3 Factorization and de-factorization formulae (without proofs) 4.4 Inverse Trigonometric function 4.5 Principle values and Relation between Trigonometric and Inverse Trigonometric function.	**12**	**15**	**CO2**
5	**Determinants & Matrices** 5.1 Revision: Determinants of 2 x 2 order 5.2 Value of Determinants of 3 x 3 order 5.3 Cramer's rule to solve three unknowns 5.4 Introduction to Matrices 5.5 Algebra of Matrices 5.6 Transpose, Adjoint and Inverse of Matrices 5.7 Solution of simultaneous equation by Matrix inversion method. (2 and 3	**12**	**18**	**CO 3**
6	**Function** 6.1 Introduction and Definition 6.2 Simple Numerical based on concept of function 6.3 Odd and Even Functions	**04**	**07**	**CO 4**
7	**Limits** 7.1 Introduction and Definition 7.2 Concepts of limits 7.3 Limits of algebraic, trigonometric, exponential and logarithmic functions	**08**	**10**	**CO 4**
	Total	**48**	**70**	

7. LIST OF ASSIGNMENTS/TUTORIALS

Term Work consists of Journal containing minimum no of 12 tutorials.

Sr. No.	Title of Tutorial	Approx.Hrs required	COs
1	Assignments on Logarithms based on laws and change of base.	2	1
2	Assignments on partial fraction (Non-repeated and repeated linear factor)	2	1
3	Assignments on partial fraction (Irreducible quadratic form and using Substitution)	2	1
4	Assignments on straight lines. (General equation of line and Angle between two lines)	2	1
5	Assignments on straight lines. (Condition of parallel and perpendicular lines Perpendicular distance from a point on the line Perpendicular distance between two parallel lines.)	2	
6	Assignments on trigonometric. (Trigonometric ratios of Compound, allied, multiple and sub-multiple angles. Factorization and de-factorization formulae.)	4	2
7	Assignments on trigonometric. (Inverse Trigonometric function)	2	2
8	Assignments on Determinates. (Basic solving and Cramer's rule)	2	2

9	Assignments on matrices. (Algebra of Matrices ,Transpose, Adjoint and Inverse of Matrices)	2	3
10	Assignments on matrices. (solving equations using matrix method)	2	3
11	Practicing matrices and on Matlab.	4	3
12	Assignments on function. (Types of functions)	2	4
13	Assignments on Limits. (Limits of algebraic, trigonometric, exponential and logarithmic functions	4	4
	Total	32	

8. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan/Tutorials
2. Assignments
3. Home Work Assignment

9. LEARNING RESOURCES

Sr. No.	Title Of Book	Author	Publication
1.	Basic Mathematics	Shri. B.M. Patel, Shri J.M. Rawal	Nirali Prakashan Mumbai
2.	Calculus for Polytechnics	Shri. S.P.Deshpande	Pune Vidyarthi Graha Prakashan Pune-30
3.	Higher Engineering Mathematics	Dr. B.S. Grewal	Khanna Publishers 2/B, Delhi-6
4	Basic Mathematics	G.V.Kumbhojkar	P.Jamnadas LLP

10. WEB REFERENCES

1. www.mic-mathematics.com
2. www.math.com
3. www.lenerstv.com
4. www.onlinetutorials.com

11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Sr. No.	TOPIC	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Logarithm	2	2		04
2	Partial Fraction	3	4		07
3	Straight Lines	2	5	2	09
4	Trigonometry	3	5	7	15
5	Determinates & Matrices	3	12	3	18
6	Function	2	3	2	07
7	Limits	3	4	3	10
TOTAL		18	35	17	70

R Remembering, U Understanding, A Applying and Above (Bloom's revised taxonomy levels)

NOTE: This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of Cos. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.

Sr. No.		NAME	SIGNATURE
1	Internal	MS.Kavita.K.Dange	
2	Internal	Mr.R.R.Ambade	
3	Internal	Mr.U.J.Patel	
4	External	Ms.Meena Gawas Organisation: Mithibai College Of Arts and Science	

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
MUMBAI
400056.

1. COURSE DETAILS

Programme: CE/ME/EE/IE/PE/CHE/DE	**Semester: I/II**
Course: Applied Chemistry	**Group: B***
Course Code:ACH190002	**Duration:16 Weeks**

2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per Week					Examination Scheme and Maximum Marks								
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D+T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
4	2	--	--	6	1	@70	20	10	70	25	50	--	175

3. COURSE OBJECTIVE

The course of applied chemistry is designed considering two aspects

a. Basic principles of Chemistry

b. Chemistry of materials

The basic principles of Chemistry as in Atomic Structure, Electrochemistry, concepts of Corrosion and Lubrication are essential to understand the various processes and their feasibility while the knowledge of chemical behavior of different chemicals and materials (metallic and non-metallic) help in appropriate selection of material for various engineering applications. The selection of materials not only depend on physical and chemical behavior but is also based on environmental and ecofriendly factors.

4. SKILL COMPETENCY

Following Skills and competency will be developed

- Identify the concepts involved in various industrial processes.
- Handle, operate equipment and reagents.
- Measure the values and interpret the observation.
- Accuracy in recording and record keeping.
- Safety and care of basic instruments, glassware.

5.COURSE OUTCOMES(COs) At the end of the semester student will be able to: -

CO No.	COURSE OUTCOME	Bloom's LEVEL
CO1	Predict the chemical and physical properties of different elements and write the correct names and formulae of different compounds.	Remember
CO2	Select appropriate cells/batteries for different purposes.	Understand, Apply
CO3	Select appropriate material- metallic, non-metallic, lubricants for different engineering applications.	Understand, Apply
CO4	Identify the type of corrosion and apply suitable preventive measures.	Understand, Apply
CO5	Analyse water sample and predict its suitability for various processes.	Understand, Apply

6. COURSE CONTENTS

Sr. No.	TOPIC/ Sub-Topics	Hours	Marks	COs
1	**1. Atomic Structure** 1.1 Structure of atom Definition of Atom, Fundamental Particles of Atom – their Mass, Charge, Location, Definition of Atomic no, Atomic Mass no., Isotopes & Isobars 1.2 Bohr's Theory and Quantum Numbers Concept of Orbits & Orbitals. 1.3 Rules for distribution of electrons in an atom Hund's Rule, Aufbau's Principle, Pauli's exclusion principle Electronic configuration of first twenty elements 1.4 Nuclear stability and Numerical problems based on it 1.5 Chemical Bonding Valency, Octet Rule, Duplet Rule Formation of Electrovalent & Covalent Compounds e.g. NaCl, $CaCl_2$, MgO, $AlCl_3$, CO_2, H_2O, Cl_2, NH_3, C_2H_4, N_2, C_2H_2	12	15	CO1
2	**2. Electrochemistry** 2.1 Concept of Ionisation & Electrolytic Dissociation Arrhenius' theory, Degree of ionization 2.2 Electrolysis. Terms Involved in Electrolysis. Mechanism of electrolysis. Faraday's Laws of Electrolysis and Numerical problems based on it. 2.3 Applications of electrolysis Electroplating & Electro refining, Electrometallurgy & Electrotyping 2.4 Cells and Batteries – Classification Primary cell (Daniel cell), Secondary cell (Lead Acid Storage cell) Lithium batteries Solar cells – advantages, disadvantages.	10	10	CO2

3	**3. Metals & Alloys Metals** 3.1 Characteristics of Metals 3.2 General Metallurgical processes 3.3 Physical properties and applications of some commonly used metals such as Fe, Cu, Al, Cr, Ni, Sn, Pb, Zn, Ag and Si. 3.4 Alloys Preparation, purposes of making alloy, classification (Ferrous & Non Ferrous) Composition, properties and application of Duralumin, Magnalium, Monel Metal, Gun metal, Brass, Bronze, Babbit metal and Ferrous alloys Alnico, Stainless Steel.	09	10	CO3
4	**4. Water and pH:** 4.1 Physical and chemical characteristics of water. 4.2 Hardness of water a) Causes and Types of Hardness b) Disadvantages of hard water – (Domestic and Industrial) Hard water in boilers and prevention: Boiler corrosion, caustic embrittlement, priming and foaming, scales and sludge. 4.3 Degree of Hardness and numerical problems based on it. 4.4 Water softening: zeolite process, ion exchange process (cation exchange and anion exchange). 4.5 Acids and bases 4.6 pH Concept of pH Applications of pH and numerical problems based on it.	09	09	CO5
5	**5. Corrosion and Protective Coatings:** **Corrosion:** 5.1 Types of Corrosion 5.2 Mechanism of Corrosion 5.3 Factors affecting corrosion 5.4 Methods of prevention of corrosion. 5.5 Methods of applying Metal coatings.	11	11	CO4
6	**6. Lubricants:** 6.1 Definition 6.2 Functions of Lubricants 6.3 Theories of lubrication 6.4 Classification and characteristics of Lubricants 6.5 Selection of Lubricants for different machines	07	06	CO3
7	**7. Non-Metallic Engineering Materials** 7.1 Polymerization, Types. 7.2 Plastics – Definition, types, compounding of plastic, properties and application 7.3 Rubber – Natural rubber & synthetic rubber properties of rubber, applications of rubber. Vulcanization of Rubber. 7.4 Thermal Insulators – Definition, characteristics, preparation, properties and applications of thermocole and glasswool.	06	09	CO3
	TOTAL	**64**	**70**	

7. LIST OF PRACTICALS

Term Work consists of Journal containing minimum no. of 10 experiments

Sr. No.	Title of Experiment	Approx.Hrs required	COs
01 to 03	Techniques of determination of concentration of solutions: Volumetric Analysis a) Neutralization Titration i) Titration between Strong Acid and Strong Base using Phenolphthalein as indicator – 2 sets b) Redox Titration i) Titration between $KMnO_4$ and $FeSO_4.7H_2O$	10	CO4 CO5
04 to 05	Determination of: a) Hardness of water using EDTA b) Chloride content in water	04	CO5
06	Determination of pH of different solutions.	02	CO5
07 to 08	Qualitative Analysis of **Two Solutions** containing One Basic and One Acidic Radical listed below: a) **Basic Radicals**: Pb^{+2}, Cu^{+2}, Al^{+3}, Fe^{+2}, Fe^{+3}, Ca^{+2}, Ba^{+2}, Mg^{+2}, K^{+}, Na^{+}. b) **Acidic Radicals**: Cl^{-}, SO_4^{-2}, CO_3^{-2}, NO_3^{-}.	10	CO1 CO2 CO3
09	Determination of Viscosity of a Lubricant.	02	CO3
10	Determination of Flash Point of a Lubricant using: a) Abel's Flash Point Apparatus b) Pensky Marten's Flash Point Apparatus	04	CO3
	TOTAL	**32**	

8.IMPLEMENTATION STRATEGY(PLANNING)

1.Teaching Plan.
2. Minimum no of practical/assignments.
3. Self Learning Online Resources
4. Worksheets for practice

9.LEARNING RESOURSES

Sr. No.	Title Of Book	Author	Publication
1.	Chemistry of Engineering Materials	Jain and Jain	Dhanpat Rai Publishing Co. New Delhi
2.	Engineering Chemistry	Narkhede & Thatte	
3.	Chemistry for Engineering students	Mahadeokar & Dr. U. P. Kodgire	Everest Publishing House, Pune
4	Applied Chemistry	B.S. Godbole	Satya Prakashan, New Delhi
5	Polytechnic Chemistry	Rao A.A.	New Age International 2007
6	Applied Chemistry	Shete S.D.	S. Chand & Company
7	A Text Book of Engineering Chemistry	Dara S.S.	S. Chand & Company, New Delhi-2008

10. WEB REFERENCES

- www.chemistryexplained.com
- https://schools.aglasem.com
- https://www.thebalance.com
- https://water.usgs.gov/edu/hardness.html
- https://engineeringinsider.org
- http://web.mit.edu/5.33/www/lec/poly.pdf

11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

SEM-END ONLINE EXAMINATION

Sr. No.	TOPIC	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Atomic Structure	8	4	3	15
2	Electrochemistry	2	4	4	10
3	Metals and Alloys	4	2	4	10
4	Water and pH	2	4	3	09
5	Corrosion and protective coatings	2	7	2	11
6	Lubricants	2	2	2	06
7	Non-metallic engineering materials	4	2	3	09
TOTAL		24	25	21	70

R Remembering, U Understanding, A Applying, (Bloom's revised taxonomy levels)

NOTE: This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of COs.The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.

12.COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME	SIGNATURE
1	Internal	S.V.Suvarna	
2	Internal	K.P.Bhave	
3	Internal	R.D.Shimpi	
4	External	Dr. S. Usri Organization: Ulhasnagar Polytechnic Thane.	

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC MUMBAI 400056.

1. COURSE DETAILS

Programme: CE/ME/EE/IE/PE/CHE/DE	**Semester: I**
Course: Environmental Studies	**Group :B***
Course Code:EVS190003	**Duration :16 Weeks**

2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per Week					Examination Scheme and Maximum Marks							
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D+T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
2	--	--	--	2	--	--	--	--	--	50	--	--	50

3. COURSE OBJECTIVE

Environmental Sciences is a multidisciplinary course aimed to impart knowledge about the current situation and future prospects of nature and natural resources. It is designed to create awareness of ecosystems of the world, earth's resources –renewable and non-renewable, health benefits of nature and adverse effects with depletion of environment. Such a knowledge can encourage today's generation to switch to safer and better choices.

