BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT
YELAHANKA – BENGALURU - 64

DEPARTMENT OF MECHANICAL ENGINEERING

COURSE FILE

SEMESTER : **I**

COURSE NAME : **Elements of Mechanical Engineering**

COURSE CODE : **18ME15**

COURSE COORDINATOR : **Dr. KEERTHI KUMAR N**

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BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

Avalahalli, Doddaballapur Road, Yelahanka, Bangalore - 560064

Institution Calender of Events (CoE) 2020-21 (ODD Semester)

VISION OF THE INSTITUTE	To emerge as one of the finest technical institutions of higher learning, to develop engineering professionals who are technically competent, ethical and environment friendly for betterment of the society.
MISSION OF THE INSTITUTE	Accomplish stimulating learning environment through high quality academic instruction, innovation and industry-institute interface.

Month	Week	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Working Days	EVENTS
September	W-1			1	2	3	4	5	5	1-Sept.: Commencement of B.E (III, V, & VII Sem.), MCA (III & V Sem.) & M.Tech (III Sem.) Classes
	W-2	6	7	8	9	10	11	12	6	10-Sept.: FYP/PBL Group Formation
	W-3	13	14	15	16	17	18	19	5	17-Sept.: Mahalaya Amavasya
	W-4	20	21	22	23	24	25	26	6	21-Sept.: FYP/PBL Guide Allotment; 21-Sept.: FIMS Update
	W-5	27	28	29	30				3	30-Sept.: FYP/PBL Synopsis Submission
October	W-6					1	2	3	2	2-Oct.: Gandhi Jayanthi
	W-7	4	5	6	7	8	9	10	6	5-7 Oct.: Internal Assessment (IA) Test - 1 B.E (III, V, & VII Sem.) M.Tech (III Sem.), MCA (III & V Sem.)
	W-8	11	12	13	14	15	16	17	6	14-Oct.: SMS Dispatch for IA-1; 16-17 Oct.: Students Feedback -1 on Faculty; 17-Oct.: PTA for Higher Semester
	W-9	18	19	20	21	22	23	24	6	20-Oct.: FIMS Update
	W-10	25	26	27	28	29	30	31	3	26-Oct.: Vijayadashami; 27-28 Oct.: FYP/PBL Patentability Review - 1; 30-Oct.: Eid Milad; 31-Oct.: Valmiki Jayanthi
November	W-11	1	2	3	4	5	6	7	6	1-Nov.: Kannada Rajyotsava; 5-7 Nov.:Internal Assessment (IA) Test - 2 B.E (III, V, & VII Sem.) M.Tech (III Sem.), MCA (III & V Sem.)
	W-12	8	9	10	11	12	13	14	6	14-Nov.: Tech-Transform 2020 Notification; 14-Nov.: SMS Dispatch for IA-2
	W-13	15	16	17	18	19	20	21	5	16-Nov.: Balipadyami Deepavali; 16-17 Nov.: Students Feedback - 2 on Faculty; 20-Nov.: PBL Patentability Review - 2/BMSIT Open Day; 20-Nov.: FIMS Update; 21-Nov.: Tech-Transfrom 2020
	W-14	22	23	24	25	26	27	28	6	27-28 Nov.: FYP Patentability Review - 2
	W-15	29	30						1	
December	W-16			1	2	3	4	5	4	3-Dec.: Kanakadasa Jayanti
	W-17	6	7	8	9	10	11	12	6	7-9 Dec.: Internal Assessment (IA) Test -3 B.E (III, V, & VII Sem.) M.Tech (III Sem.), MCA (III & V Sem.)
	W-18	13	14	15	16	17	18	19	4	16-Dec.: SMS Dispatch for IA-3; 17-Dec.: Last Working Day for B.E (3rd, 5th, & 7th Sem.), MCA (3rd & 5th Sem.) & M.Tech (3rd Sem.) Classes
	W-19	20	21	22	23	24	25	26		21-Dec.: FIMS Update; 25-Dec.: Christmas
	W-20	27	28	29	30	31				
	Total Number of Working Days								86	

CONTINUOUS INTERNAL EVALUATION

COURSE	SEM	START	END
INTERNAL ASSESSMENT - 1			
B.E	I	TBA	TBA
B.E	III, V, VII	05-Oct	07-Oct
MCA	III & V	05-Oct	07-Oct
M.Tech	I	TBA	TBA
MCA	I	TBA	TBA
INTERNAL ASSESSMENT - 2			
B.E	I	TBA	TBA
B.E	III, V, VII	05-Nov	07-Nov
MCA	III & V	05-Nov	07-Nov
M.Tech	I	TBA	TBA
MCA	I	TBA	TBA
INTERNAL ASSESSMENT - 3			
B.E	I	TBA	TBA
B.E	III, V, VII	07-Dec	09-Dec
MCA	III & V	07-Dec	09-Dec
M.Tech	I	TBA	TBA
MCA	I	TBA	TBA

SEMESTER END EXAMINATIONS

COURSE	START OF EXAM	END OF EXAM
B.E : I - SEM		
B.E : III, V, & VII - SEM	04-01-2021	23-01-2021
M.Tech: I - SEM		
M.Tech: III - SEM	04-01-2021	23-01-2021
MCA: I - SEM		
MCA: III & V - SEM	04-01-2021	23-01-2021

PROFESSIONAL TRAINING/INTERNSHIP VIVA-VOCE

COURSE	SEM	START	END
B.E			
M.Tech	III	25-Jan	08-Feb
MCA			

COMMENCEMENT OF EVEN SEMESTER (2020-21)

COURSE	SEM	DATE
B.E	III, V & VII	08-Feb
MCA	III & V	08-Feb
M.Tech	III	22-Feb

LIST OF HOLIDAYS

17-Sep	Mahalaya Amavasya
02-Oct	Mahatma Gandhi Jayanthi
26-Oct	Vijayadashami
30-Oct	Eid-Milad
31-Oct	Maharishi Valmiki Jayanti
01-Nov	Kannada Rajyotsava
16-Nov	Balipadyami Deepavali
03-Dec	Kanakadasa Jayanti
25-Dec	Christmas

PARENTS-TEACHERS ASSOCIATION

PTA	DATE
PTA - 1	17-Oct
PTA - 2	TBA

PRACTICAL EXAMINATION

COURSE	SEM	DATES
B.E	III, V, & VII	21-Dec to 31-Dec
MCA	III & V	21-Dec to 31-Dec
M.Tech	III	21-Dec to 31-Dec

ABBREVIATIONS

IA	Internal Assessment	FIMS	Faculty Information Mgmt. System
IIC	Institution Innovation Council	FYP	Final Year Project
PTA	Parents-Teachers-Association	PBL	Projects Based Learning

Coordinator - COE 4/9/2020

Head - IQAC

PRINCIPAL

BMS INSTITUTE OF TECHNOLOGY & MANAGEMENT
YELAHANKA – BENGALURU – 560 064

DEPARTMENT OF MECHANICAL ENGINEERING

COURSE NAME: ELEMENTS OF MECHANICAL ENGINEERING

COURSE CODE: 18ME15

COURSE OUTCOMES (CO's)

CO1: Identify and comprehend the different sources of energy, their conversion processes, working principles of hydraulic turbines, Pumps, IC Engines, Refrigeration and Air Conditioning.

CO2: Recognize and apply the properties of engineering materials, principles of various metal joining processes, power transmission Elements and their applications in an engineering industry

CO3: Understand and enumerate the working of conventional machine tools, machining processes, tools, accessories and advanced Manufacturing systems

CO-PO MAPPING EXPLANATION

	Explanation
CO-1	**Strongly related to PO1** because the students can be able to Identify and comprehend the different sources of energy, their conversion processes, working principles of hydraulic turbines, Pumps, IC Engines, Refrigeration and Air Conditioning with the application of basic principles of mathematics and science **Strongly related to PO2** because the students can able to identify engineering problems related to IC Engines, Gas turbines and apply concepts of these cycles to provide solution.

CO-2	**Strongly related to PO1** because the students can be able to recognize and apply the properties of engineering materials, principles of various metal joining processes, power transmission elements and their applications in an engineering industry with the applications of basic principles of mathematics and science **Strongly related to PO2** because the students can able to identify engineering problems related to power transmission elements like belt drives and gear drives.
CO-3	**Strongly related to PO1** because the students can Understand and enumerate the working of conventional machine tools, machining processes, tools, accessories and advanced Manufacturing systems using basic principles of mathematics and science. **Strongly related to PO2** because the students can able Understand and enumerate the working of conventional machine tools, machining processes, tools, accessories and advanced Manufacturing systems

Course coordinator **Module coordinator**

HoD, ME

ELEMENTS OF MECHANICAL ENGINEERING

Semester	**: I/II**	**CIE Marks**	**: 40**
Course Code	**: 18ME15/25**	**SEE Marks**	**: 60**
Teaching Hours/week (L:T:P)	**: 2:2:0**	**Exam Hours**	**: 03**
	Credits : 03		

Course Objectives:

This course **(18ME15/25)** will enable students to

CLO1 Learn the fundamental concepts of energy, its sources and conversion.
CLO2 Comprehend the basic concepts of thermodynamics.
CLO3 Understand the concepts of boilers, turbines, pumps, internal combustion engines and refrigeration
CLO4 Distinguish different metal joining techniques.
CLO5 Enumerate the knowledge of working with conventional machine tools, their specifications.

