GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

ODD TERM END EXAM NOV-DEC-2019

EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **MECHANICAL ENGINEERING**

COURSE CODE :- **MEF306/MEE310/ME206**

COURSE NAME **MACHINE TOOLS**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **25/ 11 / 2019**

Instruction :-

1) Answers must be written in the main answer book provided.(and supplements if required)
2) Illustrate your answers with sketches wherever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables shall be made available on request.
5) Assume and mention suitable additional data if necessary.
6) Use of Mobile is strictly prohibited.
7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	SQN	Question Text	R/U/A	Co MEF 306	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	State the types of coolant.	R	1	
	b)	State the disadvantages of built up edge.	U	1	
	c)	What do you know about 18-4-1 cutting tool material? Give its composition.	R	1	
	d)	What is the use of parting off operation?	U	2	
	e)	Enlist various types of lathes.	R	1	
	f)	Define "depth of cut for drill".	R	2	
Q.2		Attempt any **FOUR:**			**16**
	a)	What are chip breakers? Sketch different types of chip breakers.	U	1	
	b)	Explain single point cutting tool geornetry with neat sketch (three views)	A	1	
	c)	Explain the process of step turning with neat sketch.	U	2	
	d)	List basic parts of lathe. State function of each part.	U	2	
	e)	Draw a neat sketch of radial drilling machine.	U	1	
	f)	Explain the calculation of machining time of drilling operation.	A	2	
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain the principles of metal cutting.	A	1	
	b)	State and explain the use of following parts on Lathe machine. i) Chuck ii) Rest.	U	2	
	c)	What is mandrel? List different types of mandrel.	U	1	
	d)	Explain i) Tapping operation ii) Reaming operation on drilling.	A	2	
	e)	Differentiate between boring & counter boring operations on drilling machine.	A	2	
	f)	How will you classify drilling machines?	U	1	

P.T.O.

QN	SQN	Question Text	R/U/A	Co MEF 503	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Classify and list shapers.	R	2	
	b)	Differentiate between pull broaching and push broaching.	U	5	
	c)	Draw block diagram of a vertical broaching machine and label its all parts.	R	2	
	d)	Classify and list internal grinding machines.	R	2	
	e)	Define lapping and state its applications.	R	4	
	f)	Explain the importance of super finishing.	U	4	
Q.5		Attempt any **FOUR** :			**16**
	a)	Draw neat sketch of slotting machine and name all main parts.	R	2	
	b)	Differentiate between planner and shaper.	A	2	
	c)	State and explain various broaching methods in detail.	R	2	
	d)	State and explain various types of abrasives used in grinding.	R	1	
	e)	Explain the terms grit, grade and structure of grinding wheel.	U	2	
	f)	Explain burnishing process with neat sketch.	R	4	
Q.6		Attempt any **FOUR:**			**16**
	a)	List the various types of planning machines and explain any one in detail.	R	2	
	b)	List and explain various types of broaching operations with neat sketch.	R	3	
	c)	Explain how a grinding wheel is designated as per IS 551 – 1954.	U	2	
	d)	Draw neat sketches of various shapes of grinding wheel.	R	2	
	e)	Explain 'Honing' in detail and state its applications.	A	4	
	f)	Differentiate between polishing and buffing..	U	4	

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ODD TERM END EXAM NOV-DEC-2019

EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **MECHANICAL ENGINEERING**

COURSE CODE :- **MEF308/M208/ME208/MEE308**

COURSE NAME **THEORY OF MACHINES AND MECHANISMS**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **22/ 11 / 2019**

Instruction :-

1) Answers must be written in the main answer book provided.(and supplements if required)
2) Illustrate your answers with sketches wherever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables shall be made available on request.
5) Assume and mention suitable additional data if necessary.
6) Use of Mobile is strictly prohibited.
7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	SQN	Question Text	R/U/A	Co MEF 308	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define Kinematic link and Kinematic pair.	R	1	
	b)	Distinguish between machine and mechanism on any two points.	R	1	
	c)	Define linear acceleration and angular acceleration.	R	2	
	d)	Draw a neat sketch of Paucellier mechanism.	U	2	
	e)	Write down the difference between Ackerman and Davis steering gear mechanism.	R	2	
	f)	State the types of cam.	R	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Explain different types of constrained motion with example.	A	1	
	b)	Explain with neat sketch working principle of Oldham's coupling.	U	1	
	c)	Define linear velocity, angular velocity, absolute velocity and state the relation between linear velocity and angular velocity.	R	2	
	d)	A four bar chain mechanism ABCD with its dimensions is as shown in figure 1. It is driven by the crank AB which rotates at 500 rpm in clockwise direction. The link AD is fixed. Find the absolute velocity of point C and angular velocity of links CB and CD.	U	2	
	e)	Explain Pantograph with neat sketch.	U	2	
	f)	Write down the classification of follower in detail.	R	3	
Q.3		Attempt any **TWO:**			**16**
	a)	Draw the profile of a cam to raise a value with SHM through 40mm in $1/4^{th}$ of revolution, keep it fully raised through $1/10^{th}$ revolution and to lower it with uniform acceleration and retardation in $1/6^{th}$ revolution. The diameter of roller is 20mm and minimum radius of cam is 30mm. The axis of the valve rod passes through the axis of cam shaft and cam rotates in clockwise direction.	U	3	

P.T.O.

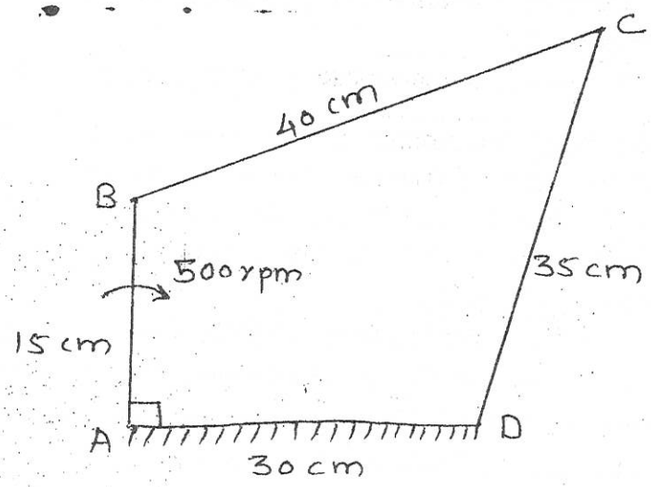
	b)	The crank of a reciprocating engine is 40mm long and it rotates at a uniform speed of 20 rad/s clockwise as shown in figure 2. The connecting rod is 160mm. Determine the velocity and acceleration of piston and angular velocity and angular acceleration of connecting rod with the crank is at 45^0 from inner dead centre. Use graphical method only.	A	2	
	c)	i) Explain beam engine mechanism with neat sketch. ii) Describe Klein's construction to determine velocity and acceleration in single slider crank chain mechanism.	U U	1 2	
Q.4		Attempt any **FOUR:**			**08**
	a)	Write any four advantages of 'V' belt over flat belt.	U	4	
	b)	Define i) Circular pitch ii) Module.	R	4	
	c)	Write advantages of cycloidal gear.	U	4	
	d)	Write any two functions of clutch.	R	5	
	e)	Define i) Height of governor ii) Mean equilibrium speed.	R	6	
	f)	Define governor and state its function.	R	6	
Q.5		Attempt any **FOUR** :			**16**
	a)	Derive an expression for length of an open belt drive.	U	4	
	b)	A pulley rotating at 50 M/s transmits 40 KW. The safe pull in belt is 400 N/cm width of belt. And angle of lap is 170^0. If the coefficient of friction is 0.24, find the required width of belt.	A	4	
	c)	Explain compound gear train with neat sketch also write formula for speed ratio of it.	U	4	
	d)	A compound gear train consist of four gears. The number of teeth on gears A,B,C, and D are 54,75,36 and 81 resp. Gear B and C constitute a compound gear. Determine the torque on the output shaft. It the input gear A transmits 9 kw at 200 rpm and train efficiency is 80% Gear D is mounted on output shaft.	A	4	
	e)	Derive an expression for torque transmitting capacity of single plat clutch by using uniform pressure theory.	U	5	
	f)	Explain working principle of proell governor with neat sketch.	R	6	

P.T.O.

Q. 6		Attempt any **FOUR:**			**16**
	a)	Explain working principle of porter governor with neat sketch.	U	6	
	b)	Explain any four types of flat belt drives with neat sketch.	R	4	
	c)	A pulley is driven by the flat belt running at a speed of 600 m/min and transmits 4kw. The coefficient of friction between belt and pulley is 0.3 and angle of contact is 160^0. Find the maximum and minimum tension in the belt.	A	4	
	d)	Give detail classification of gears based on arrangement of shafts.	U	4	
	e)	A multiplate clutch has three pairs of contact surfaces. The outer and inner radii of contact surfaces are 100mm and 50mm respectively. The maximum axial spring force is limited to 1KN. Coefficient of friction is 0.35. Assume uniform wear theory. Find power transmitted at 1500 rpm.	A	5	
	f)	A conical friction clutch is used to transmit 90KW at 1500rpm. The semicone angle is 20^0 and coefficient of friction is 0.2 If the mean diameter of bearing surface is 375mm and intensity of normal pressure is not to exceed 0.25 N/mm^2, find the dimensions of conical bearing surface.	U	5	

2)

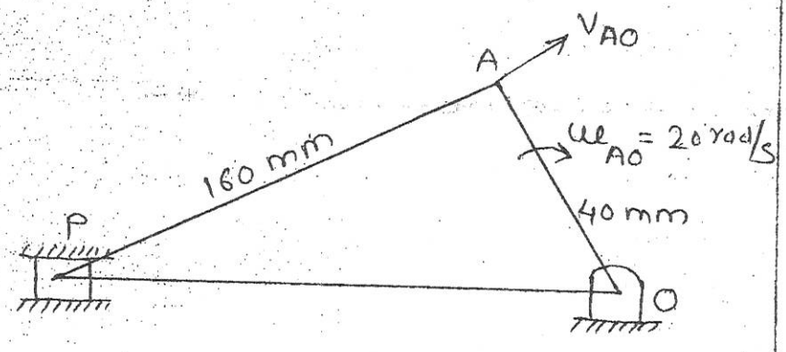
d)



Q. 2 d) Figure 1

3)

b)



Q. 3 b) Figure 2.

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ODD TERM END EXAM NOV/DEC -2019

EXAM SEAT NO. | | | | | | |

LEVEL: **V** PROGRAM: **Mechanincal Engineering**

COURSE CODE: **MEF505/MEE508/ME409** COURSE NAME: **Refrigeration and Air Conditioning**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **23/11/2019**

Instruction:-

1) Answer to two sections must be written in separate section answer book provided
2) Illustrate your answers with sketches where ever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables will be made available on request.
5) Assume and mention suitable additional data necessary.
6) Use of Mobile is strictly prohibited.
7) **QN**>Question No, **SQN**>Sub-Question No, **R**> Remembering, **U**>Understanding, **A**>Application **CO**>Course outcome

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QN	SQN	Question Text	RUA	CO MEF505	Marks
		Section –I			
Q.1		Attempt any **FOUR**			**(08)**
	a)	State the function of regenerator in pulse tube refrigerator.	R	1	
	b)	State any two thermodynamic advantages of closed system air-refrigeration.	A	2	
	c)	State the significance of Adiabatic process used in reversed carnot cycle.	U	2	
	d)	What do you meant by eco friendly refrigerant?	R	3	
	e)	List the types of refrigerator compressors.	U	4	
	f)	State the function of High pressure cutout.	R	4	
Q.2		Attempt any **FOUR**			**(16)**
	a)	Explain the need of refrigeration?	R	1	
	b)	Represent reversed carnot cycle on P-V and T-S diagram? State the various processes in the cycle and write the equation of COP for refrigeration machine working on this cycle.	A	2	
	c)	A Bell –Coleman cycle works between 1 bar and 6 bar. Compression follows $PV^{1.25}$ =C and expansion follows $PV^{1.3}$=C. find COP assuming compression and expansion begins at $7^{o}C$ and $37^{o}C$ respectively.	A	2	
	d)	Explain briefly how evaporator and condenser pressures of a refrigerant plays role in the component requirement of refrigeration system.	R	4	
	e)	Draw neat sketch of forced air circulation condenser and State its working.	U	4	
	f)	Briefly explain with neat sketch automatic expansion valve?	U	4	
Q.3		Attempt any **TWO**			**(16)**
	a)	Write a short note on ice refrigeration.	R	1	
	b)	Draw a neat diagram of Lithium bromide water absorption system and explain its working.	U	2	
	c)	Draw sectional sketch of Harmatically sealed compressor showing its internal construction and explain its construction and working.	U	4	

P.T.O.

Section-II					
Q.4		Attempt any **FOUR**			**(08)**
	a)	List different types of insulating materials.	R	2	
	b)	State Dalton's Law of partial pressure.	R	5	
	c)	Define latent heat gain in cooling load calculation.	R	6	
	d)	State the applications of comfort chart.	R	6	
	e)	List the industrial applications of A.C. System.	R	2	
	f)	State the functions of grills and diffusers.	R	2	
Q.5		Attempt any **FOUR**			**(16)**
	a)	Explain humidificatin by injection of steam. State advantages of it.	R	5	
	b)	Describe i)Air stratification and ii) Body temperature mechanism	U	6	
	c)	Represent following processes on Psychrometric chart. i)Cooling with dehumidification ii)Heating and humidification.	U	5	
	d)	Classify air conditioning system.	R	2	
	e)	Describe any four losses in duct.	R	2	
	f)	Describe the steps in applying insulations on refrigeration pipe line.	A	2	
Q.6		Attempt any **TWO**			**(16)**
	a)	Explain the types of heat loads to estimate total heat of operation theatre of hospital.	A	6	
	b)	Describe with neat layout year round air conditioning system. Also state its advantages	R	2	
	c)	With the help of Psychrometric chart. Find out properties of conditioned air having 24°C DBT & 50% relative humidity. i)Dew point tempt. ii) Wet Bulb tempt. iii)Sp. Volume of air iv) Enthalpy of air v) Sp. Humidity.			

