



**GLA**  
UNIVERSITY  
MATHURA  
Established vide U.P. Act 21 of 2010.

# Course Curriculum

**Session - 2016- 2017**

**Three Year Diploma Course**

**In**

**Mechanical Engineering**

**UNIVERSITY POLYTECHNIC**

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		Course Structure, Contact Hours And Credits	
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2	DHS 1002	Applied Mathematics -I	
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5	DCS 1001 / DME 1001	Fundamentals of Computer / Engineering. Mechanics	
6	DME 1081	Engineering Drawing-I	
7	DME 1082	Workshop Practice-I	
8	DHS 1082 / DHS 1082	Applied Chemistry Lab / Applied Physics Lab.	
9	DCS 1081	Computer Lab I	
10	DME 1083 / DME 1084	Engineering Mechanics Lab. / Field Visits and Presentations -I	
11	DME 1099	General Proficiency	
12	DHS 2001	English Communication -II	
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21	DME 1083 / DME 1084	Engineering Mechanics Lab. / Field Visits & Presentations -I	
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35	DME 4001	Hydraulics And Hydraulic Machines	
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44	DME 4085	Machine Design And Drawing Lab	
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52	DME 5081	Theory Of Machines Lab	
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56	DME 5085	Minor Project	
57	DME 5086	Seminar	
58	DME 5099	General Proficiency	
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70	DME 6005	Automobile Engineering	A
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72	DME 6081	Automobile Engineering Lab	
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76	DME 6008	Computer Integrated Manufacturing	
77	DME 6084	Computer Integrated Manufacturing Lab	
78	DME 6082	CNC Machines and Automation Lab	
79	DME 6083	CNC Machine Technology lab	

**GLA UNIVERSITY POLYTECHNIC**  
**COURSE STRUCTURE, CONTACT HOURS and CREDITS**

**DISCIPLINE : COMMON TO ALL BRANCH**  
**SEMESTER : I SEM (FULL-TIME)**

Sr. No.	Subject Code	Subject Name	Periods Per Week			Cr
			L	T	P/D	
1	DHS 1001	English Communication –I	3	2	0	4
2	DHS 1002	Applied Mathematics -I	3	2	0	4
3	DHS 1003	Applied Physics-I	3	0	0	3
4	DHS 1004	Applied Chemistry-I	3	0	0	3
5	DCS 1001/ DME 1001	Fundamentals of Computer/Engineering Mechanics	2	1	0	3
6	DME 1081	Engineering Drawing-I	0	0	4	2
7	<b>DME 1082</b>	<b>Workshop Practice-I</b>	0	1	4	3
8	DHS 1082/ DHS 1081	Applied Chemistry Lab / Applied Physics Lab	0	0	2	1
9	DCS 1081	Computer Lab I	0	0	2	1
10	DME 1083 /DME 1084	Engineering Mechanics Lab. / Field Visits and Presentations -I	0	0	2	1
11	DME 1099	General Proficiency	0	0	0	1
<b>TOTAL</b>			<b>14</b>	<b>6</b>	<b>14</b>	<b>26</b>

L- Lecture Period, T-Tutorial Period, P- Practical Period, D- Drawing Practice Period, Cr. Credits,

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**GLA UNIVERSITY POLYTECHNIC**  
**COURSE STRUCTURE, CONTACT HOURS and CREDITS**

**DISCIPLINE : COMMON To ALL BRANCH**  
**SEMESTER : II SEM (FULL-TIME)**

Sr. No.	Subject Code	Subject Name	Periods Per Week			Cr
			L	T	P/D	
1	DHS 2001	English Communication -II	3	2	0	4
2	DHS 2002	Applied Mathematics -II	3	2	0	4
3	DHS 2003	Applied Physics-II	3	0	0	3
4	DHS 2004	Applied Chemistry-II	3	0	0	3
5	DCS 1001/ DME 1001	Fundamentals of Computer/Engineering Mechanics	2	1	0	3
6	<b>DME 2082</b>	<b>Workshop Practice-II</b>	0	0	4	2
7	DME 2081	Engineering Drawing-II	0	1	4	3
8	DHS 1082/ DHS 1081	Applied Chemistry Lab / Applied Physics Lab	0	0	2	1
9	DCS 2081	Computer Lab II	0	0	2	1
10	DME 1083 / DME 1084	Engineering Mechanics Lab. / Field Visits and Presentations I	0	0	2	1
11	DME 2099	General Proficiency	0	0	0	1
<b>TOTAL</b>			<b>14</b>	<b>6</b>	<b>14</b>	<b>26</b>

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**COURSE STRUCTURE, CONTACT HOURS and CREDITS**

**DISCIPLINE : MECHANICAL ENGINEERING.**  
**SEMESTER : III SEM (FULL-TIME)**

Sr. No.	Subject Code	Subject Name	Periods Per Week			Cr
			L	T	P/D	
1	DME 3001	Strength of Materials	3	1	0	4
2	DME 3002	Thermal Engineering	3	0	0	3
3	DME 3003	Workshop Technology-I	3	0	0	3
4	DME 3004	Internal Combustion Engine	3	1	0	4
5	DEE 3001	Basics of Electrical And Electronics Engineering	3	0	0	3
6	DME 3081	Strength of Materials Lab.	0	0	2	1
7	DME 3082	Thermal Engineering Lab.	0	0	2	1
8	DME 3083	Workshop Technology-I Lab	0	0	4	2
9	DME 3084	Engineering Drawing III	0	0	4	2
10	DME 3085	Field Visits And Presentations II	0	0	2	1
11	DEE 3091	Basics Of Electrical And Electronics Engineering Lab..	0	0	2	1
12	DME 3099	General Proficiency	0	0	0	1
<b>TOTAL</b>			<b>15</b>	<b>2</b>	<b>16</b>	<b>26</b>

**L- Lecture Period, T-Tutorial Period, P- Practical Period, D- Drawing Practice Period, Cr.- Credits,**

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**COURSE STRUCTURE, CONTACT HOURS and CREDITS**

**DISCIPLINE : MECHANICAL ENGINEERING.**  
**SEMESTER : IV SEM (FULL-TIME)**

Sr. No.	Subject Code	Subject Name	Periods Per Week			Cr
			L	T	P/D	
1	DME 4001	Hydraulics And Hydraulic Machines	3	1	0	4
2	DME 4002	Materials And Metallurgy	3	0	0	3
3	DME 4003	Measurement And Metrology	3	0	0	3
4	DME 4004	Workshop Technology-II	3	0	0	3
5	DME 4005	Machine Design And Drawing	3	1	0	4
6	DME 4081	Hydraulics And Hydraulic Machines Lab.	0	0	2	1
7	DME 4082	Materials And Metallurgy Lab.	0	0	2	1
8	DME 4083	Measurement And Metrology Lab.	0	0	2	1
9	DME 4084	Workshop Practice – II Lab.	0	0	4	2
10	DME 4085	Machine Design And Drawing Lab	0	0	4	2
11	DME 4086	Field Visits And Presentations III	0	0	2	1
12	DME 4099	General Proficiency	0	0	0	1
<b>TOTAL</b>			<b>15</b>	<b>2</b>	<b>16</b>	<b>26</b>

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**COURSE STRUCTURE, CONTACT HOURS and CREDITS**

**DISCIPLINE : Mechanical Engineering**  
**SEMESTER : V SEM (Full Time)**

Sr. No.	Subject Code	Subject Name	Periods Per Week			Credit
			L	T	P/D	
1	DME 5001	Theory of Machines	3	1	0	4
2	<b>DME 5002</b>	<b>Refrigeration And Air Conditioning</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
3	DME 5003	Environmental Engineering	2	0	0	2
4	DME 5004	Computer Aided Manufacturing	3	0	0	3
5	DME 5005	Workshop Technology - III	3	0	0	3
6	DME 5081	Theory Of Machines Lab	0	0	2	1
7	<b>DME 5082</b>	<b>Refrigeration And Air Conditioning Lab</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>
8	DME 5083	Workshop Technologies - III Lab	0	0	4	2
9	DME 5084	CAM Lab	0	0	4	2
10	DME 5085	Minor Project	0	0	4	2
11	DME 5086	Seminar	0	0	2	1
12	DME 5099	General Proficiency	0	0	0	1
<b>Total</b>			<b>14</b>	<b>2</b>	<b>18</b>	<b>26</b>

L- Lecture Period, T-Tutorial Period, P- Practical Period, D- Drawing Practice Period, Cr.- Credits,

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**GLA UNIVERSITY POLYTECHNIC**  
**COURSE STRUCTURE, CONTACT HOURS and CREDITS**

**DISCIPLINE : Mechanical Engineering (General)**  
**SEMESTER : VI SEM (Full Time)**

Sr. No.	Subject Code	Subject Name	Periods Per Week			Credit
			L	T	P/D	
1	DME 6001	Power Plant Engineering	4	0	0	4
2	DME 6002	Quality Management & Value Engineering	4	0	0	4
3	DME 6003	Entrepreneurship Development & Management	3	0	0	3
4		Elective 1	4	0	0	4
5		Elective 2	4	0	0	4
6	DME 6086	Major Projects	0	0	12	6
7	DME 6099	General Proficiency	0	0	0	1
		<b>TOTAL</b>	<b>19</b>	<b>0</b>	<b>12</b>	<b>26</b>

**L- Lecture Period, T-Tutorial Period, P- Practical Period, D- Drawing Practice Period, Cr.- Credits,**

**Elective 1: (Any one)**

1. DME 6021- Maintenance Engineering & Safety
2. DME 6022- Industrial Engineering
3. DME 6023 - CNC Machine Technology

**Elective 2: (Any one)**

1. DME 6024 - Advanced Welding Technology
2. DME 6025 - Mechatronics
3. DME 6005- Automobile Engineering

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**GLA UNIVERSITY POLYTECHNIC**  
**COURSE STRUCTURE, CONTACT HOURS and CREDITS**

**DISCIPLINE : Mechanical Engineering (Automobile)**  
**SEMESTER : VI SEM (Full Time)**

Sr. No.	Subject Code	Subject Name	Periods Per Week			Credit
			L	T	P/D	
1	DME 6004	Advance Production Technology	3	0	0	3
2	DME 6005	Automobile Engineering	3	0	0	3
3	DME 6006	Automobile Servicing, Maintenance And Repair	3	0	0	3
4		Elective 1	4	0	0	4
5		Elective 2	4	0	0	4
6	DME 6081	Automobile Engineering Lab	0	0	2	1
7	DME 6082	Automobile Service, Maintenance & Repair Lab	0	0	2	1
8	DME 6083	Advance Production Technology Lab	0	0	2	1
9	DME 6086	Major Projects	0	0	12	6
10	DME 6099	General Proficiency	0	0	0	1
		<b>TOTAL</b>	<b>17</b>	<b>0</b>	<b>16</b>	<b>26</b>

**L- Lecture Period, T-Tutorial Period, P- Practical Period, D- Drawing Practice Period, Cr.- Credits,**

**Elective 1 : (Any one)**

1. DME 6021- Maintenance Engineering & Safety
2. DME 6022- Industrial Engineering
3. DME 6023 - CNC Machine Technology

**Elective 2 : (Any one)**

1. DME 6024 - Advanced Welding Technology
2. DME 6025 - Mechatronics

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**GLA UNIVERSITY POLYTECHNIC**  
**COURSE STRUCTURE, CONTACT HOURS and CREDITS**

**DISCIPLINE : Mechanical Engineering (CNC Technology)**  
**SEMESTER : VI SEM (Full Time)**

Sr. No.	Subject Code	Subject Name	Periods Per Week			Credit
			L	T	P/D	
1	DME 6007	CNC Machines Technology	3	0	0	3
2	DME 6008	Computer Integrated Manufacturing	3	0	0	3
3	DME 6003	Entrepreneurship Development & Management	3	0	0	3
4		Elective 1	4	0	0	4
5		Elective 2	4	0	0	4
6	DME 6084	Computer Integrated Manufacturing Lab	0	0	2	1
7	DME 6085	CNC Machines Technology Lab	0	0	2	1
8	DME 6086	Major Projects	0	0	12	6
9	DME 6099	General Proficiency	0	0	0	1
<b>TOTAL</b>			<b>17</b>	<b>0</b>	<b>16</b>	<b>26</b>

**L- Lecture Period, T-Tutorial Period, P- Practical Period, D- Drawing Practice Period, Cr.- Credits,**

**Elective 1: : (Any one)**

1. DME 6021- Maintenance Engineering & Safety
2. DME 6022- Industrial Engineering
3. DME 6023 - CNC Machine Technology

**Elective 2: (Any one)**

1. DME 6024 - Advanced Welding Technology
2. DME 6025 - Mechatronics

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**GLA UNIVERSITY POLYTECHNIC**  
**COURSE STRUCTURE, CONTACT HOURS and CREDITS**

**DISCIPLINE : Mechanical Engineering (Production)**  
**SEMESTER : VI SEM (Full Time)**

Sr. No.	Subject Code	Subject Name	Periods Per Week			Credit
			L	T	P/D	
1	DME 6005	Automobile Engineering	0	0	2	1
2	DME 6004	Advance Production Technology	0	0	2	1
3	DME 6003	Entrepreneurship Development & Management	3	0	0	3
4		Elective 1	4	0	0	4
5		Elective 2	4	0	0	4
6	DME 6083	Advance Production Technology Lab	0	0	2	1
7	DME 6081	Automobile Engineering Lab	0	0	2	1
8	DME 6086	Major Projects	0	0	12	6
9	DME 6099	General Proficiency	0	0	0	1
<b>TOTAL</b>			<b>17</b>	<b>0</b>	<b>16</b>	<b>26</b>

**L- Lecture Period, T-Tutorial Period, P- Practical Period, D- Drawing Practice Period, Cr.- Credits,**

**Elective 1: (Any one)**

1. DME 318- Maintenance Engineering & Safety
2. DME 315- Industrial Engineering
3. DME 317- CNC Machine Technology

**Elective 2: (Any one)**

1. DME 318 - Advanced Welding Technology
2. DME 319 - Mechatronics

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# GLA UNIVERSITY

MATHURA, U.P. INDIA

(Established vide U.P. Act 21 of 2010 &

Approved by UGC u/s 2(f))

## GRADE REPORT CARD

Diploma - First Year

Student's Name : **Abhay Pratap Singh** Roll Number : **133000001**  
 Father's Name : **Brijendra Singh Gaur** Department : **Mechanical Engineering**  
 Mother's Name : **Rajani Singh** Session : **2013-14**

### FIRST SEMESTER

S. No.	Subject Code	Subject Name	Credit	Grade
1	DCS 101	Fundamentals of Computer	2	A
2	DHC 101	Applied Chemistry - I	2	B
3	DHE 101	English Communication - I	4	B+
4	DHM 101	Applied Mathematics - I	4	C
5	DHP 101	Applied Physics - I	3	C+
6	DCS 181	Computer Lab - I	1	B+
7	DHC 181	Chemistry Lab - I	1	B
8	DHP 181	Physics Lab - I	1	B
9	DME 181	Engineering Drawing - I	3	B+
10	DME 182	Workshop Practice	3	A
11	DME 183	Field Visits & Presentations - I	1	A
12	DCE 197	General Proficiency	1	B+

### SECOND SEMESTER

S. No.	Subject Code	Subject Name	Credit	Grade
1	DHC 102	Applied Chemistry - II	2	A
2	DHE 102	English Communication - II	4	B
3	DHM 102	Applied Mathematics - II	4	B+
4	DHP 102	Applied Physics - II	3	C
5	DME 102	Applied Mechanics	3	C+
6	DCS 182	Computer Lab - II	1	B+
7	DHC 282	Chemistry Lab - II	1	B
8	DHP 282	Physics Lab - II	1	B
9	DME 184	Manufacturing Process & Building Materials	2	B+
10	DME 185	Engineering Drawing - II	3	A
11	DME 186	Mechanics Lab	1	A
12	DCE 198	General Proficiency	1	B+

First Semester Record			Second Semester Record		
CREDITS	SGP	SPI	CREDITS	SGP	SPI
26	192	7.38	26	192	7.38

Cumulative Record up to first year		
CREDITS	CGP	CPI
52	384	7.38

SGP: Semester Grade  
Print

Result: Pass, Promoted to second year

Add. Controller of Examination

**THIRD SEMESTER**

S. No.	Subject Code	Subject Name	Credit	Grade
1	DHM 301	Applied Mathematics - III	4	A
2	DME 301	Strength Of Material	4	B
3	DME 302	Thermal Engineering	3	B+
4	DME 303	Basics Of Electrical And Electronics Engineering	3	C
5	DME 304	Workshop Technology - I	3	C+
6	DME 381	Strength Of Material Lab.	1	B+
7	DME 382	Thermal Engineering Lab.	1	B
8	DME 383	Electrical Technology & Electronics Lab.	1	B
9	DME 384	Workshop Technology - I	2	B+
10	DME 385	Engineering Drawing Lab.	2	A
11	DME 386	Field & Presentation	1	A
12		General Proficiency	1	B+

**FOURTH SEMESTER**

S. No.	Subject Code	Subject Name	Credit	Grade
1	DME 401	Hydraulics & Hydraulic Machines	4	A
2	DME 402	Materials And Metallurgy	3	B
3	DME 403	Measurement And Metrology	3	B+
4	DME 404	Workshop Technology - II	3	C
5	DME 405	Machine Design And Drawing	4	C+
6	DME 481	Hydraulics & Hydraulic Machines Lab.	1	B+
7	DME 482	Materials And Metallurgy Lab.	1	B
8	DME 483	Measurement And Metrology Lab.	1	B
9	DME 484	Workshop Practice - II Lab.	2	B+
10	DME 485	Machine Design And Drawing Lab	2	A
11	DME 486	Field & Presentation	1	A
12		General Proficiency	1	B+

Third Semester Record			Fourth Semester Record		
CREDITS	SGP	SPI	CREDITS	SGP	SPI
26	192	7.38	26	192	7.38

Cumulative Record up to second year		
CREDITS	CGP	CPI
104	768	7.38

SGP: Semester Grade  
Point

**Result: Pass, Promoted to third year**

**Add. Controller of Examination**

**FIFTH SEMESTER**

S. No.	Subject Code	Subject Name	Credit	Grade
1	DME 501	Theory of Machines	4	A
2	DME 502	Refrigeration Air Conditioning & Heat & Mass Transfer	4	B
3	DME 503	Environmental Engineering	2	B+
4	DME 504	Internal Combustion Engine	3	C
5	DME 505	Workshop Technology - III	3	C+
6	DME 581	Theory Of Machines Lab	1	B+
7	DME 582	Refrigeration & Air Conditioning And HMT Lab.	1	B
8	DME 583	Workshop Technologies - III Lab	2	B
9	DME 584	Cad Lab	2	B+
10	DME 585	Minor Project	2	A
11	DME 586	Seminar	1	A
12		General Proficiency	1	B+

**SIXTH SEMESTER**

S. No.	Subject Code	Subject Name	Credit	Grade
1	DME 401	Hydraulics & Hydraulic Machines	4	A
2	DME 402	Materials And Metallurgy	3	B
3	DME 403	Measurement And Metrology	3	B+
4	DME 404	Workshop Technology - II	3	C
5	DME 405	Machine Design And Drawing	4	C+
6	DME 481	Hydraulics & Hydraulic Machines Lab.	1	B+
7	DME 482	Materials And Metallurgy Lab.	1	B
8	DME 483	Measuring And Metrology Lab.	1	B
9	DME 484	Workshop Practice - II Lab.	2	B+
10	DME 485	Machine Design And Drawing Lab	2	A
11	DME 486	Field & Presentation	1	A
12		General Proficiency	1	B+

Fifth Semester Record			Sixth Semester Record		
CREDITS	SGP	SPI	CREDITS	SGP	SPI
26	192	7.38	26	192	7.38

Cumulative Record up to final year		
CREDITS	CGP	CPI
156	1152	7.38

SGP: Semester Grade  
Point

**Result: Pass, Promoted to third year**

**Add. Controller of Examination**

### SCHEME OF EVALUATION & GRADING

The level of student's academic performance in the course unit as the aggregate of continuous evaluation, mid-term examinations & end-term examinations is reflected by letter grades on a ten points scale according to the table given below:

Aggregate Marks (Out of 100)	Letter Grade	Grade Point
≥90	A+	10
80-89	A	9
70-79	B+	8
60-69	B	7
50-59	C+	6
40-49	C	5
35-39	D	4
30-34	E	2
<30	F	0

**MINIMUM ACADEMIC REQUIREMENTS:**

The student must score a minimum Grade 'D' in each course to pass the course unit.

**SEMESTER PERFORMANCE INDEX (SPI)/TRIMESTER PERFORMANCE INDEX (TPI)**

The Semester/Trimester performance of the student is indicated as "Semester Performance Index (SPI)/ Trimester Performance Index (TPI)" at the end of every Semester/Trimester.

SPI/TPI is the weighted average of Grade Points of all letter grades secured by a student for all the course units in the Semester/Trimester. The formula for computing 'I', where 'I' is SPI or TPI as applicable, is as under:

$$I = \frac{c_1g_1 + c_2g_2 + \dots + c_kg_k}{c_1 + c_2 + \dots + c_k}$$

"c" is the credit given to the course

"g" is the grade point obtained in the course

"k" is the number of courses in the Semester/Trimester

**CUMULATIVE GRADE POINT INDEX (CPI)**

The CPI is used to describe overall performance of a student in a programme. It is weighted average of grade points obtained by him/her in all Semesters/Trimesters.

$$CPI = \frac{\sum_{i=1}^n C_i I_i}{\sum_{i=1}^n C_i}$$

"C" is the total credit of the Semester/Trimester

"n" is the semester for which the CPI is calculated

**CONVERSION OF CPI TO PERCENTAGE OF MARKS**

Percentage of marks = [CPI - 0.75] x 10

**CPI**

Greater than or equal to 8.25

Less than 8.25 and greater than or equal to 6.75

Less than 6.75 and greater than or equal to 5.75

Less than 6.75 and greater than or equal to 5.25

**EQUIVALENT DIVISION**

First Division with honours\*

First Division

Second Division for degree courses

Second Division for diploma courses

\*First division with honours will be awarded only if the candidate clears all the subjects in single attempt in normal duration of the programme and that too in regular semesters/trimesters.