Environmental education makes people understand the importance of renewable energy. Nonrenewable sources of energy like petrol, diesel etc. are the major sources of the world's pollution. Using renewable sources like ***solar energy, wind energy etc*** is encouraged by Environment Education, and is imperative in our fight against global warming.

4.SKILL COMPETENCY

Following skills and competency will be developed

- Sense of social responsibility.
- Communication and analytical skills.
- Ability to apply knowledge and skills in real-world settings.
- Competence in developing arguments from scientific, ethical and philosophical perspective.

5. COURSE OUTCOMES (COs) At the end of the semester student will be able to: -

CO No.	COURSE OUTCOME	Bloom's LEVEL
CO1	Identify and classify different natural resources and use them prudently.	Remember
CO2	Recognize and categorize the different ecosystems.	Remember
CO3	Estimate the importance of biodiversity and its conservation.	Remember, Understand
CO4	Judge the type of pollution, identify the pollutants and propose and design methods to reduce the same.	Remember, Understand
CO5	Use the information regarding environmental legislation to improve upon their surroundings for the betterment of the community.	Remember, Apply

6.COURSE CONTENT

Sr. No.	TOPIC/ Sub-Topics	Hours	Marks	CO
1	**1. The Multidisciplinary nature of environmental studies:** 1.1 Definition, scope and importance 1.2 Need for public awareness	03	--	CO5
2	**2. Natural Resources: Renewable and non-renewable resources:** 2.1 Natural resources and associated problems **2.2 Forest resources:** Use and over-exploitation, deforestation. Timber extraction, mining, dams and their effects on forest and tribal people. **2.3 Water resources:** Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams' benefits and problems. **2.4 Mineral resources:** Use and exploitation, environmental effects of extracting and using mineral resources. **2.5 Food resources:** World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity. **2.6 Land resources:** Land as a resource, land degradation, man induced landslides, soil erosion and desertification. **2.7 Energy resources:** **2.7.1 Renewable Energy Resources** – Biogas, Solar energy, Wind energy, Energy from falling water, Energy from wastes and tidal energy. **2.7.2 Non-Renewable Energy Resources** – Coal, Oil, Natural gas Issue of economic viability and ability to meet demands. Inequitable use of energy in urban and rural areas	10	--	CO1
3	**3. Eco Systems:** 3.1 Concept of ecosystem 3.2 Major ecosystems in the world	03	--	CO2
4	**4. Biodiversity and Its Conservation** 4.1 Concepts 4.2 Threats to biodiversity 4.3 Value and conservation of biodiversity	02	--	CO3
5	**5. Environmental Pollution** 5.1 Definition Causes, effects and control measures of 5.2 Air pollution 5.3 Water pollution 5.4 Soil pollution 5.5 Noise pollution	07	--	CO4

6	**6. Social issues and the Environment** 6.1 Types of wastes – generation, characteristics, treatment and disposal of: 6.2 Solid waste 6.3 e- waste 6.4 Biomedical waste 6.5 From Unsustainable to Sustainable development 6.6 Water conservation, rain water harvesting, watershed management 6.7 Environmental ethics: Issues and possible solutions like Carbon Credit. 6.8 Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.	05	--	CO5
7	**7. Environmental Protection** 7.1 Environment legislations- 7.2 Legal aspects related to environment 7.3 Brief description of various acts involving air, water and forests. 7.4 ISO-14000 7.5 Issues involved in enforcement of environmental legislation	02	--	CO5
	TOTAL	**32**		

7. LIST OF ASSIGNMENTS

Term Work consists of Journal containing minimum no of 05 Home assignments

Sr. No.	Title of Assignment	COs
1	Write a note on different renewable sources of energy.	CO1,CO3
2	List any two man-made disasters. Analyse their causes and effects on environment.	CO5
3	Analyse the problem of water scarcity and water management in India. Suggest a suitable solution for the same.	CO1
4	Describe one endangered species and measures to protect it.	CO2,CO4,CO5
5	Collect data regarding quality of air in different parts of the city. Analyse and draw conclusion about air pollution in the city.(Group Project)	CO4

8. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
2. Assignment
3. Group discussion
4. Case Study
5. Self-Learning Online Resources
6. Visit to a waste treatment plant

9. LEARNING RESOURSES

Sr. No.	Title Of Book	Author	Publication
1.	Text book of Environmental studies	Erach Bharucha	UGC Press
2.	Environmental studies	Rajagopalan	Oxford University Press
3	Environmental studies	Anandita Basak	Drling Kindersley(India)Pvt. Ltd Pearson
4	Fundamental concepts in Environmental studies	D.D. Mishra	S. Chand & Co. Ltd.
5	Role of Tech. in Environment and Health	Jain and Jain	Dhanpat Rai Publishing Co. New Delhi

10. WEB REFERENCES

- https://study.com/academy/.../what-are-natural-resources-definition-lesson-
- www.yourarticlelibrary.com/biodiversity/biodiversity...ecological-diversity/4474
- https://www.britannica.com/science/pollution-environment
- https://businessworld.in/article/Major-Environmental-Laws-Of-India/09-09-2017-125737

11.COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME	SIGNATURE
1	Internal	S.V.Suvarna	
2	Internal	K.P.Bhave	
3	Internal	R.D.Shimpi	
4	External	Dr. S. Unni	
		Organaisation: Vidyalankar Polytechnic Thane	

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC MUMBAI 400056.

1. COURSE DETAILS: Development of Life skills

Program: CE / ME /EE/ IE/PE/CH/DE	**Semester: I/II**
Course: Development of Life skills	**Group: B***
Course Code : DLS 190004	**Duration:16 Weeks**

2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per week					Examination Scheme and Maximum Marks							
Theory	Practical	Drawing	Tutorial	Credits (L+P+D+T)	Theory Paper Duration and marks		SSL	TA	Theory	TWK	PR	OR	Total
					Hours	Marks							
02	-	-	01	03	-	-	-	-	-----	50	--	50	100

3. COURSE OBJECTIVE: Life skills include psycho-social competencies and interpersonal skills that help people make informed decisions, solve problems, think critically and creatively, communicate effectively, build healthy relationships, empathize with others, by managing one's life in a healthy and productive manner. Life skills are essentially those abilities that help to promote overall wellbeing and competence in young people as they face the problems of real life. Children learn Life Skills from parents, teachers and significant others individuals to translate knowledge, attitude and values into actual abilities.

4. SKILL / COMPETENCY: This course helps the students to develop following skills/ competencies.

1. Decision making
2. Problem solving
3. Time management
4. Presentation and Grooming skills
5. Interpersonal and communication skills

5. COURSE OUTCOMES (Cos) At the end of the semester student will be able to: -

CO No.	COURSE OUTCOMES	Bloom Level
1	Find out one's Strengths, Weaknesses, opportunities and threats to contribute as youth force.	Remember
2	Make use of maximum time for more creative and constructive work.	Application
3	Demonstrate the leadership quality by making decisions while working as team member.	Understand
4	Solve the intra- personal and inter-personal conflict with highly motivated efforts.	Apply

6. COURSE CONTENTS:

Sr. No.	TOPIC/Sub-topic	Hours	COs
1	**PERSONALITY DEVLOPMENT** 1.1 Introduction, 1.2 Determinants of Personality- biological, Psychological and socio- cultural factors. 1.3 Areas of Personality development, 1.4 self-analysis,	03	CO 1
2	**TIME MANAGEMENT** 2.1 Introduction, properties of time 2.2 Time planning, how to plan time, 2.3 Time wasters, Time management 2.4 Time matrix	03	CO 2

3	**STRESS MANAGMENT** 3.1 Definition of stress, 3.2 Types of personality and stress, 3.3 Sources of stress 3.4 Stress Busters 3.5 Psychological reaction to stress 3.6 Yoga and stress control	03	CO 1
4	**PROBLEM SOLVING AND DECISION MAKING** 4.1 Definition, 4.2 Steps in Problem Solving 4.3 Factors Influencing Problem Solving 4.4 Definition Process, Need Consequences, 4.5 Models of Decision Making 4.6 Goal Setting	03	CO 3
5	**POWERPOINT PRESENTATION** 5.1 How to prepare Power point presentation 5.2 Use of aids –OHP, LCD projector, board 5.3 Use of body language and Grooming	04	CO 2
6	**MOTIVATION** 6.1 Introduction to Motivation 6.2 Need for Motivation 6.4 Self- Motivation, 6.5 Theories of Motivation	03	CO 4
7	**CONFLICT MANAGEMENT** 7.1 Definition of Conflict 7.2 Sources of Conflict, 7.3 Types of Conflict, 7.4 Conflict Resolution, 7.5 Steps In Conflict Resolution	03	CO 4

8	**SWOT ANALYSIS** 8.1 Concept of SWOT 8.2 Scope of SWOT, 8.3 SWOT as decision making tool, 8.4 How to go about SWOT	04	CO 1
9	**LEADERSHIP** 9.1 Meaning and Definition of leadership 9.2 Importance of leadership 9.3Types of leaderships: Autocratic, Democratic, bureaucratic, Delegative, liaise Fair	03	CO 3
10	**INTERVIEW AND GROUP DISCUSSION** 10.1 Meaning of Interview and G.D. 10.2 Importance of Interview and G.D. 10.3 Process of Group discussion 10.4 Types of Interview and Do's and Don'ts for Interview	03	CO 1
		32	

7(A) SUGGESTED ASSIGNMENTS: Each student has to write all ten assignment compulsorily as part of term work

Sr. No	Title of Assignments	COs
01.	Identify your areas of self-development and plan strategies to improve it.	CO 1
02.	Prepare your daily time table for any average day, enlist your time- wasters. How can you improve your time utility?	CO 2
03.	Define stress; enlist yours Stress-factors and Stress- busters.	CO 1
04.	Give a power point presentation in team on topic assigned by teacher.	CO 2
05.	Enlist the things that Motivate and Demotivate you.	CO 4
06	Enlist at least ten reasons of interpersonal conflict and solutions on it.	CO 4

07	Do your self-analysis and write down your S.W.O.T. as an individual.	CO1
08.	Describe a situation when you had to make an immediate decision on a critical issue.	CO 3
09	Write an illustration on leader that motivate you.	CO 3
10	Enlist and explain the types of interview with Do's and Don'ts for Interview.	CO 1

Note: # Teacher will do necessary changes in the assignments as per requirements.

7 (B) LIST OF TUTORIALS:

Sr.	Title of Tutorial work	Lab/ Classroom	Hrs.
1.	Role Play / Simulation	Classroom	03
2.	Video Screening	Classroom	02
3	Syndicate Task	Classroom	02
4	Extempore	Classroom	02
5	Case Studies	Classroom	02
6	Debate	Classroom	02
7	Mock interview	Classroom	03
	Total		**16**

8. IMPLEMENTATION STRATEGY (PLANNING)

01. Teaching Plan/Tutorials
02. Minimum TEN no. of assignments
03. Guest/Expert lectures
04. Brainstorming
05. Group discussions
06. Seminar
08. Self-Learning Online Resources
09. Role plays

9. SUGGESTED LEARNING RESOURSES

Sr. No.	Title Of Book	Author	Publication
1.	Development of Generic skill-I Development of life skills -II	K. Sudesh	Nandu Publication ,Mumbai
2.	Personality Development,	Hurlock, B. Elizabeth	Tata Mc Graw Hill Publishing Company Limited, New Delhi. 2007
3.	Life Skills Training for Positive Behaviour	Nair. A. Radhakrishnan,	Rajiv Gandhi National Institute of Youth Development, Tamil Nadu.
4	Managing Time First	Dr.R.L.Bhatia	Wheeler Publishing 1994

10. WEB REFERENCES

1. http://www.cbse.nic.in/cce/life_skills
2. https://www.britishcouncil.gr/en/life-skill
3. https://www.learningliftoff.com
4. https://www.skillsyouneed.com
5. https://bigthink.com

11. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.	NAME OF EXPERTS (Internal)	SIGNATURE
1	Prof. Mr. Balaji M. Pande, Lecturer (Senior Scale)	
2	Prof. Mrs. Anita A. Kulkarni, Head of Department.	
3	Prof. Mrs. Kirti P. Bhave, Lecturer (Selection Grade)	
	NAME OF EXPERTS (External)	
1	Prof. Aanchal Lalla, Lecturer, K.J.S. Polytechnic, Mumbai.	

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC MUMBAI 400056.

1. COURSE DETAILS

Program: CE/ME/PL/CH	**Semester:** I
Course: Applied Mechanics	**Group:** C*
Course Code: APM190005	**Duration:**16 Weeks

2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per week					Examination Scheme and Maximum Marks								
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D+T)	Theory Paper Duration and marks (ESE)		SSL	TA	TH	TW	PR	OR	Total
					Hours	Marks							
3	2	-	1	6	03	70	20	10	70	50	-	-	150

3. COURSE OBJECTIVE

Applied Mechanics course is to study of forces and their effect on moving or stationarybodies, to understand the principles and laws of mechanics, to understand the applications of these principles and laws in various engineering applications. Also, the concept of Mechanics will be prerequisite subject to further courses like materials & structures, analysis of structures and design of structures.

