

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVEN TERM END EXAM MAY-2019**EXAM SEAT NO.**

--	--	--	--	--	--

LEVEL :- FIFTH PROGRAM : MECHANICAL ENGINEERING**COURSE CODE :- MEF505/MEE508****COURSE NAME REFRIGERATION AND AIR CONDITIONING****MAX. MARKS : 80 TIME : 3 HRS. DATE :- 22/05 / 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	S	Section- I	R/ U/ A	Co MEF 505	Mar ks
Q.1		Attempt any FOUR :			08
	a)	Sate the need of refrigeration.	R	1	
	b)	Why reversed carnot cycle is considered as theoretical one?	U	2	
	c)	State the advantages of multistage compression.	R	2	
	d)	State the refrigerant used for i) Water cooler ii) Ice plant.	A	3	
	e)	State the selection criteria of vapour compression system components for cold storage.	A	4	
	f)	State the function of thermostat.	R	4	
Q.2		Attempt any FOUR :			16
	a)	Explain vortex tube refrigeration with neat sketch and state its applications.	U	1	
	b)	A refrigeration system operates on the reversed carnot cycle. The high temperature of the refrigerant in the system is 40 ⁰ C and lower is -15 ⁰ C. The capacity of the machine is 10 tonnes of refrigeration neglecting all losses. Find i) Cop ii) Work required	A	2	
	c)	State advantages and disadvantages of hermetically sealed compressor.	R	4	
	d)	Draw neat sketch of shell and tube type condenser and state its applications.	R	4	
	e)	Explain in detail about Hydrocarbon refrigerants	U	3	
	f)	Draw neat sketch of Li-Br absorption system	R	2	
Q.3		Attempt any FOUR :			16
	a)	Explain in brief working of heat pump and state its equation of COP	U	1	
	b)	Explain steam jet refrigeration with neat sketch.	U	1	
	c)	Explain actual vapour compression cycle with T-S diagram.	U	2	

P.T.O.

	d)	A VCR working on R134 a operates between saturation temperatures -2°C and 34°C . Refrigerant is saturated at the entry of compressor and assume no subcooling. Enthalpy of refrigerant at the end of compression is 444 KJ/kg. Find COP of the system. Find also power required per ton of refrigeration capacity. Use following data for R-134a.	A	2													
		<table><tr><th>Temperature</th><th colspan="2">Enthalpy KJ/kg</th></tr><tr><td></td><td>Liquid</td><td>Vapour</td></tr><tr><td>-2</td><td>197.33</td><td>397.51</td></tr><tr><td>34</td><td>247.47</td><td>416.85</td></tr></table>	Temperature	Enthalpy KJ/kg			Liquid	Vapour	-2	197.33	397.51	34	247.47	416.85			
Temperature	Enthalpy KJ/kg																
	Liquid	Vapour															
-2	197.33	397.51															
34	247.47	416.85															
	e)	Explain constructional details of flooded type evaporator with neat sketch.	R	4													
	f)	Explain Dry expansion chiller with neat sketch.	A	3													
QN	S	Section- II	R/	Co	Mar												
	Q		U/	MEF	ks												
	N		A	505													
Q.4		Attempt any FOUR :			08												
	a)	Define i) Dew point temperature ii) WBT	R	5													
	b)	State Delton's Law of partial pressure.	U	5													
	c)	Define sensible heat factor and write mathematical relation of SHF.	R	5													
	d)	Mention the DBT & RH values for the Human comfort.	A	5													
	e)	Classify ducts according to i) Cross section of duct ii) Pressure in duct	R	6													
	f)	Classify Fan & Blowers.	R	6													
					16												
Q.5		Attempt any TWO :															
	a)	With the help of psychrometric chart, find out the following if the air is at 20°C DBT and 100% RH. i) Dew point temp. ii) WBT iii) Specific volume of air iv) Enthalpy of Air and v) Specific humidity of air.	A	5													
	b)	State the factors affecting effective temperature.	U	5													
	c)	i) Enlist desired properties of insulating materials (any four) ii) Differentiate between refrigeration and Air conditioning.	R	5	4												
			U	5	4												
Q.6		Attempt any TWO :			16												
	a)	1) Draw a processes on psychrometric chart. i) Cooling with humidification. ii) Sensible heating.	U	5													
		2) State factors affecting on Human comfort.	R	5													
	b)	Explain with neat labeled sketch year round air conditioning system.	U	U	5												
	c)	Compare between unitary and central air conditioning system.	R	5													

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVENTERM END EXAM MAY-2019

EXAM SEAT NO.

--	--	--	--	--	--

LEVEL :- FIFTH **PROGRAM : MECHANICAL ENGINEERING**
COURSE CODE :- MEE502/ ME403
COURSE NAME INDUSTRIAL ORGANIZATION & MANAGEMENT
MAX. MARKS : 80 **TIME : 3 HRS.** **DATE :- 15/05 / 2019**

Instruction :-

- 1) Answers of two sections must be written in separate section answer book provided.
- 2) Figure to the right indicate 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.

QN		S Q N	Section- I	Ma rks
Q.1			Attempt any FOUR :	08
	a)		What is management?	
	b)		Define proprietorship.	
	c)		What is government sector?	
	d)		What is co-ordination?	
	e)		Describe authority.	
	f)		What are direct and indirect costs of accidents?	
Q.2			Attempt any FOUR :	16
	a)		Explain top level management, also state its functions.	
	b)		Differentiate between management and administration.	
	c)		What are various types of industrial sectors?	
	d)		Explain planning. Also write about steps of planning.	
	e)		Explain the recruitment and selection procedure of employees.	
	f)		Explain various methods of training for workers.	
Q.3			Attempt any FOUR :	16
	a)		How does lower management differs from middle level management?	
	b)		What is scope of management?	
	c)		Write a note on joint stock company. What are its features?	
	d)		Write a note on control function in management. What is importance of it?	
	e)		Write a note on Human Resource Management. State its objectives and functions.	
	f)		What are causes of accidents? What preventive measures should be taken to avoid accidents?	

P.T.O.

QN		S Q N	Section- II	Marks																											
Q.4			Attempt any FOUR : Enlist four functions of materials management.	08																											
	a)																														
	b)		Why financial management is required?																												
	c)		Give any four sources of finance.																												
	d)		Define accident.																												
	e)		Enlist four types of trainings.																												
	f)		What is critical path?																												
Q.5			Attempt any TWO : Describe concept of supply chain management.	16																											
	a)																														
	b)		i) Explain duties of purchasing officer. ii) Describe over and under capitalization.																												
	c)		i) Explain purchasing procedure. ii) Enlist four factors affecting working capital of medium scale industry.																												
Q.6			Attempt any TWO : i) Explain factory act and provisions in it. ii) Describe accident reporting procedure.	16																											
	a)																														
	b)		i) Differentiate clearly between PERT & CPM. ii) Explain various time estimates in network analysis.																												
	c)		Draw network diagram and show critical path. Find out project duration.																												
<table><tr><th>Activity</th><th>Predecessor</th><th>Expected Time</th></tr><tr><td>A</td><td>--</td><td>10</td></tr><tr><td>B</td><td>A</td><td>20</td></tr><tr><td>C</td><td>B</td><td>05</td></tr><tr><td>D</td><td>C</td><td>10</td></tr><tr><td>E</td><td>D,G,H</td><td>20</td></tr><tr><td>F</td><td>A</td><td>15</td></tr><tr><td>G</td><td>C,FA</td><td>05</td></tr><tr><td>H</td><td>A</td><td>15</td></tr></table>					Activity	Predecessor	Expected Time	A	--	10	B	A	20	C	B	05	D	C	10	E	D,G,H	20	F	A	15	G	C,FA	05	H	A	15
Activity	Predecessor	Expected Time																													
A	--	10																													
B	A	20																													
C	B	05																													
D	C	10																													
E	D,G,H	20																													
F	A	15																													
G	C,FA	05																													
H	A	15																													

GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

EVEN TERM END EXAM MAY -2019

EXAM SEAT NO.

--	--	--	--	--	--

LEVEL: FIRST

PROGRAM: COMMON

COURSE CODE: CCF105/0107/R107/X104/CEE105 COURSE NAME: BASIC MATHEMATICS

MAX. MARKS: 80

TIME: 3 HRS.

DATE: 14/05/2019

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	S	Question Text	R	CO	Mar
Q.1	Q		U	CCF10	ks
		Attempt any FOUR	A	5	(08)
a)		Expand $\begin{vmatrix} 1 & 3 & -1 \\ 2 & 0 & 5 \\ 6 & -2 & -7 \end{vmatrix}$	R / U	1	
b)		Resolve into partial fractions: $\frac{x+1}{x^2-2x+1}$	R / U	2	
c)		Resolve into partial fractions: $\frac{1}{(x^2+2)(x^2+5)}$	R / U	2	
d)		Expand $(3a-b)^4$ by using Binomial theorem.	R / U	4	
e)		Find the values of 'a' and 'b' if $\begin{bmatrix} a-4b & 5 \\ 6 & -a+b \end{bmatrix} = \begin{bmatrix} 11 & 5 \\ 6 & -5 \end{bmatrix}$	A	3	
f)		If $A = \begin{bmatrix} 3 & -1 \\ 2 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 2 \\ -3 & 0 \end{bmatrix}$ find matrix x such that $2x+3A-4B=I$	A	3	
Q.2		Attempt any FOUR			(16)
a)		Show that the following equation are consistent $4x-3y+1=0$, $7x-8y+10=0$, $x+y-5=0$	U	1	
b)		Resolve into partial fractions: $\frac{x^2}{(x+1)(x+2)(x+3)}$	A / U	2	
c)		Resolve into partial fractions: $\frac{3x^2+17x+14}{x^3-8}$	A / U	2	
d)		Expand $\left(x^2 - \frac{2}{y^3}\right)^6$ by using Binomial theorem.	A	4	
e)		Express the following matrix as the sum of symmetric and skew symmetric matrices. $A = \begin{bmatrix} -1 & 7 & 1 \\ 2 & 3 & 4 \\ 5 & 0 & 5 \end{bmatrix}$	U	3	
f)		Find x, y, z if $\left\{ \begin{bmatrix} 1 & 0 \\ 5 & 0 & 1 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} 1 & 2 \\ -2 & 3 \\ 3 & 1 \end{bmatrix} \right\} \begin{bmatrix} x \\ 2 \\ 1 \end{bmatrix} = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$	A / U	3	
P.T.O					

Q.3	Attempt any FOUR			(16)
a)	Solve by Cramer's Rule $\frac{2}{x-1} + \frac{3}{y-2} = 5, \frac{4}{x-1} - \frac{1}{y-2} = 3$	A	1	
b)	Resolve into partial fractions : $\frac{x^4 - x^5 + 1}{x^3(1-x)}$	A	2	
c)	By using Binomial theorem expand $\left(\frac{4}{3x} + \frac{y^2}{2}\right)^6$	A	4	
d)	If $A = \begin{pmatrix} 1 & -2 \\ -3 & 1 \end{pmatrix}$, $B = \begin{pmatrix} 4 & 2 & -5 \\ 1 & 0 & 3 \end{pmatrix}$ and $C = \begin{bmatrix} 6 & -7 & 0 \\ -1 & 2 & 5 \\ 1 & 0 & 3 \end{bmatrix}$ verify that $A(BC) = (AB)C$	U	3	
e)	If $A = \begin{bmatrix} -1 & -2 & -2 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$ show that $\text{adj } A = 3A^T$	U	3	
f)	Solve by matrix method $x + y + z = 3$ $x + 2y + 3z = 4$ $x + 4y + 9z = 6$	A	3	
Q.4	Attempt any FOUR			(08)
a)	Prove that $\cos^2 \theta - \cos^2 \theta \cos^2 \theta = 1$	U	5	
b)	Without using calculator, find the value of $\sec(3660^\circ)$	A	5	
c)	Prove that $\cos 2\theta = 1 - 2\sin^2 \theta$	U	5	
d)	Without using calculator find $\sin(15^\circ)$	A	5	
e)	If $2\sin 40^\circ \cos 10^\circ = \sin A + \sin B$ find A and B	U	5	
f)	Find principal value of $\cos\left[\frac{\pi}{2} - \sin^{-1}\left(\frac{1}{2}\right)\right]$	U	5	
Q.5	Attempt any FOUR			(16)
a)	Prove that $\frac{1 + 2\sin^2 \theta}{1 + 3\tan^2 \theta} = \cos^2 \theta$	U	5	
b)	Without using calculator, find the value of $\frac{\sec^2(135^\circ)}{\cos(-240^\circ) - 2\sin(930^\circ)}$	U	5	
c)	If $\tan(x+y) = \frac{3}{4}$, and $\tan(x-y) = \frac{8}{15}$ then show that $\tan 2x = \frac{77}{36}$	A	5	
d)	Prove that $\frac{1 - \tan 2\theta \tan \theta}{1 + \tan 2\theta \tan \theta} = \frac{\cos 3\theta}{\cos \theta}$	A	5	
e)	Prove that $\cos 10^\circ \cos 50^\circ \cos 70^\circ = \frac{\sqrt{3}}{8}$	A	5	
f)	Prove that $\cos^{-1}\left(\frac{4}{5}\right) + \tan^{-1}\left(\frac{3}{5}\right) = \tan^{-1}\left(\frac{27}{11}\right)$	A	5	
Q.6	Attempt any FOUR			(16)
a)	Without using calculator find the value of $\sin 150^\circ - \tan 315^\circ + \cos 300^\circ + \sec^2 3660^\circ$	U	5	
b)	If A and B are obtuse angle such that $\sin A = \frac{5}{13}$, $\cos B = \frac{-4}{5}$ find $\tan(A+B)$	U	5	
c)	prove that $\frac{\cos 3A - \cos 7A}{\sin 9A + \sin A} = \cos 2A \tan 4A - \sin 2A$	A	5	
d)	Prove that $\cos C + \cos D = 2 \cos\left(\frac{C+D}{2}\right) \cos\left(\frac{C-D}{2}\right)$	A	5	
e)	Prove that $\cos^{-1}\left(\frac{4}{5}\right) - \sin^{-1}\left(\frac{5}{13}\right) = \cos^{-1}\left(\frac{63}{65}\right)$	A	5	
f)	Prove that $2 \tan^{-1}\left(\frac{1}{3}\right) + \tan^{-1}\left(\frac{4}{3}\right) = \frac{\pi}{2}$	A	5	

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVEN TERM END EXAM MAY-2019**EXAM SEAT NO.**

--	--	--	--	--	--	--	--	--	--

LEVEL :- THIRD**PROGRAM : MECHANICAL ENGINEERING****COURSE CODE :- MEF306/MEEF306****COURSE NAME :- MACHINE TOOLS****MAX. MARKS : 80 TIME : 3 HRS. DATE :- 14/05 / 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	S Q N	Question Text	R/ U/ A	Co MEF 306	Ma rks
Q.1		Attempt any FOUR :			08
	a)	Define Orthogonal cutting.	R	1	
	b)	What is a chip breaker? Enlist its types.	U	1	
	c)	Specify a lathe.	U	2	
	d)	Define the term cutting speed with respect to lathe machine.	R	1	
	e)	Classify drilling machines.	R	1	
	f)	Define 'Reaming' operation with sketch.	R	1	
Q.2		Attempt any FOUR :			16
	a)	'Working with ductile material, chips produced are discontinuous'. Comment.	A	2	
	b)	Compare between orthogonal and oblique cutting.	A	1	
	c)	Show tool signature in ASA system with sketch.	U	1	
	d)	Differentiate between cemented carbides and stellite cutting tool material.	A	1	
	e)	Sketch a lathe machine. Label the parts.	U	1	
	f)	Describe i) Eccentric turning ii) Parting off operation.	U	1	
Q.3		Attempt any FOUR :			16
	a)	Sketch a taper turning attachment and describe it.	U	1	
	b)	For ensuring proper grip which lathe operation will you suggest? Describe it.	A	1	
	c)	Compare between reaming and drilling operation.	A	1	
	d)	Sketch a chuck used to support parallel shank drills.	A	1	
	e)	Describe twist drill nomenclature with sketch.	U	2	
	f)	How will you calculate machining time on drilling machine?	U	2	

P.T.O.

Q.4	Attempt any FOUR :		08
a)	Enlist the different parts of planning machine.	R	1
b)	State the principle of shaping operation with sketch.	R	1
c)	List out the various types of broaches.	R	2
d)	Differentiate pull broaching and push broaching (any two)	A	2
e)	State the advantages and application of grinding machine.	R	2
f)	State the principle of honning process.	R	4
Q.5	Attempt any FOUR :		16
a)	Describe the shaper mechanism with sketch.	U	1
b)	Explain the construction and working of slotting machine.	U	2
c)	Discuss the following operations on slotting machine i) Machining flat surface ii) Machining slots and key ways.	A	1
d)	Explain with neat sketch Trueing process in grinding process.	U	2
e)	Explain centreless grinding process.	U	2
f)	State the advantages and application of i) Polishing ii) Buffing.	A	4
Q.6	Attempt any TWO :		16
a)	Explain with suitable example , designation of grinding wheel.	A	2
b)	i) Draw a neat sketch of vertical broaching machine and label it. ii) State the application of Broaching.	A A	2 2
c)	Explain the construction and working of lapping on flat surface and cylindrical surface.	U	4

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVEN TERM END EXAM MAY-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 :- 17/05/2019****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	S Q N	Question Text	R/ U/ A	Co MEF 304	Ma rks
Q.1		Attempt any FOUR :			08
	a)	Define the term 'Pattern'.	R	1	
	b)	What is distortion allowance?	R	1	
	c)	State the use of facing sand.	U	1	
	d)	State the requirement of core sand.	U	1	
	e)	Enlist various zones in cupola furnace.	R	1	
	f)	Enlist melting furnace for non ferrous metals.	U	1	
Q.2		Attempt any FOUR :			16
	a)	Describe split pattern with a neat sketch.	U	4	
	b)	What is a core print? Describe horizontal core print with a neat sketch.	U	4	
	c)	Write about colour coding used on pattern.	U	4	
	d)	What is a 'metallic pattern'? How it is prepared?	U	4	
	e)	'Liquid metal during casting penetrates behind the surface layer of sand'. Defect the defect. Suggest remedial measures.	A	4	
	f)	Explain the working of 'Jolt squiz' machine.	U	4	
Q.3		Attempt any FOUR :			16
	a)	Describe 'shell moulding' with a neat sketch.	U	4	
	b)	Compare between green sand and dry sand.	A	4	
	c)	Describe hot chamber die casting method.	U	1	
	d)	Enlist advantages of die casting.	U	1	
	e)	Describe the working of pit furnace with sketch.	U	1	
	f)	Write about cleaning of castings.	U	1	

P.T.O.

