GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVEN TERM END EXAM SUMMER -2023

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MEF309**

COURSE NAME **ELECTRICAL TECHNOLOGY**

MAX. MARKS : **80** TIME : **03Hrs.** DATE :- **08/ 06 / 2023**

Instruction :-

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

QN	SQN	Question Text	R/U/A	Co MEF 309	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	State Ohm's Law for electric circuits and give its mathematical expression.	R	1	
	b)	Define a polyphase system in electrical engineering.	U	3	
	c)	Explain the phenomena of resistance of electrical conductors and write its unit.	U	1	
	d)	Justify the need for earthing of installation.	U	3	
	e)	Define inductance of electric circuits.	R	1	
	f)	Explain balanced loads in polyphase electric systems.	U	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Explain with diagrams and expressions Kirchoff's Laws applicable in electric networks.	U	1	
	b)	Write the relation between line voltage and phase voltage for delta connected loads. If the line current in such a balanced delta load is 20A determine the phase value.	A	3	
	c)	Determine the equivalent resistance between nodes A & B for circuit in Fig. 2 (c)	A	1	
	d)	Compare the three phase star and delta connected systems of electrical loads/networks.	U	3	
	e)	An electric immersion heater rated at 230V, (single phase), draws a current of 4.3 A for 30-mimutes. Calculate the power and energy drawn.	A	1	
	f)	Explain using proper labeled sketch the working of the Megger. Write its applications.	U/A	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain the use of the wattmeter and voltmeter in electric circuits using labeled diagrams.	U	2	
	b)	Explain the laws of electromagnetic induction using mathematical expressions and sketches.	U	2	
	c)	An alternating current is given by $i = 14.14 \sin 50\pi t$(A) Determine i) Maximum/ peak value ii) RMS value iii) Average value and iv) Period	A	2	

P.T.O

	d)	Define reactance and impedance related to a.c. networks. If an inductive coil of resistance 6 ohms has an impedance of 10 ohms determine its reactance.	R/ A	2	
	e)	Explain the behaviour of a purely resistive circuit operating on a.c. supply. Use relevant diagrams and expressions.	U	2	
	f)	Explain the behaviour of a series R-L circuit connected across an a.c. supply. Use proper diagrams and expressions.	U	2	
Q.4		Attempt any **FOUR:**			**08**
	a)	Define 'transformer'.	R	4	
	b)	State emf equation of transformer for both primary and secondary winding. Also state meaning of each term.	R	4	
	c)	State the principle of induction heating.	R	5	
	d)	State the advantages of dielectric heating (any two)	R	5	
	e)	State any four applications of Indirect resistance heating.	R	5	
	f)	State any two applications of split phase induction motor.	R	7	
Q.5		Attempt any **FOUR:**			**16**
	a)	State and explain various losses taking place in transformer.	R	4	
	b)	State any four characteristics of practical transformer.	U	4	
	c)	Explain dielectric heating with neat diagram.	R	5	
	d)	State and explain laws of illumination.	R	5	
	e)	Explain with neat sketch construction of stepper motor.	U	6	
	f)	With neat sketch explain stator rheostat starter used for 3 phase Induction motor.	U	7	
Q.6		Attempt any **FOUR:**			**16**
	a)	Explain core type induction furnace with neat diagram.	R	5	
	b)	State the illumination level required for the following items. i) Study room ii) Drawing hall iii) Workshop iv) Class room.	A	5	
	c)	Draw the experimental set up for finding efficiency and regulation of transformer by direct loading.	R	4	
	d)	State which types of dc motors are used in following applications i) Laundry Washing machines. ii) Compressors iii) Electric locomotive iv) Stamping machines.	A	6	
	e)	Classify DC motors (1 Marks) Draw the connection diagrams of following motors. (3 marks) i) Long shunt compound motor. ii) DC series motor.	R U	7 6	
	f)	Draw the torque-speed characteristics of i) Split phase induction motor. (01 mark) ii) Shaded pole motor. (01 mark) Explain both characteristics in brief. (2 marks)	U A	7	

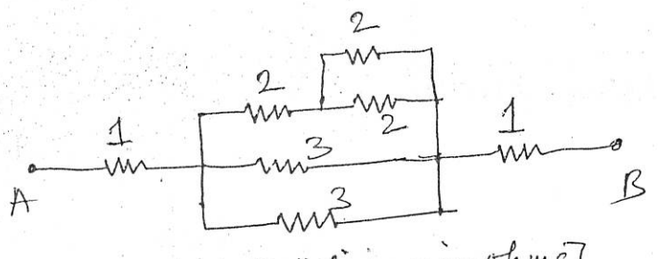

fig 2(c) [all figures in ohms]

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EVEN TERM END EXAM SUMMER -2023

EXAM SEAT NO. | | | | | | |

LEVEL : - **FIRST** PROGRAM : **MECHANICAL ENGINEERING**

COURSE CODE :- **CCG108**

COURSE NAME **ENGINEERING DRAWING - II**

MAX. MARKS : **80** TIME : **04Hrs.** DATE :- **08/ 06 / 2023**

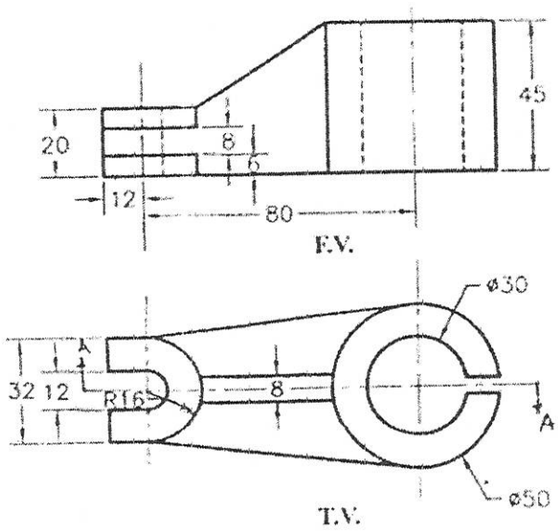
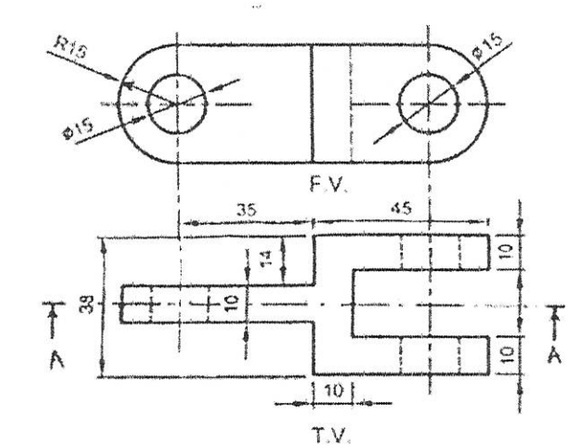
Instruction :-

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

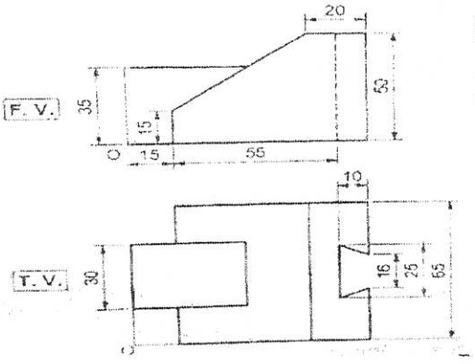
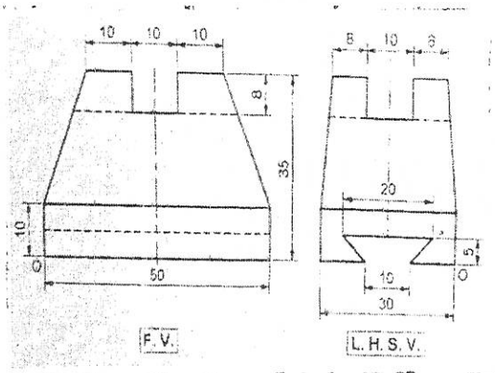
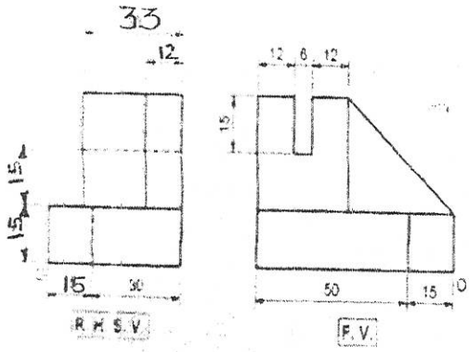
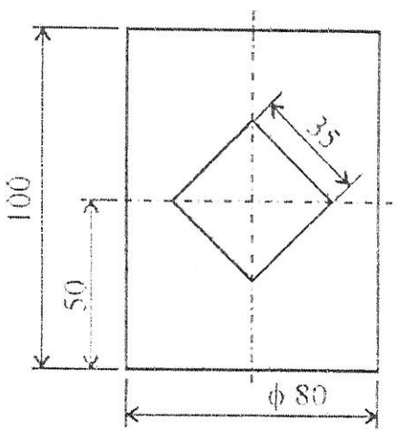
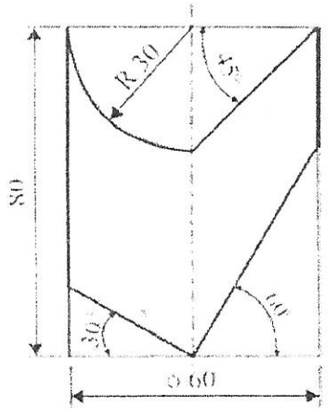
QN	SQN	Question Text	R/U/A	Co CCG 108	Marks
Q.1		Draw proportionate free hand sketches for the following (any **FOUR)**	R/U	3	**08**
	a)	British standard withworth thread (BSW)			
	b)	Lewis foundation bolt.			
	c)	Single riveted Lap Joint.			
	d)	Hexagonal Headed bolt (2 views)			
	e)	Cap Nut (2 views)			
	f)	Square Butt weld.			
Q.2		Attempt any **TWO:**			**16**
	a)	A hexagonal prism, side of base 30mm and axis length 60mm is kept on the V.P. on one of its base corner such that the longer edge passing through that corner makes an angle of 30^0 to V.P. Axis of the prism is parallel to H.P. Draw- i) Initial position. **3** ii) Inclined position. **3** iii) Side view. **2**	U	1	
	b)	A pentagonal pyramid side of base 40mm and axis length 70mm is kept on the H.P. on one of its base edges in such a way that the triangular face containing that base edges makes an angle of 50^0 to H.P. Draw the following views when the base edge on H.P. is perpendicular to V.P. i) Initial position. 3 ii) Inclined position. 3 iii) Side view 2	U	1	
	c)	A cone, base diameter 60mm and axis length 65mm is lying on the V.P. on one of its generator. Draw the following views when its axis is parallel to H.P. i) Initial position. 3 ii) Inclined position. 3 iii) Side view. 2	U	1	

P.T.O

Q.3		Attempt any **TWO:**	U	2	**16**
	a)	A square prism, base 45mm side and 80mm height, stands vertically on the H.P. with the edges of the base equally inclined to V.P. A cutting plane, perpendicular to V.P., and inclined at 60^0 to H.P. cuts its axis at point 15mm from its top end. i) Front view. ii) Sectional top view. iii) True shape of section.			 3 3 2
	b)	A hexagonal pyramid, base 30mm side and axis 65mm long has its base on H.P. with an edge of base parallel to V.P. A vertical section plane inclined at 45^0 to V.P. cuts the pyramid at a distance of 10mm from its axis. Draw i) Sectional front view. ii) Top view. iii) True shape of section.			 3 3 2
	c)	A cylinder, base diameter 60mm and axis length 80mm is kept on the H.P. on its base. It is cut by an AIP in such a way that the true shape of the section is the largest possible ellipse. Draw- i) Front view. ii) Sectional front view. iii) True shape of section.			 3 3 2
Q.4		Attempt any **ONE:**			**08**
	a)	**Fig. No.1** shows F.V. and T.V. of an object. Draw the following views. i) Sectional F.V. along section A-A. ii) Top View. iii) L.H.S.V. (First Angle Method)	U	4	
	b)	**Fig. No. 2** shows F.V. and T.V. of an object. Draw the following views by using first angle method of projection. i) Sectional F.V. along A-A. ii) Top View. iii) R.H.S.	U	4	
Q.5		Attempt any **TWO:**			**16**
	a)	**Fig. No. 3** shows F.V. and T.V. of an object. Draw isometric views.	U	5	
	b)	**Fig. No. 4** shows F.V. and L.H.S.V of an object. Draw isometric view.	U	5	
	c)	**Fig. No.5** shows F.V. and R.H.S.V. of an object. Draw isometric view.	U	5	
Q.6		Attempt any **TWO:**			**16**
	a)	Draw the development of the lateral surface of the cylinder having a square hole in it as shown in **Fig. No.6**	U	6	
	b)	Draw the development of the lateral surface of the cylinder as shown in **Fig. No.7**	U	6	
	c)	Draw development of surface of a cylinder having base diameter 50mm and axis height 80mm kept of H.P. It is cut by a cutting plane which is inclined at 45^0 with H.P. and bisecting axis of cylinder.	U	6	

Q. N.	S.Q .N.	Question text	Cognition Level R/U/A	CO Code	Marks out of
4	a]	 Fig 1			
	b]	 Fig 2.			

P.T.O.