4. SKILL COMPETENCY

The aim of the course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- Apply concepts and behavior of forces on the structures
- Analyze the structure for the loads acting on it in terms of its resultant force, equilibrant force and stability through centre of gravity
- Apply the concept of lifting machines

5. COURSE OUTCOMES (COs)

At the end of the semester student will be able to: -

CO No.	COURSE OUTCOME	Bloom's Level
1.	Resolve force and force system along with the classification for given conditions by applying the basis of mechanics	R, U
2.	Calculate the resultant and equilibrant of system of forces analytically and graphically.	R,U,A
3.	Apply principles and conditions of equilibrium and calculate the reactions at surface of contact.	R,U,A
4.	Apply and calculate force systems to friction, centroid and beam reactions	R,U,A
5.	Calculate and apply velocity ratio, Mechanical Advantage, Frictional losses and efficiency of simple lifting machines.	R,U,A

R-Remember, U-Understand, A-Apply and above (Bloom's revised taxonomy levels)

6. COURSE CONTENTS

Sr. No.	Topic / Sub-topics	Hours	Marks	CO No.
1	**1. Introduction and fundamentals of force system:** 1.1 Mechanics definition, classification, statics & dynamics, kinematics, kinetics 1.2 Fundamental units of measurements (FPS, MKS, SI), derived Units, Conversion of units, Scalars & Vectors with examples 1.3 Definition of particle, body and rigid body, mass & weight. 1.4 Concept of force, definition, unit, graphical representation of force, 1.5 Concept of system of forces, non-coplanar, coplanar, concurrent, Parallel, non-concurrent & non-parallel forces	4	5	CO1

2	**2. Resolution and Composition of forces:** 2.1. Resolution of a force into two components along any direction. 2.2 Resolution of a force into two component straight angles to each other by analytical method. 2.3 Composition and Resultant of force 2.4 Law of parallelogram of forces, 2.5 Moment of force, couples lever arm, 2.6 Varignon's theorem 2.7. Resultant of coplanar concurrent, parallel, and non- concurrent, non-parallel forces	7	10	CO2, CO3
3	**3. Equilibrium** 3.1 Definition of equilibrant, relation between Resultant and Equilibrant, Conditions of Equilibrium, Types of Equilibrium (Stable, Unstable and Neutral equilibrium) 3.2 Equilibrium of coplanar concurrent forces, Lami's theorem 3.3 Equilibrium of coplanar parallel forces & coplanar Non-concurrent Forces. 3.4Analytical conditions of equilibrium for coplanar concurrent & Non-concurrent Forces.	7	10	CO2, CO3
4	4. **Beam Reactions** 4.1 Types of supports: simple, roller hinged & fixed. 4.2 Types of Beams: simply supported, hinged & roller Supported, Cantilever, Overhang Beams 4.3 Types of Loads: Point (Concentrated) Load, Uniformly Distributed Load (UDL) 4.4 Problems on above combination of loads.	6	10	CO4

5	**5. Friction:** 5.1 Definition of friction, force of friction, limiting frictional force, coefficient of friction, angle of friction, angle of repose, relation between angle of friction, angle of repose and coefficient of friction, cone of friction, types of friction, laws of friction, advantages and disadvantages of friction. 5.2 Equilibrium of bodies on level plane –external force applied horizontal and inclined up and down. 5.3 Equilibrium of bodies on inclined plane – external forces is applied parallel to the plane, 5.4 Ladder Friction	7	10	CO4
6	**6. Centroid and Centre of Gravity:** 6.1 Definition of Centre of gravity of solids and centroid of plane laminas 6.2 Concept of parallel forces applied to find c.g. and centroid, centroid /c.g. axes of a body / lamina, c.g. / centroid of basic regular Shapes. (Applications like floating bodies, dams & retaining wall sections, beams, columns sections (rolled steel), simple and built up sections)	7	10	CO4
7	**7. Graphics Statics** 7.1 Space diagram, Bows notation. 7.2 Law of Triangle of forces, Polygon of forces, Force/ Vector diagram 7.3 Resultant and equilibrium of concurrent forces 7.4 Polar diagram, Funicular polygon 7.5Resultant and equilibrium of non–concurrent and nonparallel forces (Applications in finding reactions of beams)	5	7	CO3

8	**8. Simple Lifting Machine:** 8.1 Definition: Mechanical Advantage, Velocity Ratio, Efficiency, Relation between M.A., V.R. and Efficiency, Friction in machine in terms of load & Effort. 8.2 Law of Machine, Maximum M.A., Maximum efficiency, Condition for reversibility of a machine	5	8	CO5
	TOTAL	**48**	**70**	

7. LIST OF PRACTICALS & TUTORIALS

Termwork consists of Journal containing minimum 10 nos. of experiments and 8 nos. of tutorials with approximate number of hours required and corresponding COs as mentioned below

Sr. No.	Title of Experiment	Approx.Hrs required	COs
1.	Study of Compression of spring, calculation of spring constant and verification of Hook's Law	2	CO1
2.	Study of bell crank lever and verification of condition of equilibrium.	2	CO 2
3.	Theory of Simple Lifting Machine	2	CO 5
4.	Study of Simple screw jack and to find law of machine.	2	CO 5
5.	Study of Differential axel & wheel and to find law of machine.	2	CO 5
6.	Study of Single purchase crab and to find law of machine.	2	CO 5
7.	Study of Three sheave pulley and to find law of machine.	2	CO 5
8.	Resultant of nonparallel nonconcurrent forces.	2	CO 3
9.	Calculating Coefficient of Friction	2	CO 4
10.	Calculating Angle of Repose	2	CO 4
11.	Calculating Centroid of Plane Lamina 1	2	CO 4
12.	Calculating Centroid of Plane Lamina 2	2	CO 4
13.	Calculating Centroid of Plane Lamina 3	2	CO 4
14.	Graphics statics	6	CO 3

Sr. No.	Title of Tutorial	Approx.Hrs required	COs
1.	Tutorial on Introduction and fundamentals of force system	1	CO 1
2.	Tutorial on Resolution and Composition of forces	2	CO 2
3.	Tutorial on Equilibrium	2	CO 3
4.	Tutorial on Beam Reactions	2	CO 4
5.	Tutorial on Friction	2	CO 4
6	Tutorial on Centroid and Centre of Gravity	2	CO 4
7	Tutorial on Graphics Statics	3	CO 2
8	Tutorial on Simple Lifting Machine	2	CO 5

8. IMPLEMENTATION STRATEGY (PLANNING)

1.Teaching Plan/Tutorials

2. Self-Learning Online Resources

3. Slides / Presentations

9. SUGGESTED LEARNING RESOURSES

Sr.No.	Title of Book	Author	Publication
1.	Applied Mechanics	Dhade & Jamdar	Central Techno Publishers, Nagpur
2.	Applied Mechanics	R.S. Khurmi	S. Chand & Company Ram Nagar ,New Delhi–110055
3.	Engineering Mechanics Statics & Dynamics	A.K. Tayal	Umesh Publications
4	Applied Mechanics Vol.I&II	Sunil M Deo	Nirali / Pragati Publications
5	Applied Mechanics	M D Dayal	Nandu Publishers Chembur, Mumbai-71.
6	Applied Mechanics	S.S.Bhavikatti	Tata Mcgraw Hill

10. WEB REFERENCES

1.www.nptel.ac.in

2.www.discovery for engineers.com

3.www.swayam.gov.in

11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Sr. No.	CHAPTER	Distribution of Theory Marks			
		R Level	U Level	A LEVEL	Total Marks
1.	**Introduction and fundamentals of force system**	03	02	-	5
2.	**Resolution and Composition of forces**	02	02	06	10
3.	**Equilibrium**	02	02	06	10
4.	**Beam Reactions**	02	02	06	10
5.	**Friction**	02	02	06	10
6.	**Centroid and Centre of Gravity**	02	02	06	10
7.	**Graphics Statics**	01	02	04	7
8.	**Simple Lifting Machine**	02	02	04	8
TOTAL		**16**	**16**	**38**	**70**

R-Remembering, U-Understanding, A-Applying and above (Bloom's revised taxonomy levels)

NOTE: This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of Cos. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.

12. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME	SIGNATURE
1	Internal	Ms. Neelam N. Petkar	
2	Internal	Mr. A. K. Singh	
3	Internal	Mr. K.P. Jayateerth	
4	External	Mr. DHIRAJKUMAR S. PANDIRKAR	
		Organization: MHADA	

1. COURSE DETAILS

Programme: Mechanical Engineering	**Semester: I**
Course: Engineering Drawing	**Group:C***
Course Code: EDG190201	**Duration:16 Weeks**

2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per Week					Examination Scheme and Maximum Marks							
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D+T)	Theory Paper Duration and marks (ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
02	---	04	---	06	03	70	20	10	70	50	---	50	200

3. COURSE OBJECTIVE

Engineering drawing helps in understanding design of parts, assembly, structure etc. used in engineering field. It supports technology and technical subjects. By achieving visualization and drawing skills, the student will successfully discharge his role on shop floor, design department and inspection department etc.

4. SKILL COMPETENCY

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:
Prepare engineering drawing manually using prevailing drawing instruments.

5. COURSE OUTCOMES(COs) At the end of the semester student will be able to: -

CO No.	COURSE OUTCOME	Bloom's LEVEL
CO1	Draw two-dimensional sectional and non-sectional views of given object using principles of orthographic projections.	Understand, Apply
CO2	Draw isometric vies of given component or from orthographic projections.	Remember, Understand, Apply
CO3	Draw geometric figures and engineering curves.	Remember, Understand
CO4	Draw locus of a path of point in space for simple mechanisms.	Understand, Apply

6. COURSE CONTENTS

Sr. No.	TOPIC/Sub-topic	Hours	Marks	COs
1	**Drawing Instruments and their uses** 1.1. Introduction: Importance of Engineering Drawing 1.2. Study the use of Drawing instruments, types of lines and Dimensioning techniques used in Engineering Drawings. 1.3. Study the use of different Scales in Engineering Drawings: Reduce Scale. Enlarge Scale Full Size Scale 1.4. Geometrical constructions: To draw perpendicular bisector To divide the line into number of equal parts To draw line parallel to one another To Divide the given circle inti number of equal parts To draw regular polygon of given side	02	---	**CO1, CO3**
2	**Engineering curves** **Conic Sections:** 2.1 Introduction and Methods to draw an ellipse by Oblong, arcs of circle and concentric circle methods. 2.2 Introduction and Methods to draw parabola by Directrix-Focus and rectangular methods. 2.3 Introduction and Methods to draw hyperbola by Directrix-Focus and rectangular methods. 2.4 Cycloidal curves: Introduction and Methods to draw cycloidal curve: Cycloid, Epicycloid, Hypocycloid (Simple cases). 2.5 Involute: Introduction and Methods to draw Involutes of circle and polygon (Simple cases).	06	15	**CO3**
3	**Loci of Points.** **Mechanism:** 3.1 Slider crank mechanism. 3.2 Offset Slider crank mechanism. 3.3 Crank with a link resting on a roller. 3.4 Two equal cranks rotating in opposite directions. 3.5 Two unequal cranks: The shorter crank rotating the longer oscillating.	03	10	**CO4**
4	**Orthographic projections** 4.1 Introduction to orthographic and isometric projections, concept and applications. 4.2 Orthographic projection by First angle and Third angle method, and their symbols. 4.3 Conversion of pictorial view into Orthographic Views – object containing plain surfaces, slanting surfaces, slots, ribs, cylindrical surfaces. (use First Angle Projection Method Only.	08	15	**CO1**

5	**Sectional orthographic Views** 5.1 Sectional views: Full section, half section, offset section, 5.2 Introduction to Cutting plane line, Hatching Line and Sectioning Conventions 5.3 Conversion of pictorial views into sectional orthographic views	06	15	**CO1**
6	**Isometric projection** 6.1 Introduction to Isometric view and isometric projection. 6.2 Introduction to Isometric scale and Natural Scale 6.3 Illustrative problems related to objects having plain, slanting, cylindrical Surfaces and slots on slanting surfaces. 6.4 Conversion of orthographic views into isometric View/projection. (Isometric of sphere and composite solids not to be included.)	07	15	**CO1, CO2**
	TOTAL	**32**	**70**	

7 LIST OF ASSIGNMENTS/DRAWINGS

Term Work consists of Journal containing following drawing sheets and a sketchbook.