**DHE 1001: ENGLISH COMMUNICATION -I**

**Credits: 04**

**Semester I**

**L-T-P : 3-2-0**

<b>Module No.</b>	<b>Contents</b>	<b>Teaching Hours</b>
I	<p><b>Grammar and Usage:</b> Modals Voice Direct and Indirect Narration Question Tags Transformation of Sentences</p> <p><b>Study of Text:</b> "Science and Human life" by J.B.S. Haldane (From the prescribed text)</p>	12
II	<p><b>Writing skills:</b> Writing Paragraphs Picture Composition Letter Writing: Personal Letters</p> <p><b>Study of Text:</b> "The Eyes Are Not Here" by Ruskin Bond (From the prescribed text) "The Rocking-Horse Winner" by D.H. Lawrence (From the prescribed text)</p>	12
III	<p><b>Reading Skills:</b> Comprehension passages from the prescribed text. <b>Vocabulary:</b> Words often confused, Synonyms, Antonyms. <b>Study of Text:</b> "The Lament" by Anton P. Chekhov (From the prescribed text) "The Fly" by Katherine Mansfield (From the prescribed text)</p> <p><b>Developing Oral Communication Skills</b></p> <ul style="list-style-type: none"> <li>● Greeting, Starting a Conversation</li> <li>● Introducing Oneself</li> <li>● Introducing Others</li> <li>● Leave Taking</li> <li>● Thanks Giving, Wishing Well</li> <li>● Talking about Self</li> <li>● Talking about Likes and Dislikes</li> </ul> <p><b>(Note : The above content is for oral practice. It should not be included in theory examination.)</b></p>	12

**BOOKS PRESCRIBED:**

- *An Anthology of English Short Stories*, Ed. R.P.Singh, Oxford University Press, New Delhi.
- *Current English Grammar & Usage with Composition* by R.P. Sinha, Oxford University Press, New Delhi.

**BOOKS RECOMMENDED FOR STUDY:**

- *Communicating Effectively in English, Book-I* by RevathiSrinivas, Abhishek Publications, Chandigarh.
- *High School English Grammar and Composition* by Wren & Martin, S. Chand & Company Ltd., Delhi.
- *Communication Techniques and Skills* by R.K.Chadha, DhanpatRai Publications, New Delhi.
- *Intermediate English Grammar* by Raymond, Murphy, Cambridge University Press, New Delhi.
- *Living English Structure* by W. Allen, Pearson Education, New Delhi.
- *Oxford English Hindi Dictionary* by R.N. Sahai&S.Kumar, Oxford University Press, New Delhi.

## DHM 1001: APPLIED MATHEMATICS - I

Teachers should give examples of engineering/technology applications of various concepts and principles in each topic so that students are able to appreciate learning of these concepts and principles.

**Credits: 04**

**Semester I**

**L-T-P: 3-2-0**

Module No.	Contents	Teaching Hours (Approx.)
I	<p><b>Algebra:</b> Determinants and Matrices: expansion of determinants (upto III order) by expansion method, solution of equations(upto three unknowns) by Cramer's rule, Definition of matrix, addition, subtraction, multiplication of matrices (upto III order), transpose of matrix, minor and cofactor, Inverse of a matrix by adjoint method (upto II Order). Partial Fractions(Linear factors, repeated linear factors, non reducible quadratic factors excluding repeated factors), concept of A.P., G.P., permutation and combination (<math>nPr</math>, <math>nCr</math>) Binomial theorem(without proof) for positive integral index (expansion and general forms), Binomial theorem for any index (expansion without proof), first and second binomial approximation with application to engineering problems</p>	12
II	<p><b>Trigonometry:</b> T - ratios of allied angles (without proof), sum , difference formulae and their applications( without proof), product formulae ( transformation of product to sum, difference and vice - versa), T - ratios of multiple angles, sub multiple angles (<math>2A</math>, <math>3A</math>, <math>A/2</math>), Properties and solution of the triangle, inverse trigonometrical functions ( principal value only). Definition of complex numbers, real and imaginary parts of complex number, polar and cartesian form and their inter- conversion, conjugate, modulus and argument of a complex number, addition, subtraction, multiplication and division of a complex number. Demoivre's theorem, Euler's theorem of circular functions, hyperbolic functions</p>	12
III	<p><b>Coordinate Geometry:</b> Equation of straight line in standard forms (without proof), intersection of two straight lines, angle between two lines, perpendicular distance formula (without proof). General equation of circle and its characteristics, to find the equation of the circle given: centre and radius or three points lying on it or coordinates of end points of a diameter Equation of conics(ellipse, parabola and hyperbola), simple problems related to engineering (standard forms only)</p>	12

### Reference Books/ Text Books / Cases:

- \* Gupta P.(2012), Comprehensive Mathematics XII, Laxmi Publications, Delhi
- \* Grewal B. S. Elementary Engineering Mathematics, Khanna Publishers, New Delhi
- \* Sharma R.D., Applied Mathematics, Dhanpat Rai Publications, Delhi

## DHP 1001: APPLIED PHYSICS – I

**Credits: 03**

**Semester I**

**L-T-P: 3-0-0**

**Note:- Teachers should give examples of engineering/technology applications of various concepts and principles in each topic so that students are able to appreciate learning of these concepts and principles.**

Module No.	Content	Teaching Hours
I	Physical quantities, fundamental and derived units, systems of units (CGS, MKS and SI units), Dimensions and dimensional formulae of physical quantities, Checking the correctness of physical relations and derivation of relations between various physical quantities, Error in measurement, types of errors, significant figures, Scalar and Vector quantities, representation of vectors, types of vectors, Addition, subtraction, multiplication of vectors, scalar and vector products, Force: Newton's laws of motion, linear momentum and its conservation laws, impulse, simple numerical problems, Friction, Types of friction and its application, equilibrium of forces, lami's theorem, Projectile, horizontal and oblique projections and equation of trajectory, Relation between linear and angular variables (velocity and acceleration), Circular motion, Angular displacement, angular velocity and angular acceleration Centripetal force (derivation) and centrifugal force with application such as banking of roads and bending of cyclists	12
II	Concept of Translatory and rotatory motion with examples, Definitions of Torque, angular momentum and their relationship, Law's of Conservation of angular momentum (qualitative) and its examples, Moment of inertia and its physical significance, rotational kinetic energy, inertia of rod, rod, disc, ring and sphere (Formulae only), Planetary motion: Newton's law of gravitation, Kepler's law of planetary motion (Qualitative), escape velocity, Work (definition), work done against friction on horizontal and inclined plane, Work done by a moving object on horizontal and inclined plane (incorporating frictional forces), Power (definition), Calculation of power in simple cases, Energy (definition), Kinetic energy and Potential energy with their derivations, Principle of conservation of mechanical energy (for freely falling bodies), transformation of energy from one form to another, Elasticity (definition), stress and strain, different types of modulus of elasticity (Formulae), Hooke's law with its applications, Pressure (definition), atmospheric pressure. gauge pressure, absolute pressure, Surface tension (concept), angle of contact, measurement of surface tension by capillary tube method, applications of surface tension.	12
III	Difference between heat and temperature, Principles of measurement of temperature and different scales of temperature and their relationship, Types of thermometers (Concept only), Expansion of solids, liquids and gases, coefficient of linear, surface and cubical expansions and relation amongst them (Concept and only formulae), Modes of transfer of heat (Conduction, convection and radiation with examples), Thermal conductivity: Co-efficient of thermal conductivity, Laws of Black body radiations: Stephens law, Kirchoff's law, Weinn's Law (Concept and related formulae), Simple Harmonic Motion (SHM): definition, expression for displacement, velocity, acceleration, time period, frequency in S.H.M. Equation of simple harmonic progressive wave, Wave motion: Transverse and longitudinal wave motion with examples, Velocity of sound waves, frequency and wave length of a wave (relationship $v = \nu\lambda$ ) and their applications, superposition of wave and application to interference, beats and stationary waves.	12

**Reference Books:**

- Applied Physics Vol. I TTTI Publications, Tata McGraw Hill, New Delhi
- Concepts in Physics by HC Verma, Vol. I , Bharti Bhawan Ltd. New Delhi
- Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
- Applied Physics by Jasmer Kaur and Bhupinder Singh, Lords Publications, Jalandhar
- Engineering Physics by Vanchna Singh and Sheetal Kumar, Cengage Learning India Pvt. Ltd. Patparganj, Delhi

**Text Books:**

- Applied Physics Vol.I by T.R.Narula and Suman Chaudhary, North Publications, Jalandhar
- Nutan Physics by Kumar & Mittal

## DHC 1001: APPLIED CHEMISTRY-I

**Credits: 2**

**Semester-I**

**L-T-P: 2-0-0**

Module No.	Contents	Teaching Hours
I	<p><b>General Chemistry:</b> Symbols, formula of simple inorganic compounds, valency, chemical equations, Atomic weight, Equivalent weight, Molecular weight, Isotopes, Isobars, Surface tension, Viscosity, Specific gravity.</p> <p><b>Structure of atom:</b> Fundamental particles viz. electron, proton, neutron. Rutherford and Bohr's model of atom, Bohr Burry Scheme, Aufbau principle and Hund's Rule, Electronic configuration of elements (up to atomic number 30), Quantum numbers.</p>	8
II	<p><b>Periodic properties of elements:</b> Modern periodic law, Long form of periodic table and its merits and demerits. Atomic radii, ionic radii, Ionization potential, Electro negativity and Electron affinity.</p> <p><b>Electrochemistry:</b> Electrolytes and non electrolytes, Faraday's Law of electrolysis, Arrhenius acid - base concept, pH (numericals of strong acid and strong base) &amp; buffer solution (definition and types). Common ion effect and solubility product. Oxidation number, Oxidation and reduction including electronic concept. Dry cell.</p>	8
III	<p><b>Chemical bonding:</b> Types of chemical bonding (ionic, covalent and co-ordinate bond). Hydrogen bonding, Hybridisation (sp<sup>3</sup>, sp<sup>2</sup>, sp).</p> <p><b>Solutions:</b> Homogeneous and heterogeneous solutions. Normality, Molarity, Molality, Mole concept, colligative properties, osmotic pressure and its measurement by Berkley and Hartley method.</p> <p><b>Radioactivity:</b> General idea of radioactivity, emission of alpha, beta, gamma rays and their properties. Fajan's group displacement law, half life, average life, nuclear fission and nuclear fusion.</p>	8

## DCS 1001: FUNDAMENTALS OF COMPUTER

**Credits: 02**

**Semester I**

**L-T-P: 2-0-0**

Module No.	Content	Teaching Hours
I	<p><b>Fundamentals of Computer concepts</b> Impact of computer in society: Computer application in office, book publishing, data analysis, accounting, investment, inventory control, graphics, air and railway ticket reservation, robotics, military, banks, Insurance financial transactions and many more.</p> <p>Generations of computer, block diagram of a computer, CPU, memory, data – numeric data, alpha numeric data, processing of data. Computers for information storage, information seeking, information processing and information transmission, computer organization, computer hardware and software; primary and secondary memory: RAM, ROM, PROM etc.</p> <p>Input devices; keyboard, mouse, scanner, output devices; VDU and Printer (Impact and non-Impact printers), Plotter etc. Primary and Secondary Storage (Auxiliary Storage), Secondary storage; magnetic disks – tracks and sectors, optical disk (CD, CD-RW and DVD Memory)</p> <p>System software, application software, operating systems, advantages of software and application packages. Introduction to Operating Systems such as MS-DOS and Windows, difference between DOS and Windows.</p>	8
II	<p><b>Introduction to MS-Office</b> <i>Introduction to WORD package</i> Starting Word Document; Typing and Editing text, Copying and Moving, Typing Special Characters (Symbols); Some common features: Changing the case of text, Moving &amp; copying text with drag and drop, Justifying text, inserting bulleted and numbered lists, Arranging and moving between open documents; Finding and replacing, formatting; Using the spell checker, Checking grammar, mail merging</p> <p><i>Concepts of POWER POINT</i> How to make an effective presentation, Physical aspects of presentation; A Presentation Graphics package; Creating a presentation: creating a Title slide, Creating a Graph, Creating Tables, Make Organization Chart, To Save and close presentation; Working with Tools: Create, Edit, Move, Delete, Resize, Format text object, Working with Graphics tools; Slide show</p>	8
III	<p><b>Introduction to Computer Network</b> Network Goals, Devices, Topologies, Cables and connectors, Addressing, Antivirus</p> <p><b>Introduction to INTERNET</b> What is INTERNET, intranet, client-server architecture, various file formats, Application of INTERNET: E-mail, WWW, Study of various search engine using LYNX, LOGIN PROCEDURE, Study of INTERNET EXPLORER, Creating mailing account, Surfing using WORLD WIDE WEB information relating to employment, education, alumni, social networking.</p>	8

**Reference Books:**

- Basics of Information Technology by Priti Srivastava, North Publication
- Fundamentals of Computer by E Balagurusamy, Tata McGraw Hill Education Pvt. Ltd, New Delhi
- Fundamentals of Computer by V Rajaraman; Prentice Hall of India Pvt. Ltd., New Delhi
- Internet for Every One by Alexis Leon and Mathews Leon; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
- MS Office by BPB Publications, New Delhi



**GLA**  
UNIVERSITY  
MATHURA  
ESTABLISHED IN 1957

Course Curriculum (Session 2014-15)  
**[Diploma in Engineering]**

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## DME 1081: ENGINEERING DRAWING – I

**Credits: 03**

**Semester I**

**L-T-P: 0-1-4**

- Note: 1. First angle projection is to be followed
2. Instruction relevant to various drawings may be given along with appropriate demonstration, before assigning drawing practice to the students

Module No.	Content	Teaching Hours
<b>I</b>	<p><b>Drawing Office Practice, Lines and Lettering (2 Sheets)</b></p> <p>1.1 Definition of drawing, classification of drawing</p> <p>1.2 Drawing instruments such as mini drafter, drawing board, drawing sheet, drawing pins, pencils, eraser, sandpaper, sharpener, cello-tape etc.</p> <p>1.3 Sizes and layout of standard drawing sheets and drawing boards</p> <p>1.4 Different types of lines in engineering drawing as per BIS specifications</p> <p><b>1.5</b> Definition and classification of letterings, free hand lettering (alphabets and numerals) in different standard series of 2.5, 3,5,7,10 and 15 mm heights. Single stroke vertical and inclined lettering at 75° (alphabets and numerals) lowercase and uppercase in the ratio of 7:4.</p>	04
<b>II</b>	<p><b>Dimensioning (2 Sheets)</b></p> <p>2.1 Necessity of dimensioning, Types of dimensioning (chain, parallel and progressive dimensioning, size and location dimensioning) Methods of placing dimensioning (Aligned and unidirectional system), use of leader lines. General principles of dimensioning.</p> <p>2.2 Dimensioning of overall sizes, circles, thread holes, chamfered surfaces, angles, tapered surface holes equally spaced on PCD, counter sunk hole counter bored holes, cylindrical parts, narrow space and gaps, radii, curves and arches.</p>	04
<b>III</b>	<p><b>Simple Geometrical Constructions used in Engineering Practice (2 Sheets)</b></p> <p>3.1 Construction of regular polygons (triangle, square, pentagon, hexagon) and circles</p> <p>3.2 Ellipses (concentric circle method and Intersecting Arcs method)</p> <p>3.3 Parabola (rectangle and tangent method), cycloid</p> <p>3.4 Freehand sketching of above geometrical shapes</p>	04
<b>IV</b>	<p><b>Scale (2 sheets)</b></p> <p>3.5 4.1 Scale – their need and importance, Definition of representative fraction (R.F), find RF of given scale</p> <p>3.6 4.2 Construction of plain and diagonal scales</p>	04
<b>V</b>	<p><b>Principle of Projections (10 sheets)</b></p> <p>3.7 5.1 Principle of orthographic projection and introduction to first angle projection and third angle projection</p> <p>3.8 Projection of points situated in different quadrants (1 Sheet)</p> <p>3.9 Projection of lines, Lines inclined to one plane and parallel to the other and vice versa (1st &amp; 3rd quadrants) (1 Sheet)</p> <p>3.10 Projection of Planes: Planes perpendicular and parallel to either</p>	20

	<p>of the planes; planes perpendicular to one plane and parallel to the other or vice versa (1st &amp; 3rd quadrants) (1 Sheet)</p> <p>3.11 5.5 Drawing 3 orthographic views of given objects (6 sheets, at least one sheet in 3rd Angle Projection)</p> <p>3.12 5.6 Identification of surfaces on drawn orthographic views from isometric object drawn (1Sheet)</p>	
<b>VI</b>	<p><b>Sectional Views (2 sheets)</b></p> <p>6.1 Need for sectional views –Drawing of different conventions for materials in sections, conventional breaks for shafts, pipes, rectangular, square, angle, channel and rolled sections</p>	04

**RECOMMENDED BOOKS**

1. Engineering Drawing by KK Dhiman, Ishan Publications, Ambala, Haryana
2. Elementary Engineering Drawing (in first angle projection) by ND Bhatt, Charotar Publishing House, Anand, Gujrat
3. A Text Book of Engineering Drawing by Surjit Singh published by Dhanpat Rai and Co., Delhi
3. Engineering Drawing by PS Gill published by SK Kataria and sons, Delhi
4. Engineering Drawing by RB Gupta published by Satya Prakashan, New Delhi
5. Engineering Drawing by NS Kumar published by King India Publication, New Delhi

**References:**

1. Ghosh and Malik, "Manufacturing science" East West Pvt. Ltd.
2. Boothroyd, "Fundamental of Metal Cutting and Machine tools"
3. Sharma, P.C., "Manufacturing Technology (Manufacturing Processes)" S. Chand
4. Jain V.K., "Advance machining Process"

## DME 1082: WORKSHOP PRACTICE -I

**Credits: 03**

**Semester I**

**L-T-P: 1-0-4**

The following shops are included in the syllabus:

1. Carpentry Shop-1
2. Fitting Shop
3. Welding Shop-I
4. Electric Shop –I
5. Smithy Shop or Electronic Shop-I
6. Sheet Metal Shop

**Note:**

1. The branches e.g. Civil Engineering, Electrical Engineering, Mechanical Engineering, Production Engineering and Automobile Engineering will do **Smithy Shop** instead of Electronic Shop- I.
2. The branches e.g. Electronics and Communication Engineering, Electronics and Instrumentation, Instrumentation and Control, Computer Engineering, Medical Electronics, Textile Technology, Textile Processing, Knitting Technology, Chemical Engineering, Ceramic Engineering and Food Technology will do **Electronic Shop-I** instead of Smithy Shop.

Module No.	Content	Teaching Hours
<b>I</b>	<p><b>Carpentry Shop - I</b></p> <p>1.1 Introduction to various types of wood such as Deodar, Kail, Partal, Teak, Mango, Sheesham, etc. (Demonstration and their identification).</p> <p>1.2 Demonstration, function and use of commonly used hand tools. Care, maintenance of tools and safety measures to be observed. Job I Marking, sawing, planning and chiseling &amp; their practice (size should be mentioned)</p> <p>1.3 Introduction to various types of wooden joints, their relative advantages and uses. Job II Preparation of half lap joint Job III Preparation of Mortise and Tenon Joint</p> <p>1.4 Demonstration of various methods of painting wooden items. Job IV Preparation of wooden surface before painting including primer coating Job V Painting Practice by brush/spray</p> <p>1.5 Safety precautions in carpentry shop</p>	08
<b>II</b>	<p><b>Fitting Shop</b></p> <p>2.1 Introduction to fitting shop tools, common materials used in fitting shop, Identification of materials. Such as Steel, Brass, Copper, Aluminium etc. Identification of various sections of steel such as Flat, Angle, Tee, Channel, Bar Girder, Square, Z-Section, etc.</p> <p>2.2 Description and demonstration of various types of work benches, holding devices and files. Precautions while filing.</p> <p>2.3 Description and demonstration of simple operation of hack-</p>	08

	<p>sawing, demonstration and description of various types of blades and their specifications, uses and method of fitting the blade.</p> <p>Job I Marking of job, use of marking tools and measuring instruments.</p> <p>Job II Filing a dimensioned rectangular or square piece of an accuracy of <math>\pm 0.5\text{mm}</math></p> <p>Job III Filing practice (production of flat surfaces). Checking by straight edge.</p> <p>Job IV Making a cutout from a square piece of MS Flat using hand hacksaw.</p> <p>2.4 Care and maintenance of measuring tools like calipers, steel rule, try square, vernier calipers, micrometer, height gauge, combination set. Handling of measuring instruments, checking of zero error, finding of least count (all gauges including dial gauge).</p>	
<b>III</b>	<p><b>Welding Shop – I</b></p> <p>3.1 (a) Introduction to welding and its importance in engineering practice; types of welding; common materials that can be welded, introduction to welding equipment e.g. a.c. welding set, d.c. rectifier, electrode holder, electrodes and their specifications, welding screens and other welding related equipment, accessories and gloves.</p> <p>(b) Safety precautions during welding</p> <p>(c) Hazards of welding and its remedies</p> <p>3.2 Electric arc welding, (a.c. and d.c.) precautions while using electric arc welding, Practice in setting current and voltage for striking proper arc. Earthing of welding machine.</p> <p>Job I Practice of striking arc bending and tacking while using electric arc welding set.</p> <p>Job II Welding practice on electric arc welding for making uniform and straight weld beads</p> <p>3.3 Various types of joints and end preparation.</p> <p>Job III Preparation of butt joint by electric arc welding.</p> <p>Job IV Preparation of lap joint by electric arc welding.</p> <p>Job V Preparation of corner joint by using electric arc welding.</p> <p>Job VI Preparation of Tee joint by electric arc welding.</p>	08
<b>IV</b>	<p><b>Electric Shop – I</b></p> <p>4.1 Study, demonstration and identification of common electrical materials such as wires, cables, switches, fuses, ceiling roses, PVC Conduits, PVC Channels and allied items, tools along with electrical instruments such as voltmeter, ammeter and multimeter.</p> <p>4.2 Study of electrical safety measures and demonstration about use of protective devices such as fuses, MCBs, ELCBs and relays including earthing.</p> <p>Job I Identification of phase, neutral and earth of domestic appliances and their connection to two pin/three pin plugs.</p> <p>Job II Preparation of a house wiring circuit on wooden board using fuse,</p>	08