Q. N.	S.Q .N.	Question text	Cognition Level R/U/A	CO Code	Marks out of
5	a]	 Fig 3			
	b]	 Fig 4			
	c]	 Fig 5.			
6	a]	 Fig 6.			
	b]	 Fig 7			

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EVEN TERM END EXAM SUMMER -2023

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MEG304/MEF304**

COURSE NAME **MANUFACTURING PROCESS**

MAX. MARKS : **80** TIME : **03Hrs.** DATE :- **09/ 06 / 2023**

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.
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5) Assume and mention suitable additional data if necessary.
6) Use of Mobile is strictly prohibited.
7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	SQN	Question Text	R/U/A	Co MEG 304	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Name any four pattern making materials.	R	1,2	
	b)	Why colour coding of pattern is required?	R	1,2	
	c)	List any four types of pattern.	R	1,2	
	d)	Write any four properties of Moulding Sand.	R	1,3	
	e)	List any four casting defects.	R	1,4	
	f)	Write Advantages of die-casting method.	R	1,4	
Q.2		Attempt any **FOUR:**			**16**
	a)	Explain Shrinkage Allowances.	U	1,2	
	b)	Sketch and explain split pattern.	A	1,2	
	c)	Explain Horizontal and Vertical core.	U	1,3	
	d)	Explain types of Moulding Sand.	U	1,3	
	e)	Sketch and label Elements of Gating system.	A	1,4	
	f)	Differentiate between Hot Chamber and Cold Chamber die casting.	U	1,4	
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain Jolt-Squeeze Machine Moulding process.	A	1,3	
	b)	Explain properties of Moulding Sand.	U	1,3	
	c)	Explain with neat sketch Shell Moulding Process.	U	1,3	
	d)	Write the basic steps in Making Castings.	U	1,3	
	e)	With neat sketch, explain Induction Furnace.	A	1,4	
	f)	State the possible causes and Remedies for the following casting defects : i) Blow holes ii) Shits	U	1,4	

P.T.O

QN	SQN	Question Text	R/U/A	Co MEG 304	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	State principle of arc welding.	U	1,5	
	b)	What is 'punching'?	U	1	
	c)	List applications of cold rolling.	A	1	
	d)	List different types of rolling mills.	R	1	
	e)	State need of shielding in arc welding.	U	1,5	
	f)	Write use of feed stock in the press working.	A	1	
Q.5		Attempt any **FOUR:**			**16**
	a)	Write advantages and disadvantages of forging.	A	1,5	
	b)	Differentiate in between Hot rolling and cold rolling.	A	1	
	c)	Explain submerged Arc welding process.	U	1.5	
	d)	List press working operations.	U	1	
	e)	Explain back word extrusion process.	U	1	
	f)	State applications of soldering and brazing (two each)	A	1	
Q.6		Attempt any **FOUR:**			**16**
	a)	List welding defects. Explain any one.	A	1,5	
	b)	List different types of press machines.	R	1	
	c)	Draw and label sketch of 'Open die'.	U	1	
	d)	Explain Drop forging process.	U	1	
	e)	Explain gas welding along with sketch.	U	1,5	
	f)	List different forging operations.	R	1	

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EXAM SEAT NO. | | | | | | |

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

COURSE CODE: **MEF312/CEF312/0227** COURSE NAME: **Non-conventional energy sources.**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **07/06/2023**

Instruction :-

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

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QN	SQN	QUESTION TEXT`	RUA	CO MEF 312	Marks
Q.1	A	Attempt any **FOUR**			**(08)**
	a)	Enlist four direct applications of solar energy.	R	01	
	b)	Define i) Solar Zenith angle ii) Declination angle	R	01	
	c)	Describe the term – Solar Radiation which instruments are used for measurement of solar radiation.	U	01	
	d)	Define power Co-efficient.	R	02	
	e)	Enlist the types of biomass conversion technologies.	R	03	
	f)	Explain the disadvantages of KVIC Digester plant.	U	03	
Q.2	A	Attempt any **FOUR**			**(16)**
	a)	Explain the need of alternate energy sources.	U	01	
	b)	Explain the working of solar pond with neat sketch.	U	01	
	c)	Draw a neat sketch of liquid flat plate collector & explain its working.	U	01	
	d)	Describe the factors for selection of site for wind mills.	R	02	
	e)	Explain the environmental aspects of wind energy.	A	02	
	f)	Explain with neat sketch the working of KVIC digester.	U	03	
Q.3		Attempt any **FOUR**			**(16)**
	a)	Explain the advantages of concentrating collector over flat plate collector.	U	01	
	b)	State the principle of solar photo-voltaic electric conversion. How is it occured?	U	01	
	c)	Draw the neat sketch of domestic solar cooker. Explain its working.	U	01	
	d)	Explain the working of Horizontal axis wind mill turbine generator with neat sketch.	U	02	
	e)	Describe various power control mechanisms used in the generator.	A	02	
	f)	Describe the factors which affect the Biogas production.	R	03	

QN	SQN	QUESTION TEXT`	RUA	CO MEF 312	Marks
Q.4		Attempt any **FOUR**			**(08)**
	a)	Compare open cycle and closed cycle OTEC system.	U	04	
	b)	State the principle of Tidal power generation.	R	04	
	c)	Classify various geothermal energy sources.	U	04	
	d)	State two advantages and limitations of small scale hydroelectric plant.	R	04	
	e)	Define energy management.	R	05	
	f)	State the meaning of simple payback period and return on investment.	R	05	
Q.5		Attempt any **FOUR**			**(16)**
	a)	Draw schematic of closed cycle OTEC power plant. Explain in short.	U	04	
	b)	Explain double basin arrangement of tidal power plant, with neat labeled sketch.	U	04	
	c)	Select type of turbine best suited for micro hydel plant. Explain it in brief.	U	04	
	d)	Draw schematic of open cycle MHD generators. State two advantages of MHD system.	U	04	
	e)	List and explain various components of small hydroelectric plant.	U	04	
	f)	Explain main components of fuel cell with neat sketch.	U	04	
Q.6		Attempt any **FOUR**			**(16)**
	a)	Classify fuel cell. State its two advantages and applications.	U	04	
	b)	Distinguish between preliminary energy audit and detailed energy audit.	A	05	
	c)	Explain significance of energy conservation.	U	05	
	d)	Explain Sankey diagram and its use.	U/A	05	
	e)	Explain principle and methods of energy conservation.	U	05	
	f)	Relate cogeneration with energy conservation in industrial sector and elaborate.	U	05	

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EVEN TERM END EXAM SUMMER -2023

EXAM SEAT NO. | | | | | | |

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

COURSE CODE: **MEG316/MEF416** COURSE NAME: **Mechanical Engineering measurements.**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **07/06/2023**

Instruction :-

1) Answer must be written in 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.
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5) Assume and mention suitable additional data necessary.
6) Use of Mobile is strictly prohibited.
7) **QN**-Question No, **SQN**-Sub-Question No, **R**- Remembering, **U**-Understanding, **A**-Application **CO**-Course outcome

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QN	SQN	QUESTION TEXT	RUA	CO MEG 316	Marks
Q.1	A	Attempt any **FOUR**			**(08)**
	a)	Define the following terms i) Range ii) Span	R	01	
	b)	State any four parameters for selection of displacement transducer.	R	02	
	c)	Stat any four advantages of L.V.D.T.	U	02	
	d)	Define seeback effect.	R	03	
	e)	State any two advantages and disadvantages of optical parameter.	U	03	
	f)	State any two low pressure measurement gauges.	A	03	
Q.2	A	Attempt any **FOUR**			**(16)**
	a)	Draw and explain generalized measurement system.	U	01	
	b)	Classify the errors and explain any one error in detail.	R	01	
	c)	Explain with neat sketch how load cell is used for strain measurement.	A	02	
	d)	Explain working principle of eddy current Dynamometer.	U	02	
	e)	State any four applications of displacement transducer.	A	02	
	f)	Explain with neat sketch McLeod Gauge.	U	03	
Q.3		Attempt any **FOUR**			**(16)**
	a)	Define the following terms i) Speed of response ii) Dynamic error iii) Fidelity iv) Overshoot.	U	01	
	b)	Classify instruments on the basis of following i) Method of contact ii) Mode of operation iii) Source of energy iv) Nature of Output signal.	A	01	
	c)	Differentiate between radiation pyrometer and optical pyrometer.	R	03	
	d)	Explain liquid in glass thermometer with neat sketch.	A	03	
	e)	State advantages and disadvantages of potentiometer. (any two)	R	02	
	f)	Draw and explain rotory transformer.	A	02	

QN	SQN	QUESTION TEXT`	RUA	CO MEG 316	Marks
Q.4		Attempt any **FOUR**			**(08)**
	a)	Classify flow measuring instruments.	R	04	
	b)	State working principle of venturimeter.	U	04	
	c)	State application of ultrasonic flowmeter.	U	04	
	d)	State application of stroboscope.	A	05	
	e)	Explain Gauge factor.	U	05	
	f)	State working principle of hair hygrometer.	U	06	
Q.5		Attempt any **FOUR**			**(16)**
	a)	Draw neat sketch of rotameter. Explain its working.	R	04	
	b)	Explain construction and working of hot wire anemometer.	U	04	
	c)	Explain construction and working of inductive pick-up tachometer.	U	05	
	d)	Explain working and application of bonded strain gauge.	A	05	
	e)	Explain sight glass float type liquid level sensor with neat sketch.	U	06	
	f)	Explain sound measurement using electrodynamic microphone with neat sketch.	A	06	
Q.6		Attempt any **FOUR**			**(1[illegible])**
	a)	Explain construction & working of hot wire anemometer.	U	04	
	b)	Explain capacitive pickup with neat sketch.	A	05	
	c)	State methods of strain measurement & explain any one in detail.	U	05	
	d)	Explain working of inductive pickup with neat sketch.	U	05	
	e)	Explain with neat sketch working of gamma ray liquid level sensor.	A	06	
	f)	Explain capacitance level indicator with neat sketch.	U/R	06	

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EVEN TERM END EXAM SUMMER -2023

EXAM SEAT NO. | | | | | | |

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

COURSE CODE: **MEG305/MEF305** COURSE NAME: **Strength of Materials.**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **06/06/2023**

Instruction :-

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

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QN	SQN	QUESTION TEXT`	RUA	CO MEG 305	Marks
.1	A	Attempt any **FOUR**			**(08)**
	a)	Define poisson's ratio, with its expression.	R	01	
	b)	State relation between Young's modulus and bulk modulus.	R	01	
	c)	State meaning of suddenly applied load with an example.	U	02	
	d)	Draw resultant stress distribution diagram at base section for the condition the direct stress is less than bending stress.	U	04	
	e)	State parallel axis theorm with its expression.	R	03	
	f)	State Values of M.I. of semicircle of radius 'R' about. i) centroidal XX – axis ii) Centroidal YY - axis	R	03	
Q.2	A	Attempt any **TWO**			**(16)**
	a)	Draw a stress strain curve for mild steel and show important points on it.	U	01	
	b)	A metal rod 24mm diameter and 2m long is subjected to axial pull of 40kN. If the elongation of the rod is 0.5mm. Find the stress induced and the value of Young's modulus.	A	01	
	c)	A steel bar 20mm in diameter and 200mm long extends by 0.13mm under the load of 40kN. Calculate the strain energy stored in the bar if the load is applied. i) Gradually ii) suddenly.	A	02	
	d)	Find the M.I. of rectangle 60mm x 200mm about its 200mm edge.	A	03	
	e)	Calculate polar M.I. of a square section having 200mm as side.	A	03	
	f)	A rectangular rod of size 50mm x 100mm is bent into 'C' shape as shown in figure 1. The load applied at point A is 40kN. Calculate the resultant stresses developed at section xx.	A	04	
Q.3		Attempt any **FOUR**			**(16)**
	a)	A brass bar shown in figure 2 is subjected to a tensile load of 40kN. Determine total elongation of the bar if $E = 1x10^5 N/mm^2$.	A	01	

	b)	A steel rod 4.5m long is at a temperature of 28^0 C. Find the free expansion of rod when the temperature is raised to 78^0 C. If this expansion is completely prevented, calculate magnitude and nature of temperature stress and strain developed.	A	01	
	c)	A cube of 100mm side is subjected to a uniform tensile stress of $40N/mm^2$ on all faces. Calculate increase in volume of the cube. Take $E = 2x10^5$ n/mm^2 & $\frac{1}{m} = 0.33$	A	01	
	d)	A bar of 20mm in diameter and 1m in length is subjected to a load of 1kN which is dropped from a height of 500mm on to the collar attached at the lower end of the bar. Determine instantaneous stress developed due to this load E = 200 Gpa	A	02	
	e)	Find M.I. of a T-section shown in figure 3, about x-x axis passing through c.g. of the section.	A	03	
	f)	A short mild steel column of external diameter 200mm and internal diameter 150mm carries an eccentric load. Find the greatest eccentricity which the load can have without producing tension in the section of column.	A	04	
QN	SQN	QUESTION TEXT	RUA	CO MEG 305	Marks
Q.4		Attempt any **FOUR**			**(08)**
	a)	Explain various type of loading on beam with sketches.	R	04	
	b)	Define shear force.	R	04	
	c)	State the assumptions in theory of bending. (any four)	R	04	
	d)	Show on a diagram the shear stress distribution for a hollow rectangular section.	R	04	
	e)	Give the torsional formula with meaning of each term.	R	06	
	f)	Give the expression for power transmitted by a shaft.	R	06	
Q.5		Attempt any **FOUR**			**(16)**
	a)	Find the maximum shear force and bending moment for a cantilever beam as shown in figure 1. Also draw shear force and bending moment diagram.	A	04	
	b)	The beam supported and loaded as shown in figure 2. Draw SFD and BMD with calculations and locate the point of contra flexure.	A	04	
	c)	A rectangular beam 50mm wide and 250mm deep is simply supported over span of 6m carrying U.D.L. of 10kN/m. find maximum bending stress.	A	04	
	d)	Draw shear stress distribution diagram for circular section. Also state relation between maximum shear stress & average shear stress for this distribution.	U	04	
	e)	A bar is subjected to a tensile stress of $100N/mm^2$, Determine the normal and tangential stress on a plane making an angle of 60^0 with the axis of tensile stress.	A	05	
	f)	Compute the maximum torque induced in a solid circular shaft 50mm diameter. If permissible shear stress in not to exceed 75MPa.	A	06	