Q.4	Attempt any FOUR :		08
	a) Explain notching operation in case of press operation.	U	1
	b) Define brazing and state its applications.	A	4
	c) State the principle of operation of "Arc welding".	U	4
	d) State various types of presses.	R	1
	e) State different types of dies.	R	1
	f) Define forging operation, classify it.	R	1
Q.5	Attempt any FOUR :		16
	a) Distinguish between arc and gas welding from the point of heat concentration, temperature, ease of operation and running cost.	A	1
	b) Explain various zones of following oxy acetylene gas flame with neat sketch i) Neutral flame ii) Carburizing flame	U	5
	c) Draw neat sketch of power press and label it.	R	1
	d) Compare press forging and drop forging (any four points)	A	4
	e) Explain principle of rolling with neat sketch.	R	4
	f) Draw neat sketch of direct extrusion and explain its working.	U	1
Q.6	Attempt any FOUR :		16
	a) Describe "Three High Rolling Mill" with sketch.	U	1
	b) Define forgeability and explain closed die with neat sketch.	R	6
	c) Explain the following die set components with neat sketch. i) Stripper ii) Pilot	U	1
	d) Explain the causes of following welding defects. i) Under cut ii) Cracks	A	5
	e) Explain spot resistance welding with neat sketch.	R	5
	f) State and explain the various sections of rolled parts with neat sketch.	R	4

GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.
(An Autonomous Institute of Govt. of Maharashtra)
EVEN TERM END EXAM MAY -2019

EXAM SEAT NO.

LEVEL: FIRST

PROGRAM: COMMON

COURSE CODE: CCF110/X11/CCCE110

COURSE NAME: APPLIED MECHANICS

MAX. MARKS: 80

TIME: 3 HRS.

DATE: 20/05/2019

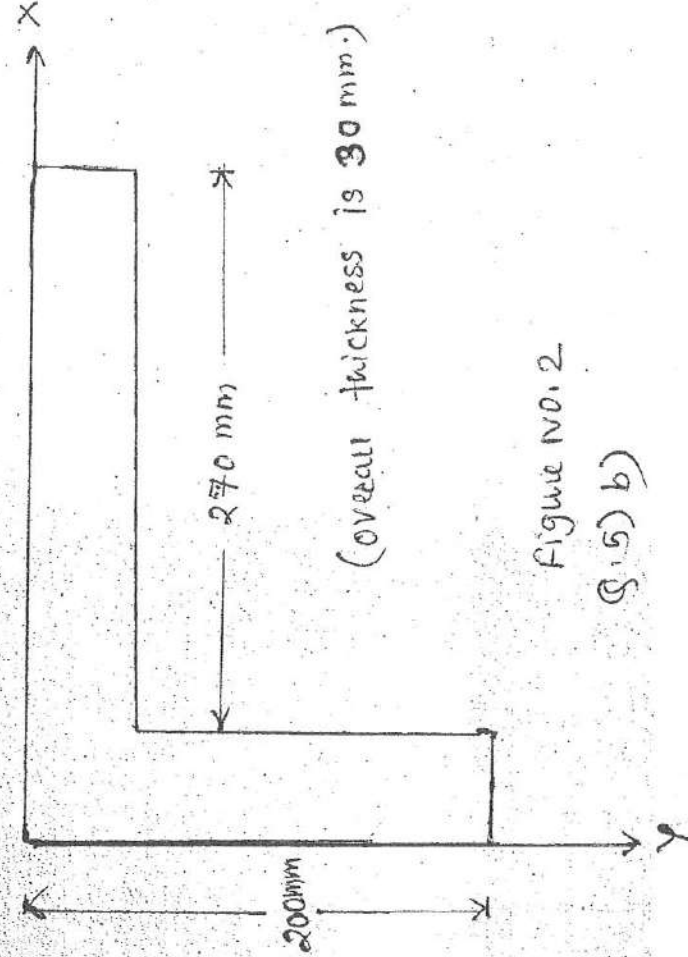
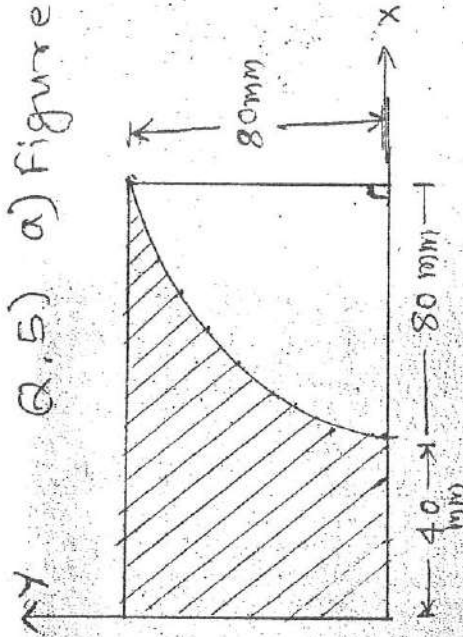
Instruction:-

- 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	S Q N	Question Text	R U A	CO CCF 110	Marks
Q.1		Attempt any FOUR			(08)
	a)	Different between particle & body. (any two)	U	1	
	b)	State principle of transmissibility.	R	1	
	c)	Give field examples of i) Concurrent force system. ii) Parallel force system.	R	1	
	d)	Define equilibrant & state its effect on body.	R	2	
	e)	Define i) Angle of friction ii) Angle of Repose.	R	2	
	f)	State laws of friction. (any two)	R	2	
Q.2		Attempt any FOUR			(16)
	a)	Determine the components of the force 500KN at 20° & 30° at either side of it.	A	1	
	b)	Two forces acts at an angle 120° , The bigger force is 50 N and resultant of both is perpendicular to smaller force. Find smaller force.	A	1	
	c)	Determine the magnitude & direction of resultant force of forces away from point 8 N, 10 N, 20 N and 12 N making an angle 30° , 120° , 200° & 310° with the x-axis measured in clockwise direction respectively. (solve by Analytical method)	A	1	
	d)	Three forces of 20 N, 40 N, & 60 N along the sides of equilateral triangle of side 30 cm respectively in order. Calculate the magnitude & position of resultant of force system from apex point.	A	1	
	e)	A light string ABCDE whose extremity 'A' is fixed, has 'W ₁ ' and 'W ₂ ' attached at 'B' & 'C'. It passes frictionless pulley at 'D' carrying a weight of 200 N at free end 'E'. If in equilibrium position BC is horizontal & AB & CD makes an angle 150° & 100° respectively with BC, Determine magnitudes 'W ₁ ' & 'W ₂ '	A	2	
	f)	Solve Q.No.2(C) by Graphical method.	U	3	
Q.3		Attempt any FOUR			(16)
	a)	Simply supported beam of 5m span carries UDL of 12 KN/m over half span from left side support & vertically downward point load of 27KN acting 1 m from right side support. Determine support reaction by analytical method.	A	2	
	b)	Solve Q. No 3(a) by graphical method.	U	3	
	c)	State advantages & limitations of graphical method over analytical method.	R	3	
	d)	A heavy stone of mass 400 kg is on hill of 45° inclined with horizontal. If coefficient of friction between stone & hill is 0.50, is stone stable?	A	2	

	e)	A block weighing 40KN resting on rough horizontal plane can be moved by a force of 22 KN applied at an angle 35° with the horizontal. Determine coefficient of friction.	A	2	
	f)	A ladder of 3 m weighing 100 N is kept 30° inclined with smooth horizontal ground and rough wall. If the man weighing 700 N is standing on mid of ladder, what is the force 'P', horizontal to ground contact surface, required to keep the ladder in rest. Take μ for ladder & wall is 0.3.	A	2	
Q.4		Attempt any FOUR			(08)
	a)	Define Kinematics.	R	5	
	b)	Define momentum.	R	5	
	c)	Define angular acceleration.	R	5	
	d)	State law of conservation of energy.	R	5	
	e)	Define work & power.	R	5	
	f)	Define velocity ratio.	R	6	
Q.5		Attempt any FOUR			(16)
	a)	Determine the co-ordinates of the centroid of the shaded area with respect to the axes shown in figure. no.1 in which a quarter circle of radius 80 mm is cut-off from a rectangle of size 120 mm x 80 mm.	A	4	
	b)	Determine the centroid of an unequal angle from the reference axes X & Y as shown in figure No.2.	A	4	
	c)	A ball is dropped from the top of a tower 30 m high. At the same instant a second ball is thrown upward from the ground with an initial velocity 15 m/sec when & where they cross?	A	5	
	d)	Power supply was cut off to a power driven wheel when it was rotating at a speed of 900 rpm. It was observed to come to rest after making 360 revolutions. Determine its angular retardation & time it took to come to rest after power supply cut-off.	A	5	
	e)	A stone is released from a height 30 m. Calculate velocity of stone when it strikes to the ground using law of conservation of energy.	A	5	
	f)	In a lifting machine an effort of 500 N is to be raise a load 10,000 N, velocity ratio of machine is 25. Determine efficiency of machine, ideal effort, effort lost in friction & load lost in friction,	A	6	
Q.6		Attempt any FOUR			(16)
	a)	A solid right circular cone of height 40 cm & diameter 20 cm is placed on a cylinder of diameter 20 cm & height 30 cm. Locate the position of center of gravity from the base of the cone.	A	4	
	b)	A railway wagon is moving at 108 kmph. The driver observes the red signal & applies brakes to stop the train & it covers a distance of 300 meter before coming to rest. Calculate the retardation produced & time taken to rest.	A	5	
	c)	A wheel starts from the rest & accelerates at 12 rad/sec^2 until it reaches a speed of 200 rpm. With this speed it rotates for 2 minutes & then retards uniformly for 150 seconds & stops. Determine total number of revolutions made, Acceleration time & angular retardation.	A	5	
	d)	Determine the power required to raise a lift containing 15 persons to a height of 150 m in 10 minutes. The average weight of each person may be taken as 650 N. The weight of lift is 2.5 KN.	A	5	
	e)	In a machine an effort of 15 N can lift a load of 300 N & an effort of 25 N can lift a load of 500N. Determine the law of machine & also effort required to lift a load of 1000N.	A	6	
	f)	In a lifting machine law of machine is $P = (0.025 W + 0.05) \text{ KN}$ & velocity ratio is 44.44. Calculate efficiency of machine at load 20 KN. and state machine is reversible or not at load 20 KN. Also determine maximum M.A & maximum efficiency of machine.	A	6	

Q.5) a) Figure No. 1



(Overall thickness is 30 mm.)

Figure No. 2

Q.5) b)

GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt.of Maharashtra)

EVEN TERM END EXAMMAY -2019

EXAM SEAT NO.

--	--	--	--	--	--

LEVEL: **FOURTH**

PROGRAM: **MECHANICAL**

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

COURSE NAME: **HYDRAULIC MACHINERY**

MAX. MARKS: **80**

TIME: **3 HRS.**

DATE: **20/05/2019**

Instruction:-

- 1) Answer to each section must be written in separate answer book.
- 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

QN	S. Q. N	Question Text (Section – I)	Cogniti on Level R/U/A	Co Code MEF 406	Mar ks
Q.1		Attempt any FOUR (4X2)			(08)
	a)	Define sp. Volume & state its SI unit.	R	1	
	b)	One lit. of crude oil weighs 9.6 N, calculate its Density	A	1	
	c)	Define - i) Total pressure ii) Centre of pressure	R	2	
	d)	Determine Intensity of pressure of oil of sp.gr. 0.9 and at a height of 40m.	A	2	
Q.2	e)	State Bernoulli's theorem & write its equation	U	3	
	f)	State Laws of fluid friction for laminar flow	U	3	
		Attempt any FOUR (4X4)			(16)
	a)	Explain the phenomenon of capillary and Surface Tension	U	1	
	b)	Define – Absolute vacuum, gauge pressure Absolute pressure & Atmospheric pressure & show it's Relationship, by drawing chart.	U/R	2	
	c)	An oil of sp. Gr. 0.9 is flowing through a venturimeter having inlet dia. 20 cm. and throat dia 10 cm. The oil-mercury differential manometer shows a reading of 20 cm. Calculate the discharge of oil through the horizontal venturimeter (cd=0.98)	A	3	
	d)	A simple Manometer is used to measure the pressure of oil (sp.gr.0.8) flowing in a pipe line. Its right limb is open to the atmosphere & left limb is connected to the pipe. The centre of pipe is 9 cm below the level of mercury in right limb. If the difference of mercury level in two limbs is 15 cm. determine pressure of oil in pipe.	A	2	
	e)	Explain with neat sketch differential manometer.	U	3	
	f)	A pipe of diameter 300 mm & length 3000 m is used for the transmission of power by water. The total head at the inlet of pipe is 400 m. Find the maximum power available at the outlet of the pipe.	A	3	
		Attempt any FOUR (4X4)			(16)
Q.3	a)	Determine the viscosity of a liquid having kinematic viscosity 6 stokes and sp.gr.1.9.	A	1	
	b)	A rectangular plane surface 3m wide and 4m deep lies in water in such a way that its plane make an angle of 30° with the free surface of water. Determine the total pressure and position of centre of pressure when the upper edge is 1.5 m below the free surface of water.	A	2	
	c)	Explain with neat sketch Bourdon's tube pressure gauge	U	2	
	d)	Derive the expression for the discharge through a venturimeter.	U	3	
	e)	An orifice meter with dia 15 cm is inserted in a pipe of 30 cm. diameter. The pressure gauges fitted upstream and downstream of orificemeter gives readings of 14.715 N/cm ² and 9.81 N/cm ² respectively. Find the rate of flow of water through the pipe in liter /sec. (take cd=0.6)	A	3	

f)	Find the head loss due to friction in a pipe of diameter 250mm and length of 60 m. Through the pipe water is flowing at a velocity of 3 m/s using i) Darcy formula ii) Chezy's formula for which $C=55$ and take kinematic viscosity = 0.01 stoke.	A	3	
Section – II				Marks
Q.4	Attempt any FOUR	(2X4)		(08)
a)	State any two functions of draft tube.	R	5	
b)	Write the formula for force exerted by a jet on the moving flat plate, when the jet strikes the plate at the centre. State the meaning of each term used in formula.	R	4	
c)	Define Manometric efficiency of a centrifugal pump.	R	6	
d)	Define Net positive suction Head (NPSH) of a centrifugal pump.	R	6	
e)	Classify the reciprocating pump.	R	6	
f)	State any two functions of air vessel.	R	6	
Q.5	Attempt any FOUR	(4X4)		(16)
a)	Draw General layout of hydro-electric power plant.	U&R	5	
b)	Differentiate between the Impulse and reaction turbine.	U&R	5	
c)	With neat labelled sketch explain working of centrifugal pump.	U&R	6	
d)	A jet of water of diameter 50mm moving with a velocity of 40m/s, strikes a curved fixed symmetrical plate at the centre. Find the force exerted by the jet of water in the direction of the jet, if the jet is deflected through an angle of 120° at the outlet of the curved plate.	A	4	
e)	A pelton wheel working under a head of 60m develops 95.6475 kW shaft power at 200 r.p.m. Calculate the diameter of jet if the overall efficiency is 85% and co-efficient of the velocity is equal to 0.98.	A	5	
f)	A single acting reciprocating pump running at 30 r.p.m., delivers 0.012 m ³ /sec of water. The diameter of piston is 25 cm and stroke length is 50 cm. Determine i) The theoretical discharge of the pump, ii) Co-efficient of discharge, iii) Slip and percentage slip of the pump.	A	6	
Q.6	Attempt any TWO	(8X2)		(16)
a)	I) With neat labelled sketch explain working of francis turbine. II) Draw indicator diagram for single acting reciprocating pump showing effect of acceleration in suction and delivery pipes.	U&R	5	
b)	A pelton wheel is to be designed for the following specifications : Shaft Power =11,772kw; Head =380 meters; speed =750 r.p.m.; overall efficiency =86%; Jet diameter is not to exceed one –sixth of the wheel diameter. Determine : i) The wheel diameter ii) The number of jets required, and iii) Diameter of jet.	A	5	
c)	I) Differentiate between centrifugal pump and reciprocating pump. II) Water is flowing through a pipe at the end of which a nozzle is fitted. The diameter of the nozzle is 100 mm and the head of water at the centre of nozzle is 100 m. Find the force exerted by the jet of water on a fixed vertical plate. The co-efficient of velocity is given as 0.95.	U&R A	6 4	

(An Autonomous Institute of Govt. Of Maharashtra)

EXAM SEAT NO.