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ODD TERM END EXAM NOV/DEC -2019

EXAM SEAT NO. | | | | | | |

LEVEL: **FIFTH** PROGRAM: **MECHANICAL ENGINEERING**

COURSE CODE: **MEF506/ME410/MEE509/2410** COURSE NAME: **AUTOMOBILE ENGINEERING**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **23/11/2019**

Instruction:-

1) Answer to two sections must be written in separate section answer book provided
2) Illustrate your answers with sketches where ever necessary.
3) Use of non-programmable pocket calculator is permissible.
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5) Assume and mention suitable additional data necessary.
6) Use of Mobile is strictly prohibited.
7) **QN**>Question No, **SQN**>Sub-Question No, **R**> Remembering, **U**>Understanding, **A**>Application **CO**>Course outcome

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QN	SQN	Question Text	RUA	CO MEF506	Marks
		Section -I			
Q.1		Attempt any **FOUR**			**(08)**
	a)	Define the term 'Automobile'. List various types of automobile.	R	1	
	b)	Define the term 'king pin inclination'.	R	1	
	c)	Write any two advantages & disadvantages of pneumatic Brakes.	U	1	
	d)	What is tractive effort?	U	2	
	e)	Write functions of differential in an automobile.	U	2	
	f)	List two functions of clutch.	R	2	
Q.2		Attempt any **FOUR**			**(16)**
	a)	Give importance of aerodynamic body shape of vehicle.	A	1	
	b)	Draw & explain any one type of clutch.	R	2	
	c)	Explain the working of differential with neat sketch.	U	2	
	d)	Define the following term with neat sketch. i) Caster ii) Camber iii) Toe-in iv) Toe -out	R	1	
	e)	Compare disc brake with drum brake.	R	2	
	f)	Draw neat sketch of over drive & explain its working.	U	1	
Q.3		Attempt any **FOUR**			**(16)**
	a)	Explain with neat sketch working of power steering.	U	1	
	b)	State the components of pneumatic braking system with its 'function.	R	1	
	c)	Differentiate between live axle & dead axle.	R	2	

P.T.O

	d)	Explain with sketch construction working of epicyclical gear box.	U	2	
	e)	Explain working of recirculating ball type steering system with sketch.	U	1	
	f)	Explain the concept of double declutching related to constant mesh gear box.	U	2	
		Section-II			
Q.4		Attempt any **FOUR**			**(08)**
	a)	Why suspension is necessary in automobiles.	R	4	
	b)	How automobiles tyres are specified.	U	4	
	c)	Define wheel Alignment.	R & U	4	
	d)	Define: Wheel Balancing.	R & U	4	
	e)	State function of Battery	R	5	
	f)	Define Battery capacity.	R	5	
Q.5		Attempt any **FOUR**			**(16)**
	a)	List types of suspension system & give its applications.	R & A	4	
	b)	With neat sketch explain the working of Mac-Pherson struct suspension system.	U		
	c)	Compare tubed tyres with tube less tyres.	A & A	4	
	d)	Draw neat sketch of Radial ply tyres.	U	4	
	e)	Explain the working of battery used in Automobiles.	U & R	5	
	f)	Define rating of battery recommended by SAE.	U & R	5	
Q.6		Attempt any **FOUR**			**(16)**
	a)	With neat sketch explain the working of telescopic shock absorber.	U	4	
	b)	Explain with neat sketch of Air suspension system.	U	4	
	c)	What is wheel balancing describe its procedure.	U & R	4	
	d)	Explain with neat sketch of battery ignition system.	U & R	5	
	e)	Describe with neat sketch the working of starting motor.	U	5	
	f)	Draw a typical wiring diagram of automobile.	R	5	

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ODD TERM END EXAM NOV-DEC-2019

EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **MECHANICAL ENGINEERING**

COURSE CODE :- **MEF307/ME207/MEE307**

COURSE NAME **APPLIED ELECTRONICS**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **23/ 11 / 2019**

Instruction :-

1) Answers must be written in the main answer book provided.(and supplements if required)
2) Illustrate your answers with sketches wherever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables shall be made available on request.
5) Assume and mention suitable additional data if necessary.
6) Use of Mobile is strictly prohibited.
7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	SQN	Question Text	R/U/A	Co MEF 307	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Draw symbol of BJT types.	R	1	
	b)	Draw circuit for output waveform. (refer fig (1 b))	A	2	
	c)	Define extrinsic semiconductor.	R	1	
	d)	Define ripple factor.	R	2	
	e)	State features of voltage regulator ICs. (any four)	R	3	
	f)	Draw block diagram of regulated power supply.	U	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Draw circuit and explain single stage common emitter amplifier.	U	2	
	b)	Explain VI characteristics of zener diode with neat sketch.	U	1	
	c)	Compare between C & L filter. (any four points)	U	2	
	d)	Draw the circuit and explain 'II' filter.	A	2	
	e)	With block diagram explain switched mode power supply.	U	3	
	f)	Draw circuit for zener as a voltage regulator and give applications of it.	A	1	
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain with block diagram off line UPS.	U	3	
	b)	Explain concept of line regulation with circuit diagram.	U	3	
	c)	Compare between Half, full and bridge rectifier (any four points)	U	2	
	d)	State need of filter and give any 2 applications of filter.	R	2	
	e)	Draw circuit for common base and common collector PNP transistor.	U	1	
	f)	Draw symbol for PN junction diode and give its any four applications.	U	1	

P.T.O.

QN	SQN	Question Text	R/U/A	CO ME F307	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Draw the symbol and truth table of AND gate and OR gate.	U	4	
	b)	Name the following Boolean laws i) $(X.Y)Z = X(Y.Z)$ ii) $X(Y+Z) = XY + XZ$	A	4	
	c)	Define synchronous counter.	R	6	
	d)	Draw block diagram of full adder using two half adders.	R	5	
	e)	Convert the following decimal into binary equivalent $(151.75)_{10} = (----)_2$	A	4	
	f)	State the types of triggering.	R	6	
Q.5		Attempt any **FOUR** :			**16**
	a)	Draw and explain Half adder.	U	5	
	b)	Solve the following expression using K-map. i) $f(A,B,C) = \sum m(0,1,2,3,6,7)$ ii) $f(A,B,C) = \sum m(0,1,3,4,5)$	A	5	
	c)	Draw symbol and write truth table for SR flip-flop.	R	6	
	d)	Convert $(GAC)_{16}$ and $(5C7)_{16}$ into binary equivalent.	A	4	
	e)	Draw diagram of 1:4 demux and explain its operation.	U	5	
	f)	For 3-bit synchronous up counter i) Draw circuit diagram. ii) Write truth table.	U	6	
Q.6		Attempt any **FOUR:**			**16**
	a)	For a given logic diagram. Write Boolean expression for output Y.	A	4	
	b)	Explain working of full adder using neat diagram.	U	5	
	c)	Draw symbol and truth table of i) NAND gate ii) NOR gate iii) EX-OR gate iv) EX-NOR- gate	R	4	
	d)	Draw the block diagram of multiplexer and explain.	A	5	
	e)	Compare following on the basis of two parameter i) D FF & T FF ii) SR FF & JK FF.	U	6	
	f)	Draw 4 bit down counter with truth table.	R	6	

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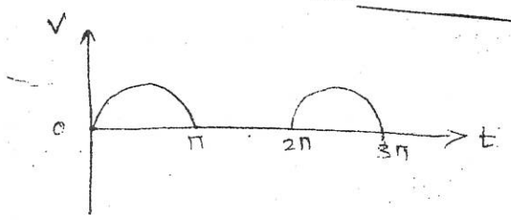
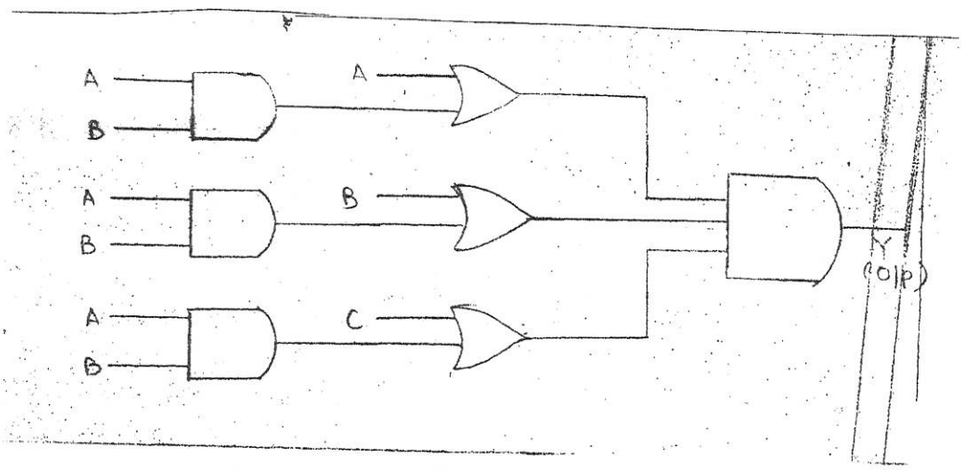
Fig. 1b



Q. No. 1 (b)



Q. No. 6 (a)

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ODD TERM END EXAM NOV-DEC-2019

EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **ALLIED**

COURSE CODE :- **MEF312/EIF311/MTE312/MTF408/EEE311/R227**

COURSE NAME **NON CONVENTIOLAL ENERGY SOURCES**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **20/ 11 / 2019**

Instruction :-

1) Answers must be written in the main answer book provided.(and supplements if required)
2) Illustrate your answers with sketches wherever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables shall be made available on request.
5) Assume and mention suitable additional data if necessary.
6) Use of Mobile is strictly prohibited.
7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	SQN	Question Text	R/U/A	Co CEF 308	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	What is energy? How it is important in our life.	R		
	b)	What do you mean by primary source of energy?	R		
	c)	Draw solar radiation geometry.	A		
	d)	List basic components of WECS.	R		
	e)	How wind is created?	R		
	f)	What is aerobic digestion?	R		
Q.2		Attempt any **FOUR:**			**16**
	a)	What is principle of solar photovoltaic conversion?	U		
	b)	What are principles to enhance efficiency of solar pond?	A		
	c)	What are limitations of solar furnace?	A		
	d)	How to ultize solar energy for agriculture?	A		
	e)	Explain environmental aspects of wind mills.	R		
	f)	Explain concept of horizontal axis wind mill.	R		
Q.3		Attempt any **TWO:**			**16**
	a)	What is active and passive solar heating? Explain in brief.	A		
	b)	What are different types of wind mills? Explain any two from two types.	A		
	c)	Explain with neat sketch KVIC digester.	U		

P.T.O.

Q.4		Attempt any **FOUR:**			**08**
	a)	What is the principle of geothermal energy?	R	5	
	b)	State the limitations of tidal power.	R	4	
	c)	What are the site requirements for OTEC systems?	R	4	
	d)	What are the advantages of fuel cell?	U	5	
	e)	Name the types of energy audit.	R	5	
	f)	What is the meaning of life-cycle cost?	U	5	
Q.5		Attempt any **FOUR** :			**16**
	a)	Describe the closed cycle OTEC system with the help of neat diagram.	U	4	
	b)	Compare between geothermal power plant and conventional steam power plant.	U	5	
	c)	Discuss the advantages and disadvantages of geothermal energy.	U	5	
	d)	Write various components of SHP and state their functions.	R	5	
	e)	What is co-generation? Explain its usefulness in industry?	U	5	
	f)	Describe the short energy conservation technology.	U	5	
Q.6		Attempt any **FOUR:**			**16**
	a)	With neat sketch, describe single basin system of tidal power plant.	U	4	
	b)	How the fuel cells are classified?	R	5	
	c)	Explain the working principle of MHD power generation.	U	5	
	d)	Describe the meaning of ROI.	U	5	
	e)	State two waste heat recovery devices and their working.	U	5	
	f)	Explain preliminary audit methodology.	U	5	

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

ODD TERM END EXAM NOV/DEC -2019

EXAM SEAT NO. | | | | | | |

LEVEL: **THIRD** PROGRAM: **MECHANICAL**

COURSE CODE:**MEF 310/ME 210/MEE 310**

COURSE NAME: **ENGG. METALLURGY AND MATERIALS**

MAX. MARKS: **80** TIME: **3 HRS.** DATE:**21/11/2019**

Instruction:-

1) Answers must be written in the main answer book provided. (and supplements if required)
2) Illustrate your answers with sketches where ever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables will be made available on request.
5) Assume and mention suitable additional data necessary.
6) Use of Mobile is strictly prohibited.
7) **QN**>Question No, **SQN**>Sub-Question No, **R**> Remembering, **U**>Understanding, **A**>Application **CO**>Course outcome

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QN	SQN	Question Text	RUA	CO MEF 310	Marks
Q.1		Attempt any **FOUR**			**(08)**
	a)	Metals with FCC structure are more ductile than that of BCC structure justify.	A	1	
	b)	State any two Hume Rothery's rules of solid solution formation.	R	1	
	c)	Define space lattice and unit cell.	R	1	
	d)	State peritectic and peritectoid reaction.	R	2	
	e)	List different types of cast iron.	R	1	
	f)	State meaning of 40C8 and XT75W18Cr4V1	R	1	
Q.2		Attempt any **FOUR**			**(16)**
	a)	List seven crystal structures of metals and state relationship between their lattice parameter.	R / U	1	
	b)	Compare BCC and FCC lattice structure. State their two examples of metals.	U	1	
	c)	Illustrate the terms, solid solution. State and explain its types in short.	U	1	
	d)	State and explain use of Lever arm principle.	U / A	2	
	e)	Draw phase diagram for eutectic system and explain various terms and phases in it.	U	2	
	f)	Construct binary equilibrium diagram for Isomorphous system and state its steps.	A	2	
Q.3		Attempt any **FOUR**			**(16)**
	a)	Illustrate allotropic transformation of pure iron with cooling curves of pure iron.	U	1	
	b)	Draw iron – iron carbide equilibrium diagram with various phases and temperatures. State eutectic and eutectoid reaction, involved in it.	U	1	
	c)	Explain various effect of adding alloying elements in steel, on Iron-carbon equilibrium diagram	U	1	
	d)	Draw and explain changes in microstructure during slow cooling of hypo eutectoid steel.	U	1	
	e)	State two properties and applications of malleable cast-iron and nodular cast iron.	U / A	1	
	f)	State four properties and applications of heat resisting steel.	U / A	1	
Q.4		Attempt any **FOUR**			**(08)**
	a)	Enlist four purpose of heat treatment.	R	3	
	b)	State the importance of TTT curve.	A	3	
	c)	Explain the Smart materials.	U	4	
	d)	Explain gun metal giving composition and applications.	A	4	
	e)	Define NDT and list various methods.	R	5	
	f)	Explain the steps in dry penetrant testing.	A	5	

P.T.O.

Q.5		Attempt any **TWO**			**(16)**
	a)	Draw TTT curve for eutectoid steel and explain various cooling rates in it.	U	3	
	b)	Explain carburising and nitriding process with their applications.	A	3	
	c)	Differentiate between i) annealing and normalizing ii) Hardening and tempering.	U	3	
Q.6		Attempt any **TWO**			**(16)**
	a)	Explain properties, applications and various alloys of i) Aluminium, ii) Copper, iii) Magnesium, iv) Tin	A	4	
	b)	Explain characteristics and uses of i) Acrylics ii) Epoxy Resin iii) Poly ethylene iv) Polystyrene.	A	4	
	c)	i) Explain MPT with sketch. ii) Explain methods to check internal cracks of object.		5	

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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ODD TERM END EXAM NOV/DEC -2019

EXAM SEAT NO. | | | | | | |

LEVEL: **FIFTH** PROGRAM: **MECHANICLA ENGINEERING**

COURSE CODE: **MEE502/2403** COURSE NAME: **INDUSTRIAL ORGANISATION AND MANAGEMENT**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **21/11/2019**

Instruction:-

1) Answer to two sections must be written in separate section answer book provided.
2) Figure to the right indicates marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

Section – I **Marks**

Q.1 Attempt any **FOUR** **(08)**

a) List any four purposes of communication.

b) Define the term "management" with regard to industry?

c) List the various sources of finance for joint stock company.

d) What do you mean by "planning"?

e) Define human resource management.

f) State four objectives of training.