MODULE-1

Sources of Energy : Introduction and application of energy sources like fossil fuels, hydel, solar, wind, nuclear fuels and bio-fuels; environmental issues like global warming and ozone depletion.

Basic concepts of Thermodynamics: Introduction, states, concept of work, heat, temperature; Zeroth, 1st, 2nd and 3rd laws of thermodynamics. Concept of internal energy, enthalpy and entropy (simple numericals).

Steam: Formation of steam and thermodynamic properties of steam (simple numericals).

(RBT : L1, L2 & L3)

MODULE-II

Boilers: Introduction to boilers, classification, Lancashire boiler, Babcock and Wilcox boiler. Introduction to boiler mountings and accessories (no sketches).

Turbines: Hydraulic Turbines – Classification and specification, Principles and operation of Pelton wheel turbine, Francis turbine and Kaplan turbine (elementary treatment only).

Hydraulic Pumps: Introduction, classification and specification of pumps, reciprocating pump and centrifugal pump, concept of cavitation and priming.

(RBT: L1, L2 & L3)

MODULE – III

Internal Combustion Engines

Classification, I.C. Engines parts, 2 and 4 stroke petrol and 4-stroke diesel engines. P-V diagrams of Otto and Diesel cycles. Simple problems on indicated power, brake power, indicated thermal efficiency, brake thermal efficiency, mechanical efficiency and specific fuel consumption.

Refrigeration and Air conditioning

Refrigeration - Definitions - Refrigerating effect, Ton of Refrigeration, Ice making capacity, COP, relative COP, Unit of Refrigeration. Refrigerants, Properties of refrigerants, List of commonly used refrigerants. Principle and working of vapor compression refrigeration and vapor absorption refrigeration. Domestic refrigerator. Principles and applications of air conditioners, window and split air conditioners.

(RBT Levels : L1, L2 & L3)

MODULE IV

Properties, Composition and Industrial Applications of engineering materials

Metals – Ferrous: cast iron, tool steels and stainless steels and nonferrous: aluminum, brass, bronze. Polymers - Thermoplastics and thermosetting polymers. Ceramics - Glass, optical fiber glass, cermets. Composites - Fiber reinforced composites, Metal Matrix Composites Smart materials – Piezoelectric materials, shape memory alloys, semiconductors and insulators.

Joining Processes: Soldering, Brazing and Welding

Definitions. Classification and methods of soldering, brazing and welding. Brief description of arc welding, oxy-acetylene welding, TIG welding, and MIG welding.

Belt drives

Open & crossed belt drives, Definitions -slip, creep, velocity ratio, derivations for length of belt in open and crossed belt drive, ratio of tension in flat belt drives, advantages and disadvantages of V belts and timing belts, simple numerical problems.

Gear drives

Types–spur, helical, bevel, worm and rack and pinion. Velocity ratio, advantages and disadvantages over belt drives, simple numerical problems on velocity ratio.

(RBT Levels : L1, L2 & L3)

MODULE-V

Lathe - Principle of working of a center lathe. Parts of a lathe. Operations on lathe - Turning, Facing, Knurling, Thread Cutting, Drilling, Taper turning by Tailstock offset method and Compound slide swiveling method, Specification of Lathe.

Milling Machine - Principle of milling, types of milling machines. Working of horizontal and vertical milling machines. Milling processes - plane milling, end milling, slot milling, angular milling, form milling, straddle milling, and gang milling.

(Layout sketches of the above machines need not be dealt. Sketches need to be used only for explaining the operations performed on the machines)

Introduction to Advanced Manufacturing Systems

Computer Numerical Control (CNC): Introduction, components of CNC, open loop and closed loop systems, advantages of CNC, CNC Machining centers and Turning centers.

Robots: Robot anatomy, joints and links, common robot configurations.

Applications of Robots in material handling, processing and assembly and inspection.

(RBT Levels : L1, L2 & L3)

Course Outcomes:

Upon completion of this course, students will be able to

CO1 Identify different sources of energy and their conversion process.

CO2 Explain the working principle of hydraulic turbines, pumps, IC engines and refrigeration.

CO3 Recognize various metal joining processes and power transmission elements.

CO4 Understand the properties of common engineering materials and their applications in engineering industry.

CO5 Discuss the working of conventional machine tools, machining processes, tools and accessories.

CO6 Describe the advanced manufacturing systems.

Question paper pattern:

- **The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 60.**
- The question paper will have **ten** full questions carrying equal marks.
- Each full question consisting of **20** marks.
- There will be **two** full questions (with a **maximum** of **three** sub questions) from each module.
- Each full question will have sub question covering all the topics under a module.
- The students will have to answer **five** full questions, selecting **one** full question from each module.

Note

- To illustrate the concepts of operations of turbines, pumps, conventional machines like lathe, drilling, milling, grinding etc., the instructions should be blended with video presentations and visit to the laboratories/ machine shop concerned.
- Demonstration of soldering, brazing and welding should be arranged in the workshop.
- To illustrate the fundamentals of CNC machining and turning centers and robots, video presentations should be adapted in addition to class room instructions.
- The boiler mountings and accessories should be shown in the engine lab.

- Assignments should be submitted by students on materials, sources of energy, global warming, welding processes, robots and their applications. These assignments should be given due credit in awarding CIE marks.

Textbooks :

1. **Elements of Mechanical Engineering,** K. R. Gopalakrishna, Subhas Publications, Bangalore, 2008.
2. **Elements of Mechanical Engineering,** Vol.-1 & 2, Hajra Choudhury, Media Promoters, New Delhi, 2001.
3. **A Text Book of Elements of Mechanical Engineering",** S. Trymbaka Murthy, 3rd revised edition 2006, I .K. International Publishing House Pvt. Ltd., New Delhi.

Reference Books :

1. **Elements of Mechanical Engineering,** R.K. Rajput, Firewall Media, 2005.
2. **Elements of Mechanical Engineering,** Dr. A. S. Ravindra, Best Publications, 7th edition, 2009.
3. **CAD/CAM/CIM,** Dr. P Radhakrishnan, 3rd edition, New Age International Publishers, New Delhi.
4. **Introduction to Robotics: Mechanics And Control,** Craig, J. J., 2nd Ed.Addison-Wesley Publishing Company, Readong, MA, 1989.
5. **Introduction to Engineering Materials",** B.K. Agrawal ,Tata McGraHill Publication, New Delhi.
6. **Thermal Science and Engineering",** Dr. D.S. Kumar, S.K. Kataria & sons Publication, New Delhi.

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DEPARTMENT OF MECHANICAL ENGINEERING

Course Plan
Name of the Course: Elements of Mechanical Engineering
Course Code: 18ME15
AY- 2020-21 (Odd)

WEEK	MODULE	TOPICS	PLANNED HOURS
1	1	**Sources of Energy :** Introduction and application of energy sources like fossil fuels, hydel, solar, wind, nuclear fuels and bio-fuels; environmental issues like global warming and ozone depletion.	**04 Hours**
2	1	**Basic concepts of Thermodynamics:** Introduction, states, concept of work, heat, temperature; Zeroth, 1st, 2nd and 3rd laws of thermodynamics. Concept of internal energy, enthalpy and entropy, simple numericals.	**04 Hours**
3	1	**Steam:** Formation of steam and thermodynamic properties of steam, simple numericals.	**04 Hours**
4	2	**Boilers:** Introduction to boilers, classification, Lancashire boiler, Babcock and Wilcox boiler. Introduction to boiler mountings and accessories.	**02 Hours**
	2	**Hydraulic Turbines** – Classification and specification, Principles and operation of Pelton wheel turbine,	**02 Hours**
5	2	Francis turbine and Kaplan turbine	**02 Hours**
	2	**Hydraulic Pumps:** Introduction, classification and specification of pumps, reciprocating pump and centrifugal pump, concept of cavitation and priming.	**02 Hours**
6	3	**Internal Combustion Engines:** Classification, I.C. Engines parts, 2 and 4 stroke petrol and 4-stroke diesel engines. P-V diagrams of Otto and Diesel cycles. Simple problems on indicated power, brake power, indicated thermal efficiency, brake thermal efficiency, mechanical efficiency and specific fuel consumption.	**04 Hours**