--	--	--	--	--	--

Instruction :-

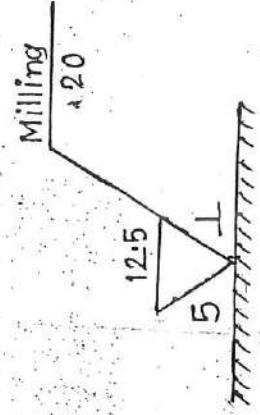
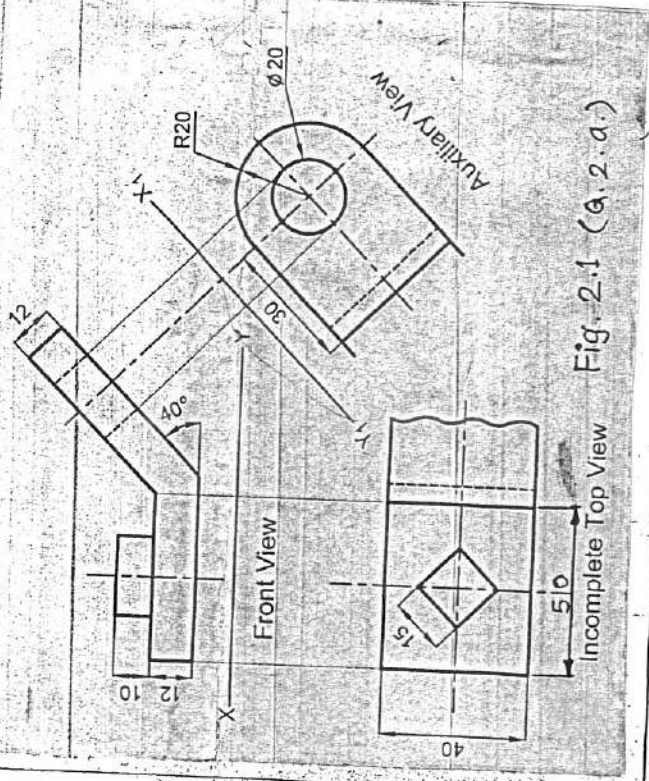
- 1) Answers must be written in the main answer book provided.(and supplements if required)
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume 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	S Q N	Question Text	R/ U/ A	Co MEF 303	Ma rks
Q.1		Attempt any FOUR : Draw conventional representation of any four of the following. i) White metal ii) Splined shaft iii) Tee iv) Square on shaft v) Spur gear vi) Countersunk.	R	2	08
Q.2		Attempt any TWO : Fig. 2.1 shows front view, partial auxiliary view and incomplete top view of a bracket. Redraw the given figure and complete the top view. b) i) State the meaning of the symbol shown in fig. 2.2 -0.02. +0.02. ii) The shaft size is given as $40^{+0.02}_{-0.04}$ and the hole size is $40^{-0.04}_{+0.02}$. Determine the type of fit.	U A	1 4	16
	c)	A vertical square prism having side of base 50mm and axis length 100mm, has its vertical faces equally inclined to the V.P. It is penetrated by another square prism having side of base 50mm and axis length 100mm so that, its axis is parallel to H.P. and V.P. and is 12 mm in front of the axis of the vertical prism. The faces of the vertical prism are equally inclined to the H.P. Draw projections of the prism showing the lines of intersection.	A	4	
Q.3		Attempt any TWO : Fig. 3.1 shows front view and part auxiliary view and part of top views of a cast block. Draw the given views and complete the top view. b) i) Draw the symbols for following features which are controlled in geometrical tolerancing 1) Angularity 2) Profile of any surface 3) Symmetry 4) Flatness ii) Draw freehand sketches of following welding symbols 1) Spot weld 2) Single –U-butt weld 3) Flat single v-butt weld 4) Concave fillet weld.	U R	1 4	16

c)	A right circular cylinder with base diameter 60mm and axis length 80mm stands vertically on its base in the H.P. A square prism with side of base 25mm and axis length 80mm penetrates horizontally such that its axis is parallel to V.P and 10mm away (in front) from the axis of vertical cylinder and is 30mm above the base of the cylinder. The faces of square prism are equally inclined with H.P. Draw the projections of solids with curve of intersection.	A	2	
Q.4	Refer fig. No 4.1 shows the assembly of Non Return valve. Draw the detailed drawing of following parts. i) Body sectional F.V. & T.V. ii) Valve - F.V. and T.V. iii) Valve seat F.V. & T.V. iv) Indication of tolerances geometric tolerances.			20
Q.5	Attempt any ONE :			20
a)	Refer Fig. No. 5.1 shows the details of lathe tail stock. Draw the assembly of tail stock. Prepare bill of material. OR Refer Fig. No 5.2 shows the details of foot step bearing. Draw the assembly of sectional front views and top view. Prepare the bill of material.	A	5	20
		A	5	20

2/6

R/U/A



R/U/A

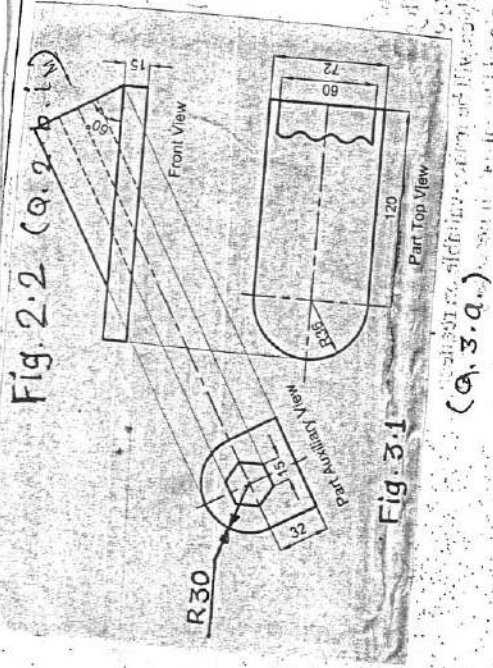
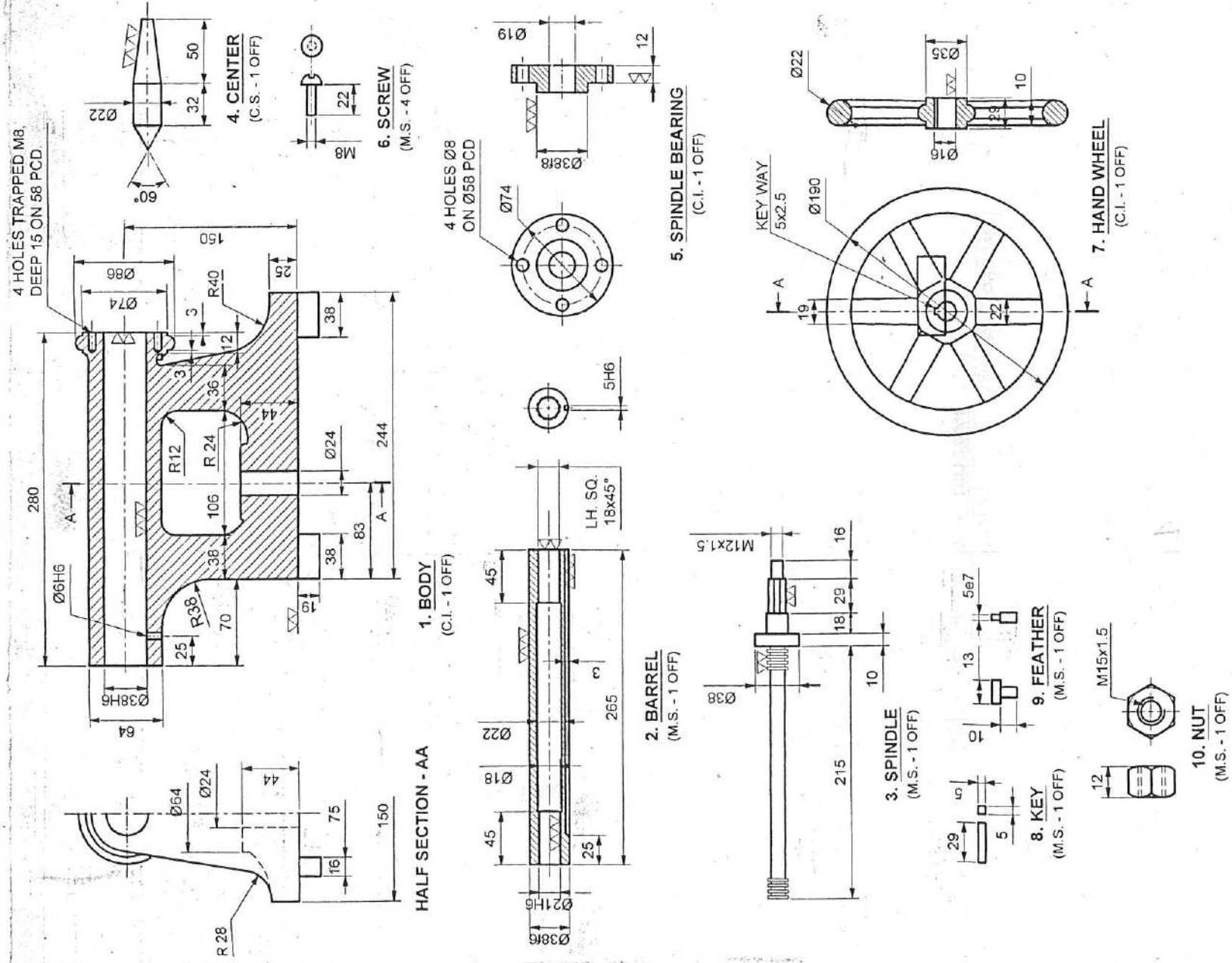
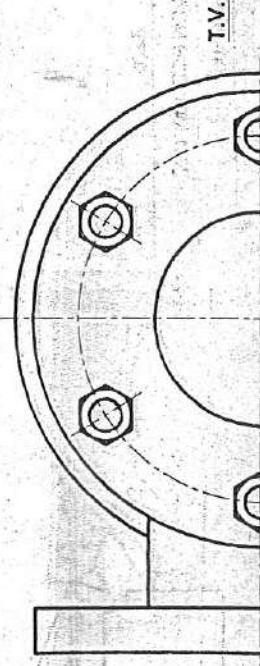
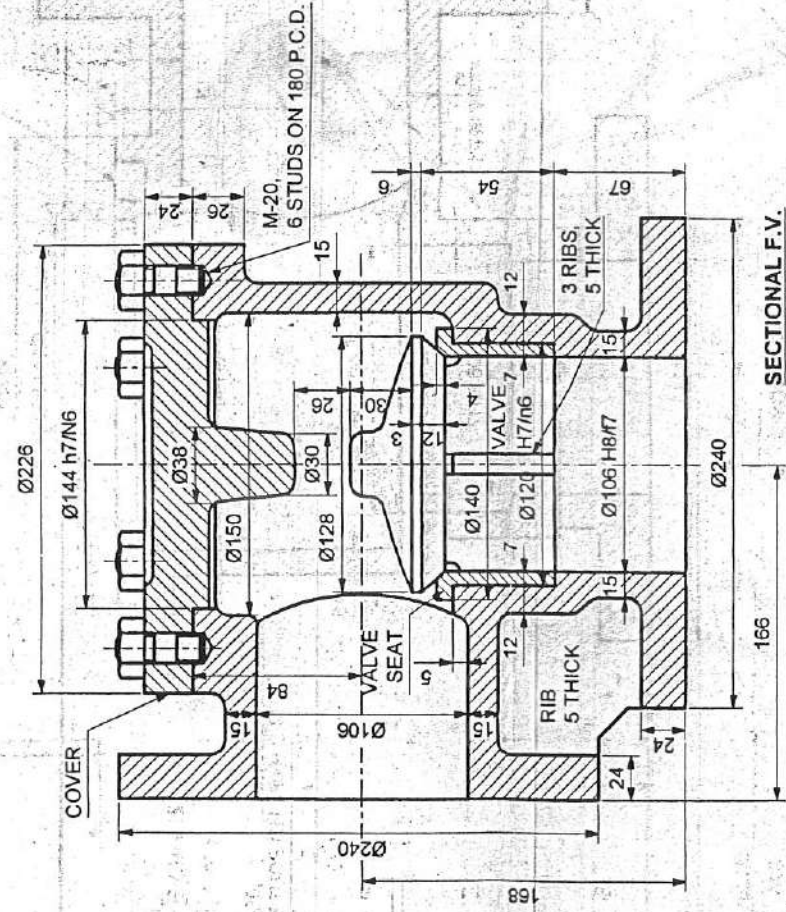


Fig. 3.1

(Q. 3.a.)



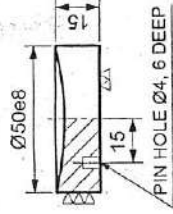
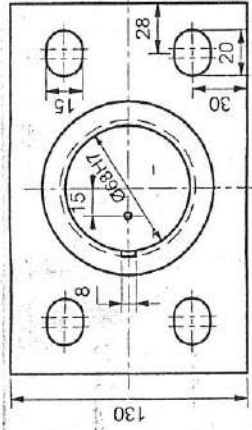
Q. No. 5
Fig. No. 510



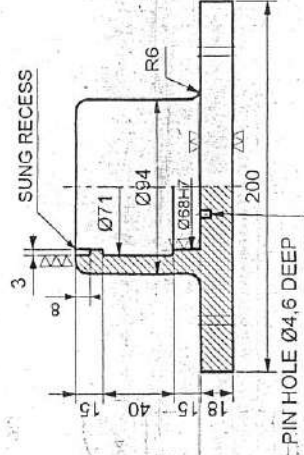
Q.No 4

516

$$E_1^2 \cdot M_2 \cdot E_2(a)$$

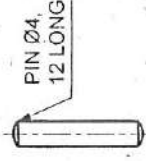


4. DISC
G.M. 1 - OFF

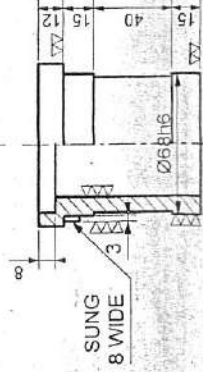


1. BODY
C.I. 1 - OFF

3. SHAFT
M.S. 1 - OFF



5. PIN
M.S. 1 - OFF



2. BUSH
G.M. 1 - OFF

TOLERANCE CHART

68H7 = +0.030	68h6 = -0.019
50B8 = +0.039	50e8 = -0.050
8H7 = +0.015	8g6 = -0.005

Q. No. 5 Fig. No. 59

GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

EVEN TERM END EXAM MAY -2019**EXAM SEAT NO.**

--	--	--	--	--	--	--	--

LEVEL: THIRD**PROGRAM: MECHANICAL****COURSE CODE: MEF307/MEE307/ME207 COURSE NAME: APPLIED ELECTRONICS****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 16/05/2019****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	S Q N	Question Text	R U A	CO MEF 307	Marks
Q.1		Attempt any FOUR			(08)
	a)	State any four application of zener diode.	A		
	b)	Define following terms i) Load regulation ii) Line regulation.	U		
	c)	Draw circuit diagram of common collector configuration.	R		
	d)	State function of rectifier. Mention types of rectifier.	U		
	e)	Draw labelled diagram of Half wave rectifier.	R		
	f)	Compare intrinsic and Extrinsic semiconductor. Any two point.	A		
Q.2		Attempt any FOUR			(16)
	a)	Draw and explain V-I characteristics of P-N junction diode.	R	1	
	b)	Explain online UPS with neat diagram.	U	3	
	c)	Draw and explain Bridge rectifier with suitable waveforms.	R	2	
	d)	Mention difference between common base and common emitter configuration.	A	1	
	e)	Explain operation of SMPS.	U	3	
	f)	Compare L&C filter. Any four points.	A	2	
Q.3		Attempt any FOUR			(16)
	a)	Draw & explain common emitter as a single stage amplifier.	R	1	
	b)	Mention necessity of filter in electronic devices. Explain it with rectifier filter combination diagram.	A	2	
	c)	Explain operation of zener diode in forward and reverse bias, with detail diagram.	U	1	
	d)	Mention role of regulator in power supply. Give its IC numbers.	A	3	
	e)	Explain zener diode as a voltage regulator in line regulation.	U	3	

P.T.O

	f)	Define the following terms and state its values for Half wave rectifiers and full wave rectifier. i) Rectifier efficiency ii) Ripple factor.	U	2	
Q.4		Attempt any FOUR			(08)
	a)	Convert octal to decimal $(48)_8 \rightarrow (?)_{10}$	A	4	
	b)	Draw symbol for i) NAND gate ii) NOT gate.	R	4	
	c)	Draw circuit for full adder.	R	5	
	d)	State need of multiplexer.	R	5	
	e)	Define flip-flop.	R	6	
	f)	Draw RS latch using NAND gate.	R	6	
Q.5		Attempt any FOUR			(16)
	a)	Draw & explain working of four bit left shift SISO register.	U	6	
	b)	Explain with truth table working of JK flip-flop.	U	6	
	c)	Draw logical circuit diagram for 4:1 mux & give its truth table.	U	5	
	d)	Solve using K-Mpap i) $F(A, B, C) = \sum m(0, 1, 2, 3) + d(4, 5, 7)$ ii) $F(A, B, C) = \sum m(0, 2, 4, 6)$	A	5	
	e)	State & prove De'Morgan's theorem.	R	4	
	f)	Convert $(5008.12)_{10}$ into equivalent Hex number.	A	4	
Q.6		Attempt any FOUR			(16)
	a)	Draw & explain truth table for EX-OR & AND gate.	U	4	
	b)	Convert $(57)_{10} \rightarrow (?)_2$	A	4	
	c)	Simplify expression to get canonical POS $Y = (A + B + \bar{C}) (A + C + \bar{B}\bar{B})(B + \bar{C} + \bar{A}A)$	A	5	
	d)	Draw & explain full subtractor.	U	5	
	e)	Design 3 bit asynchronous up counter.	A	6	
	f)	Compare shift register & counter (any four points)	R	6	

GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

EVEN TERM END EXAM MAY -2019

EXAM SEAT NO.

--	--	--	--	--	--	--	--	--	--

LEVEL: First

COURSE CODE:CCF 102/CCE 102

MAX. MARKS: 80

PROGRAM: EE/IE/IT/ET

COURSE NAME: Engineering Physics

TIME: 3 HRS.

DATE: 09/05/2019

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

QN	S. Q. N	Question Text	Cognition Level	Co Code CCF	Marks
Q.1		Attempt any FOUR	R/U/A	102	(08)
	a)	Define specific mass and give its SI unit.	R	01	
	b)	Shape of a liquid drop is spherical. Explain.	U	01	
	c)	Define coefficient of viscosity & give its SI unit.	R	01	
	d)	State any two applications of nanotechnology in the field of automobile.	R	03	
	e)	Define surface tension. Give its SI unit.	R	01	
	f)	Define 1) Nanotechnology 2) Nanoparticle	R	03	
Q.2		Attempt any FOUR			(16)
	a)	Explain the behavior of wire under continuously increasing load.	U	01	
	b)	Derive an expression for coefficient of viscosity using Stoke's method.	A	01	
	c)	Define capillary action. Give any three examples of capillary action.	R	01	
	d)	State any four points of distinction between longitudinal and transverse waves.	U	02	
	e)	Mention any two applications each of nanotechnology in the field of textile and environment.	R	03	
	f)	A wire of diameter 2mm and length 2.5m extends by 1.5mm when a force of 15N is applied to it. Find the Young's modulus of the wire.	A	01	
Q.3		Attempt any FOUR			(16)
	a)	Explain the molecular theory of surface tension.	U	01	
	b)	Define 1) Amplitude 2) Period 3) Frequency 4) Wavelength of a wave.	R	02	
	c)	Derive expression $h_{1r1} = h_2 r_2$ for capillary action.	A	01	
	d)	Define stress and explain the three types of stress.	R	01	
	e)	State any four applications of viscosity.	R	01	
	f)	Define resonance. Give any three examples of resonance.	R	02	

P.T.O.