Q.2 Attempt any **FOUR** **(16)**

a) Explain briefly the importance of management.

b) Describe the importance of planning.

c) What are the steps in the process of organising?

d) Explain the need for co-ordination.

e) Briefly explain the roles and qualities of personal manager.

f) What are the different methods of training for artisans? Explain briefly.

Q.3 Attempt any **TWO** **(16)**

a) Write a short note on "Levels of management"?

b) i) What is a Joint stock company? State its advantages and disadvantages?

ii) Differentiate between co-operative society and joint stock company.

c) What is the importance of industrial safety? Explain various losses which may occur due to an accident in a factory? Enumerate common causes of industrial accidents?

P.T.O

Section – II

Marks

Q.4 Attempt any **FOUR** **(08)**

a) List sources of fixed capital.

b) Define balance sheet.

c) Define inventory & list types of inventory.

d) State the causes of accidents in industries

e) State the health provision in 'Factory Act'

f) State various time estimate in PERT.

Q.5 Attempt any **FOUR** **(16)**

a) Explain the concept of supply chain management.

b) State the objectives of purchasing? Explain the steps in purchasing.

c) State the duties of materials manager.

d) Describe different methods of purchasing.

e) Compare fixed and working capital.

f) List and explain factors affecting working capital.

Q.6 Attempt any **FOUR** **(16)**

a) Explain the provision in workmen's compensation Act.

b) Explain the causes of accident in industry.

c) Explain MRP.

d) Differentiate between CPM & PERT.

e) Explain various time estimate in PERT

f) Different project activities and their time duration is given below. Find out project duration, EST, LST, Float. Draw network diagram and show critical path.

Preceding Activity	Activity	Time(days)
-	A	6
A	B	5
A	C	6
A	D	4
B	E	5
C	F	3
D	G	5
E	H	4
F	I	2

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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ODD TERM END EXAM NOV-DEC-2019

EXAM SEAT NO. | | | | | | |

LEVEL : - **FOURTH** PROGRAM : **MECHANICAL ENGINEERING**

COURSE CODE :- **MEF407/MEE407/ME307**

COURSE NAME **METROLOGY**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **20/ 11 / 2019**

Instruction :-

1) Answers of two sections must be written in separate section answer book provided.
2) Illustrate your answers with sketches wherever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables shall be made available on request.
5) Assume and mention suitable additional data if necessary.
6) Use of Mobile is strictly prohibited.
7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	SQN	Section- I	R/ U/ A	Co MEF 407	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define metrology. State its categories.	R	1	
	b)	Define i) Accuracy ii) calibration.	R	1	
	c)	Give classification of comparators.	R	4	
	d)	State Taylor's principle for gauge design.	R	5	
	e)	State any two advantages of CMM.	R	5	
	f)	Draw a symbol indicating a curved surface that is to be measured along the curve.	R	5	
Q.2		Attempt any **FOUR:**			**16**
	a)	Explain any four factors affecting the accuracy of measurement.	U	1	
	b)	What is legal metrology? State any two functions of legal metrology.	R	1	
	c)	State the advantages of wave length standards over material standards.	U	3	
	d)	State the essential characteristics of the good comparator. (any eight)	U	4	
	e)	Explain the following terms related to metrology any give one example i) Selective assembly ii) Interchangeability.	U	1	
	f)	Enlist types of CMM. Explain working of any one.	U	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	List any two errors that could creep in while taking measurement with Vernier caliper. Also suggest how those errors can be avoided.	A	3 5	
	b)	By using standard set of slip gauges. Buid following dimensions i) 45.875 ii) 98.08. The set contain	A	6	

Range (mm)	Step	Pieces
1.005	----	01
1.001 to 1.009	0.001	09
1.01 to 1.49	0.01	49
0.5 to 9.5	0.5	19
10 to 90	10	09

P.T.O.

	c)	Interpret the meaning of 40 H_7 i_7 with respect to fit and basis system.	A	5	
	d)	Explain multi gauging concept with example.	U	3	
	e)	Explain factors contributing for selection of CMM.	A	4	
	f)	Why hole basis system is most commonly used?	A	4	
QN	SQN	**Section- II**	R/U/A	Co MEF 407	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Why it is necessary to calibrate measuring instrument?	U	3	
	b)	List the equipments required for the alignment test.	R	1	
	c)	Define the terms related to surface texture i) Roughness ii) Waviness.	R	1	
	d)	Write any two causes of periodic pitch error.	U	3	
	e)	List different elements of gear tooth which are measured for accuracy of gears.	R	1	
	f)	List various types of errors in screw thread.	R	1	
Q.5		Attempt any **FOUR** :			**16**
	a)	Define the term 'Lay' related to surface texture. Write meaning of any four symbols used to indicate direction of Lay.	U	3	
	b)	Define the term 'calibration'. Explain the procedure for calibration of micrometer.	U	3	
	c)	Define the term 'Roundness'. List various methods used for measurement of roundness.	R	1	
	d)	Explain with neat sketch Rolling test for inspection of gears.	U	3	
	e)	Suggest the measuring instruments to measure the following features of external and internal threads. i) Minor Diameter ii) Effective Diameter iii) Pitch iv) Thread Angle.	A	4	
	f)	Define progressive error in thread. Write any two causes of progressive error.			
Q.6		Attempt any **FOUR:**			**16**
	a)	Define straightness. List commonly used methods for measuring straightness.	R	1	
	b)	Explain the procedure for calibration of Vernier caliper.	U	3	
	c)	In the measurement of surface roughness heights of 18 successive peaks and valleys measured from a datum are as follows: 49,27,39,24,44,26,45,27,41,25,42,28,43,26,46,29,47,28 the measurements were made over a length of 18mm- Compute the C.L.A and R.M.S. Values of the rough surface.	A	4	
	d)	Explain the following techniques of qualitative analysis for surface finish i) Centerline average method ii) Root Mean square value method.	U	2	
	e)	Explain 'Run out' test for inspecting gears.	U	3	
	f)	Explain with sketch drunken error in screw thread.			

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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ODD TERM END EXAM NOV/DEC -2019

EXAM SEAT NO. | | | | | | |

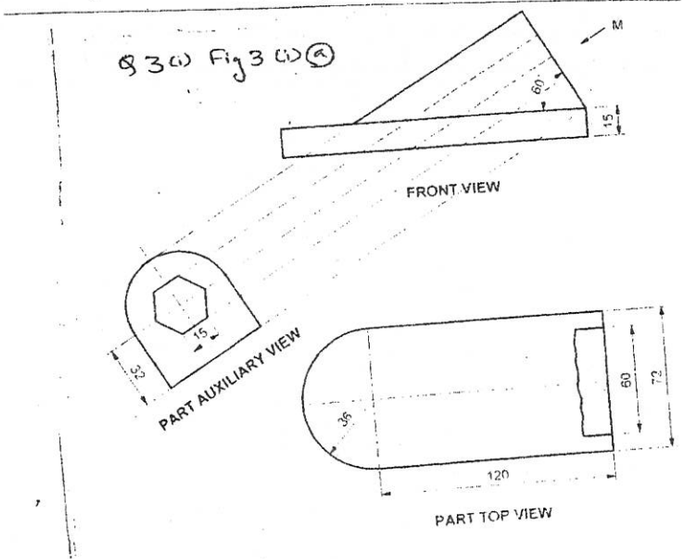
LEVEL: **III** PROGRAM: **MECHANICAL ENGINEERING**

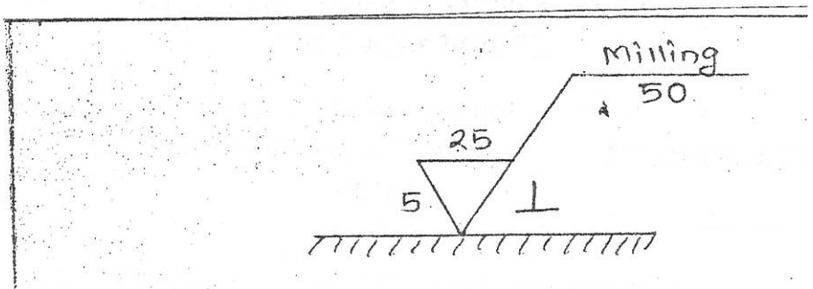
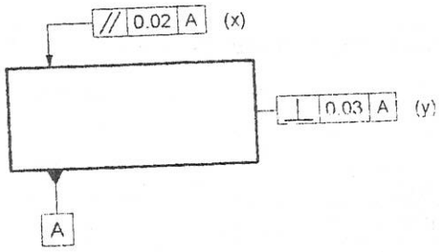
COURSE CODE:**MEF303/MEE303** COURSE NAME: **MACHINE DRAWING**

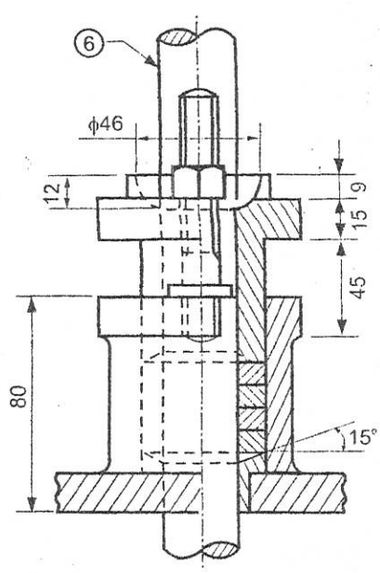
MAX. MARKS: **80** TIME: **4 HRS.** DATE:**28 /11/2019**

Instruction:-

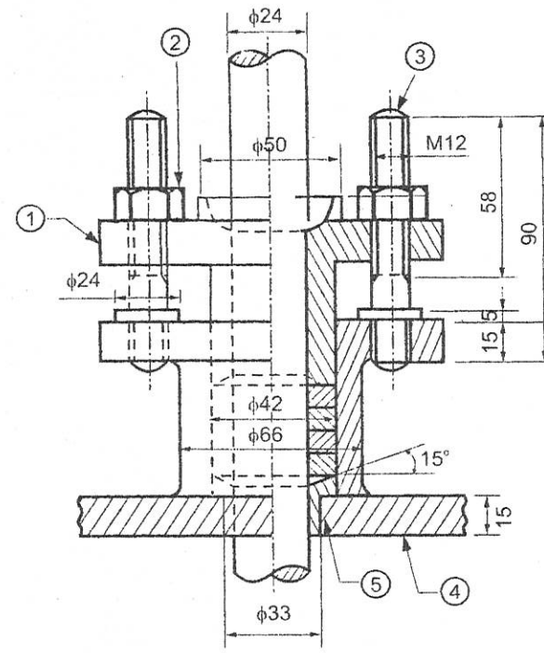
1) Answers must be written in the main answer book provided. (and supplements if required)
2) Illustrate your answers with sketches where ever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables will be made available on request.
5) Assume and mention suitable additional data necessary.
6) Use of Mobile is strictly prohibited.
7) **QN**>Question No, **SQN**>Sub-Question No, **R**> Remembering, **U**>Understanding, **A**>Application **CO**>Course outcome

QN	SQN	Question Text	RUA	CO ME F303	Marks
Q.1		Draw the conventional representation for the following.(Attempt any **FOUR)**			**(08)**
	a)	White metals	R	2	
	b)	Bearings	R	2	
	c)	Diamond knurling	R	2	
	d)	Internal screw thread	R	2	
	e)	Spur gear	R	2	
	f)	Countersunk	R	2	
Q.2		Attempt any **TWO**			**(16)**
	a)	A vertical square prism base 60mm side and axis height 105mm has a rear rectangular face inclined at 30° to V.P. It is completely penetrated by a horizontal square prism of 45mm edge of abase and 105 mm long faces of which are equally inclined to H.P. Axis of two prisms are parallel to V.P. and bisect each other at right angles. Draw the projections of solids showing lines of intersection.	U / A	3	
	b)	A vertical cylinder of diameter 70mm and height 100mm is completely penetrated by a horizontal square prism of side 50mm and length 110mm. The axis of prism bisect the axis of cylinder. All the rectangular faces of prism are equally inclined to H.P. Draw F.V., T.V. and S.V. showing the curves of intersection.	U / A	3	
	c)	i)Explain types of fits. ii)The shaft has a size of $35^{-0.02}_{-0.04}$ and hole has a size of $35^{+0.02}_{+0.00}$. Find the allowances to determine the type of fit between them.	U A	4 4	
Q.3		Attempt any **TWO**			**(16)**
	a)	Fig.3(i)(a) shows partial auxiliary view, incomplete top view and front view. Complete the top view with the help of given views. 	U	1	

	b)	A)Draw symbol of the following--- i) Flatness ii) Symmetry iii) Cylindricity iv) Concentricity B)State the meaning of the symbol showing in fig.3(ii)(b)  Q.3] ii) Fig. 3 (ii) (b)	R U	4 4	
	c)	i) Represent the welding drawing of two shafts with equal diameter welded end to end by means of square butt weld with convey counter at site. ii) Refer fig. 3(iii)(b) what is the meaning of symbol at 'X' & 'Y'.  Q.3] iii) Fig. 3 (iii) (b)	A U	4 4	
Q.4		Attempt any **ONE**			**(08)**
	a)	Fig. 4.1 shows assembly of Gland and stuffing box. Draw following details. i)Body – sectional F.V. ii)Stud	A	5	**06** **02**
	b)	Fig. 4.2 shows assembly of Non-return valve. Draw the following details. i)Body – Sectional F.V. ii)Valve seat – Sectional F.V.			**06** **02**
Q.5		Fig. 5.1 shows assembly of Pedestal bearing. Draw the following details. i)Body – Sectional F.V. and T.V. ii)Cap	A	5	**08** **04**
Q.6		Attempt any **ONE**	A	5	**(20)**
	a)	Fig.6.1 shows the details of Screw Jack. Draw the following views of assembly. i)Sectional Front View ii)Top View iii)Prepare bill of material.			
	b)	Fig. 6.2 shows the details of Lathe Tool Post. Draw sectional F.V. and T.V. of the assembly. Prepare bill of material and Indicate type of fit.			