Q.6		Attempt any **FOUR**			(16)
	a)	A cantilever beam of length 10m carries two point loads of magnitude 20kN and 30kN at 4m from LHS and free end respectively. Drawn the SFD and BMD.	A	04	
	b)	A simply supported beam of span 8m carries udl of 12kN/m over span 4m length from LHS and point load of 80kN at 2m from right support. Draw SF and BM diagram. (Fig-3)	A	04	
	c)	Draw the state of stress for a point in pure shear and comment on principle stress at the point	A	05	
	d)	A rectangular beam is 200mm x 300mm in size. If the maximum permissible shear stress in limited to $8N/mm^2$. Find the maximum shear force which the beam can carry.	A	04	
	e)	A point in a strained material is subjected to two mutually perpendicular stresses of 200MPa (compressive) and 350 PMa (Tensile) determine the intensities of normal and tangential stresses on a plane at 38^0 to the plane carrying 200MPa stress.	A	05	
	f)	A solid circular shaft of 30mm diameter is subjected to a torque of 250kNm causing an angle of twist 3.74^0 in length of 2m. Determine the modulus of rigidity for a material of the shaft.	A	06	

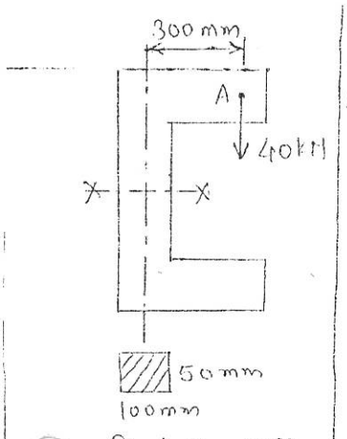

Fig 1 Qu. 2(f)

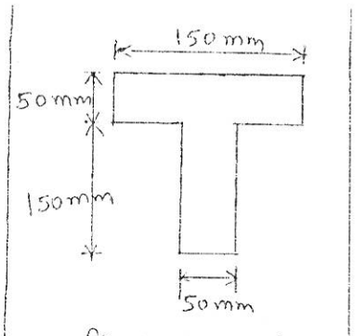

Fig 3 Qu. 3(e)

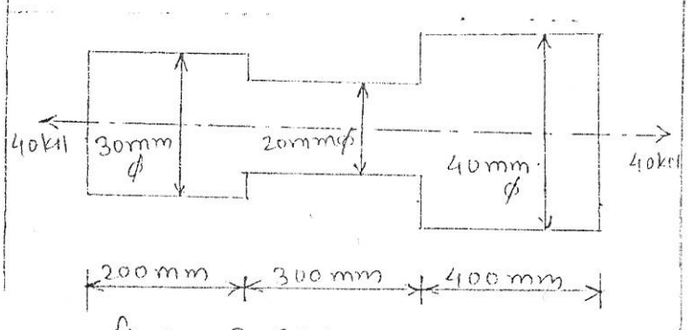

Fig 2 Qu. 3(a)

Qu. 2 and Qu 3 figures ↑

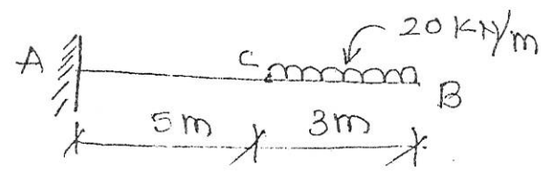

Figure 1, Q5 (a)

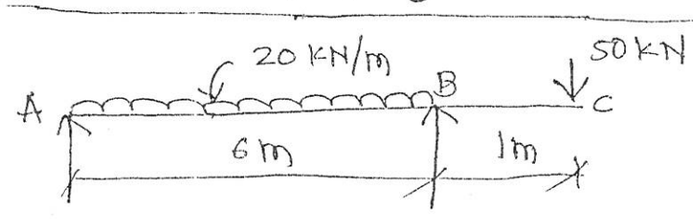

Figure 2, Q5 (b)

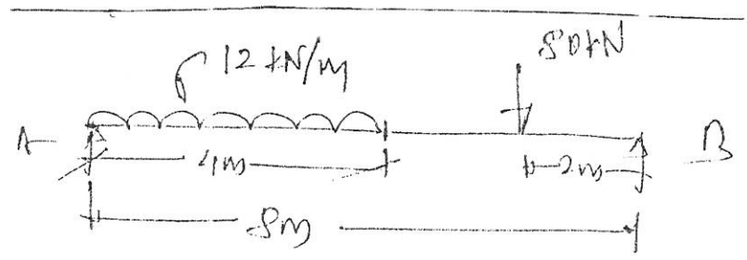

Fig (3) . Q.6 (b)

Qu. 5 and Q. 6 - figures ↑

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER/SUMMER

EXAM SEAT NO. | | | | | | |

LEVEL : - Four PROGRAM :Mechanical Engg.

COURSE CODE :- MEG406

COURSE NAME :- Fluid Mechanics & Machinery

MAX. MARKS : **80** TIME : **03 Hrs** DATE :-05/06/2023

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 QN	SECTION –I	R/ U/ A	Co	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define Specific weight and Mass density.	R	MEG 406.1	
	b)	One liter of oil weighs 7.3N. Calculate its density.	A	MEG 406.1	
	c)	Convert $12N/cm^2$ pressure in oil column of sp. gravity 0.85	A	MEG 406.1	
	d)	Define i)Turbulent flow ii)Compressible flow	R	MEG 406.2	
	e)	State and Define Continuity Equation	R	MEG 406.2	
	f)	State laws of fluid friction for Laminar flow	R	MEG 406.3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Calculate Sp. weight, Density, Sp. Volume and sp. gravity of 2 liter of petrol which weighs 14N.	A	MEG 406.1	
	b)	An isosceles triangular plate of base 3m and height 2.5m immersed vertically in oil of sp. gr. 0.85 in such way that the apex is in the downward direction and base is parallel and 2m below the free surface of oil. Calculate total pressure and centre of pressure.	A	MEG 406.1	
	c)	State Bernoulli's theorem and give its assumptions and applications.	R	MEG 406.2	
	d)	A horizontal venturimeter with inlet and throat diameter 30cm and 15cm is used to measure the flow of an oil of sp. gravity 0.8 Determine the deflection of the oil-mercury manometer, if the discharge of the oil through venturimeter is 50lit/sec (take $C_d = 0.98$)	A	MEG 406.2	
	e)	Obtain the condition for maximum power transmission through pipe	U/A	MEG 406.3	
	f)	Water is to be supplied to the consumers of a collage through a supply main. The following data are given- Distance of the reservoir from the collage-4km, Number of consumers-3500 Consumption of water per day of each consumer-180 lit/sec Loss of head due to friction-18m, if the half of the daily supply is pumped in 8hrs, determine the size of the supply main. (*take f= 0.0075*)	A	MEG 406.3	
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain the phenomenon of capillary rise and write its equation for capillary rise of liquid	U	MEG 406.1	
	b)	Explain the concept of Absolute pressure, atmospheric pressure, gauge pressure with neat sketch	U	MEG 406.1	

	c)	A simple U-tube manometer is used to measure the pressure of oil (sp.gr. 0.8) flowing in a pipe. Its right limb is open to atmosphere and left limb is connected to pipe. The centre of the pipe is 9cm below the level of mercury in right limb. If the difference of mercury level in the two limb is 15cm. Determine the absolute pressure of the oil in the pipe.	A	MEG 406.1	
	d)	Explain with neat sketch working principle of Venturimeter	U	MEG 406.2	
	e)	Water is flowing through a pipe having diameters 40cm and 20cm at the bottom and upper end respectively. The intensity of pressure at the bottom end is $29.43N/cm^2$ and pressure at the upper end is $14.715N/cm^2$. Determine the difference in datum head if the rate of flow through is 60lit/sec	A	MEG 406.2	
	f)	Calculate head loss due to friction in a pipe of length 80m and diameter 0.50m when rate of flow of water through pipe is 105lit/sec. (*take C=55*)	A	MEG 406.3	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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WINTER/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL : - PROGRAM : MECHANICAL ENGINEERING

COURSE CODE :- MEG406

COURSE NAME :- FLUID MECHANICS & MACHINERY

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 05/06/2023

QN	SQN	SECTION –II	R/U/A	Co MEG 406	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Define 1) Hydraulic efficiency 2) Mechanical efficiency w.r.t. turbines.	R	5	
	b)	Draw neat labeled sketch of Kaplan turbine.	R	5	
	c)	Write the formula to calculate force exerted by a jet of fluid on the flat moving plate when the jet strikes the plate at the center.	R	4	
	d)	State the purpose of priming in Centrifugal pump.	R	6	
	e)	Define: 1) NPSH 2) Manometric head	R	6	
	f)	State the formula to calculate force exerted by jet of fluid in the direction normal to the stationary vertical plate.	R	4	
Q.5		Attempt any **FOUR:**			**16**
	a)	Draw the layout of hydroelectric power plant and classify the turbines used in it.	U	5	
	b)	Describe with neat sketches different types of draft tubes used in reaction turbines.	U	5	
	c)	The external and internal diameters of an inward flow reaction turbine are 600 mm and 200 mm respectively and the breadth at inlet is 150 mm. If the velocity of flow through the runner is constant at 1.35 m/s, find the discharge through turbine and breadth of turbine at outlet.	A	5	
	d)	Draw neat labeled sketch of: 1) Multistage pumps in Series 2) Multistage pumps in Parallel	U	6	
	e)	Explain the construction & working of Reciprocating pump with neat sketch.	U	6	
	f)	A single acting reciprocating pump running at 100 rpm delivers 0.009 m^3/s of water. The diameter of piston is 150 mm and stroke length is 250 mm, the suction and delivery heads are 3 m and 10 m respectively. Determine: 1) Theoretical Discharge 2) Slip	A	6	
Q.6		Attempt any **FOUR:**			**16**
	a)	A jet of water having 50 mm diameter moving at a velocity of 25 m/s, strikes normally a flat smooth plate. Determine the thrust on the plate: 1) If the plate is at rest. 2) If the plate is moving in the same direction as the jet with a velocity of 10 m/s.	A	4	
	b)	Explain the concept of cavitation in the turbines.	U	5	
	c)	With neat sketch explain construction and working of Francis Turbine.	U	5	
	d)	A Pelton wheel has a mean bucket speed of 12 m/s and is supplied with water at a rate of 750 litres per second under a head of 35 m. If the bucket deflects the jet through an angle of 160°, find the power developed by the turbine and its hydraulic efficiency. Take the coefficient of velocity as 0.98.	A	5	
	e)	Draw indicator diagrams of a reciprocating pump showing the effect of acceleration and friction head on suction and delivery pipes.	U	6	
	f)	A centrifugal pump delivers water against a net head of 14.5 m and a design speed of 1000 rpm. The vanes are curved back at an angle of 30° with the periphery. The diameter of impeller at outlet is 300 mm and outlet width is 50 mm. Determine the discharge of the pump if manometric efficiency is 95%.	A	6	

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P-3/3

GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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EVEN TERM END EXAM SUMMER -2023

EXAM SEAT NO. | | | | | | |

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

COURSE CODE: **MEG314/MEF407** COURSE NAME: **Engineering Metrology**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **05/06/2023**

Instruction :-

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

QN	SQN	QUESTION TEXT`	RUA	CO MEG 314	Marks
Q.1	A	Attempt any **FOUR**			**(08)**
	a)	List applications of legal metrology.	A	01	
	b)	List different measuring standards.	R	04	
	c)	State any four advantages of Pneumatic comparator.	R	04	
	d)	State Taylor's principle of gauge Design.	R	04	
	e)	Enlist various types of CMM.	R	04	
	f)	Draw any four GD&T symbols with their use.	U	04	
Q.2	A	Attempt any **TWO**			**(16)**
	a)	Explain the necessity of inspection in manufacturing industry.	U	01	
	b)	Interpret the Meaning of 35H6f8 with respect to fit & basis of system.	A	05	
	c)	Differentiate between hole basis & shaft basis system.	U	05	
	d)	Explain i) Random Error ii) Systematic Error.	R	01	
	e)	Differentiate between material standard & wave length standard.	U	04	
	f)	Prepare the stack of slop gauges for height of 58.975mm using set of M112.	A	04	

Range (mm)	Step (mm)	Pieces.
1.001 – 1.009	0.001	09
1.01 – 1.49	0.01	49
0.5 – 24.5	0.5	49
25,50,75,100	25	04
1.0005	-	1
	Total:	112

Q.3		Attempt any **FOUR**			**(16)**
	a)	State the factors affecting on the accuracy of measuring instrument.	U	01	
	b)	Describe use of accessories for slip gauges with sketch.	U	04	
	c)	Define i) Tolerance ii) Allowance iii) Limit iv) Deviation.	U	05	
	d)	Write the design factors considered in CMM.	U	04	
	e)	Write the purpose and advantages of using GD&T in industry.	A	04	
	f)	List & explain the types of fits with sketch.	U	05	

P.T.O.