Q.4	Attempt any FOUR			(08)
a)	Define refraction of light.	R	04	
b)	State Ohm's law for electricity.	R	04	
c)	Define photoelectric effect.	R	05	
d)	State two properties of laser.	R	05	
e)	State the principle of production of X-rays.	R	05	
f)	Define critical angle.	R	06	
Q.5	Attempt any FOUR			(16)
a)	Derive prism formula to calculate refractive index of given prism.	A	04	
b)	A 6 m long copper wire has diameter 0.45 mm. If its resistance is $18\ \Omega$, calculate its resistivity.	A	04	
c)	State any four characteristics of photoelectric effect.	R	05	
d)	Distinguish between spontaneous and stimulated emission. (any four points.)	U	05	
e)	State any four applications of X-rays.	R	05	
f)	State any four applications of optical fibre.	R	06	
Q.6	Attempt any FOUR			(16)
a)	How long will light take in travelling a distance 500 m in water ? R.I. of water is $\frac{4}{3}$ and velocity of light in vacuum is 3×10^8 m/s.	A	04	
b)	Derive equation of equivalent resistance for parallel combination of three resistors.	A	04	
c)	Explain construction and working of photoelectric cell.	U	05	
d)	Describe the term population inversion.	U	05	
e)	Explain the term total internal reflection.	U	06	
f)	Obtain balancing condition for Wheatstone's network.	A	04	

* * *

GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

EVEN TERM END EXAM MAY -2019

EXAM SEAT NO.

--	--	--	--	--	--

LEVEL: **THIRD**

PROGRAM: **CE/ME/SM/MT**

COURSE CODE:

CEF301/MEF301/MTE301/SMF310/1201/C201/CEE301/2201/M201/ME201/MEE301/MG201/SM201/SME301

COURSE NAME: **APPLIED MATHEMATICS**

MAX. MARKS: **80**

TIME: **3 HRS.**

DATE: **10/05/2019**

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

S QN	S Q N	Question Text	R U A	CO CEF301	Marks
Q.1		Attempt any FOUR			(08)
	a)	Evaluate $\int \frac{x+3}{x-2} dx$	U	1	
	b)	Find the area under the curve $y = \cos x$ & $x = 0$ & $x = \pi$	A	1	
	c)	Evaluate $\int_0^{\frac{1}{2}} \frac{dx}{\sqrt{1-x^2}}$	R	1	
	d)	Evaluate $\int \sqrt{1-\cos 2x} dx$	R	1	
	e)	Find the mean value of the function $y = 3e^{-x}$ over the range from $x = 0$ to $x = 1$	A	1	
	f)	Evaluate $\int \frac{3-5x^2+9x^4-10x^6}{x^6} dx$	R	1	
Q.2		Attempt any FOUR			(16)
	a)	Evaluate $\int \frac{x^5}{1+x^{12}} dx$	U	1	
	b)	Find the area of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ by integration method.	A	1	
	c)	Evaluate $\int \frac{1-\tan x}{1+\tan x} dx$	U	1	
	d)	Evaluate $\int_0^{\frac{\pi}{2}} \cos^2 x dx$	A	1	
	e)	Evaluate $\int \cot^{-1} x dx$	A	1	
	f)	Evaluate $\int_2^6 \frac{\sqrt{1-x} dx}{\sqrt{1-x} + \sqrt{x-7}}$	A	1	
Q.3		Attempt any FOUR			(16)
	a)	Evaluate $\int \frac{(x^2+1)dx}{x(2x-1)(1-x)}$	A	1	
	b)	Evaluate $\int_{-1}^1 \frac{x+x^2}{x^2+1} dx$	A	1	
	c)	Find the area enclosed between the parabola $y^2 = 4x$ and the line $2x - y = 4$	A	1	
P.T.O					

	d)	Evaluate $\int \cos(\sqrt{x}) dx$	U	1										
	e)	If $i_1 = 10 \sin wt$ & $i_2 = 20 \cos wt$ Find $i_1 + i_2$ in the form $r \sin(wt + \alpha)$ & calculate the R.M.S value over the range from $t = 0$ to $t = \frac{\pi}{w}$	A	1										
	f)	Evaluate $\int \frac{dx}{(x+1)(x^2+4)}$	A	1										
Q.4		Attempt any FOUR			(08)									
	a)	Define order and degree of a differential equation.	R	2										
	b)	What is the solution of a linear differential equation $\frac{dy}{dx} + Py = Q$. Where P and Q are functions of x only or constants.	R	2										
	c)	Show that the differential equation $(ye^{xy} - 2y^2) dx + (xe^{xy} - 6xy^2 - 2y) dy = 0$ is exact.	U	2										
	d)	If C.V of a distribution is 4 with mean 80 find S.D.	R	3										
	e)	The two sets of observations are given below: <table><tr><td>Set I</td><td>Set II</td></tr><tr><td>$\bar{x} = 82.5$</td><td>$\bar{x} = 48.75$</td></tr><tr><td>$\sigma = 73$</td><td>$\sigma = 8.35$</td></tr></table> Which of the two sets is more consistent?	Set I	Set II	$\bar{x} = 82.5$	$\bar{x} = 48.75$	$\sigma = 73$	$\sigma = 8.35$						
Set I	Set II													
$\bar{x} = 82.5$	$\bar{x} = 48.75$													
$\sigma = 73$	$\sigma = 8.35$													
	f)	Two coins tossed simultaneously. Find the probability of getting at least one head.	R	4										
Q.5		Attempt any FOUR			(16)									
	a)	Solve $(1 + y^2) dx = (\tan^{-1} y - x) dy$	A	2										
	b)	Show that the solution of D.E $\left(4 - \frac{y^2}{x^2}\right) dx + \frac{2y}{x} dy = 0$ is $4x^2 + y^2 = cx$	U	2										
	c)	Solve $x \log x \frac{dy}{dx} + y = 2 \log x$	A	2										
	d)	Solve $x(x + y) dy - y^2 dx = 0$	A	2										
	e)	Find the particular solution of D.E $y\sqrt{1-x^2} dy + x\sqrt{1-y^2} dx = 0$ When $x = \frac{3}{4}, y = \frac{4}{5}$	A	2										
	f)	A set of 18 items has mean and variance 7 and 16 respectively. But one number was taken 21 instead of 12 by mistake. Calculate correct mean and correct S.D.	U	3										
Q.6		Attempt any FOUR			(16)									
	a)	Two kinds of electric bulbs of the same wattage manufactured by a factory have mean life and S.D as given below: <table><tr><td>Sample</td><td>Mean life</td><td>S.D</td></tr><tr><td>A</td><td>1620hrs</td><td>300hrs</td></tr><tr><td>B</td><td>1940hrs</td><td>345hrs</td></tr></table> Which of the two bulbs has a greater variability?	Sample	Mean life	S.D	A	1620hrs	300hrs	B	1940hrs	345hrs	U	3	
Sample	Mean life	S.D												
A	1620hrs	300hrs												
B	1940hrs	345hrs												

b)	The following data gives the age in years of 100 voters of certain constituency.							A	3																							
<table><tr><td>Age less than or equal to</td><td>30</td><td>40</td><td>50</td><td>60</td><td>70</td><td>80</td><td>90</td></tr><tr><td>No of Voters</td><td>13</td><td>40</td><td>68</td><td>80</td><td>90</td><td>97</td><td>100</td></tr></table>									Age less than or equal to	30	40	50	60	70	80	90	No of Voters	13	40	68	80	90	97	100								
Age less than or equal to	30	40	50	60	70	80	90																									
No of Voters	13	40	68	80	90	97	100																									
Find mean and S.D																																
c)	Find the mean deviation from the mean for the following data							A	3																							
<table><tr><td>C.I</td><td>10-20</td><td>20-30</td><td>30-40</td><td>40-50</td><td>50-60</td><td>60-70</td></tr><tr><td>Frequency</td><td>4</td><td>6</td><td>10</td><td>18</td><td>9</td><td>3</td></tr></table>									C.I	10-20	20-30	30-40	40-50	50-60	60-70	Frequency	4	6	10	18	9	3										
C.I	10-20	20-30	30-40	40-50	50-60	60-70																										
Frequency	4	6	10	18	9	3																										
d)	The weights in gms of the tins are given below.							A	3																							
<table><tr><td>Wt in gms</td><td>900-920</td><td>920-940</td><td>940-960</td><td>960-980</td><td>980-1000</td><td>1000-1020</td><td>1020-1040</td></tr><tr><td>No of tins</td><td>4</td><td>11</td><td>63</td><td>90</td><td>73</td><td>38</td><td>10</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td>10</td><td>05</td></tr></table>									Wt in gms	900-920	920-940	940-960	960-980	980-1000	1000-1020	1020-1040	No of tins	4	11	63	90	73	38	10							10	05
Wt in gms	900-920	920-940	940-960	960-980	980-1000	1000-1020	1020-1040																									
No of tins	4	11	63	90	73	38	10																									
						10	05																									
Calculate S.D by using step deviation method.																																
e)	A box contains 10 radio valves of which 4 are defective. Show that the probability is $\frac{2}{15}$ if two of them valves are taken from the box such that both are defective.							U	4																							
f)	The probability that a student passes H.S.C examination is $\frac{2}{3}$ and the probability that he passes both H.S.C and IIT entrance examinations is $\frac{14}{45}$. The probability that he passes atleast one examination is $\frac{4}{5}$. What is the probability that he passes the IIT entrance examination?							A	4																							

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVEN TERM END EXAM MAY-2019**EXAM SEAT NO.**

--	--	--	--	--	--

LEVEL :- FOURTH **PROGRAM : MECHANICAL****COURSE CODE :- MEF410/ME309/MEE410****COURSE NAME MECH. MEASUREMENT & MECHATRONICS****MAX. MARKS : 80** **TIME : 3 HRS.** **DATE :- 13/05 / 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	S Q N	Section- I			R/ U/ A	Co MEF 410	Mar ks
Q.1		Attempt any FOUR :					08
	a)	Differentiate between Accuracy and Precision.			U	1	
	b)	Draw the block diagram of zero order system and write one example of it.			R	1	
	c)	Define the term Threshold.			R	1	
	d)	A metallic toothed-rotor having 40 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 2400 per second. Calculate the shaft speed.			A	2/3	
	e)	A spring scale requires a change of 100N in the applied weight to produce a 2cm change in the deflection of the spring scale. Determine the static sensitivity.			A	1	
	f)	A pressure gauge reads 15 bar pressure and the true value of the pressure is 14.5 bar. Determine the error and the correction for the given pressure gauge.					
Q.2		Attempt any FOUR :					16
	a)	Draw the block diagram of generalized measurement system and explain the role of sensor in brief.			U	1	
	b)	The principle of Electromagnetic Induction can be used to measure the speed of a rotating shaft. Explain the working of such a measuring instrument with suitable sketch.			A	2/3	
	c)	Explain the working principle of capacitive liquid level sensor, with suitable sketch.			U	3	
	d)	Classify errors,. Write the causes and remedies of any two types of errors.			U	1	
	e)	Explain the working of Linear Motion potentiometer with suitable circuit diagram.			U	2/3	
	f)	Enlist the types of strain gauge and define the term gauge factor.			R	3	
Q.3		Attempt any FOUR :					16
	a)	Explain the working of constant temperature type hot wire anemometer with a neat sketch.			U	3	
	b)	Select suitable measuring instrument to measure force acting on a beam. Explain its working with a sketch.			A	2/3	
	c)	Draw a neat labeled sketch of Eddy current Dynamometer.			R	3	

P.T.O.

	d)	Enlist speed (rpm) measuring instruments (any 8)	R	2/3	
	e)	Explain the working of optical pyrometer with suitable sketch.	U	2/3	
	f)	Piezoelectric crystal can be used to convert sound energy to electrical energy. Explain such an instrument with suitable sketch.	A	3	
QN	S Q N	Section- II	R/ U/ A	Co MEF 410	Mar ks
Q.4		Attempt any FOUR :			08
	a)	Draw pin configuration of 8051 microcontroller.	R	4	
	b)	State any four criteria of selection of PLC.	R	4	
	c)	Identify the need of Data acquisition system in automated industry.	A	5	
	d)	Draw neat sketch of A/D flash converter.	R	5	
	e)	State specific applications of variable frequency drive.	R	6	
	f)	Draw neat labelled sketch of Pneumatic actuation system.	R	6	
Q.5		Attempt any FOUR :			16
	a)	Draw architecture of 8051 microcontroller.	R	4	
	b)	Compare microprocessor and microcontroller in any four important points.	U	4	
	c)	Draw block diagram of PLC and label it.	R	4	
	d)	Explain different buses in microprocessor system.	U	4	
	e)	Explain R-2R resistor ladder type of D/A converter.	U	5	
	f)	Draw neat labelled sketch of data loggers and explain is working.	R	5	
Q.6		Attempt any FOUR :			16
	a)	Draw neat labelled sketch of microprocessor system. State its two applications.	R	4	
	b)	Identify suitable device to control rotary movement of shaft and explain its features.	U	6	
	c)	Explain working principle of field current interaction in electric motor.	U	6	
	d)	Identify any eight selection criteria of electric motor as per application.	A	6	
	e)	Explain hydraulic actuation system with neat sketch.	U	6	
	f)	Draw neat labelled sketch of electromagnetic relay and explain its working.	R	6	

GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

EVEN TERM END EXAM MAY -2019**EXAM SEAT NO.**

--	--	--	--	--	--	--	--

LEVEL: FIRST**PROGRAM: CE/ME/SM/MT****COURSE CODE: CCF101/X102/CCE101/0104****COURSE NAME: ENGINEERING PHYSICS****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 08/05/2019****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

S QN	Q N	Question Text	R U A	CO CCF101	Marks
Q.1		Attempt any FOUR			(08)
	a)	Define factor of safety.	R	1	
	b)	State any two applications of elasticity.	R	1	
	c)	Define specific volume & specific weight.	R	1	
	d)	State Stoke's law of viscosity.	R	1	
	e)	Define Cohesive force and Adhesive force.	R	1	
	f)	State the effect of temperature & impurity on surface tension.	U	1	
Q.2		Attempt any FOUR			(16)
	a)	Define stress. Explain its types.	U	1	
	b)	State and explain Newton's law of viscosity. Define coefficient of viscosity.	U	1	
	c)	Explain Laplace molecular theory of surface tension.	U	1	
	d)	Define capillary action. Give its any three examples.	R	1	
	e)	Differentiate between longitudinal wave and transverse wave (any four points).	U	2	
	f)	Define Nanostructured material. Give its any two examples.	R	3	
Q.3		Attempt any FOUR			(16)
	a)	A wire of diameter 2mm and length 2.5m extends by 1.5mm by applying a force of 15N. Find Young's modulus of wire.	A	1	
	b)	Derive the expression for coefficient of viscosity of liquid by Stokes method.	A	1	
	c)	Define Resonance. Give its any two applications.	R	2	
	d)	State any four applications of surface tension.	R	1	
	e)	Explain free and forced oscillations with one example each.	U	2	
	f)	State any four applications of Nanotechnology.	R	3	
P.T.O					

Q.4	Attempt any FOUR			(08)
	a) Define i) Refraction ii) Dispersion	R	4	
	b) State any two properties of photons.	R	5	
	c) Define i) Photoelectric effect ii) Threshold frequency	R	5	
	d) Mention any two properties of x-ray.	R	5	
	e) Define i) Echo ii) Reverberation	R	6	
	f) Define ultrasonic waves.	R	6	
Q.5	Attempt any FOUR			(16)
	a) For refraction of light through a prism show that $A + \delta = i + e$	A	4	
	b) With the help of a neat circuit diagram of meter-bridge, derive an expression for unknown resistance.	A	4	
	c) Explain the concept of population inversion with the help of neat diagrams.	U	5	
	d) Find the refractive index of a prism, if its refracting angle is 60° and the angle of minimum deviation is $48^\circ 36'$	A	4	
	e) With the help of a neat diagram explain the construction of a photo-cell.	U	5	
	f) When two resistances are connected in series their effective resistance is 100Ω but when they are connected in parallel the effective resistance is 24Ω . Calculate the two resistances.	A	4	
Q.6	Attempt any FOUR			(16)
	a) i) State and explain Ohms law. ii) Define specific resistance and give its SI unit.	R	4	
	b) State and explain four properties of laser.	U	5	
	c) Mention any four applications of x-rays.	R	5	
	d) Explain any one method of production of ultrasonic waves.	U	6	
	e) Mention the requirements of good acoustics for an auditorium (any four points)	R	6	
	f) Calculate kinetic energy of ejected photoelectrons, if light of frequency 1.39×10^{15} Hz is made incident on a metal plate of threshold frequency 1.12×10^{15} Hz. Given $h = 6.63 \times 10^{-34}$ Js.	A	5	

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVEN TERM END EXAM MAY-2019**EXAM SEAT NO.**

--	--	--	--	--	--	--	--

LEVEL :- FOURTH**PROGRAM : MECHANICAL ENGG.****COURSE CODE :- MEF401/MEE401****COURSE NAME POWER ENGINEERING****MAX. MARKS : 80 TIME : 3 HRS. DATE :- 08/05/2019****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		S Q N	Section- I			R/ U/ A	Co MEF 401	Mar ks
Q.1			Attempt any FOUR :			A		08
	a)		State the causes of pre-ignition.			R	1	
	b)		State the limitations of catalytic converter.			R	2	
	c)		Explain loop or reverse scavenging?			U	1	
	d)		Define i) volumetric Efficiency ii) Relative Efficiency			R	4	
	e)		Classify cooling systems of IC engine.			R	2	
	f)		State the functions of i) crank shaft & ii) Piston.			U	1	
Q.2			Attempt any FOUR :					16
	a)		Explain with neat sketch infrared exhaust gas analyzer.			R	2	
	b)		Explain hydrodynamic lubrication and boundary lubrication.			R	2	
	c)		Explain with neat sketch Turning moment diagram of four stroke I.C. engine			U	1	
	d)		Classify IC engines are classified.			R	1	
	e)		Explain the necessity of testing an IC engine? State the types of tests carried out on engines.			U	3	
	f)		Describe the stages of combustion in SI engine.			R	1	
Q.3			Attempt any TWO :					16
	a)		In an ideal Otto cycle, air at the beginning of compression is at 1 bar and 15°C. The ratio of compression is 8. If heat added during constant volume process is 1000 KJ/kg, determine, i) Maximum temperature in the cycle ii) Air standard Efficiency. iii) Workdone per kg of air. iv) Heat rejected. $C_v = 0.718 \text{ KJ/kg-K}$ & $\gamma = 1.4$			A	1	