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approximate Hrs required	COs
1	One sheet on lettering, lines, dimensioning techniques and geometrical constructions.	04	CO1, CO3
2	Two sheets with four problems on Engineering Curves.	14	CO3
	Home Assignments: Four problems in sketchbook.		
3	One sheet with four problems on Loci of Points.	12	CO4
	Home Assignments: Four problems in sketchbook.		
4	One sheet with four problems on Orthographic Projections.	10	CO1
	Home Assignments: Four problems in sketchbook.		
5	One sheet with four problems on Sectional Orthographic Projections.	12	CO1
	Home assignments: four problems in sketchbook		
6	One sheet with four problems on Isometric View and Projections.	12	CO2
	Home Assignments: Four problems in sketchbook		

8 IMPLEMENTATION STRATEGY (PLANNING)

1.Teaching Plan
2. Slides
3. Online Resources

9 LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication
1	Engineering drawing	R.K. Dhawan	S.Chand & Co.Ltd., Ram Nagar New Delhi-110 055. ISBN-13: 9788121914314 ISBN-10: 8121914310
2	Engineering drawing	N.H. Dubey	Nandu Prakashan
3	Engineering Drawing Practice for Schools and Colleges IS: SP-46	Bureau of Indian Standards.	BIS, Government of India, Third Reprint, October 1998; ISBN: 81-7061-091-2
4	Engineering Drawing	Bhatt, N.D.	Charotar Publishing House, Anand, Gujarat 2010; ISBN: 978-93-80358-17-8
5	Machine Drawing	Bhatt, N.D.; Panchal, V. M	Charotar Publishing House, Anand, Gujarat 2010; ISBN: 978-93-80358-11-6
6	Engineering Drawing	Shaha, P. J.	S. Chand and Company, New Delhi, 2008, ISBN: 81-219-2964-4

10 WEB REFERENCES

1. http://pstulpule.com/
2. https://www.youtube.com/watch?v=TJ4jGyD-WCw
3. https://www.youtube.com/watch?v=dmt6_n7Sgcg
4. https://www.youtube.com/watch?v=_MQScnLXL0M
5. https://www.youtube.com/watch?v=3WXPanCq9LI
6. https://www.youtube.com/watch?v=fvjk7PlxAuo
7. http://www.me.umn.edu/courses/me2011/handouts/engg%20graphics.pdf
8. https://www.machinedesignonline.com

11 SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Sr. No.	TOPIC	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Drawing Instruments and their uses	---	---	---	---
2	Engineering curves	07	08	---	15
3	Loci of Points	---	05	05	10
4	Orthographic projections	----	07	08	15
5	Sectional orthographic Views	---	07	08	15
6	Isometric projection	02	05	08	15
	Total	09	32	29	70

12 COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME	SIGNATURE
1	Internal	Shri N.M.Pathak	
2	Internal	Shri N.M.Patil	
3	Internal	Shri G.B. Deshpande	
4	External	**Shri Chirag Kachaliya**	
		Organisation: M/s Mihir industries Pvt.Ltd.	

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC MUMBAI 400056.

1. COURSE DETAILS

Programme: Mechanical Engineering	**Semester: I**
Course: Workshop Practice	**Group: C***
Course Code: WSP190008	**Duration :16 Weeks**

2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per week					Examination Scheme and Maximum Marks							
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D+T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
--	04	--	--	04	--	--	--	--	--	50	--	--	50

3. COURSE OBJECTIVE

Workshop aims to provide comprehensive theoretical and hands on practical experience on operating various tools and equipments in fitting, carpentry, welding, plumbing and sheet metal shop by interpreting job drawings to produce and inspect jobs for specified dimensions

4. SKILL COMPETENCY

The aim of the course is to develop the various basic skills required for industry to identify various manufacturing processes and to use various workshop tools and equipment by following safe practices.

5. COURSE OUTCOMES(COs) At the end of the semester student will be able to: -

CO No.	COURSE OUTCOME	Bloom's Level
CO1	Identify various marking, measuring, holding, striking and cutting tools & equipment.	Apply
CO2	Explain various manufacturing processes for industrial product.	Understand
CO3	Use various workshop equipment and tools for different workshop jobs.	Apply
CO4	Recall safety practices while working in industry.	Remember

6. COURSE CONTENTS:

Sr. No.	TOPIC/Sub-topic	Hours	Marks	COs
1	**Fitting** **Practical Content:** 1.1 Demonstration of safety equipments & their working, safety precautions, First aid, safety rules in workshop, layout of workshop, 1.2 Introduction, Various Marking, Measuring, Cutting, Holding and Striking tools 1.3 Introduction to Vernier calliper, it's working and use 1.4 Different Fitting operation like Chipping, Filing, Right angle, Drilling, Tapping 1.5 Working principle of Drilling machine, Tapping dies and its use. 1.6 Demonstration of different Fitting Tools and Drilling Machines and Power Tools 1.7 Demonstration of different operations like Chipping, Filing, Drilling, Reaming, Tapping, Cutting etc. 1.8 One Fitting assembly job for per student as per drawing involving practice of Chipping, Filing, Drilling, Tapping, Cutting and Sawing operations	20	20	CO1 CO2 CO3 CO4
2	**Carpentry** **Practical Content:** 2.1 Introduction, Various types of Woods 2.2 Different types of Tools, Machines and Accessories 2.3 Demonstration of different Wood Working Tools, Machines. 2.4 Demonstration of wood working Machine followed by practice 2.5 One Carpentry job per student as per drawing covering of different Wood Working Processes, like Planing, Marking, Chiselling, Grooving, etc	12	15	CO1 CO2 CO3 CO4

3	**Welding** **Practical Content:** 3.1 Introduction to welding, soldering 3.2 Types of welding -Arc, Gas welding 3.3 Types of welding joints 3.4 Demonstration of different welding tools / machines 3.5 One job of Arc Welding processes for per student as per drawing and Demonstration of Testing of welded joints a) visual Testing b) Liquid Penetrant Testing	16	15	CO1 CO2 CO3 CO4
4	**Plumbing** **Practical Content:** 4.1 Introduction, Various marking, measuring, cutting, holding and striking tools. 4.2 Different G.I. pipes. PVC pipes 4.3. G. I. pipes and PVC pipe fittings and accessories. 4.4. Demonstration of different plumbing tools. 4.5 Observing different pipe joints and pipe accessories, different samples of PVC pipes and PVC pipe fittings. 4.6. Demonstration of one job covering different operations in plumbing as per drawing for group of students followed by practice for students	08	--	CO1 CO2 CO3 CO4
5	**Sheet Metal** **Practical Content:** 5.1 Introduction 5.2. Various marking, measuring, cutting, striking tools, equipments and accessories. 5.3 Demonstration of different types of sheet metal tools 5.4. Demonstration of different types of operations in sheet metal shop. 5.5. Sheet metal joining by welding or riveting 5.6. Demonstration of one job covering different sheet metal operations as per drawing for group of students followed by practice for students	08	--	CO1 CO2 CO3 CO4
	TOTAL	**64**	**50**	

7. NOTE-

1] The instructor shall give demonstration to the students by preparing a specimen job as per the job drawing.

2] The workshop diary/journal shall be maintained by each student duly signed by instructor of respective shop.

3] Workshop diary/Journal should contain the following:

a. Safety precautions in workshop.
b. Part Drawings/Designs of the job and procedure/methodology adopted for making
   i) Job on carpentry
   ii) Job on fitting.
   iii) Job on Welding.
   iv) Demonstration job of Plumbing
   v) Demonstration Job of Sheet metal.

4] Workshop diary/Journal should be certified by the Incharge chargeman/ foreman.

8. IMPLEMENTATION STRATEGY (PLANNING)

1. Demonstrations
2. Preparation of jobs

9. LEARNING RESOURCES

Sr. No.	Title Of Book	Author	Publication
1.	Workshop Technology- vol-I	S.K. Hajara Chaudhary-	Media Promoters and Publishers, New Delhi
2.	Workshop Technology	B.S. Raghuwanshi	Dhanpat Rai and Sons, New Delhi
3.	Production Technology	R K Jain	Khanna Publishers, New Delhi
4.	Workshop Technology (manufacturing Processes)	R.S. Khurmi & J.K. Gupta	S. Chand Publications, New Delhi
5	Workshop Practice	Bawa, H.S.	McGraw Hill Education, Noida; ISBN: 978-0070671195

10. WEB REFERENCES

1. http://files.kvsrcse.webnode.in/200000118-deb8cdfb49/carpen%20tools.pdf
2. https://www.bvrit.ac.in/Freshman_Lab_Manuals/Engineering%20Workshop/Engineering%20Workshop.pdf
3. http://www.bspublications.net/downloads/05229cf9b012a3_workshop_Ch_1.pdf
4. https://www.wilhelmsen.com/globalassets/marine-products/welding/documents/wilhelmsen-ships-service---unitor-welding-handbook.pdf
5. http://ecsnz.com/cimco/downloads/CIMCO_2017-18_plumbing-tools.pdf
6. http://infohouse.p2ric.org/ref/36/35594.pdf
7. https://www.weldingtechnology.org

11. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME	SIGNATURE
1	Internal	Mr. P.R.Parate	
2	Internal	Mr. S. C. Kolekar	
3	Internal	Mr. P. P. Sawant	
4	External	Mr. M.V. Bhor Organization: MCGM, Sub. Engg.	

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC MUMBAI 400056.

1. COURSE DETAILS

Programme: CE/ME/EE/IE/PL/CH/DE	Semester: II
Course: Engineering Mathematics	Group: B*
Course Code: EMT190009	Duration:16 Weeks

2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per week					Examination Scheme and Maximum Marks							
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D+T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
3	-	-	2	5	3	70	20	10	70	25	-	-	125

3. COURSE OBJECTIVE:

This Course is being introduced to provide mathematical background needed for any Diploma engineer. It intends to enable the students to apply basic facts, concepts and principles of differential calculus, vector algebra, complex number, Indefinite integral, Numerical method and Statistics as a tool to analyze engineering problems.

4. SKILL COMPETENCY

The aim of this course is to help the student to attain the following industry identified

Competency through various teaching learning experiences:

· Solve broad-based Engineering problems using the Advanced Knowledge of mathematics.

5. COURSE OUTCOMES (COs) At the end of the semester student will be able to: -

CO No.	COURSE OUTCOME	Bloom's LEVEL
1	Use the concepts of differential calculus to solve engineering related problems.	R, U
2	Apply basic concepts of vector algebra and complex number in the field of elementary engineering problems.	R, U, A
3	Study the concept of Indefinite Integral.	R, U
4	Understand the concept of Probability distribution and Statistics apply to evaluate the problems.	U, A

6. COURSE CONTENTS

Sr No.	TOPIC Sub-Topics	Hours	Marks	Cos
1	**Derivatives** 1.1 Definition of Derivatives 1.2 Rules of Differentiation 1.3 Composite function 1.4 Inverse trigonometric function 1.5 Implicit function 1.6 Logarithmic function 1.7 Parametric function 1.8 Partial derivatives of first order(two variable)	12	17	CO1
2	**Vector Algebra** 2.1 Definition of vector 2.2 Algebra of vectors, equality, addition, subtraction and multiplication, 2.3 Dot product and Cross product 2.4 Scalar triple product 2.5 Work done 2.6 Moment of force about a point and line	06	09	CO2
3	**Probability Distribution** 3.1 Definition of probability, addition and multiplication theory of probability 3.2 Probability Distribution • Normal Distribution • Binomial Distribution	06	09	CO4
4	**Integration** 4.1 Definition of integration as anti-derivative 4.2 Integration of standard functions 4.3 Composite Integrals 4.4 Integration of sum and difference of two or more functions 4.5 Integrals of Simple Algebraic Rational Function 4.6 Integrals of Simple Trigonometric Function 4.7 Method of integration By Partial fraction	12	15	CO3
5	**Complex Number** 5.1 Definition of complex number 5.2 Algebra of complex number - equality, addition, subtraction, multiplication and division 5.3 De Movires theorem 5.4 Euler`s form of circular function	06	09	CO 2

	Statistics 6.1 Range, coefficient of range of discrete and grouped data 6.2 Mean deviation and standard deviation from mean of grouped and ungrouped data, weighted means 6.3 Variance and coefficient of variance 6.4 Comparison of two sets of observation	**06**	**11**	**CO 4**
		48	**70**	

7. LIST OF ASSIGNMENTS/TUTORIALS

Term Work consists of Journal containing minimum no of 12 tutorials.

Sr. No.	Title of Tutorial	Approx.Hrs required	COs
1	Assignment on Differentiation. (Rules of Differentiation, Composite function, Inverse trigonometric function, Implicit function)	4	1
2	Assignment on Differentiation. (Logarithmic function Parametric function, Partial derivatives of first order, Second order differentiation)	4	1
3	Assignment on Vectors. (Dot product and Cross product Scalar triple product)	2	2
4	Assignment on Vectors. (Work done, Moment of force about a point and line)	2	2
5	Assignment on Probability. (Probability Distribution, Normal Distribution, Binomial Distribution, Poisson's distribution)	2	4
6	Assignment on Integration. (Integration of standard functions Composite Integrals, Integration of sum and difference of two or more functions)	4	3
7	Assignment on Integration. (Integrals of Simple Algebraic Rational Function, Integrals of Simple Trigonometric Function Method of integration)	4	3
8	Assignment on Statistics	4	4
9	Assignment on Complex Number	4	2
10	Practicing Integration and Statistics on MATLAB.	2	3
	Total	**32**	

8. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan/Tutorials
2. Assignments
3. Home Work Assignment

9. LEARNING RESOURES

Sr. No.	Title Of Book	Author	Publication
1.	Calculus for Polytechnics	Shri. S.P.Deshpande	Pune Vidyarthi Graha Prakashan Pune-30
2.	Applied Mathematics	Shri. B.M. Patel, Shri J.M. Rawal	Nirali Prakashan Mumbai
3.	Higher Engineering Mathematics	Dr. B.S. Grewal	Khanna Publishers 2/B, Delhi-6
4	Applied Mathematics	G.V.Kumbhojkar	P.Jamnadas LLP

10. WEB REFERENCES

1. www.mic-mathematics.com
2. www.math.com
3. www.lenerstv.com
4. www.onlinetutorials.com
5. www.archieves.math.utk.edu

11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Sr. No.	TOPIC	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Derivatives	7	10		17
2	Vector Algebra	2	5	2	09
3	Probability	1	5	3	09
4	Integration	5	10		15
5	Complex Number	2	5	2	09
6	Statistics	2	4	5	11
TOTAL		19	39	12	70

R Remembering, U Understanding, A Applying and Above (Bloom's revised taxonomy levels)

NOTE: This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of COs. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.

12. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME	SIGNATURE
1	Internal	MS.Kavita.K.Dange	
2	Internal	Mr.R.R.Ambade	
3	Internal	Mr.U.J.Patel	
4	External	Ms.Meena Gawas Organisation: Mithibai College Of Arts and Science	

1. COURSE DETAILS

Programme: CE/ME/EE/IE/PL/CH/DE	Semester: I / II
Course: APPLIED PHYSICS	Group: B*
Course Code:APH190010	Duration:16 Weeks

2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per					Examination Scheme and Maximum Marks							
Theory Hrs L	Practical Hrs P	Drawing Hrs	Tutorial Hrs	Credits (L+P+D+T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
4	2	-	-	6	1	@70	20	10	70	25	50	-	175

3. COURSE OBJECTIVE

Diploma engineers have to deal with various materials, instruments and machines. This course is designed with some fundamental information to help the diploma engineers apply the basic concepts and principles of physics to solve broad based engineering problems. The study of basic principles of physics and the concepts related to properties of materials, heat, acoustics, electricity, magnetism, optics, semiconductors help in understanding the engineering courses where emphasis is on the applications of these in engineering.

4. SKILL COMPETENCY

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- **Solve broad-based engineering problems applying basic concepts and principles of physics.**

5. COURSE OUTCOMES:

CO No.	COURSE OUTCOME	BLOOM'SLEVEL
1	Estimate errors in measurement of physical quantities.	Understand, Application
2	List the use of physical properties of different materials.	Remembering
3	Use the basic principles of elasticity, surface tension, viscosity, heat and optics in related engineering applications.	Understanding
4	Apply the principles and concepts of electricity, magnetism, sound to solve engineering problems.	Application

6. COURSE CONTENT:

Sr.No	Topic/Sub-topic	Hours	Marks	COs
1.0	**1. Measurement and errors** 1.1 Fundamental, Derived, Supplementary SI units. 1.2 Accuracy and Precision in Measurement. 1.3 Significant figures in measured quantities. 1.4 Basic Measuring instruments-Vernier Caliper, 1.5 Micrometer screw gauge, spherometer, ammeter, Voltmeter with their least count, range, accuracy and precision.	04	04	CO1
2.0	**2. Properties of matter : Elasticity , Surface Tension** 2.1 Elasticity : 2.1.1 Deforming force, restoring force, elastic and plastic body. 2.1.2 Stress and strain with their types. 2.1.3 Elastic limit, Hooke's law. 2.1.4 Moduli of elasticity. 2.1.5 Stress-strain diagram, behaviour of wire under continuously increasing load. 2.1.6 Definition of yield point, ultimate stress, factor of safety. 2.1.7 Numerical on stress, strain and Young's modulus. 2.2 Surface Tension : 2.2.1Molecular force, cohesive and adhesive force, molecular range, sphere of influence. 2.2.2 Definition of surface tension and its S.I. unit, angle of contact. 2.2.3 Capillary action with examples, shape of meniscus for water and mercury. 2.2.4 Relation between surface tension, capillary rise and radius of capillary (no derivation). 2.2.5 Effect of impurity and temperature on surface tension, 2.2.6 Numerical on relation between surface tension, capillary rise and radius. 2.3 Viscosity : 2.3.1Fluid friction, viscous force. 2.3.2 Definition of viscosity, velocity gradient. 2.3.3 Newton's law of viscosity, Definition coefficient of viscosity and its S.I. unit. 2.3.4 Streamline and turbulent flow with examples, critical velocity. 2.3.5 Variation of viscosity with temperature. 2.3.6 Reynolds number and its significance.	11	13	CO 1 CO2 CO3

3.0	**3. Heat and Temperature** 3.1 Heat : 3.1.1 Conduction, convention and radiation, good and bad conductor of heat with examples. 3.1.2 Law of thermal conductivity, coefficient of thermal conductivity and its S.I. unit. 3.1.3 Definition of linear, aerial and cubical expansion and relation between them (no derivation) 3.2Temperature : 3.2.1Boyle's law, Charle's law, Gay Lussac's law. 3.2.2Absolute zero temperature, Kelvin scale of temperature, general gas equation(statement only). 3.2.3 Effect of temperature on physical parameter, specific heat of gas at constant pressure and volume (Cp and Cv), the three gas laws, determination of specific heats of different materials. 3.2.4 Temperature measurement : Optical pyrometer, Thermoelectric thermometer	**05**	**06**	**CO1** **CO 2** **CO3**
4.0	**4. Sound , ultrasonic and acoustics** 4.1 Simple Harmonic Motion : 4.1.1 Uniform circular motion motion, periodic, Vibrational motion (definition with examples), 4.1.2 Simple Harmonic Motion (S.H.M.) (Definition) 4.1.3 Characteristics of S.H.M. 4.1.4 Amplitude, Frequency, Period of S.H.M. 4.1.5 General equations of (S.H.M.) (no derivation) 4.1.6 Graphical representation of S.H.M. (only diagram). 4.1.7 Phase of S.H.M., Epoch or phase constant of S.H.M. (definition). 4.1.8 Numerical on amplitude, frequency and period of S.H.M. 4.2 Wave Motion 4.2.1Defination of Wave motion, amplitude, period, frequency and wavelength. 4.2.2 Relation between velocity, frequency, and wavelength. 4.2.3Equation of progressive wave (no derivation). 4.2.4 Longitudinal and transverse wave. 4.2.5 Definition and formation of stationary wave. 4.2.6 Definition of Node, Antinode, Free vibration, Forced vibration and Resonance. 4.2.7 Velocity of sound by resonance tube. 4.2.8 Frequency of A.C. Supply by Sonometer. 4.2.9 Numerical on relation $v = n\lambda$ and resonance. 4.3 Acoustics and Reverberation : 4.3.1Defination of Echo, Reverberation, Reverberation time. 4.3.2 Sabine's formula (no derivation). 4.3.3 Definition of Absorption coefficient, Open window unit (OWU), Absorption coefficient	**10**	**12**	**CO1** **CO2** **CO 4**

5.0	**5.OPTICS** 5.1 Photoelectric effect : 5.1.1 Statement of photoelectric effect, Planck's hypotheses, Einstein's equation. 5.1.2 Definition: Threshold wavelength, Threshold frequency, Work function. 5.1.3 Study of experimental set up for study of photoelectric effect, Study of factors on which photoelectric effect depend on. Definition: Stopping potential. 5.1.4 Characteristics of photoelectric effect. 5.1.5 Photocells: Photo emissive, photoconductive, photovoltaic. 5.1.6 Engineering applications. 5.1.7 Numerical on energy of photon, work function, Einstein's equation. 5.2 Interference : 5.1Interference of light, Interference pattern. Constructive interference, Destructive interference. Steady interference of light. 5.2.2Conditions for steady interference pattern 5.2.3 Newton's rings, Newton's rings setup,Wavelength of source of light (No derivation) 5.2.4Optical flatness, Engineering Applications Fiber optics Total internal reflection, optical fiber-step index and graded index, Applications. 5.3 Diffraction : 5.3.1 Diffraction of light, Diffraction at a slit, 5.3.2 Diffraction Grating, Characteristics of grating spectra. 5.4 Polarization : 5.4.1 Polarization of light, Definition : Plane of polarization, plane of vibration 5.4.2 Explanation of polarization of light, Nicol prism. 5.4 X-rays : 5.4.1 Production of X-rays, types of X-ray spectra-continuous and characteristics, 5.4.2 X-ray wavelength (simple Problems), properties of X-rays. 5.4.3 Applications of X-rays.	**11**	**11**	**CO 1** **CO 2** **CO 3**

6.0	**6.0 ELECTRICITY AND MAGNETISM** 6.1 Coulomb's law , Intensity and Potential : 6.1.1 Coulomb's inverse square law for electric charges, Electric fields, Intensity of electric field. 6.1.2 Electric line of forces, Properties of electric line of forces. 6.1.3 Electric flux, Electric flux density, Relation between flux density and Intensity of electric field. 6.1.4 Electric potential, Absolute electric potential. Numerical problems. 6.2 Capacitor : 6.2.1 Capacity of conductor, Definition: Capacitance, Farad. 6.2.2 Capacitance of Spherical conductor, Principle of capacitor (condenser). 6.2.3 Capacitors in series and parallel, Expression for the energy stored, 6.2.4 Numerical on capacitor. 6.3 Current electricity : 6.3.1 Ohm's law, Resistance, Specific resistance, Combination of resistances, e.m.f. and p.d., Temperature coefficient of resistance. Potentiometer , Applications , Numerical problems on specific resistances . 6.4 Magnetic materials : 6.4.1 Modern concepts of magnetism, Dia, Para, Ferromagnetism, 6.4.2 Testing of magnetic materials , Current carrying conductor in magnetic field, 6.4.3 Shunt, Moving coil galvanometer.	**10**	**10**	**CO 1** **CO 2** **CO 4**

7.0	**7. MODERN PHYSICS** 7.1 Crystal Structure 7.1.1 Space lattice, Unit cell, Cubic Crystal Structures- Simple cubic,(S.C.), Body centered cubic(B.C.C.), Face centered cubic(F.C.C.). 7.1.2 Number of atoms per unit cell, Atomic radius, Co-ordination number, Packing density. 7.1.3 Atomic planes and spacing, Miller indices. 7.3 Lasers : 7.3.1 Elementary idea, Spontaneous and Stimulated emissions, population inversion, pumping methods, Helium-neon laser construction and working, Ruby laser. 7.3.2 Elementary idea, Spontaneous and Stimulated emissions, Ruby laser, Helium-neon laser.	**10**	**10**	**CO 3** **CO 4**
8.0	**8.0 SUPERCONDUCTIVITY AND NANOTECHNOLOGY** 8.1 Super conductivity : 8.1.1 Principle of superconductivity, zero ohmic resistance, Meissner effect. 8.1.2 Properties and Applications. 8.2 Nanotechnology : 8.2.1 Nano – Technology, Nano – science, Nano – materials, Nano – machines. 8.2.2 Instruments being used in Nano – technology, Five generation of Nano – technology, Carbon allotropes, Applications.	**03**	**04**	**CO 2**
		64	**70**	

7. LISTOF PRACTICALS/ASSIGNMENTS

Term Work consists of Journal containing minimum no of 10 experiments and 03Demonstrations.

Sr. No.	Title of experiment/Assignments/Tutorials/Drawings/Demonstrations	Appr.Hrs required	COs
1.	Use of Measuring Instruments – Vernier Callipers, Micrometer Screw Gauge , Spherometer.	2	CO1
2.	Young's Modulus by Searle's Apparatus.	2	CO2
3.	Surface tension by Capillary rise method.	2	CO2
4.	Viscosity by Poiseuille's method.	2	CO2
5.	Thermal conductivity of a good conductor by Searle's Apparatus.	2	CO2
6.	Velocity of sound by Resonance.	2	CO2
7.	Frequency of A.C. Supply by Sonometer .	2	CO4
8.	Wavelength of Light by Diffraction Grating.	2	CO3
9.	'J 'by Electrical Method.	2	CO1
10.	Wavelength of Laser Beam (He – Ne) by Diffraction Grating.	2	CO4
11.	Wavelength of Light by Diffraction Grating.	2	CO4
12.	Study of Crystal Structure.	2	CO2
13.	Use of Potentiometer (Principle, Comparison of e.m.f.s of Cell, Calibration of Voltmeter).	2	CO1,CO4
14.	Use of Wheatstone's bridge (Resistance, Specific resistance).	2	CO1,CO4
15.	Study of Spectrometer (Minimum Deviation and Refractive Index.	2	CO3

	Demonstrations		
(i)	Use of Precision Measuring Instruments (Dial Vernier , Dial Micrometer , Travelling Microscope etc.)	1	CO1
(ii)	Temperature of Flame (Optical Pyrometer)	1	CO2
(iii)	Spectra of Ionized Gases.	1	CO2
(iv)	Study of Photocell.	1	CO3
(v)	Study of Newton's Rings.	1	CO3
(vi)	Study of Para and Diamagnetism by Electromagnet.	1	CO3

8.0 IMPLEMENTATION STRATEGY:

(i) Teaching Plan
(ii) Minimum number of Practical.
(iii) Demonstrations
(iv) Guest lecture

9.0 LEARNING RESOURCES:

Sr. No.	Title Of Book	Author	Publication
1.	Engineering Physics	R.K. Gaur and S.L. Gupta	Dhanpat Rai Publishing Co. New Delhi
2.	Physics for Engineers	M.R.Shrinivasan	New Age International , New Delhi
3.	A Text Book of Engineering Physics	P.G.Kshirsagar and M.N.Avandhunulu	S. CNHAND & CO. LTD.
4	Introductory Physics – Volume 1,2 & 3	Gambhir, Durgapal and Banerji	Wiley Eastern

10.WEB REFERENCES

1. http://www.books.google.co.in/books/physics Dummies by Steven Holzner, http://www.hypertextbook.com/physics , http://www.google.co.in/search?=physics, **http://www.physics.ucsc.edu/-josh/6A/mechanics-e-books**

2. 2.1 Elasticity :

http://www.hyperphysics.phy-astr.gsu.edu/hbase/permot2.html, http://www.youtube.com/watch?v=Ejn6Fytn15Y