QN	SQN	QUESTION TEXT	RUA	CO MEG 314	Marks
Q.4		Attempt any **FOUR**			**(08)**
	a)	State the types of errors in screw thread.	R	4	
	b)	Enlist the various instruments used to measure screw thread elements / parameters.	R	4	
	c)	Define backslash error in gear.	R	4	
	d)	Define terms sampling length & lay with reference to surface finish.	R	4	
	e)	Define angle gauges.	R	5	
	f)	Define calibration of measuring instruments.	R	6	
Q.5		Attempt any **FOUR**			**(16)**
	a)	State and explain angle gauges applications.	U	4	
	b)	Explain in detail Tomilson surface tester with neat sketch.	U / A	4	
	c)	Describe importance of calibration of measuring instruments.	U	6	
	d)	Describe thread gauge micrometer with neat sketch.	U	4	
	e)	Describe principle of gear tooth vernier caliper with neat sketch.	U	4	
	f)	Write in detail analytical & functional inspection of gear.	U / A	4	
Q.6		Attempt any **FOUR**			**(16)**
	a)	Write procedure to measure the minor diameter of external screw thread using floating carriage dial micrometer.	U / A	4	
	b)	Draw and explain general symbol of surface finish.	R / U	4	
	c)	In the measurement of surface roughness height of 12 successive peaks & valley measured from datum are as follows. 45, 30, 35, 45, 55, 38, 35, 52, 48, 32, 36, 42 microns. It measurements made over a length of 20mm. Determine CLA & RMS value of surface finish.	A	4	
	d)	Write the working principle of Parkinson Gear Tester with neat sketch.	U A	4	
	e)	Describe calibration of vernier caliper.	A	6	
	f)	Suggest the name of measuring instrument or method for measurement of following parameter of external screw thread. i) Major diameter ii) Effective diameter iii) Pitch iv) Thread angle	U A	4	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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WINTER / SUMMER

EXAM SEAT NO. | | | | | | |

LEVEL : - 4th PROGRAM : MECHANICAL ENGINEERING

COURSE CODE :- MEG 402 / MEF402

COURSE NAME :- MACHINE DESIGN

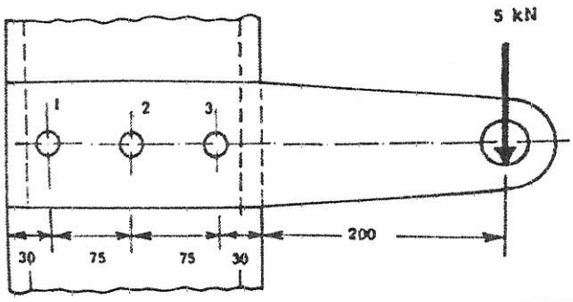
MAX. MARKS : **80** TIME : **03 Hrs** DATE :-03/06/2023

Instruction :-

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

QN	SQN	SECTION -I	R/U/A	Co MEG 402	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define Standardization.	R	1	02
	b)	Define factor of safety.	R	1	02
	c)	State any four factors that govern the selection of material while designing machine components.	R	1	02
	d)	State meaning of power screw.	R	3	02
	e)	State advantages of "V" threads over square threads	R	3	02
	f)	Draw stress strain curve for ductile material	R	1	02
Q.2		Attempt any **FOUR:**			**16**
	a)	Explain the steps involved in general design procedure.	R	1	04
	b)	Explain the maximum normal stress theory.	U	2	04
	c)	A lead screw of lathe has single start square thread of 25 mm outside diameter and 5 mm pitch. In order to drive tool carriage, the screw exerts an axial load of 2.5 KN. Find the efficiency of screw and power required to drive the screw, if it rotates at 300rpm. Neglect the collar friction. Assume coefficient of friction for screw thread as 0.12.	A	3	04
	d)	Explain with neat sketch, the bolt of uniform strength.	U	3	04
	e)	State the design procedure of spigot of cotter joint with neat sketch.	U	2	04
	f)	A cylinder head of steam engine is held in position by M20 bolts. The effective diameter of cylinder is 350 mm and steam pressure is 0.75 N/mm^2. If the bolts are not initially stressed, find the number of bolts required. Take working stress for bolt material 20 N/mm^2.	A	3	04

P.T.O.

Q.3		Attempt any **FOUR:**			**16**
	a)	Explain the term self-locking of screw and overhauling of screw.	U	3	04
	b)	A steel plate subjected to a force of 5 kN by means of three bolts is shown in fig. The permissible shear stress of the bolt is 70 N/mm2. Specify the size of bolts 	A	3	04
	c)	The stresses induced in a component are as follows $\sigma_x = 100\ N/mm^2$, $\sigma_y = 40\ N/mm^2$, $\tau_{xy} = 80\ N/mm^2$, Calculate i) Max. normal stress ii) Max. shear stress	U	2	04
	d)	Design a Pin of a knuckle joint to transmit 80 KN. The design stresses may be taken as 75 MPa in tension, 60MPa in shear and 150 MPa in compression.	A	2	04
	e)	Explain the aesthetic consideration in design.	U	1	04
	f)	In a machine tool application, The screw has single start square threads of 48 mm nominal diameter and 8 mm pitch. The force of 500 N is exert on the tool holder. The mean radius of friction collar is 40 mm. The coefficient of friction at thread and collar surface is 0.15. Calculate: Power required to drive the screw if the screw rotates at 625 rpm.	U	2	04

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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WINTER/SUMMER

EXAM SEAT NO. | | | | | | |

LEVEL : - IVth PROGRAM : ME

COURSE CODE :- MEG 402 / MEF402

COURSE NAME :- Machine Design

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 03/06/2023

QN	SQN	SECTION –II	R/U/A	Co	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Define fatigue failure	R	MEG 402-1	
	b)	Enlist any four types of couplings	R	MEG 402-4	
	c)	Define i) Spring Stiffness ii) Active coils in spring	R	MEG 402-5	
	d)	Classify the spring	R	MEG 402-5	
	e)	Define i) Addendum ii) backlash	R	MEG 402-5	
	f)	Draw neat sketch of helical gear and write its applications	R	MEG 402-5	
Q.5		Attempt any **FOUR:**			**16**
	a)	Define Stress concentration and explain with neat sketch any two methods to reduce it	R	MEG 402-1	
	b)	A shaft 2000 mm long is supported between two bearings. A pulley is keyed at midpoint of shaft. The power transmitted by shaft is 10 kW at 800 r.p.m. Total tension in belt is 2000 N. The belt is vertical. Neglect the weight of pulley. Take permissible shear stress for shaft material as 60 MPa. Find the diameter of the shaft.	A	MEG 402-4	
	c)	The shaft running at 125 r.p.m. transmits 440 kW. Find the diameter of shaft if the angle of twist in shaft must not be more than 0.5° on a length of 1 meter. The modulus of rigidity G = 80000 N/mm^2.	A	MEG 402-4	
	d)	Draw a neat sketch of helical compression spring and explain following terms i) solid length ii) compressed length iii) free length	U	MEG 402-5	
	e)	Compare belt drive and gear drive on following points i) center distance, ii) velocity ratio, iii) Maintenance, and iv) cost	U	MEG 402-5	
	f)	The radial load acting on a ball bearing is 5.5 kN and the expected life for 90% of the bearings is 8000 hours. Calculate i) Bearing life (L_{10}) ii) the dynamic load carrying capacity of the bearing, when the shaft rotates at 1400 rpm	A	MEG 402-6	
Q.6		Attempt any **FOUR:**			**16**
	a)	A solid circular shaft is subjected to bending moment of 800 N-m and twisting moment of 250 N-m. Permissible shear stress for shaft material is 80 N/mm^2. Determine the diameter of the shaft according to the ASME code if, $k_b = k_t = 1.5$	A	MEG 402-4	
	b)	Explain the function of key. Draw the neat sketch of any three types of keys.	U	MEG 402-4	
	c)	A closed coil helical spring is carries a load of 2500 N with a deflection 90 mm. The spring index is '6'. The permissible shear stress is 650 N/mm^2 and modulus of rigidity is 80000 N/mm^2. Calculate i) Wire diameter ii) mean coil diameter and iii) Number of active turns.	A	MEG 402-5	
	d)	A 15 tooth spur pinion has a module of 3 mm and run at a speed of 1200 rpm. The driven gear has 60 teeth. Find i) Speed of driven gear. ii) Diameter of pinion and gear. iii) Circular pitch. iv) The centre distance	A	MEG 402-5	
	e)	Explain the basic procedure for the selection of a bearing from the manufacturer's catalogue	U	MEG 402-6	
	f)	Explain i) Deep Groove Ball Bearing ii) Cylindrical Roller Bearing	U	MEG 402-6	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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~~WINTER~~/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL : - V^th PROGRAM : Mechanical Engineering

COURSE CODE :- MEG503 / MEF504 / MEE504

COURSE NAME :- INDUSTRIAL ENGINEERING

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 02/05/2023

Instruction :-

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

QN	SQN	SECTION -I	R/U/A	Co	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define productivity	R	MEG503.1	
	b)	Write any four disadvantages of product layout	R	MEG503.2	
	c)	State any four advantages of Selecting the plant site in a urban	R	MEG503.2	
	d)	Define Plant capacity	R	MEG503.3	
	e)	State the functions of dispatching	R	MEG503.3	
	f)	State the objectives of Production Planning and Control	R	MEG503.3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Explain the batch production system	U	MEG503.1	
	b)	Explain any four Principles of plant layout:	A	MEG503.2	
	c)	Explain Process layout with neat sketch	A	MEG503.2	
	d)	State the factors affecting Process Planning	A	MEG503.3	
	e)	Explain the following terms i) Routing ii) Sequencing	U	MEG503.3	
	f)	Explain Line Balancing	U	MEG503.3	
Q.3		Attempt any **FOUR:**			**16**
	a)	Determine the multifactor productivity for the combined input of labor machine time and overhead using the following data Output = 5500 units @ Rs.1.8 each Labor = Rs. 1000 Materials = Rs. 1500 Overhead = Rs. 2000	A	MEG503.1	
	b)	State any four factors affecting the selection of material handling equipment	A	MEG503.2	
	c)	Define group technology and state any four benefits of it	U	MEG503.2	
	d)	Differentiate between floor inspection and centralized inspection	U	MEG503.3	
	e)	Explain the steps involved in Process Planning	U	MEG503.3	
	f)	There are seven jobs which are to be pressed first on Machine I and then on Machine II. Processing times in hours are given below:	A	MEG503.3	

Job	A	B	C	D	E	F	G
Machine I	7	24	30	12	18	23	19
Machine II	16	20	22	13	24	5	3

Find the optimal sequence and total elapsed time

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL : - V PROGRAM : Mechanical Engineering

COURSE CODE :- MEG 503 / MEF504 / MEE504

COURSE NAME :- Industrial Engineering

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 2 / 6 / 23

QN	SQN	SECTION –II	R/U/A	Co	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	State the advantages of jigs and fixtures	R	4	2
	b)	State the objectives of ergonomics.	R	5	2
	c)	State the types of compatibility of control members	U	5	2
	d)	Define work study	R	6	2
	e)	Enlist time study equipments.	R	6	2
	f)	Define rapid prototyping	R	6	2
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain with neat sketch 3-2-1 principle	U	4	4
	b)	Enlist the ergonomic consideration in design of displays	U	5	4
	c)	List and explain various allowances considered while calculating standard time.	U	6	4
	d)	Sketch the symbol of following therbligs- i. Search ii. Disassemble iii. Hold iv. Position	A	6	4
	e)	Explain flexible manufacturing systems.	U	6	4
	f)	Explain the term POKA YOKE with suitable examples.	A	6	4
Q.6		Attempt any **FOUR:**			**16**
	a)	Explain types of locators and clamping devices with suitable applications	A	4	4
	b)	State the ergonomic considerations used in following controls- i. Cranks ii. Joysticks iii. Push buttons iv. Levers	A	5	4
	c)	State the factors considered for selection of work. Explain any one of them.	U	6	4
	d)	Draw Outline flow process chart for manufacturing and checking 50 mm of shaft on lathe machine.	A	6	4
	e)	A particular activity on the shop floor consists of three elements. Calculate standard time for the activity. Total allowances given as percentage of normal.	A	6	4