P.T.O.

	b)	Following observations are made during the trial on two stroke oil engine. Brake power = 9.94 KW Fuel oil consumption = 3.6 kg C.V. of fuel = 42,500 KJ/kg. Mass of jacket cooling water per hour = 468 Kg. Rise in temp of cooling water = 28 °C Air used per kg of oil = 34 Kg Amb. Temperature = 300 °C Temperature of exhaust gas = 4000 °C. Cp=1.005 KJ/kg-K. Draw a heat balance sheet on minute basis.	A	3	
	c)	i) Derive an expression for air standard efficiency of diesel cycle. ii) A single cylinder, CI engine with a brake thermal efficiency of 30% uses diesel oil having C.V. of 42000 KJ/kg. If its mechanical efficiency is 80%. Calculate 1) BSFE 2) ISFC 3) η_{ith}	U A	1 4	
QN	S Q N	Section- II	R/ U/ A	Co MEF 401	Mar ks
Q.4		Attempt any FOUR :			08
	a)	Define "Free air delivery (FAD)" of reciprocating compressor.	R	5	
	b)	State the function of intercooler in multistage compressor.	U	5	
	c)	Which type of compressor is used for gas turbine? Why?	U	5	
	d)	Represent subcooled vapour compression cycle on T-S diagram labeling clearly all process	R	6	
	e)	State the function of expansion valve.	U	6	
	f)	Define specific humidity and write its equation.	R	6	
Q.5		Attempt any FOUR :			16
	a)	An air motor is supplied with compressed air at 6.5 bars and 157 °C from a single stage reciprocating compressor. Air is expanded to atmosphere pressure of 1.04 bar in motor. Determine the work required in compressor by 1 kg of air and the intake air temperature of compressor. Assume compression according to $pV^{1.3} = \text{const}$ and neglect clearance.	A	5	
	b)	Differentiate between reciprocating and rotary compressors.	U	5	
	c)	With line diagram explain open cycle gas turbine.	R	5	
	d)	Explain vapour compression cycle with T-S and P-H diagram.	U	6	
	e)	State the advantages of vapour absorption system.	R	6	
	f)	Explain sensible heating with dehumidification by sketching it on outline diagram of psychrometric chart.	R	6	

Q.6	Attempt any TWO:		16
a)	A single stage double acting air compressor delivers 3 m^3 of free air per minute at 1.013 bar and 20°C to 8 bar with following data: RPM = 300; Mech efficiency = 0.9; pressure loss in passing through intake valve = 0.04 bar; temperature rise of air during suction stroke = 12°C; clearance volume = 5% of stroke volume; index of compression and expansion, $n=1.35$; length stroke = 1.2 times cylinder diameter. Calculate :- - Power input to the shaft - The volumetric efficiency - The cylinder diameter	A	5
b)	Draw a neat sketch of closed cycle gas turbine. Explain the cycle and represent it on T-S diagram. State the advantages of closed cycle gas turbine.	U	5
c)	Explain construction and working of ice plant with neat sketch.	R	6

GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

EVEN TERM ENDE EXAM MAY -2019**EXAM SEAT NO.**

--	--	--	--	--	--	--	--	--	--

LEVEL: THIRD**PROGRAM: MECHANICAL****COURSE CODE: MEF302/MEE302****COURSE NAME: THERMAL ENGINEERING****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 09/05/2019****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	S Q N	Question Text	R U A	CO MEF 302	Marks
Q.1		Attempt any FOUR			(08)
	a)	Define the term "pure substance" and give its examples.	R	1	
	b)	Define thermodynamic system. Classify the same.	U	1	
	c)	Draw neat sketch of isolated system and label it with energy intersections.	R	1	
	d)	Define intensive property and give its examples.	R	1	
	e)	State zeroth law of thermodynamics.	U	2	
	f)	State Fourier's law of heat conduction.	U	3	
Q.2		Attempt any FOUR			(16)
	a)	Define thermodynamic concept of work. Show that an electric system is equivalent to thermodynamic work.	R	1	
	b)	Define the following terms i) Property ii) Process iii) State iv) Cycle.	R	1	
	c)	List the limitations of a first law of thermodynamics.	R	2	
	d)	A closed system undergoes a reversible process at constant pressure of 3.5 bar and its volume changes from 0.15 m ³ to 0.06 m ³ . During this process 25 KJ of heat is rejected by the system. Determine changes in internal energy of the system.	A	2	
	e)	Derive the relation $(C_p - C_v) = R$ and $C_v = \frac{R}{\gamma - 1}$	A	2	
	f)	2 kg of gas at 50° C is heated at constant volume until the pressure is doubled. Determine i) Final temperature ii) Change in internal energy.	A	2	
Q.3		Attempt any TWO			(16)
	a)	State and explain with neat sketches Kelvin plank and clausious statement of second law of thermodynamics.	R	2	

P.T.O

	b)	A certain quantity of air has a volume of 0.028 m^3 at a pressure of 1.25 bar and 25°C . It is compressed to a volume of 0.042 m^3 according to the law $PV=1.3$ constant. Find the temperature and work done during compression.	A	2	
	c)	With neat sketch explain shell and tube heat exchanger.	U	3	
Q.4		Attempt any FOUR			(08)
	a)	Define i) Wet steam ii) Superheated steam.	R	4	
	b)	Define mountings. State the location of steam pressure gauge.	R	5	
	c)	State continuity equation. State meaning of each term.	R	6	
	d)	Classify steam turbines.	U	6	
	e)	State Dalton's law of partial pressure.	R	6	
	f)	Enlist the sources of air leakage in steam condenser.	R	6	
Q.5		Attempt any FOUR			(16)
	a)	Represent the process of generation of steam on T-H diagram and label it	U	4	
	b)	Determine the enthalpy of 1 kg of steam at a pressure of 12 bar when the steam is i) 80% dry and ii) Superheated upto 280°C . Assume C_p of superheated steam $= 2.1 \text{ KJ/kg}$. Refer steam table for the properties of steam. <i>hf = 209 KJ/kg, hfg = 2382 KJ/kg, hg = 2592 KJ/kg. T = 219.57</i>	A	4	Required data hf = 1235 hfg = 1543 hg = 2779 KJ
	c)	Distinguish between water tube and fire tube boiler.	U	6	
	d)	State the purpose of compounding of steam turbine. Describe pressure compounding.	A	6	
	e)	State the process of 'bleeding of steam'. Draw a neat sketch and interpret the process.	U	6	
	f)	Distinguish between Jet and surface condensers.	U	6	
Q.6		Attempt any FOUR			(16)
	a)	Determine the dryness fraction of steam if 0.7 kg of water is in suspension with 35 kg of dry steam.	A	4	
	b)	Represent isobaric and isentropic process on enthalpy - entropy chart.	U	4	
	c)	State the functions of i) Economiser ii) Pressure gauge iii) Fusible plug iv) Super heater.	U	5	
	d)	Define the term 'boiler draught'. Distinguish between natural and artificial draught.	U	5	
	e)	Define 'nozzle' state different types of nozzles. State two applications of nozzles.	U	6	
	f)	State the purpose of cooling tower. Draw a neat sketch of induced draft cooling tower and state function of each part.	A	6	

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVEN TERM END EXAM MAY-2019

EXAM SEAT NO.

--	--	--	--	--	--

LEVEL :- FOURTH PROGRAM : MECHANICAL ENGINEERING

COURSE CODE :- MEF403/MEE403/M308

COURSE NAME ADVANCE MACHINING PROCESSES

MAX. MARKS : 80 TIME : 3 HRS. DATE :- 09/05/2019

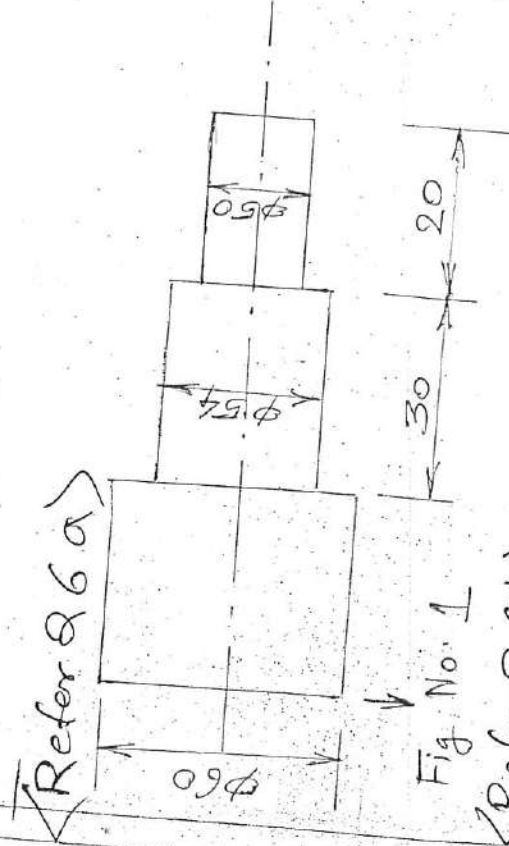
Instruction :-

- 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	S Q N	Section- I			R/ U/ A	Co MEF 403	Mar ks
Q.1		Attempt any FOUR :					08
	a)	List out the basic parts of column and Knee type milling machine.			R	1	
	b)	State the different types of milling operations.			U	1	
	c)	Define Gear Cutting.			R	2	
	d)	State the different work holding devices used on milling machine.			U	1	
	e)	Give the advantages and disadvantages of LBM			R	3	
	f)	State the working principle of Electron Beam machining. (EBM)			U	3	
Q.2		Attempt any FOUR :					16
	a)	Explain with neat sketch wire cut EDM.			R	3	
	b)	Explain plain indexing method.			U	2	
	c)	Explain with neat sketch "Straddle Milling".			U	1	
	d)	Differentiate between "Traditional and Non-traditional machining process".			U	3	
	e)	State the functions of Universal dividing head in milling machine. List out the different parts of UDH.			A	1	
	f)	Draw neat sketches of any four types of milling cutters.			U	1	
Q.3		Attempt any TWO :					16
	a)	Explain the construction and working of EDM with a neat sketch. State its advantages and limitations.			A	3	
	b)	Explain in detail following Gear finishing processes. i) Gear shaving. f) Gear Grinding.			A	2	
	c)	State the detailed classification of milling machines and draw a neat and labelled sketch of "Column and knee type milling machine".			U	1	

P.T.O.

QN		S Q N	Section- II		R/ U/ A	Co MEF 403	Mar ks
Q.4			Attempt any TWO :				08
	a)		Compare CNC machine with conventional machine.	R	4		
	b)		Explain open loop control with neat sketch.	U	4		
	c)		Define repair cycle. Write important terms involved in it.	R	5		
Q.5			Attempt any FOUR :				16
	a)		Describe principle parts of vertical machining centre with neat sketch.	U	4		
	b)		Describe incremental co-ordination system with example.	U	4		
	c)		Explain axis identification on CNC machines.	U	4		
	d)		Explain maintenance record.	U	5		
	e)		State the disadvantages of breakdown maintenance.	U	5		
	f)		Explain the elements of good housekeeping for an organization.	U	5		
Q.6			Attempt any TWO :				16
	a)		With a part program for Turning component as shown in Fig. No.1 Data given :- S 1000, F 200 mm/ min	A	4		
	b)		Write a part program for component as shown if Fig No.2 Data given :- S 800, F 300 mm/ min	A	4		
	c)		i) Explain application areas of CNC. ii) Explain the importance of machine tool maintenance.	U U	4 5		



Refer Q.6.b)



All dimensions are in mm

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVEN TERM END EXAM MAY-2019**EXAM SEAT NO.**

--	--	--	--	--	--

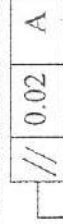
LEVEL :- FOURTH PROGRAM : MECHANICAL ENGINEERING**COURSE CODE :- MEF407/ME307/MEE407****COURSE NAME METROLOGY****MAX. MARKS : 80 TIME : 3 HRS. DATE :- 30/05/2019****Instruction :-**

- 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		S	Section- I		R/ U/ A	Co MEF 407	Mar ks																						
Q.1			Attempt any FOUR :				08																						
	a)		Define the following terms. i) Tolerance ii) Limit.		R	4																							
	b)		Define standard. Write the role of standard in measurement.		R	1																							
	c)		Write any four precautions/ care to be taken while using slip gauges.		R	1																							
	d)		Variation in temperature affects measurement. Justify.		A	1																							
	e)		Find the values of tolerances for hole and shaft with following dimensions. Hole : $\phi 25^{+0.05}_{+0.00}$ mm Shaft $\phi 25^{-0.02}_{-0.05}$ mm		A	4																							
	f)		Define CMM. Enlist types of CMM.		R	4																							
Q.2			Attempt any FOUR :				16																						
	a)		Define the term inspection. Explain its need in industry.		U	1																							
	b)		Build up a dimension of 24.192 mm by using M45 slip gauge set.		U	1																							
			<table><tr><th>Range (mm)</th><th>Step (mm)</th><th>Pieces</th></tr><tr><td>1.001 to 1.009</td><td>0.001</td><td>9</td></tr><tr><td>1.01 to 1.09</td><td>0.01</td><td>9</td></tr><tr><td>1.1 to 1.9</td><td>0.1</td><td>9</td></tr><tr><td>1 to 9</td><td>1</td><td>9</td></tr><tr><td>10 to 90</td><td>10</td><td>9</td></tr><tr><td colspan="2"></td><td>Total 45</td></tr></table>		Range (mm)	Step (mm)	Pieces	1.001 to 1.009	0.001	9	1.01 to 1.09	0.01	9	1.1 to 1.9	0.1	9	1 to 9	1	9	10 to 90	10	9			Total 45				
Range (mm)	Step (mm)	Pieces																											
1.001 to 1.009	0.001	9																											
1.01 to 1.09	0.01	9																											
1.1 to 1.9	0.1	9																											
1 to 9	1	9																											
10 to 90	10	9																											
		Total 45																											
	c)		Compare line standards and End standards.		U	1																							
	d)		Differentiate between Interchangeable assembly and selective assembly.		U	4																							
	e)		Differentiate between systematic error and random error.		U	1																							
	f)		State Taylor's principle of gauge design.		U	3																							

P.T.O.

Q.3	Attempt any FOUR :			16
a)	Explain any two types of fits with suitable sketches.	U	4	
b)	For the following hole and shaft assembly, find shaft tolerance, hole tolerance and state whether the type of fit is i) Clearance ii) Transition iii) Interference Hole : $\phi 25^{+0.03}_{+0.00}$ mm Shaft $\phi 25^{+0.06}_{-0.04}$ mm	A	4	
c)	Write any four precautions/ care to taken while using a measuring instrument for getting higher precision and accuracy.	R	1	
d)	Explain any four advantages of CMM.	U	4	
e)	Write the procedure for wringing of slip gauges.	U	1	
f)	Explain the purpose of giving geometrical tolerances on drawing. Write the meaning of different elements shown in Fig No. 1	A	3	
QN	Section - II	R/ U/ A	Co MEP 407	Mar ks
Q.4	Attempt any FOUR :			08
a)	Define i) Major diameter ii) Minor diameter of screw.	R	4	
b)	State qualitative methods of surface finish measurement.	R	4	
c)	Define i) Squareness ii) Roundness	R	5	
d)	List the types of errors in threads.	R	4	
e)	Define backlash and runout related to gear.	R	4	
f)	Define the term "calibration".	R	5	
Q.5	Attempt any FOUR :			16
a)	Explain analytical and functional inspection of Gears.	U	4	
b)	Explain how will you check parallelism of an axis to the plane.	A	5	
c)	Suggest the measuring instruments to measure following features of external and internal threads. i) Major Diameter ii) Effective diameter iii) Pitch iv) Thread angle.	A	4	
d)	Explain i) Ra ii) Rz value for surface finish measurement.	U	4	
e)	Mention calibration procedure for micrometer.	U	6	
f)	State the importance of calibration of measuring instrument.	U	6	
Q.6	Attempt any TWO :			16
a)	Explain in brief how effective diameter of a screw thread is to be measured using two wire method.	U	4	
b)	Explain with neat sketch Parkinson's gear tester (Gear rolling Tester) with sketch.	U	4	
c)	With neat sketch, explain stylus probe type instrument of surface finish measurement.	U	4	



Q.N.3 P.10, N.10.1 (82)

Page No. 4 of 4

GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

EVEN TERM END EXAM MAY -2019

EXAM SEAT NO.

--	--	--	--	--	--

LEVEL: THIRD

PROGRAM: MECHANICAL

COURSE CODE: MEF308/M208/ME208/MEE308 COURSE NAME: THEORY OF MACHINE AND MECHANISM

MAX. MARKS: 80

TIME: 3 HRS.