2.2 Surface Tension :

http://www.hyperphysics.phy-astr.gsu.edu/hbase/surten.html, http://www.youtube.com/watch?v=wOOY1szbcX4

2.3 Viscosity :

http://www.books.google.co.in/books/physics Dummies by Steven Holzner, http://www.hypertextbook.com/physics http://www.wiley.com/college/cutnell, http://www.google.co.in/search?=physics

3. . Heat and Temperature :

http://www.google.co.in/search?=physics , http://www.hypertextbook.com/physics

4. SOUND , ULTRASONIC AND ACOUSTICS :

http://www.google.co.in/search?=physics , http://www.hypertextbook.com/physics,http://en.wikipedia.org/wiki/Simpleharmonic motion,http://wwwyoutube.com/watch?v=SBC0C8pa2VU, **http://www.hyperphysics.phy-astr.gsu.edu/hbase/sound/**

wavplt.html , www.tutorvista.com/content/physics/physics-iii/waves/stationary-waves.php, http://www.youtube.com/watch?v=y_Ne17Y1h7I

5.OPTICS:

http://www.hypertextbook.com/physics ,http://www.google.co.in/search?=physics, http://www.hyperphysics.phy-astr.gsu.edu/hbase/relative/photel.htm, www.newton.dep.anl.gov/askasci/phy05/phy05070.htm, http://www.hyperphysics.phy-astr.gsu.edu/hbase/quantum/hydfin.html, http://www.youtube.com/watch?v=0CdXidwO8LM

6. ELECTRICITY AND MAGNETISM:

http://www.hypertextbook.com/physics , , http://www.wiley.com/college/cutnell, http://www.google.co.in/search?=physics, http://www.biomed.exactatign.com/topic/environment/energy/electricity/electromagnetics, http://www.books.google.co.in/books/physics Dummies by Steven Holzner, http://www.physics.ucsc.edu/-josh/6A/mechanics-e-books

7.0 MODERN PHYSICS :

http://www.hypertextbook.com/physics ,http://www.google.co.in/search?=physics, http://www.hyperphysics.phy-astr.gsu.edu/hbase/relative/photel.htm, www.newton.dep.anl.gov/askasci/phy05/phy05070.htm, http://www.hyperphysics.phy-astr.gsu.edu/hbase/quantum/hydfin.html, http://www.youtube.com/watch?v=0CdXidwO8LM, http://www.hyperphysics.phy-astr.gsu.edu/hbase/soilds/fermi.html, http://www.electronics-tutorials.ws/diode/diode_1.html,

8. SUPERCONDUCTIVITY AND NANOTECHNOLOGY:

http://www.hypertextbook.com/physics ,http://www.google.co.in/search?=physics,

11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN:

Sr.No.	TOPIC	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1.	MEASUREMENT AND ERRORS	2	1	1	04
2.	PROPERTIES OF MATTER : ELASTICITY , SURFACE TENSION	6	4	3	13
3.	HEAT AND TEMPERATURE.	2	2	2	06
4.	SOUND , ULTRASONIC AND ACOUSTICS	4	4	4	12
5.	OPTICS	4	4	3	11
6.	ELECTRICITY AND MAGNETISM	3	4	3	10
7.	MODERN PHYSICS	4	3	3	10
8.	SUPERCONDUCTIVITY AND NANOTECHNOLOGY	1	2	1	04
	TOTAL	21	27	22	70

R Remembering, U Understanding, A Applying, (Bloom's revised taxonomy levels)

NOTE: This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of COs. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.

12.COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME	SIGNATURE
1	Internal	MR. G.R. WAGHMARE	
2	Internal	MR.S.S.SALVE	
3	Internal	MR. L.B.DESHPANDE	
4	External	Mr. M. B. JAISWAR Organization: Shri T.P. Bhatia Jr. College, Kandivali (W)	

1. COURSE DETAILS: Communication Skills

Program: CE/ME/ EE/IE/PE/CH/DE	**Semester: I /II**
Course: Communication Skills	**Group: B***
Course Code: CMS190011	**Duration:16Weeks**

2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per week					Examination Scheme and Maximum Marks							
Theory Hrs	Practical Hrs	Drawing Hrs	Tutorial Hrs	Credits (L+P+D+T)	Theory Paper Duration and Marks		SSL	TA	TH	TWK	PR	OR	Total
					Hours	Marks							
03	--	--	01	04	03	70	20	10	70	25	-	-	125

3. **COURSE OBJECTIVE:** The communicative competence in English is the pre-requisite for the employment market at national and international level today. However, the ability to communicate effectively does not come easily to many people. No matter how brilliant and invaluable your idea is, it is worthless until shared either orally or in written manner. Here arises the need to learn communication skills which will enable the students to enhance their comprehension, writing and oral skills in English.

4. **SKILL COMPETENCY:** Students will be able to develop the following skills / competencies.
   1. Interpersonal skills
   2. Listening and Reading skills
   3. Formal Writing skills
   4. Pronunciation and Speaking
   5. Usage of Grammar and Vocabulary

5. COURSE OUTCOMES (COs) at the end of the semester student will be able to: -

CO No.	COURSE OUTCOMEs	Bloom's Level
CO1	Define communication with its types and understand the Process of communication.	Remember
CO 2	Apply the various grammatical structures which will enhance oral and written communication.	Application
CO 3	Demonstrate the proficiency in language skills (L.S.R.W.) by using language lab.	Understand
CO 4	Draft various types of written communication eg. Letter, circular, notices for personal and professional use.	Application

6. COURSE CONTENTS:

Sr. No.	TOPIC/Sub-topic	Hours	Marks	COs
1	**COMMUNICATION** 1.1 Communication: Meaning and Definition 1.2 Features of communication 1.3 Oral & written Communication 1.4 verbal and Nonverbal communication	04	06	CO 1
2	**Application of Grammar** 2.1 Tense & its sub types 2.2 Degree and Its types 2.3 Change the voice	04	06	CO 2
3	**Vocabulary Building** 3.1 Word Formation Processes Affixation, Echoism, clipping, conversion Back formation, Shortfoms, Acronyms 3.2 Idioms and use of idioms in sentence 3.3 Antonyms and synonyms	04	03	CO 2
4	**Language lab and Spoken English** 4.1 English sound system (RP) 4.2 Vowels & Diphthongs(RP), Consonants(RP) 4.3 Word Accent, stress a Rhythm and Intonation	04	03	CO 3

5	**Nonverbal Communication** 5.1 Meaning of Nonverbal Communication 5.2 Use of body language in communication 5.3 Nonverbal codes: Haptics, vocalics,Artifacts, chronemics, proxemics	04	08	CO 1
6	**Barriers to communication** 6.1 Definition of Barrier 6.2 Types of barriers of communication 6.3 Mechanical, Psychological, Linguistic, Social-cultural & Environmental	05	08	CO 1
7	**Paragraph writing** 7.1 Types of paragraph writing Inductive and Deductive method 7.2 Development of Paragraph	05	06	CO 4
8	**Notice and circular** 8.1 Difference between notice and circular 8.2 Drafting notice and circular for Library, gym, office, Students stores facility and sports	06	06	CO 4
9	**Letter writing** 9.1 Importance of letters writing in business 9.2 7 Cs of letter writing 9.3 Layouts: Block, semi –block, full block 9.4 Job application letter 9.5 Resume writing	08	16	CO 4
10	**Reading comprehension** 10.1 Unseen passages with wh- type and MCQ types of questions	04	08	CO 3
	TOTAL	48	70	

7 (A) LIST OF ASSIGNMENTS: Each student has to write all ten assignments compulsorily as term work.

Sr. No.	Title of Assignments	COs
1.	Explain the process of communication with the help of diagram.	CO 1
2.	Give five examples of each sub type of tense.	CO 2
3.	Find out twenty difficult words from the English newspaper and understand their meaning by using dictionary and use it in your own sentences.	CO 2
4.	Write the phonetic transcription of given words by using dictionary.	CO 3
5.	Explain various types of barriers to communication.	CO 3
6	Explain different nonverbal codes with help of pictures.	CO 1
7	Attempt to answers for given unseen passage for reading comprehension.	CO 3
8.	Explain the Various formats of letter writing with diagram.	CO 4
9	Draft the notice / circular on given topic.	CO 4
10	Develop the paragraph on the given topic	CO 4

Note: # Teacher will do necessary changes in the assignments as per requirements.

7 (B) LIST OF TUTORIALS:

Sr.	Title of Tutorial	Lab /Classroom	Hrs.
1.	Practice of R.P. English sounds to overcome mother tongue impact.	Lang.lab	03
2.	Listen and repeat words with phonemic transcription.	Lang.lab	03
3	Public speaking (Listening Famous speakers)	Lang.lab	02
4	Extempore	Classroom	02
5	Loud reading / Recitation	Classroom	02
6	Debate / Role play	Classroom	02
7	Mock interview	Classroom	02
	Total		**16**

8. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan/ Tutorials
2. Minimum TEN no assignments
3. Guest/Expert lectures
5. Slides
7. Group discussions
8. Seminar
9. Self-Learning Online Resources

9 Learning Resources:

Sr. No.	Title Of Book	Author	Publication
1.	Communication Skills for Engineers	C. Murali Krishna	Pearson Education
2.	Technical Communication Principles and Practice	Meenakshi Raman, Sangeeta Sharma	Oxford university press , Chennai
3.	A Communicative Grammar of English	Geoffrey Leech, Jan Swartvik	ELBS – with Longman
4	Body Language	Allan Pease	Sheldon Press, London
5	Basics of Management and Communication Skills	Dr. P.C. Shejwalkar	Everest Publishing House
6	Business Communication Strategies	Matthau M. Monippally	Tata – McGraw – Hill

10. WEBSITE REFERENCES

1. http://www.free-english-study.com
2. https://communicationkills.bandcamp.com
3. http://www.english-online.org.uk
4. http://www.talkenglish.com
5. http://www.learnenglish.de

11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Sr. No.	CHAPTER	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Communication	3	3	0	06
2	Application of Grammar	-	3	3	06
3	Vocabulary Building	-	-	3	03
4	Language lab and Spoken English	-	-	3	03
5	Nonverbal Communication	4	4	-	08
6	Barriers to communication	4	4	-	08
7	Paragraph writing	--	-	6	06
8	Notice & circulars	--	--	6	06
9	Letter writing	-	8	8	16
10	Reading comprehension	-	-	8	08
TOTAL		11	22	37	70

R - Remembering, U- Understanding, A- Application, AN - Analyzing, E- Evaluation and C- Creating (Bloom's revised taxonomy levels)

Note: This specification table provides general guidelines to assist students for their learning and to teachers to teach ad assess the students with respect to the attainment of COs. The actual distribution of marks at different taxonomy levels (R, U, A, An etc.) in the question paper may vary From above table.

12 COURSE EXPERT COMMITTEE MEMBERS

Sr. No.	NAME OF EXPERT (Internal)	SIGNATURE
1	Prof. Mr. Balaji M. Pande, Lecturer (Senior Scale)	
2	Prof. Mrs. Anita A. Kulkarni, Head of Department.	
3	Prof. Mrs. Kirti P. Bhave, Lecturer (Selection Grade)	
	NAME OF EXPERT (External)	
4	Prof. Mrs Aanchal Lalla, Lecturer , K.J.S Polytechnic , Mumbai	Aanchal Lalla

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC MUMBAI 400056.

1. COURSE DETAILS

Programme: Mechanical Engineering	**Semester: II**
Course: Engineering Graphics	**Group:C***
Course Code: ENG190202	**Duration:16 Weeks**

2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per Week					Examination Scheme and Maximum Marks							
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D+T)	Theory Paper Duration and marks (ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
01	02	03	--	06	03	70	20	10	70	50	50	--	200

3. COURSE OBJECTIVE

Engineering drawing helps in understanding design of parts, assembly, structure etc. used in engineering field. It supports technology and technical subjects. By achieving visualization and drawing skills, the student will successfully discharge his role on shop floor, design department and inspection department etc.

