GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.
(An Autonomous Institute of Govt. Of Maharashtra)
EVEN TERM END EXAM JUNE – JULY 2022

EXAM. SEAT NO.						

LEVEL: -**THIRD** PROGRAM: MECHANICAL ENGINEERING
COURSE CODE: - **MEG305/MEF305**
COURSE NAME: - **STRENGHT OF MATERIALS**
MAX. MARKS: **80** TIMES: **3HRS 45 MIN.** DATE: - **01/07/2022**

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		R/U/A	Co MEG 305	Marks
Q.1		Attempt any **FOUR :**			**08**
	a)	Define modules of elasticity and state its S.I. unit.	R	1	
	b)	State Hooke's law & hence unit of E.	R	1	
	c)	Define linear and lateral strain & their units.	R	1	
	d)	Define modular ratio.	R	1	
	e)	State parallel axis theorem of M.I.	R	3	
	f)	Define radius of gyration & state its unit.	R	3	
Q.2		Attempt any **FOUR :**			**16**
	a)	A brass bar is an shown in figure 1, find total change in length. $E_{brass} = 1.05 \times 10^5$ N/mm^2	A	1	
	b)	A composite bar of length 500mm consist of a mild steel circular rod of 20mm diameter enclosed in a brass tube of 30mm external and 22mm internal diameter. The composite bar is subjected to an axial pull of 60 KN. Find stresses in mild steel rod and brass tube. $E_s = 210$ GPa, $E_{brass} = 100$GPa	A	1	
	c)	A rectangular section has width of 200mm and depth of 300mm. Using paralled axis theorem calculate MI about its base.	A	3	
	d)	Determine moment of inertia about xx axis of an asymmetrical I – section having following details. Top flange :- 160mm x 12mm Bottom flange :- 240mm x 12mm Web :- 10mm x 200mm	A	3	
	e)	A hollow circular section having external and internal diameters of 300mm and 250mm respectively carries vertical load of 100KN at outer edge of section. Calculate the maximum & minimum intensities of stress in the section.	A	4	
	f)	A steel flat 200mm wide and 20mm thick is subjected to a pull of 200KN at an eccentricity of 10mm in a plane bisecting the thickness. Find σ_{max} and σ_{min}	A	4	

P.T.O.

Q.3		Attempt any **FOUR.**			**16**
	a)	A steel rod 500mm long and 20mm x 10mm in section is subjected to an axial pull of 300KN. If the modules of elasticity is 2x 10^5MPa, calculate the stress, strain and elongation of the rod.	A	1	
	b)	A metal bar 50mm x 50mm section, is subjected to an axial compressive load of 500KN. The contraction of a 200mm gauge length is found to be 0.5mm and increase in thickness 0.04mm. Find the value of Young's modulus and Poisson's ratio.	A	1	
	c)	A bar 2m long and 25mm in diameter is subjected to an axial load of 40KN applied suddenly. Calculate instantaneous stress and deformation. E = 2 x 10^5 MPa	A	2	
	d)	A disc having weight 6000N falls through a height onto a collar attached to a rod of length 3000mm and having cross – sectional area 600mm^2. Find the height of fall if maximum instantaneous stress is 130MPa & E = 200 GPa.	A	2	
	e)	An angle section 120mm x 100mm x 20mm is placed as shown in figure 2. Calculate moment of inertia about xx only.	A	3	
	f)	A rectangular section of 200mm wide x 160mm thick carries an axial load of 100KN an eccentric load of 60KN on axis at a distance of 40mm bisecting the thickness. Find direct and bending stresses induced in the section.	A	4	
Q.4		Attempt any **FOUR** :			**08**
	a)	Define point of contraflexure of a loaded beam with sketch.	R	5	
	b)	State the relation between shear force and bending moment.	Y	5	
	c)	Draw a shear stress distribution diagram for a circular section.	U	6	
	d)	State shear stress distribution formula with the meaning of term used.	R	6	
	e)	Define angle of obliquity.	R	6	
	f)	State the torsional formula with the meaning of each term used.	R	8	
Q.5		Attempt any **FOUR** :			**16**
	a)	Draw SFD and BMD for a simply supported beam as shown in figure no. 3.	A	5	
	b)	Draw SFD and BMD for a cantilever beam loaded as shown in figure no. 4	A	5	
	c)	A rectangular beam 300mm wide and 500mm deep is simply supported over a span of 4m. It carries a UDL of 10KN/m over entire span. Determine maximum bending stress induced in the section. Draw the stress distribution diagram.	A	6	
	d)	A beam of circular section, 300mm in diameter is subjected to a shear force of 40KN. Determine maximum shear stress induced.	A	6	
	e)	At a certain point in the beam, there is a tensile stress of 120 N/mm^2 in the horizontal direction accompanied by a shear stress of 40N/mm^2. Determine the principal stresses at the point and position of principal planes.	A	7	
	f)	A shaft is required to transmit 20kw at 150 r.p.m. The maximum torque exceeds average torque by 40% Determine the diameter of the shaft, if shear stress is not to exceed 50 MPa.	A	8	