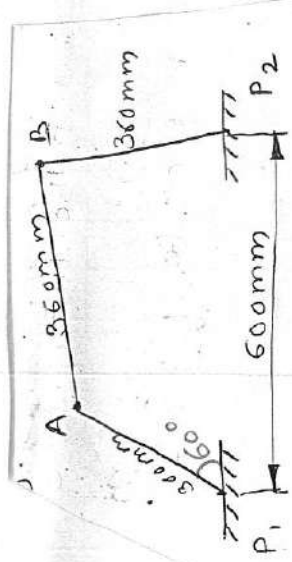
DATE: 21/05/2019

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	S Q N	Question Text	R U A	CO MEF 308	Marks
Q.1		Attempt any FOUR			(08)
	a)	Define Kinematic pair.	R	1	
	b)	List the types of Kinematic pair according to its motion between the elements.	R	1	
	c)	Define linear velocity.	R	2	
	d)	State formula for calculating velocity of slider crank mechanism.	R	2	
	e)	Define lower pair.	R	2	
	f)	Enlist the types of followers.	R	3	
Q.2		Attempt any FOUR			(16)
	a)	Explain elliptical trammels-inversion of double slider crank mechanism.	U	1	
	b)	Differentiate between machine & mechanism.	R	1	
	c)	As show in figure below, crank P ₁ A has an angular velocity of 10 rad/s & angular acceleration of 30 rad/sec ² , both clockwise. Determine the angular velocity of P ₂ B and AB (solve graphically)	A	2	
	d)	Draw neat sketch of Ackerman's steering.	R	2	
	e)	Write any four applications of cam & follower.	R	3	



P.T.O

f)	Find the magnitude & direction of centripetal and tangential component of acceleration for the link OA shown in figure. If pt. A moves with uniform velocity about fixed point 'O'.	A	2	
Q.3	Attempt any TWO			(16)
a)	i) Draw labelled sketch of crank & slotted lever arm quick return mechanism. ii) Explain Scott Russell mechanism	R U	1 2	
b)	i) In a single crank mechanism, length of connecting rod is 80 mm. Ratio of length of connecting rod & crank is 4. Crank rotates at 240 rpm in anticlockwise direction & crank makes 45° with I.D.C. Find velocity of slider & angular velocity of crank. ii) Explain Klein's construction for velocity diagram of slider crank mechanism.	A U	2 2	
c)	A cam is to be designed for a Knife-edge follower with the following data. i) Cam lift 40 mm during 90° of Cam rotation with SHM. ii) Dwell for next 30° iii) During next 60° of cam rotation, follower returns to its original position with SHM iv) Dwell during remaining 180° . Draw profile of cam when the line of stroke of follower passes through the axis of cam shaft the radius of base circle of cam is 40 mm.	A	3	
Q.4	Attempt any FOUR			(08)
a)	Define slip of belt and write formula of velocity ratio considering slip of belt.	R	4	
b)	Define i) Pitch circle ii) Pressure angle	R	4	
c)	Write advantages of involute gear.	R / U	4	
d)	Compare dry clutch with wet clutch.	U	5	
e)	What do you understand by sensitiveness of governor?	U	5	
f)	Enlist four types of spring controlled governor.	R	6	
Q.5	Attempt any FOUR			(16)
a)	Explain with neat sketch construction and working of centrifugal governor.	R / U	6	

P.T.O

	b)	Write any four requirements of clutch.	R / U	5	
	c)	Explain slip and creep of belt.	R	4	
	d)	Explain with neat sketch Reverted gear train also write formula for speed ratio of it.	U	4	
	e)	Prove that, $T_{\max} = 3T_C$ Where, $T_{\max}$ = Maximum tension in belt T_C = Centrifugal tension in belt	R / U	4	
	f)	A compound gear train consisting of four gears, gear A is mounted on driving shaft, gear B&C are mounted on same shaft. Gear D is mounted on Driven shaft. Number of teeth on gears A, B, C and D are 20, 50, 30, and 60 respectively. Driving shaft is rotating in clockwise direction at 400 rpm. Determine speed and direction of rotation of driven shaft.	U / A	4	
Q.6		Attempt any FOUR			(16)
	a)	The pulleys one 450 mm diameter and the other 200 mm diameter are on parallel shafts 1.95 m apart and are connected by a crossed belt. Find the length of belt required and angle of contact between the belt and each pulley.	U / A	4	
	b)	A compound gear train consists of six gears. The no. of teeth on gears A, B, C, D, E and F are 60, 40, 50, 25, 30 and 24 respectively. The gears B&C are on one shaft while gears D&E are on another shaft. The gear A drives gear B, gear C drives D and gear E drives F. If the gear A transmits 1.5 kw at 100 rpm and gear train has efficiency of 80%. Find the torque on gear F.	U / A	4	
	c)	Determine the maximum, minimum & average pressure in plate clutch when the axial force is 4 KN. The inside radius of the contact surface is 50 mm and outside radius is 100 mm. Assume uniform wear.	U / A	5	
	d)	Write difference between centrifugal and inertia governor.	U	6	
	e)	An engine of car has a single plate clutch develop maximum torque 147 N.m. External diameter of clutch plate is 1.2 times its internal diameter. Determine the dimension of clutch plate and axial force provided by the spring. The maximum pressure intensity of clutch facing 98 KN/m ² coefficient of friction is 0.3.	U / A	5	
	f)	For a belt 6 mm thick of mass 1 gm /cm ³ . Determine the width of belt so that stress in the belt does not exceed 210 N/cm ² . Power transmitted is 20 kw. Speed of rotation of driving shaft is 300 rpm & pulley diameter is 90 cm angle of lap is 180°. & coefficient of friction is 0.25.	U / A	4	

GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

EVEN TERM END EXAM MAY -2019**EXAM SEAT NO.**

--	--	--	--	--	--	--	--	--	--

LEVEL: FIFTH**PROGRAM: MECHANICAL****COURSE CODE: MEF507/ME411/MEE510 COURSE NAME: INDUSTRIAL HYDRAULICS AND****PNEUMATICS****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 27/05/2019****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

QN	S Q N	Question Text	R U A	CO MEF 507	Marks
Section -I					
Q.1		Attempt any FOUR			(08)
	a)	List any two limitations of hydraulic system.	R	3	
	b)	State types of valves used in hydraulic system.	R	4	
	c)	Draw symbol of double acting cylinder.	R	2	
	d)	What is function of i) Pressure relief valve ii) Oil reservoir.	R	4	
	e)	State disadvantages of screw pump.	R	3	
	f)	Draw neat and labeled sketch of external gear pump.	R	3	
Q.2		Attempt any FOUR			(16)
	a)	Draw general layout of hydraulic system and explain its working.	U	5	
	b)	Define viscosity index and state its significance.	U	1	
	c)	Compare Gear pump and Vane pump. (4 important points)	U	3	
	d)	Explain two mounting methods of cylinder.	U	4	
	e)	Explain the construction of 4/2 poppet valve with neat sketch and symbol.	U	4	
	f)	Draw and explain in brief meter in circuit.	R	5	
Q.3		Attempt any TWO			(16)
	a)	Sketch and explain meter –in-circuit to control speed of extension of DAC. Explain why meter-in-circuit is not preferred for over running loads.	A	5	
P.T.O					

	b)	What is seal? Classify seals according to shape. State the factors for seal selection.	U	3	
	c)	What is function of filters? Classify the filters and draw two types of filters.	U	5	
Section-II					
Q.4		Attempt any FOUR			(08)
	a)	Enlist any four components of pneumatic system.	R	2	
	b)	Draw symbol of solenoid operated 5/3 D.C. Valve.	U	1	
	c)	Draw symbol of double acting actuator with double piston rod.	U	1	
	d)	Draw symbol of FRL unit.	U	1	
	e)	State any four materials used in pneumatic pipes.	U	3	
	f)	How actuators are classified?	R	3	
Q.5		Attempt any FOUR			(16)
	a)	Explain with neat sketch construction and working of two stages Reciprocating compressor.	U	3	
	b)	Explain with neat sketch construction & working of spool type 4/2 D.C valve.	U	3	
	c)	Explain with neat sketch construction & working of single acting linear actuator.	U	3	
	d)	Explain with neat sketch construction & working of Vane type air motor.	U	3	
	e)	Explain with neat sketch construction & working of quick exhaust valve.	U	3	
	f)	Name any eight pipes & tube fittings, write their functions in brief.	U	3	
Q.6		Attempt any TWO			(16)
	a)	State merits & limitations of pneumatic system.	U	3	
	b)	Explain with neat sketch sequencing of single acting cylinder & double acting cylinder using roller operated D.C. Valve	A	5	
	c)	Explain working of pneumatic 'OR' circuit to operate single acting cylinder with neat sketch.	A	5	

GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

EVEN TERM END EXAM MAY -2019

EXAM SEAT NO.

--	--	--	--	--	--

LEVEL: **THIRD**

PROGRAM: CE/ME/SM/MT

COURSE CODE: CEF 313/MEF313/MEE313/ME214 COURSE NAME: **HIGHER MATHEMATICS**

MAX. MARKS: 80

TIME: 3 HRS.

DATE: 24/05/2019

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	S	Question Text	R	CO	Marks												
Q.1		Attempt any FOUR			(08)												
	a)	Define forward and backward difference operator.	R	1													
	b)	Prove that $EV = VE = \Delta$	U	1													
	c)	Find $\left(\frac{\Delta^2}{E}\right)x^3$	A	1													
	d)	If $z = 3^x \tan y$ find $\frac{\partial z}{\partial x} \cdot \frac{\partial z}{\partial y}$	R	2													
	e)	If $u = e^{xyz}$ find $\frac{\partial^3 u}{\partial x \partial y \partial z}$	A	2													
	f)	If $u = \sin^{-1}\left(\frac{x}{y}\right)$ prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 0$	U	2													
Q.2		Attempt any FOUR			(16)												
	a)	Using Lagrange's interpolation formula estimate u_4 and u_6 with $u_0 = -18, u_1 = 0, u_5 = -248$	A	1													
	b)	Express $y = 3x^3 + x^2 + x + 1$ in the factorial notation. Hence find $\Delta^3 y$	A	1													
	c)	Find missing term in the following table <table><tr><td>x</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>y</td><td>2</td><td>5</td><td>7</td><td>-</td><td>32</td></tr></table>	x	1	2	3	4	5	y	2	5	7	-	32	A	1	
x	1	2	3	4	5												
y	2	5	7	-	32												
	d)	Using Newton's forward interpolation formula find $f(8)$ <table><tr><td>x</td><td>5</td><td>10</td><td>15</td><td>20</td></tr><tr><td>f(x)</td><td>50</td><td>70</td><td>100</td><td>145</td></tr></table>	x	5	10	15	20	f(x)	50	70	100	145	A	1			
x	5	10	15	20													
f(x)	50	70	100	145													
	e)	If $u = \log(\tan x + \tan y + \tan z)$ prove that $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = 6u$	U	2													
Q.3		Attempt any FOUR			(16)												
	a)	Given <table><tr><td>x</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>y</td><td>7</td><td>17</td><td>45</td><td>103</td><td>203</td></tr></table> Find y when $x = 3.6$ using suitable interpolation.	x	0	1	2	3	4	y	7	17	45	103	203	A	1	
x	0	1	2	3	4												
y	7	17	45	103	203												
	b)	Using Newton's forward interpolation formula find $\sin 45^\circ$ <table><tr><td>x</td><td>0°</td><td>30°</td><td>60°</td><td>90°</td></tr><tr><td>$\sin x$</td><td>0</td><td>0.5</td><td>0.87</td><td>1</td></tr></table>	x	0°	30°	60°	90°	$\sin x$	0	0.5	0.87	1	A	1			
x	0°	30°	60°	90°													
$\sin x$	0	0.5	0.87	1													

P.T.O

c)	If $x = u \cos v$, $y = u \sin v$ prove that $JJ' = 1$	U	2	
d)	if $u = \tan^{-1}(x^2 + 2y^2)$ prove that i) $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \sin 2u$ ii) $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = 2 \sin u \cos 3u$	U	2	
e)	If $u = \log \left(\frac{x^3 + y^3}{x^2 + y^2} \right)$ prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 1$	U	2	
f)	If $z^3 - xz - y = 0$ Find $\frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}$	A	2	
Q.4	Attempt any FOUR			(08)
a)	Define Laplace transform of $f(t)$	R	3	
b)	Solve: $\frac{d^3 y}{dx^3} - \frac{5d^2 y}{dx^2} + \frac{8dy}{dx} - 4y = 0$	R	4	
c)	Show that, the solution of differential equation : $\frac{d^3 y}{dx^3} - \frac{3d^2 y}{dx^2} + \frac{3dy}{dx} - y = 0$ is $y = (c_1 + c_2 x + c_3 x^2) e^x$	U	4	
d)	State Convolution theorem for inverse Laplace transform.	R	3	
e)	Prove that, $L\{\cos at\} = \frac{s}{s^2 + a^2}$	U	3	
f)	Define linear differential equation of degree 'n' with constant coefficient.	R	4	
Q.5	Attempt any FOUR			(16)
a)	Prove that, $L\left\{\frac{2 \sin t \sin 2t}{t}\right\} = \frac{1}{2} \log \left(\frac{s^2 + 9}{s^2 + 1} \right)$	U	3	
b)	Solve: $\frac{d^3 y}{dx^3} + 27y = 0$	A	4	
c)	Solve: $\frac{d^4 y}{dx^4} + \frac{2d^3 y}{dx^3} + \frac{3d^2 y}{dx^2} + \frac{2dy}{dx} = 0$	A	4	
d)	Using the method of Partial fraction find $L^{-1} \left\{ \frac{s+29}{(s+4)(s^2+9)} \right\}$	A	3	
e)	Show that, the solution of differential equation : $\frac{d^4 y}{dx^4} + \frac{8d^2 y}{dx^2} + 16y = 0$ is $y = (c_1 + c_2 x) \cos 2x + (c_3 + c_4 x) \sin 2x$	U	4	
f)	Solve using Laplace transform: $\frac{dy}{dx} + y = e^{-3x}$; $y(0) = 1$	A	3	
Q.6	Attempt any FOUR			(16)
a)	Find: $L\{t \cos 2t \cosh t\}$	A	3	
b)	Using method of partial fraction prove that $L^{-1} \left\{ \frac{2s^2 - 4}{(s+1)(s-2)(s-3)} \right\} = \frac{-1}{6} e^{-t} - \frac{4}{3} e^{2t} + \frac{7}{2} e^{3t}$	U	3	
c)	Using Convolution theorem for inverse Laplace transform. find: $L^{-1} \left\{ \frac{s^2}{(s^2+1)(s^2+4)} \right\}$	A	3	
d)	Prove that solution of differential equation $\frac{d^4 y}{dx^4} + a^4 y = 0$ is $y = e^{\frac{a}{\sqrt{2}}x} \left[c_1 \cos \left(\frac{a}{\sqrt{2}}x \right) + c_2 \sin \left(\frac{a}{\sqrt{2}}x \right) \right] + e^{-\frac{a}{\sqrt{2}}x} \left[c_3 \cos \left(\frac{a}{\sqrt{2}}x \right) + c_4 \sin \left(\frac{a}{\sqrt{2}}x \right) \right]$	U	4	
e)	Solve: $\frac{d^4 y}{dx^4} + \frac{18d^2 y}{dx^2} + 81y = 0$			
f)	Solve: $\frac{d^3 y}{dx^3} + \frac{3d^2 y}{dx^2} + \frac{4dy}{dx} + 2y = 0$			

GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

EVEN TERM END EXAM MAY -2019

EXAM SEAT NO.

--	--	--	--	--	--

LEVEL: THIRD

PROGRAM: MECHANICAL /SUGAR

COURSE CODE: MEF309/ME209/MEE309/SM207 COURSE NAME: ELECTRICAL TECHNOLOGY

MAX. MARKS: 80

TIME: 3 HRS.

DATE: 27/05/2019

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	S Q N	Question Text	R U A	CO MEF A 309	Marks
Q.1		Attempt any FOUR			(08)
	a)	Explain the phenomena of electrical resistance.	U	1	
	b)	Write Ohms law of electrical conductors and its mathematical expression.	R	1	
	c)	Define a three phase system in electrical engineering.	R	3	
	d)	Explain balanced loads in electrical engineering	U	3	
	e)	Explain the property of inductance of coils.	U	1	
	f)	Explain the need for earthing of electrical installations.	U	3	
Q.2		Attempt any FOUR			(16)
	a)	Explain Kirchhoff's laws for electrical circuits and write their equations along with simple diagram.	U	1	
	b)	Write the voltage relations for the line and phase values for a star network. If the phase current in such a network is 10A. Determine the line value.	U	3	
	c)	Determine the equivalent resistance between nodes X & Y for network in fig. given below.			
			A	1	
	d)	Compare the three phase three wire & three phase four wire system of electric supply.	V	3	
	e)	An electric heater rated at 230 V, draws a current of 5.2 A for 20 minutes. Calculated the power and energy assuming it a single phase heater.	A	1	
	f)	Explain using proper sketches the plate earthing system and give its two applications.	A	3	

P.T.O

Q.3	Attempt any FOUR			(16)
a)	Explain with simple sketches the laws electromagnetic induction.	U	2	
b)	Write the applications of the following meters and show their connections in a simple circuit branch. i) Voltmeter ii) Clip-on-meter	U	2	
c)	Write down four applications of the digital multimeter.	U	2	
d)	Define cycle and frequency related to alternating quantities.	R	2	
e)	A certain alternating quantity is given by $q=141.4 \cos 100\pi t$. Determine its i) Frequency ii) Maximum peak value iii) RMS value iv) Average value	A	2	
f)	A certain electrical branch has a resistance of 6 ohms and inductive reactance of 8 ohms. Draw the circuit branch showing the same and calculated the impedance of the branch.	A	2	
Q.4	Attempt any FOUR			(08)
a)	Classify D.C motors.	R	6	
b)	State inverse square law of illumination.	R	5	
c)	Give classification of single phase AC motors.	R	7	
d)	Define transformer.	R	4	
e)	State the applications of 3 ϕ phase induction motors. (any four)	A	7	
f)	Why efficiency of a transformer is very high.	U	4	
Q.5	Attempt any FOUR			(16)
a)	Give the schematic representation and applications of D.C.motors.	U	6	
b)	Draw & explain torque-speed characteristics of 3 phase induction motors.	U	7	
c)	Explain dielectric heating with neat diagram.	R	5	
d)	Define the term illumination & give illumination level required for small & big workshop, drawing hall.	A	5	
e)	What are the constant and variable losses of a transformer?	R	4	
f)	Compare ideal & parallel transformer.	U	4	
Q.6	Attempt any FOUR			(16)
a)	Derive an emf equation of a transformer.	U	4	
b)	Compare stepper motor & servo motor.	U	6	
c)	Explain Direct-On-Line (DOL) starter used for starting the 3-phase induction motor.		7	
d)	Explain the need of starters for squirrel cage induction motor.	U	7	
e)	With neat diagram explain the working if induction furnace.	R	5	
f)	With help of neat sketch explain resistance heating.	U	5	

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVEN TERM END EXAM MAY-2019**EXAM SEAT NO.**

--	--	--	--	--	--	--	--

LEVEL :- THIRD**PROGRAM : MECHANICAL ENGINEERING****COURSE CODE :- MEF310/ME210/MEE310****COURSE NAME :- ENGINEERING METALLURGY AND MATERIALS****MAX. MARKS : 80 TIME : 3 HRS. DATE :- 29 / 05 / 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	S Q N	Question Text	R/ U/ A	Co MEF 310	Ma rks
Q.1		Attempt any FOUR :			08
	a)	Draw HCP lattice structure. State two metals having HCP lattice structure.	R	1	
	b)	Classify crystal system.	U	1	
	c)	Define packing factor. State packing factor of BCC & FCC lattice structure.	R	1	
	d)	Draw cooling curve of pure metal and alloy.	U	2	
	e)	Iron is an allotropic metal. Justify.	A	1	
	f)	State the meaning of 40 Cr4Mo2 and FG150.	R	1	
Q.2		Attempt any FOUR :			16
	a)	Distinguish between substitutional solid solution and interstitial solid solution.	U/ A	1	
	b)	Explain mechanism of crystallization of pure metal	U	1	
	c)	Illustrate point and line imperfection of crystal in short.	U	1	
	d)	Construct equilibrium diagram of solid solution system, and state the important features in it.	A	2	
	e)	Construct equilibrium diagram for eutectic system and state its steps.	A	2	
	f)	Explain meaning of eutectoid and eutectic mixture alongwith their reactions.	U	2	
Q.3		Attempt any FOUR :			16
	a)	Draw iron-iron carbide equilibrium diagram. State and define various phases associated with iron-carbon equilibrium diagram.	U	1	
	b)	Identify various parameters in selection of material. Classify engineering material.	A	1	

	c)	Compare white cast iron and gray cast iron in terms of properties and applications.	U/ A	1
	d)	Explain changes in microstructure during slow cooling of hypereutectoid steel with sketch.	U	1
	e)	State any four properties and applications of high speed steel.	U/ A	1
	f)	Elaborate the effects of ferrite stabilizers and austenite stabilizers on iron-carbon equilibrium diagram.	U/ A	1
Q.4		Attempt any FOUR :		08
	a)	Define heat treatment. State any four purposes of heat treatment.	R	3
	b)	Hardening is always followed by tempering heat treatment. Explain.	U	3
	c)	Give the advantages and limitations of ceramics.	U	4
	d)	Give the application of aluminum alloy.	A	4
	e)	Enlist important characteristics of polymer.	U	4
	f)	Define NDT. Give its importance.	R	5
Q.5		Attempt any FOUR :		16
	a)	Explain flame hardening heat treatment with neat sketch.	U	3
	b)	With neat sketch explain TTT diagram for eutectoid steel	U	3
	c)	Explain ABS with its characteristics and application.	A	4
	d)	Give the composition, properties and applications of i) Muntz metal ii) Gun metal	A	4
	e)	Explain the principle of eddy current testing. State its advantages and limitation.	R	4
	f)	Explain dye-penetrant test of non destructive testing with its application and limitations.	A	5
Q.6		Attempt any TWO :		16
	a)	Explain annealing heat treatment in detail. With its purpose, advantages and limitations.	U	3
	b)	i) Differentiate between hardening and normalizing. ii) Give the properties and applications of PVC and Bakelite.	U	3 4
	c)	i) Explain the ultrasonic test of non destructive testing with its advantages & limitations. ii) Give the properties and applications of nano material and smart material.	A A	5 5

GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

EVEN TERM END EXAM MAY -2019**EXAM SEAT NO.**

--	--	--	--	--	--

LEVEL: FIFTH**PROGRAM: MECHANICAL****COURSE CODE: MEF503/MEE504****COURSE NAME: INDUSTRIAL ENGINEERING****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 28/05/2019****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.