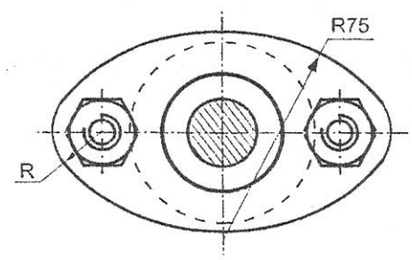
Right Hand Side View



Front View

PART LIST

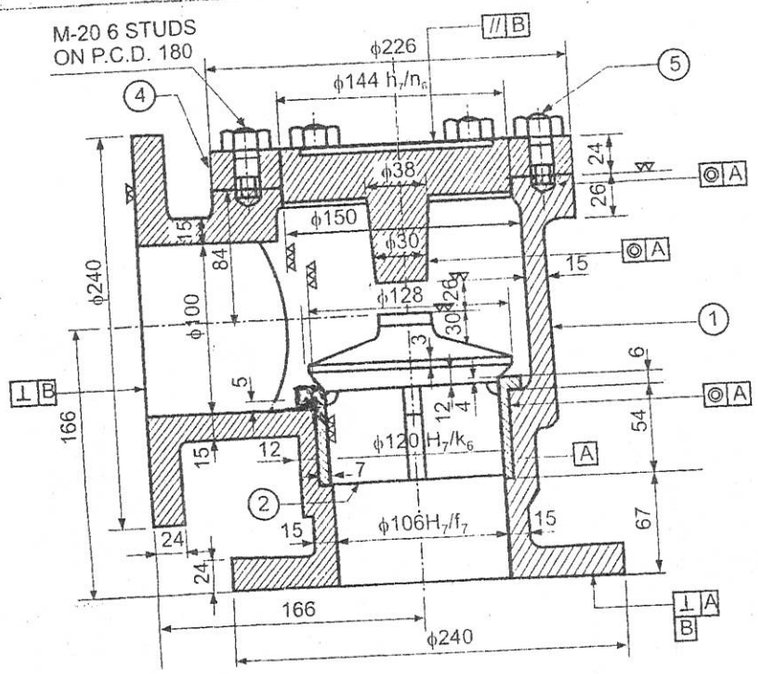
Part No.	Part Name	Material	Quantity
1.	Body	C.I.	1
2.	Nut, M12	M.S.	2
3.	Bush	Brass	1
4.	Stud	M.S.	2
5.	Gland	Brass	1
6.	Shaft	M.S.	1

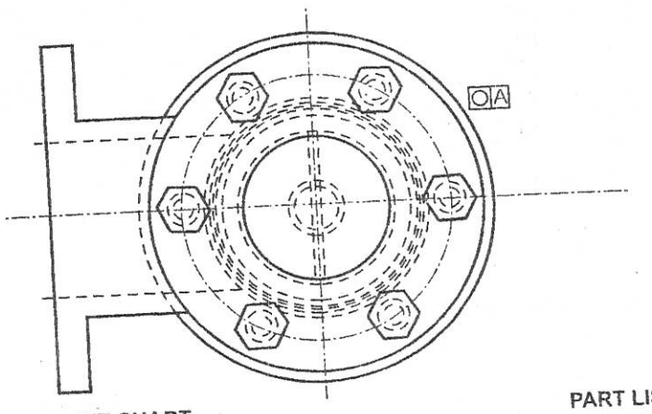


Top View

Q. 4.a Fig. 4.1

Q.N. | S.Q.N. | Code | Marks out of





FIT CHART

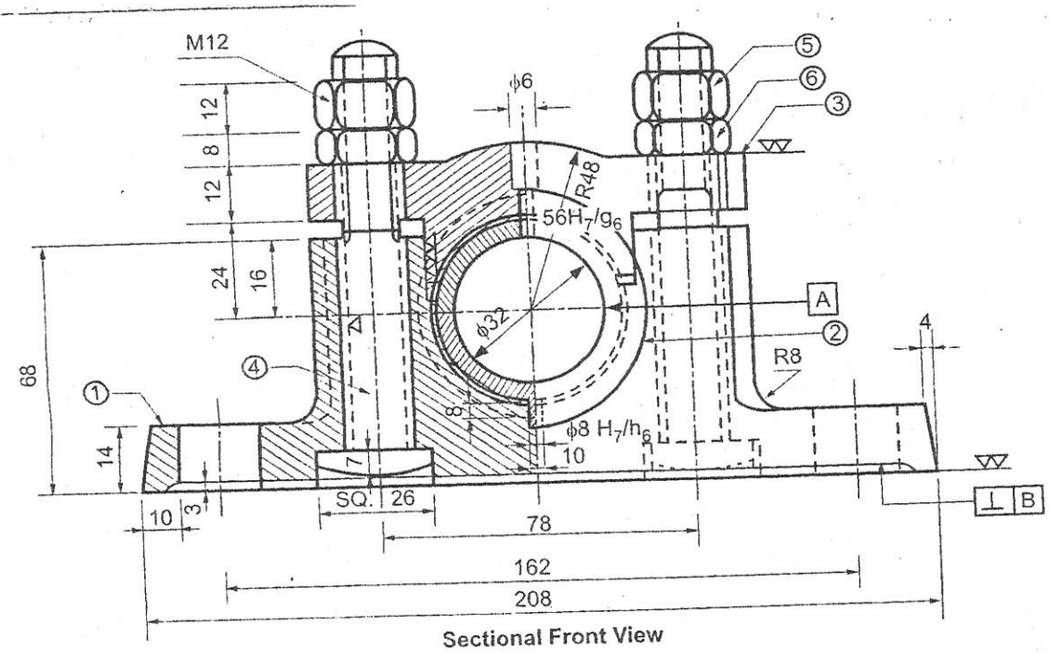
$106H_7/f_7$ = CLEARENCE FIT
$100H_7/h_6$ = CLEARENCE FIT
$120H_7/k_6$ = TRANSITION FIT

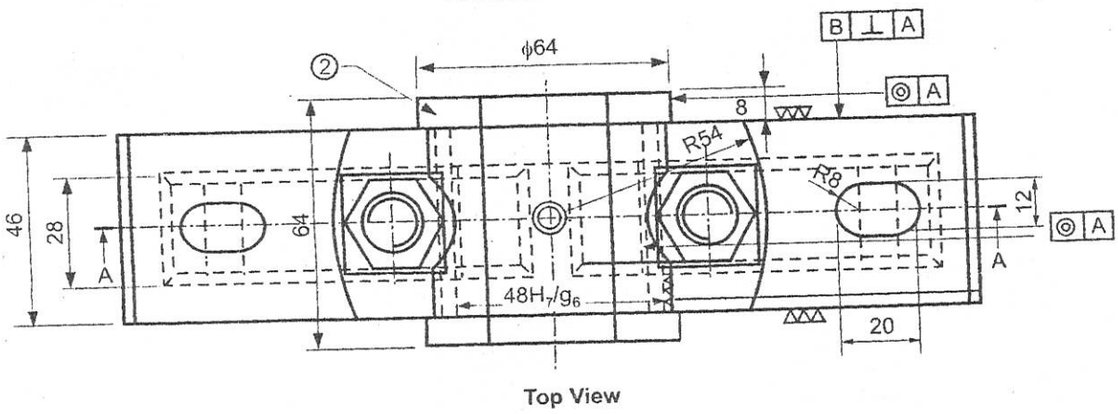
PART LIST

PART NO.	PART NAME	MATERIAL	QUANTITY
1.	BODY	C.I.	1
2.	VALVE SEAT	G.M.	1
3.	VALVE	G.M.	1
4.	COVER	C.I.	1
5.	STUD	M.S.	4

Q.4.b. Fig. 4.2

Marks out of





FIT CHART

$8H_7/h_6$ = Clearence FIT
$48H_7/g_6$ = Clearence FIT
$46H_7/h_6$ = Clearence FIT
$56H_7/g_6$ = Clearence FIT

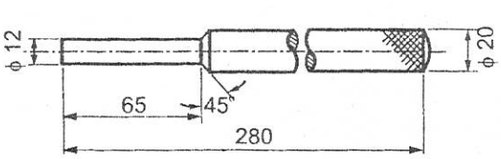
PART LIST

Part No.	Part Name	Material	Quantity
1.	BODY	C.I.	1
2.	BRASS	G.M.	1
3.	CAP	C.I.	1
4.	BOLT	M.S.	2
5.	NUT	M.S.	2
6.	LOCK NUT	M.S.	2

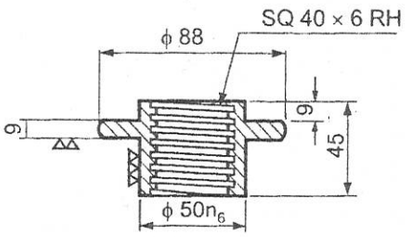
Q.5. Fig. 5.1

P.No. 5

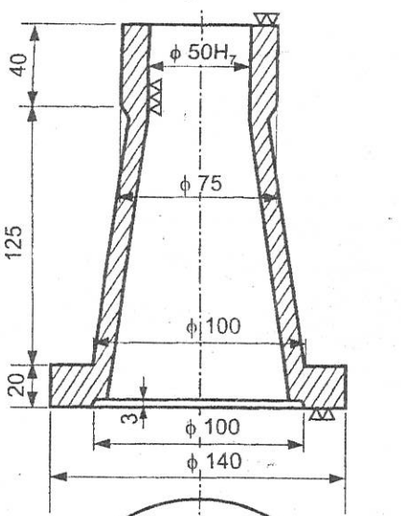
Marks out of

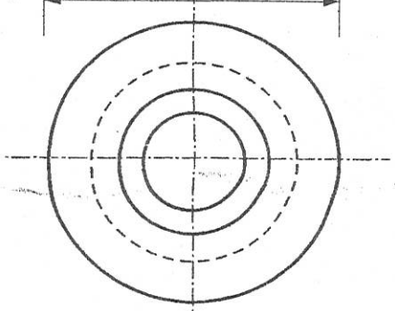


7. TOMMY BAR
M.S., 1-OFF

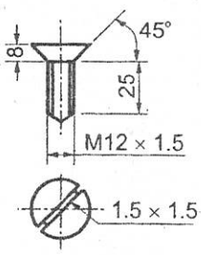


2. BUSH
M.S., 1-OFF



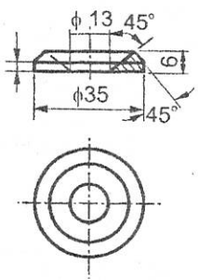


1. BODY
C.I., 1-OFF

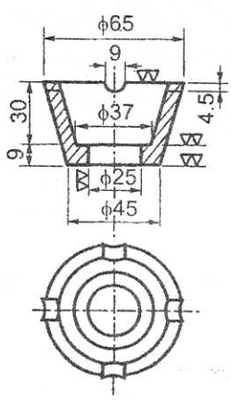


6. SET SCREW
M.S., 1-OFF

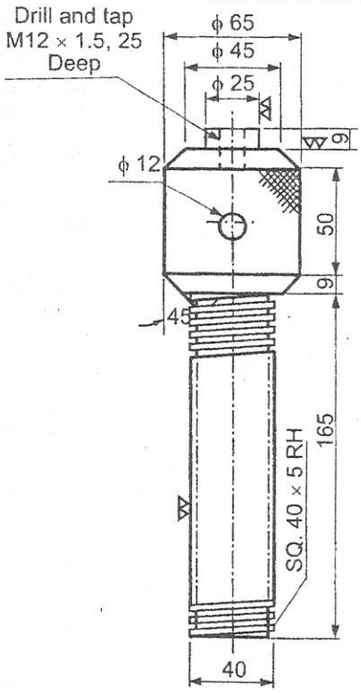
2.5



5. WASHER
M.S., 1-OFF



4. CUP
C.I., 1-OFF



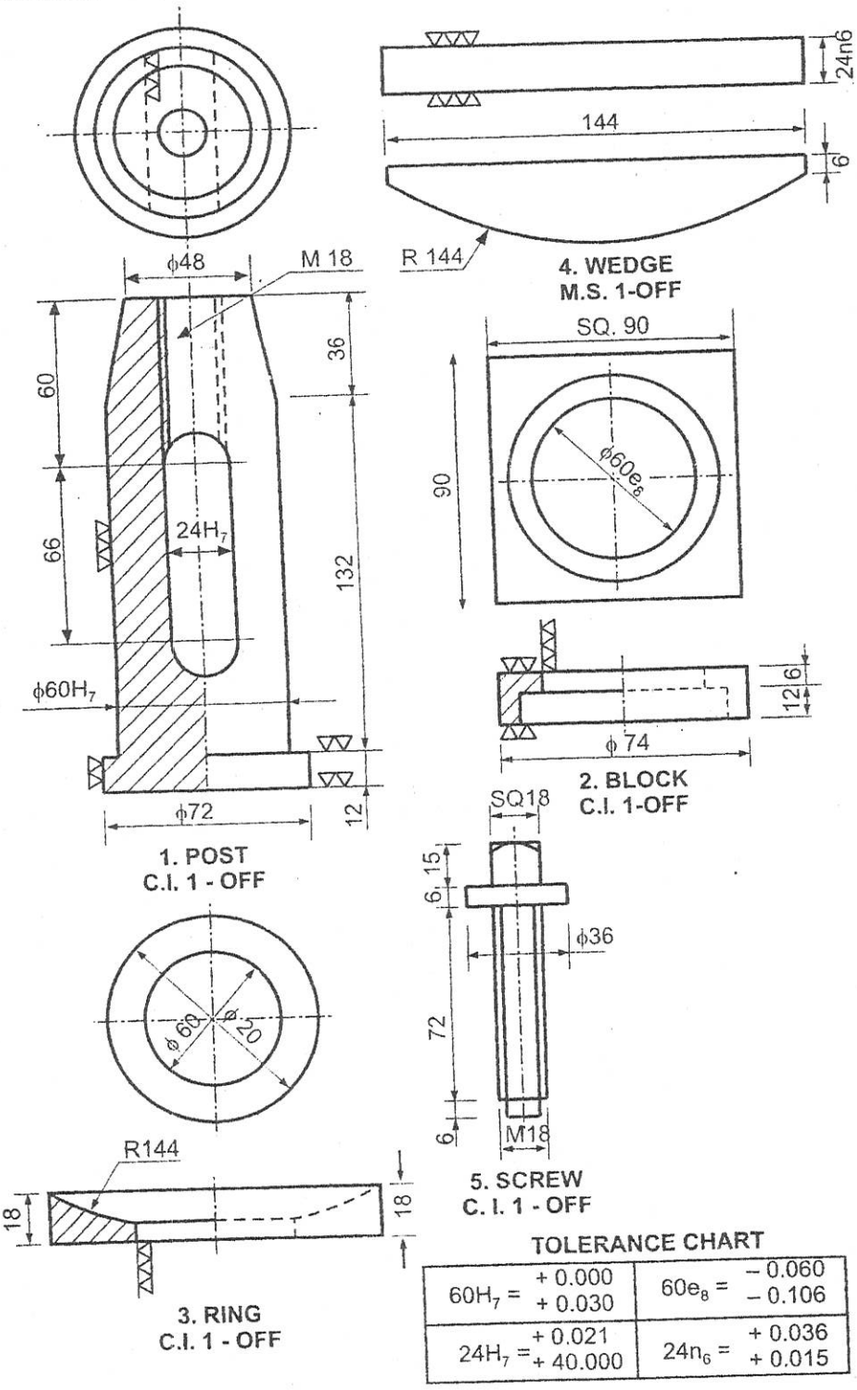
3. SCREW
M.S., 1-OFF

TOLERANCE CHART

$50H_7$ = +0.030 +0.000	$50n_6$ = +0.039 +0.020

Q. 6. a. Fig. 6.1

Q N	S Q N		CO Code	Marks out of



TOLERANCE CHART

$60H_7 = \begin{matrix} +0.000 \\ +0.030 \end{matrix}$		$60e_8 = \begin{matrix} -0.060 \\ -0.106 \end{matrix}$	
$24H_7 = \begin{matrix} +0.021 \\ +40.000 \end{matrix}$		$24n_6 = \begin{matrix} +0.036 \\ +0.015 \end{matrix}$	

Q.6.b. Fig. 6.2

— x —

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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ODD TERM END EXAM NOV-DEC-2019

EXAM SEAT NO. | | | | | | |

LEVEL : - **FOURTH** PROGRAM : **MECHANICAL ENGINEERING**
COURSE CODE :- **MEF402/M302/ME302/MEE402**
COURSE NAME **MACHINE DESIGN**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **29/ 11 / 2019**

Instruction :-

1) Answers of two sections must be written in separate section answer book provided.
2) Illustrate your answers with sketches wherever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables shall be made available on request.
5) Assume and mention suitable additional data if necessary.
6) Use of Mobile is strictly prohibited.
7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	SQN	**Section- I**	R/ U/ A	Co **MEF 402**	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	What is ergonomics in design?	R	1	
	b)	State the advantage of preferred numbers.	R	1	
	c)	Draw stress-strain diagram for mild steel and show various points.	U	1	
	d)	Give the relationship between shear stress and shear strain.	U	2	
	e)	Write any two advantages of square threads over trapezoidal threads.	R	2	
	f)	State the condition of 'self locking' screw.	U	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Explain the importance of aesthetic considerations in machine design.	U	1	
	b)	Describe any four factors that govern selection of material while designing a machine component.	U	1	
	c)	Define the following terms i) Tensile stress ii) Compressive stress . iii) Direct shear stress iv) Torsional shear stress.	R	2	
	d)	A beam of uniform rectangular cross-section is fixed at one end and carries an electric motor weighing 400N at a distance of 300 mm from the fixed end. The maximum bending stress in the beam is 40 MPa. Find the width and depth of the beam, if depth is twice that of width.	A	2	
	e)	A double threaded power screw, with ISO metric square threads , is used to raise a load of 300KN. The nominal diameter is 100mm and the pitch is 12mm. The coefficient of friction at screw threads is 0.15 Neglecting collar friction, calculate :- i) Torque required to raise the load. ii) Torque required to lower the load.	A	3	
	f)	State any four advantages of threaded joint.	U	3	

P.T.O.