	<p>switches, socket, holder, ceiling rose etc. in PVC conduit and PVC casing and capping wiring system.</p> <p>4.3 Study of common electrical appliances such as electric iron, electric kettle, ceiling fan, table fan, electric mixer, electric Geyser, gas geyser, desert cooler, refrigerator, water purifier</p> <p>4.4 Introduction to lead-acid battery, identification of parts and its working.</p> <p>Job III Installation of inverter with battery and to connect two or more batteries in series and in parallel (knowledge of a.c. and d.c.)</p> <p>Job IV Charging of a battery and testing it with the help of hydrometer and cell tester</p>	
<p>V</p>	<p><b>Smithy Shop</b></p> <p>5.1 Demonstration and detailed explanation of tools and equipment used. Forging operations in smithy shop. Safety measures to be observed in the smithy shop.</p> <p>5.2 Demonstration and description of bending operation, upsetting operation, description and specification of anvils, swage blocks, hammers etc.</p> <p>5.3 Demonstration and description of tongs, fullers, swages etc.</p> <p>Job I To forge a L-hook. Job II To prepare a job involving upsetting process Job III To forge a chisel Job IV To prepare a cube from a M.S. round by forging method.</p> <p style="text-align: center;">OR</p> <p><b>Electronic Shop - I</b></p> <p>5.1 Identification and familiarization with the following tools used in electronic shop such as Tweezers, Screw drivers (different sizes), Insulated Pliers, Cutter, Sniper, Philips Screw Driver (Star Screw Driver), L-Keys, Soldering Iron, soldering wire, flux . Their demonstration and uses.</p> <p>5.2 Identification and familiarization with Multimeter (analog and digital)</p> <p>Job I Practice in the use of above mentioned tools and instruments. For this a small experimental set up may be done</p> <p>5.3 Various types of protective devices such as : wire fuse, cartridge fuse etc. ,</p> <p>5.4 Identification and familiarization with ear phone speaker connector, telephone jacks and similar male and female connectors (audio, video)</p> <p>5.5 Safety precautions to be observed in the electronic shop</p> <p>5.6 Identification and familiarization with soldering and desoldering practice</p> <p>5.7 Introduction to thimbles and crimping tools</p> <p><b>NOTE: Demonstration boards for the electronics components such as resistors, capacitors, diodes, transistors, FETs, IFT Coils, ICs should be made.</b></p> <p>Job II Cut, strip, join an insulated wire with the help of soldering iron (repeat with different types of</p>	<p>08</p>

	<p>Job III</p> <p>wires) Cut, strip, connect/solder/crimp different kinds of wires/ cables (including co-axial and shielded cable) to different types of power/general purpose/audio video/telephone plugs, sockets, jacks, terminals, binding posts, terminal strips, connectors. The tasks should include making complete recording/ playback/ antenna/ speaker leads for common electronic products such as Radio, TV, CD players, VCD/DVD players, cassette recorder and players, Hi-Fi equipment, hand- set, microphone.</p>	
VI	<p><b>Sheet Metal Shop</b></p> <p>Introduction to sheet metal shop, use of hand tools and accessories e.g. different types of hammers, hard and soft mallet, sheet and wire gauge, necessary allowance required during job fabrication, selection of material and specifications.</p> <p>6.1 Introduction and demonstration of hand tools used in sheet metal shop.</p> <p>6.2 Introduction and demonstration of various machines and equipment used in sheet metal shop e.g. shearing machine, bar folder, burring machine, power press, sheet bending machine.</p> <p>6.3 Introduction and demonstration of various raw materials used in sheet metal shop e.g. M.S. sheet, galvanized-iron plain sheet, galvanised corrugated sheet, aluminium sheets etc.</p> <p>6.4 Study of various types of rivets, steel screw etc.</p> <p>Job I Shearing practice on a sheet using hand shears.</p> <p>a) Practice on making single riveted lap joint/double riveted lap joint.</p> <p>b) Practice on making single cover plate chain type, seam joint and riveted butt joint</p>	08

**References:**

1. Workshop Technology I,II,III, by S K Hajra, Choudhary and A K Chaoudhary; Media Promoters and Publishers Pvt. Ltd., Bombay
2. Workshop Technology by Manchanda Vol. I,II,III; India Publishing House, Jalandhar.
3. Manual on Workshop Practice by K Venkata Reddy, KL Narayana et al; MacMillan India Ltd. New Delhi
4. Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd., New Delhi
5. Workshop Technology by B.S. Raghuwansh;, Dhanpat Rai and Co., New Delhi
6. Workshop Technology by HS Bawa; Tata McGraw Hill Publishers, New Delhi.

## DHC 1081: CHEMISTRY – I LAB

### Semester-I

### LIST OF EXPERIMENTS

**Credits: 03**

**L-T-P: 0-0-2**

Module No.	Contents	Teaching Hours
I	<ol style="list-style-type: none"> <li>1. Instructions for working in chemistry laboratory.</li> <li>2. Instructions for handling of various apparatus/instruments used in laboratory.</li> <li>3. Preparation of standard solution of oxalic acid or sodium hydroxide.</li> <li>4. Analysis of the following acidic radicals* CO<sub>3</sub><sup>2-</sup>, NO<sub>2</sub><sup>-</sup>, S<sup>2-</sup>, SO<sub>4</sub><sup>2-</sup>, NO<sub>3</sub><sup>-</sup>, CH<sub>3</sub>COO<sup>-</sup>, Cl<sup>-</sup>, Br<sup>-</sup> and I<sup>-</sup></li> <li>5. Analysis of the following basic radicals* NH<sub>4</sub><sup>+</sup>, Pb<sup>2+</sup>, Cu<sup>2+</sup>, Cd<sup>2+</sup>, As<sup>3+</sup>, Sb<sup>3+</sup>, Sn<sup>2+</sup>, Al<sup>3+</sup>, Fe<sup>3+</sup>, Cr<sup>3+</sup>, Zn<sup>2+</sup>, Mn<sup>2+</sup>, Ni<sup>2+</sup>, Co<sup>2+</sup>, Ba<sup>2+</sup>, Sr<sup>2+</sup>, Ca<sup>2+</sup> and Mg<sup>2+</sup></li> <li>6. Identification of functional group -CHO, -OH (phenolic and alcoholic), -COOH in a given organic compound.</li> <li>7. Determination of the solubility of a solid at room temperature.</li> <li>8. Determination of acid value of oil.</li> <li>9. Determination of viscosity of given liquid.</li> <li>10. Determination of surface tension of the given liquid by using stalagmometer.</li> </ol>	24

**\*NOTE:-** In practical examination mixture containing two acidic and two basic radicals will be given

**DHP 1081: APPLIED PHYSICS – I LAB**

**Credits: 01**

**Semester I**

**L-T-P: 0-0-2**

**LIST OF PRACTICALS**

<b>Module No.</b>	<b>Contents</b>	<b>Teaching Hours</b>
<b>I</b>	<ol style="list-style-type: none"> <li>1. To find the diameter of wire using a screw gauge</li> <li>2. To measure the thickness of a given sheet using a screw gauge.</li> <li>3. To find the volume of solid cylinder using a vernier calipers.</li> <li>4. To find the volume of hollow cylinder using a vernier calipers.</li> <li>5. To determine the radius of curvature of a spherical surface using spherometer.</li> <li>6. To verify parallelogram law of forces</li> <li>7. Determination of 'g' using simple pendulum.</li> <li>8. To determine force Constant of spring using Hooke's Law</li> <li>9. To find the coefficient of friction between a block and a horizontal surface.</li> <li>10. To determine the coefficient of viscosity of a given liquid by measuring the terminal velocity of a given spherical body in it.</li> <li>11. Determination of velocity of sound by resonance tube.</li> <li>12. To determine the young's modulus by searles apparatus.</li> <li>13. To determine moment of inertia of solid bodies</li> </ol>	24



## DCS 1081: COMPUTER LAB I

**Credits: 01**

**Semester I**

**L-T-P: 0-0-2**

### LIST OF PRACTICALS

Module No.	Contents	Teaching Hours
I	<ol style="list-style-type: none"> <li>1. Identify and list functions of various components and peripherals of given computer.</li> <li>2. Exercises on entering text and data (Typing Practice)</li> <li>3. Features of Windows as an operating system:               <ol style="list-style-type: none"> <li>a) Start , shutdown and restore</li> <li>b) Creating and operating on the icons</li> <li>c) Opening, closing and resizing the windows</li> <li>d) Using elementary job commands like – creating, saving, modifying, renaming, finding and deleting a file , creating and operating on a folder</li> <li>e) Introduction to all properties such as changing settings like, date, time, calculator, colour (back ground and fore ground)</li> <li>f) Using short cuts</li> </ol> </li> <li>4. Installation of operating system viz. * Windows XP, *Windows 2007 etc.</li> <li>5. Installing a computer system by giving connection and loading the system software and application software and various sources to install software</li> <li>6. Word Processing (MS Office/Open Office)               <ol style="list-style-type: none"> <li>a) File Management:                   <ul style="list-style-type: none"> <li>Opening, creating and saving a document, locating files, copying contents in some different file(s)</li> </ul> </li> <li>b) Editing a document:                   <ul style="list-style-type: none"> <li>▪ Entering text, cut, copy, paste using toolbars</li> <li>▪ Use of spell check</li> <li>▪ PDF file and its conversion in different file formats (MS Word/Excel etc.)</li> <li>▪ Scanning, editing and printing of a document</li> </ul> </li> <li>c) Formatting a document:                   <ul style="list-style-type: none"> <li>▪ Using different fonts, changing font size and colour, changing the appearance through bold/ italic/ underlined, highlighting a text, changing case, using subscript and superscript, using different underline methods</li> <li>▪ Aligning of text in a document, justification of document ,Inserting bullets and numbering</li> <li>▪ Formatting paragraph, inserting page breaks and column breaks, line spacing</li> <li>▪ Use of headers, footers, inserting footnote, end note, use of comments</li> <li>▪ Inserting date, time, special symbols, importing graphic images, drawing tools</li> </ul> </li> <li>d) Tables and Borders:                   <ul style="list-style-type: none"> <li>▪ Creating a table, formatting cells, use of different border styles, shading in tables, merging of cells, partition of cells, inserting and deleting a row in a table</li> <li>▪ How to change docx file to doc file</li> <li>▪ Print preview, zoom, page set up, printing options</li> </ul> </li> </ol> </li> </ol>	24



	<ul style="list-style-type: none"><li>▪ Using Find, Replace options</li></ul> <p>7. Power Point Presentation (MS Office/Open Office)</p> <p>Introduction to PowerPoint</p> <ul style="list-style-type: none"><li>▪ How to start PowerPoint</li><li>▪ Working environment: concept of toolbars, slide layout, templates etc.</li><li>▪ Opening a new/existing presentation</li><li>▪ Different views for viewing slides in a presentation: normal, slide sorter etc.</li></ul> <p>Addition, deletion and saving of slides</p> <p>Insertion of multimedia elements</p> <ul style="list-style-type: none"><li>▪ Adding text boxes, importing pictures, tables and charts etc.</li></ul> <p>Formatting slides</p> <ul style="list-style-type: none"><li>▪ Text formatting, changing slide layout, changing slide colour scheme</li><li>▪ Changing background, Applying design template</li></ul> <p>How to view the slide show?</p> <ul style="list-style-type: none"><li>▪ Viewing the presentation using slide navigator, Slide transition</li><li>▪ Animation effects etc.</li></ul> <p>8. Antivirus</p> <ul style="list-style-type: none"><li>▪ What is virus and its types</li><li>▪ Problems due to virus</li><li>▪ Installation and updation of antivirus (anyone out of Kaspersky, Mcafee, Norton, Quickheal).</li><li>▪ How to scan and remove the virus</li></ul> <p>9. Internet and its Applications</p> <p>Log-in to internet, introduction to search engine, Browsing and down loading of information from internet</p> <p>Creating e-Mail Account</p> <ul style="list-style-type: none"><li>▪ Log in to e-mail account and Log out from e-mail account</li></ul> <p>Managing e-Mail</p> <ul style="list-style-type: none"><li>▪ Creating a message</li><li>▪ Sending, receiving and forwarding a message</li><li>▪ Attaching a file</li><li>▪ Deleting a message</li></ul>	
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**DHE 2001: ENGLISH COMMUNICATION -II**

**Credits: 04**

**Semester II**

**L-T-P : 3-2-0**

Module No.	Contents	Teaching Hours (Approx.)
I	<p><b>Grammar and Usage:</b> Parts of Speech Sentence Structure: Subject; Verb and Object Articles: 'a', 'an' and 'the' Tenses</p> <p><b>Study of Text:</b> "The Renunciation" by Rabindranath Tagore (From the prescribed text) "The Gift of the Magi" by O' Henry (From the prescribed text)</p>	14
II	<p><b>Reading skills:</b> Unseen comprehension <b>Vocabulary:</b> Phrasal Verbs, One-Word Substitutions <b>Study of Text:</b> "The Heritage of India" by A.L. Basham (From the prescribed text) "Water" by C.V. Raman (From the prescribed text)</p>	10
III	<p><b>Writing skills:</b> Notice writing Story writing using given clues Official communication: Applications, Resume', Complaint letters, E-mail, <b>Study of Text:</b> "A Bookish Topic" by R.K. Narayan (From the prescribed text) <b>Developing Oral communication skills</b> 2.1 Offers/Responding to Offers 2.2 Requests/Responding to Requests 2.3 Congratulating 2.4 Expressing Sympathy and Condolences 2.5 Expressing Disappointments 2.6 Apologizing, Forgiving 2.7 Complaining 2.8 Warning 2.9 Asking for and Giving Information 2.10 Giving Instructions 2.11 Getting and Giving Permission 2.12 Asking For and Giving Opinions <b>(Note: The above content is for oral practice. It should not be included in theory examination)</b></p>	12

**BOOKS PRESCRIBED:**

- *An Anthology of English Essays*, Ed. R.P.Singh, Oxford University Press, New Delhi.
- *Current English Grammar & Usage with Composition*, R.P. Sinha, Oxford University Press, NewDelhi.

**BOOKS RECOMMENDED FOR STUDY:**

- *Communicating Effectively in English, Book-I* by RevathiSrinivas, Abhishek Publications, Chandigarh.
- *High School English Grammar and Composition* by Wren & Martin, S. Chand & Company Ltd., Delhi.
- *Communication Techniques and Skills* by R.K.Chadha, DhanpatRai Publications, New Delhi.
- *Intermediate English Grammar* by Raymond, Murphy, Cambridge University Press, New Delhi.
- *Living English Structure* by W. Allen, Pearson Education, New Delhi.
- *Oxford English Hindi Dictionary* by R.N. Sahai&S.Kumar, Oxford University Press, New Delhi.

**DHM 2001: APPLIED MATHEMATICS - II**

**Credits: 04**
**Semester II**
**L-T-P : 3-2-0**

Module No.	Content	Teaching Hours (Approx.)
I	<b>Differential Calculus:</b> Definition of function, concept of limits, standard limits. $\text{Lt. } (x^n - a^n) / (x - a), \text{ Lt. } \sin x / x, \text{ Lt. } (a^x - 1) / x$ etc. $x \rightarrow a$ $x \rightarrow 0$ $x \rightarrow 0$ Differentiation by definition of $x^n, \sin x, \cos x, \tan x, e^x, \log_a x$ only. Differentiation of sum, product, quotient of functions, differentiation of function of a function. Differentiation of inverse trigonometric, logarithmic and exponential functions, successive differentiation ( upto III order)	12
II	<b>Integral Calculus:</b> Integration as inverse operation of differentiation, simple standard integrals and related problems, simple integration by substitution, by parts and by partial fractions (for linear problems only), Evaluation of definite integrals(simple problems), Definite integral as a limit of the sum.	12
III	<b>Applications of Calculus in Engineering:</b> Equation of tangent and normal to a curve(for explicit functions only) – simple problems only. Velocity and acceleration, approximation of errors., maxima and minima, numerical integration by Simpson's rules	12

**Reference Books/ Text Books / Cases:**

- \* Gupta P.(2012), Comprehensive Mathematics XII, Laxmi Publications, Delhi
- \* Grewal B. S. Elementary Engineering Mathematics, Khanna Publishers, New Delhi
- \* Sharma R.D., Applied Mathematics, Dhanpat Rai Publications, Delhi

**DHP 2001: PHYSICS – II**

**Credits: 03**

**Semester II**

**L-T-P: 3-0-0**

Module No.	Content	Teaching Hours
Unit-I	Coulombs law, electric potential and electric potential due to point charge, electric potential difference, Electric field, electric field intensity, electric lines of force, electric flux Gauss's Law, Applications of Gauss law in finding electric field of point charge, straight charged conductor, plane charged sheet and between two plane parallel charged sheets using Gauss law, Capacitance types of capacitors, capacitance of parallel plate capacitor, series and parallel combination of capacitors, Dielectric and its effect on capacitance, Concept of electricity, current and its units, direct and alternating current, internal resistance of a cell, expression for current from a cell, potentiometer and its applications in the comparison of e.m.f. of two cells. Measurement of internal resistance of a cell. Series and parallel combination of cells, Ohm's law and its applications, concept of resistance, conductance, specific resistance, effect of temperature on resistance, co-efficient of resistance, series and parallel combination of resistors, Kirchhoff's laws, Wheatstone bridge principle and its applications (Meter bridge, post office Box), Heating effect of current and concept of electric power, energy and their units.	12
Unit-II	Alternating current phase and phase difference, Behaviour of resistance, capacitance and inductance in A.C. Circuits, A.C. Circuits containing R-L, R-C & L-R-C in series, Power in A.C. circuits and power factor, Magnetic field and its units, magnetic intensity, magnetic lines of force, magnetic flux, Right hand thumb rule, magnetic lines of force due to straight conductor, circular coil and solenoid, Force on a charge, moving in a uniform magnetic field (Lorentz force). Force on a current carrying straight conductor. Torque on a current carrying rectangular coil, Moving coil galvanometer conductor, its principle, construction and working, conversion of a galvanometer into ammeter and voltmeter, Electromagnetic induction, Faradays Laws, Lenz's Law, Ampere's circuital law.	12
Unit-III	Formation of energy bands, insulators, intrinsic and extrinsic semiconductors, p-n junction diode and its characteristics (in forward and reverse bias), Diode as rectifier – half wave and full wave rectifier, pnp and npn-transistors and their uses in electronic circuits, Fibre optics: introduction to optical fiber materials, types, light propagation and applications in communication, nanotechnology: Concept of manipulating matter on an atomic and molecular scale, new materials with dimensions on the nano or molecular scale, applications.	12

**Reference Books:**

- Applied Physics, Vol. II, TTTI Publications, Tata McGraw Hill, Delhi
- Concepts in Physics by HC Verma, Vol. II, Bharti Bhawan Ltd. New Delhi
- A Text Book of Optics, Subramanian and Brij Lal, S Chand & Co., New Delhi
- Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
- Basic Electronics and Linear Circuits by NN Bhargava et al Tata Mc Graw Hill Publishers, New Delhi
- Principles of Electronics by SK Sahdev, Dhanpat Rai and Co, New Delhi
- Engineering Physics by Vanchna Singh and Sheetal Kumar, Cengage Learning India Pvt. Ltd. Patparganj, Delhi

**TEXT BOOKS:**

- Applied Physics Vol.II by T.R.Narula and Suman Chaudhary, North Publications, Jalandhar
- Nutan Physics by Kumar & Mittal

**DHC 2001: APPLIED CHEMISTRY-II**

**Credits: 2**

**Semester-II**

**L-T-P : 2-0-0**

Module No.	Contents	Teaching Hours
I	<p><b><u>Water treatment:</u></b> Hardness of water, types of hardness, units of hardness. Boiler feed water. Softening of hard water by Calgon process and reverse osmosis method.</p> <p><b><u>Fuel:</u></b> Definition, classification, calorific value (HCV &amp; LCV). Petroleum and its distillation products, knocking, antiknock compounds, octane number and cetane number. Biogas.</p> <p><b><u>Lubricants:</u></b> Definition, classification, properties of lubricants, flash point and fire point, saponification value, acid value, oiliness, emulsification, cloud &amp; pour point and its applications</p>	8
II	<p><b><u>Organic chemistry:</u></b> Classification of organic compounds on the basis of functional groups. IUPAC nomenclature of simple organic compounds containing one functional group only, homolytic fission, heterolytic fission, purification of organic compounds by distillation, fractional distillation, steam distillation, vacuum distillation and thin layer chromatography (TLC).</p> <p><b><u>Glass and cement:</u></b> General introduction to glass and cement. Manufacturing process of glass and cement.</p>	8
III	<p><b><u>Polymers:</u></b> Definition, classification, preparation and uses of polyethene, polystyrene, PVC, Teflon, Nylon66, Natural rubber, vulcanization of rubber.</p> <p><b><u>Corrosion:</u></b> Introduction, Types of corrosion, wet theory of corrosion and prevention of corrosion.</p> <p><b><u>Miscellaneous materials:</u></b> Paints and varnishes- Definition, classification and Application.  Soap and detergents- Definition, classification and uses.</p>	8

## DME 1001: APPLIED MECHANICS

**Credits: 3**

**Semester-II**

**L-T-P : 2-1-0**

Module No.	Contents	Teaching Hours
I	<p><b>1. Introduction</b> 1.1 Concept of mechanics and applied mechanics. Importance and necessity of applied mechanics giving suitable examples of bodies at rest and in motion. 1.2 Concept of rigid body, scalar quantity and vector quantity.</p> <p><b>2. Force System &amp; various laws of Mechanics</b> 2.1 Force systems: coplanar and non coplanar force systems, coplanar concurrent and non concurrent force systems. 2.2 Principle of transmissibility of forces. 2.3 Composition and resolution of coplanar forces. 2.4 Law of triangle, law of parallelogram and law of polygon of forces. 2.5 Free body diagram and its related problems, equilibrium and equilibrant forces. 2.6 Lami's theorem.</p>	8
II	<p><b>3. Moment Couple and Torque</b> 3.1 Concept of moment, couple and torque. 3.2 Application of moment to simple mechanism. 3.3 Calculation of resultant of coplanar forces using moment of force method. 3.4 General condition of equilibrium of bodies under coplanar forces and moments. .</p> <p><b>4. Introduction of Friction</b> 4.1 Concept of friction and types of friction. 4.2 Limiting friction and sliding friction 4.3 Laws of static friction and coefficient of friction. 4.4 Equilibrium of bodies lying on a rough horizontal plane under external forces. 4.5 Equilibrium of bodies lying on a rough inclined plane under external forces.</p>	08
III	<p><b>5 Centre of Gravity &amp; Moment of inertia</b> 5.1 Concept of gravity and gravitational force. 5.2. Concept of centroid and centre of gravity. 5.3. Concept of moment of inertia I Section &amp; T section.</p> <p><b>6. Laws of Motion</b> 6.1 Concept of momentum. 6.2 Newton's laws of motion, their application. 6.3 Derivation of force equation from second law of motion. 6.4 Numerical problems on second law of motion. 6.5 Newton's third law of motion and numerical problems based on it.</p>	08

### TEXT BOOKS

1. Bansal R.K., Engineering Mechanics, Laxmi Publication Pvt Ltd., Delhi.
2. Khurmi R.S., Engineering Mechanics, S. Chand & Co., Delhi.
3. Kapoor J.K., Applied Mechanics, Bharat Bharti Prakashan, Meerut.
4. Yadav K.S., Engineering Mechanics, Vayu Education of India.