Elements	I	II	III
Observed time (min)	1.20	0.50	0.80
Rating factor (%)	80	90	75
Total allowances (%)	22	19	20

	f)	Explain push and pull types of manufacturing systems.	U	6	4

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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EVEN TERM END EXAM SUMMER -2023

EXAM SEAT NO. | | | | | | |

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

COURSE CODE: **MEG310 / MEF310** COURSE NAME: **Engineering Metallurgy & Material.**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **02/06 /2023**

Instruction :-

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

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QN	SQN	QUESTION TEXT	RUA	CO MEG 310	Marks
Q.1		Attempt any **FOUR**			**(08)**
	a)	Draw BCC unit cell.	R	1	
	b)	Explain eutectoid reaction.	U	1	
	c)	Enlist types of cast iron.	R	1	
	d)	State the meaning of isomorphous system.	U	2	
	e)	Write four applications of law carbon steel.	U	1	
	f)	Define allotropy.	R	2	
Q.2		Attempt any **FOUR**			**(16)**
	a)	Draw Hexagonal closed packed structure and explain it.	U	1	
	b)	Explain packing factor.	U	1	
	c)	Write lever arm principle.	U	2	
	d)	Explain any two reactions in binary system.	U	1	
	e)	Define i) Ferrite ii) Pearlite.	U	2	
	f)	Write detail classification of ferrous material.	U	1	
Q.3		Attempt any **FOUR**			**(16)**
	a)	Calculate the atomic packing factor for a Face Centered Cubic structure.	A	1	
	b)	Explain point imperfection in crystal.	A	1	
	c)	Describe process of constructing binary equilibrium diagram.	A	2	
	d)	Write down the composition, properties and application of High speed steel and stainless steel.	A	1	
	e)	Draw labelled Iron- Iron carbide equilibrium diagram.	R	1	
	f)	Explain effect of slow cooling on microstructure of steel.	A	2	

P.T.O.

QN	SQN	QUESTION TEXT	RUA	CO MEG 310	Marks
Q.4		Attempt any **FOUR**			**(08)**
	a)	State any four purposes of heat treatment.	R	3	
	b)	State significance of TTT diagram.	U	3	
	c)	List various alloys of copper and write composition of any one alloy.	R	4	
	d)	State the applications of Butadiene & Buna.	A	4	
	e)	Draw neat sketch to show working principle of Magnaflux test.	U	5	
	f)	State the application of Eddy current test.	A	5	
Q.5		Attempt any **FOUR**			**(16)**
	a)	Draw neat labelled TTT diagram and explain it.	U	3	
	b)	Explain full annealing process with purposes.	U	3	
	c)	Explain Tempering process with applications.	A	3	
	d)	Show proper normalizing temperature range in Iron carbon diagram and state its advantages and applications.	A	3	
	e)	Explain Carburising process with its applications.	A	3	
	f)	Explain Flame hardening process with its applications.	A	3	
Q.6		Attempt any **FOUR**			**(16)**
	a)	State composition of Phosphar Bronze and its applications.	A	4	
	b)	Select suitable material for bearing write its composition and properties.	R	4	
	c)	State two properties and applications of following materials. i) ABS ii) Bakelites	A	4	
	d)	Write four applications of following materials. i) Nano materials ii) Aluminium and its alloys.	A	4	
	e)	Draw neat labelled sketch of Ultrasonic test. State its applications.	A	5	
	f)	Explain Penetrant test with its applications.	A	5	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER/SUMMER-

EXAM SEAT NO. | | | | | | |

LEVEL : - VTH. PROGRAM :Mechanical Engineering

COURSE CODE :-MEG507 / MEF507

COURSE NAME :- Industrial Hydraulics and Pneumatics

MAX. MARKS : **80** TIME : **03 Hrs** DATE :-01/06/2023

QN	SQN	SECTION –II	R/U/A	Co MEG 507	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Enlist main components of pneumatics system.	R	3	
	b)	Give classification of air compressor.	R	3	
	c)	State a function of air compressor.	R	3	
	d)	Draw symbol of FRL unit.	R	3	
	e)	Enlist types of air motors.	R	3	
	f)	State main components of sequencing circuit.	R	5	
Q.5		Attempt any **FOUR:**			**16**
	a)	State any 4 merits and demerits of pneumatics system.	U	3	
	b)	Explain with neat sketch single acting pneumatic cylinder.	U	3	
	c)	Give broad classification of pneumatic cylinders.	U	3	
	d)	Explain with neat sketch screw compressor.	U	3	
	e)	Explain with neat sketch vane motors.	U	3	
	f)	Draw circuit of speed control of double acting cylinder.	U	5	
Q.6		Attempt any **FOUR:**			**16**
	a)	Draw and explain general layout of pneumatic system.	A	3	
	b)	Write difference between rotary and reciprocating compressor.	A	3	
	c)	Explain with neat sketch FRL unit used in pneumatic circuit.	A	3	
	d)	Explain with neat sketch shuttle valve	A	3	
	e)	Explain with neat sketch Quick exhaust valve.	A	5	
	f)	Draw and explain AND circuit.	A	5	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL : - V PROGRAM : MECHANICAL ENGINEERING
COURSE CODE :- MEG 507 / MEF507
COURSE NAME :- INDUSTRIAL HYDRAULICS AND PNEUMATICS
MAX. MARKS : **80** TIME : **03 Hrs** DATE :-01 /06/ 23

Instruction :-

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

QN	SQN	SECTION -I	R/U/A	Co	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	State functions of oil in hydraulic systems.	R	MEG507.3	
	b)	State advantages of hydraulic systems.	R	MEG507.2	
	c)	Classify pumps used in hydraulic systems	U	MEG507.3	
	d)	Define positive displacement pump.	R	MEG507.3	
	e)	Draw symbols of i) flow control valve(variable) ii)4/3 D.C. Valve (hand lever operated, spring return)	A	MEG507.1	
	f)	Enlist pipe materials used in hydraulic systems	R	MEG507.4	
Q.2		Attempt any **FOUR:**			**16**
	a)	Draw general layout of hydraulic system and label it well.	U	MEG507.2	
	b)	Draw and explain working of unbalanced vane pump.	U	MEG507.3	
	c)	Define i) positive seals and nonpositive seals ii) static seals and dynamic seals	R	MEG507.4	
	d)	Classify valves used in hydraulic systems.	U	MEG507.4	
	e)	Differentiate between pressure relief valve and unloading valve.	U	MEG507.4	
	f)	Classify actuators used in hydraulic systems.	U	MEG507.3	
Q.3		Attempt any **TWO:**			**16**
	a)	Draw and explain hydraulic circuit for grinding machine	A	MEG507.5	
	b)	Explain with neat sketch any one oil filter	U	MEG507.4	
	c)	State different valve actuation methods and draw their symbols.	R	MEG507.4	

P.T.O.

GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

EVEN TERM END EXAM SUMMER -2023

EXAM SEAT NO. | | | | | | |

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

COURSE CODE: **MEG308/MEF308** COURSE NAME: **THEORY OF MACHINE**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **31/05/2023**

Instruction;-

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

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QN	SQN	QUESTION TEXT`	RUA	CO MEG 308	Marks
Q.1	A	Attempt any **FOUR**			**(08)**
	a)	Define term kinematic link.	R	01	
	b)	Enlist four inversions of four bar chain mechanism.	R	01	
	c)	Define coefficient of fluctuation of energy.	R	03	
	d)	State effects of imbalance in machine.	R	03	
	e)	Give classification of Governor.	R/U	03	
	f)	List different types of kinematic pairs.	R	01	
Q.2	A	Attempt any **FOUR**			**(16)**
	a)	Explain with neat sketch working of whitworth quick return mechanism.	U	01	
	b)	Define linear velocity, linear acceleration, angular velocity and angular acceleration.	R	02	
	c)	Sketch and explain working of beam engine mechanism.	U	01	
	d)	Explain with neat sketch centrifugal governor.	U	03	
	e)	Draw and explain the turing moment diagram of a four stroke IC engine.	A	03	
	f)	Define completely constrained motion and successfully constrained motion with suitable example.	U/A	01	
Q.3		Attempt any **TWO**			**(16)**
	a)	Explain Klein's construction to determine velocity and acceleration of different links in single slider crank mechanism.	U	02	
	b)	In a slider crank mechanism crank is 30mm long and connecting rod is 120mm. the crank makes an angle of 30^0 with IDC and rotates with uniform speed of 200r.p.m. clockwise. Determine graphically. i) Angular acceleration of connecting rod. ii) Acceleration of slider.	A	02	
	c)	Attempt the following i) State the necessity of balancing. List different types of balancing methods. ii) Explain with neat sketch Hartnell governor.	U	03	

QN	SQN	QUESTION TEXT`	RUA	CO MEG 308	Marks
Q.4		Attempt any **FOUR**			**(08)**
	a)	Define slip & creep of belt.	R	04	
	b)	Write any two functions of clutch.	U	05	
	c)	Write formula for length for cross belt drive.	R	04	
	d)	Draw neat sketch of Reverted gear train.	U	04	
	e)	Why roller follower is preferred over knife edge follower.	A	06	
	f)	State any two methods to increase initial tension.	A	04	
Q.5		Attempt any **FOUR**			**(16)**
	a)	What is centrifugal tension & state its effect on maximum tension.	U	04	
	b)	Explain in detail i) Uniform wear theory. ii) Uniform pressure theory.	A	04	
	c)	List the different types of cam & explain with figure each type.	U	06	
	d)	A shaft runs at 60 r.p.m. & drives another shaft at 180 r.p.m. through belt drive. The diameter of the driving pulley is 600mm. determine the diameter of the driven pulley when: i) Belt thickness is 3mm & ii) Belt thickness 5mm & total slip of 3% iii) Assuming no slip & neglecting belt thickness.	U/A	04	
	e)	A Single plate clutch transmits 25KW at 900 r.p.m. The maximum pressure intensity between the plates is 85 kN/m^2. The outer diameter of the plate is 360mm. Both the sides of the plate are effective & the coefficient of friction is 0.25. Determine :- i) Inner diameter of the plate ii) The axial force to engage the clutch.	U/A	05	
	f)	Define : i) Prime circle ii) Cam angle iii) Pressure angle iv) Lift of stroke.	R	06	
Q.6		Attempt any **TWO**			**(16)**
	a)	i) Explain with sketch working principle of epicyclic gear train. ii) A V-belt drive has the semi groove angle 25^0. The belt speed is 20 m/s, the angle of lap is 160^0 & the coefficient of friction is 0.28 The mass of the belt is 1 Kg/m run. If the permissible tension in the belt is 2800 N. find the power that can be transmitted.	U	04	
	b)	i) Explain with neat sketch internal expanding shoe brake. ii) Explain with neat sketch centrifugal clutch.	U	05	
	c)	It is required to set out the profile of a cam for the following motions as under with following details. 1) The follower to move outward through an angular displacement of 20^0 during 90^0 of the cam rotation. 2) Follower to dwell for the 45^0 of the cam rotation. 3) Follower to return to its position of zero displacement in 75^0 of the cam rotation. 4) Follower to dwell for the remaining period of revolution of cam. The distance between pivot center & follower roller center is 70mm. Roller diameter is 20mm, minimum diameters of the cam is 100mm. location of the pivot point 70mm to left & 60mm above the axis of rotation of cam. The motion of the follower is to take place with uniform acceleration & retardation for both in outstroke & return stroke.	U/A	06	

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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EVEN TERM END EXAM SUMMER -2023

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MEG306/MEF306**

COURSE NAME **MACHINE TOOLS**

MAX. MARKS : **80** TIME : **03Hrs.** DATE :- **29/ 05 / 2023**

Instruction :-

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

QN	SQN	Question Text	R/U/A	Co MEG 306	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	State the factors responsible for producing continuous chip.	R	1	
	b)	Classify lathe machines.	U	2	
	c)	Describe facing and turning operations on lathe machine.	R	3	
	d)	State the purpose of Knurling operation.	U	3	
	e)	Name different operations performed on drilling machine.	R	3	
	f)	Draw neat labeled sketch of radial drilling machine.	U	2	
Q.2		Attempt any **FOUR:**			**16**
	a)	Write meaning of a tool signature 8-10-6-6-5-10-0.8.	U	1	
	b)	Give values of different tool angles for turning mild steel rod using H.S.S tool.	A	1	
	c)	Calculate machining time for turning Take- Depth of cut:1mm. Turning length :80mm Feed rate : 0.2mm/rev. Cutting speed : 30m/min	A	2,3	
	d)	Name taper turning methods on lathe and explain any one.	U	3	
	e)	State different cutting fluids used for machining.	A	1	
	f)	Differentiate between continuous and discontinuous chips.	U	1	
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain side and end cutting edge angles.	U	1	
	b)	Define cutting speed and state its unit.	R	1	
	c)	Explain tapping operation with a neat sketch.	U	3	
	d)	What are different work holding devices used on drilling machine.	R	2	
	e)	Explain cutting speed, feed and depth of cut for drilling operation.	U	3	
	f)	Draw a neat labeled sketch of twist drill showing nomenclature.	U	2	