7	**3**	**Refrigeration and Air conditioning:** Refrigeration - Definitions - Refrigerating effect, Ton of Refrigeration, Ice making capacity, COP, relative COP, Unit of Refrigeration. Refrigerants, Properties of refrigerants, List of commonly used refrigerants. Principle and working of vapor compression refrigeration and vapor absorption refrigeration. Domestic refrigerator. Principles and applications of air conditioners, window and split air conditioners.	**02 Hours**
	4	**Properties, Composition and Industrial Applications of engineering materials:** Metals – Ferrous: cast iron, tool steels and stainless steels and nonferrous: aluminum, brass, bronze. Polymers - Thermoplastics and thermosetting polymers. Ceramics - Glass, optical fiber glass, cermets. Composites - Fiber reinforced composites, Metal Matrix Composites Smart materials – Piezoelectric materials, shape memory alloys, semiconductors and insulators	**02 Hours**
8	**4**	**Joining Processes:** Soldering, Brazing and Welding Definitions. Classification and methods of soldering, brazing and welding. Brief description of arc welding, oxy-acetylene welding, TIG welding, and MIG welding.	**04 Hours**
9	**4**	**Belt drives:** Open & crossed belt drives, Definitions -slip, creep, velocity ratio, derivations for length of belt in open and crossed belt drive, ratio of tension in flat belt drives, advantages and disadvantages of V belts and timing belts, simple numerical problems.	**04 Hours**
10	**4**	**Gear drives:** Types–spur, helical, bevel, worm and rack and pinion. Velocity ratio, advantages and disadvantages over belt drives, simple numerical problems on velocity ratio.	**04 Hours**
11	**5**	**Lathe** - Principle of working of a center lathe. Parts of a lathe. Specification of Lathe.	**02 Hours**
	5	Operations on lathe - Turning, Facing, Knurling, Thread	**02 Hours**

		Cutting, Drilling, Taper turning by Tailstock offset method and Compound slide swiveling method,	
12	**5**	**Milling Machine** - Principle of milling, types of milling machines. Working of horizontal and vertical milling machines.	**02 Hours**
		Milling processes - plane milling, end milling, slot milling, angular milling, form milling, straddle milling, and gang milling.	**02 Hours**
13	**5**	**Introduction to Advanced Manufacturing Systems Computer Numerical Control (CNC):** Introduction, components of CNC, open loop and closed loop systems, advantages of CNC, CNC Machining centers and Turning centers.	**02 Hours**
	5	**Robots:** Robot anatomy, joints and links, common robot configurations. Applications of Robots in material handling, processing and assembly and inspection.	**02 Hours**

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DEPARTMENT OF MECHANICAL ENGINEERING

Sample T-L Resources

Module-1
https://drive.google.com/file/d/1gn0Y9Kg87zlgVJFhUvnIzVyKzpq9-Dew/view?usp=sharing

Module-2
https://drive.google.com/file/d/1uKZrTGoLJOwCzijf8UQMROxIMMaLGP2v/view?usp=sharing

Module-3
https://drive.google.com/file/d/147H3JNo6vbL_eexqD_K1e9r8S9pd1vPG/view?usp=sharing

Module-4
https://docs.google.com/document/d/1NUzFBfyLSkPZBCkGeCIZeUe86wqkRqvu/edit?usp=sharing&ouid=104312038613023048457&rtpof=true&sd=true

Module-5
https://drive.google.com/file/d/1Em8nLxQVFDRAUVcjPVZO_1gTq3-vMB36/view?usp=sharing

Department of Mechanical Engineering

Proctors for First Semester Students - AY 2020-21

S.No	Student Name
1	Shreyas Kashyap
2	V V Sai Veekshana
3	Vijay Hemanth T
4	Manoj S V
5	Bhoomika Bhat
6	Darshan Jadav E
7	Mekala Jawahar Babu
8	Mohammed Zeeshan Sharieff
9	Mohammad Suhail Rather
10	Mavuleti Dhananjay Raju
11	Rishi J
12	Alok S C
13	Chetan Gada
14	Nishanth R Nayak
15	Aditya C V
16	Rahul Kumar
17	Shivraj S V
18	Pavan M
19	C Raghu
20	Lobemo Mark Kikon
21	Avneet Singh
22	Karampal Singh
23	Rituraj Roy Chowdhry
24	P Dikshith
25	Somisetty Sourav Sai
26	Syed Farhan Ahmed
27	Nikhil D
28	G Pratham
29	Rishabh Jha
30	N Madhumitha
31	Deepak V
32	Mohit R M
33	Anirudh Ganapathy
34	Nandan Reddy P S
35	Gaurav Tripathi
36	Abhishek Kumar
37	Debasis K Santo
38	Pamidi Mohammad Suhail
39	Mohith K M
40	Atharva Deepak Desai
41	Vivek Kumar
42	Harshvardhan Sharma
43	Rahul Singh
44	Sukhdeb Bhattacharya
45	Md Danish
46	Sharan R Raman
47	Aditya C A
48	Diptangshu Dasgupta
49	Piyush Ranjan
50	Abu Bakar Bin Abdullah

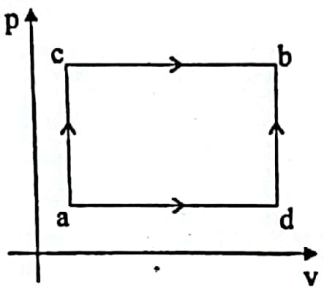
BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

Avalahalli, Doddaballapur Main Road, Bengaluru - 560064

FIRST INTERNAL ASSESSMENT TEST, JANUARY 2021

Course Name	Elements of Mechanical Engineering	Course Code	18ME15
Semester & Branch	I sem / ECE (H, I, J sec), EEE (K sec), Civil (L sec), Mech (M sec), AL&ML (N sec)	Date	30/01/2021
Course Coordinator (s)	SG, Dr.AG, MCM, Dr.KKN, SD, Dr.YJJ, Dr.SB	Max. Marks	50

Note: *Answer **THREE** full questions from **Part A** and **Part B** questions are compulsory.*

Q. No		PART A	Marks	CO
1.		Differentiate between renewal and non-renewal sources of energy	10 M	CO 1, K2
		OR		
2.		Explain the working of hydroelectric plant with a neat diagram	10 M	CO 1, K2
3.		When a system is taken from 'a' to 'b' as shown in figure, along the path acb 84 kJ of heat flow into the system and the system do 32 kJ of work. How much will be the heat flow into the system along the path adb if the work done is 10.5 kJ. 	10 M	CO 1, K3
		OR		
4.		A gas is compressed from an initial state of 0.35 m^3 and 105 kPa to a final state of 0.14 m^3 and to the same pressure. Determine change in internal energy of gas which rejects 38 kJ of heat.	10 M	CO 1, K3
5.		State the following laws: (i) Zeroth law of thermodynamics (ii) First law of thermodynamics (iii) Second law of thermodynamics (iv) Third law of thermodynamics	10 M	CO 1, K2
		OR		
6.	a)	Define the following: (i) Enthalpy of wet steam (ii) Enthalpy of superheated steam (iii) dryness fraction (iv) Latent heat of evaporation	08 M	CO 1, K2
	b)	Mention the advantages of superheated steam	02 M	
		PART B		
7.		Determine the additional heat and specific volume required to run the steam turbine at 10 bar of pressure. The initial state of 1 kg of steam is 20% wet.	10 M	CO 1, K5

8.		The sun provides earth with staggering amount of energy. Despite the abundance of solar energy we use very little of it to directly power human activities. Discuss the solar thermal conversion and its applications as discussed by George W Crabtree et al in "Solar Energy Conversion" article.	10 M	CO 1, K4

Course Outcomes (COs)

CO1:	Comprehend the different sources of energy, their conversion processes, working principles of hydraulic turbine, Pumps, IC Engines, Refrigeration and Air Conditioning
CO2:	Recognize properties of engineering materials, principles of various metal joining processes, power transmission elements and their applications in engineering industry
CO3:	Understand the working of conventional machine tools, machining processes, tools, accessories and advanced manufacturing systems

Bloom's Category

Remember (K1)	Understand (K2)	Apply (K3)	Analyze K4)	Evaluate (K5)	Create (K6)

Signatures of the Question Paper Scrutiny Committee

Course Coordinator(s)	**Module Coordinator(s)**	**Program Coordinator**	**Head of the Department**

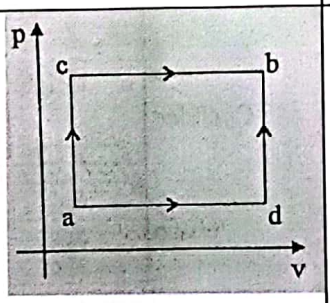
BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

Avalahalli, Doddaballapur Main Road, Bengaluru - 560064

Scheme for FIRST INTERNAL ASSESSMENT TEST, JANUARY 2021

Course Name	Elements of Mechanical Engineering	Course Code	18ME15
Semester & Branch	I sem / ECE (H, I, J sec), EEE (K sec), Civil (L sec), Mech (M sec), AL&ML (N sec)	Date	30/01/2021
Course Coordinator (s)	SG, Dr.AG, MCM, Dr.KKN, SD, Dr.YJJ, Dr.SB	Max. Marks	50

Note: *Answer **THREE** full questions from **Part A** and **Part B** questions are compulsory.*