Q.6		Attempt any **FOUR** :			**16**
	a)	Figure No. 5 shows a SFD for a beam. Determine loading on the beam with explanation.	U	5	
	b)	Draw SFD & BMD for a simply supported beam of spam L carrying a UDL W/unit length over the entire span.	U	5	
	c)	A simply supported beam of span 6m carries a UDL of 3 KN/m over 2m from left support and a point load of 6 KN at 4m from left support. Draw SFD & BMD.	A	5	
	d)	A rectangular beam 120mm wide and 300mm deep is simply supported over a span of 4m. What UDL the beam may carry if the bending stress is not to exceed 120 MPa.	A	6	
	e)	A bar is subjected to a tensile stress of 100N/mm^2. Determine the normal and tangential stresses on a plane making an angle of 60^o with the axis of tensile stress. Also find resultant stress and angle of obliquity.	A	7	
	f)	A solid circular shaft of 30mm diameter is subjected to a torque of 0.25 KN-m causing an angle of twist of 3.74^0 in 2m length. Determine modulus of rigidity for the material of the shaft.	A	6	

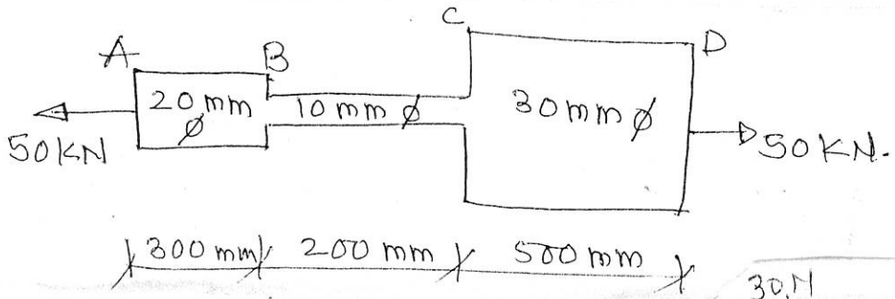

Figure 1, Q2 (a)

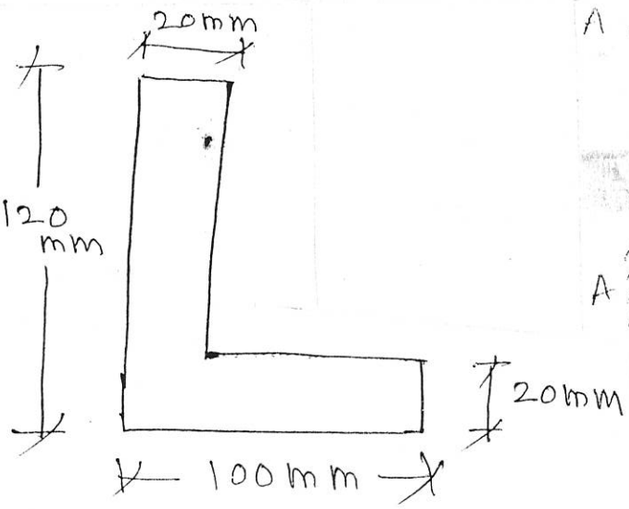

Figure 2, Q3 (e)

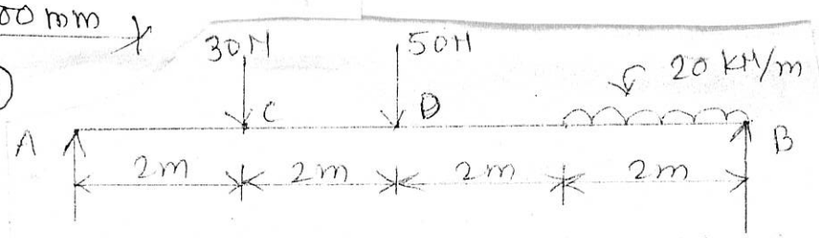

Fig. no. 3 Qu. 5 (a)