P.T.O

QN	SQN	Question Text	R/U/A	Co MEG 306	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Why No cutting fluids are used on shapers?	A	2	
	b)	Write types of Grinding Wheel.	R	2	
	c)	Explain Broaching operation in short.	U	3	
	d)	Which grinding machine is used for heave duty work?	A	2	
	e)	Give classification of broaching machine.	R	2	
	f)	List Parts of vertical broaching machine.	R	2	
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain Designation of grinding wheel as per SSI – 1954.	A	2	
	b)	Explain with neat sketch Quick-Return mechanism of shaping Machine.	U	1	
	c)	Write short Note on i) Honing Process ii) Burnishing Process	U	4	
	d)	Explain with Neat sketch vertical Broaching machine.	U	2	
	e)	Write advantages, limitations and applications of lapping process.	U	4	
	f)	Explain with neat sketch hydraulic drive for a shaper.	A	1	
Q.6		Attempt any **FOUR:**			**16**
	a)	Explain in detail different types of broaching methods.	A	3	
	b)	Write short Note on "Types of Abrasive".	U	2	
	c)	Explain in detail Burnishing Process.	U	4	
	d)	Differentiate Between – i) Lapping & Honing ii) Polishing & Buffing.	U	4	
	e)	Explain in details Grit, Grade, Structure of grinding wheel.	A	2	
	f)	Explain with neat sketch Sollted disc mechanism.	U	1	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVEN TERM END EXAM SUMMER -2023

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MEF502**

COURSE NAME **QUALITY MANAGEMENT**

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- **27/ 05 / 2023**

Instruction :-

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

QN	SQN	SECTION -I	R/ U/ A	Co MEF 502	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define the term quality control. Write any four objectives of quality control.	R	1	
	b)	Write the factors considered while designing reliability.	U	1	
	c)	State advantages of Quality Assurance.	R	2	
	d)	What do you understand by quality audit?	U	2	
	e)	Describe briefly Cost of Quality.	A	2	
	f)	State the meaning of cost of prevention.	U	2	
Q.2		Attempt any **FOUR:**			**16**
	a)	State various factors governing Quality of conformance.	R	1	
	b)	State the meaning of Reliability, giving suitable examples.	U	1	
	c)	Write different element of cost of Quality.	R	1	
	d)	Define Quality Circles and state its different characteristics.	U	2	
	e)	Define cost of failure. Explain briefly what do you understand by the cost of External Failure.	U	2	
	f)	With the help of a graph explain. What do you understand by Quality of Design?	A	2	
Q.3		Attempt any **FOUR:**			**16**
	a)	State and explain different elements of Reliability.	U	1	
	b)	Define Inspection. Write its various objectives.	U	1	
	c)	Explain the working of a Quality Circle briefly.	U	2	
	d)	State different objectives of Quality Audit.	R	2	
	e)	Explain the meaning of Cost of Quality with a suitable diagram.	A	2	
	f)	State and explain the various features of Cost of Appraisal.	U	2	

P.T.O.

QN	SQN	SECTION II	RUA	CO MEF 502	Marks
Q.4		Attempt any **FOUR**			**(08)**
	a)	Define Mode and Median.	R	3	
	b)	Define statistical quality control.	R	3	
	c)	Name the basic elements of TQM.	U	4	
	d)	Describe vision statement of quality.	U	4	
	e)	Give the purpose of cause and effect diagram.	A	5	
	f)	List the 5's for improvement.	R	5	
Q.5		Attempt any **FOUR**			**(16)**
	a)	Describe the normal distribution curve.	U	3	
	b)	The following is $\overline{X}$ and R values for subgroup of five. Subgroup: 1 | 2 | 3 | 4 | 5 | 6 | 7 $\overline{X}$: 10.2 | 10.6 | 10.8 | 10.9 | 10.7 | 10.5 | 10.6 R: 1.1 | 1.3 | 1.0 | 0.9 | 1.4 | 1.2 | 1.3 Calculate UCL and LCL for $\overline{X}$ & 'R' control chart. Assume A_2 = 0.58, D_4 = 2.11, D_3 =0	A	3	
	c)	Write Deming philosophy of Quality	R	4	
	d)	Discuss the significance of Quality Council in Quality Management	U	4	
	e)	Explain the Pareto diagram for data classification.	A	5	
	f)	Describe use of six sigma in process analysis.	A	5	
Q.6		Attempt any **FOUR**			**(16)**
	a)	Discuss the steps involve in construction of $\overline{X}$ and 'R' chart.	R	3	
	b)	Thermostatic controls are tested to determine ÖN" temperature. The measurement are 42, 40, 41, 40, 42, 43 The tolerance are 41^{+3} . Calculate the process capability index.	A	3	
	c)	Describe the 'KAIZEN'.	U	4	
	d)	Discuss the PDSA cycle for Quality Management.	R	4	
	e)	Explain the ISO 9000 series standard.	A	5	
	f)	Describe the construction of Histogram and its purpose to analysis the process.	R	5	

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

EVEN TERM END EXAM SUMMER -2023

EXAM SEAT NO. | | | | | | |

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

COURSE CODE: **MEG 302 /MEF302** COURSE NAME: **Thermal Engineering**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **26/05 /2023**

Instruction :-

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

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QN	SQN	QUESTION TEXT	RUA	CO MEG 302	Marks
Q.1		Attempt any **FOUR**			**(08)**
	a)	Define the term 'Control Volume'.	R	1	
	b)	Draw the diagram of closed system and show on it energy interactions.	U	1	
	c)	State what is perpetual motion machine of first kind.	R	2	
	d)	Calculate the initial pressure of 4.5 m^3 of dry nitrogen gas, if it occupies 3.3m^3 at 1.2 bar pressure. Assume temperature remains constant.	A	2	
	e)	Represent graphically Boyle's law.	U	2	
	f)	State Fourier's law of heat conduction.	R	3	
Q.2		Attempt any **FOUR**			**(16)**
	a)	Briefly explain path function and point function.	R	1	
	b)	Draw schematic diagram of water pump and derive steady flow energy equation for the same.	U	2	
	c)	A centrifugal pump delivers water with inlet and outlet pressure are 100KPa and 400KPa respectively. The suction is 2m below the centre of pump and delivery is 8m above the centre of pump. If the velocities of inlet and exit of water is 1.91m/s and 7.64 m/s Find work done to the pump per second.	A	2	
	d)	State the equation of work and heat, with P-V and T-S diagram for Isothermal process.	R	2	
	e)	Differentiate between free and forced convection.	R	3	
	f)	Calculate the heat loss through a glass wool layer per hour per unit area, which has a temperature difference of 40^0C across 15cm thickness. The thermal conductivity of glass wool is 0.038W/m ^{0}K.	A	3	
Q.3		Attempt any **TWO**			**(16)**
	a)	Explain the term "Energy". What are the different forms of energy, explain with examples? An aeroplane of 30 tons mass is travelling at 1000 Km per hr. How much is its K.E. in K.W. hr.	R	1	
	b)	Explain with neat sketch Joules law experiment for the formulation of first law of thermodynamics.	R	2	
	c)	Explain constant volume process representing it on P.V. and T-S diagram. A cylinder fitted with a piston contains 0.5kg of steam at 4 bar. The initial volume of steam is 0.1m^3. Heat is transferred to the steam at constant pressure until the temperature becomes 300^0C. Determine Heat transfer and work done during the process.	A	2	

P.T.O.

<table>
<tr><th>QN</th><th>SQN</th><th>Question Text</th><th>R/U/A</th><th>Co MEG 302</th><th>Marks</th></tr>
<tr><td>Q.4</td><td></td><td>Attempt any FOUR:</td><td></td><td></td><td>08</td></tr>
<tr><td></td><td>a)</td><td>Define i) Wet steam ii) Dry steam.</td><td>R</td><td>4</td><td></td></tr>
<tr><td></td><td>b)</td><td>Define sensible heat with its SI Unit.</td><td>R</td><td>4</td><td></td></tr>
<tr><td></td><td>c)</td><td>State the function of Blow off cock.</td><td>U</td><td>5</td><td></td></tr>
<tr><td></td><td>d)</td><td>Enlist various fire tube boilers.</td><td>R</td><td>5</td><td></td></tr>
<tr><td></td><td>e)</td><td>State the ‘Dalton’s law of partial pressure’.</td><td>U</td><td>6</td><td></td></tr>
<tr><td></td><td>f)</td><td>Define convergent Nozzle.</td><td>R</td><td>6</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Q.5</td><td></td><td>Attempt any FOUR:</td><td></td><td></td><td>16</td></tr>
<tr><td></td><td>a)</td><td>Explain with neat sketch Modified Rankine Cycle.</td><td>U</td><td>4</td><td></td></tr>
<tr><td></td><td>b)</td><td>Explain with neat sketch Evaporative jet condenser.</td><td>U</td><td>6</td><td></td></tr>
<tr><td></td><td>c)</td><td>Differentiate between Impulse turbine and Reaction turbine.</td><td>R</td><td>6</td><td></td></tr>
<tr><td></td><td>d)</td><td>State the function and location of the following Devices.
i) Water level indicator. ii) Fugible plug.</td><td>A</td><td>5</td><td></td></tr>
<tr><td></td><td>e)</td><td>Steam enters an engine at a pressure of 12 bars with a 67^0C of superheat. It is exhausted at a pressure of 0.15 bar and 0.95 dry. Find the drop in enthalpy of the steam.
From steam table
<table>
<tr><td>Pressure</td><td>hf (KJ/kg)</td><td>hf g(KJ/kg)</td></tr>
<tr><td>12 bar</td><td>798.4</td><td>1984.3</td></tr>
<tr><td>0.15bar</td><td>226.</td><td>2373.2</td></tr>
</table></td><td>A</td><td>4</td><td></td></tr>
<tr><td></td><td>f)</td><td>Give classification of Boiler.</td><td>U</td><td>5</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Q.6</td><td></td><td>Attempt any TWO:</td><td></td><td></td><td>16</td></tr>
<tr><td></td><td>a)</td><td>Explain with neat sketch Generation of steam at constant pressure. Show on T-H, H-S and P-H diagram.</td><td>U</td><td>4</td><td></td></tr>
<tr><td></td><td>b)</td><td>Explain with neat sketch Cochron Boiler.</td><td>U</td><td>5</td><td></td></tr>
<tr><td></td><td>c)</td><td>State different types of compounding of steam turbine. Explain any one in brief.</td><td>U</td><td>6</td><td></td></tr>
</table>

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

~~WINTER~~/ SUMMER 2023

EXAM SEAT NO. | | | | | | |

LEVEL : - IV PROGRAM : MECHANICAL ENGINEERING

COURSE CODE :- MEF 401

COURSE NAME :- POWER ENGINEERING

MAX. MARKS : **80** TIME : **03 Hrs** DATE :-25/05/2023

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	SN	**SECTION -I**	R/ U/ A	Co MEG 401	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Write the equation of air standard efficiency of diesel cycle? Give the various parameters of the equation?	U	1	
	b)	State the need of "Choke" in carburetor?	R	1	
	c)	Represent the Otto cycle on P-v and T-s diagram?	A	1	
	d)	State any two advantages of water cooling type over air cooling of I C engine?	R	2	
	e)	Find brake power for an engine having RPM=200; Brake diameter=150cm; Net load on brake =1200N?	R	2	
	f)	Write exhaust pollutants from C I engine?	U	2	
Q.2		Attempt any **FOUR:**			**16**
	a)	Draw actual and theoretical valve timing diagram for four stroke C I engine?	U	1	
	b)	Explain dual cycle with P-v and T-s diagram?	R	1	
	c)	An engine of bore 250 mm and stroke works on Otto cycle. The clearance volume is 0.00263m^3. Find the air standard efficiency of cycle and also sketch the cycle on P-v and T-s diagram?	A	1	
	d)	Briefly explain pre-ignition? State reasons of it to occur?	R	2	
	e)	Draw a neat sketch of non dispersive infrared gas analyzer and write its principle of operation?	U	2	
	f)	Write the steps used in conduction of Morse test to measure indicated power?	A	2	
Q.3		Attempt any **FOUR:**			**16**
	a)	With pressure- crank angle diagram explain the combustion stages in S I engine?	U	1	
	b)	Draw a neat sketch of fuel pump of diesel engine labeling all of its parts and explain its function?	U	2	
	c)	A 4 cylinder, 4 stroke petrol engine 6cm bore and 19cm stroke was tasted at constant speed. The fuel supply fixed to 0.13kg/min and plugs of 4 cylinders were successively short circuited without change of speed. The brake power measurements were as follows; With all cylinders working = 16.65kW; with No 1 cylinder cut off =11.55kW; with No 2 cylinder cut off =11.65kW; with No 3 cylinder cut off =11.70kW; with No 4 cylinder cut off =11.50kW; Find (a) The I P of the engine (b) The mechanical efficiency (c) Indicated thermal efficiency if C V of the fuel used is 42000kJ/kg	A	2	

P.T.O.