Q. No		PART A	Marks	CO
1.		Differentiate between renewable and non-renewal sources of energy **Scheme - 5 marks for renewable and 5 marks for non renewable with 1 marks each for one example**	10 M	CO 1, K2
		OR		
2.		Explain the working of hydroelectric plant with a neat diagram **Scheme – 6 marks for sketch and 4 marks for explanation**	10 M	CO 1, K2
3.		When a system is taken from 'a' to 'b' as shown in figure, along the path acb 84 kJ of heat flow into the system and the system do 32 kJ of work. How much will be the heat flow into the system along the path adb if the work done is 10.5 kJ. **Scheme – 5marks for finding ΔU = 52 KJ** **5marks for finding Q along adb = 62.5 KJ** 	10 M	CO 1, K3
		OR		
4.		A gas is compressed from an initial state of 0.35 m^3 and 105 kPa to a final state of 0.14 m^3 and to the same pressure. Determine change in internal energy of gas which rejects 38 kJ of heat. **Scheme – 5marks for finding work done = -22.05 KJ** **5 marks for finding ΔU = -15.95 KJ**	10 M	CO 1, K3
5.		State the following laws: (i) Zeroth law of thermodynamics (ii) First law of thermodynamics (iii) Second law of thermodynamics (iv) Third law of thermodynamics **Scheme – 2.5 marks for each law**	10 M	CO 1, K2
		OR		
6.	a) b)	Define the following: (i) Enthalpy of wet steam (ii) Enthalpy of superheated steam (iii) dryness fraction (iv) Latent heat of evaporation Mention the advantages of superheated steam **Scheme – 2 marks for each definition and 2 marks for advantages.**	08 M 02 M	CO 1, K2
		PART B		
7.		Determine the additional heat and specific volume required to run the steam turbine at 10 bar of pressure. The initial state of 1 kg of steam is 20% wet. **Scheme – 2 marks for finding steam table values at 10 bar pressure**	10 M	CO 1, K5

		6 marks for calculation of enthalpy of dry steam. **2 marks for mentioning temperature beyond saturation temperature or additional heat required.**		
8.		The sun provides earth with staggering amount of energy. Despite the abundance of solar energy we use very little of it to directly power human activities. Discuss the solar thermal conversion and its applications as discussed by George W Crabtree et al in "Solar Energy Conversion" article. **Scheme – 2 marks for each application**	10 M	CO 1, K4

Course Outcomes (COs)

CO1:	Comprehend the different sources of energy, their conversion processes, working principles of hydraulic turbine, Pumps, IC Engines, Refrigeration and Air Conditioning
CO2:	Recognize properties of engineering materials, principles of various metal joining processes, power transmission elements and their applications in engineering industry
CO3:	Understand the working of conventional machine tools, machining processes, tools, accessories and advanced manufacturing systems

Bloom's Category

Remember (K1)	Understand (K2)	Apply (K3)	Analyze K4)	Evaluate (K5)	Create (K6)

Signatures of the Question Paper Scrutiny Committee

Course Coordinator(s)	**Module Coordinator(s)**	**Program Coordinator**	**Head of the Department**

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

Avalahalli, Doddaballapur Main Road, Bengaluru - 560064

SECOND INTERNAL ASSESSMENT TEST, FEBRUARY 2021

Course Name	**Elements of Mechanical Engg**	**Course Code**	**18ME15**
Semester & Branch	**I Sem H/I/J/K/L/M/N SEC ECE / EEE / CV / ME/AI&ML**	**Date**	**27/02/2021 (SS)**
Name of the Course Coordinator (s)	**MCM/ Dr.YJJ/DR.AG/ Dr.SBM / SG / Dr.KKN / SD**	**Max. Marks**	**50**

Note: *Answer **THREE** full questions from **Part A** and **Part B** questions are compulsory.*

Qn. No.		PART A	Marks	CO
1.		With a sketch, explain the working of Babcock and Wilcox boiler	10 M	COs:1 K:2
		OR		
2.		With a sketch, explain the working of a centrifugal pump and mention its applications.	10 M	COs:1 K:2
3.		With a sketch, explain the different parts of Internal Combustion(IC) engine.	10 M	COs:1 K:2
		OR		
4.		Differentiate between 2 stroke cycle engine and 4 stroke cycle engine.	10 M	COs:1 K:2
5.		A 4 cylinder four stroke petrol engine develops 30 kW BP at 2500 rpm. The mean effective pressure is 800 kPa and mechanical efficiency is 80%. Calculate the diameter and stroke of the cylinder, if the stroke to bore ratio is 1.5, also calculate the fuel consumption if brake thermal efficiency is 28%. The calorific value of fuel is 43900 kJ/kg.	10 M	COs:1 K:3
		OR		
6.		An engine working on a 4 stroke cycle has a cylinder diameter of 25 cm and stroke length of 45 cm, running at 180 rpm. Its mechanical efficiency is 80% and mean effective pressure is 6.5 bar. Determine Indicated power, brake power and frictional power. What is the fuel consumption (kg/hour) and brake specific fuel consumption (kg/kWh).If the energy content of fuel is 42000 kJ/kg and brake thermal efficiency is 25%.	10 M	COs:1 K:3
		PART B		
7.		For power generation, a person wants to install a turbine for higher head, impulse type and tangential flow of water, Suggest which turbine is suitable for the installation? Explain the working of such a turbine with a sketch.	10 M	COs:1 K:4
8.		With reference to case study, analyze some common refrigerants, selection criteria of refrigerants and current applications of refrigeration.	10 M	COs:1 K:4

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

Avalahalli, Doddaballapur Main Road, Bengaluru - 560064

SECOND INTERNAL ASSESSMENT TEST, FEBRUARY 2021

Course outcomes: students will be able to

CO-1: *Identify and comprehend the different sources of energy, their conversion processes, working principle of Hydraulic Turbines, Pumps, IC Engines and Refrigeration and Air conditioning*

CO-2: *Recognize and apply the properties of engineering materials, principles of various metal joining processes and power transmission elements and their applications in an engineering industry*

CO-3: *: Understand and Enumerate the working of conventional machine tools, machining processes, tools, accessories and advanced manufacturing systems*

Bloom's Category

Remembering (K1)	Understanding (K2)	Applying (K3)	Analyzing (K4)	Evaluating (K5)	Creating (K6)

Signatures of the Question Paper Scrutiny Committee

Course Coordinator(s)	**Module Coordinator(s)**	**Program Coordinator**	**Head of the Department**

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

Avalahalli, Doddaballapur Main Road, Bengaluru - 560064

SECOND INTERNAL ASSESSMENT TEST, FEBRUARY 2021

SCHEME AND SOLUTIONS

Course Name	**Elements of Mechanical Engg**	**Course Code**	**18ME15**
Semester & Branch	**I Sem H/I/J/K/L/M/N SEC ECE / EEE / CV / ME/AI&ML**	**Date**	**27/02/2021 (AS)**
Name of the Course Coordinator (s)	**MCM/ Dr.YJJ/DR.AG/ Dr.SBM / SG / Dr.KKN / SD**	**Max. Marks**	**50**

Note: *Answer **THREE** full questions from **Part A** and **Part B** questions are compulsory.*

Qn. No.		PART A	Marks	CO
1.		With a sketch, explain the working of Babcock and Wilcox boiler **Sketch : 05Marks Explanation for working principle:05 Marks**	10 M	**COs:1 K:2**
		OR		
2.		With a sketch, explain the working of a centrifugal pump and mention its applications. **Sketch : 05Marks Explanation for working principle:05 Marks**	10 M	**COs:1 K:2**
3.		With a sketch, explain the different parts of Internal Combustion(IC) engine. **Sketch : 05Marks Explanation for any 5 parts:05 Marks**	10 M	**COs:1 K:2**
		OR		
4.		Differentiate between 2 stroke cycle engine and 4 stroke cycle engine. **Minimum 5 differences , 2 marks each 2*5=10M**	10 M	**COs:1 K:2**
5.		A 4 cylinder four stroke petrol engine develops 30 kW power at 2500 rpm. The mean effective pressure is 800 kPa and mechanical efficiency is 80%. Calculate the diameter and stroke of the cylinder, if the stroke to bore ratio is 1.5, also calculate the fuel consumption if brake thermal efficiency is 28%. The calorific value of fuel is 43900 kJ/kg. **To write IP formula = 02 Marks,** **To find out diameter(d) = 0.062m or 62mm = 03 Marks** **To find out Stroke length = 1.5*d = 1.5*0.062 m = 0.093m or 93mm = 02 Marks** **to write fuel consumption formula = 01 Marks** **Fuel consumption final answer = 0.00244 kg/s = 8.78 kg/hr=02 Marks Total : 02+03+02+02+01 = 10 Marks**	10 M	**COs:1 K:3**
		OR		
6.		An engine working on a 4 stroke cycle has a cylinder diameter of 25 cm and stroke length of 45 cm, running at 180 rpm. Its mechanical efficiency is 80% and mean effective pressure is 6.5 bar. Determine Indicated power, brake power and frictional power. What is the fuel consumption (kg/hour) and brake specific fuel consumption (kg/kWh).If the energy content of fuel is 42000 kJ/kg and brake thermal efficiency is 25%. **To find IP = 21.53 kW (formula with answer)= 03 Marks,** **BP = 17.22 kW(formula with answer)=02 Marks,** **FP =4.31 kW(formula with answer)=01 Marks,** **To find mass of fuel = 0.00164 kg/s 0r 5.904 k/hr(formula with answer)=02 Marks, To find BSFC = 02 Marks(formula with answer) Total : 03+02+01+02+02 = 10 Marks**	10 M	**COs:1 K:3**