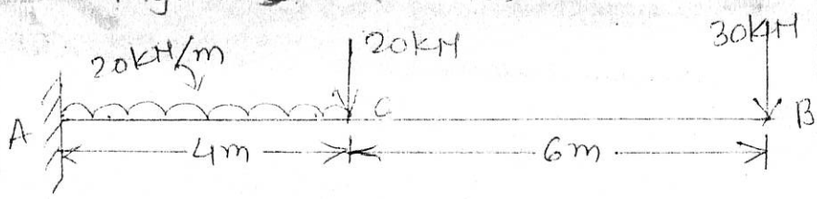

Fig. no. 4 Qu. 5 (b)

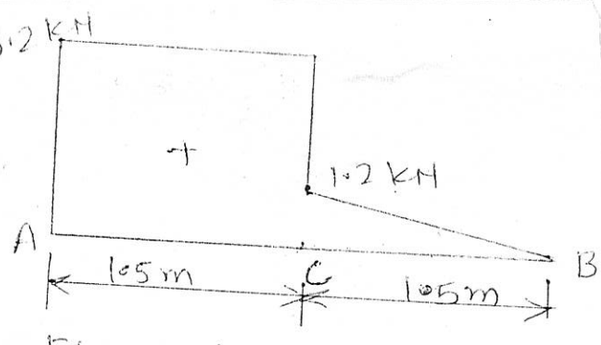

Fig. no. 5 Qu. 6 (a)

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EVEN TERM END EXAM JUNE-JULY-2022

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MEF406**

COURSE NAME **HYDRAULIC MACHINERY**

MAX. MARKS : **80** TIME : **3.45 HRS.** DATE :- **25/ 06 / 2022**

Instruction :-

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

QN	SQN	**Section- I**	R/ U/ A	Co MEF 406	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define i) Vapour pressure. ii) Compressibility	R	1	02
	b)	Define Kinematic Viscosity and state its SI unit.	R	1	02
	c)	State any two limitations of Piezometer.	R	2	02
	d)	List types of fluid flow.	R	1	02
	e)	Define discharge with its unit in SI system.	R	2	02
	f)	What is water hammer effect?	R	3	02
Q.2		Attempt any **FOUR:**			**16**
	a)	Define fluid and differentiate between ideal and real fluid.	U	1	4
	b)	Explain the concept of atmospheric pressure, absolute pressure and Gauge pressure.	U	2	04
	c)	Explain Bourdon tube type pressure gauge with neat sketch.	R	2	04
	d)	Draw neat and labelled sketch of venturimeter. State why the length of divergent cone is made larger.	U	2	4
	e)	Explain why coefficient of discharge for venturimeter is superior than that of orifice meter.	U	2	04
	f)	State the laws of fluid friction for Laminar flow.	U	1	04
Q.3		Attempt any **Four:**			**16**
	a)	Calculate mass density, specific volume and weight of 10 liter of liquid, whose specific weight is 7.85 KN/m^3.	A	1	04
	b)	A tube containing mercury has its right limb open to atmosphere. The left limb is connected to a pipe containing a liquid of specific gravity 0.9. under pressure. If the mercury level in the right side is higher by 50mm. Find pressure in pipe. The center of the pipe is 30mm above the right limb mercury level.	A	4	
	c)	A circular plate 3m in diameter is immersed in a liquid of density $900Kg/m^3$ such that the greatest and the least depth below free surface of water are 6m and 4.5 m respectively. Determine total pressure on the plate and the position of center of pressure.	A	2	04
	d)	Water is flowing through a horizontal pipe having diameter 20cm and 100cm at section A and B respectively. The discharge passes through pipe is 3.5 lit/sec. If pressure at section A is $300KN/m^2$. Calculate pressure at section B. Neglect losses.	A	3	04
	e)	Calculate the discharge through pipe of diameter 20cm when difference of pressure head between the two ends of pipe 500m apart is 4m of water. Take the value of f= 0.009 in the formula $h_f=4fLv^2/2gd$	A	3	04

P.T.O.