4. SKILL COMPETENCY

This aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

Prepare engineering drawings using prevailing drawing standards, instruments and CAD/CAG software

5. COURSE OUTCOMES(COs) At the end of the semester student will be able to: -

CO No.	COURSE OUTCOME	Bloom's LEVEL
CO1	Interpret the orthographic views and draw missing views.	Remember, Understand, Apply
CO2	Draw projections of 2D and 3D standard regular entities.	Understand, Apply
CO3	Draw sectional views of objects.	Understand, Apply
CO4	Identify and sketch various fasteners and conventional representation.	Remember, Understand
CO5	List and apply AutoCAD commands for drafting 2D and 3D drawings.	Remember, Understand, Apply

6. COURSE CONTENTS

Sr. No.	TOPIC/Sub-topic	Hours	Marks	COs
1	**Missing Views** Deriving the third view-non-sectional or sectional views. Full section, Half Section and Offset section from given orthographic two views (F.V. and T.V. **OR** F.V. and S.V.).	02	15	CO1
2	**Projection of Straight Lines and Projection of planes** 2.1 Projections of lines with following positions i) Line Parallel to both the reference planes, Line Perpendicular to one reference plane and parallel to other reference plane. ii) Line Inclined to one reference plane and parallel to the other. iii) Line inclined to both the reference planes (Ends of line to be in same quadrants with no traces). 2.2 Projection of Planes- Projections of regular polygons and circle i) Plane Perpendicular to one reference plane and parallel to other reference plane. ii) Plane Inclined to one reference plane and perpendicular to another. iii) Plane inclined to both the reference planes iv) Reverse problems with true shape given and derive the inclination of the plane	04	07 08	CO2
3	**Projections of solids** 3.1 Types of solids- Polyhedron and solids of revolutions 3.2 Projection of regular solids like prisms, pyramids, cylinders and cones with axis i) Perpendicular to one of the reference planes, **ii)** inclined to one reference plane and parallel to another, **iii)** inclined to both the reference plane.	03	14	CO2
4	**Section of Solids** 4.1 Projections of section of prism, Pyramids, cone and cylinder with auxiliary inclined plane and auxiliary vertical planes with true shape of the section and true shape of section on auxiliary view. 4.2 The solid may be resting on base or face or axis may be inclined to one reference plane.	03	14	CO3

5	**Thread profile and screw fasteners** 5.1 Prepare neat proportionate freehand sketches/ conventional representation of different profiles of threads 5.2 Conventional representations of left hand – right hand threads, single and multistart square threads, external and internal threads. 1. Different types of nuts. 2. Different types of bolts. 3. Lock nuts (Castle, slotted nut, simond's nut etc.) use of plane and spring washers and different types of screws heads and ends	02	06	CO4
6	**Conventional representation** 6.1 Standard conventions using SP -46 (1988) Materials - C.I., M.S., Brass, Bronze, Aluminum, Wood, Glass, Concrete and rubber. Break lines in pipe, rod and shaft. Ball and roller bearings. Knurling, serrated shafts, splined shafts and chain wheels. Spring: Semi elliptic leaf spring, Semi elliptic leaf spring with eyes, Cylindrical Compression Spring, Cylindrical Tension Spring , Gear: Spur, Bevel and Helical gear, Sprocket wheel. Countersunk and counter bore.	02	06	CO4
7	**Fundamentals of CAD drawing setup** 7.1 Fundamentals of Computer Aided Drafting (CAD) and its applications, various softwares for Computer Aided Drafting 7.2 Co-ordinate system, Cartesian and Polar Absolute, Relative mode	-	-	CO5
8	**Drawing commands** 8.1 Basics drawing commands to draw primitives like line, point, arc, circle, etc. 8.2 Drawing commands like line, donut, hatch, etc.	-	-	CO5
9	**Utility commands** 9.1 Utility commands like end, save, status etc. 9.2 Edit & inquiry commands - Commands like copy, move, erase, area etc.	-	-	CO5
10	**Display and setting commands** 10.1 Display commands like zoom, pan, view, regeneration, etc. 10.2 Setting commands like grid, ortho, axis, etc.	-	-	CO5
11	**Layer and shape files** 11.1 Concept and use of layer command 11.2 Creation of shape file. 11.3 Creating line type, creating font style etc.	-	-	CO5
12	**Complex Object Drawing** 12.1Using block, wblock, insert, etc. 12.2Setting commands with prototype drawing file.	-	-	CO5

13	**Three-Dimensional Drawing** 13.1Commands, V point, hide, view, 3D-view, elevation 3D-polyline, 3D-face, 3D mesh. 13.2 UCS, UCSICON, change property 13.3 TABSURF, REVSURF, EDGESURF, 3DARRAY 3D Operation like ADD, COURSETRACT, etc	-	-	CO5
	TOTAL	**16**	**70**	

7. LIST OF PRACTICALS/ASSIGNMENTS/DRAWINGS

Term Work consists of Journal containing following drawing sheets, CAD drawings and a sketchbook.

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approximate Hrs required	COs
1	One sheets with four problems on missing views each.	10	CO1
	Home Assignments: Four problems on missing views in sketchbook.		
2	One sheet with four problems on Projection of straight lines (Line inclined to both the reference planes).	08	CO2
	Home Assignments: Four problems on projection of lines (Line inclined to both the reference planes) in sketchbook.		
3	One sheet with four problems on Projection of planes.	08	CO2
	Home Assignments: Four problems on projection of planes in sketchbook.		
4	One sheet with four problems on Projection of solids.	08	CO2
	Home Assignments: Four problems on projection of solids in sketchbook.		
6	One sheet with four problems on section of solids.	08	CO3
	Home Assignments: Four problems on section of solids in sketchbook.		
7	One sheet with sketches on various screw fasteners and conventional representations.	06	CO4
	Home Assignments: Sketches on various screw fasteners and conventional representations in sketchbook.		
8	Four problems on non-sectional orthographic views for the objects with curvilinear features by using CAG 2D commands.	12	CO5
9	Four problems on sectional orthographic views for the objects with curvilinear features by using CAG 2D commands.	10	CO5
10	Two problems on isometric views of 3D objects containing lines, arcs, circles, holes, ribs and slots using CAG 3D commands.	10	CO5

8 IMPLEMENTATION STRATEGY (PLANNING)

1.Teaching Plan
2. Slides
3. Online Resources

9 LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication
1	Engineering drawing	R.K. Dhawan	S.Chand & Co.Ltd., Ram Nagar New Delhi-110 055. ISBN-13: 9788121914314 ISBN-10: 8121914310
2	Engineering drawing	N.H. Dubey	Nandu Prakashan
3	Engineering Drawing Practice for Schools and Colleges IS: SP-46	Bureau of Indian Standards.	BIS, Government of India, Third Reprint, October 1998; ISBN: 81-7061-091-2
4	Engineering Drawing	Bhatt, N.D.	Charotar Publishing House, Anand, Gujarat 2010; ISBN: 978-93-80358-17-8
5	Machine Drawing	Bhatt, N.D.; Panchal, V. M	Charotar Publishing House, Anand, Gujarat 2010; ISBN: 978-93-80358-11-6
6	Engineering Drawing	Shah, P. J.	S. Chand and Company, New Delhi, 2008, ISBN: 81-219-2964-4
7	Essentials of Engineering Drawing and Graphics using AutoCAD	Jevapoovan T.	Vikas Publishing House Pvt. Ltd, Noida 2011, ISBN: 978-8125953005
8	AutoCAD User guide	Autodesk	Autodesk Press, USA, 2015
9	AutoCAD 2016 for Engineers and Designers	Sham, Tickoo	Dreamtech Press; Galgotia Publication New Delhi, 2015, ISBN: 978-9351199113

10 WEB REFERENCES

1. http://pstulpule.com/
2. https://www.youtube.com/watch?v=TJ4jGyD-WCw
3. https://www.youtube.com/watch?v=dmt6_n7Sgcg
4. https://www.youtube.com/watch?v=_MQScnLXL0M
5. https://www.youtube.com/watch?v=3WXPanCq9LI
6. https://www.youtube.com/watch?v=fvjk7PlxAuo
7. http://www.me.umn.edu/courses/me2011/handouts/engg%20graphics.pdf
8. https://www.machinedesignonline.com

9. http://www.mycadsite.com/tutorials/
10. http ://tutorial145.com/learn-autocad-basics-in-21-days/
11. https ://www.lynda.com/AutoCAD-training-tutorials/ 160-0. html
12. http://www.investintech.com/resources/blog/archives/5947-free-online-autocadtutorials-courses.html
13. http://www.cad-training-course.com/
14. http://au.autodesk.com/au-online/overview
15. https://www.youtube.com/watch?v=yruPUj 61bw
16. https://www.youtube.com/watch?v=xqu18gcdwbs
17. https://www.youtube.com/watch?v=JTOP6TV4Mvw
18. https://www.youtube.com/watch?v=x7X25Xpa07o

11 SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Sr. No.	TOPIC	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Missing Views	02	03	10	15
2	Projection of Straight Lines and Projection of planes	---	02	13	15
3	Projections of solids	---	02	12	14
4	Section of Solids	---	02	12	14
5	Thread profile and screw fasteners	04	02	---	06
6	Conventional Representation	04	02	---	06
	Total	10	13	47	70

12 COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME	SIGNATURE
1	Internal	Shri N.M.Pathak	
2	Internal	Shri N.M.Patil	
3	Internal	Shri G.B. Deshpande	
4	External	**Shri Chirag Kachaliya**	
		Organisation: M/s Mihir industries Pvt.Ltd.	

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC ★ MUMBAI 400056

1. COURSE DETAILS

Programme: Mechanical Engineering	**Semester: II**
Course: Manufacturing Processes and Materials	**Group:C***
Course Code: MPM190203	**Duration:16 Weeks**

2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per					Examination Scheme and Maximum Marks								
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D+T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
02	04	--	--	06	03	70	20	10	70	50	---	25	175

3. COURSE OBJECTIVE:

Manufacturing process and materials, helps to understand, select and use various manufacturing process like casting, welding and machining processes with important concepts of material phases, material selection and heat treatment.

4. SKILL COMPETENCY

The aim of this course is to help the students to attain following industry competency through various teaching learning experiences.

-Select various material and manufacturing processes required to manufacture utility jobs in mechanical engineering Industry.

5. COURSE OUTCOMES(COs) At the end of the semester student will be able to: -

CO No.	COURSE OUTCOME	Bloom's LEVEL
CO1	Classify, describe various manufacturing processes like Lathe, Shaping, Casting and Welding	Remember, Understand
CO2	Describe various properties of engineering materials, ferrous, non-ferrous metals and alloys.	Remember, Understand
CO3	Understand the concept of phase diagram.	Remember, Understand
CO4	Understand the concept of various process of heating and cooling.	Remember, Understand

6. COURSE CONTENTS

Sr. No.	TOPIC/Sub-topic	Hours	Marks	COs
1	**Casting** **1 Patterns-** 1.1 Materials – Wood, Metal, Plastics. 1.2 Types – Solid, Split, Match Plate, Gated, Loose Piece, Sweep 1.3 Pattern Allowances 1.4 Cores – Horizontal, Vertical, Hanging, Balance, Right and Left Hand Cores. 1.5 Core Making – CO2, Core, Shell, 1.6 Introduction to Gating System (Only components and their functions) **2. Moulds –** 2.1 Moulding sand- green sand, dry sand , facing sand, baking sand, system Sand 2.2 Properties of moulding sands 2.3 Sand preparation 2.4 Moulding methods- machine moulding, shell mouldings, green sand moulding **3. Melting Practice** 3.1 Furnaces- cupola furnace **4. Die casting-** Gravity Die casting	07	15	CO1
2	**Lathe** 2.1 Types of lathes – light duty, Medium duty and heavy duty, Specifications. 2.2 Basic parts and their functions, Operations and tools – Centering, Turning, Facing, drilling, step turning, taper turning. 2.3 Cutting Parameters 2.3 Attachments	04	08	CO1
3	**Shaper** 3.1 Types of Shapers 3.2 Basic parts and their functions 3.3 Shaper Operations – Machining horizontal, vertical & angular Surface, Cutting slots, grooves and keyways	03	08	CO1
4	**Welding** 4.1 Introduction, classification 4.2 Resistance welding (spot welding) 4.3 MIG welding, 4.4 TIG welding 4.5 Submerged arc welding 4.6 Welding defects	04	08	CO1

5	**Engineering Materials and their properties** 5.1 Material and its classification 5.2 Engineering requirements of materials 5.3 Technological properties of metals and alloys: castability, Machinability, weldability, Solderability, workability. 5.4 Factors affecting the selection of materials for engineering 5.5 Introduction to Metallurgical Microscope 5.6 Specimen Preparation	03	06	CO2
6	**Ferrous & Non-ferrous metals and Alloys** 6.1 Steel: Classification, Properties, applications & chemical Compositions and Microstructures of Low carbon steel, Medium carbon steel, High carbon steel and Mild steel. 6.2 Cast iron: Classification and microstructure of Grey iron, Ductile iron 6.3 Introduction, Properties, applications & chemical Compositions and Microstructures of Copper alloys (naval brass, muntz metal, Gun metal & phosphor bronze, Aluminium alloys (duralumin) 6.4 Effect of various alloying elements on properties of steel such as –Carbon, chromium, nickel, manganese, molybdenum, tungsten,	04	10	CO2
7	**Phase Diagrams** 7.1 Introduction 7.2 Cooling curves – Pure metal, Binary Solid Solution, Binary Eutectic System 7.3 Introduction to Iron-Carbon Equilibrium Diagram 7.4 Introduction to T-T-T diagram	04	08	CO3
8	**Heat Treatment Of Steels** 8.1 Introduction to Heat treatment processes such as Annealing, 8.2 Normalizing, Hardening, Tempering 8.3 Introduction to Surface Hardening – Types: Case Hardening & Flame Hardening	03	07	CO4
	TOTAL	**32**	**70**	

7 LIST OF PRACTICALS/JOBS/DEMOSTRATIONS/ASSIGNMENTS

Sr. No.	Title of Experiment//jobs/ Study Assignment	Approx. Hrs required	COs
1	Prepare One job on pattern making	08	CO1
2	Prepare One job of metal turning using lathe machine covering facing, turning, centring operations etc.	14	CO1
3	Prepare One job using shaper machine covering various operations of shaper.	10	CO1
4	Demonstration to Prepare specimens of a given material for microscopic examination in group	06	CO2
5	Use metallurgical microscope to interpret micro structure of steel and steel alloys on standard specimen	04	CO2

6	Use metallurgical microscope to interpret micro structure of cast iron on standard specimen	02	CO2
7	Use metallurgical microscope to interpret micro structure of aluminum and aluminum alloys on standard specimen	04	CO2
8	Use metallurgical microscope to interpret micro structure of copper and copper alloys on standard specimen	04	CO2
9	Study of iron carbon equilibrium diagram.	04	CO3
10	Study of Use of muffle furnace to compare Effect of oil as quenching media on the hardness of mild steel Effect of water as quenching media on the hardness of mild steel Effect of brine as quenching media on the hardness of mild steel	08	CO4
		64 hrs.	