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

Avalahalli, Doddaballapur Main Road, Bengaluru - 560064

SECOND INTERNAL ASSESSMENT TEST, FEBRUARY 2021

SCHEME AND SOLUTIONS

		PART B		
7.		For power generation, a person wants to install a turbine for higher head, impulse type and tangential flow of water, Suggest which turbine is suitable for the installation? Explain the working of such a turbine with a sketch. **Sketch and Explanation for PELTON WHEEL TURBINE** **Sketch : 05Marks Explanation for working principle:05 Marks**	10 M	**COs:1 K:4**
8.		With reference to case study, analyze some common refrigerants, selection criteria of refrigerants and current applications of refrigeration. **To mention name of refrigerants : 03 Marks , Selection of Refrigerants(Desirable properties): 04 Marks, Applications of refrigerants: 03 Marks**	10 M	**COs:1 K:4**

Course outcomes: students will be able to

CO-1: *Identify and comprehend the different sources of energy, their conversion processes, working principle of Hydraulic Turbines, Pumps, IC Engines and Refrigeration and Air conditioning*

CO-2: *Recognize and apply the properties of engineering materials, principles of various metal joining processes and power transmission elements and their applications in an engineering industry*

CO-3: *: Understand and Enumerate the working of conventional machine tools, machining processes, tools, accessories and advanced manufacturing systems*

Bloom's Category

Remembering (K1)	Understanding (K2)	Applying (K3)	Analyzing (K4)	Evaluating (K5)	Creating (K6)

Signatures of the Question Paper Scrutiny Committee

Course Coordinator(s)	Module Coordinator(s)	Program Coordinator	Head of the Department

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

Avalahalli, Doddaballapur Main Road, Bengaluru - 560064

THIRD INTERNAL ASSESSMENT TEST, MARCH 2021

Course Name	Elements of Mechanical Engg	Course Code	18ME15
Semester & Branch	I Sem H/I/J/K/L/M/N SEC ECE / EEE / CV / ME/AI&ML	Date	03/04/2021 (AS)
Name of the Course Coordinator (s)	MCM/ Dr.YJJ/DR.AG/ Dr.SBM / SG / Dr.KKN / SD	Max. Marks	50

Note: *Answer **THREE** full questions from **Part A** and **Part B** questions are compulsory.*

Qn. No.	PART A	Marks	CO
1.	Briefly explain spur, helical, bevel, rack and pinion gears with relevant sketches.	10 M	COs:2 K:2
	OR		
2.	Derive an expression for the length of belt in a cross belt drive.	10 M	COs:2 K:4
3.	Explain Oxy Acetylene welding with neat diagram.	10 M	COs:2 K:2
	OR		
4.	Define taper turning. With neat sketch explain taper turning operation by compound slide swiveling method and tailstock offset method.	10 M	COs:3 K:1
5.	Sketch and explain the Cartesian coordinate and Spherical coordinate robot configuration.	10 M	COs:3 K:2
	OR		
6.	Explain the following operation on milling machine with suitable sketches: Form Milling ii. Angular Milling iii. Gang Milling	10 M	COs:3 K:1
	PART B		
7.	Explain various applications of Robots in the manufacturing industry.	10 M	COs:3 K:3
8.	With reference to the discussed case study, in order to obtain an increase in hardness and impact strength, mention the suitable welding method and explain with a neat sketch.	10 M	COs:2 K:4

Course outcomes: students will be able to

CO-1: *Identify and comprehend the different sources of energy, their conversion processes, working principle of Hydraulic Turbines, Pumps, IC Engines and Refrigeration and Air conditioning*

CO-2: *Recognize and apply the properties of engineering materials, principles of various metal joining processes and power transmission elements and their applications in an engineering industry*

CO-3: *: Understand and Enumerate the working of conventional machine tools, machining processes, tools, accessories and advanced manufacturing systems*

Bloom's Category

Remembering (K1)	Understanding (K2)	Applying (K3)	Analyzing (K4)	Evaluating (K5)	Creating (K6)

Signatures of the Question Paper Scrutiny Committee

Course Coordinator(s)	Module Coordinator(s)	Program Coordinator	Head of the Department

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

Avalahalli, Doddaballapur Main Road, Bengaluru - 560064

THIRD INTERNAL ASSESSMENT TEST, FEBRUARY 2021
SCHEME AND SOLUTIONS

Course Name	**Elements of Mechanical Engg**	**Course Code**	**18ME15**
Semester & Branch	**I Sem H/I/J/K/L/M/N SEC ECE / EEE / CV / ME/AI&ML**	**Date**	**03/04/2021 (AS)**
Name of the Course Coordinator (s)	**MCM/ Dr.YJJ/DR.AG/ Dr.SBM / SG / Dr.KKN / SD**	**Max. Marks**	**50**

Note: *Answer **THREE** full questions from **Part A** and **Part B** questions are compulsory.*

Qn. No.		PART A	Marks	CO
1.		Briefly explain spur, helical, bevel, rack and pinion gears with relevant sketches. **Sketch : 05 Marks for each case, Explanation for working principle for each case:05 Marks**	10 M	**COs:1 K:2**
		OR		
2.		Derive an expression for the length of belt in a cross belt drive. **Derivation of Length of belt – 10 Marks**	10 M	**COs:1 K:2**
3.		Explain Oxy Acetylene welding with neat diagram. **Sketch : 05Marks Explanation of construction and working principle :05 Marks**	10 M	**COs:1 K:2**
		OR		
4.		Define taper turning. With neat sketch explain taper turning operation by compound slide swiveling method and tailstock offset method. **Definition : 02 Marks, Sketch and Explanation of compound slide swiveling method carries 4 Marks and tailstock offset method 4 Marks**	10 M	**COs:1 K:2**
5.		Sketch and explain the Cartesian coordinate and Spherical coordinate robot configuration. **Sketch and Explanation carries of Cartesian coordinate carries 5 Marks** **Sketch and Explanation carries of Spherical coordinate carries 5 Marks**	10 M	**COs:1 K:3**
		OR		
6.		Explain the following operation on milling machine with suitable sketches: Form Milling ii. Angular Milling iii. Gang Milling **Sketch: 05Marks Explanation :05 Marks**	10 M	**COs:1 K:3**
		PART B		
7.		Explain various applications of Robots in the manufacturing industry. **Applications of Robotics in modern industries 2Marks for each applications**	10 M	**COs:1 K:4**
8.		With reference to the discussed case study, in order to obtain an increase in hardness and impact strength, mention the suitable welding method and explain with a neat sketch. **To mention name: 03 Marks and explanation of suitable method carries 7 Marks**	10 M	**COs:1 K:4**

Course outcomes: students will be able to

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

Avalahalli, Doddaballapur Main Road, Bengaluru - 560064

THIRD INTERNAL ASSESSMENT TEST, FEBRUARY 2021

SCHEME AND SOLUTIONS

CO-1: *Identify and comprehend the different sources of energy, their conversion processes, working principle of Hydraulic Turbines, Pumps, IC Engines and Refrigeration and Air conditioning*

CO-2: *Recognize and apply the properties of engineering materials, principles of various metal joining processes and power transmission elements and their applications in an engineering industry*

CO-3: *: Understand and Enumerate the working of conventional machine tools, machining processes, tools, accessories and advanced manufacturing systems*

Bloom's Category

Remembering (K1)	Understanding (K2)	Applying (K3)	Analyzing (K4)	Evaluating (K5)	Creating (K6)

Signatures of the Question Paper Scrutiny Committee

Course Coordinator(s)	**Module Coordinator(s)**	**Program Coordinator**	**Head of the Department**

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VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

HELLO, 1BYME

BMS Institute of Technology and Management, BANGALORE

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Dashboard (dashboard.php) Subject Faculty Allotment (subject_mapping.php)

IA Marks Entry (internal_marks_home.php) HOD Dashboard (hod_dashboard.php)

Instruction (instruction.php)

INTERNAL MARKS ENTRY

Semester

1 Semester

SubjectCode

18ME15 - Elements of Mechanical Engineering

Choose Faculty

1BYME0007789 - KEERTHI KUMAR N

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IA Entry for 18ME15 -

Show 100 entries Search:

Sl.No.	USN	Student Name	Attendence	Marks Scored	Max Marks	Status
1	1BY20ME001	ABHISHEK KUMAR	Present	16	40	**Frozen**
2	1BY20ME002	ABU BAKAR BIN ABDULLAH	Present	23	40	**Frozen**

Sl.No.	USN	Student Name	Attendence	Marks Scored	Max Marks	Status
3	1BY20ME003	ADITYA C A	Present	23	40	Frozen
4	1BY20ME004	ADITYA C V	Present	34	40	Frozen
5	1BY20ME005	ALOK S C	Present	34	40	Frozen
6	1BY20ME006	ANIRUDH GANAPATHY	Present	28	40	Frozen
7	1BY20ME007	ATHARVA DEEPAK DESAI	Present	27	40	Frozen
8	1BY20ME008	AVNEET SINGH	Present	18	40	Frozen
9	1BY20ME009	BHOOMIKA BHAT	Present	39	40	Frozen
10	1BY20ME010	C RAGHU	Present	18	40	Frozen
11	1BY20ME011	CHETAN GADA	Present	19	40	Frozen
12	1BY20ME012	DARSHAN JADAV E	Present	33	40	Frozen
13	1BY20ME013	DEBASIS KARMOKAR SANTO	Present	16	40	Frozen
14	1BY20ME014	DEEPAK V	Present	27	40	Frozen
15	1BY20ME015	DIPTANGSHU DASGUPTA	Present	16	40	Frozen
16	1BY20ME016	G PRATHAM	Present	22	40	Frozen
17	1BY20ME017	GAURAV TRIPATHI	Present	27	40	Frozen
18	1BY20ME018	HARSHVARDHAN SHARMA	Present	30	40	Frozen
19	1BY20ME019	KARAM PAL SINGH	Present	20	40	Frozen