### REF BOOKS:

1. Kumar D.S., Engineering Mechanics, S.K. Kataria & Sons, Delhi.

## **DME 2082: WORKSHOP PRACTICE-II**

**Credits: 02**

**Semester II**

**L-T-P : 0-0-4**

The following shops are included in the syllabus.

1. Carpentry Shop-II
2. Plumbing Shop
3. Welding Shop -II
4. Electric Shop –II/ Machine Shop-II
5. Electronic Shop-II
6. Painting Shop

**Note:**

1. The branches e.g. Civil Engineering, Electrical Engineering, Mechanical Engineering, Production Engineering and Automobile Engineering will do **Machine Shop** instead of Electronic shop- II
2. The branches e.g. Electronics and Communication Engineering, Electronics and Instrumentation, Instrumentation and Control, Computer Engineering, Medical Electronics and Food Technology will do **Electronic shop-II** instead of Machine shop.
3. The instructor is to first explain the introductory part given at the beginning under each shop followed by demonstration and practice by students.

### **DETAILED CONTENTS**

Module No.	Content	Teaching Hours
<b>I</b>	<p><b>Carpentry Shop-II</b></p> <p>1.1 Introduction to joints, their relative advantages and uses.            Job I Preparation of dovetail joint and glued joint.            Job II Preparation of mitre joint            Job III Preparation of a lengthening Joint            Job IV Preparation of at least one utility job with and without lamination.</p> <p>1.2 Demonstration of job showing use of rip saw, bow saw and tenon saw, method of sharpening various saws.</p> <p>1.3 Demonstration of job on band saw and circular saw, chain and chisel, universal wood working machine, Saw re-sharpening machine, saw brazing unit.</p> <p>1.4 Importance and need of polishing wooden items. Introduction to polishing materials.            Job V Polishing on wooden items.</p>	08
<b>II</b>	<p><b>Plumbing Shop</b></p> <p>2.1 Introduction to various types of threads (internal and external)-single start, multi-start, left hand and right hand threads.</p> <p>2.2 Description and demonstration of various types of drills, taps and dies Selection of dies for threading, selection of drills, taps and reamers for tapping operations.            Job I Making internal and external threads on a job by tapping and dieing operations (manually)</p> <p>2.3 Precautions while drilling soft metals, e.g. copper, brass, aluminium etc.            Job II Drilling practice on soft metals such as aluminum, brass and copper            Job III Preparation of a job by filing on non- ferrous</p>	08



	Job IV	metal up to an accuracy of $\pm 0.2\text{mm}$ Preparation of job involving thread on GI pipe/ PVC pipe and fixing of different types of elbow, tee, union, socket, stopcock, taps etc	
<b>III</b>	<p><b>Welding Shop – II</b></p> <p>3.1 Introduction to gas welding, spot welding and seam welding and welding techniques. Adjustments of different types of flames in gas welding, demonstration and precautions about handling welding equipment.</p> <p>Job I Practice in handling gas welding equipment (Low pressure and High pressure) and welding and tacking practice on simple jobs.</p> <p>3.2 Common welding joints generally made by gas welding.</p> <p>Job II Preparation of butt joint by gas welding.</p> <p>Job III Preparation of small cot frame from conduit pipe by gas welding.</p> <p>Job IV Preparation of square pyramid from MS rods by welding (type of welding to be decided by students themselves).</p> <p>Job V Exercise of preparing a job on spot/seam welding machine.</p> <p>3.3 Demonstration and use of TIG and MIG welding equipment</p>		08
<b>IV</b>	<p><b>Electric Shop – II</b></p> <p>4.1 Importance of three-phase wiring and its effectiveness. Demonstration of three-phase wiring with the help of a demonstrating panel.</p> <p>Job I Laying out 3-phase wiring for an electric motor or any other 3-phase machine.</p> <p>Job II Connecting single-phase energy meter and testing it. Reading and working out the power consumption and the cost of energy.</p> <p>Job III Checking continuity of connection (with tester and series lamp) location of faults with a multimeter and their rectification in simple machines and/or other electric circuits fitted with earthing.</p> <p>Job IV Finding fault in simple electric machine and its rectification</p> <p>4.2 Demonstration of dismantling, servicing and reassembling a table fan/ceiling fan/air cooler/mixer/electric iron, electric heater, geyser, electric oven, air conditioner etc.</p> <p>Job V Testing single phase/three phase electrical motor by using voltmeters, ammeter, clip-on meter, tachometer etc.</p> <p>Job VI Reversing the direction of rotation of a motor.</p>		08
<b>V</b>	<p><b>Electronic Shop- II</b></p> <p>5.1 Identification, demonstration and uses of the items mentioned below:</p> <p>a) Various types of single, multi-cored insulated screened wire and cables -power, audio, video, co-axial, general purpose wires/cables</p> <p>b) Various types of plugs, sockets, connectors suitable for general purpose audio and video use, 2 and 3 pin mains plugs and sockets, RF plugs and sockets.</p> <p>Banana-plugs, and sockets, BNG, RCA, DIN, UHF, ear phone speaker connector, telephone jacks and similar male and female connectors and terminal strips.</p>		

	<p>c) Various types of switches such as normal/miniature toggle, slide, push button, piano key, rotary, micro switches, SPST, SPDT, DPST, DPDT, band selector, multi way master mains switch.</p> <p>d) Various types of protective devices such as : wire fuse, cartridge fuse, slow acting/fast acting fuse, HRC fuse, thermal fuse, single/multiple circuit breakers, over and under current relays.</p> <p>e) Materials: conducting, insulating and magnetic materials.</p> <p>f) Single beam simple CRO, signal generator and function-generator</p> <p>g) Regulated power supply-fixed and variable voltage, single output as well as dual output.</p> <p>5.2 Identification and familiarization with active and passive components; types and colour code of resistor, capacitors and potentiometers (including VDR, LDR, and thermistor). Identification of components including diode, LED, transistor, LCD, UJT, FET, coils, relays, read relays, transformers, linear and digital ICs, thyristors.</p> <p>5.3 Demonstration of the following:</p> <p>a) Making perfect solder joints and soldering on PCBs</p> <p>b) Removing components/wires by unsoldering.</p> <p>c) Assembling components on boards, chassis, tape strips.</p> <p>d) Laying of cables by various methods</p> <p>e) Modern soldering and de-soldering processes</p> <p>f) Working of active and passive components</p> <p>g) Testing of active and passive components by the use of multimeter</p> <p><b>Note:</b> For the above field visits to relevant place may be arranged.</p> <p>Job I Cut, bend, tin components, leads, inserts and solder components (capacitor, diodes, transistor, IFT, ICs etc) on a PCB.</p> <p>Job II Soldering practice0</p> <p>Job III Temperature controlled soldering station</p> <p>Job IV De-soldering pump</p> <p>Job V De-soldering strip/wik</p> <p>Job VI De-solder, remove and clean all the components, wires from a given equipment, a PCB or a tag strip.</p> <p>Job VII Wiring of a small circuit on a PCB/tag strip involving lacking, sleeving and use of identifier tags</p> <p style="text-align: center;">Or</p> <p><b>Machine Shop</b></p> <p>Job I Study &amp; sketch of Lathe machine.</p> <p>Job II Plane and step turning &amp; knurling practice.</p> <p>Job III Thread cutting on circular bar</p> <p>Job IV Study &amp; sketch of planning machine and plane a rectangle of cast iron.</p>	
<p><b>VI</b></p>	<p><b>Painting Shop</b></p> <p>Introduction to painting shop and its necessity. Different types of paint Introduction of powder coating plant and spray painting with their uses.</p> <p>Job I Preparation of surface before painting such as cleaning,</p>	<p>08</p>

	sanding, applying putty, filling procedure and application of primer coat and painting steel item. Job II Painting practice by brush on MS sheet Job III Practice of dip painting Job IV Practice of lettering: name plates / sign board Job V Polishing and painting on wooden and metallic surfaces Job VI Practical demonstration of powder coating.	
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**References:**

1. Workshop Technology I,II,III, by S K Hajra, Choudhary and A K Choudhary; Media Promoters and Publishers Pvt. Ltd., Bombay
2. Workshop Technology by Manchanda Vol. I,II,III; India Publishing House, Jalandhar.
3. Manual on Workshop Practice by K Venkata Reddy; MacMillan India Ltd. New Delhi
4. Basic Workshop Practice Manual by T Jeyapooan; Vikas Publishing House (P) Ltd., New Delhi
5. Workshop Technoogy by B.S. Raghuwanshi; Dhanpat Rai and Co., New Delhi
6. Workshop Technology by HS Bawa; Tata McGraw Hill Publishers, New Delhi

**DME 2081: ENGINEERING DRAWING-II**

**Credits: 03**

**Semester II**

**L-T-P : 0-1-4**

**DETAILED CONTENTS**

Module No.	Content	Teaching Hours
I	<p><b>Detail and Assembly Drawing (2 sheets)</b></p> <p>1.1 Principle and utility of detail and assembly drawings 1.2 Wooden joints i.e. corner mortice and tenon joint, Tee halving joint, Mitre faced corner joint, Tee bridle joint, Crossed wooden joint, Cogged joint, Dovetail joint, Through Mortice and Tenon joint, furniture drawing - freehand and with the help of drawing instruments.</p>	04
II	<p><b>Screw threads and threaded fasteners (8 sheets)</b></p> <p>2.1 Thread Terms and Nomenclature 2.1.1 Types of threads-External and Internal threads, Right and Left hand threads (Actual and Conventional representation), single and multiple start threads. 2.1.2 Different Forms of screw threads-V threads (B.S.W threads, B.A thread, American National and Metric thread), Square threads (square, Acme, Buttress and Knuckle thread) 2.2 Nuts and Bolts 2.2.1 Different views of hexagonal and square nuts and hexagonal headed bolt 2.2.2 Assembly of Hexagonal headed bolt and Hexagonal nut with washer. 2.2.3 Assembly of square headed bolt with hexagonal and with washer. 2.3 Locking Devices 2.3.1 Different types of locking devices-Lock nut, castle nut, split pin nut, locking plate, slotted nut and spring washer. 2.3.2 Foundations bolts-Rag bolt, Lewis bolt, curved bolt and eye bolt. 2.4 Drawing of various types of machine screw, set screw, studs and washers</p>	16
III	<p><b>Rivets and Riveted Joints (4 sheets)</b></p> <p>4.1 Types of general purpose-rivets heads (4 Sheets) 4.2 Caulking and fullering of riveted joints 4.3 Types of riveted joints (i) Lap joint-Single riveted, double riveted (chain and zig-zag type) (ii) Single riveted, Single cover plate butt joint (chain type) (iii) Single riveted, double cover plate butt joint (chain type) (iv) Double riveted, double cover plate butt joint(chain and zig-zag type)</p>	08
IV	<p><b>Symbols and Conventions (2 sheets)</b></p> <p>6.1 Civil engineering sanitary fitting symbols 6.2 Electrical fitting symbols for domestic interior installations</p>	04
V	<p><b>AUTO CAD (for practical and viva-voce only)</b></p>	06

	<p>7.1 Concept of AutoCAD, Tool bars in AutoCAD, coordinate system, snap, grid, and ortho mode</p> <p>7.2 Drawing commands – point, line, arc, circle, ellipse</p> <p>7.3 Editing commands – scale, erase, copy, stretch, lengthen and Explode</p>	
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Note: Minimum 20 drawing sheets will be prepared by the students.

### **INSTRUCTIONAL STRATEGY**

*Teacher should show model or realia of the component/part whose drawing is to be made. Emphasis should be given on cleanliness, dimensioning and layout of sheet. Focus should be on proper selection of drawing instrument and its proper use.*

### **References:**

1. Engineering Drawing by KK Dhiman, Ishan Publications, Ambala, Haryana
2. Elementary Engineering Drawing (in first angle projection) by ND Bhatt, Charotar Publishing House, Anand, Gujarat
3. A Text Book of Engineering Drawing by Surjit Singh published by Dhanpat Rai and Co., Delhi
4. Engineering Drawing by PS Gill published by SK Kataria and Sons, Delhi
5. Engineering Drawing by RB Gupta published by Satya Prakashan, New Delhi
6. Engineering Drawing by NS Kumar published by King India Publication, New Delhi

## DHC 1081: CHEMISTRY LAB-II

### LIST OF EXPERIMENTS

**Credits: 1**

**Semester-II**

**L-T-P : 0-0-2**

Module No.	Contents	Teaching Hours
I	1. Prepare buffer solution of pH-4 and verify it by pH meter. 2. Determination of moisture content in a given sample of coal. 3. Determination of temporary and permanent hardness of water sample by complexometric method using EDTA as complexing agent. 4. Determination of constituents and amount of alkalinity in a given water sample. 5. Estimation of iron metal in the rust (solution of rust in concentrated HCl may be given). 6. To determine the amount of copper in the given solution of copperore with the help of hypo solution. 7. Preparation of Tetraminecopper(II)sulphate from copper sulphate solution. 8. Preparation of phenol-formaldehyde resin (Bakelite). 9. Preparation of soap. 10. To find out the percentage of available chlorine in a given sample of bleaching powder by Iodometric method.	24

## DHP 1081 : PHYSICS LAB -II

### LIST OF EXPERIMENTS

#### Semester-II

**Credits: 1**

**L-T-P : 0-0-2**

Module No.	Contents	Teaching Hours
1.	To Verify Ohm's law	24
2.	To Verify law of resistance in series.	
3.	To verify law of resistance in parallel.	
4.	To Convert a Galvanometer of known resistance into an Ammeter of given range.	
5.	To Convert a Galvanometer of known resistance into a voltmeter of given range.	
6.	To determine the resistivity (Specific resistance) of the given wire with the help of post office box.	
7.	To draw characteristic curve of a P-N junction diode.	
8.	To compare the emf's of two primary cells using potentiometer.	
9.	To Verify of Kirchhoff's Laws	
10.	To determine the internal resistance of a given primary cell using ammeter & voltmeter.	
11.	To determine the internal resistance of a given primary cell using potentiometer.	

**DCS 2081: COMPUTER LAB II**  
**Semester II**

**Credits: 01**

**LIST OF PRACTICALS**

**L-T-P: 0-0-2**

Module No.	Contents	Teaching Hours
I	<p><b>Microsoft Excel</b></p> <p>a) Starting Excel (Spread Sheet Processing) open worksheet, enter, edit data, formulae to calculate values, format data, create chart, printing chart, save worksheet, switching between different spread sheets</p> <p>b) <i>Menu commands</i> <i>Create, format charts, organize, manage data, solving problem by analyzing data, creating graphs</i></p> <p>c) Work books <ul style="list-style-type: none"> <li>▪ Managing workbooks (create, open, close, save, rename), working in work books</li> <li>▪ Editing a worksheet: copying, moving cells, pasting, inserting, deleting cells, rows, columns, find and replace text, numbers of cells, formatting worksheet</li> </ul> </p> <p>d) Creating a chart <ul style="list-style-type: none"> <li>▪ Working with chart types, changing data in chart, formatting a chart, use chart to analyze data</li> <li>▪ Using a list to organize data, sorting and filtering data in list</li> </ul> </p> <p>e) Formulas <ul style="list-style-type: none"> <li>▪ Addition, subtraction, division, multiplication, percentage and auto sum</li> </ul> </p>	12
II	<p><b>Microsoft Access</b></p> <p>a) Brief overview of Databases and Database Applications</p> <p>b) Starting Microsoft Access</p> <p>c) Creating and Viewing Tables <ul style="list-style-type: none"> <li>• Creating a Table Using the Design View</li> <li>• Exercise: Creating a Table</li> <li>• Viewing and Adding Data to a Table</li> <li>• Exercise: Adding Data to a Table</li> <li>• Creating Relationships Between tables</li> </ul> </p> <p>d) Creating and Running Queries <ul style="list-style-type: none"> <li>• Single Table Queries</li> <li>• Exercise: Single Table Queries</li> <li>• Multiple Table Queries</li> <li>• Exercise: Multiple Table Queries</li> </ul> </p> <p>e) Creating and Running Data Entry Forms <ul style="list-style-type: none"> <li>• Creating a Single Table Form using the Wizard</li> <li>• Exercise: Creating a Single Table Form</li> <li>• Review of Creating and Running a Data Entry Form</li> </ul> </p> <p>f) Creating and Running Reports <ul style="list-style-type: none"> <li>• Creating a Single Table Report using the wizard</li> <li>• Exercise: Creating a Single Table Report</li> <li>• Review of Creating and Running a Report</li> </ul> </p>	12



## DME 1083: MECHANICS LAB

**Credits: 01**

**Semester-II**

**L-T-P : 0-0-2**

### LIST OF PRACTICALS

Module No.	Contents	Teaching Hours
I	<ol style="list-style-type: none"> <li>1. Verification of the polygon law of forces using greaves and apparatus.</li> <li>2. To verify the forces in different members of jib crane.</li> <li>3. To verify the reaction at the supports of a simply supported beam.</li> <li>4. To find the mechanical advantage, velocity ratio and efficiency in case of an inclined plane.</li> <li>5. To find the mechanical advantage, velocity ratio and efficiency of a screw jack.</li> <li>6. To find the mechanical advantage, velocity ratio and efficiency of worm and worm wheel.</li> <li>7. To find mechanical advantage, velocity ratio and efficiency of single purchase crab.</li> <li>8. To find out center of gravity of regular lamina.</li> <li>9. To find out center of gravity of irregular lamina.</li> <li>10. To determine coefficient of friction between three pairs of given surface.</li> </ol>	24

### INSTRUCTIONAL STRATEGY

Applied Mechanics, being a fundamental subject, the teachers are expected to emphasize on the applications of applied mechanics in various subjects so that students are able to appreciate the importance of the subject.

## DME 3001: STRENGTH OF MATERIAL

**Credits: 04**

**Semester III**

**L-T-P: 3-1-0**

Module No.	Contents	Teaching Hours
I	<p><b>Stresses and Strains</b>            Concept of load, stresses and strain, Tensile compressive and shear stresses and strains, Concept of Elasticity, Elastic limit and limit of proportionality. Hook's Law, Young Modulus of elasticity, Nominal stress, Stress strain diagram, Yield point, plastic stage, Ultimate strength and breaking stress Percentage elongation, Proof stress and working, stress Factor of safety, Poisson's ratio, Shear modulus</p> <p>Bending stresses, Concept of Bending stresses, Theory of simple bending, Use of the equation <math>f/y = M/I = E/R</math>, Concept of moment of resistance, Bending stress diagram, Calculation of maximum bending stress in beams of rectangular, circular, and T section. Permissible bending stress Section modulus for rectangular, circular and symmetrical I section.</p>	12
II	<p><b>Columns and Beams</b>            Bending Moment and Shearing Force, Concept of beam and type of loading, Concept of end supports-Roller, hinged and fixed, Concept of bending moment and shearing force, B.M. and S.F. Diagram for cantilever and simply supported beams subjected to concentrated and U.D.L.</p> <p>Concept of column, modes of failure, Types of columns, Buckling load, crushing load, Slenderness ratio, Factors effecting strength of a column, End restraints, Effective length, Strength of column by Euler Formula without derivation.</p>	12
III	<p><b>Torsion</b>            Concept of torsion- difference between torque and torsion, Use of torque equation for circular shaft, Comparison between solid and hollow shaft with regard to their strength and weight, Power transmitted by shaft, Concept of mean and maximum torque.</p> <p><b>Springs</b>            Closed coil helical springs subjected to axial load, Stress deformation, Stiffness and angle of twist and strain energy, Proof resilience, Laminated spring (semi elliptical type only), Determination of number of plates.</p> <p>Longitudinal and circumferential stresses in thin walled cylindrical shells.</p>	12

**Text Books:**

1. Rajput R. K., Strength of Materials, S.Chand & Co. Ltd., Delhi.
2. Kapoor J.K., Strength of Materials, Asian Publication, Muzaffarnagar.
3. Punmia B.C., Strength of Materials, Laxmi Publication, Delhi.