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

~~WINTER~~/SUMMER - 2023

EXAM SEAT NO. | | | | | | |

LEVEL : - 4th PROGRAM : Mechanical Engineering

COURSE CODE :- MEG401/MEF401

COURSE NAME :- Power Engineering

MAX. MARKS : **80** TIME : **03 Hrs** DATE :-25/05/2023

QN	SQN	SECTION –II	R/U/A	Co	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Define the following terms with respect to Compressor, i) Pressure ratio, ii) Swept volume.	R	5	
	b)	Draw a neat sketch of open cycle gas turbine & label its parts.	R	5	
	c)	Define 'Tones of refrigeration'.	R	5	
	d)	A single stage single acting air compressor is required to compress air from 1bar to 5 bar. If initial volume of air sucked is 2.1948 m3/min & compression followes law PV1.3= C, determine the volume of air at the end of compression.	A	5	
	e)	Write comparison of closed cycle gas turbine and open cycle gas turbine on the basis of i) Cycle of operation. ii) Blade Life.	U	5	
	f)	Suggest the refrigeration device for following refrigeration application, i) cooling of drinking water, ii) storing of perishable vegetables	A	5	
Q.5		Attempt any **FOUR:**			**16**
	a)	Write any four effects of clearance volume on work required for reciprocating air compressor.	U	6	
	b)	State any four methods of energy saving in compressors	R	5	
	c)	Draw neat sketch of Ram jet & explain its working.	U	6	
	d)	Define the term " Psychrometry" and write the significance of Psychrometric chart.	R	5	
	e)	Draw a neat sketch of window air conditioner and name the parts.	U	6	
	f)	Draw a neat sketch of vapour compression refrigeration cycle and Name the different parts.	U	6	
Q.6		Attempt any **FOUR:**			**16**
	a)	A single acting two stage reciprocating air compressor with complete intercooling delivers 7 kg/min of air at 16 bar. The suction occurs at 1bar & 15°C & compression index is n= 1.3 then calculate i) Intermediate pressure ii) The power required to drive the compressor.	A	5	
	b)	Explain with neat sketch construction and working of Roots blower compressor	U	6	
	c)	State any four applications of gas turbines.	R	5	
	d)	Write any four industrial uses of compressed air.	R	5	
	e)	Define the term "Air-conditioning". Write applications of air-conditioning.	R	6	
	f)	Represent sub cooling and superheating on p-h and T-S diagram in Refrigeration.	A	6	

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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EVEN TERM END EXAM SUMMER -2023

EXAM SEAT NO. | | | | | | |

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

COURSE CODE: **MEG 303 /MEF303** COURSE NAME: **MACHINE DRAWING**

MAX. MARKS: **80** TIME: **4 HRS.** DATE: **24/05 /2023**

Instruction :-

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

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QN	SQN	QUESTION TEXT	RUA	CO MEG 303	Marks
Q.1		Attempt any **FOUR**			**(08)**
	a)	Draw conventional representation of any four of following. (Any Four) i) Bevel gear ii) Gate valve iii) Splined Shaft iv) Concrete iv) Leather v) Spur gear	R	02	
Q.2		Attempt any **ONE**			**(08)**
	a)	Figure 2.1 Shows incomplete front view, top view and auxiliary view of an object. Draw the given views and complete front view.	U / A	01	
	b)	Figure 2.2 Shows front view, auxiliary view and incomplete side view OF AN OBJECT. Redraw the given views and complete the side view.	R	01	
Q.3		Attempt any **TWO**			**(12)**
	a)	1) Draw the symbols for the following. i) Flatness ii) Circularity iii) Roundness iv) Symmetry	R	04	**04**
		2) State the meaning of symbol at X shown in figure 3.1	U		**02**
	b)	1) Draw a sketch showing basic size, lower deviation, upper deviation and Tolerance.	R		**02**
		2)The shaft size is given as $\Phi 16^{+0.023}_{-0.012}$ mm and hole size is $\Phi 16^{+0.018}_{-0.000}$ mm . Determine types of fit between them.	A	04	**04**
	c)	1. State the meaning of symbol shown in figure 3.2	A		**02**
		2. A bush bearing has internal diameter $\Phi 25^{-0,025}_{-0,000}$ mm. and the shaft diameter is $\Phi 25^{-0.020}_{-0.040}$ mm. Find type of fit between them.	A		**04**

P.T.O.

Q.4		Attempt any TWO			**12**
	a)	A vertical square prism 60mm sides of base and height 100mm has its base on H.P. and rectangular faces equally inclined to V.P. It is penetrated by a horizontal square prism 45mm sides and axis 100mm such that the axis bisect each other. The faces of the horizontal prism are equally inclined to H.P. Draw the three views of solids showing the lines of intersection.	U/A	03	
	b)	A vertical square prism base 50mm side and height 90mm is completely penetrated by a horizontal square prism , 35mm side and axis length 90mm so that their axes are 6mm apart and in front of the observer. The axis of the horizontal prism is parallel to V.P. while the faces of both prism are equally inclined to the V.P. Draw the projections of the prism showing lines of intersections.	U/A		
	c)	A vertical cylinder of 70mm diameter is penetrated but another cylinder of 50mm diameter. The axis of the penetrating cylinder is parallel to both H.P. and V. P. and is 8 mm away from the axis of the vertical cylinder. Draw its projections showing curves of intersection.	U/A		
Q.5		**Attempt the following**			**(20)**
		Figure I Shows assembly of a Oldham's coupling. Draw the following details i) Flange (Sectional FV & SV) ii) Center Block (Sectional FV & SV) iii) Key (FV & SV) iv) Shaft (FV & SV)	U	05	
Q.6		Attempt any **ONE**			**(20)**
	a)	Figure II shows the details of foot step Bearing. Draw the following views of assembly. i) Sectional Front view (10 marks) ii) Top view (06 marks) iii) Prepare part list (04 marks)	U/ A	05	
	b)	Figure III shows the details of screw jack. Draw the following views of assembly. i) Sectional Front view (10 marks) ii) Top view (06 marks) iii) Prepare part list (04 marks)			

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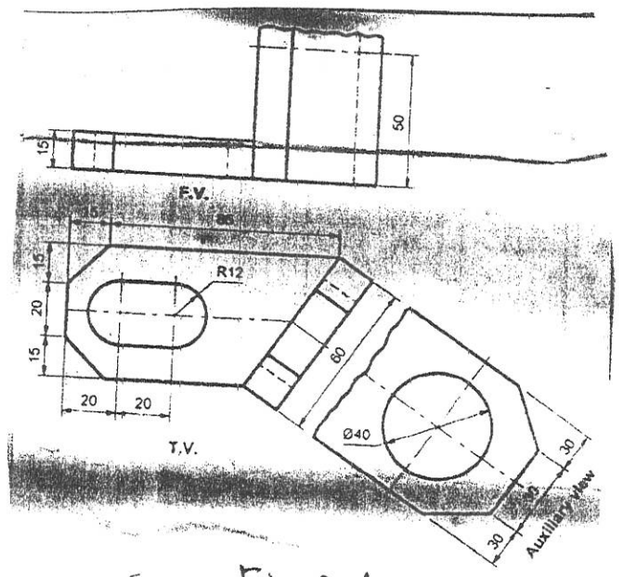


Fig 2.1 Fig. 2.1

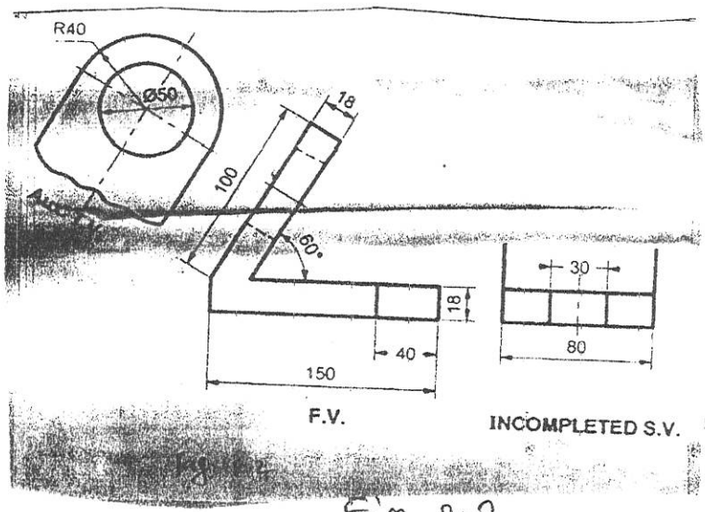


Fig. 2.2

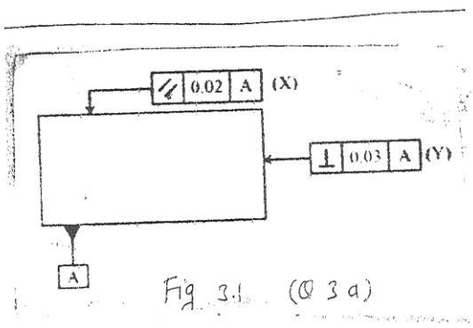


Fig 3.1 (Q 3 a)

Fig. 3.1

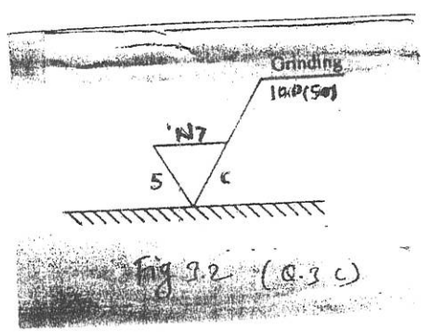
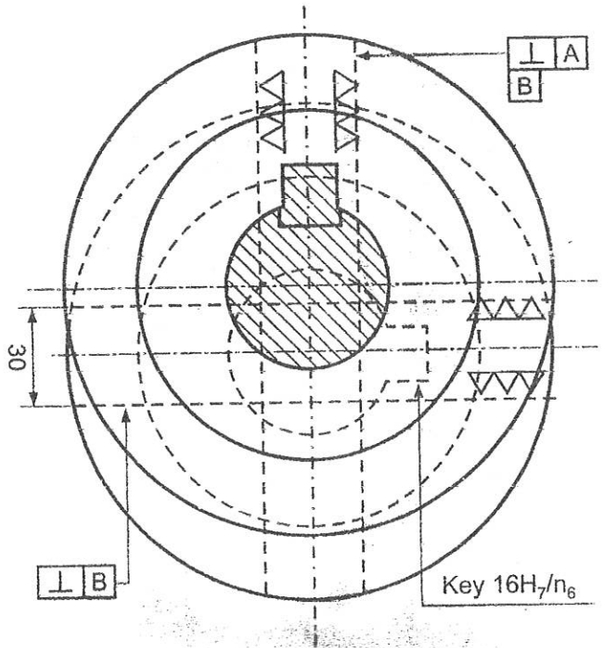
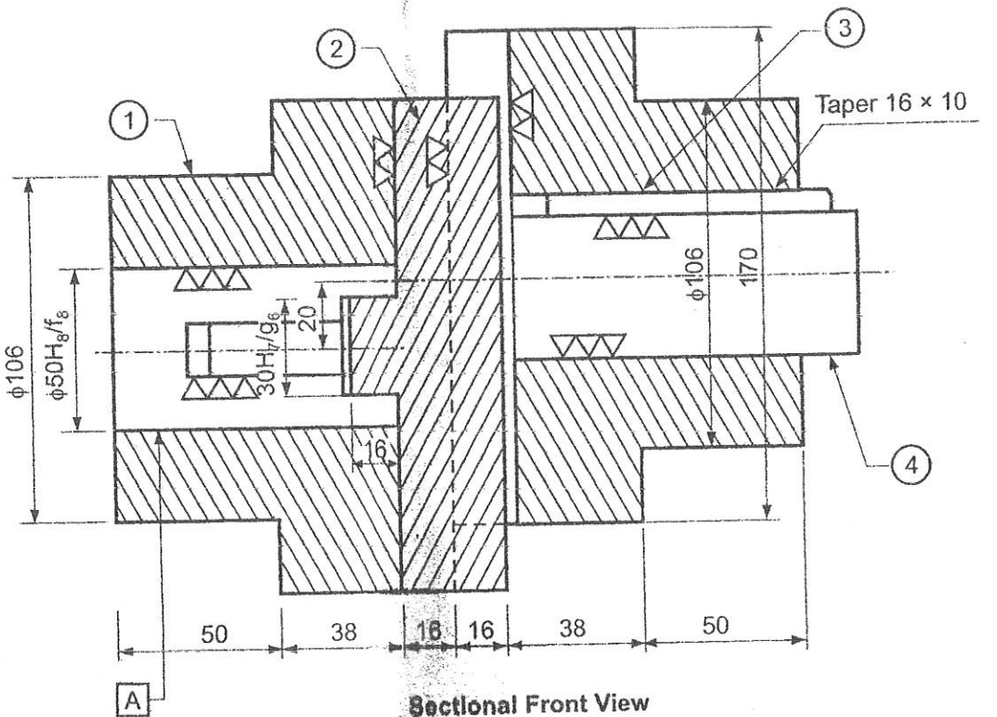


Fig 3.2 (Q.3 c)

Fig. 3.2.