Sl.No.	USN	Student Name	Attendence	Marks Scored	Max Marks	Status
20	1BY20ME020	LOBEMO MARK KIKON	Present	27	40	**Frozen**
21	1BY20ME021	MANOJ S V	Present	21	40	**Frozen**
22	1BY20ME022	MAVULETI DHANANJAY RAJU	Present	34	40	**Frozen**
23	1BY20ME023	MD DANISH	Present	36	40	**Frozen**
24	1BY20ME024	MEKALA JAWAHAR BABU	Present	27	40	**Frozen**
25	1BY20ME025	MOHAMMAD SUHAIL RATHER	Present	24	40	**Frozen**
26	1BY20ME026	MOHAMMED ZEESHAN SHARIEFF	Present	28	40	**Frozen**
27	1BY20ME027	MOHIT R M	Present	28	40	**Frozen**
28	1BY20ME028	MOHITH K M	Present	18	40	**Frozen**
29	1BY20ME029	N MADHUMITHA	Present	31	40	**Frozen**
30	1BY20ME030	NANDAN REDDY P S	Present	16	40	**Frozen**
31	1BY20ME031	NIKHIL D	Present	39	40	**Frozen**
32	1BY20ME032	NISHANTH R NAYAK	Present	26	40	**Frozen**
33	1BY20ME033	P DIKSHITH	Present	16	40	**Frozen**
34	1BY20ME034	PAMIDI MOHAMMAD SUHAIL	Present	20	40	**Frozen**
35	1BY20ME035	PAVAN M	Present	30	40	**Frozen**
36	1BY20ME036	PIYUSH RANJAN	Present	16	40	**Frozen**

Sl.No.	USN	Student Name	Attendence	Marks Scored	Max Marks	Status
37	1BY20ME037	RAHUL KUMAR	Present	32	40	**Frozen**
38	1BY20ME038	RAHUL SINGH	Present	31	40	**Frozen**
39	1BY20ME039	RISHABH JHA	Present	33	40	**Frozen**
40	1BY20ME040	RISHI J	Present	33	40	**Frozen**
41	1BY20ME041	RITURAJ ROY CHOWDHURY	Present	16	40	**Frozen**
42	1BY20ME042	SHARAN R RAMAN	Present	16	40	**Frozen**
43	1BY20ME043	SHIVRAJ S	Present	28	40	**Frozen**
44	1BY20ME044	SHREYAS KASHYAP	Present	36	40	**Frozen**
45	1BY20ME045	SOMISETTY SOURAV SAI	Present	17	40	**Frozen**
46	1BY20ME046	SUKHDEB BHATTACHARYA	Present	17	40	**Frozen**
47	1BY20ME047	SYED FARHAN AHMED	Present	23	40	**Frozen**
48	1BY20ME048	V V SAI VEEKSHANA	Present	36	40	**Frozen**
49	1BY20ME049	VIJAY HEMANTH T	Present	27	40	**Frozen**
50	1BY20ME050	VIVEK KUMAR	Present	29	40	**Frozen**

Showing 1 to 50 of 50 entries

Previous 1 Next

NOTE:

► The values are already Submitted and Frozen!

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BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT
YELAHANKA – BENGALURU - 64

DEPARTMENT OF MECHANICAL ENGINEERING

Name of the Course: Elements of Mechanical Engineering
Course Code: 18ME15
AY- 2020-21 (Odd)

ASSIGNMENT 1

1. Explain the working of 2 stroke petrol engine.
2. An engine working on a 4 stroke cycle has a cylinder of diameter 25cm and the stroke length is 45 cm running at 180 rpm. It is mechanical efficiency is 80%. Mean effective pressure is 6.5 bar. Find the **indicated power, brake power, friction power** and also find the **fuel consumption in kg/hr** if energy content of fuel is 42000 kj/kg and brake thermal efficiency is 25%.
3. During a trial of 60 min on single cylinder oil engine having L=1.5 times the bore working on 2 stroke cycle, following observations were made. The total fuel consumption is 9.6L. Total no. of revolutions is 12624. Mean effective pressure is 7 bar. Specific gravity of the oil is 0.8. Calorific value is 45000 kj/kg. Find **thermal efficiency, specific fuel consumptions, length and bore of the cylinder**. Mechanical efficiency is 87% and brake power=26 kw.

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT
YELAHANKA – BENGALURU - 64

DEPARTMENT OF MECHANICAL ENGINEERING

Name of the Course: Elements of Mechanical Engineering
Course Code: 18ME15
AY- 2020-21 (Odd)

ASSIGNMENT 2

1. Write the difference between soldering and brazing.
2. Write the difference between TIG and MIG.
3. Derive the equation for length of cross belt drive.
4. Derive the ratios of tensions in belt drive.
5. List out the different configuration of robots & with a neat line diagram explain any 3 configuration.
6. Including both taper turning, explain any other 3 operations of lathe. (total 5)
7. Write any 3 milling operations.
8. With a neat figure, explain the principles of milling.

CBCS SCHEME

USN | 1 | BY | 20 | EC | 082 | 18ME15/25

First/Second Semester B.E. Degree Examination, Jan./Feb. 2021
Elements of Mechanical Engineering

Time: 3 hrs. Max. Marks: 100

Note: 1. *Answer any FIVE full questions, choosing ONE full question from each module.*
2. *Assume missing data (if any)*
3. *Use of steam tables is permitted.*

Module-1

1 a. Distinguish between renewable and non-renewable sources of energy with suitable examples. **(08 Marks)**

b. With a neat sketch, explain the working principle of solar flat plate collector and indicate its merits and demerits. **(08 Marks)**

c. Find the enthalpy of 1kg of steam at 12 bar when
i) Steam is dry saturated
ii) Steam is 22% wet. **(04 Marks)**

OR

2 a. Explain the formation of steam with the Temperature – Enthalpy diagram. **(08 Marks)**

b. Steam which is initially at a pressure of 9 bar and dryness fraction of 0.98 is subjected to the following operations.
i) Steam loses 50kJ/kg at constant pressure
ii) Steam receives 150kJ/kg at constant pressure.
Find the final quality and temperature of steam under each of the above condition **(08 Marks)**

c. State the Zeroth law and First law of thermodynamics. **(04 Marks)**

Module-2

3 a. Explain the working of a Babcock and Wilcox boiler with a neat sketch. **(08 Marks)**

b. With a neat labeled sketch, explain the working of a Francis turbine. **(08 Marks)**

c. List the important mountings on a boiler. **(04 Marks)**

OR

4 a. Discuss the construction and working of a Lancashire boiler with a neat sketch. **(08 Marks)**

b. Explain the working of a Pelton turbine with a neat sketch. **(08 Marks)**

c. With a neat labeled sketch, explain the working of a centrifugal pump. **(04 Marks)**

Module-3

5 a. Explain the working of a 4 stroke petrol engine with neat sketches. Indicate the 4 stroke and the pressure – volume changes on a P-V diagram. **(10 Marks)**

b. A two stroke engine has a piston diameter of 200mm and stroke length of 300mm. The engine has a mean effective pressure of 3.6 bar and speed of 400rpm. The effective diameter of brake drum is 1m and the load on the brake drum is 81 kg. Determine the indicated power, brake power and mechanical efficiency of the engine. **(10 Marks)**

OR

6 a. Explain the principle of working of a room air conditioner with a neat sketch. **(10 Marks)**

b. A single cylinder 4 stroke engine has a swept volume of 6 litres and a rated speed of 300 rpm. At full load, the torque developed was measured with a dynamometer whose pulley diameter is 1m. The tension in the tight side is 700N and on the slack side is 300N, 4kg of fuel was consumed to run the engine for 1 hour. The indicated mean effective pressure is 6 bar and calorific value of the fuel is 42,000 kJ/kg. Calculate the indicated power, brake power, mechanical efficiency and indicated thermal efficiency. **(10 Marks)**

Module-4

7 a. Explain the principle of arc welding with a neat sketch. **(08 Marks)**

b. Discuss the applications of ferrous and non-ferrous metals. **(06 Marks)**

c. In a crossed belt drive system, the tension on the tight side of a belt is 3000N and the angle of lap is 160°. If the coefficient of friction is 0.3, find the tension on the slack side of the belt and initial tension. **(06 Marks)**

OR

8 a. What are the shape memory alloys? Discuss the applications of these alloys. **(08 Marks)**

b. List different types of gears and mention their applications. **(06 Marks)**

c. Discuss the applications of composite materials in aerospace industry, automobile industry and recreation. **(06 Marks)**

Module-5

9 a. Explain the different operations carried out on a lathe [any 4]. **(08 Marks)**

b. Mention the applications of robots in material handling, assembly and inspection. **(08 Marks)**

c. What are the advantages of CNC machines? **(04 Marks)**

OR

10 a. With a neat sketch, explain the process of taper turning on a lathe using compound slide method. **(08 Marks)**

b. Explain the following operations on milling, straddle milling, slab milling and slot milling. **(08 Marks)**

c. Name the common configurations used in a robot and explain their working. **(04 Marks)**

* * * * *

USN | | | | | | | | | | |

18ME15/25

Model Question Paper

First Semester B.E. Degree (CBCS) Examination

Elements of Mechanical Engineering

Time: 3 hrs. Max. Marks: 100

Note: 1.Answer any FIVE full questions, choosing one full question from each module.
2. Use of steam tables is permitted.