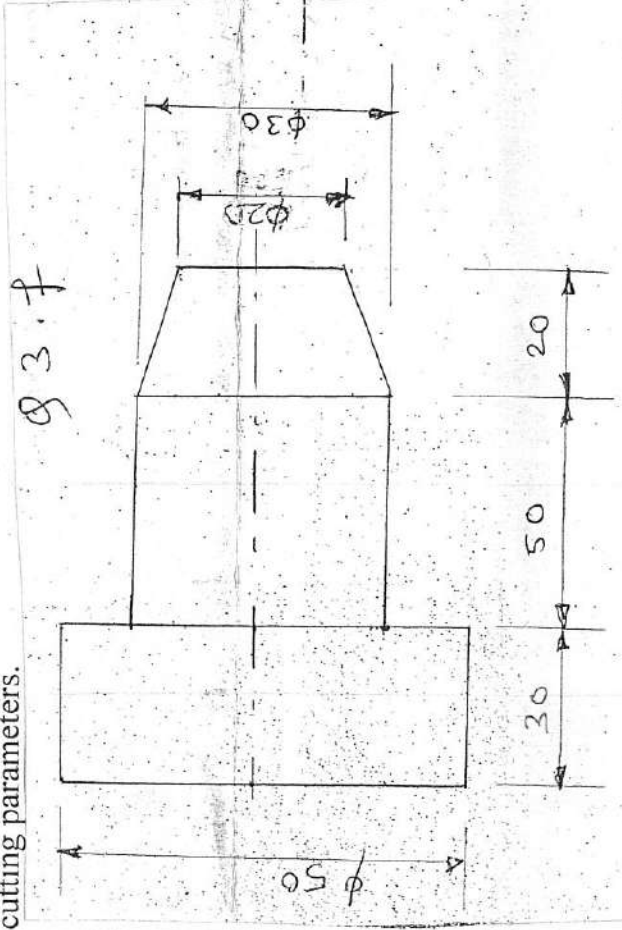
5) Assume and mention suitable additional data necessary.

6) Use of Mobile is strictly prohibited.

7) QN>Question No, SQN>Sub-Question No, R> Remembering, U>Understanding, A>Application CO>Course outcome

QN	S Q N	Question Text	R U A	CO MEF 503	Marks
Section -I					
Q.1		Attempt any FOUR			(08)
	a)	Define productivity and write its relationship with production.	U	1	
	b)	Draw a labelled sketch of process layout.	U	2	
	c)	Write in brief about cellular layout.	U	2	
	d)	Define capacity and capacity planning.	R	3	
	e)	Write the factors affecting on scheduling.	R	3	
	f)	Write the functions of Dispatching.	R	3	
Q.2		Attempt any FOUR			(16)
	a)	Define batch production. State its advantages and limitations with example.	R / U	1	
	b)	Write the symptoms of bad plant layout.	U	2	
	c)	Explain the factors influencing the site selection for the following products (Any two) i) Textile (cotton) industries. ii) Sugar industries iii) Food processing industries.	A	2	
	d)	Explain the factors considered in machine selection,	U	3	
	e)	Explain Gantt chart with neat sketch.	U / A	3	
	f)	Write a short note on line balancing techniques.	U	3	
Q.3		Attempt any FOUR			(16)
	a)	Draw and explain Break-Even chart.	U	1	
	b)	Write the advantages and limitations of urban, semiurban & rural location for plant.	U	2	

P.T.O

c)	State for what applications the following material handling equipments are used. i) Fork lift ii) Jib crane iii) Roller conveyer iv) Pipes	U / A	2																									
d)	List different types of assembly and explain any one.	U	3																									
e)	Seven jobs to be processed on two machines in order of M ₁ to M ₂ , processing times in hours are given below. <table border="1"> <thead> <tr> <th>Job</th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> <th>F</th> <th>G</th> </tr> </thead> <tbody> <tr> <td>M₁</td> <td>6</td> <td>24</td> <td>30</td> <td>12</td> <td>20</td> <td>22</td> <td>18</td> </tr> <tr> <td>M₂</td> <td>16</td> <td>20</td> <td>20</td> <td>13</td> <td>24</td> <td>2</td> <td>6</td> </tr> </tbody> </table> Find the optimal sequence and table elapsed time. Compute idle time on machine 2	Job	A	B	C	D	E	F	G	M ₁	6	24	30	12	20	22	18	M ₂	16	20	20	13	24	2	6	A	3	
Job	A	B	C	D	E	F	G																					
M ₁	6	24	30	12	20	22	18																					
M ₂	16	20	20	13	24	2	6																					
f)	Prepare operation sheet for the component shown in the figure. Material-Ms, Material size ϕ 55 mm x 110 mm. Assume suitable cutting parameters. 	A	3																									

Section-II

Q.4	Attempt any FOUR			(08)
a)	Write advantages of Jig & fixtures.	R	4	
b)	Define inventory.	R	5	
c)	Suggest a system to avoid problems due to improper and unclean workplace.	A	6	
d)	Define procurement cost and carrying cost.	R	5	
e)	Explain need of inventory control.	U	5	
f)	Draw neat sketch of inventory control model.	U	5	
Q.5	Attempt any FOUR			(16)
a)	Explain flexible manufacturing system.	U	6	
b)	Explain KAIZEN.	U	6	
c)	Explain EOQ with a neat sketch.	U	5	
d)	Write a short note on work study.	R	6	
e)	State different recoding techniques used in method study.	U	6	
f)	Explain Lean manufacturing system.	U	6	

P.T.O

Q.6	Attempt any FOUR			(16)																								
a)	Suggest and explain suitable method to increases production on manually operated machine for machining identical parts in large quantity.	A	4																									
b)	Differentiate between Jig and fixture.	U	4																									
c)	Calculate EOQ when average annual compensation of inventory is 300 units, procurement cost is RS 50/- per order. Cost of carrying inventory 2% and cost of each unit is Rs. 150/-	A	5																									
d)	If a worker takes 15 minutes as standard time for a job which total allowance is 20 % of normal time? If the rating of worker is 105%. Find the actual time requirement.	A	6																									
e)	The observed time and performance ratings for the four elements are given. Calculate the standard time assuming personal allowance as 15% and contingency allowance as 2 % of the basic time. <table><tr><td>Element</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>Observed time (min)</td><td>0.4</td><td>1.6</td><td>1</td><td>2.4</td></tr><tr><td>Rating</td><td>85</td><td>80</td><td>90</td><td>85</td></tr></table>	Element	1	2	3	4	Observed time (min)	0.4	1.6	1	2.4	Rating	85	80	90	85	A	6										
Element	1	2	3	4																								
Observed time (min)	0.4	1.6	1	2.4																								
Rating	85	80	90	85																								
f)	A particular activity on shop floor consists of three elements. Calculated standard time for the activity. Various allowances are given as percentage of normal time. <table><tr><td>Elements</td><td>a</td><td>b</td><td>c</td></tr><tr><td>Observed time (min)</td><td>1.0</td><td>1.5</td><td>2.0</td></tr><tr><td>Rating factors (%)</td><td>125</td><td>110</td><td>115</td></tr><tr><td>Relaxation allowance (%)</td><td>10</td><td>11</td><td>12</td></tr><tr><td>Delay allowance (%)</td><td>5</td><td>2</td><td>4</td></tr><tr><td>Personal allowance (%)</td><td>6</td><td>5</td><td>6</td></tr></table>	Elements	a	b	c	Observed time (min)	1.0	1.5	2.0	Rating factors (%)	125	110	115	Relaxation allowance (%)	10	11	12	Delay allowance (%)	5	2	4	Personal allowance (%)	6	5	6	A	6	
Elements	a	b	c																									
Observed time (min)	1.0	1.5	2.0																									
Rating factors (%)	125	110	115																									
Relaxation allowance (%)	10	11	12																									
Delay allowance (%)	5	2	4																									
Personal allowance (%)	6	5	6																									

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVEN TERM END EXAM MAY-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 :- **23/05 / 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.

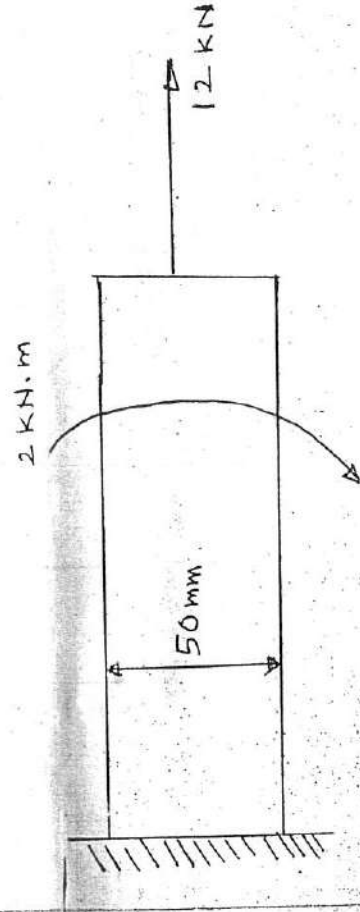
QN		S	Section-I		R/ U/ A	Co MEF 402	Mar ks
Q.1			Attempt any FOUR :				08
	a)		Write four series of preferred number for sizes and their multiplying factor.	U	1		
	b)		Name any four standards used in mechanical engineering design.	R	1		
	c)		Mention the material use for following components. i) Machine tool bed ii) Gear iii) Cylinder head iv) Crank shaft.	A	1		
	d)		Define principal maximum shear stress.	U	2		
	e)		List the advantage of square threads in power screws.	U	3		
Q.2	f)		Name the type of threads used in following devices i) Screw jack ii) Lead screw iii) Vices iv) Press	R	3		
			Attempt any FOUR :				16
	a)		Describe the general steps followed in mechanical engineering design.	R	1		
	b)		Discuss the factors should be considered for selecting the material.	R	1		
	c)		A bar of 50mm dia. is subjected for combined loading as shown in Fig. No. 1. Calculate :- i) Maximum Normal stress ii) maximum shear stress	A	2		
	d)		Describe the stresses in a bar due to torsional moment.	U	2		
	e)		A vertical screw with a single start square thread 50mm mean diameter and 10mm pitch is raised against load of 15KN. The axial load is taken by a collar which has a mean radius 70mm. The coefficient of friction is 0.15 for a screw and 0.18 for collar surface. Calculate the maximum stress induced into the screw.	A	3		

P.T.O. (1/4)

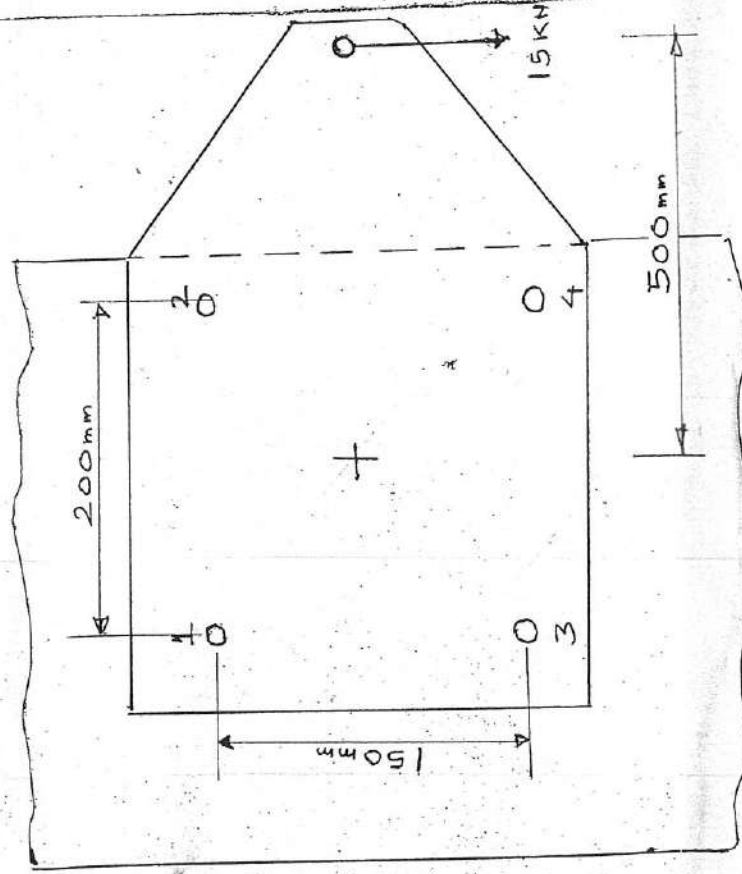
	f)	Calculate the preload or initial load for a bolt of 25mm core diameter and having Yield strength 320 N/mm^2 . Also calculate the torque requirement to apply this preload. (Assume torque coefficient 0.20)	A - 3	
Q.3		Attempt any TWO :		16
	a)	Design a knuckle joint to carry a load of 65 KN. Material is same for eye, fork & pin. The permissible tensile stress = 80 N/mm^2 . The permissible compressive stress = 150 N/mm^2 . The permissible shear stress = 55 N/mm^2 .	A 2	
	b)	A double threaded power screw used in screw jack has a nominal dia. of 70mm and pitch 10mm. The threads are square and height of Nut is 80mm. The screw jack is used to lift a load of 20 KN. The outer dia. of collar is 140mm and inner diameter is 70mm. The coefficient of friction at thread surface is 0.14 and at collar surface is 0.17. Calculate i) Principal shear stress in screw body. ii) Transverse shear stress in threads of screw and nut.	U 3	
	c)	A structural connection shown in Fig. No 2 is subjected to a force of 15KN. with an eccentricity of 500mm. The centre distance between bolt '1' and '2' is 200mm and centre distance between bolts '1' and '3' is 150mm. All bolts are identical. The permissible shear stress is 75 N/mm^2 . Determine size of the bolts.	U 1	
Q.4	S Q N	Section- II	R/ U/ A	Co MEF 402 ks
		Attempt any FOUR :		08
	a)	Define endurance limit.	R 4	
	b)	Enlist four types of shaft.	R 4	
	c)	Write the Lewis equation for stress in gear tooth.	R 5	
	d)	Define module of gear and addendum.	R 5	
	e)	State applications of following i) Deep groove ball bearing. ii) Needle roller bearing.	U 5	
	f)	Write expression for bearing life and explain each term.	R 5	

Q.5	Attempt any FOUR :			16
a)	Discuss the use of ASME code in design of shaft.	U	4	
b)	A solid circular shaft is subjected to a bending moment of 3000 Nm and $T = 10,000$ Nm. Shaft is made of 46C 8 steel having yield tensile stress of 700 MPa and ultimate shear stress of 500 MPa. Assume F.S. = 6, determine diameter of shaft	A	4	
c)	State applications of i) Helical spring ii) Torsion spring iii) Leaf spring iv) Conical spring.	A	5	
d)	The spring of spring balance elongates by 150mm, when subjected to load of 400N. The spring index is 6. Take permissible shear stress for spring material as 540 N/mm^2 consider the effect of direct shear and wire curvature. Take $G = 8.4 \times 10^4 \text{ N/mm}^2$. Find i) Wire diameter and coil diameter ii) Number of active turns required	A	5	
e)	List the advantages of gear drive over belt drive.	U	5	
f)	Give classification of bearing.	R	5	
Q.6	Attempt any FOUR :			16
a)	Define stress concentration. List any four methods to reduce it with neat sketches.	U	4	
b)	A pinion rotates at 1600 rpm and teeth on pinion are 25. A module of pinion is 3mm. Gear rotates at 400rpm. Calculate i) Teeth on gear. ii) Diameter of pinion and gear. iii) Tangential force on gear to transmit 8 KW power.	U	5	
c)	Prove that for a square key 'crushing stress' is twice shearing stress'	U	4	
d)	Compare rigid and flexible coupling on points i) Purpose ii) Alignment iii) Deflection iv) Cost.	U	4	
e)	Define i) Spring index ii) Spring stiffness	R	5	
f)	Derive a relation for stiffness or spring constant for a springs connected in series and parallel.	A	5	