R.H.S.V.



Sectional Front View

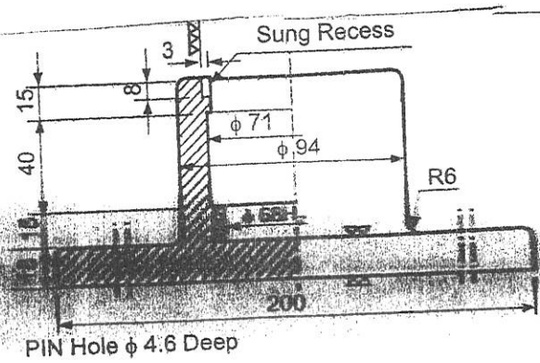
FIT CHART

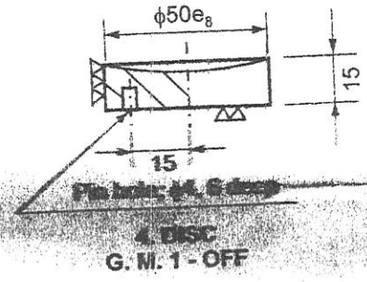
$16H_7/n_6$	TRANSITION FIT
$30H_7/g_6$	CLEARANCE FIT
$50H_8/f_8$	CLEARANCE FIT

PART LIST

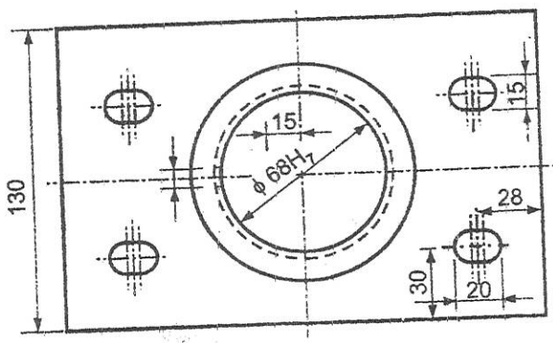
Part No.	Part Name	Material	Qty.
1.	FLANGE	C.I.	2
2.	CENTER BLOCK	C.I.	1
3.	KEYS	M.S.	2
4.	SHAFT	M.S.	2

Ag. I.

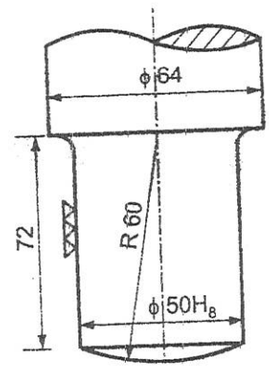




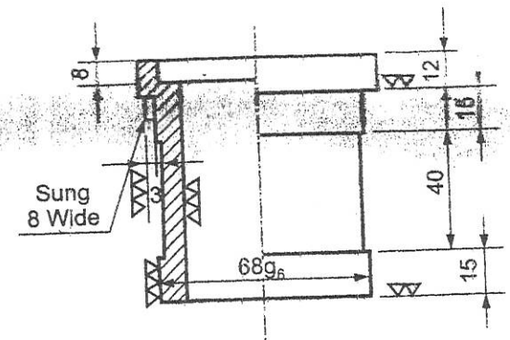
4. DISC
G. M. 1 - OFF



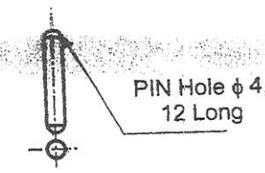
1. BODY
C.I. 1-OFF



3. SHAFT
M.S. 1 - OFF



2. BUSH
G. M. 1 - OFF

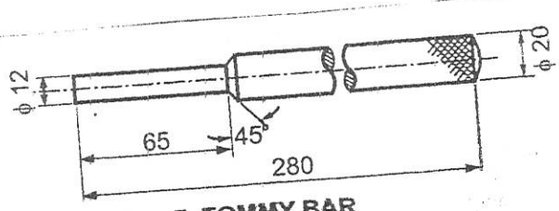


5. PIN
M.S. 1 - OFF

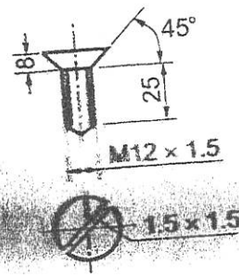
Tolerance Chart

$68H_7 = \frac{+0.030}{+0.000}$	$68h_6 = \frac{-0.019}{+0.000}$
$50H_7 = \frac{+0.039}{+0.000}$	$50e_8 = \frac{-0.050}{+0.089}$
$8H_7 = \frac{+0.015}{+0.000}$	$8g_6 = \frac{-0.005}{-0.014}$

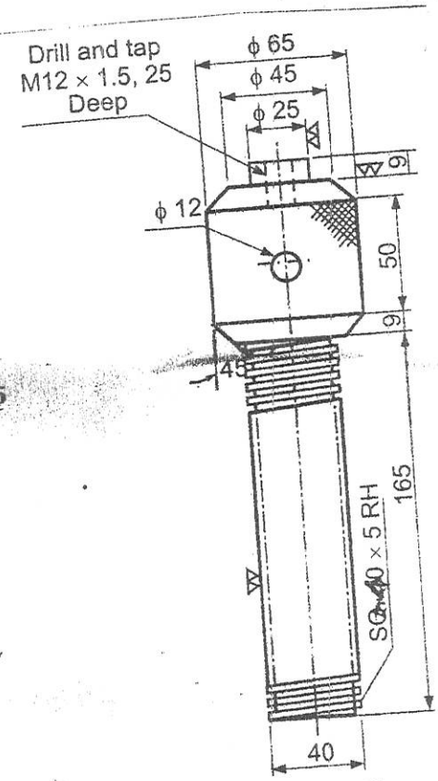
Fig. II



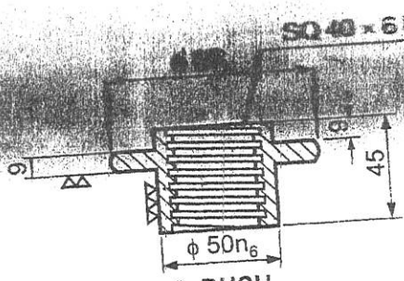
7. TOMMY BAR
M.S., 1-OFF



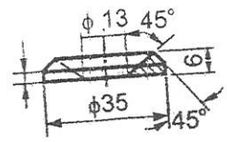
6. SET SCREW
M.S., 1-OFF

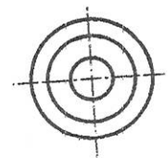


3. SCREW
M.S., 1-OFF

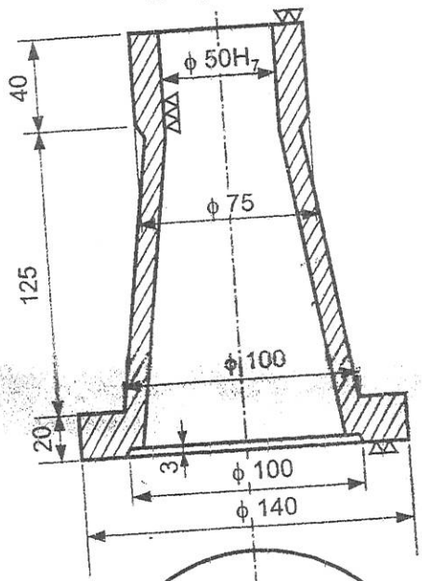


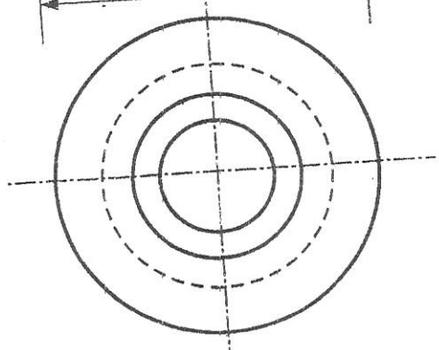
2. BUSH
M.S., 1-OFF



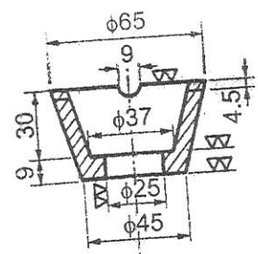


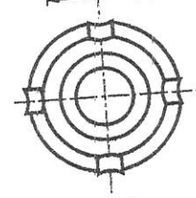
5. WASHER
M.S., 1-OFF





1. BODY
C.I., 1-OFF





4. CUP
C.I., 1-OFF

TOLERANCE CHART

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

Fig III

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER/SUMMER- 2023

EXAM SEAT NO. | | | | | | |

LEVEL : - PROGRAM : ME

COURSE CODE :- MEG418

COURSE NAME :- TOTAL QUALITY MANAGEMENT

MAX. MARKS : **80** TIME : **03 Hrs** DATE :-07/06/2023

Instruction :-

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

QN	SQN	**SECTION -I**	R/U/A	Co	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	State Objectives of Quality Control.	R	MEG 418.1	02
	b)	Define Quality Characteristics	R	MEG 418.1	02
	c)	Name the various types of Quality Audits.	R	MEG 418.2	02
	d)	State advantages of Quality Assurance.	R	MEG 418.2	02
	e)	State different cost involved in Cost of Quality.	R	MEG 418.2	02
	f)	Define Quality of Appraisal.	R	MEG 418.2	02
Q.2		Attempt any **FOUR:**			**16**
	a)	State the factors controlling Quality of Design.	U	MEG 418.1	04
	b)	Differentiate between Inspection & quality control	A	MEG 418.1	04
	c)	State the roles of management and Supplier to ensure Quality of the product.	U	MEG 418.1	04
	d)	Explain Internal quality auditing.	U	MEG 418.2	04
	e)	Explain the concept of cost of quality and value of quality by using suitable graph	U	MEG 418.1	04
	f)	Explain internal and external failure cost.	U	MEG 418.2	04
Q.3		Attempt any **FOUR:**			**16**
	a)	Differentiate between In process inspection and Central inspection.	A	MEG 418.1	04
	b)	Explain Concept of reliability & maintainability.	A	MEG 418.1	04
	c)	Explain functions of Quality Circle.	A	MEG 418.2	04
	d)	Explain Quality Audit procedure.	A	MEG 418.2	04
	e)	State the factors controlling Quality of Conformance.	U	MEG 418.2	04
	f)	Explain concept of cost of prevention	U	MEG 418.1	04

P.T.O.

(An Autonomous Institute of Govt. Of Maharashtra)

SUMMER/WINTER-

EXAM SEAT NO. | | | | | | |

LEVEL : - IV PROGRAM : ME

COURSE CODE :- MEG 418

COURSE NAME :- QUALITY MANAGEMENT

MAX. MARKS : **80** TIME : **03 Hrs** DATE :-07/06/2023

QN	SQN	**SECTION –II**	R/U/A	Co	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Define process capability	U	MEG 418-3	
	b)	Write formula for process capability index	R	MEG 418-3	
	c)	List the basic element of TQM	A	MEG 418-4	
	d)	Give the purpose of Check sheet	R	MEG 418-4	
	e)	Define Benchmarking	R	MEG 418-4	
	f)	Name 5 's' for Quality improvement.	U	MEG 418-5	
Q.5		Attempt any **FOUR:**			**16**
	a)	Draw the normal curve and describe the normal distribution	A	MEG 418-3	
	b)	The following is the $\overline{X}$ and 'R' Values of ten Subgroups	A	MEG 418-3	

Subgroup number	1	2	3	4	5	6	7	8	9	10
$\overline{X}$	9.0	9.2	9.3	9.2	9.4	9.5	9.2	9.4	9.5	9.4
R	2	3	3	4	4	5	5	3	2	2

Calculate UCL and LCL for '$\overline{X}$' and 'R' Chart Assume $A_2 = 0.58$, $D_3 = 0$, $D_4 = 2.11$

	c)	Describe Kaizen	R	MEG 418-4	
	d)	Give application and use of Poka – Yoke.	U	MEG 418-4	
	e)	Discuss the Juran Triology for Continues process improvement .	U	MEG 418-4	
	f)	Explain cause and effect Diagram.	R	MEG 418-4	
Q.6		Attempt any **FOUR:**			**16**
	a)	Calculate mean, mode, Median, Range, and standard deviation for the height of seven people. 1.83,1.91,1.78,1.80,1.83,1.85,1.87	A	MEG 418-3	
	b)	Give the common procedure for construction of Frequency histogram.	R	MEG 418-3	
	c)	List the duties of Quality Council.	R	MEG 418-4	
	d)	Discuss the characteristics of Quality leaders.	U	MEG 418-4	
	e)	Explain Pareto diagram as a tool for statistical process control.	R	MEG 418-5	
	f)	Describe ISO 9001, 9002, 9003,and ISO 9004	U	MEG 418-5	

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