MODULE – I

1	a	Classifydifferent sources of energy with suitable examples.	**(04 Marks)**
	b	Find the enthalpy of 1kg of steam at 12 bar when (i) steam is dry saturated (ii) steam is 22% wet (iii) superheated to 250°C. Take the specific heat of superheated steam as 2.25kJ/kgK.	**(06 Marks)**
	c	With the help of T-h diagram, explain the generation of steam at constant pressure.	**(10 Marks)**

OR

2	a	Write short note on (i) global warming (ii) Ozone depletion	**(10 Marks)**
	b	State and Explain Zeroth law, first law and second law of thermodynamics.	**(10 Marks)**

MODULE – II

3	a	With a neat sketch, explain the working of water tube boiler.	**(10 Marks)**
	b	Classify Hydraulic pumps and explain the working principle of centrifugalpump with a neat sketch.	**(10 Marks)**

OR

4	a	Classify hydraulic turbines and with a neat sketch explain the working of Francis turbine.	**(10 Marks)**
	b	Explain the functions of (i) Water level indicator (ii) Safety valve (iii) Super heater (iv) Pressure gauge (v) Feed check valve	**(10 Marks)**

MODULE – III

5	a	With the help of P-V diagram, explain the operation of 4-Stroke Petrol engine	**(10 Marks)**
	b	Following data are collected from a 4-stroke, single cylinder at full load. Bore = 200mm, stroke= 280mm, speed = 300 rpm, Indicated mean effective pressure = 5.6bar, Torque on the brake drum = 250 N-m, fuel consumed = 4.2kg/hour, and calorific value of fuel = 41000 KJ/kg.Determine (i) Brake power (ii) Mechanical Efficiency (iii) Indicated thermal efficiency (iv) Brake thermal efficiency	**(10 Marks)**

OR

6	a	Define the following refrigeration terms : i) Refrigerant ii) Ton of refrigeration iii) COP iv) Relative COP v) Refrigerating effect	**(05 Marks)**
	b	Define refrigeration. State the application of refrigeration	**(05 Marks)**
	c	With the help of a flow diagram, explain the functioning of Vapor Compression refrigeration cycle.	**(10 Marks)**

MODULE – IV

7	a	Classify and explain various types of Steel	**(10 Marks)**
	b	With a neat sketch explain the Arc welding method.	**(10 Marks)**

OR

8	a	Derive an expression for length of belt in open belt drive.	**(10 Marks)**
	b	A shaft running at 100 rpm, is to drive a parallel shaft at 150 rpm. The pulley on the driving shaft is 350 mm in diameter. Find the diameter of the driven pulley. Calculate the linear velocity of the belt and the velocity ratio.	**(10Marks)**

MODULE – V

9	a	Explain the following machining operations on Lathe machine with suitable sketches (i) Turning (ii) Facing (iii) Thread cutting (iv) Knurling	**(10 Marks)**
	b	With a neat sketch explain the working of vertical milling machine	**(10 Marks)**

OR

10	a	Explain the advantages and applications of robots in industries.	**(10Marks)**
	b	Discuss the elements of a CNC system with a neat block diagram.	**(10 Marks)**

USN | | | | | | | | | | |

18ME15/25

Model Question Paper

First Semester B.E. Degree (CBCS) Examination

Elements of Mechanical Engineering

Time: 3 hrs. Max. Marks: 100

Note: 1.Answer any FIVE full questions, choosing one full question from each module.
2. Use of Thermodynamic data hand book permitted.

MODULE – I

1	a	Enumerate the method of extracting energy from wind with a neat sketch	(08Marks)
	b	Illustrate the formation of steam with relevant sketches.	(08Marks)
	c	What are the different states of steam? Explain them in brief.	(04 Marks)
		OR	
2	a	Explain Zeroth law of thermodynamics. List the similarities and dissimilarities between work and heat.	(10 Marks)
	b	A stationary mass of gas is compressed without friction from an initial stage of 0.3 m^3 and 0.105 MPa to a final state of 0.15 m^3, the pressure remaining constant. There is a transfer of 37.6 kJ of heat from the gas during the process. How much does the internal energy of the gas change?	(10Marks)

MODULE – II

3	a	With a neat sketch, explain the working of Lancashire boiler.	(10 Marks)
	b	Explain the different boiler mountings and accessories.	(10 Marks)
		OR	
4	a	Classify Hydraulic turbines and with a neat sketch explain the working of a typical impulse turbine.	(10 Marks)
	b	Describe the working of a reciprocating pump.	(10 Marks)

MODULE – III

5	a	With the help of P-V diagram, explain the operation of 4-Stroke Diesel engine	(10 Marks)
	b	The following observations were recorded during a test on single cylinder diesel engine: Brake Power= 75 kW, Brake thermal efficiency= 35%, Mechanical efficiency= 90%, calorific value =40000 kJ/kg. Determinei) IP ii) FP iii) fuel consumed per hour.	(10 Marks)
		OR	
6	a	Explain the ideal properties of refrigerant.	(06 Marks)
	b	With the help of a sketch, explain the functioning of Vapor AbsorptionSystem.	(10 Marks)
	c	List the most commonly used refrigerants.	(04 Marks)

MODULE – IV

7	a	Classify and explain various types of smart materials	(10 Marks)
	b	With a neat sketch explain TIG welding.	(10 Marks)
		OR	
8	a	Derive an expression for length of belt in cross belt drive.	(10 Marks)
	b	What are the advantages and disadvantages of gear drives over belt drives?	(10Marks)

MODULE – V

9	a	What are the various methods of producing taper turning method? Explain taper turning by swiveling the compound method.	(10Marks)
	b	Explain the following machining operations on milling machine with suitable sketches (i) Plane milling (ii) End milling (iii) Slot milling (iv) Form milling	(10 Marks)
		OR	
10	a	Explain the components of a CNC with a block diagram	(10Marks)
	b	Elaborate the various robot configurations with simple sketches	(10 Marks)

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT
YELAHANKA – BANGALORE – 64
DEPARTMENT OF MECHANICAL ENGINEERING

Batch (Year)	2020 (2020-21)
Course Name	EME, I sem, M section (ODD), ME
Course Code	18ME25
Semester	I
Name of the Faculty	Dr. Keerthi Kumar N

	Test 1	Test 2	Test 3
co1	1 to 8	1 to 8	
co2			1,2,3,8
co3			4,5,6,7

CO AND PO MAPPING ON SCALE 3

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-
Average	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