**Ref. Books:-**

1. Ramamarutham S., Strength of Materials, Dhanpat Rai & Sons, Delhi.

## DME 3002: THERMAL ENGINEERING

**Credits: 03**

**Semester III**

**L-T-P: 3-0-0**

Module No.	Contents	Teaching Hours
I	<p><b>FUNDAMENTAL OF THERMODYNAMICS:</b></p> <p>Definition, concept of thermodynamic system and surroundings. Closed system, open system, isolated system, thermodynamics definition of work. Zeroth law of thermodynamics. First law of thermodynamics for cyclic and non-cyclic processes. Idea of internal energy and enthalpy. Thermodynamic processes -constant volume, constant pressure, constant temperature (Isothermal) processes, adiabatic Process polytrophic process, their representation on P-V diagram and calculation of work done. Application of the first law of these process. Second law of thermodynamic Concept of perpetual motion machine of first order and that of second order. Concept of heat engine, heat pump and refrigerator. Carnot cycle efficiency for heat engine and cop forrefrigerator and heat pump.</p> <p>Physical concept and significance of Entropy. Reversibility and efficiency. Expression for change of entropy in various thermodynamic processes.</p>	12
II	<p><b>PROPERTIES OF STEAM &amp; STEAM GENERATORS</b></p> <p>Idea of steam generation begining from heating of water at0°C to its complete fromation into saturated steam. Pressure temperature curve for steam. Idea of dry saturated steam, wet steam and its dryness fraction, super heated steam and its degree of super heat. Enthalpy, entropy, specific volume and saturation pressure and temperature of steam. Use of steam table and mollier chart.</p> <p>Types of steam generators - Low pressure and High pressure boilers, Modern high pressure high discharge boiler - Stirling boiler, Lamont, Loefflor, Benson, Velox, ramsin and Schmid-Hartmann boiler, Computer controlled accessories, Equivalent evaporation, Boiler performance efficiency.</p>	16
III	<p><b>AIR COMPRESSOR</b></p> <p>Definition and their use, Difference between reciprocating and rotary compressor, their types and working work done during compression in single stage and two stage, Heat rejected and inter cooling in tow stage compression, volumetric efficiency, compress or lubrication.</p>	10



	<p><b>Heat &amp; Mass Transfer (HMT)</b> Concepts of mechanisms of heat flows, Modes of Heat transfer, Fins &amp; their types, Planck's law, Wein's displacement law, Stefan Boltzmann law, Heat Exchanger &amp; their Types, Fouling factors, Fick's law of diffusion</p>	
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**RECOMMENDED BOOKS**

1. Engineering Thermodynamics by PK Nag; Tata McGraw Hill, Delhi.
2. Basic Engineering Thermodynamics by Roy Chaudhary; Tata McGraw Hill, Delhi.
3. Engineering Thermodynamics by CP Arora; Tata McGraw Hill, Delhi.

## DEE 3001: BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

**Credits: 03**

**Semester III**

**L-T-P: 3-0-0**

Module No.	Contents	Teaching Hours
I	Basic Electrical Quantities Definition of voltage, current, power and energy with their units, name of instruments used for measuring above quantities. Difference between AC and DC, various applications of electricity, advantages of electrical energy over other types of energy. Production of emf, idea of a transformer and its working principle. Basic Electronics Basic idea of semiconductors – P and N type; diodes, zener diodes and their applications, transistor – PNP and NPN, symbols, identification of terminals of transistor, current flowing in a transistor, its characteristics and uses. Characteristics and applications of a thyristor	12
II	Transmission and Distribution System Key diagram of 3 phase transmission and distribution system, Brief functions of Accessories of transmission line. Difference between high and low voltage distribution system, identification of three-phase wires, neutral wire and earth wire in a low voltage distribution system. Identification of voltages between phases and Between one phase and neutral. Difference between three-phase and single- phase supply. Arrangement of supply system from pole to the distribution board, function of service line, energy meter, main switch, distribution board. Various types of domestic & industrial circuits, various accessories and parts of domestic electrical installation. Identification of wiring systems, staircase installation	12
III	Electric Motors and Pumps Definition and various applications of single-phase and three-phase motors. Connection and starting of three-phase induction motors by star-delta starter. Conversion of horse power in watts or kilowatts, Type of pumps and their applications, difference between direct online starter and star delta starter, characteristics and applications of servo motors. Electrical Safety Electrical shock and precautions against shock, treatment of electric shock, concept of fuses and their classification, selection and application, concept of earthing and various types of earthing, applications of MCBs and ELCBs. Introduction and applications to inverter and generators.	12

### RECOMMENDED BOOKS

1. Basic Electrical Engineering by PS Dhogal; Tata McGraw Hill Publishers, New Delhi
2. A Text Book of Electrical Technology, Vol. I and II by BL Thareja; S Chand and Co., New Delhi
3. Basic Electricity by BR Sharma; Satya Prakashan, New Delhi
4. Basic Electrical Engineering by JB Gupta, S Kataria and Sons, Delhi
5. Experiments in Basic Electrical Engineering by SK Bhattacharya and KM Rastogi, New Age International Publishers Ltd., New Delhi
6. Basic Electronics by VK Mehta; S Chand and Co., New Delhi
7. Electrical Machines by SK Bhattacharya; Tata McGraw Hill, New Delhi

## DME 3003: WORKSHOP TECHNOLOGY-I

**Credits: 03**

**Semester III**

**L-T-P: 3-0-0**

Module No.	Contents	Teaching Hours
I	<p><b>Metal Forming Processes</b></p> <p><b>Press Working</b> - Types of presses, type of dies, selection of press die, die material. Press Operations-Shearing, piercing, trimming, punching, notching, shaving, gearing, embossing, stamping</p> <p><b>Forging</b> - Open die forging, closed die forging, Press forging, upset forging, swaging, up setters, roll forging, Cold and hot forging</p> <p><b>Rolling</b> - Elementary theory of rolling, Types of rolling mills, Thread rolling, roll passes, Rolling defects and remedies</p> <p><b>Extrusion and Drawing</b> - Type of extrusion- Hot and Cold, Direct and indirect. Pipe drawing, tube drawing , wire drawing.</p>	10
II	<p><b>Welding</b></p> <p><b>Welding Process-:</b> Principle of welding, Classification of welding processes, Advantages and limitations of welding, Industrial applications of welding, Welding positions and techniques, symbols.</p> <p><b>Gas Welding-:</b> Principle of operation, Types of gas welding flames and their applications, Gas welding equipment - Gas welding torch, Oxy acetylene cutting torch, Blow pipe, Pressure regulators, Filler rods and fluxes</p> <p><b>Arc Welding-:</b> Principle of operation, Arc welding machines and equipment, A.C. and D.C. arc welding, Effect of polarity, current regulation and voltage regulation</p> <p><b>Other Welding Processes-:</b> Resistance welding, introduction to spot and seam welding Modern welding methods – TIG, MIG, ultrasonic welding, laser beam welding, robotic welding.</p> <p><b>Welding Defects-:</b> Types of welding defects, methods of controlling welding defects, inspection of welding defect.</p>	12
III	<p><b>Casting</b></p> <p><b>Pattern making-:</b> Types of pattern, Pattern material, Pattern allowances, Pattern codes as per B.I.S., Introduction to cores, core boxes and core materials, Core making procedure, Core prints, positioning of cores.</p> <p><b>Moulding and Casting Moulding Sand :</b> Properties of moulding sand, their impact and control of properties. Various types of moulding sand.</p> <p><b>Mould Making-:</b> Types of moulds, molding boxes, hand tools used for mould making, molding processes, molding machines: squeeze machine, jolt squeeze machine and sand slinger.</p> <p><b>Casting Processes -:</b> Charging a furnace, melting and pouring both ferrous and non ferrous metals, cleaning of castings, Principle, working and applications of Die casting</p>	14

	<p><b>Gating and Riser System-:</b> Elements of gating system, Pouring basin, sprue, runner, gates, Types of risers, location of risers, Directional solidification</p> <p><b>Melting Furnaces-:</b> Construction and working of Pit furnace, Cupola furnace, Crucible furnace – tilting type, Electric furnace</p> <p><b>Casting Defects-:</b> Different types of casting defects, Testing of defects through magnetic</p>	
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**RECOMMENDED BOOKS**

1. Workshop Technology by BS Raghuvanshi : Dhanpat Rai and Sons Delhi
2. Elements of Workshop Technology by SK Choudhry and Hajra : Asia Publishing House
3. Manufacturing Technology by M Adithan and A.B. Gupta; Wiley Eastern India Ltd. New Delhi.
4. A Text Book of Production Engineering by PC Sharma; S Chand and Company Ltd. Delhi
5. Foundry Technology by KP Sinha and DB Goel; Roorkee Publishing House, Roorkee.

**DME 3004: INTERNAL COMBUSTION ENGINE**

**Credits: 4**

**Semester III**

**L-T-P: 3-1-0**

Module No.	Contents	Teaching Hours
Unit – I	<p><b>Air Standard Cycles:</b> Internal and external combustion engines; classification of I.C. Engines, Cycles of operation in four stroke and two stroke I.C. Engines; Otto cycle, Diesel cycle, dual combustion cycle; air standard efficiency, specific work output, specific weight; work ratio; mean effective pressure.</p> <p><b>Introduction to Engine Performance parameters:-</b> mechanical efficiency, brake mean effective pressure and indicative mean effective pressure, torque, volumetric efficiency; specific fuel consumption (BSFC, ISFC), thermal efficiency; Basic engine measurements; fuel and air consumption, brake power, indicated power and friction power, <i>Hear balance sheet(Diagram)</i>.</p>	12
Unit – II	<p><b>Carburetion, Fuel Injection and Ignition systems:-</b> Mixture requirements for various operating conditions in S.I. Engines; carburetor, MPFI, factors affecting air fuel mixture, injection system in diesel engine; types of <i>injection systems</i>, Ignition system; types of ignition systems, spark plugs, super charging, turbocharging.</p> <p><b>Pollution from Engine and Its control:-</b> Air pollution from I.C. Engine, Hydrocarbons and Hydrocarbons emissions, Other emissions, Methods of emission control; alternative fuels for I.C. Engines.</p>	12
Unit - III	<p><b>Combustion in I.C. Engines:</b> <b>S.I. engines:-</b> Combustion in S.I. Engines; detonation; effects of engine variables on detonation; Octane rating of fuels; pre-ignition; combustion chambers in S.I. engines. <b>C.I. Engines :-</b> Combustion in C.I. Engines; delay period; variables affecting delay period; knock in C.I. engines, Cetane rating; combustion chambers in C.I. engine.</p> <p><b>Lubrication and Cooling Systems:-</b> Lubricating system, Types of lubrication system; properties of lubricating oil; SAE rating of lubricants, , Need of engine cooling; disadvantages of overcooling; Types of cooling systems, radiators.</p>	12

**Reference Books:**

1. Internal Combustion Engines –V. Ganesan, Pub.-Tata McGraw-Hill.
2. Engineering fundamental of the I. C. Engine – Willard W. Pulkrabek Pub.-PHI, India



**DME 3081: STRENGTH OF MATERIALS LAB.**

**Credits: 01**

**Semester III**

**L-T-P: 0-0-2**

**LIST OF PRACTICALS**

<b>Module No.</b>	<b>Contents</b>	<b>Teaching Hours</b>
1	Determination of shear force at different sections on a simply supported beam under points loads.	24
2	Determination of bending moment at different sections on a simply supported beam under different types of loading.	
3	Determination of yield stress, ultimate stress, percentage elongation, plot the stress strain diagram and compute. the value of Young's Modulus of mild steel.	
4	Determination of the maximum deflection and Young's Modulus. of elasticity by deflection apparatus.	
5	Determination of modulus of rigidity of material by Torsion apparatus.	
6	Determination of hardness of a metal plate by RockWell Brinell hardness testing machine.	
7	To perform impact test on Izod Impact testing machine.	
8	To determine the ultimate crushing strength of materials like steel and copper and compare their strength.	
9	To determine the various parameters of helical coil spring	
10	To determine the angle of twist for a given torque by Torsion apparatus and to plot a graph between torque and angle of twist.	

**DME 3082: THERMAL ENGINEERING LAB.**

**Credits: 01**

**Semester III**

**L-T-P: 0-0-2**

**LIST OF PRACTICALS**

<b>Module No.</b>	<b>Contents</b>	<b>Teaching Hours</b>
1	Determination of temperature by a. Thermo couple b. Pyrometer	24
2	Study of constructional details and specification of different types of boilers and sketch	
3	Demonstration of mounting and accessories on a boiler for study and sketch (field visit).	
4	Performance testing of steam boiler.	
5	Determination of dryness fraction of wet steam sample.	
6	Study and understanding of various types of furnace and their use through available Furnaces / visits.	
7	Study and sketching of various hand tools, Lifting tacks, Gadgets used in plant.	
8	To study various types of compressors with the help of their models.	

**DEE 3091: BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING LAB.**

**Credits: 01**

**Semester III**

**L-T-P: 0-0-2**

**LIST OF PRACTICALS**

<b>Module No.</b>	<b>Contents</b>	<b>Teaching Hours</b>
1	To change the speed and direction of rotation of d.c. shunt motor by (a) Armature control method. (b) Field control method.	24
2	To change the speed and direction of rotation of d.c. compound motor by (a) Armature control method. (b) Field control method.	
3	To measure the terminal voltage with variation of load current of (a) D.C. shunt generator. (b) D.C. compound generator.	
4	To perform load test on a single phase transformer and determine its efficiency.	
5	To start and run a induction motor by (a) Star Delta Starter. (b) Auto Transformer Starter.	
6	To measure slip of an induction motor by direct loading.	
7	To start and change the direction of rotation of an induction motor.	
8	To measure transformation ratio of a single phase transformer.	
9	To measure power and P.F. in a single phase circuit by Ammeter, Voltmeter and Wattmeter.	
10	To measure power and P.F. in a 3 phase/A.C. circuit by two wattmeter method.	
11	To calibrate a single phase energy meter at different P.F.'s and different loads.	
12	To locate the faults in an electrical machine by a megger.	
13	To connect a fluorescent tube and note its starting and running current.	
14	To draw characteristics of Silicon Controlled Rectifier (SCR).	
15	Testing of electrical devices - Zener, Diode, Transistor, FET, UJT, SCR.	
16	Use of operational amplifier as adder, subtractor, comparator, differentiator and integrators.	
17	Repair and maintenance of inverters and generators.	

**DME 3083: WORKSHOP TECHNOLOGY –I**

**Credits: 02**

**Semester III**

**L-T-P: 0-0-4**

**LIST OF PRACTICALS**

<b>Module No.</b>	<b>Contents</b>	<b>Teaching Hours</b>
	<b>Welding</b>	
1	Preparing gas welding joint in vertical position joining M.S. Plates	16
2	Exercise on gas cutting of mild steel plate with oxy-acetylene gas torch.	
3	Exercise on gas welding of cast iron and brass part or component.	
4	Exercise on spot welding/seam welding	
5	Exercise on MIG and TIG welding	
	<b>Pattern Making</b>	
1	Preparation of solid/single piece pattern.	16
2	Preparation of two piece/split pattern	
3	Preparation of a pattern on wooden lathe	
4	Preparation of a core box.	
	<b>Foundry Shop</b>	
1	Preparation of mould with solid pattern on floor.	16
2	Preparation of floor mould of solid pattern using cope.	
3	Preparation of floor mould of split pattern in cope and drag of moulding box.	
4	Moulding and casting of a solid pattern of aluminum	
5	A visit to cast iron foundry should be arranged to have first hand knowledge of cast iron melting pouring and casting.	
6	Testing of moisture contents and strength of moulding sand	

**DME 3084: ENGINEERING DRAWING -III**

**Credits: 02**

**Semester III**

**L-T-P: 0-0-4**

**LIST OF PRACTICALS**

<b>Module No.</b>	<b>Contents</b>	<b>Teaching Hours</b>
1	Drawing of the following with complete dimensions, tolerances, materials and surface finish marks.	48
1.1	Universal coupling (Assembly) and Oldham coupling (02 Sheets)	
1.2	Bearings (04 sheets)	
1.2.1	Bushed Bearing (Assembled Drawing)	
1.2.1	Ball Bearing and Roller Bearing (Assembled Drawing)	
1.2.3	Plummer Block ( Assembled Drawing)	
1.2.4	Foot step Bearing (Assembled Drawing)	
1.3	Pulleys (01 sheet)	
1.3	Fast and loose pulley (Assembled Drawing) (02 sheets)	
1.4	Pipe Joints	
1.4	Expansion pipe joint (Assembly drawing)	
1.4.1	Flanged pipe and right angled bend joint (Assembly Drawing)	
1.4.2	Lathe Tool Holder (Assembly Drawing) (01 sheets)	
1.5	Reading of mechanical components drawings (01 sheets)	
1.6	Sketching practice of bearing, bracket and pulley. (02 sheets)	
1.7	Drilling Jig (Assembly) (01 sheet)	
2	Machine Vice (Assembly) (01 sheet)	
3		
4	<b><i>Couplings (2 sheets)</i></b> Flange coupling (Protected and non-protected), muff coupling and half-lap muff coupling.	

**DME 4083: MEASUREMENT & METROLOGY LAB.**

**Credits: 1**

**Semester-III**

**L-T-P: 0-0-2**

**LIST OF PRACTICALS**

<b>Module No.</b>	<b>Contents</b>	<b>Teaching Hours</b>
1	Measurement of angle with the help of sine bar/ vernier Bevel protractor.	<b>24</b>
2	Study and sketch of various types of optical projectors.	
3	Use of comparators for measurement	
4	To measure the diameter of a hole with the help of precision balls.	
5	Measurement of Taper by standard balls and rollers.	
6	To test the squareness of a component	
7	To measure the pitch, angle and form of thread of a screw.	
8	Measurement of gear elements by using gear tooth vernier.	
9	To measure the straightness of the edge of a component with the help of autocollimator.	
10	Use of linear measuring instrument such as vernier caliper and micrometer.	
11	Use of height gauge and vernier colliers.	
12	Calibration of vernier calipers/micrometers with slip gauge.	
13	Calibration of height gauge/depth gauge with slip gauge.	
14	Measurement of Thread Parameter by using tool maker's microscope.	
15	Use of slip gauge in measurement of centre distance between two pin.	
16	Checking of accuracy of a plug gauge with micrometer.	
17	Measurement of surface roughness of a surface.	
18	Use of feeler, wire, radius and fillet gauges for checking of standard parameters.	

**DME 4001: HYDRAULICS & HYDRAULIC MACHINES**

**Credits: 4**

**Semester IV**

**L-T-P: 3-1-0**

Module No.	Contents	Teaching Hours
I	<p><b>Properties of Fluids:</b></p> <p><b>Fluid :</b> Real fluid, ideal fluid., Fluid Mechanics, Hydraulics, Hydrostatics, Hydro kinematics., Mass density, specific weight, specific gravity, cohesion, adhesion, viscosity, surface tension, capillarity, vapor pressure and compressibility. Hydrostatic Pressure: Pressure, intensity of pressure, pressure head, Pascal's law and its applications..</p> <p><b>Measurement of Pressure:</b> Atmospheric pressure, gauge pressure, vacuum pressure and absolute pressure. Use of simple manometer, differential manometer and mechanical gauges. Measurement of pressure by manometers and pressure gauges. Fundamental of Fluid Flow, Types of Flow, Steady and unsteady flow, Laminar and turbulent flow Uniform and nonuniform flow. Discharge and continuity equation (flow equation) Types of hydraulic energy.</p> <p>Potential energy, Kinetic energy, Pressure energy Bernoulli's theorem; statement and description (without proof of theorems). Venturimeter (horizontal and inclined)</p>	12
II	<p><b>Orifice:</b> Definition of Orifice, and types of Orifices, Hydraulic Coefficients. Large vertical orifices. Free, drowned and partially drowned orifice. Time of emptying rectangular/circular tanks with flat bottom.</p> <p><b>Flow through Pipes:</b> Definition, laminar and turbulent flow explained through Reynold's Experiment. Reynolds Number, critical velocity and velocity distribution. Head Losses in pipe lines due to friction, sudden expansion and sudden contraction entrance, exit, obstruction and change of direction (No derivation of formula). Hydraulic gradient line and total energy line.</p>	12
III	<p><b>Flow Measurements:</b> Measurement of velocity by Pitot tube , Measurement of Discharge by a Notch Difference between notches and orifices.</p> <p>Dimension less numbers types (definition only)</p> <p><b>Pumps &amp; Turbines:</b> Reciprocating pumps ( parts, working, discharge, work done, %slip only ), Centrifugal pumps ( parts, working), Reciprocating v/s Centrifugal pumps, Turbine (layout, efficiency, classification), Construction &amp; working of (Pelton turbine, reaction turbine, Kaplan turbine, Francis turbine only)</p> <p>Hydraulic &amp; Pneumatic system with block diagram.</p>	12

**Text Books:**

1. Fluid Mechanics & Hydraulic Machines, Laxmi Publaction (P) Ltd., New Delhi.
2. Vijay Gupta & Gupta S.K., Fluid Mechanics, New Age International Publishers, New Delhi.
3. Kapoor J.K., Hydraulics, Bharat Bharti Prakashan, Merrut.
4. Likhi S.K., Hydraulics Laboratory Manual, New Age International Publishers, New Delhi.

**Ref Books:**

1. Garde R.J., Fluid Mechanics, New Age International Publishers, New Delhi.
2. Jagdish Lal, Hydraulics & Hydraulic Machines, Metropolitan Book Depot, Delhi.
3. Modi P.N., Fluid Mechanics, New Age International Publishers, New Delhi.



**DME 4002: MATERIALS AND METALLURGY**

**Credits: 3**

**Semester-IV**

**L-T-P: 3-0-0**

<b>Module No.</b>	<b>Contents</b>	<b>Teaching Hours</b>
I	<p><b>Introduction</b> Material, History of Material Origin, Scope of Material Science, Overview of different engineering materials and applications, Classification of materials, Thermal, Chemical, Electrical, Mechanical properties of various materials, Present and future needs of materials, Overview of Biomaterials and semi-conducting materials, Various issues of Material Usage-Economical, Environment and Social.</p> <p><b>Crystallography Fundamentals</b> Crystal, Unit Cell, Space Lattice, Arrangement of atoms in Simple Cubic Crystals, BCC, FCC and HCP Crystals, Number of atoms per unit Cell, Atomic Packing Factor.</p> <p><b>Failure Mechanisms</b> Overview of failure modes, fracture, fatigue and creep.</p>	12
II	<p><b>Metals And Alloys Introduction</b> History and development of iron and steel, Different iron ores, Raw Materials in Production of Iron and Steel, Basic Process of iron-making and steel-making, Classification of iron and steel,</p> <p><b>Cast Iron</b> Different types of Cast Iron, manufacture and their usage.</p> <p><b>Steels</b> Steels and alloy steel, Classification of plain carbon steels, Availability, Properties and usage of different types of Plain Carbon Steels, Effect of various alloying on properties of steel, Uses of alloy steels (high speed steel, stainless steel, spring steel, silicon steel)</p> <p><b>Concepts and affects of Heat Treatment</b> Purpose of heat treatment, Cooling Curves Iron –carbon diagram , TTT Diagram various heat treatment processes hardening, tempering, annealing, normalizing, Case hardening and surface hardening.</p> <p><b>Composites</b> Classification, properties, applications</p>	12
III	<p><b>Non Ferrous</b> Materials: Properties and uses of Light Metals and their alloys, properties and uses of White Metals and their alloys, Bearing metal.</p> <p><b>Miscellaneous materials</b> Important sources of plastics, Classification-thermoplastic and thermo set and their uses, Various Trade names of engg. Plastics, Plastic Coatings.</p> <p>Classification, properties, applications of composites.</p>	12

	Classification, properties, applications of ceramics.. Heat insulating materials. Properties and uses of Asbestos, Glass wool, thermocole, cork, mica.Refractory materials.	
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**Text Books:-**

1. Hajra Choudhury S.K., Materials Science & Processes, Indian Book Distributing Company, Kolkata.
2. Bhatnagar S.K., Material & Materials Science, Nav Bharat Prakashan, Meerut.
3. Gupta K.M., Book of Materials Science.