Q.3		Attempt any **TWO:**			**16**
	a)	A cotter foundation bolt is subjected to a maximum pull of 45KN. The bolt and cotter are made of steel FeE300 (Syt = 300N/mm^2) and the factor of safety is 5. The yield strength in compression can be assumed to be twice of the tensile yield strength. The thickness of the cotter is one fourth of the diameter of enlarged end of the bolt. Calculate i) The diameter of the bolt. ii) The diameter of the enlarged end of the bolt. iii) The thickness and the width of the cotter, and iv) The compressive stress between the cotter and the bolt. Is it safe.	U	1	
	b)	A triple threaded power screw, used in a screw-jack, has a nominal diameter of 50mm and a pitch of 8mm. The threads are square and the length of nut is 48mm. The screw-jack is used to lift a load of 7.5KN. The coefficient of friction at the threads is 0.12 and the collar friction is negligible. Calculate i) The principal shear stress in the screw body. ii) The transverse shear stresses in the screw and the nut and iii) The unit bearing pressure. State whether the screw is self-locking.	A	3	
	c)	Explain the term 'bold of uniform strength'. Describe two methods to obtain bolt of uniform strength. Compare them.	A	3	
QN	SQN	**Section- II**	R/U/A	Co MEF 402	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Define i) endurance limit ii) Notch sensitivity.	R	4	
	b)	Write formula for equivalent Torsional moment as per ASME code and write meaning of each term.	R	4	
	c)	Give any two applications of helical compression spring.	R	5	
	d)	Two helical compression springs, each of stiffness 10 N/mm, are connected in series. Find the effective stiffness of springs combination.	U	5	
	e)	Give any four applications of sliding contact bearings.	R	5	
	f)	Write the meaning of each digit for rolling contact bearing designated as 6305.	U	5	
Q.5		Attempt any **FOUR** :			**16**
	a)	Define and explain stress concentration and stress concentration factor.	U	4	
	b)	Show that for square key the permissible crushing stress is twice of permissible shear stress if yield strength in tension is equal to yield stress, in compression for key material.	U	4	
	c)	The standard cross section flat key 16 X 10 mm is fitted on 50 mm diameter shaft. The key is transmitting 475 N.m torque from shaft to hub. The key is made of steel Syt=Syc=230 N/mm^2. Determine length of key if factor of safety is 3.	A	4	
	d)	Write and explain any four factors deciding selection of material for helical compression springs.	U	5	
	e)	Draw free body diagram (equilibrium diagram) showing components of tooth forces for spur gear pair.	U	5	

	f)	A taper roller bearing has dynamic load carrying capacity of 26KN. The desired life for 90% of bearings is 12000 hours and the speed is 200 rpm. Calculate equivalent radial load that bearing can carry.	A	5	
Q.6		Attempt any **TWO:**			**16**
	a)	A shaft supported on two bearings 3m apart carries a pulley of weight 2000N at midpoint of shaft. The pulley is keyed to shaft and receives 20 KW at 300 rpm. The belt drive is vertical and sum of belt tension is 4400 N upward. Assume $K_b=K_t=1.5$ and permissible shear stress is 50 N/mm^2. Determine shaft diameter on strength basis.	A	4	
	b)	Following data refers to helical compression spring. Maximum force = 1500N. Deflection at maximum force = 35mm spring index = 6 Modulus of rigidity = 81370 N/mm^2. Permissible shear stress= 545 N/mm^2. Design spring and calculate i) Wire diameter. ii) Mean coil diameter. iii) Number of active coils. iv) Total number of coils. v) Free length of spring. vi) Pitch of the coil. Also draw neat sketch of the spring showing various dimensions.	A	5	
	c)	A pair of spur gears with 20^0 full depth involute teeth consists of 20 teeth pinion meshing with 41teeth gear. The module is 3 mm and face width is 40mm. The material for pinion as well as gear is steel with ultimate tensile stress 600 N/mm^2. The pinion rotates at 1450 rpm. Take velocity factor as $\left(\frac{3}{3+v}\right)$. Also assume Levis form factor as 0.32 and permissible bending stress as one third of ultimate tensile stress. Determine power transmitted by the gear pair.	A	5	

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ODD TERM END EXAM NOV/DEC -2019

EXAM SEAT NO. | | | | | | |

LEVEL: **III** PROGRAM: **MECHANICAL ENGINEERING**

COURSE CODE:**MEF302/MEE301** COURSE NAME: **THERMAL ENGINEERING**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **26 /11/2019**

Instruction:-

1) Answers must be written in the main answer book provided. (and supplements if required)
2) Illustrate your answers with sketches where ever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables will be made available on request.
5) Assume and mention suitable additional data necessary.
6) Use of Mobile is strictly prohibited.
7) **QN**>Question No, **SQN**>Sub-Question No, **R**> Remembering, **U**>Understanding, **A**>Application **CO**>Course outcome

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QN	SQN	Question Text	RUA	CO ME F302	Marks
Q.1		Attempt any **FOUR**			**(08)**
	a)	Define thermodynamic system and write two examples.	R	1	
	b)	Explain "Energy of an isolated system is said to remain constant". Comment on its validity in practice.	U	1	
	c)	Define intensive property and write two examples.	R	1	
	d)	An engine works between the temperature limits of 1775°K and 375°K. Determine the maximum thermal efficiency of the engine.	A	2	
	e)	Write Boyle's law.	R	2	
	f)	Two kilograms of an ideal gas is heated from 50°C to 150°C. Determine the change in its internal energy. Assume R = 280 J/kg°K and r = 1.32.	A	2	
Q.2		Attempt any **FOUR**			**(16)**
	a)	Explain with sketches meaning of various types of thermodynamic system.	U	1	
	b)	Briefly explain "Thermodynamic equilibrium"	R	1	
	c)	Give the statements of First law of thermodynamics. What are its limitations.	R	2	
	d)	Steam at 700 KN/$M^2$and 200°C enters an insulated convergent divergent nozzle with a velocity of 60m/s . It tears the nozzle at a pressure of 140KN/$m^2$and enthalpy of 2600KJ/Kg. Determine the velocity of steam at exit.	A	2	
	e)	A quantity of air has a volume of 0.4m^3at a pressure of 5 bar and a temperature of 80°C. It is expanded in a cylinder at a constant temperature to a pressure of 1 bar. Determine the amount of work done by the air during expansion.	A	2	
	f)	Derive an expression of heat conduction in a composite slab.	R	3	
Q.3		Attempt any **TWO**			**(16)**
	a)	Prove that violation of Kelvin-Plank statement of second law of thermodynamics leads to the violation of clausius statement.	U	2	
	b)	i)Represent constant volume process on P-V and T-S diagram. Write its P-V-T relationship , work done equation and equation of change in internal	A	2	

		energy. ii)A gas occupies a space of $0.3m^3$at a pressure of 2bar and a temperature of 77^oC, it is heated at a constant volume until its pressure is 7bar. Determine i)Temperature at the end of the process ii)Mass of the gas. Take R-287J/KgK.			
	c)	Classify heat exchangers. Determine the rage of heat transfer through a composite wall made of 25mm thick steel plate and covered with an insulating material of 7mm thick on one side. Thermal conductivity of steel and insulating material is 58 W/mk and 0.116W/mk respectively. The temperature at the inner and outer surfaces of wall are 280^oC and 40^oC respectively.	A	3	
Q.4		Attempt any **FOUR**			**(08)**
	a)	State the function of cooling towers.	R	6	
	b)	State applications of nozzle.	R	6	
	c)	Define mountings & enlist them.			
	d)	Define i)Latent heat ii) Dry steam	U	4	
	e)	Define vaccum Efficiency.	U	6	
	f)	State the function of i)Feed pump ii) Economiser.	R	5	
Q.5		Attempt any **FOUR**			**(16)**
	a)	State the functions of condenser & define condenser efficiency.	R	6	
	b)	What is reheating of steam in turbine. Draw heat-entropy chart.	U	4	
	c)	State the functions of each element of steam condensing plant.	R	6	
	d)	Explain with T-S diagram Rankine cycle.	U	4	
	e)	Define dryness fraction and determine it if 0.7Kg of water is in suspension with 35Kg of dry steam.	A	4	
	f)	Define boiler draught and classify it.	R	5	
Q.6		Attempt any **TWO**			**(16)**
	a)	Superheated steam at pressure 15bar and $95^oC$of superheat expands isentropically, until its pr. becomes 3bar. Find , final quality of steam, the change in internal energy and heat added. Take Cpsup=2.1KJ/Kg-K.	A	4	
	b)	Explain with neat sketch working of Bension boiler. State advantages of it.	R	5	
	c)	Why compounding is necessary? Explain velocity compounding with neat sketch.	U	6	

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ODD TERM END EXAM NOV-DEC-2019

EXAM SEAT NO. | | | | | | |

LEVEL : - **FOURTH** PROGRAM : **MECHANICL ENGINEERING**

COURSE CODE :- **MEF403/MEE403**

COURSE NAME **ADVANCED MACHINING PROCESSES**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **02/ 12 / 2019**

Instruction :-

1) Answers of two sections must be written in separate section answer book provided.
2) Illustrate your answers with sketches wherever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables shall be made available on request.
5) Assume and mention suitable additional data if necessary.
6) Use of Mobile is strictly prohibited.
7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	SQN	**Section- I**	R/ U/ A	Co MEF 403	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	State the applications of i) End Milling ii) Form Milling.	A	1	
	b)	State the functions of the following basic points of column and Knee type milling Machine. i) Saddle ii) column.	R	1	
	c)	State any four disadvantages of gear shaping.	R	2	
	d)	Explain the need of gear shaping process.	R	2	
	e)	State the applications of i) Wire cut EDM. Ii) Electro Chemical Machining.	A	3	
	f)	State the functions of a dielectric Fluid in EDM.	R	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Enlist work holding devices of milling and explain any one of them.	R	1	
	b)	Explain cutting parameters of milling.	U	1	
	c)	Explain differential indexing in gear cutting.	U	2	
	d)	Explain Gear Grinding with neat sketch.	R	2	
	e)	Explain how different process parameters affect on EDM process.	R	3	
	f)	Explain the principle of Wire- cut EDM with neat sketch.	U	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	Classify milling cutter and explain any one of it.	R	1	
	b)	Explain side and face milling with neat sketch.	R	1	
	c)	Draw labeled sketch of knee type milling machine and state its working principle.	U	1	
	d)	Explain gear burnishing in detail.	U	2	
	e)	Explain the limitations of LBM & EBM.	A	3	
	f)	Differentiate between conventional and non conventional machining processes.	A	3	

P.T.O.

QN	SQN	Section- II	R/U/A	Co MEF 403	Marks
Q.4		Attempt any **TWO:**			**08**
	a)	Define CNC machine and draw its block diagram,	R	4	
	b)	Explain close loop control with neat sketch.	U	4	
	c)	Describe repair cycle analysis.	R	5	
Q.5		Attempt any **FOUR** :			**16**
	a)	Describe principle parts of horizontal machining centre with neat sketch.	U	4	
	b)	Explain absolute co-ordinate system with example.	U	4	
	c)	Explain Thumb rule for axis identification.	U	4	
	d)	What do you know about maintenance manual?	U	5	
	e)	Write important features of preventive maintenance.	U	5	
	f)	Explain the advantages of housekeeping for the organization.	U	5	
Q.6		Attempt any **TWO:**			**16**
	a)	Write a part program for Turning component as shown in Fig. No.1 Data given :- S1000, F200 mm/min.	Λ	4	
	b)	Write a part program for component as shown in Fig. No. 2	Λ	4	
	c)	i) Enlist advantages & disadvantages of CNC. ii) Explain the need of machine tool maintenance.	U U	4 5	

<Refer Q6a>

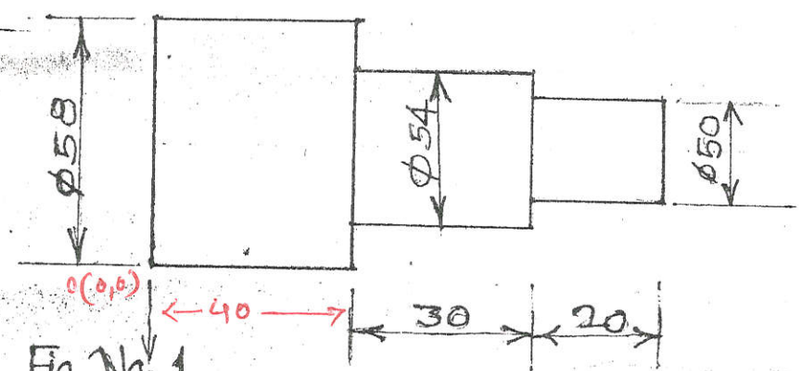

Fig No. 1

<Refer Q6b>

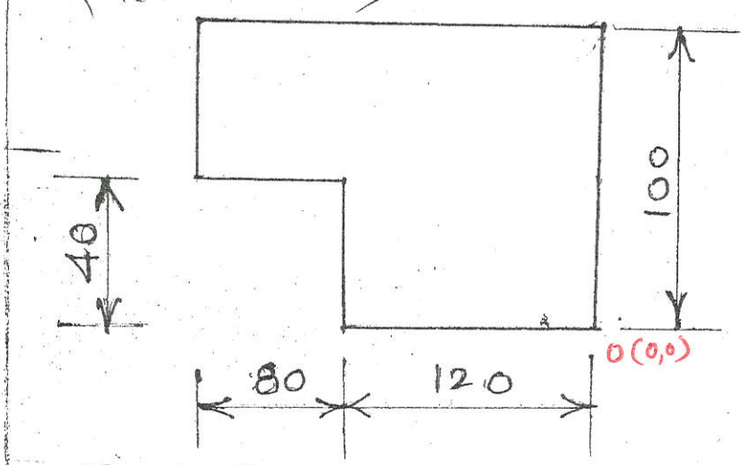

Fig. No. 2 All dimensions are in mm

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ODD TERM END EXAM NOV-DEC-2019

EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **MECHANICAL ENGINEERING**

COURSE CODE :- **MEF305/MEE305/M205/ME205**

COURSE NAME **THEORY OF ENGINEERING DESIGN**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **03 / 12 / 2019**

Instruction :-

1) Answers must be written in the main answer book provided.(and supplements if required)
2) Illustrate your answers with sketches wherever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables shall be made available on request.
5) Assume and mention suitable additional data if necessary.
6) Use of Mobile is strictly prohibited.
7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	SQN	Question Text	R/U/A	Co MEF 305	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	State Hook's Law.	R	1	
	b)	Define resilience and proof resilience.	R	1	
	c)	A bar of 20mm diameter subjected a load of 100KW, suddenly applied, find the stress induced in the bar.	U	1	
	d)	State the relation between bending moment and shear force.	R	2	
	e)	State perpendicular axes theorem.	R	3	
	f)	A rectangular body of 100 mm X 200mm. Find the moment of inertia at the base of rectangle.	R	3	
Q.2		Attempt any **TWO:**			**16**
	a)	A steel bar ABCD is subjected to point loads as shown in the Fig. No.1. Calculate the force 'P' necessary for equilibrium. Also calculate the change in the length of the bar. Take $E = 2 \times 10^5$ N/mm^2.	A	1	
	b)	i) A rod is 2m long at a temperature of 20^0C find the expansion of the rod, when the temperature is raised to 80^0C. If the expansion is prevented. Find the stress induced in the rod. $E = 1.0 \times 10^5$ N/mm^2 & $\alpha = 12 \times 10^{-6}/^0$C. ii) Draw a neat labeled stress-strain curve for behavior of ductile material under tension and define each term.	A	1	
	c)	Determine instantaneous stress developed in a collared bar of length 800mm when a slotted weight of 30N falls freely on its bottom collar through a height of 300mm. Diameter of bar is 20mm, E= 200 GPa.	A	1	
Q.3		Attempt any **TWO:**			**16**
	a)	A simply supported beam of 16m effective span carries concentrated loads of 400N, 500N and 300N at distances 3m, 7m and 11m respectively from left support. Draw SFD and BMD.	A	2	
	b)	Draw SFD & BMD for beam loaded and supported as shown in Fig. No.2. Also locate point of contra flexure if any.	A	2	
	c)	Determine the moment of inertia about both centriodal axis passing through C.G. of the section in fig. No.3	A	3	

P.T.O.

QN	SQN	Question Text	R/U/A	Co MEF 305	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	State any two assumption in shear stress.	R	4	
	b)	Define i) Bending moment ii) Bending stress.	R	4	
	c)	State the relation between maximum and average shear stress for circular section.	U	4	
	d)	Define angle of obliquity.	R	5	
	e)	A circular shaft rotating with 100 rpm with torque 5KN.m. Find out power transmitted by shaft.	U	6	
	f)	Define 'angle of twist'.	R	6	
Q.5		Attempt any **TWO** :			**16**
	a)	A rectangular steel beam is used for a simply supported span of 4m. It carries u.d.l. of 30 KN/m throughout the span and a downword point load of 40KN at the mid span. Assume width of the beam as 2/3 of the depth and determine the size of the beam assuming the permissible bending stress in steel as 6 N/mm^2.	A	4	
	b)	At a point in a strained cylindrical shell the principal stresses are 120 N/mm^2 and 60 N/mm^2 both Tensile. Find Normal, tangential and resultant stress and direction of the resultant stress on a plane inclined at 60^0 to the direction of major principal plane.	A	5	
	c)	A solid shaft 60mm ϕ is running at 150rpm. Find the power that can be transmitted by the shaft if the permissible shear stress is 100 N/mm^2 and the maximum torque is likely to exceed by 40% over its mean value.	A	6	
Q.6		Attempt any **TWO:**			**16**
	a)	A solid shaft transmits 300KW at 100rpm. If the shear stress is not to exceed 80 N/mm^2, what should be the diameter of shaft? If this shaft is to be replaced by a hollow shaft whose internal diameter shall be 0.6 times the outer diameter, determine the size and % saving in weight, maximum stress being same.	A	6	
	b)	The I-section of a beam is subjected to sagging bending moment of 6 KNm. Dimensions of flanges & web are 50mm X 10mm & 130mm X 10mm respectively. Calculate the stresses at the extreme fibers.	A	4	
	c)	At a point in an elastic material, a direct tensile stresses of 80 N/mm^2 and a direct compressive stress of 40 N/mm^2 are applied on planes at right angles to each other. If the maximum principal stresses are limited to 100 N/mm^2 (Tensile). Find the shear stress that may be allowed on the planes. Also determine the minimum principal stress and maximum shear stress.	A	5	

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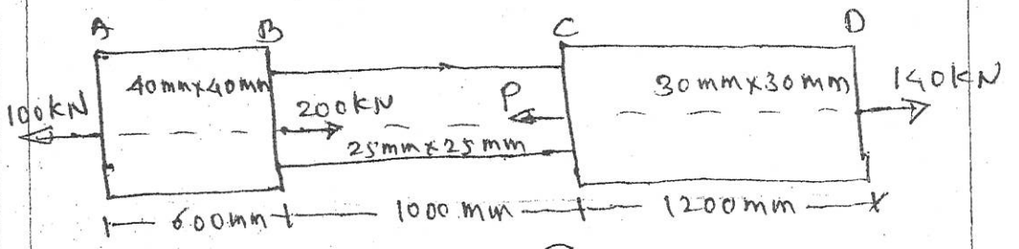

Fig 1 Q No. 2 (a)

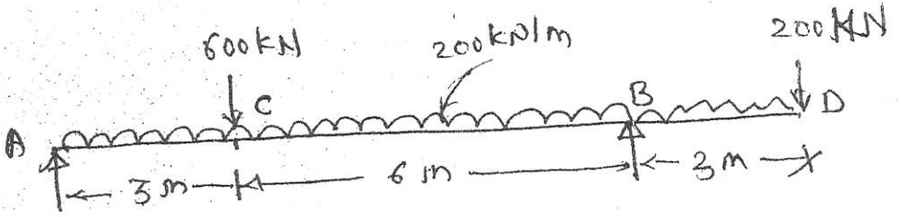

Fig. No. 2 Q No. 3 (b)

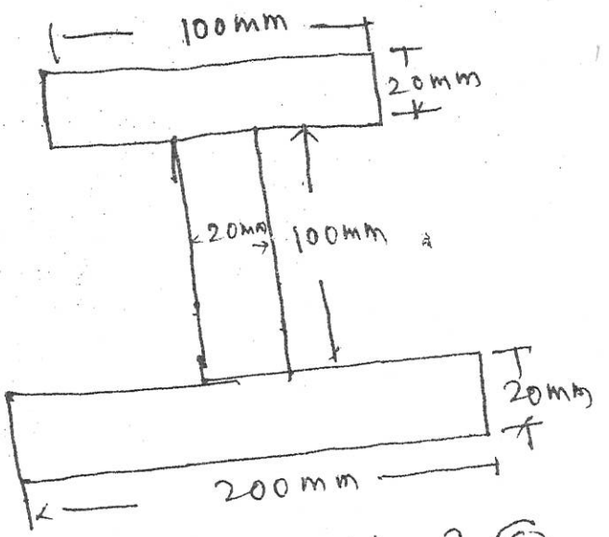

Fig No. 3 Q No. 3 (c)

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ODD TERM END EXAM NOV-DEC-2019

EXAM SEAT NO. | | | | | | |

LEVEL : - **FOURTH** PROGRAM : **MECHANICAL ENGINEERING**

COURSE CODE :- **MEF406/MEE406/M306**

COURSE NAME **HYDRAULIC MACHINERY**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **04/ 12 / 2019**

Instruction :-

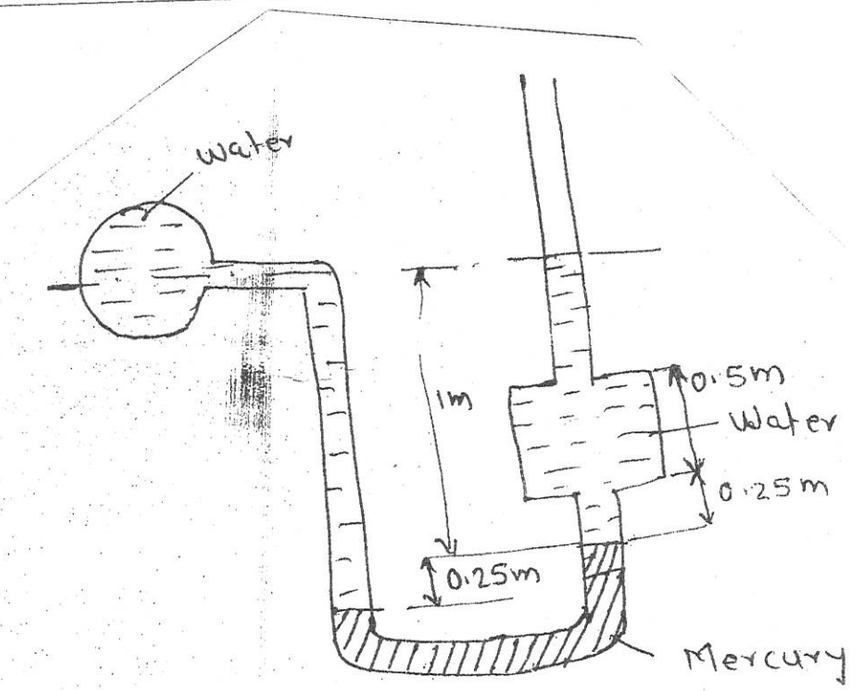
1) Answers of two sections must be written in separate section answer book provided.
2) Illustrate your answers with sketches wherever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables shall be made available on request.
5) Assume and mention suitable additional data if necessary.
6) Use of Mobile is strictly prohibited.
7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	SQN	**Section- I**	R/ U/ A	Co MEF 406	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	List any four types of fluid.	R	1	
	b)	Define dynamic viscosity and state its SI unit.	R	1	
	c)	State Pascal's law of fluid pressure. List any two applications of it.	R	2	
	d)	Define i) Steady flow ii) Uniform flow.	R	1	
	e)	State any two limitations of Bernoulli's theorem.	R	2	
	f)	Define i) Total energy line. (TEL) ii) Hydraulic gradient line (HGL)	R	2	
Q.2		Attempt any **FOUR:**			**16**
	a)	Explain the phenomenon of capillary rise with reference to surface tension.	U	1	
	b)	Explain the concept of Atmospheric pressure, absolute pressure and Gauge pressure.	R	1	
	c)	Differentiate between simple manometer and differential manometer.	U	2	
	d)	Write the construction and working of pitot tube.	R	2	
	e)	Explain why coefficient of discharge for venturimeter is superior than that of orifice meter.	U	2	
	f)	State the laws of fluid friction for turbulent flow.	U	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	Calculate mass density, specific volume and weight of 10 litre liquid whose specific weight is 5 KN/m^3.	A	1	
	b)	Find the pressure in the pipe at point X for the arrangement shown in Fig. No. 1	A	2	

P.T.O.

	c)	A circular plate of diameter 2m is immersed in water such a way that the least depth of immersion is 0.6m and maximum depth of immersion is 1.6m. Find the depth of center of pressure. Also find the total pressure on the plate.	A	2	
	d)	A liquid of specific weight 9000N/m^3 is flowing through a horizontal pipe having diameter 15cm and 12cm at section A and B respectively. The discharge passes through pipe is 30 lit/sec if pressure at section A is 200 KN/m^2. Calculate pressure at section B. neglect losses.	A	3	
	e)	Explain with neat sketch working of venturimeter.	U	2	
	f)	Find the head lost due to friction in a pipe of diameter 300mm and length 50m through which water is flowing at a velocity of 3 m/s using i) Darcy's formula ii) Chezy's formula for which C=60. Take F=0.0256	A	3	
QN	SQN	**Section- II**	R/U/A	Co MEF 406	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Define the terms Gross head and net head in case of turbine.	R	5	
	b)	Classify hydraulic turbines according to direction of flow with one example.	R	5	
	c)	State concept of priming in centrifugal pump.	U&R	5	
	d)	Enlist different types of impeller.	R	6	
	e)	Define slip and negative slip in case of reciprocating pump.	R	6	
	f)	Draw ideal indicator diagram for reciprocating pump.	U&R	6	
Q.5		Attempt any **FOUR** :			**16**
	a)	With neat labeled sketch explain the working of Kaplan turbine.	U&R	5	
	b)	Sketch different types of draft tube used in hydro-electric power plant.	U&R	5	
	c)	Define following terms of centrifugal pump . i) Manometric efficiency. ii) Static head. iii) Mechanical efficiency. iv) Neat Positive Suction Head.(NPSH)	U&R	6	
	d)	A jet of water of diameter 10cm strike a flat plate normally with a velocity of 15m/s. The plate is moving with a velocity of 6 m/s in the direction of jet away from the jet. Find i) The force exerted by the jet on the plate. ii) Work done by the jet on the plate per second.	A	4	
	e)	Two jets strikes the buckets of pelton turbine which is having shaft power as 15500 KW. The diameter of each jet is 200mm. If net available head on turbine is 400m, find overall efficiency of turbine assuming Cv=1.00.	A	5	
	f)	A single acting reciprocating pump running at 50 r.p.m., delivers 0.01m^3/s. of water. The diameter of piston is 200mm and stroke length 400mm. Determine i) The theoretical discharge of the pump. ii) Co-efficient of discharge. iii) Slip and percentage slip of pump.	A	6	

Q.6		Attempt any **TWO:**			**16**
	a)	i) Differentiate between Francis and Kaplan turbine. ii) Explain construction and working of single acting reciprocating pump with neat sketch.	U& R U& R	5 6	
	b)	A reaction turbine works at 450 r.p.m. under a head of 120 metres. Its diameter at inlet is 120cm and the flow area is $0.4m^2$. The angles made by absolute and relative velocities at inlet are 20^0 and 60^0 respectively with the tangential velocity. Determine i) The volume flow rate, ii) The power developed and iii) Hydraulic efficiency. Assume whirl at outlet to be zero.	A	5	
	c)	i) Draw a neat labeled sketch of multistage centrifugal pump for high head. ii) Find the force exerted by a jet of water of diameter 100mm on a stationary flat plate, when the jet strikes the plate normally with a velocity of 30 m/s.	A	4	



Q.3 (b)

Fig-1

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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ODD TERM END EXAM NOV/DEC -2019

EXAM SEAT NO. | | | | | | |

LEVEL: **THIRD** PROGRAM: **MECHANICAL ENGINEERING**

COURSE CODE: **MEF304/ME204/MEE304** COURSE NAME: **MANUFACTURING PROCESSES**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **30/11/2019**