S.No	USN	Name of the Student	Test 1		Test 2		Test 3												Assignment	CO1 Final			CO2 Final			CO3 Final			University Marks (Including after
			CO 1		CO 1		CO 2	CO 2	CO 2	CO 3	CO 3	CO 3	CO 3	CO 2	CO 2		CO 3													
			obt	max	obt	max	Q No1	Q No 2	Q No 3	Q No 4	Q No 5	Q No 6	Q No 7	Q No 8	obt	max	obt	max		obt	max	%	obt	max	%	obt	max	%	
1	1BY20ME001	ABHISHEK KUMAR	AB	50	AB	50	10		8		10		10	2	20	30	20	20	6	6	10	60	26	40	65	26	30	87	21
2	1BY20ME002	ABU BAKAR BIN ABDULLAH	AB	50	24	50		10	8		10		10	4	22	30	20	20	5	29	60	48	27	40	68	25	30	83	25
3	1BY20ME003	ADITYA C A	AB	50	28	50	9		9		8		10	8	26	30	18	20	5	33	60	55	31	40	78	23	30	77	29
4	1BY20ME004	ADITYA C V	30	50	42	50	8		10		10		10	4	22	30	20	20	10	82	110	75	32	40	80	30	30	100	21
5	1BY20ME005	ALOK S C	47	50	42	50	9		8		8		10		17	30	18	20	10	99	110	90	27	40	68	28	30	93	32
6	1BY20ME006	ANIRUDH GANAPATHY	37	50	20	50		4	6		10		7	7	17	30	17	20	10	67	110	61	27	40	68	27	30	90	12
7	1BY20ME007	ATHARVA DEEPAK DESAI	32	50	26	50	10			10	10		9	10	20	30	29	20	10	68	110	62	30	30	100	39	40	98	22
8	1BY20ME008	AVNEET SINGH	39	50	AB	50		8	8			7	9		16	30	16	20	10	49	60	82	26	40	65	26	30	87	1
9	1BY20ME009	BHOOMIKA BHAT	48	50	48	50	10		10		10		10	8	28	30	20	20	10	106	110	96	38	40	95	30	30	100	36
10	1BY20ME010	C RAGHU	AB	50	6	50	8		10		9		10	4	22	30	19	20	8	14	60	23	30	40	75	27	30	90	26
11	1BY20ME011	CHETAN GADA	30	50	23	50	10			10	10		10	8	18	30	30	20	8	61	110	55	26	30	87	38	40	95	27
12	1BY20ME012	DARSHAN JADAV E	48	50	22	50	8		10		9		9		18	30	18	20	10	80	110	73	28	40	70	28	30	93	27
13	1BY20ME013	DEBASIS KARMOJAR SANTO	37	50	AB	50	10			10	10		9	10	20	30	29	20	9	46	60	77	29	30	97	38	40	95	AB
14	1BY20ME014	DEEPAK V	42	50	29	50	8			9	8		2	9	17	30	19	20	5	76	110	69	22	40	55	24	30	80	25
15	1BY20ME015	DIPTANGSHU DASGUPTA	AB	50	22	50	10		10		10		10	8	28	30	20	20	4	26	60	43	32	40	80	24	30	80	21
16	1BY20ME016	G PRATHAM	25	50	27	50	10			9	10		10	8	18	30	29	20	5	57	110	52	23	30	77	34	40	85	21
17	1BY20ME017	GAURAV TRIPATHI	44	50	44	50		7	8		10		10	5	20	30	20	20	3	91	110	83	23	40	58	23	30	77	21
18	1BY20ME018	HARSHVARDHAN SHARMA	47	50	29	50	9			9	10		5	7	16	30	24	20	10	86	110	78	26	30	87	34	40	85	32
19	1BY20ME019	KARAMPAL SINGH	49	50	AB	50	9			9	10		9	8	17	30	28	20	10	59	60	98	27	30	90	38	40	95	0
20	1BY20ME020	LOBEMO MARK KIKON	AB	50	40	50	10			10	10		10	8	18	30	30	20	5	45	60	75	23	30	77	35	40	88	25
21	1BY20ME021	MANOJ S V	32	50	15	50	9		9		10		10	10	28	30	20	20	5	52	110	47	33	40	83	25	30	83	21
22	1BY20ME022	MAVULETI DHANANJAY RAJU	36	50	39	50	10			7	10		10	9	19	30	27	20	10	85	110	77	29	30	97	37	40	93	27
23	1BY20ME023	MD DANISH	40	50	40	50	10			10	10		9	9	19	30	29	20	10	90	110	82	29	30	97	39	40	98	31
24	1BY20ME024	MEKALA JAWAHAR BABU	21	50	10	50		10	6		10		10	10	26	30	20	20	10	41	110	37	36	40	90	30	30	100	23
25	1BY20ME025	MOHAMMAD SUHAIL RATHER	25	50	38	50	9		10		7		9	7	26	30	16	20	5	68	110	62	31	40	78	21	30	70	28
26	1BY20ME026	MOHAMMED ZEESHAN SHARIFF	34	50	30	50	10		10		10		10	9	29	30	20	20	10	74	110	67	39	40	98	30	30	100	28
27	1BY20ME027	MOHIT R M	37	50	29	50	8		9		10		9		17	30	19	20	5	71	110	65	22	40	55	24	30	80	34
28	1BY20ME028	MOHITH K M	30	50	5	50	10			9	9		9	10	20	30	27	20	5	40	110	36	25	30	83	32	40	80	16
29	1BY20ME029	N MADHUMITHA	31	50	26	50	6			5	10		9	10	16	30	24	20	10	67	110	61	26	30	87	34	40	85	29
30	1BY20ME030	NANDAN REDDY P S	19	50	3	50	9			8	10		10	7	16	30	28	20	10	32	110	29	26	30	87	38	40	95	2
31	1BY20ME031	NIKHIL D	44	50	50	50	8			8	10		6	8	16	30	24	20	10	104	110	95	26	30	87	34	40	85	46
32	1BY20ME032	NISHANTH R NAYAK	42	50	26	50	9			7	10		10	8	17	30	27	20	10	78	110	71	27	30	90	37	40	93	11
33	1BY20ME033	P DIKSHITH	AB	50	0	50		8	7		1			4	19	30	1	20	10	10	60	17	29	30	97	11	40	28	1
34	1BY20ME034	PAMIDI MOHAMMAD SUHAIL	36	50	10	50		7	7		1	1			14	30	2	20	5	51	110	46	19	30	63	7	40	18	21
35	1BY20ME035	PAVAN M	25	50	34	50	9		10		10		10	9	28	30	20	20	10	69	110	63	38	40	95	30	30	100	42
36	1BY20ME036	PIYUSH RANJAN	AB	50	AB	50	9			10	10		10	9	18	30	30	20	10	10	10	100	28	30	93	40	40	100	6
37	1BY20ME037	RAHUL KUMAR	36	50	36	50	10		10		10		9	10	30	30	19	20	10	82	110	75	40	40	100	29	30	97	48
38	1BY20ME038	RAHUL SINGH	31	50	22	50		8		5	10		10	4	12	30	25	20	10	63	110	57	22	30	73	35	40	88	14
39	1BY20ME039	RISHABH JHA	31	50	38	50	10		10			9	10	10	30	30	19	20	10	79	110	72	40	40	100	29	30	97	35
40	1BY20ME040	RISHI J	42	50	40	50	9		9		9		10	9	27	30	19	20	10	92	110	84	37	40	93	29	30	97	32
41	1BY20ME041	RITURAJ ROY CHOWDHRY	AB	50	2	50	10			6	10		10	8	18	30	26	20	10	12	60	20	28	30	93	36	40	90	2
42	1BY20ME042	SHARAN R RAMAN	AB	50	0	50	8		9		8		9	7	24	30	17	20	10	10	60	17	34	40	85	27	30	90	9
43	1BY20ME043	SHIVRAJ S V	34	50	28	50	8		9		10		9	8	25	30	19	20	10	72	110	65	35	40	88	29	30	97	36
44	1BY20ME044	SHREYAS KASHYAP	14	50	41	50	9			5	10		10	10	19	30	25	20	10	65	110	59	29	30	97	35	40	88	43
45	1BY20ME045	SOMISETTY SOURAV SAI	AB	50	9	50	9			5	10		10	8	17	30	25	20	5	14	60	23	22	40	55	30	30	100	14
46	1BY20ME046	SUKHDEB BHATTACHARYA	16	50	26	50	10			6	8		10	7	17	30	24	20	5	47	110	43	22	40	55	29	30	97	18
47	1BY20ME047	SYED FARHAN AHMED	27	50	17	50		10		6	10		8	9	19	30	24	20	10	54	110	49	29	30	97	34	40	85	15
48	1BY20ME048	V V SAI VEEKSHANA	42	50	41	50	10			9	10		9	10	20	30	28	20	10	93	110	85	30	30	100	38	40	95	40
49	1BY20ME049	VIJAY HEMANTH T	27	50	30	50		10		7	10		10	8	18	30	27	20	10	67	110	61	28	30	93	37	40	93	35
50	1BY20ME050	VIVEK KUMAR	37	50	25	50	10		9		4		8	1	20	30	12	20	10	72	110	65	30	40	75	22	30	73	35

TARGET is 60% marks

Attainment level 1: 40% students scoring more than 60% marks
Attainment level 2: 45% students scoring more than 60% marks
Attainment level 3: 50% students scoring more than 60% marks

PERCENTAGE OF STUDENTS SCORING > 60% of Marks (For Internal Assessment)					
	CO1	CO2	CO3		
Number of Students Scored above 60% of Marks	31	45	48		
Number of Students attempted the test	50	50	50		
% OF STUDENTS	62	90	96		
Attainment Level	3	3	3		

PERCENTAGE OF STUDENTS SCORING > 60% of Marks (For University Examination)	
Number of Students Scored above 60% of Marks	7
Number of Students attempted the Examination	49.00
% OF STUDENTS	14
Attainment Level	0

PO Attainment Intetnal assessment

PO ATTAINMENT													
CO's	**Attainment level**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	3	3	-	-	-	-	-	-	-	-	-	-
CO2	**3**	3	3	-	-	-	-	-	-	-	-	-	-
CO3	**3**	3	3	-	-	-	-	-	-	-	-	-	-
Average		**3**	**3**	-	-	-	-	-	-	-	-	-	-

PO Attainment UNIVERSITY EXAMINATION

PO ATTAINMENT													
CO's	**Attainment level**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	0	0	0	-	-	-	-	-	-	-	-	-	-
CO2	0	0	0	-	-	-	-	-	-	-	-	-	-
CO3	0	0	0	-	-	-	-	-	-	-	-	-	-
Average		0	0	-	-	-	-	-	-	-	-	-	-

PO Attainment Course Exit Survey

PO ATTAINMENT													
CO's	**Attainment level**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	3	3	-	-	-	-	-	-	-	-	-	-
CO2	**3**	3	3	-	-	-	-	-	-	-	-	-	-
CO3	**3**	3	3	-	-	-	-	-	-	-	-	-	-
Average		**3**	**3**	-	-	-	-	-	-	-	-	-	-

weightage given for internal examination+OBE is 40%
weightage given for university examination is 60%

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
PO Attainment for (Internal Assessment + Course Exit Survey)	3.00	3.00	-	-	-	-	-	-	-	-	-	-
PO Attainment for University examinations	0	0	-	-	-	-	-	-	-	-	-	-
Final Attainment	**1.2**	**1.2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**