**Ref. Books**

1. Kashyap K.T., Materials Science for Engineers, I.K. International Publishing House Pvt. Ltd., New Delhi.
2. Purohit R.K., Materials Science & Processes, Standard Publishers Distributors, Delhi.

## DME 4003: MEASUREMENT AND METROLOGY INSTRUMENTS

**Credits: 3**

**Semester-IV**

**L-T-P: 3-0-0**

Module No.	Contents	Teaching Hours
I	<p><b>INTRODUCTION:</b> Meaning and scope of metrology in field of engineering. Standards and types of measurements (Line and Wave length, Primary, Secondary and Tertiary measurement concept only). Interchangeability, Limits, Fits and Tolerances. Precision and accuracy, Sources of error.</p> <p><b>TRANSDUCERS</b> Definition, various types of transducers such as resistive, strain gauges capacitive, inductive, electromagnetic, photo electric, piezo-electric and their use in instrumentation.</p>	12
II	<p><b>COMPARATORS</b> General principles of constructions, balancing and graduation of measuring instruments, characteristics of comparators, use of comparators, difference between comparators, limit gauges and measuring instruments. Classification of comparators, construction and working of dial indicator, Johansson "Mikrokator", read type mechanical comparator, mechanical-optical, zees opt test, electro limit, electromechanical, electronics, pneumatic comparators, gauges, tool makers microscope.</p> <p><b>TEMPERATURE MEASUREMENT</b> Various types of thermometers, thermocouples, pyrometers (Radiation and optical type both).</p>	15
III	<p><b>SURFACE FINISH</b> Geometrical characteristics of surface roughness- Waviness. Lay, flaws. Effect of surface quality on its functional properties. Factor affecting the surface finish. Drafting symbols for surface roughness. Evaluation of surface finish. RMS and CLA values. Methods of measuring surface roughness. Qualitative and quantitative methods. Comparison of surfaces produced by common production methods.</p> <p><b>VARIOUS TYPES OF INSTRUMENTS USED FOR Measurement</b> Physical Measurements such as -Length, Depth height, Thickness, Gaps, Curvature , Angle, Taper, Area, Undulations, Surface finish, Thread and Gear measurement., Liquid Level &amp; Viscosity - Liquid level measuring methods and devices Viscometer - Plate and Cone viscometer, Two float viscometer, Rhea viscometer. couple, vacuum gauges.</p> <p><b>Strain Gauge</b> Use of strain gauge and load cells.</p>	15

**Text Books:**

1. Bhatnagar S., Metrology & measuring Instrument, Nav Bharat Prakshan, Meerut.
2. Vikram Sharma, Measurement, Metrology and Control, S.K. Kataria & Sons, New Delhi.

**Ref. Books:**

1. Rajput R.K., Mechanical Measurement and Instrument, S.K. Kataria & Sons, New Delhi.

**DME 4004: WORKSHOP TECHNOLOGY-II**

**Credits: 3**

**Semester-IV**

**L-T-P: 3-0-0**

Module No.	Contents	Teaching Hours
I	<p><b>Cutting Tools and Cutting Materials</b></p> <p><b>Cutting Tools</b> Various types of single point cutting tools and their uses application.</p> <p><b>Cutting Tool Materials</b> Properties of cutting tool material, Study of various cutting tool materials viz. High-speed steel, tungsten carbide, cobalt steel cemented carbides, stellite, ceramics and diamond.</p> <p><b>Cutting Fluids and Lubricants</b> Function of cutting fluid, Types of cutting fluids, Difference between cutting fluid and lubricant, Selection of cutting fluids for different materials and operations, Common methods of lubrication of machine tools.</p>	10
II	<p><b>Lathe</b> Function and operations of various parts of a lathe, Classification and specification of various types of lathe, Work holding devices, Lathe tools and operations :- Plain and step turning, facing, parting off, taper turning, eccentric turning, drilling, reaming, boring, threading and knurling, form turning, spinning.</p> <p><b>Cutting parameters</b> Speed, feed and depth of cut for various materials and for various operations, machining time. Speed ratio, preferred numbers of speed selection.</p> <p><b>Lathe accessories</b> Centers, dogs, different types of chucks, collets, faceplate, angle plate, mandrel, steady rest, follower rest, taper turning attachment, tool post grinder, milling attachment, Quick change device for tools.</p> <p>Introduction to capstan and turret lathe.</p> <p><b>Drilling</b> Principle, Classification of drilling machines and their description. Drilling machine operations - drilling, spot facing, reaming, boring, counter boring, counter sinking, hole milling, tapping. Speeds and feeds during drilling, impact of these parameters on drilling, machining time. Types of drills and their features, nomenclature of a drill, Drill holding devices.</p> <p><b>Boring</b> Principle, Classification and their brief description. Boring tools, boring bars and boring heads.</p>	14
III	<p><b>Shaping, Planing and Slotting</b> Working principle of shaper, planer and slotter. Type of shapers, Type of planers, Types of tools used and their geometry, Speeds and feeds in above processes.</p> <p><b>Broaching &amp; Hobbing</b> Introduction, Types of broaching machines - Single ram and</p>	12

	duplex ram horizontal type, vertical type pull up, pull down, push down. Elements of broach tool, broach tooth details – nomenclature, types, and tool material.	
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**LIST OF RECOMMENDED BOOKS**

1. Workshop Technology by BS Raghuvanshi : Dhanpat Rai and Sons Delhi
2. Elements of Workshop Technology by SK Choudhry and Hajra : Asia Publishing House
3. Manufacturing Technology by M Adithan and A.B. Gupta; Wiley Eastern India Ltd. New Delhi.
4. A Text Book of Production Engineering by PC Sharma; S Chand and Company Ltd. Delhi
5. Foundry Technology by KP Sinha and DB Goel; Roorkee Publishing House, Roorkee.

## DME 4005: MACHINE DESIGN AND DRAWING

**Credits: 4**

**Semester-IV**

**L-T-P: 3-1-0**

Module No.	Contents	Teaching Hours
I	<p><b>Introduction</b> Definition, Design requirements of machine elements, Design procedure, Standards in design, Selection of preferred sizes, Indian Standards designation of carbon &amp; alloy steels, Selection of materials for static and fatigue loads.</p> <p><b>Design against Static Load</b> Modes of failure, Factor of safety, Principal stresses, Stresses due to bending and torsion, Theory of failure.</p> <p><b>Design against Fluctuating Loads</b> Cyclic stresses, Fatigue and endurance limit, Stress concentration factor, Stress concentration factor for various machine parts, Notch sensitivity, Design for finite and infinite life, Soderberg, Goodman &amp; Gerber criteria</p>	12
II	<p><b>Shafts</b> Cause of failure in shafts, Materials for shaft, Stresses in shafts, Design of shafts subjected to twisting moment, bending moment and combined twisting and bending moments, Shafts subjected to fatigue loads, Design for rigidity</p> <p><b>Keys and Couplings</b> Types of keys, splines, Selection of square &amp; flat keys, Strength of sunk key, Couplings- Design of rigid and flexible couplings</p>	12
III	<p><b>Gears</b> Nomenclature of gears and conventional representation Drawing the actual profile of involute teeth gear by different methods</p> <p><b>Power Screws</b> Forms of threads, multiple threads, Efficiency of square threads, Trapezoidal threads, Stresses in screws, Design of screw jack</p>	12

### RECOMMENDED BOOKS

1. Machine Design by R.S. Khurmi and JK Gupta, Eurasia Publishing House (Pvt.) Ltd, New Delhi.
2. Machine Design by V.B.Bhandari, Tata McGraw Hill, New Delhi.
3. Engineering Design by George Dieter; Tata McGraw Hill Publishers, New Delhi.
4. Mechanical Engineering Design by Joseph Edward Shigley; McGraw Hill, Delhi.
5. Machine Design by Sharma and Agrawal; Katson Publishing House, Ludhiana.
6. Design Data Handbook by D.P. Mandali, SK Kataria and Sons, Delhi.

**DME 4081: HYDRAULICS & HYDRAULIC MACHINES LAB.**

**Credits: 1**

**Semester-IV**

**L-T-P: 0-0-2**

**LIST OF PRACTICALS**

<b>Module No.</b>	<b>Contents</b>	<b>Teaching Hours</b>
1	To verify Bernoulli's Theorem.	<b>24</b>
2	To find out venturimeter coefficient.	
3	To determine coef. of velocity (Cv), Coef. of discharge(Cd) Coef. of contraction (Cc) and verify the relation between them.	
4	To perform Reynold's Experiment.	
5	To determine Darcy's coefficient of friction for flow through pipes.	
6	To verify loss of head due to: <b>I</b> - Sudden enlargement <b>II</b> - Sudden Contraction.	
7	Study of the following <b>I</b> - Reciprocating Pumps <b>II</b> - Centrifugal Pumps. <b>III</b> - Pressure Gauge / Pitot tube.	

**DME 4082: MATERIALS AND METALLURGY LAB.**

**Credits: 1**

**Semester-IV**

**L-T-P 0-0-2**

**LIST OF PRACTICALS**

<b>Module No.</b>	<b>Contents</b>	<b>Teaching Hours</b>
1	Study of diamond polishing apparatus.	<b>24</b>
2	Study metallurgical microscope.	
3	a)- To prepare specimens for microscope examination (For Polishing and etching). b)- To examine the microstructure of the above specimens under metallurgical microscope.	
4	c)- To know composition of alloy steel by speller stereoscope d)- To know carbon in steel by carbon steel estimation apparatus Preparation of specimens and study of microstructure of eight given metals and alloys on metallurgical microscope. a)- Brass. b)- Bronze. c)- Grey Cast Iron. d)- Malleable Cast Iron. e)- Low Carbon Steel. f)- High Carbon Steel. g)- High Speed Steel. h)- Bearing Steel.	
5	To perform heat treatment process on materials of known carbon percentage: a)- Annealing b)- Normalizing c)- Case Hardening	



**DME 4084: WORKSHOP PRACTICE – II LAB.**

**Credits: 2**

**Semester-IV**

**L-T-P: 0-0-4**

**LIST OF PRACTICALS**

<b>Module No.</b>	<b>Contents</b>	<b>Teaching Hours</b>
	<b>ADVANCE WELDING SHOP:</b> (a) Study of various Gas cutting and welding equipments: Welding transformer, Generator/rectifier, Gas cylinder, Gas cutting machines, Cutting torches etc., Various electrodes and filler metals and fluxes. Practice of welding and cutting of different metals by making suitable jobs by different methods:	
1	Arc Welding practice of mild steel (M.S.) and Spot welding on stainless steel jobs.	
2	Tag Welding practice of Non-Ferrous metals, like Copper, Brass and Aluminum.	
3	Practice of Gas cutting manually.	
4	Practice of Gas cutting by cutting machine.	
5	Practice of Arc cutting.	
6	Study of Welding defects.	
7	Inspection and Tests of welded joints.	
8	Practice of Spot and Seam welding.	
9	Practice of Welding pipe joints, Pipes and Pressure vessels.	
	<b>Turning Shop</b>	
Job 1	Grinding of single point turning tool.	
Job 2	A composite job involving, turning, taper turning, external thread cutting and knurling.	
	<b>Advance Fitting Shop</b>	
Job 1	Exercise on drilling, reaming, counter boring, counter sinking and tapping	
Job 2	Dove tail fitting in mild steel	
Job 3	Radius fitting in mild steel	
Job 4	Pipe threading with die	
	<b>Machine Shop</b>	
Job 1	Prepare a V-Block accuracy on shaper machine	
Job 2	Exercise on key way cutting and spline cutting on shaper machine.	
		<b>48</b>

**DME 4085: MACHINE DESIGN AND DRAWING LAB.**

**Credits: 2**

**Semester-IV**

**L-T-P: 0-0-4**

**LIST OF PRACTICALS**

<b>Module No.</b>	<b>Contents</b>	<b>Teaching Hours</b>
1	Design & drawing of Key.	<b>48</b>
2	Design & drawing of Shaft with keyways.	
3	Design of machine components subjected to combined steady and variable loads	
4	Design of shaft for combined constant twisting and bending loads	
5	Design of shaft subjected to fluctuating loads	
6	Design and drawing of flanged type rigid coupling	
7	Design and drawing of flexible coupling	
8	Design and drawing of screw jack	
9	Design and drawing of gears.	
10	<b>Keys and Cotters (3 sheets)</b>	
11	<ol style="list-style-type: none"> <li>1. Various types of keys and cotters and their practical application and preparation of drawing of various keys and cotters showing keys and cotters in position</li> <li>2. Various types of joints (3 sheets)               <ul style="list-style-type: none"> <li>- Spigot and socket joint</li> <li>- Gib and cotter joints</li> <li>- Knuckle joint</li> </ul> </li> </ol>	

## DME 5001: THEORY OF MACHINES

**Credits: 4**

**Semester V**

**L-T-P: 3-1-0**

Module No.	Contents	Teaching Hours
Unit – I	<p><b>SIMPLE MECHANISMS</b> Definition of statics, kinetics, kinematics and dynamics , Rigid body and resistant body ,Links ,Kinematics pairs and their types , Degree of freedom ,Kinematics chain and their types ,Constrained motion and mechanisms ,Classification of mechanisms , Equivalent mechanism , Laws of inversion of mechanisms , Single slider crank chain and its inversions , Quick return mechanism, Indicator mechanism, pantograph.</p> <p><b>Friction &amp; Clutches</b> Frictional torque in screws for both square and V-threads , Screw jack , Calculation of power required for raising a load.</p> <p><b>CLUTCHES</b> Introduction of clutches and its working principle, single plate, multi-plate clutch and cone clutches construction and working only.(without numerical ).</p>	12
Unit – II	<p><b>Cams</b> Definition of cam , Classification of cams , Followers and their classification ,Brief description of different types of cams and followers with simple line diagram ,</p> <p><b>Power Transmission Devices (Belt, Rope and Chain Drive)</b> Introduction ,Belt and rope drives, open and crossed belt drives, actions of belt on pulleys, velocity ratio , Slip in belts &amp; ropes ,Types of V Belt and Flat belt , Laws of belting and length of belt (open &amp; cross belt) , Ratio of tensions , Power transmitted and max power transmitted by belt , lifted</p> <p><b>Gear Drive</b> Functions of gear , Classification of gears , Gear nomenclature , Forms of teeth, cycloid profile and involute profile teeth , Simple problems on gear trains</p>	12
Unit - III	<p><b>Balancing</b> Need of balancing Concept of static and dynamic balancing Balancing of rotating mass by another mass in the same plane</p> <p><b>Fly Wheel</b> Functions of fly wheel&amp; Types, Kinetic Energy of rotating masses, turning moment diagram, Co-efficient of energy &amp; speed, Simple problems.</p> <p><b>Governor</b> Functions of governor; comparison between a fly wheel and governor. Types of governor – Principle, construction and working of Watt governor Simple problems on watt Governor, Terminology used in Governors: Height, equilibrium speed, Hunting, isochronism, stability, sensitiveness ( numerical problem).</p> <p><b>Vibration</b> Introduction Types of vibration – longitudinal, transverse and torsional vibration Causes, remedial measures &amp; harmful effects of vibrations</p>	12

**Reference Books:**

1. JS Rao and Dukkupati; Mechanism and Machine Theory; Wiley Eastern, New Delhi
2. A Ghosh and AK Malik: Theory of Mechanism and Machine; East West Press (Pvt) Ltd., New Delhi
3. MF Spotts: Design of Machine Elements; Prentice Hall of India Ltd., New Delhi
4. R.C Jindal; Theory of Machines & Mechanisms; Ishan Publications, Ambala City
5. S.S Rattan: Theory of Machines; Tata McGrawHill , New Delhi

**DME 5002: REFRIGERATION AIR CONDITIONING**

**Credits: 4**

**Semester V**

**L-T-P: 3-1-0**

Module No.	Contents	Teaching Hours
Unit - I	<b>Introduction</b> Fundamentals of Refrigeration and Air Refrigeration Introduction, methods of refrigeration, Unit of refrigeration, COP, Carnot refrigeration cycle, Air refrigeration cycle, Refrigeration principles, COP, power calculations, refrigerants, Refrigeration Systems, VCRS(VAPOR COMPRESSION REFRIGERATION SYSTEM), VARS (VAPOR ABSORPTION REFRIGERATION SYSTEM )	12
Unit - II	<b>Refrigerants, Refrigeration Equipment and applications</b> Refrigeration devices- Compressors, Evaporators, Condenser, Cooling towers- function, types & capacity; Domestic refrigerators – ice plant, Water cooler, cold storages freezer. Non conventional Refrigeration system, low temperature Refrigeration	12
Unit - III	<b>PSYCHROMETRY &amp; Air Conditioning</b> Effective temperature, comfort condition, psychrometry, psychrometer, psychrometric process. Air Conditioning cycles-Design-Duct design and selection of fan or blower, Fluidized bed drying system, working & usages of freezers and cold storages, Filters & Dust collectors, Types of Air Conditioners: window, split, central, A.C. plant- Installation practice & servicing, Requirement of power	12

**Reference Books:**

1. Refrigeration & Air Conditioning by R .S. Khurmi, S Chand Publication
2. Refrigeration and Air Conditioning – by Arora
3. Refrigeration and Air Conditioning – by Domakundavar
4. Heat Transfer, by R. Yadav, Central Publishing House, Allahabad.

## DME 5003: ENVIRONMENTAL ENGINEERING

**Credits: 2**

**Semester V**

**L-T-P: 2-0-0**

Module No.	Contents	Teaching Hours
Unit - I	<p><b>Introduction:</b> Basics of ecology: flora &amp; fauna, Ecosystem, Biodiversity Human activities and its effect on ecology and eco system, different development i.e. irrigation, urbanization, road development and other engineering activities and their effects on ecology and eco system</p> <p><b>Mining and deforestation and their effects:</b> Lowering of water level, Urbanization. -Biodegradation and Biodegradability, composting, bio remediation, Microbes .Use of bio-pesticides and bio-fungicides - Global warning concerns, Ozone layer depletion, Green house effect, Acid rain, etc.</p>	8
Unit - II	<p><b>Pollution:</b> Sources of pollution, natural and manmade, their effects on living environments and related legislation.</p> <p><b>Water Pollution:</b> Factors contributing water pollution and their effect – Domestic waste water and industrial waste water. Heavy metals, microbes and leaching metal-Physical, Chemical and Biological Characteristics of waste water - Indian Standards for quality of drinking water - Indian Standards for quality of treated waste water. – Treatment methods of effluent (domestic waste water and industrial/ mining waste water), its reuse/safe disposal.</p>	8
Unit - III	<p><b>Air Pollution:</b> Definition of Air pollution, types of air pollutants i.e. SPM, NOX,SOX, CO, CO<sub>2</sub>, NH<sub>3</sub>, F, CL, causes and its effects on the environment - Monitoring and control of air pollutants, Control measures techniques. Introductory Idea of control equipment in industries i.e.</p> <p>A. Settling chambers B. Cyclone separator C. Scrubbers (Dry and Wet) D. Multi Clones E. Electro Static Precipitations F. Bog Fillers</p> <p>a) Ambient air quality measurement and their standards. b) Process and domestic emission control c) Vehicular Pollution and Its control with special emphasis of Euro-I, Euro-II, Euro-III and Euro IV.</p> <p><b>Introduction To Cleaner Production</b></p>	8

**Reference Books:**

1. Garg S. K., Environmental Engineering Vol I, Khanna Publishers.
2. Birdie G.S & Birdie J.S, Water Supply and Sanitary Engineering, Dhanpat Rai & Sons.
3. Duggal K N, Elements of Environmental Engineering, S Chand & Co Ltd.
4. Manoj Tiwari, Kapil Khulbe, Environmental Studies, I.K. International Publishing Pvt. Ltd.