Instruction:-

1) Answers must be written in the main answer book provided. (and supplements if required)
2) Illustrate your answers with sketches where ever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables will be made available on request.
5) Assume and mention suitable additional data necessary.
6) Use of Mobile is strictly prohibited.
7) **QN**>Question No, **SQN**>Sub-Question No, **R**> Remembering, **U**>Understanding, **A**>Application **CO**>Course outcome

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QN	SQN	Question Text	RUA	CO MEF304	Marks
Q.1		Attempt any **FOUR**			**(08)**
	a)	'Large numbers of casting are desired'. State the material of the pattern.	A	4	
	b)	Compare between single piece and split pattern.	A	4	
	c)	State the uses of facing sand.	R	1	
	d)	Define core prints.	R	1	
	e)	State the principle of die casting.	U	1	
	f)	How the casting defect 'shift' can be prevented?	A	4	
Q.2		Attempt any **FOUR**			**(16)**
	a)	Explain colour coding provided on a pattern.	U	1	
	b)	Compare between plastic and wax as pattern material.	A	4	
	c)	Explain skeleton pattern with a neat sketch.	U	1	
	d)	Compare between moulding sand and core sand.	A	4	
	e)	Explain various properties of moulding sand.	U	1	
	f)	Explain shell moulding process with sketch.	U	1	
Q.3		Attempt any **FOUR**			**(16)**
	a)	Compare between hot chamber and cold chamber die casting.	A	4	
	b)	Sketch induction furnace and explain it.	U	4	
	c)	Explain horizontal and hanging type core print.	U	4	
	d)	State the process of charging cupola.	U	1	
	e)	Explain causes and remedies for following casting defects. a) Scab b) Dirt	U	1	
	f)	Sketch pit furnace and explain it.	U	4	

P.T.O

Q.4		Attempt any **FOUR**			**(08)**
	a)	Enlist the different welding defects.	R	1	
	b)	Which types of gas is used for gas welding process? State the types of flames.	A	4	
	c)	State the advantages and disadvantages of welding process.	R	1	
	d)	State any four press working operations.	R	1	
	e)	What are the advantages & disadvantages of forming process?	U	4	
	f)	Define extrusion. State its types.	R	1	
Q.5		Attempt any **FOUR**			**(16)**
	a)	Differentiate between TIG welding and MIG welding.	A	4	
	b)	Explain spot welding with neat sketch. State its application.	A	4	
	c)	State the principle of arc welding process. Explain shielded metal arc welding.	U	4	
	d)	Differentiate between Notching and lancing operation.	A	4	
	e)	Explain three high rolling mill with sketch.	U	4	
	f)	Explain following forging operation with application. i) Bending ii) Punching	A	1	
Q.6		Attempt any **FOUR**			**(16)**
	a)	Explain soldering process with its application.	A	1	
	b)	Draw a block diagram of die set component and lebel it.	U	4	
	c)	Explain indirect extrusion process with neat sketch.	U	4	
	d)	Differentiate open die & closed die forging.	A	4	
	e)	Explain the principle of rolling operation. Draw a sketch of the diff shapes formed in rolling.	A	4	
	f)	State the advantages, disadvantages and application of direct extrusion.	A	4	

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ODD TERM END EXAM NOV-DEC-2019

EXAM SEAT NO. | | | | | | |

LEVEL : - **FOURTH** PROGRAM : **MECHANICAL ENGINEERING**

COURSE CODE :- **MEF401/CEE401/ME301**

COURSE NAME **POWER ENGINEERING**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **27/ 11 / 2019**

Instruction :-

1) Answers of two sections must be written in separate section answer book provided.
2) Illustrate your answers with sketches wherever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables shall be made available on request.
5) Assume and mention suitable additional data if necessary.
6) Use of Mobile is strictly prohibited.
7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	SQN	**Section- I**	R/ U/ A	Co MEF 401	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define i) Piston displacement ii) Compression ratio.	R	1	
	b)	Write the name of thermodynamic processes involved in 'Otto cycle'.	R	1	
	c)	Suggest the materials for following parts of I.C. engine i) Piston ii) cylinder block.	A	1	
	d)	Enlist any four pollutants in exhaust gases of I.C. engine with their Harmful effects.	R	2	
	e)	What do you mean by BSFC with respect to I.C. engine?	R	2	
	f)	List any two lubricant additives used in I.C. engine with their advantages.	A	2	
Q.2		Attempt any **FOUR:**			**16**
	a)	An engine working on Otto cycle has diameter of 150mm and stroke of 225mm and clearance volume is 1.25×1^{-3} m^3. Find air standard efficiency.	A	4	
	b)	Explain in brief combustion stages in C.I. engine.	U	1	
	c)	Classify I.C. engine according to i) Method of ignition ii) Applications iii) Thermodynamic cycle iv) Fuel supply	R	2	
	d)	Draw Dual cycle on P-V and T-S diagram and write the process involved in it.	R	2	
	e)	Differentiate between air cooled and water cooled engines.(any four points)	R	2	
	f)	During a trial on 4 stroke single cycle oil engine. Following data were obtained. Duration of trial = 30mm, speed = 1750 rpm, Brake power = 3628.5 KJ/min, Mass of jacket cooling water = 483kg, Rise in cooling water temperature = 60^0C, Mass of exhaust gas = 191.35kg, atmospheric temperature 486^0C, Specific heat of exhaust gas= 1.25 KJ/kg^{0}K, Calorific value of fuel = 42300 KJ/kg^{0}K. Determine heat balance sheet on minute basis.	A	2 3 4	

P.T.O.

Q.3		Attempt any **TWO:**			**16**
	a)	Differentiate between S.I. and C.I. engines (any 8 points)	U	1	
	b)	Draw a neat labeled sketch of Battery ignition system and explain in brief working of it.	U	2	
	c)	What is catalytic converter? With neat sketch explain two way catalytic converter also mention the specifications of Bharat stage III norms.	U	2	
QN	S Q N	**Section- II**	R/ U/ A	Co MEF 401	Mar ks
Q.4		Attempt any **FOUR:**			**08**
	a)	A single acting single stage reciprocating air compressor receives air at 1 bar and 27^0C. It delivers 10 kg/min of air at a pressure of 7 bar and develops indicated power 34.1435 KW. Determine isothermal efficiency of compressor. Take R = 0.287 KJ/kg K.	A	3	
	b)	Write any four applications of Gas Turbine.	R	1	
	c)	Write function of air compressor. Define the term " Free air Delivered" (FAD)	U	2	
	d)	Write Dalton's law of partial pressure.	R	1	
	e)	Write any four applications of Turbo Jet Engine.	R	1	
	f)	Write any two advantages of vapour absorption system.	R	1	
Q.5		Attempt any **FOUR** :			**16**
	a)	Write necessity of multistage compression.	U	2	
	b)	With neat sketch explain working of constant volume Gas Turbine.	U	2	
	c)	Draw a neat sketch of ICE plant and label its part.	R	1	
	d)	In a single stage reciprocating air compressor volume of air entering the compressor is 2 m^3 /min. the suction pressure and temperature are 1 bar and 20^0C respectively. It delivers air at 5 bar. Calculate i) Indicated power ii) Isothermal power Take n = 1.2 (Index of compression)	A	3	
	e)	With neat sketch explain working of Ram jet engine.	U	6	
	f)	Define Air conditioning. Write any two applications of Air-conditioning.	U	1	
Q.6		Attempt any **FOUR:**			**16**
	a)	Compare reciprocating compressor with Rotary compressor on the basis of i) Suitability ii) Air supply iii) Lubrication iv) working principle.	U	2	
	b)	Draw a neat sketch of vapour compression system and label its parts.	U	6	

	c)	Define the following Psychrometric terms i) Dry Bulb Temperature (DBT) ii) Wet Bulb Temperature (WBT) iii) Dew point Temperature (DPT) iv) Relative Humidity (RH)	R	1	
	d)	A single acting two-stage reciprocating air compressor with complete inter cooling delivers 6 kg/min of air at 16 bar. The suction pressure and temperature are 1 bar and 15^0C. Index of compression is n = 1.3 Calculate :- i) Inter mediate pressure. ii) Indicated power, iii) Volume of air entering the compressor. Take R = 287 J/kg K for air.	A	3	
	e)	Compare closed cycle gas turbine with open cycle gas turbine on the basis of i) Cycle of operation. ii) Blade life. iii) Method of heating. iv) Efficiency.	U	2	
	f)	With neat sketch describe Gas Turbine plant with inter-cooling. Also draw its T-S diagram.	U	6	

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EXAM SEAT NO. | | | | | | |

LEVEL: **V** PROGRAM: **MECHANICAL ENGINEERING**

COURSE CODE:**MEF507/MEE510/ME411/2411** COURSE NAME: **INDUSTRIAL HYDRAULICS&PNEUMATICS**

MAX. MARKS: **80** TIME: **3 HRS.** DATE:**27 /11/2019**

Instruction:-

1) Answer to two sections must be written in separate section answer book provided
2) Illustrate your answers with sketches where ever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables will be made available on request.
5) Assume and mention suitable additional data necessary.
6) Use of Mobile is strictly prohibited.
7) **QN**>Question No, **SQN**>Sub-Question No, **R**> Remembering, **U**>Understanding, **A**>Application **CO**>Course outcome

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QN	SQN	Question Text	RUA	COMEF507	Marks
		Section –I			
Q. 1		Attempt any **FOUR**			**(08)**
	a)	State any four practical applications of hydraulic system.	U	2	
	b)	Draw neat sketch of unbalanced Vane pump.	U	3	
	c)	Enlist four material used to manufacture pipes & tubes for hydraulic system.	R	3	
	d)	Draw neat sketch of directly operated pressure Relief valve.	U	3	
	e)	State application of meter out circuit.	A	5	
	f)	State disadvantages of Bleed-off circuit.	A	5	
Q. 2		Attempt any **TWO**			**(16)**
	a)	i)State merits & limitations of oil Hydraulic System. ii) State function of hydraulic fluid & Name 10 desirable properties that a hydraulic fluid should possess.	U	2	
	b)	i) state various factors consider while selecting a hydraulic pump for a specific application. ii)explain with neat sketch construction & working of Bent axis type piston pump.	A U	3 3	
	c)	Draw Hydraulic circuits for milling machine & shaping machine & Explain working of one of them.	A	5	
Q. 3		Attempt any **TWO**			**(16)**
	a)	Draw symbols of i)Sequence valve ii)Variable displacement limited rotation motor. iii) Gas charged Accumulator. iv)3/2 push button operated spring return D.C. valve. v) Pressure Compensated flow control valve. vi) Double acting Actuators with double piston rod.	U	3	
	b)	Define flow control valve. Explain non-pressure compensated flow control valve with neat sketch.	U	3	
	c)	i) Explain with neat sketch working of counter balanced valve. ii)Explain with neat dketch construction & working of oil filter.	U	3	
		Section-II			
Q. 4		Attempt any **FOUR**			**(08)**
	a)	State any two limitations of Pneumatic system	R	5	
	b)	State any two applications of pneumatic system.	R	5	
	c)	List types of flow control valves.	R	3	
	d)	Draw symbol of i)FRL Unit ii)Bi-direction air motor	R	3	

P.T.O.

	e)	Define sequencing.	R	5	
	f)	List any two types of speed control systems.	R	5	
Q. 5		Attempt any **FOUR**			**(16)**
	a)	Explain general layout of pneumatic system.	U	5	
	b)	Explain construction and working of tandem cylinder.		4	
	c)	Draw a sketch and explain working of gear type air motor.	R + U	4	
	d)	Explain pneumatic 'AND' circuit with neat sketch.	U	5	
	e)	Explain pneumatic circuit for speed control of single acting cylinder with neat sketch.	A	5	
	f)	List factors to be considered for selecting the pipes while designing the pneumatic system.	U	3	
Q. 6		Attempt any **TWO**			**(16)**
	a)	Develop a pneumatic circuit for operation of two DA cylinders such that one operates after other, using travel dependant sequencing.	A	5	
	b)	Classify pneumatic actuators and explain with a neat sketch working of vane type air motor.	A + U	4	
	c)	Explain time delay valve with neat sketch.	U + A	3	

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ODD TERM END EXAM NOV/DEC -2019

EXAM SEAT NO. | | | | | | |

LEVEL: **FIRST** PROGRAM: **MECHANICAL**

COURSE CODE:**CCF 107/CCE 107** COURSE NAME: **ENGINEERING DRAWING - I**

MAX. MARKS: **80** TIME: **4 HRS.** DATE:**11/12/2019**

Instruction:-

1) Answers must be written in the main answer book provided. (and supplements if required)
2) Illustrate your answers with sketches where ever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables will be made available on request.
5) Assume and mention suitable additional data necessary.
6) Use of Mobile is strictly prohibited.
7) **QN**>Question No, **SQN**>Sub-Question No, **R**> Remembering, **U**>Understanding, **A**>Application **CO**>Course outcome

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QN	SQN	Question Text	RUA	CO CCF 107	Marks
Q.1		Attempt any **FOUR**			**(08)**
	a)	State the uses of T – square.	R	1	
	b)	Draw the convention for i) Bronze ii) Steel	U	1	
	c)	Define an ellipse.	R	2	
	d)	State what is "Conic" ? How parabola is obtained in terms of conics.	R	2	
	e)	A tennis player hit the ball to pass to other side of net. What type of path will the ball follow ? Show schematically.	A	2	
	f)	Draw the projection of point 'A' if it is in VP and 2.5cm above HP.	U	3	
Q.2		Attempt any **FOUR**			**(16)**
	a)	A distance of 30 cm measured on a map amounts to 450 metre. Draw a diagonal scale showing division of 50 cm capable of measuring 300 metre. Mark on it 255.5 metre and 177.5 metre.	A	1	
	b)	Construct on ellipse by Arcs of Circle method. Given major axis equals to 100 mm and minor axis 70 mm.	U	2	
	c)	Two straight lines OA and OB are inclined to each other at an angle of 70^0 A point 'P' is 35 mm from OA and 45 mm from OB. Draw a hyperbola through P with OA and OB as asymptoter.	A	2	
	d)	With suitable sketch explain system of dimensioning.	R	1	
	e)	A circle of 40 mm diametre rolls along a straight line without slipping. Draw the curve traced out by a point p on the circumference for one complete revolution of circle. Name the curve.	U	2	
	f)	Draw the involute of a pentagon of 30 mm side.	U	2	
Q.3		Attempt any **TWO**			**(16)**
	a)	Rod OC, 100 mm long is rotating uniformly about O. During the time rod completes one revolution point P starts from C moves along the rod uniformly at 'O' and reaches back to point 'C'. Draw the path traced out by point P. Name the curve.	U	2	
	b)	i) Draw the projection (three views) of a point P which is 30 mm in front of a vertical plane, 50 mm above horizontal plane and 20 mm in front of profile plane. Which is on the right side of the observer ? ii) A line AB of length 60 mm has its end A on the HP and 20 mm in front of the VP. Line is parallel to VP. Draw three views of the line and find its plan length ?	A	3	

P.T.O.