(314)



Q. 2, S&N.-C fig. No. 1



Q. No. 3, S&N. 'c' fig. No. 2 (4/4)

GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

EVEN TERM END EXAM MAY -2019**EXAM SEAT NO.**

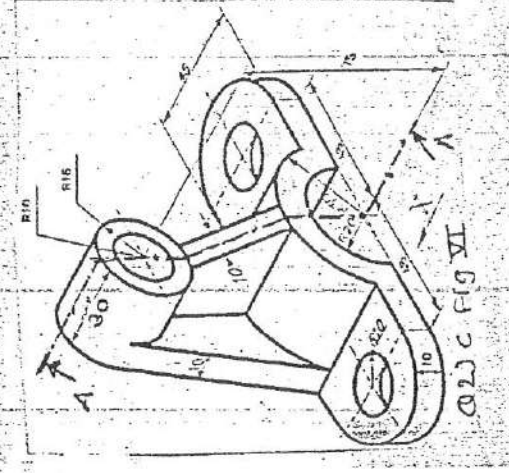
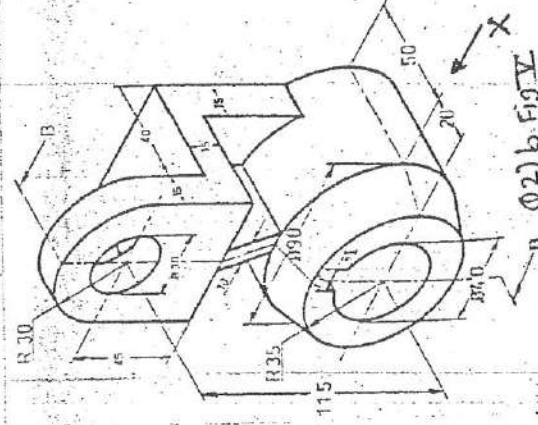
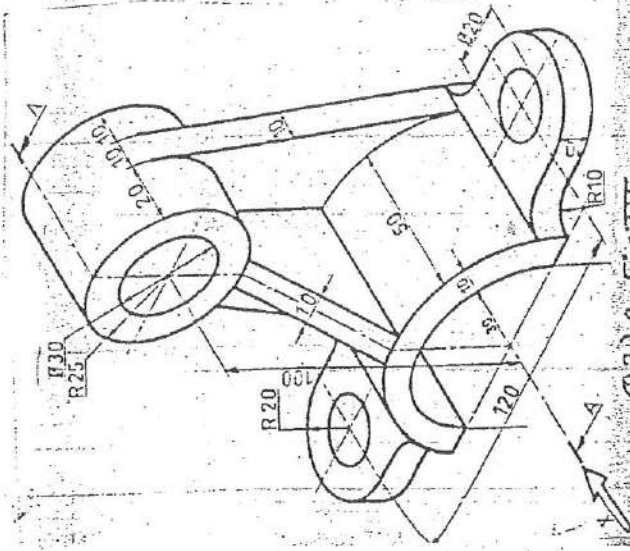
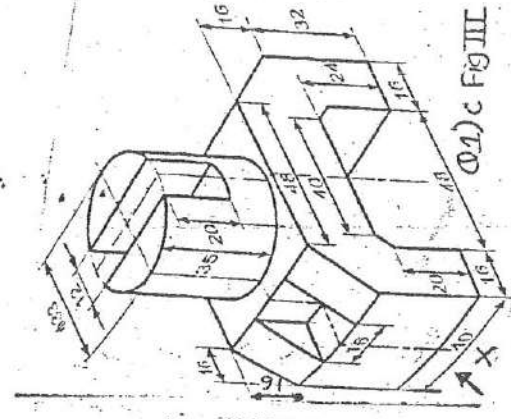
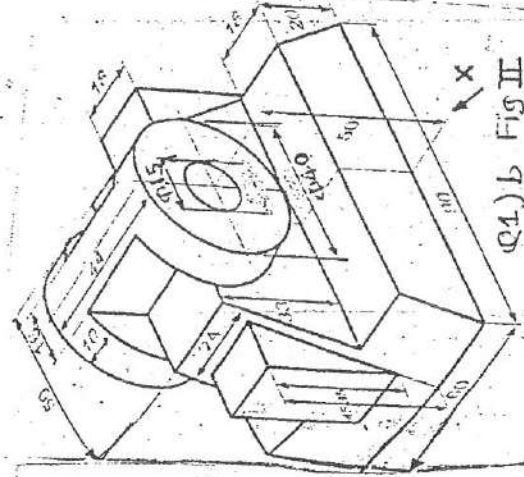
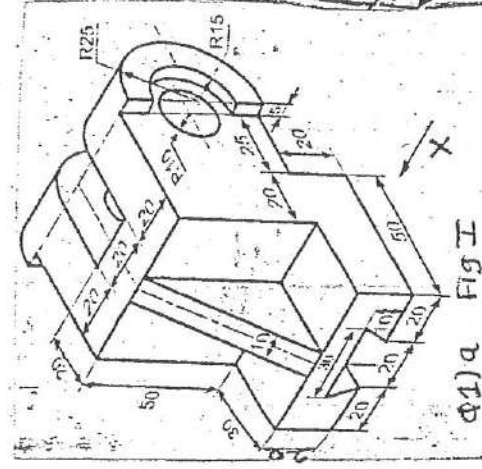
--	--	--	--	--	--

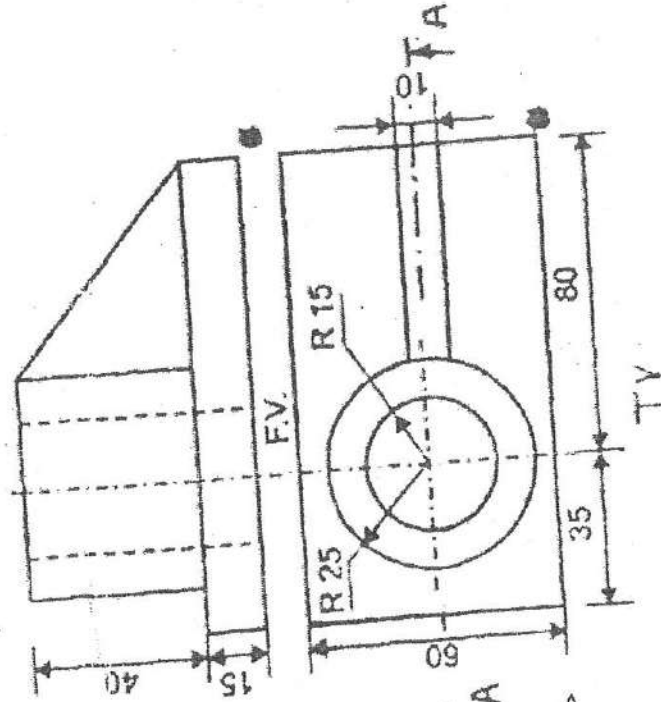
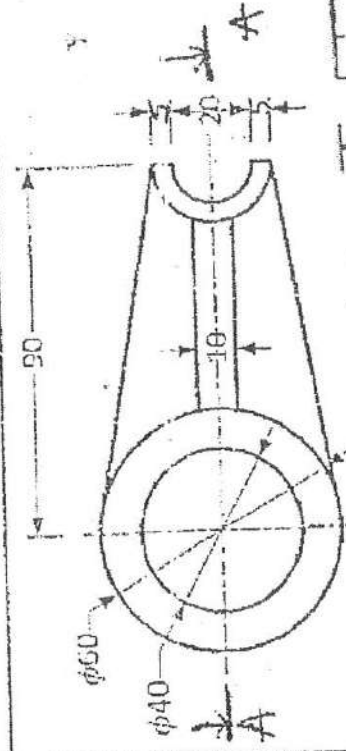
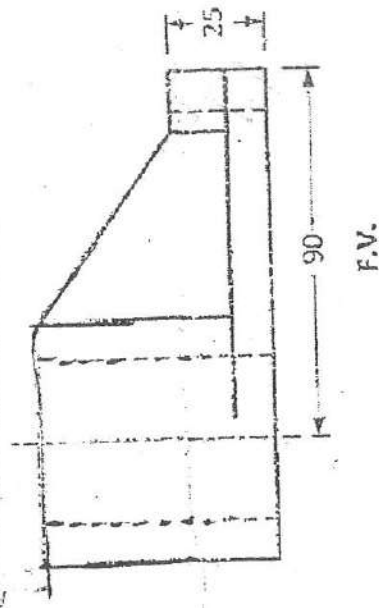
LEVEL: FIRST**PROGRAM: MECHANICAL****COURSE CODE: CCF108/CCE108****COURSE NAME: ENGINEERING DRAWING - II****MAX. MARKS: 80****TIME: 4 HRS.****DATE: 23/05/2019****Instruction:-**

- 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	S Q N	Question Text	R U A	CO CCF A 108	Marks
Q.1		Attempt any TWO			16
	a)	Fig. I shows the pictorial view of an object. Draw i) Front view in X direction 04 marks ii) Left hand side view 04 marks Use I st angle method of projection.	U & A	1	
	b)	Fig. II shows pictorial view of an object. Draw i) F.V. in the direction of an arrow 'X' 04 marks ii) Top view 04 marks Use I st angle method	U & A	1	
	c)	Fig. III shows pictorial view of an object. Draw i) F.V. in the X direction 04 marks ii) Right hand side view 04 marks Use I st angle method	U & A	1	
Q.2		Attempt any TWO			(16)
	a)	Fig. IV shows a pictorial view of an object. Draw i) F.V. in the X direction 04 marks ii) Sectional right hand side view (section along A-A) (04 marks) Use I st angle method	U & A	2	
	b)	Fig. V shows a pictorial view of an object. Draw i) Sectional F.V. (section along B-B) 04 marks ii) Top view 04 marks Use I st angle method	U & A	2	

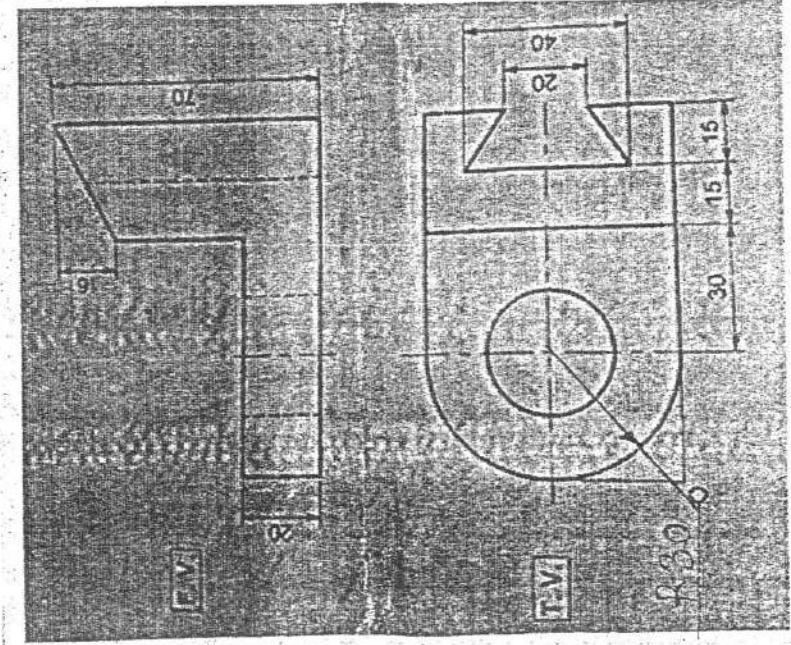
c)	Fig. VI shows a pictorial view of an object. Draw i) Front view in the X direction 04 marks ii) Sectional Left hand side view (section A-A) (04 marks) Use 1 st angle method Attempt any FOUR	U & A	2	
Q.3	Draw proportionate free hand sketches for the following i) British association thread ii) Single 'V' butt weld. iii) Grooved nut iv) Ring nut v) Lewis foundation bolt vi) Double rivetted double strap Zig-Zag butt joint. Attempt any ONE of the following	U & A	3	(08)
Q.4	Fig. NO. VII shows top view and front view of an object. Draw the following views of the object. i) Sectional front view –section (A-A) 04 marks ii) Missing side view (Right hand) 04 marks Fig. NO. VIII shows front view and top view of an object. Draw the following views. i) Front view –(Section along A-A) 04 marks ii) Missing Right hand side view 04 marks Attempt any ONE of the following	U	4	(08)
Q.5	Fig. no IX shows the front view and top view of an object. Draw Isometric view taking 'O' as origin. (16 marks) i) Fig. no X shows the front view and top view of an object. Draw Isometric projection taking 'O' as origin. (14 marks) ii) Construct an Isometric scale for the length 120 mm (02 marks) Attempt any TWO	U	5	(16)
Q.6	A cylinder of diameter of base 40 mm and axis 60 mm long, is resting on its base on the ground /H.P. It is cut by a section plane perpendicular to V.P and inclined to H.P at 45°. The section plane is passing through the top and of an extreme generator of the cylinder. Draw the development of lateral surface of cut cylinder. A hexagonal pyramid, base 30 mm side and axis 75 mm long is resting on HP with side of base parallel to V.P. It is cut by a section plane, perpendicular to V.P and inclined at 45° to the H.P and bisecting the axis. Draw front view and development of lateral surface. A right circular cone, diameter of base 60 mm and axis height 60 mm is resting on its base on H.P. It is cut by a section plane perpendicular to V.P and inclined to H.P at 45° and bisecting the axis of the cone. Draw the front view, top view and development of lateral surface.	U	6	(16)
		U	6	
		U	6	



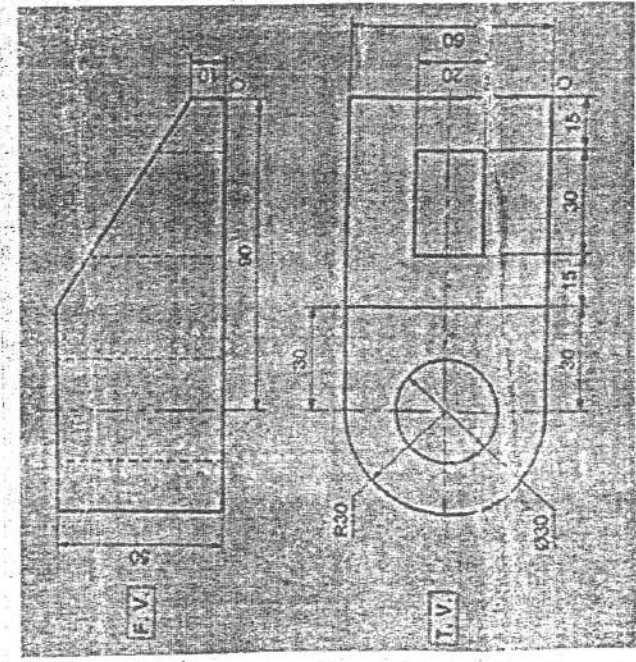


Q.4(a) Fig No-VIII

Q.4(b) Fig No-VIII



Q.5(a) Fig No IX



Q.5(b) Fig No-X

GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.
(An Autonomous Institute of Govt. of Maharashtra)
EVEN TERM END EXAM MAY -2019

EXAM SEAT NO.

--	--	--	--	--	--	--	--

LEVEL: FIFTH

PROGRAM: MECHANICAL

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

MAX. MARKS: 80

TIME: 3 HRS.

DATE: 22/05/2019

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

QN	S Q N	Question Text	R U A	CO MEF 506	Marks
Section -I					
Q.1	Attempt any FOUR				(08)
	a)	What is the necessity of Gear in Automobiles?	R	2	
	b)	Why universal joints & sliding joints are used in propeller shaft.	A	2	
	c)	Differentiate between single plate clutch & multiplate clutch.	A	2	
	d)	Write the advantages & disadvantages of air brakes over mechanical brakes.	A	3	
	e)	Differentiate between drum brake and Disc brake.	U	3	
	f)	Define :- i) Toe in ii) Toe out	R	3	
Q.2	Attempt any FOUR				(16)
	a)	Give classification of Automobiles.	R	1	
	b)	Explain the working of cone-clutch with diagram.	R	2	
	c)	Explain the various resistances that have to overcome by automobile.	U	2	
	d)	Explain with neat sketch construction & working of synchromesh gear box.	U	2	
	e)	Explain power –steering used in automobiles.	U	3	
	f)	Explain with neat sketch master cylinder.	U	3	
Q.3	Attempt any FOUR				(16)
	a)	Explain the importance of aerodynamics shape of a car body.	U	1	
	b)	Explain the concept of double De-Clutching used for constant mesh gear box.	U	2	
P.T.O					

	c)	Sketch & explain the working of differential gear box.	U	2	
	d)	What is the difference between live rear axle & dead rear axle? Write different stresses to be resisted by rear axle.	U	2	
	e)	Explain with neat sketch pneumatic braking system.	U	3	
	f)	Explain the working of steering linkage for rigid axle suspension vehicle with neat sketch.	U	3	
Section-II					
Q.4		Attempt any FOUR			(08)
	a)	Write any two functions of suspension system.	U	4	
	b)	How suspension system is classified?	R	4	
	c)	What is balancing of wheel?	R	4	
	d)	Describe tubeless tyre wheel.	R	4	
	e)	State colour coding in wiring system.	U	5	
	f)	List advantages of CDI ignition system.	R	5	
Q.5		Attempt any FOUR			(16)
	a)	Describe construction of Macpherson suspension system with neat sketch.	R	4	
	b)	State the function of Helper spring & Shackle in leaf spring.	U	4	
	c)	Differentiate between Radial & Cross ply tyres.	R	4	
	d)	Compare tubed tyres with tubeless tyres.	R	4	
	e)	Explain function of Bendix drive in starter system.	R	5	
	f)	Explain the working of car air conditioning with neat layout.	R	5	
Q.6		Attempt any FOUR			(16)
	a)	Explain the working of telescopic shock absorber with neat sketch.	R	4	
	b)	Explain torsion bar for rear suspension.	R	4	
	c)	Describe with neat sketch the effect of i) Under inflation ii) Over inflation on tyre.	U	4	
	d)	Give any four probable causes of tyre wear & give its remedies.	A	4	
	e)	State advantages of electronic ignition system.	R	5	
	f)	How batteries are rated? Explain testing of lead acid battery. Elaborate procedure of testing.	U	5	