**DME 5004: COMPUTER AIDED MANUFACTURING**

**Credits: 3**

**Semester V**

**L-T-P: 3-0-0**

Module No.	Contents	Teaching Hours
Unit - I	Introduction to CAM, Automation and its types  Features of NC Machine-Fundamental of NC Machine, Element of NC Machine tools, Classification of NC Machine tools, advantages, suitability & limitations of NC Machine tools, application of NC System, method for improving accuracy considering the factors such as tool deflection and chatter and productivity.	12
Unit - II	Computer Control in NC-  Problems with conventional NC, Computer numerical control (CNC), Direct numerical control (DNC), Combined DNC/CNC system. ADAPTIVE CONTROL SYSTEM – their types, advantages, adaptive control for proper cutting speed, feed in turning operation.  Introduction to CIM-  Layout, application, advantages, limitations.  Introduction to FMS and their types with advantages and disadvantages.	12
Unit - III	Introduction to computer Aided process planning (CAPP), Detailed introduction to group technology, types of formats.  (i) Introduction to NC Part programming- Manual (word address format), GM Codes.  (ii) Programming on lathe- turning, facing, drilling. Canned cycle. Milling.	12

**Reference Books:**

1. Internal Combustion Engines –V. Ganesan, Pub.-Tata McGraw-Hill.
2. Engineering fundamental of the I. C. Engine – Willard W. Pulkrabek Pub.-PHI, India

## DME 5005: WORKSHOP TECHNOLOGY III

**Credits: 3**

**Semester V**

**L-T-P: 3-0-0**

Module No.	Contents	Teaching Hours
Unit - I	<p><b>Modern Machining Processes</b>            Mechanical Process: Ultrasonic machining (USM): Introduction, principle process, advantages and limitations, applications, Electro chemical machining (ECM), Fundamental principle, process, applications, Electrical Discharge Machining (EDM): Introduction, principle parts of EDM machine, EDM terminology. Principal, metal removing rate, dielectric fluid and properties of electric fluid, applications, Wire cut EDM, Extrusion process &amp; Plasma Arc Machining</p>	12
Unit - II	<p><b>Metallic Coating Process</b>            Metal Spraying, Wire process, powder process, applications, Electro plating, anodizing and galvanizing, Organic Coatings, oil base paint, rubber base coating</p> <p><b>Finishing Processes</b>            Purpose of finishing surfaces, Surface roughness, definition &amp; units, Honing process and its applications, Description of hones, Brief idea of honing machines, Lapping process, its applications, Description of lapping compounds &amp; tools, Brief idea of lapping machines, Super finishing process and its applications, Use of super finishing attachment on center lathe, Polishing, Buffing</p>	12
Unit - III	<p><b>Gear Manufacturing and Finishing Processes</b>            Gear <b>hobbing</b>, Gear shaping, Gear shaving, Gear burnishing</p> <p><b>Jigs &amp; Fixtures</b>            Importance and use of jigs &amp; fixtures, Principle of location, Locating devices, Clamping devices, Types of jigs, Drilling jigs, bushes, template jigs, plate jigs, channel jig, leaf jig, Fixture of milling, Advantages of jigs &amp; fixtures.</p> <p><b>CNC</b>            Basic components of CNC and DNC, Advantages and Disadvantages of CNC machine, Application of CNC machine, difference between Conventional and CNC machine, profitable application of CNC Machine</p>	12

**Reference Books:**

1. A text Book of Production Engineering by P.C. Sharma; S. Chand and Company Ltd., New Delhi
2. Manufacturing Technology by Rao; Tata McGraw Hill Publishers, New Delhi
3. CNC Machines by Bharaj Satya Pyblication, New Delhi
4. Computer Numerical Control & Automation by M.S. Sehwat and J.S. Narang, Dhanpat Rai & Co.

**DME 5081: THEORY OF MACHINE LAB.**

**Credits: 1**

**Semester V**

**L-T-P: 0-0-2**

**LIST OF PRACTICALS**

<b>Module No.</b>	<b>Contents</b>	<b>Teaching Hours</b>
1	To study various types of kinematics links, pairs, chains & Mechanisms.	24
2	To plot slider displacement, velocity & acceleration against crank rotation for single slider crank mechanisms.	
3	To study various types of gears	
4	To study various types of gear trains – Simple, Compound, reverted, Epicyclic and Differential.	
5		
6	To perform gyroscopic couple on Motorized Gyroscope. To study gyroscopic effects through models.	
7	To perform the experiment for static balancing on static balancing	
8	machine.	
9	To study various types of dynamometer.	
10	To find co-efficient of friction between belt and pulley. To study the working of screw jack and determine its efficiency	



**Credits: 1**

**Semester V**

**L-T-P: 0-0-2**

**LIST OF PRACTICALS**

<b>Module No.</b>	<b>Contents</b>	<b>Teaching Hours</b>
1	Study of basic tools used in RAC equipment	24
2	Study of Vapour compression refrigeration system.	
3	To evaluate the C O P of a given Vapour Compression system	
4	To study Domestic Refrigerator, Electrolux Refrigerator, Water Cooler, Ice Plant.	
5	Study of air conditioning system (window type Air conditioner and split type unit)	
6	Study of servicing and maintenance of RAC equipment	
7	To calculate the COP of ice plant through test rig.	

**DME 5083: WORKSHOP TECHNOLOGIES - III LAB.**

**Credits: 2**

**Semester V**

**L-T-P: 0-0-4**

**LIST OF PRACTICALS**

Module No.	Contents	Teaching Hours
I	<b>Turning Shop</b> Thread cutting operation Grinding of turning tool Threaded assembly operation of male and female fit Operation of Eccentric turning	12
II	<b>Welding Shop</b> Preparation of T - Joint Preparation of H - Joints Preparation of Angular joints Preparation of combined joint of H Joint and T Joint	12
III	<b>Foundry Shop</b> Making of Connecting rod in foundry shop Core making in foundry shop Making of Pulleys in foundry shop Study of Cupola furnace in foundry shop	12
IV	<b>Machine Shop</b> Execution of slotting operations with Shaper machine Execution of cutting operation of v-block with shaper machine Milling machine operations Spur gear cutting operation with milling machine	12

**DME 5084: COMPUTER AIDED MANUFACTURING (CAM) LAB.**

**Credits: 2**

**Semester V**

**L-T-P: 0-0-4**

**LIST OF PRACTICALS**

<b>Module No.</b>	<b>Contents</b>	<b>Teaching Hours</b>
1	Setting up of drawing environment by setting drawing limits, drawing units, naming the drawing, naming layers, setting line types for different layers using various type of lines in engineering drawing, saving the file with drawing extension	48
2	Layout drawing of a building using different layer and line colors indicating all Building details. Name the details using text commands, Make a Title Block	
3	Make an Isometric dimensioned drawing of Connecting Rod using isometric grid and snap	
4	Draw quarter sectional isometric view of a cotter joint.	
5	Draw different types of bolts and nuts with internal and external threading in Acme and Square threading standards. Save the bolts and nuts as blocks suitable for insertion.	
6	Draw 3D models by extruding simple 2D objects, dimension and name the objects	
7	Draw a spiral by extruding a circle	
8	To Draw Orthographic Projection Drawings (Front, Top, Side) of boiler safety valve giving name the various components of the valve.	

## DME 6001: POWER PLANT ENGINEERING

**Credits: 4**

**Semester VI**

**L-T-P: 4-0-0**

Module No.	Contents	Teaching Hours
Unit – I	<p><b>Thermal Power Plants</b> <i>Introduction- power and energy, sources of energy</i> Basic thermodynamic cycles, various components of steam power plant layout pulverized coal burners- Fluidized bed combustion-coal handling system sash handling systems- Forced draft and induced draft fans- Boilers-feed pumps super heater regenerator-condenser- de-aerators-cooling tower</p>	14
Unit – II	<p><b>Hydro Electric Power Plants</b> Layout-dams-selection of water turbines-types-pumped storage hydro plants <b>Gas and Diesel Power Plants</b> Types, open and closed cycle gas turbine, work output &amp; thermal efficiency, methods to improve performance-reheating, inter-cooling, regeneration advantage and disadvantages- Diesel engine power plant-component and layout</p>	18
Unit - III	<p><b>Non Conventional Power Generation</b> Solar energy collectors, OTEC, wind power plants, tidal power plants and geothermal resources, fuel cell, MHD power generation-principle, thermoelectric power generation, thermionic power generation <b>Nuclear Power Plants</b> Principles of nuclear energy- Fission reactions-nuclear reactor-nuclear power plants</p>	16

**Reference Books:**

1. A Course in Power Plant Engineering by Arora and Domkundwar, Dhanpat Rai and Co. Pvt. Ltd., New Delhi.
2. Power Plant Engineering by P.K. Nag, Tata McGraw Hill, Second Edition, Fourth reprint 2003.
3. Power station Engineering and Economy by Bernhardt G.A. Skrotzki and William A. Vopat Tata McGraw Hill Publishing Company Ltd., New Delhi, 20th reprint 2002.
4. An introduction to power plant technology by G.D. Rai Khanna Publishers, Delhi - 110 005.
5. Power Plant Technology, M.M. El-Wakil McGraw Hill 1984.

## DME 6002: QUALITY MANAGEMENT & VALUE ENGINEERING

**Credits: 3**

**Semester VI**

**L-T-P: 3-0-0**

Module No.	Contents	Teaching Hours
Unit - I	<b>Quality Concepts</b> -Evolution, Control, Concept change, Control on Purchased product-Procurement, Evaluation of supplies, Capacity, Verification, Development of sources, Procurement procedure, Manufacturing Quality-Methods & Techniques for manufacturing, Inspection & Control of Product, Service Quality- Quality in Sales & Service, Guarantee/ Warrantee, Analysis of Claims	12
Unit - II	<b>Quality Management</b> - Organization structure & Design, Quality Function, Decentralization, Designing & Fitting, Organization for different type of Products and Company, Economics of Quality, Value & Contribution, Quality cost, Optimizing Quality cost, Human factors in Quality- Attitude of Top Management, Cooperation of group, Operator's attitude, Responsibility, Causes of apparatus error and corrective methods  <b>Quality Tools</b> – concept & implementation of 5S, QC & 7 tools, Kaizen, JIT, QFD, House of Quality, ISO-9000, ISO 14000, Taguchi Method	12
Unit - III	<b>Statistical Quality Control</b> - Control charts & their applications, Measurement range, R charts, process capability, Attributes of Control charts-Defects, Construction and analysis of charts, Improvement by control charts, Variable sample size, Construction & analysis of C charts, Defect diagnosis & prevention, defect study- identification & analysis, corrective measures, Reliability, MTTF, Maintainability, Zero defect  <b>Value Engineering</b> - Concepts and approaches of value engineering, importance of value, Function - identity, clarify – analysis Evaluation of value engineering, problem setting system, problem solving system, setting and solving management, evaluation of value results accelerators, Basic steps in using the systems understanding the decision environment, Life Cycle Cost (LCC), construction management contracts, value engineering case studies, Effective organization for value work, function analysis system techniques-FAST diagram, Case studies	12

### Reference Books-

1. Total Quality Management, Lt. Gen. H. Lal Eastern Ltd. 1990
2. TQM in New Product Manufacturing Menon, H.G. Mc Graw Hill, 1994
3. Parker, D.E., "Value Engineering Theory", Sundaram publishers, 1990.
4. Miles, L.D., "Techniques of Value Engineering and Analysis", McGraw Hill Book Co., 2nd End., 1972

**DME 6004: ADVANCE PRODUCTION TECHNOLOGY**

**Credits: 3**

**Semester VI**

**L-T-P:3 -0-0**

Module No.	Contents	Teaching Hours
Unit - I	<p><b>Production Machine Tools:</b> Machine tools used for quantity production, Semi automatic multi tools centre lathe, Auto lathes- Single spindle automatics, Sliding head types, Single spindle automatics, Multispindle automatics, Ultra high speed machining, External centreless grinding, Internal centreless grinding, Hydraulic servo copying systems for lathe, Electric copying systems, special purpose machines - Brake Drum Turning Lathe.</p>	12
Unit - II	<p><b>Production of plastic -</b> Polymers, Thermo plastics, Moulding of thermoplastic, Extrusion process, Sheet forming process, Machining of thermoplastics, Thermosetting Plastics, Moulding of Thermosetting plastics</p> <p><b>Plastic Moulding Techniques</b> Injection moulding – working principle, advantages and limitations, Blow moulding – working principle, advantages and limitations, Compression moulding – working principle, advantages and limitations</p>	12
Unit - III	<p><b>Cutting tools for machining -</b> Elementary theory of metal cutting, Single point tools- Basic angles. Chip formation and their classification, basic mechanism of chip formation, geometry of chip formation, forces on chip, Tool material, Tool wear and Tool life, Taylor's tool life equation. Properties of tool materials. Surface treatment of cutting tools- Its advantage, Tin coated high speed steel, diamonds, Cubic boron nitrides.</p> <p><b>Press tools -</b> Elements of Press tools, Factors affecting press tool design. Shearing, Bending, and Drawing operation, combination, progression and compound die, Rubber die forming.</p>	12

**Reference Books:**

1. Amitabh Ghosh , Mallik Manufacturing Science East-West Press Pvt. Ltd. HMT, Bangalore
2. Production Technology Tata Mc-Graw Hill Pabla B. S. , M. Adithan
3. Industrial maintenance S. Chand & Co. Ltd. P. K. Mistra
4. Non conventional Machining Narvasa Publishing House , Lindley R. Higgins

## DME 6003: ENTREPRENEURSHIP DEVELOPMENT & MANAGEMENT

**Credits: 3**

**Semester VI**

**L-T-P: 3-0-0**

Module No.	Contents	Teaching Hours
Unit - I	Concept and meaning of entrepreneurship, need of entrepreneurship in context of prevailing employment conditions of the country, Successful entrepreneurship and training for its development. entrepreneurship as a desirable and feasible career option- entrepreneur competencies and attributes- characteristics of a successful entrepreneur, Process of entrepreneurship development	12
Unit - II	Nature, Purpose and pattern of Human Activities: Economic and Non-Economic Entrepreneurial Pursuits and Human Activities, Need for Creativity and innovation in societies, Building enterprising Personality and Society, Entrepreneurship as a Human Resource Development concept	12
Unit - III	Role of Entrepreneur in Indian economy with reference to self-employment development, Employment pattern of the educated in India, Entrepreneurial Culture, Importance of nursing Entrepreneurial culture in developing economies Entrepreneurial Values, Entrepreneurial Discipline and Social responsibilities, Entrepreneurship Support system as like District Industry Centers (DICs), Commercial Banks, state financial corporations	12

### Reference Books:

1. 1: A Hand book of Entrepreneurship, Edited by BS Rathore and JS Saini, Aapga publications, Panchkula Haryana.
2. 2: Entrepreneurship Development By CB Gupta and P Shrinivasan, Sultan chand and sons, New Delhi.
3. 3: Dynamics of Entrepreneurship development and management (ivth) edition by Shri Vsant Desai.
4. Entrepreneurship development by Shri S.S. Khanka.
5. 5 Entrepreneurship by NITTT& R Chennai

**DME 6083: ADVANCE PRODUCTION TECHNOLOGY LAB.**

**Credits: 1**

**Semester VI**

**L-T-P: 0-0-2**

Module No.	Contents	Teaching Hours
1.	Two jobs on CNC milling having following operations – face milling, slotting, Contour machining. (Group of two students, each group must use different program for different job dimensions)	24
2.	One assignment on part programming on machining center.	
3.	One assignment on machine tool installation procedure.	
4.	Industrial visit to observe automats and report on the tools, fixtures and cams used on automats.	
5.	Industrial visit to observe at least one non-traditional machining process and report on visit.	
6.	Dismantling and Assembly of any one – a) Tailstock on lathe b) Apron	
7.	Mechanism. c) Tapping attachment on drilling machine. d) Lathe Chuck	
8.	Report on mounting and dismounting procedure of following (any two) – a) Milling machine arbor. b) Vertical milling head. c) Tool post One assignment on USM, CHM, EBM, AJM, WJM, PAM.	



## DME 6005: AUTOMOBILE ENGINEERING

**Credits: 3**

**Semester VI**

**L-T-P: 3-0-0**

Module No.	Contents	Teaching Hours
Unit - I	Introduction to Components of an automobile, Classification of automobiles, Layout of Chassis, Types of drives i.e. front wheel, rear wheel, four wheel, left hand, right hand; Transmission System; Clutch Function, Constructional details of single plate and multiple friction clutches, Centrifugal and semi centrifugal clutch, Gear Box Function, Working of slide mesh, constant mesh and synchromesh gear box, Torque convertor, Overdrive Propeller shaft and rear axle Function, Universal joint, Differential Rear axle drives and different types of rear axles Wheels & Tyres, Types of wheels, disc wheels and wire wheel, Types of tyre used in Indian vehicles, Causes of Tyre wear, Toe in, Toe out, Chamber, Caster, Kingpin inclination Tube less tyres	12
Unit - II	Steering System Function and principle, Ackerman and Davis steering gears Types of steering gears worm and nut, worm and wheel, worm and roller, Rack and pinion type. Constructional detail and working of mechanical, hydraulic and vacuum brake details of master cylinder, wheel cylinder Concept of brake drum, brake lining and brake equipment, Bleeding of brake, Brake efficiency, air brake, Independent Suspension System Function, Types Working of coil spring, leaf spring Shock absorber Battery Constructional details of lead and cell battery Specific gravity of electrolyte Effect of temperatures, charging and discharging on specific gravity Capacity and efficiency of battery ,Battery charging Maintenance of batteries, Checking of batteries for voltage, faults and specific gravity	12
Unit - III	Dynamo and Alternator, Dynamo Function and details Regulators voltage, current and compensated type Cutout Construction, working and their adjustment, Alternator Construction and working, Charging of battery from alternator,. Diagram of a Typical Wiring system, Lighting System and Accessories, Lighting system, Wining circuit, Head light aiming of headlights lighting switches, Direction indicator, Windscreen Wipers, Horn Speedometer, Heater Air conditioning, Wiring harness, panel lights, fog light, fuel gauge, pressure gauge, temperature gauge, types of horn, traffic rules, transport management	12

### Reference Books:

1. Automobile I & II :- P.S. Gill -(S.K. Kataria)
2. Automotive Chassis - P.M. Heldt.
3. Mechanism of the car - A.W. Judge
4. Automotive mechanism - Joseph Heitner.
5. The Automobile - Harbansigh Reyat
6. Automotive Engineering - G.B.S. Narang
7. An introduction to Automobile - N.R. Khatawate Engineering

## DME 6006: AUTOMOBILE SERVICING, MAINTENANCE AND REPAIR

**Credits: 3**

**Semester VI**

**L-T-P: 3-0-0**

Module No.	Contents	Teaching Hours
Unit - I	<p><b>Engine Maintenance &amp; Repairing</b> Maintenance &amp; maintenance schedule, Routine Maintenance schedule for petrol engine and diesel engine, lubricating chart, cleaning and adjustment, preventive maintenance, trouble shooting for faults in engines, overhauling of engines, Adjusting the engine timing, Maintenance and adjustment of carburetor and fuel injection pump, Checking the valve clearance and adjustment, valve grinding and lapping, engine tuning, repairing Process, Cylinder rebooting and relieving, Removal of liners and fitting, inspection-repair and fitting of valve and valve guides, checking the connecting rod for bending and connecting rod alignment, inspection of crank shaft for ovality and regrinding</p>	12
Unit - II	<p><b>Repair &amp; Maintenance of Radiator &amp; Lubricating System</b> Radiator repair and maintenance, Maintenance of lubricating system, Flushing the lubricating system, Change of used lubricating oils, clearing and fitting of oil filter lubrication of water pump, grades of oils, multi grade oil, additives for improving the quality of oil. Chassis Repair and Maintenance Grease and greasing points requiring greasing, specifications of greases to be used for different parts, repair of tyres and tubes, greasing of wheel bearing, rotating schedule for front and rear tyres, bleeding of brakes, pedal play adjustment in clutch and brakes, adjustment, change of brake lining</p> <p><b>Electrical System Repair &amp; Maintenance</b> Starter trouble, shooting and suggesting remedies, removal of starter from engine, repairing the starter, bushes and bushes replacement, checking of armature for short circuit, cleaning of commutators, checking, repairing of starter drive reassembly and testing of starter, dynamo, lubricating the dynamo, changing the bushes, checking and turning the electrical horn</p>	12
Unit - III	<p><b>Accessories of Electrical System &amp; their Service</b> Wind screen, wiper, electrical horn and relay, cigarette lighter, growler, spark plug cleaner and tester, electrical test bench, cylinder rebooting machine, surface grinder, arbor press, valve seat cutter and grinder, valve reface crank shaft grinder, engine tune up instruments, feeler gauge, Timing light (Neon light), Tachometer, Spark Plug cleaner micrometer, cylinder gauge, dial gauge, hydraulic hoist specification and working, car washer specification and working, air compressor specification and utility, screw jack, fuel pump testing and calibration machine, nozzle testing machine</p> <p><b>Repair &amp; Maintenance of Vehicle Air Conditioning System</b> Testing and Charging of Air Conditioner, care &amp; electrical components, noise level system, fresh air allowance, primary &amp; secondary circuit, heat exchanger, cooling &amp; dehumidifying coil, care &amp; servicing-Air control unit, temperature control unit, magnet clutch, condenser, fan assembly, Evaporator, relays, expansion valve, filters and three way solenoid valve,</p>	12

### Reference Books:

1. Singh Kirpal, Automobile Engineering Vol I & II, Standard Publishing E.R.S. & Distributors.
2. Poonia M.P., Objective I.C. Engines & Automobile Engineering, Standard Publishing.

## DME 6003: ENTREPRENEURSHIP DEVELOPMENT & MANAGEMENT

**Credits: 3**

**Semester VI**

**L-T-P: 3-0-0**

Module No.	Contents	Teaching Hours
Unit - I	Concept and meaning of entrepreneurship, need of entrepreneurship in context of prevailing employment conditions of the country. Successful entrepreneurship and training for its development, entrepreneurship as a desirable and feasible career option- entrepreneur competencies and attributes- characteristics of a successful entrepreneur. Process of entrepreneurship development	12
Unit - II	Nature, Purpose and pattern of Human Activities: Economic and Non-Economic- Entrepreneurial Pursuits and Human Activities- Need for Creativity and innovation in societies -Building enterprising Personality and Society - Entrepreneurship as a Human Resource Development concept	12
Unit - III	Role of Entrepreneur in Indian economy with reference to self-employment development Employment pattern of the educated in India- Entrepreneurial Culture- Importance of nursing Entrepreneurial culture in developing economies Entrepreneurial Values- Entrepreneurial Discipline and Social Responsibilities, Entrepreneurship Support system as like District Industry Centers (DICs), Commercial Banks, state financial corporations,	12

### Reference Books:

1. A Hand book of Entrepreneurship, Edited by BS Rathore and JS Saini, Aapga publications, Panchkula Haryana.
2. Entrepreneurship Development By CB Gupta and P Shrinivasan, Sultan chand and sons, New Delhi.
3. Dynamics of Entrepreneurship development and management (ivth) edition by Shri Vsant Desai.
4. Entrepreneurship development by Shri S.S. Khanka.
5. Entrepreneurship by NITTT& R Chennai

**DME 6081: AUTOMOBILE ENGINEERING LAB.**

**Credits: 1**

**Semester VI**

**L-T-P: 0-0-2**

Module No.	Contents	Teaching Hours
1.	Study and sketch of i. Battery Ignition System ii. Magnetic Ignition System	24
2.	Study and Sketch of i. Radiator ii. Water Pump iii. Oil Pump iv. Shock Absorber	
3.	Study and sketch of i. A. C. Pump ii. S. V. Pump iii. Master Cylinder	
4.	Study and sketch of i. Rear axle ii. Differential iii. Steering System	
5.	Checking and setting of ignition on timing using timing light for advance and retard	
6.	Fault finding practice of an automobile vehicle four wheelers (Petrol and Diesel vehicle)	
7.	Charging of Automobile battery and measuring cell voltage and specific gravity of Electrolyte	
8.	Determination of gear ratio of an auto engine tachometer/stroboscope.	
9.	Cleaning and adjustment a carburetor.	
10.	Changing of wheels and checking the alignment of wheels.	