	c)	i) Two points A & B are in HP. A is 30 mm in front of VP and B is behind VP. The distance between the projectors is 75 mm. The line joining their top view makes 45^0 angle with x-y. Draw its projections and find distance of B from VP. ii) A line PQ makes an angle of 45^0 with VP and is situated on HP. End A and B of the line are 50 mm and 20 mm respectively in front of VP. Draw three views of the line & find true length and elevation length.	A	3	
Q.4		Attempt any **TWO**			**(08)**
	a)	A this Hexagonal plate 25 mm side, is resting on a corner in the HP with its surface perpendicular to HP and inclined at 45^0 to VP. Draw its projections when two sides are perpendicular to HP.	A	4	**4**
	b)	A circular plate of negligible thickness of 50 mm diametre has a point on its circumference in VP. Its surface is perpendicular to HP and inclined to VP such that front view appears as an ellipse with minor axis 35 mm. Draw its projections and find the inclination of the plate with VP.	A	4	**4**
	c)	A square plate ABCD has a corner A resting on HP with its surface perpendicular to VP and inclined at 30^0 to HP. Draw its projections, when diagonal AC is parallel to VP. Take side of square as 60 mm.	A	4	**4**
Q.5		Attempt any **TWO**			**(16)**
	a)	A pentagonal prism base 25 mm side and axis 60 mm long is standing on a corner of the side on HP. With its axis inclined at 45^0 to HP and parallel to VP. Draw its projection.	A	5	**8**
	b)	A cylinder having its base diametre 50 mm and axis length 70 mm is resting on the HP on a point of its base circumference in such a way that base appears as an ellipse of minor axis 30 mm in plan. Draw the projections of the cylinder when its axis is parallel to VP.	A	5	**8**
	c)	A square pyramid side of base 40 mm and axis length 60 mm is kept on the HP on a corner of its base such that its axis makes an angle of 30^0 to the HP and parallel to VP. Draw the projections of the pyramid.	A	5	**8**
Q.6		Attempt any **TWO**			**(16)**
	a)	A square prism 50 mm side of base and 80 mm in height is resting on its base on HP with all sides of base making equal angle with VP. It is cut by a section plane normal to VP and passing through the left bottom corner and top right corner of front view. Draw i) Front view – (2 Mark) ii) Sectional Top View – (3 Mark) iii) True shape of the section – (3 Mark)	A	6	**8**
	b)	A Cube of 60 mm long edges is kept on the HP on one of its faces with all sides of that face equally inclined to VP. It is cut by an AIP in such a way the true shape of the section is a regular hexagon. Draw i) Front view – (2 Mark) ii) Sectional Top View – (2 Mark) iii) True shape of a section – (4 Mark)	A	6	**8**
	c)	A cone, diameter of base 60 mm and axis 65 mm long is resting on its base on HP. It is cut by a plane perpendicular to VP. So that true shape of section is a parabola having 46 mm base. Draw i) Front view – (2 Mark) ii) Sectional Top view – (3 Mark) iii) True shape of section – (3 Mark)	A	6	**8**

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EXAM SEAT NO. | | | | | | |

LEVEL : - **FIFTH** PROGRAM : **MECHANICAL ENGINEERING**

COURSE CODE :- **MEF502/MEE503/ME404/2309**

COURSE NAME **QUALITY MANAGEMENT**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **11/ 12 / 2019**

Instruction :-

1) Answers of two sections must be written in separate section answer book provided.
2) Illustrate your answers with sketches wherever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables shall be made available on request.
5) Assume and mention suitable additional data if necessary.
6) Use of Mobile is strictly prohibited.
7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	SQN	**Section- I**	R/ U/ A	Co MEF 502	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define quality.	R	1	
	b)	Define Reliability.	R	1	
	c)	State stages in quality of Assurance.	R	2	
	d)	Enlist the responsibilities of quality assurance.	R	2	
	e)	Define cost of failure.	R	3	
	f)	Explain value of product.	R	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Differentiate the inspection and quality control.	U	1	
	b)	Describe concept of reliability goals.	U	1	
	c)	Explain how quality is related to the customer.	U	1	
	d)	Explain quality circles and its operation.	U	2	
	e)	Discuss the concept "Quality Audit"	U	2	
	f)	Explain the meaning of optimum quality of design with the help of graph.	U	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	How you relate quality of conformance and quality of performance?	A	1	
	b)	Justify everyone of the organization is responsible for quality output.	A	1	
	c)	Discuss the characteristics of quality circle.	U	1	
	d)	Justify the significance of quality audit on ISO 9000.	A	2	
	e)	How does the cost of rework & cost of repairs affect the cost of quality?	U	3	
	f)	Explain economics of quality of performance.	U	3	

P.T.O.

QN	SQN	Section- II	R/U/A	Co MEF 502	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Define i) Standard deviation ii) Range.	R	3	
	b)	Write formula for process capability index. Also write meaning of each term in it.	R	3	
	c)	Enlist the basic elements of Total Quality management. (TQM)	R	4	
	d)	Define Total Quality Management.	R	4	
	e)	Give any two benefits of ISO.	R	5	
	f)	Write any two benefits of sorting as per 5S theory.	R	5	
Q.5		Attempt any **FOUR** :			**16**
	a)	Discuss the causes of variations in quality characteristics.	U	3	
	b)	Draw the Normal distribution curve and interpret the area under the curve.	R	3	
	c)	Enlist the duties of quality council in Total Quality Management.	R	4	
	d)	Give any six characteristics of quality leaders.	R	4	
	e)	Explain the causes and effect diagrams in brief.	U	5	
	f)	Write the purposes of Benchmarking.	R	5	
Q.6		Attempt any **FOUR:**			**16**
	a)	Write the steps for construction of histogram.	R	3	
	b)	Give Importance of Statistical Quality Control. (SQC)	U	3	
	c)	Comment on customer focus as important element in Total Quality Management. (TQM)	U	4	
	d)	Explain with the flow chart, the Deming's philosophy of Total Quality Management.	U	4	
	e)	Draw and explain control charts as one of the seven tools of TQM.	U	5	
	f)	Explain in brief six sigma principle.	U	5	

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EXAM SEAT NO. | | | | | | |

LEVEL : - **FIFTH** PROGRAM : **MECHANICAL ENGINEERING**

COURSE CODE :- **MEF410 / MEE410 / ME309**

COURSE NAME **MECHANICAL MEASUREMENTS & MECHATRONICS**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **09/ 12 / 2019**

Instruction :-

1) Answers of two sections must be written in separate section answer book provided.
2) Illustrate your answers with sketches wherever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables shall be made available on request.
5) Assume and mention suitable additional data if necessary.
6) Use of Mobile is strictly prohibited.
7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	SQN	**Section- I**	R/ U/ A	Co MEF 410	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Differentiate between Range and Span with one example each.	U	1	
	b)	Draw the block diagram of first order system and write one example of it.	R	1	
	c)	Define the term Resolution.	R	1	
	d)	A metallic toothed –rotor having 60 teeth was mounted on a shaft whose speed was to be determined. The pulses induced in the inductive type magnetic pick-up were registered to be 3600 per second. Calculate the shaft speed.	A	2 3	
	e)	A spring scale requires a change of 200N in the applied weight to produce a 4cm change in the deflection of the spring scale. Determine the static sensitivity.	A	1	
	f)	A photo-electric pickup reads the speed of a rotating disc as 486 rpm and the true value of the speed is 492 rpm. Determine the error and the correction for the given instrument.	A	1	
Q.2		Attempt any **FOUR:**			**16**
	a)	Draw the block diagram of Generalized measurement System and explain the role of Indicator in brief.	U	1	
	b)	Flashing light can be used to measure speed of rotation of an object. Explain the working of such a measuring instrument with suitable sketch.	A	2 3	
	c)	Explain the working principle of Gamma-ray liquid level sensor, with a suitable sketch.	U	3	
	d)	Explain Hysteresis along with its causes and characteristic curve.	U	1	
	e)	Explain the working of Linear Variable Differential Transformer (L.V.D.T.) with a schematic diagram.	U	2 3	
	f)	Enlist temperature measuring instruments (any 8)	R	2 3	
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain the working on constant current type hot wire anemometer with a neat sketch.	U	3	
	b)	Select suitable measuring instrument to measure load acting on a beam. Explain its working with a sketch.	A	2 3	

P.T.O.

	c)	Draw a neat labeled sketch of closed vessel bubbler or purge system.	R	3	
	d)	Enlist the requirements and materials of Strain gauge.	R	2 3	
	e)	Explain the working of Radiation Pyrometer with suitable sketch.	U	2 3	
	f)	Construct a schematic diagram of a measuring instrument where human hair is used to measure moisture content in air. Also explain its working.	A	3	
QN	SQN	**Section- II**	R/U/A	Co MEF 410	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Draw pin configuration of 8051 Microcontroller.	U	4	
	b)	Define Mechatronics.	R	4	
	c)	State the use of data loggers.	A	5	
	d)	Draw process of A/D conversion and label it.	U	5	
	e)	State the principle of electromagnetic relay.	R	6	
	f)	State the working principle of electric motor.	R	6	
Q.5		Attempt any **FOUR** :			**16**
	a)	Draw architecture of 8051 Microcontroller.	U	4	
	b)	Compare microprocessor with microcontroller.	R	4	
	c)	Draw block diagram of PLC.	U	4	
	d)	State basic parameter in selection of PLC.	R	4	
	e)	Explain various registers in microprocessor.	U	4	
	f)	Draw block diagram of data loggers and explain its features.	U	5	
Q.6		Attempt any **FOUR:**			**16**
	a)	Explain successive approximation A/D converter with neat labeled sketch.	U	5	
	b)	Explain working of stepper motor.	U	6	
	c)	State and explain industrial application of VFD.	A	6	
	d)	State and explain eight parameters in selection of motor.	U	6	
	e)	Draw hydraulic actuation system and state function of different components.	U	6	
	f)	Draw neat sketch of Directional control valve and explain is working.	U	6	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

ODD TERM END EXAM NOV-DEC-2019

EXAM SEAT NO. | | | | | | |

LEVEL : - **FIFTH** PROGRAM : **MECHANICAL ENGINEERING**

COURSE CODE :- **MEF503/MEE504/2309**

COURSE NAME **INDUSTRIAL ENGINEERING**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **06/ 12 / 2019**

Instruction :-

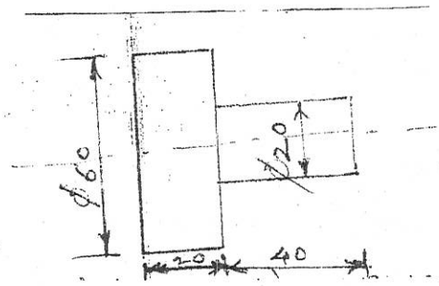
1) Answers of two sections must be written in separate section answer book provided.
2) Illustrate your answers with sketches wherever necessary.
3) Use of non-programmable pocket calculator is permissible.
4) Mathematical and other tables shall be made available on request.
5) Assume and mention suitable additional data if necessary.
6) Use of Mobile is strictly prohibited.
7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	SQN	**Section- I**	R/ U/ A	Co MEF 503	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define fixed cost and variable cost.	U	3	
	b)	Define production.	R	2	
	c)	List various material handling devices.	R	2	
	d)	State factors affecting process planning.	R	3	
	e)	Give different functions of PPC.	R	3	
	f)	Define production control.	R	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Explain the factors on which selection of material handling device depends.	U	2	
	b)	Suggest and justify suitable plant layout for continuous production of connecting rods of maruit-800 car.	A	2	
	c)	Explain how inspection stages are determined.	U	3	
	d)	Explain the concept of line balancing.	U	3	
	e)	There are two industries manufacturing two types of plugs. The standard time per piece is 1.5min. The output of two industries is 300 and 200 respectively per shift of 8 hrs. What is the productivity of each per shift? Also calculate production of each per week (6 days) on the basis of two shifts.	A	3	
	f)	Five jobs are to be machined on two machines M1& M2 in the order M1-M2. Processing time is given. Determine the sequence that minimizes the total elapsed and idle time, if any associated with the machines.	A	3	

Processing times (Hrs.)

Job	Machine M1	Machine m2
1	5	2
2	1	6
3	9	7
4	3	8
5	10	4

P.T.O.

Q.3		Attempt any **FOUR:**			**16**
	a)	Explain product layout with neat sketch.	U	2	
	b)	State and explain how different operations can be combined.	U	3	
	c)	Explain Gantt chart with suitable example.	U	3	
	d)	State advantages and disadvantages of process layout.	R	3	
	e)	Name the material handling devices for following activities i) To move and stock material at height. ii) To lift heavy stones at height. iii) To move cement bags at a short and fixed distance. iv) To move chemical from store to storage tank.	A	2	
	f)	Prepare operation process sheet and operation sequence for the component given below.  Assume suitable cutting parameters.	A	3	

QN	SQN	**Section- II**	R/U/A	Co MEF 503	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	State different components of jig and fixtures.	R	4	
	b)	Define inventory.	R	5	
	c)	Explain bin card.	R	5	
	d)	List the equipments required for time study.	R	6	
	e)	Discuss the aspects of work selection in work study.	U	6	
	f)	Write in brief about JIT.	U	6	
Q.5		Attempt any **FOUR** :			**16**
	a)	List different types of locators and with neat sketch explain any two.	U	4	
	b)	Differentiate clearly between jigs and fixtures.	U	4	
	c)	Draw two handed process chart for clamping a work/job on lathe chuck.	A	6	
	d)	Write primary and secondary questions. Explain how they are useful.	U	6	
	e)	Write a short note on Ergonomics.	U	6	
	f)	Explain Poka Yoke with suitable example.	U/A	6	

<table>
<tr><td>Q.6</td><td></td><td>Attempt any TWO:</td><td></td><td></td><td>16</td></tr>
<tr><td></td><td>a)</td><td>i) Explain EOQ model with neat sketch.
ii) A manufacturer has to supply 3600 units per year, shortages are not permitted. Inventory carrying cost amount R1.2 per unit per annum. The set-up cost per run is R80. Find Economic order quantity.</td><td>A</td><td>5</td><td></td></tr>
<tr><td></td><td>b)</td><td>The following data refers to the study conducted for an operation. Table shows actual time for elements in minutes,
Cycle →
<table>
<tr><th>Elements</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th></tr>
<tr><td>1</td><td>2.5</td><td>2.1</td><td>2.2</td><td>5.4</td><td>2.5</td></tr>
<tr><td>2</td><td>6.2</td><td>6.00</td><td>6.1</td><td>5.9</td><td>5.9</td></tr>
<tr><td>3</td><td>2.3</td><td>2.0</td><td>2.1</td><td>2.1</td><td>2.2</td></tr>
<tr><td>4</td><td>2.4</td><td>2.1</td><td>2.8</td><td>3.0</td><td>2.3</td></tr>
</table>
i) Element 2 is machine element.
ii) Delete abnormal observation if it is more than 2% of average time of that element.
iii) Take performance rating as 120.
iv) Personal allowance 30 minutes in 8 hour shift, fatigue allowance – 15%, contingency allowance – 2%.
Estimate standard time of operation and production per 8 hours shift.</td><td>U</td><td>5</td><td></td></tr>
<tr><td></td><td>c)</td><td>Write a short note on
i) Rapid prototyping
ii) Flexible manufacturing system.</td><td>U</td><td>6</td><td></td></tr>
</table>

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