Note:

1. The instructor shall give demonstration to the students by preparing a specimen job as per the job drawing.
2. The workshop diary shall be maintained by each student duly signed by instructor of respective shop and certified by chargeman/foreman incharge
3. Workshop diary should contain
   a. Safety precautions in workshop.
   b. Part Drawings/Designs of the job and procedure/methodology adopted for making
      i) Job on pattern making.
      ii) Job on Metal turning.
      iii) Job on shaper
4. Journal consisting of Study assignments should be certified by the lecturer incharge.

8 IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
2. Minimum 03 no of practical jobs / 08 Study assignments etc.
3. Guest/Expert lectures
4. Demonstration

9 LEARNING RESOURCES

Sr. No.	Title Of Book	Author	Publication
1.	Workshop Technology vol.1	S.K.Chaudhary	Media promoters and publishers, New Delhi
2.	Workshop Technology	B.S. Raghuvanshi	Dhanpat Rai and Sons New Delhi
3.	Production Technology	R.K. Jain	Khanna Publishers, New Delhi
4	Welding technology	O.P. Khanna	Dhanpat Rai and Sons New Delhi
5	Material Science And Metallurgy	Dr.V.D. Kodgire	Everest Publishing House[1990]
6	A Text Book of Material Science and Metallurgy	O.P.Khanna	Dhanpat Rai and Sons [1999]
7	Workshop Technology vol.2 (Machine Tool)	S.K.Chaudhary	Media promoters and publishers, New Delhi

10 WEB REFERENCES

1. www.sciencebuddy .com
2. http://files.kvsrcse.webnode.in/200000118-deb8cdfb49/carpen%20tools.pdf
3. https://www.bvrit.ac.in/Freshman_Lab_Manuals/Engineering%20Workshop/Engineering%20Workshop.pdf
4. http://www.bspublications.net/downloads/05229cf9b012a3_workshop_Ch_1.pdf
5. https://www.wilhelmsen.com/globalassets/marine-products/welding/documents/wilhelmsen-ships-service---unitor-welding-handbook.pdf
6. https://www.weldingtechnology.org

11 SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Sr. No.	TOPIC	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Casting	03	12	-	15
2	Lathe	02	06	-	08
3	Shaper	02	06	-	08
4	Welding	02	06	-	08
5	Engineering Materials and their properties	03	03	-	06
6	Ferrous & Non-ferrous metals and Alloys	03	07	-	10
7	Phase Diagrams	03	05	-	08
8	Heat Treatment Of Steels	03	04	-	07
TOTAL		21	49	—	70

12 COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME	SIGNATURE
1	Internal	Mr. P. R. Parate	
2	Internal	Mr. S. C. Kolekar	
3	Internal	Mr. P. P. Sawant	
4	External	Mr. M. V. Bhor	
		Organization: MCGM, Sub Engg.	

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC ★ MUMBAI 400056.

1. COURSE DETAILS

Program: Mechanical Engineering. **Course:** Programming in C++ **Code:** PIC190204	**Semester: II** **Group: A** **Duration:16 Weeks**

2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per Week					Examination Scheme and Maximum Marks								
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D +T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
02	03	--	--	05	--	--	--	--	--	50	50	--	100

3. COURSE OBJECTIVE

C++ supports the two most popular programming paradigms procedural programming and object oriented programming. It also offers a powerful way to cope up with the real world problems. Students will be able to write better programs in C++ because it offers software s reusability, testability, portability and reliability.

4. SKILL COMPETENCY

The aim of this course is to help the students to attain following industry competency through various teaching learning experiences.

- Perform coding for various engineering applications
- Debug any errors in program of engineering applications

5. COURSE OUTCOMES(COs) At the end of the semester student will be able to:

CO No.	COURSE OUTCOME	Bloom's LEVEL
CO1	List the keywords, operators of the C++ language	Remember, Understand
CO2	Draw flowchart for programs	Remember, Understand
CO3	Write programs in C++	Remember, Understand

6. COURSE CONTENTS

Sr. No.	TOPIC/Sub-topic	Hours	Marks	COs
1	**Structured programming using C++** 1.1 C++ as a superset of C programming language 1.2 C++ Fundamentals: Character set, Identifiers and keywords, Data types constants and Variables Declarations, Operators and expressions, Library Functions, Symbolic constants, Preprocessor Directives	02	04	COs 1/2/3
2	**Data Input and Output** 2.1 getchar( ), putchar( ), scanf( ), printf( ), puts( ), cin, cout, setw( ), endl etc 2.2 Control statements: if, if-else, switch-case Loop statements: for, while, do-while Breaking Control statements: break, continue, goto	03	04	COs 1/2/3
3	**Functions and Program Structures** 3.1 Introduction 3.2 Defining of Function 3.3 Return statement 3.4 Types of Function 3.5 Actual and formal Arguments 3.6 Local and Global Variables 3.7 Default Arguments 3.8 Multifunction Programs 3.9 Storage Class Specifiers: Automatic, Register, Static, External Variables 3.10 Recursive Functions	06	10	COs 1/2/3
4	**Pointers** 4.1 Declarations, Referencing and De-referencing, Passing Pointers to Functions, Pointers to Arrays 4.2 Structures and Unions: defining and Processing a structure and union	03	04	COs 1/2/3
5	**Arrays** 5.1 Array notation 5.2 Array Declaration 5.3 Array Initialization 5.4 Processing with Array 5.5 Arrays and Functions 5.6 Multidimensional Arrays 5.7 Character Arrays	03	04	COs 1/2/3

6	**Classes and Objects** 6.1 Introduction 6.2 Structures and Classes 6.3 Declaration of Class 6.4 Arrays of Class Objects 6.5 Constructors: Copy and default constructors 6.6 Destructors 6.7 Static Class members: Static data member and static member functions 6.8 Friend Functions 6.9 Dynamic memory allocations 6.10 This pointersilicon and phosphorous.	08	12	COs 1/2/3
7	**Inheritance** 7.1 Single inheritance 7.2 Multiple inheritance	02	04	COs 1/2/3
8	**Overloading** 8.1 Function overloading: With various data types, with argument, scooping rules for function overloading, special features of function overloading 8.2 Operator Overloading: Overloading Assignment, Binary operator	03	04	COs 1/2/3
9	**Polymorphism** 9.1 Introduction, Virtual functions, Pure virtual functions	02	04	COs 1/2/3
	TOTAL	**32**	**50**	

7 LIST OF PRACTICALS

Sr. No.	Title of Experiment//jobs/ Study Assignment	Approx. Hrs required	COs
1	Programs on for, do, do-while, while loop	04	COs1/2/3
2	Program on switch-case	04	COs1/2/3
3	Program on function and recursive function	05	COs1/2/3
4	Program on single and two dimension arrays	05	COs1/2/3
5	Program on pointers	05	COs1/2/3
6	Program on structure	05	COs1/2/3
7	Program on class and object, constructor, destructor, friend function	05	COs1/2/3
8	Program on single, multiple, multilevel inheritance	05	COs1/2/3
9	Program on function overloading and operator overloading	05	COs1/2/3
10	Program on polymorphism	05	COs1/2/3
		48 hrs.	

8 IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
2. Practical performance on C++

9 LEARNING RESOURCES

Sr.	Author	Title	Publishers & Address
1	D. Ravichandran	Programming with C++	Tata McGraw Hill
2	Balaguruswamy	Programming in C++	Tata McGraw Hill
3	Robert Lafore	Object Oriented Programming in C++	Galgotia Publications
4	Yashwant Kanetkar	Let us C++	B.P.B. Publications

10 WEB REFERENCES

1. https://onlinecourses.nptel.ac.in/noc16_cs17
2. https://nptel.ac.in/courses/106105151/
3. http://nptelvideos.com/programming/

11 COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME	SIGNATURE
1	Internal	Mr. A. K. Chore	
2	Internal	Mr. P. P. Sawant	
3	Internal	Mr. A. S. Shukla	
4	External	Mr. Prashant Kashikar	
		Organization: MD, Mika Engg. India (P) Ltd.	

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC MUMBAI 400056.

1. COURSE DETAILS

Programme: CE/ME/EE/PE/CH	**Semester:II/II/IV/III/II**
Course: Stress Management	**Group:M**
Course Code: STM190012	**Duration:16 Weeks**

2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per Week					Examination Scheme and Maximum								
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D+T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
-----	02	-----	-----	02	-----	-----	-----	-----	-----	-----	-----	-----	022

3. COURSE OBJECTIVE

Students will be able to

1. Gain knowledge about the basic technique and practice of yoga, including instruction in Breath control, meditation, and physical postures.

2. Develop physical competency and mental concentration.

3. Gain an intellectual and theoretical understanding of the principles embodied in the Yoga Sutras,

4. Increase efficiency, concentration, inner power and enhance the spiritual power for improving Learning Skill

4. SKILL COMPETENCY :

The aim of the course is to develop the various basic skills required for individuals to identify and manage various stresses in their academic and personal life.

5. COURSE OUTCOMES(COs) At the end of the semester student will be able to: -

CO No.	COURSE OUTCOME	Bloom's LEVEL
CO1	Understand the basic methods to manage the stress.	Understanding
CO2	Understand the social ethics	Understanding
CO3	Develop the positive attitude towards society	Applying
CO4	Reduce psychological, mental and emotional stress	Applying

6. COURSE CONTENTS

Sr. No.	TOPIC/Sub-topic	Hours	Marks	COs
1	. HISTORICAL BACKGROUND AND YOGA LEARNING i) Yoga in Vedas ii) Yoga and its Principles iii) Consciousness iv) Yoga approach and Scientific view v) Pranayama: Breath Control, Breath and Postures, Rhythmic Breathing vi) Controlling the Body, Mechanism of Body: Kriyas and its high Therapeutic value. vii) Body as understood in its frame work systems and structure:.Asanas Cultural and Relaxation Asanas - viii) Muscles strength, Muscular coordination strength of Immune system ix) Relation and Reflection techniques Shavasana Shakshi Bhavanam. x)Bandhas and Mudras. xi) Depth of perception and expansion of awareness xii) Gross level Muscular stretches xiii) Subtle level Respiration changes and normalizing breath.	10	---	CO1 CO2
2	MEDITATION AND ITS TECHNIQUES: Meditative postures and kinds of Meditation Bodily Benefits Lower Blood Pressure ,lowers the levels of blood lactate, improves the immune system, increases body vitality, controls insomnia and increases overall health of the body Violence Free Society Meditation develops happiness, contentment and calmness. When increasing number of people practice meditation, it has a calming effect on the environment. This is a potent way to achieve a violence free society. Mental Benefits Emotional stability, anxiety decreases, anger reduces, happiness increases, and intuition develops clarity and peace of mind, induces ability to focus, and reduces tension and fear. Value Based Society	10	----	CO3

3	ART OF LIVING 1. Sudarshan Kriya 2. Life Skills 3. Ancient Wisdom 4. Practical knowledge to deal with the daily challenges of life 5. Interactive exercises 6. Dealing with your emotions 7. Improving Communication skills and Relationship	08	----	CO3
4	STRESS MANAGEMENT FOR STUDENTS Stress management techniques: 1. Time management techniques 2. Organization techniques 3. Create a study environment 4. Memorization techniques 5. Be an Optimist 6. Sleep Well 7. Study Techniq	04	----	CO4
	TOTAL	32	----	----

7. LIST OF PRACTICALS/ASSIGNMENTS/EXERCISES/TUTORIALS/DRAWINGS

This is purely practice based subject where students will be doing exercises of asana and pranayama and dhyan under the guidance of external and internal experts

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx.Hrs required	COs
1	HISTORICAL BACKGROUND AND YOGA LEARNING	04	CO1
2	MEDITATION AND ITS TECHNIQUES	08	CO3
3	ART OF LIVING	04	CO3
4	STRESS MANAGEMENT FOR STUDENTS	08	CO4

8. IMPLEMENTATION STRATEGY (PLANNING)

1. The students will be performing practice sessions covering above topics.
2. Live demonstration along with content delivery sessions will be conducted.
3. The lecture room/ Hall separately will be assigned batchwise as per Time Table for Male (Boys) and Female(Girls) as where an applicable depending upon relevant topics.
4. The materials/ Items required example Yoga Matt/ Chatai/corresponding matt / towels / chadar are to be brought by students only for particular topics.

9. LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication
1	The Yoga Sutra of Patanjali	M.R.Yardi, Bhandarkar	-
2	Indian Philosophy	Dr. S. Radhakrishanan	-
3	Introduction to Indian Philosophy	Dutta & Hiriyanna Chatterji	-
4	Outlines of Indian Philosophy	Hiriyanna.	-

10. WEB REFERENCES

1. http://www.artofliving.org
2. http://www.bkwsu.org
3. http://www.theyogainstitute.org
4. http://www.managingstress.com
5. http://3srb.org

11. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME	SIGNATURE
1	Internal	**N.M.Pathak**	
2	Internal	R.D. Shimpi	
3	Internal	S.A. Kamble	
4	External	**Chirag Kachaliya** M/s Mihir Idustries pvt ltd	Chirag

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