**DME 6082: AUTOMOBILE SERVICING, MAINTENANCE AND REPAIR  
LAB.**

**Credits: 1**

**Semester VI**

**L-T-P: 0-0-2**

Module No.	Contents	Teaching Hours
1	Study and sketch of hand tools different gauges and their use.	24
2	Automobile engine cylinder boring practice.	
3	Valve face grinding, tapping and reaming of valve guide.	
4	Light vehicle brake drum turning practice.	
5	Nozzle cleaning, testing and adjustment.	
6	Assemble and disassemble of petrol and diesel engine of an automobile vehicle.	
7	Setting a regulator of cut out and testing of dynamo and rectify its minor repairs.	
8	Phasing and calibration of diesel fuel injection pump.	
9	Checking and adjusting a clutch pedal play and brake pedal play, tightness of fan belt and brake shoe.	
10	Automobile engine cylinder honing practice.	
11	Measuring spark plug gap, valve clearance and ring clearance, grinding and lapping operation for adjustment.	
12	Care and servicing of following Air conditioning components for automobile vehicle:- I. Auto control unit II. Temperature control unit III. Solenoid valve IV. Expansion valve V. Relays.	

## DME 6007: CNC MACHINES TECHNOLOGY

**Credits: 3**

**Semester VI**

**L-T-P: 3-0-0**

Module No.	Contents	Teaching Hours
Unit – I	<p><b>Introduction to CNC</b> Basic components of NC, CNC and DNC, Advantages and Disadvantages of CNC machine, Application of CNC machine, difference between Conventional and CNC machine, profitable application of CNC Machine. Working principle of CNC system adoption controls</p> <p><b>Tooling of CNC Machines</b> Introduction, various cutting tools for CNC machines, Work holding devices, automatic tool changer.</p> <p><b>Control System</b> Open &amp; close loop control system, fundamental problem in control: Accuracy, resolution, repeatability, instability, response &amp; damping, type of position control Point to point, Straight line, Continuous</p>	12
Unit – II	<p><b>Construction/ Components of CNC Machine</b> Machine Control Uniting, Control Unit, NC, PLC control- it's Advantages and disadvantages. NC-Coordinate systems, Application and limitations of PLC machines, special constructional requirement of CNC machines, slide ways, bolt screw &amp; nut assembly, Lubrication &amp; cooling of CNC machines, Spindle &amp; spindle motors, axis drives motor, safety provision of CNC machines, Feedback mechanism in CNC Machines, Axis designate of CNC machines, linear axis and rotary axis machine With rotating tools, machine with rotating work piece, machine with non rotating tool</p>	12
Unit - III	<p><b>Part Programming</b> Part programming and basic concepts of part programming, NC words, part programming formats, simple programming for rational components, part programming using conned cycles, subroutines and do loops, tool off sets, cutter radius compensation and wear compensation</p> <p><b>Common Problems in CNC Machines</b> Common problems in mechanical, electrical, pneumatic, electronic and PC components of NC machines, diagnostic study of common problems and remedies, use of on-time fault finding diagnosis tools in CNC machines</p> <p><b>Industrial Automation</b> Meaning of automation, need of automation, different types of automation, advantages/disadvantages of automation, Components of automated system, programmable logic controllers - introduction and use, concept of FMS.</p>	12

### Reference Books:

1. CNC Machines – Programming and Applications by M Adithan New Age International (P) Ltd.
2. Computer Aided Manufacturing by Rao, Kundra and Tiwari; Tata Mc Graw Hill, New Delhi.
3. CNC Machine by Bharaj; Satya Publications, New Delhi

## DME 6008: COMPUTER INTEGRATED MANUFACTURING

**Credits: 3**

**Semester VI**

**L-T-P: 3-0-0**

Module No.	Contents	Teaching Hours
Unit - I	<b>CAD/CAM</b> :-CAD/CAM Definition, <b>CIM introduction definition and advantage &amp; disadvantage</b> . Computer Technology-central processing unit (CPU), types of memory, input/output, the binary number system, computer programming languages. Automation- Types of Automation, CIM, reasons for automating, automation strategies. Conventional Numerical Control: Basic components of NC system, the NC procedure, NC coordinate systems, NC motion control system, applications of numerical control, advantages and disadvantages of NC, computer controls in NC, NC controller technology, computer numerical control, functions of CNC, advantages of CNC	12
Unit - II	<b>Robotics Technology</b> : Joints and links, common robot configurations, work volume, drive systems, types of robot control, accuracy and repeatability, applications of robots. Automated Material Handling & FMS: The material handling function, FMS-Components, types of systems, applying FMS technology, FMS workstation, planning. <b>Computer Integrated Manufacturing System And robotics</b> -. Group Technology, Flexible Manufacturing system, CM, CAD/CAM, Computer Aided Process Planning-Retrieval and Generative, Concept of Mechatronics, Computer Aided Inspection.	12
Unit - III	<b>Computer Aided Quality Control</b> : Introduction, terminology in Quality Control, the computer in QC, contact and non-contact inspection methods-optical and non-optical, and computer aided testing. Computer Integrated Manufacturing Systems: Introduction, types, machine tools and related equipments, material handling systems, computer control systems, function of the computer in a CIMS, CIMS benefits.	12

### Reference Books:

1. Automation, Production Systems and Computer Integrated Manufacturing, Groover M.P, Prentice Hall of India.
2. CAD/CAM – Groover M.P, Zimmers E.W, Prentice Hall of India. Reference Books:
3. Approach to Computer Integrated Design and Manufacturing Nanua Singh, John Wiley

## DME 6003: ENTREPRENEURSHIP DEVELOPMENT & MANAGEMENT

**Credits: 3**

**Semester VI**

**L-T-P: 3-0-0**

Module No.	Contents	Teaching Hours
Unit - I	Concept and meaning of entrepreneurship. need of entrepreneurship in context of prevailing employment conditions of the country. Successful entrepreneurship and training for its development. entrepreneurship as a desirable and feasible career option- entrepreneur competencies and attributes- characteristics of a successful entrepreneur. Process of entrepreneurship development	12
Unit - II	Nature, Purpose and pattern of Human Activities: Economic and Non-Economic- Entrepreneurial Pursuits and Human Activities- Need for Creativity and innovation in societies -Building enterprising Personality and Society - Entrepreneurship as a Human Resource Development concept	12
Unit - III	Role of Entrepreneur in Indian economy with reference to self-employment development Employment pattern of the educated in India- Entrepreneurial Culture- Importance of nursing Entrepreneurial culture in developing economies Entrepreneurial Values- Entrepreneurial Discipline and Social responsibilities, Entrepreneurship Support system as like District Industry Centers (DICs), Commercial Banks, state financial corporations,	12

### Reference Books:

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2. Entrepreneurship Development By CB Gupta and P Shrinivasan, Sultan chand and sons, New Delhi.
3. Dynamics of Entrepreneurship development and management (ivth) edition by Shri Vsant Desai.
4. Entrepreneurship development by Shri S.S. Khanka.
5. Entrepreneurship by NITTT& R Chennai



**DME 6084: COMPUTER INTEGRATED MANUFACTURING LAB.**

**Credits: 1**

**Semester VI**

**L-T-P: 0-0-2**

Module No.	Contents	Teaching Hours
1	Using of Pre-processor and post processor in finite element analysis (Exercise must include importing model from a modeling package, model correction, meshing, and addressing quality of mesh issues).	24
2	Model analysis of engineering structures (Exercises must include model analysis of simple beams and plates and comparison of FEA and analytical solutions, and model analysis of actual components like brackets, machine tool structures etc).	
3	Nonlinear analysis (Exercise must include plastic deformation of simple objects or crash analysis simple structures.	
4	3 Axis CNC code generation for CNC machining.	
5	CNC Machining of complex features like machining of hemispherical cavity, tapered hole, hole of parabolic shape etc.	

**DME 6082: CNC MACHINES TECHNOLOGY LAB.**

**Credits: 1**

**Semester VI**

**L-T-P: 0-0-2**

Module No.	Contents	Teaching Hours
1	Study the constructional details of CNC lathe.	24
2	Study the constructional details of CNC milling machine.	
3	Study the constructional details and working of: - Automatic tool changer and tool setter - Multiple pallets - Safety devices	
4	Develop a part programme for following lathe operations and make the job on CNC lathe - Plain turning and facing operations - Taper turning operations - Thread cutting operation	
5	Develop a part programme for the following milling operations and make the job on CNC milling machine - Plain milling - Slot milling - Contouring - Pocket milling	
6	Preparation of work instruction for machine operator	
7	Preparation of preventive maintenance schedule for CNC machine.	
8	Use of software for turning operations on CNC turning center.	
9	Use of software for milling operations on machine centre's	

**DME 6021: MAINTENANCE ENGINEERING & SAFETY**

**Credits: 4**

**Semester VI**

**L-T-P: 4-0-0**

Module No.	Contents	Teaching Hours
Unit - I	<p><b>Introduction</b> Fundamentals of Maintenance Engineering &amp; its importance in material &amp; energy conservation, inventory control, productivity, safety, pollution control etc; Safety Regulations, pollution problems, human reliability, total quality management (TQM), total productivity maintenance (TPM),</p> <p><b>Maintenance Management</b> types of maintenance strategies, Planned and unplanned maintenance, breakdown, preventive &amp; predictive maintenance, their comparison, advantages &amp; disadvantages; maintenance scheduling, spare part management</p>	16
Unit - II	<p><b>Tribology</b> in Maintenance, friction wear and lubrication, types of lubrication mechanisms, lubrication processes, Lubricants – types &amp; purpose</p> <p><b>Machine Health Monitoring</b> Condition based maintenance, signature analysis, oil analysis, vibration, noise and thermal signatures, Instrumentation &amp; equipment used in machine health monitoring, application of intelligent systems</p>	16
Unit - III	<p>Reliability, availability &amp; maintainability (RAM), Introduction to RAM failure mechanism, reliability of repairable and non repairable systems, Improvement in reliability, reliability testing, and reliability prediction, utilization factor, system reliability by Monte Carlo Simulation Technique</p> <p><b>Safety</b> Safety, Health and Environment Management (SHE), Occupational Safety, Health and Environmental Safety Management, principles &amp; practices, Role of Management in Industrial Safety, Organizational Behavior, Human factors contributing to accident, Planning for Safety, Safety Committee, Directing for Safety, Bureau of Indian Standards on Safety and Health, MIS, Human behavior</p>	16

**Reference Books-**

1. Maintenance Engineering Hand Book Higgins
2. Maintenance & Spare parts Management Gopal Krishnan
3. Industrial Maintenance Management S.K. Shrivastava
4. Health & Safety: Manufacturing and Service Industries

**DME 6022: INDUSTRIAL ENGINEERING**

**Credits: 4**

**Semester VI**

**L-T-P: 4-0-0**

Module No.	Contents	Teaching Hours
Unit - I	<p><b>Production and Productivity</b> Production, productivity functions, productivity, factor affecting productivity, measurement of productivity, Causes of decrease in productivity, Difference between production and productivity.</p> <p><b>Plant Location, Layout and Job Evaluation</b> Plant location, factor affecting plant location, Concept of plant layout, Types of layout and their characteristics, factor affecting plant layout, Definition of job evaluation, job evaluation methods such as ranking method, grade description method, Point system and factor comparison method, hybrid system.</p>	16
Unit - II	<p><b>Work Study</b> Definition and scope of work study, area of application of work study in industry, role of work study in improving productivity, Objective, needs and method of work study, information collection, Recording techniques, process symbol, Charts and diagram, Critical examination, work measurement objectives, Needs and method of work measurement, Time &amp; motion study, various allowances, Calculation of time, Work sampling, Standard data and its use.</p> <p><b>Production Planning and Control</b> Introduction, Objectives and components (functions) of P.P.C., Advantages and stages of P.P.C., Process planning, routing, scheduling, Dispatching and follows up, Routing process, Route sheet, CPM/PERT techniques, drawing of simple networks and critical time calculation, Production Control in job order, Batch type and continuous types of production, difference between these controls.</p>	16
Unit - III	<p><b>Estimation and Costing</b> Introduction, Purpose/ Functions of estimating, Costing concept, Ladder and elements of cost. Difference between estimation and costing, Overheads and their types, Estimation of material cost, Estimation of cost of machining process, numerical problems, Bonus &amp; Incentive to workers</p> <p><b>Introduction of Statistics</b> Basic statistical concept, Histogram, Frequency, Mean, Mode, Standard deviation</p>	16

**Reference Books-**

1. Industrial Engineering and Management by TR Banga.
2. Industrial Engineering and Management by OP Khanna, Dhanpat Rai Publications, Delhi.
3. Industrial Organization and Management by Tara Chand, Nem Chand and Brothers, Roorkee.
4. Industrial Engineering by S.C.Sharma; Khanna Publisher.

**DME 6023: CNC MACHINE TECHNOLOGY**

**Credits: 4**

**Semester VI**

**L-T-P: 4-0-0**

<b>Module No.</b>	<b>Contents</b>	<b>Teaching Hours</b>
Unit – I	Concepts and features of NC systems, Classification of NC systems, Design considerations of NC machine tools, Constructional features of CNC machine tools, Functions of MCU	16
Unit – II	Machining center, turning center, CNC EDM, Ball screws, Bearings, Centralized lubrication systems. Manual part programming, Preparatory, Miscellaneous functions, Sinumeric, Fanuc controls, Computed aided part programming, Post processors, APT programming, CNC programming based on CAD	16
Unit - III	Feedback devices, tooling for CNC machine, Interpolators. Point-to-point and contouring systems, Adaptive control, ACO and ACC systems, Maintenance of CNC Machines, Economics of manufacturing using CNC machines	16

**Reference Books-**

1. Koren, Y. "Computer Control of Manufacturing Systems", McGraw Hill Book co. New Delhi, 1986
2. Radhakrishnan P., "Computer Numerical Control Machines", New Central Book Agency, Calcutta, 1992
3. Kundra T. K., Rao P. N., and Tiwari N. K., "CNC and Computer Aided Manufacturing", Tata McGraw Hill, New Delhi, 1991. 3.Fitzpatric,M. " Machining And CNC Technology" , McGraw-Hill College, 2004

**DME 6083: CNC MACHINE TECHNOLOGY LAB.**

**Credits: 1**

**Semester VI**

**L-T-P: 0-0-2**

Module No.	Contents	Teaching Hours
1	Programming and operation of CNC Lathe, Turning center, Milling machine and machining center: - <b>EMCO PC TURN 55</b> Study of EMCO CNC machine - programming codes - programs for simple components using linear interpolation, circular interpolation	24
2	Programs for components using canned cycle and for threaded operation	
1	<b>HMT STC-15 Turning Centre</b> Study of STC-15 CNC machine - programming codes -study of tool and zero offsets	
2	Programs for simple components using linear interpolation and circular interpolation - tool	
1	<b>T5 Turning Centre (Fanuc - OT)</b> Study of T5 CNC machine - programming codes -study of tool and zero offsets	
2	Programs for simple components using linear interpolation and circular interpolation - tool	
1	<b>TRIAC 3AXES CNC Milling Machine</b> Study of Triac CNC machine- programming codes - programs for simple profiles using linear interpolation, circular interpolation- tool path generation - machining	
2	Programs for profiles using canned cycles - tool path generation – machining advanced programming	
	<b>VMC 3 AXES CNC Machining Centre (Fanuc - OM)</b> Study of VMC CNC machine - programming codes - programs for simple profiles using linear interpolation, circular interpolation-Simulation-Machining Incremental programming	

**Reference Books-**

1. Koren, Y. "Computer Control of Manufacturing Systems", McGraw Hill Book co. New Delhi, 1986
2. Radhakrishnan P., "Computer Numerical Control Machines", New Central Book Agency, Calcutta, 1992
3. Kundra T. K., Rao P. N., and Tiwari N. K., "CNC and Computer Aided Manufacturing", Tata McGraw Hill, New Delhi, 1991. 3.Fitzpatric,M. " Machining And CNC Technology" , McGraw-Hill College, 2004

**DME 6024: ADVANCED WELDING TECHNOLOGY**

**Credits: 4**

**Semester VI**

**L-T-P: 4-0-0**

Module No.	Contents	Teaching Hours
Unit - I	<p><b>Introduction</b> Importance and application of welding, classification of welding process, Selection of welding process</p> <p><b>Brief review of conventional welding process</b> Gas welding, Arc welding, MIG, TIG welding, Resistance welding, Electroslag welding, Friction welding etc, Welding of MS, CI, Al, Stainless steel &amp; Maurer/Schaeffler Diagram, Soldering &amp; Brazing</p>	16
Unit - II	<p><b>Advanced welding Techniques</b> Principle and working and application of advanced welding techniques such as Plasma Arc welding, Laser beam welding, Electron beam welding, Ultrasonic welding etc</p> <p><b>Advanced welding Techniques (continued)</b> Principle and working and application of advanced welding techniques such as explosive welding/ cladding, underwater welding, spray--welding / Metalizing, Hard facing</p>	16
Unit - III	<p><b>Weld Design</b> Welding machines/equipments and its characteristics and arc--stability, Weld defects and distortion and its remedies, Inspection/testing of welds, Weld Design, Welding of pipe-lines and pressure vessels, Life prediction</p> <p><b>Thermal and Metallurgical consideration</b> Thermal considerations for welding, temperature distribution, Analytical/Empirical analysis/formulae, heating &amp; cooling curves, Metallurgical consideration of weld, HAZ and Parent metal, micro &amp; macro structure, Solidification of weld and their properties</p>	16

**Reference Books-**

1. Welding Technology Hand book

## DME 6025:MECHATRONICS

**Credits: 4**

**Semester VI**

**L-T-P: 4-0-0**

Module No.	Contents	Teaching Hours
Unit - I	<p><b>Introduction</b> Introduction to Mechatronics, systems, measurement systems, control systems, microprocessor-based controllers, The Mechatronics approach,</p> <p><b>Review of Transducers</b> Sensors and transducers, performance terminology, Displacement position and proximity, velocity &amp; motion, Force, Fluid pressure, Liquid flow, liquid level, Temperature, Light sensors, Selection of sensors, Inputting data by switches,</p>	16
Unit - II	<p><b>Signal Conditioning</b> Signal conditioning, The operational amplifier, Protection, Filtering, Wheatstone bridge, Digital signals, Multiplexers, Data acquisition, Digital signal processing, Pulse - modulation,</p> <p><b>Data Presentation System</b> Displays, Data presentation elements, Magnetic recording, Displays, Data acquisition systems, Measurement systems, Measurement systems, Testing and calibration,</p> <p><b>Pneumatic &amp; Hydraulic System</b> Actuation systems, Pneumatic and hydraulic systems, Directional control valves, Pressure control valves, Cylinders, Process control valves, rotary actuators,</p>	16
Unit - III	<p><b>Mechanical Actuation System</b> Mechanical systems, Types of motion, Kinematics chains, Cams, Gear trains, Ratchet and pawl, Belt and chain drives, Bearings, Mechanical aspects of motor selection,</p> <p><b>Electrical Actuation System</b> Electrical systems, Mechanical Switches, Solid-state switches, Solenoids, DC motors, AC motors, Stepper motors,</p> <p><b>Basic system Models</b> Mathematical models, mechanical system building blocks, Electrical system building blocks, Thermal system building blocks,</p>	16

**Reference Books-**

1. Mechatronics - W. Bolton, 2 Ed. Addison Wesley Longman, Pub, 1999 (Delhi)



## DME 6002: QUALITY MANAGEMENT & VALUE ENGINEERING

**Credits: 3**

**Semester VI**

**L-T-P: 3-0-0**

Module No.	Contents	Teaching Hours
Unit - I	<b>Quality Concepts</b> -Evolution, Control, Concept change, Control on Purchased product-Procurement, Evaluation of supplies, Capacity, Verification, Development of sources, Procurement procedure, Manufacturing Quality-Methods & Techniques for manufacturing, Inspection & Control of Product, Service Quality- Quality in Sales & Service, Guarantee/ Warrantee, Analysis of Claims	12
Unit - II	<b>Quality Management</b> - Organization structure & Design, Quality Function, Decentralization, Designing & Fitting, Organization for different type of Products and Company, Economics of Quality, Value & Contribution, Quality cost, Optimizing Quality cost, Human factors in Quality- Attitude of Top Management, Cooperation of group, Operator's attitude, Responsibility, Causes of apparatus error and corrective methods  <b>Quality Tools</b> – concept & implementation of 5S, QC & 7 tools, Kaizen, JIT, QFD, House of Quality, ISO-9000, ISO 14000, Taguchi Method	12
Unit - III	<b>Statistical Quality Control</b> - Control charts & their applications, Measurement range, R charts, process capability, Attributes of Control charts-Defects, Construction and analysis of charts, Improvement by control charts, Variable sample size, Construction & analysis of C charts, Defect diagnosis & prevention, defect study- identification & analysis, corrective measures, Reliability, MTTF, Maintainability, Zero defect  <b>Value Engineering</b> - Concepts and approaches of value engineering, importance of value, Function - identity, clarify – analysis Evaluation of value engineering, problem setting system, problem solving system, setting and solving management, evaluation of value results accelerators, Basic steps in using the systems understanding the decision environment, Life Cycle Cost (LCC), construction management contracts, value engineering case studies, Effective organization for value work, function analysis system techniques-FAST diagram, Case studies	12

### Reference Books-

1. Total Quality Management, Lt. Gen. H. Lal Eastern Ltd. 1990
2. TQM in New Product Manufacturing Menon, H.G. Mc Graw Hill, 1994
3. Parker, D.E., "Value Engineering Theory", Sundaram publishers, 1990.
4. Miles, L.D., "Techniques of Value Engineering and Analysis", McGraw Hill Book Co., 2nd End., 1972