	f)	Find the maximum power that can be transmitted by a power station through a hydraulic pipe 3 km long and 0.2m diameter. The pressure at power station is 60 bars. Take f=0.0075.	A	3	04
QN	SQN	**Section- II**	R/ U/ A	Co MEF 406	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Give a brief classification of hydraulic turbines.	R	5	02
	b)	State the term "Priming".	R	6	02
	c)	State the formula for force exerted by stationery vertical plate on the jet of fluid in the direction normal to the plate.	R	4	02
	d)	State any two applications of submersible pump.	R	6	02
	e)	State the advantages of using air vessel in Reciprocating pump.	R	5	02
	f)	Differentiate between single acting pump and double acting pump (any two points)	R	5	02
Q.5		Attempt any **TWO:**			**16**
	a)	A jet of water 75mm in diameter having velocity of 20m/s strikes a series of the Flat plates arranged around periphery of a wheel such that each plate appears successively before the jet. If the plates are moving at a velocity of 5 m/s, compute the force exerted by the jet on the plate, the work done per second on the plate and efficiency of the jet.	A	4	08
	b)	With a neat sketch explain construction and working principle of Francis turbine	U	5	08
	c)	A pelton wheel has to be designed for following data: 1) Power to be developed = 6000kW 2) Net head available =300m 3) speed = 550rpm 4) Ratio of jet diameter to wheel diameter = 1/10 5) overall efficiency = 85% . Find the number of jet, diameter of the wheel and the quantity of water required.	A	6	08
Q.6		Attempt any **TWO:**			**16**
	a)	Draw a neat velocity diagram for 1) Pelton wheel and 2) Francis turbine also state meaning of each and every term involved in velocity diagram	U	5	08
	b)	Explain following terms related to centrifugal pump. 1) Manometric efficiency 2) NPSH 3) Work done 4) Overall efficiency.	U	6	08
	c)	Explain indicator diagram for reciprocating pump with effect of acceleration head and frictional head.	U	7	08

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EVEN TERM END EXAM JUNE – JULY 2022

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MEG314**

COURSE NAME :- **ENGINEERING METROLOGY**

MAX. MARKS : **80** TIME : **3.45 HRS.** DATE :- **25/06/2022**

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		R/U/A	Co MEG 314	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define i) Readability ii) Reproducibility	R	1	
	b)	A vernier caliper has 1mm marks on the main scale. It has 25 equal divisions on vernier scale which match with 24 main scale divisions. Find least count of vernier caliper.	A	1	
	c)	State any two advantages of wavelength standard.	R	1	
	d)	Define comparator. State any two types of mechanical comparator.	R	1	
	e)	Define i) Fit ii) Tolerance	R	3	
	f)	State any four advantages of CMM.	R	4	
Q.2		Attempt any **FOUR:**			**16**
	a)	Differentiate between precision and accuracy.	R	1	
	b)	State types of Metrology and explain any one.	U	1	
	c)	Explain the construction and working of the Dial indictor.	U	1	
	d)	Built – up dimension of 60.975mm using the following slip gauge set.	A	1	
	e)	Draw the symbols for : i)Circularity ii) Concentricity iii) Position iv) Flatness	A	4	
	f)	Explain the concept of interchangeability. State any four advantages of interchangeability.	U	4	

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 – 100	25	04
1.005	1.005	01

Q.3		Attempt any **FOUR :**			**16**
	a)	Define "Error in measurement". List any four various source of error.	U	1	
	b)	Differentiate between line standard and end standard.	U	1	
	c)	Describe the factors for selection of CMM.	A	4	
	d)	Explain Taylor's principle of gauge design.	R	4	
	e)	Interpret the meaning of $25H_7j_7$ with respech to fit and basis of system.	A	4	
	f)	In a hole and shaft assembly, hole and shaft are: Shaft : $30^{-0.04mm}_{-0.07mm}$ Hole : $30^{+0.02mm}_{-0.00mm}$ Find : i) Maximum clearance. ii) Minimum clearance. iii) Hole and shaft tolerances. iv) Type of fit.			
Q.4		Attempt any **FOUR:**			**08**
	a)	List the types of errors in threads.	R	4	
	b)	Define 'Calibration'	R	6	
	c)	State applications of Parkinson gear tester.	R	4	
	d)	List any four errors in gear tooth.	R	4	
	e)	Define 'Ra' value.	R	4	
	f)	List the instruments used for angle measurement.	R	5	
Q.5		Attempt any **FOUR :**			**16**
	a)	Explain with neat sketch construction and working of sine bar.	U	4	
	b)	State the need of calibration of measuring instrument (Any four points)	A	6	
	c)	Explain the procedure of calibration of micrometer.	A	6	
	d)	Explain working principle of floating carriage dial micrometer with neat sketch.	U	4	
	e)	State and draw different elements of screw thread to be measured.	A	4	
	f)	Explain the procedure of measurement of gear tooth thickness using a gear tooth vernier.	U	4	
Q.6		Attempt any **FOUR :**			**16**
	a)	Suggest suitable measuring instruments to measure the following features of threads. i) Major diameter ii) Effective diameter. iii) Pitch iv) Thread angle.	A	4	
	b)	Classify the following inspection parameters of gear into analytical and functional inspection. i) Alignment of tooth. ii) Vibration of gear. iii) Concentricity of gear teeth. iv) Noise in gear.	A	4	
	c)	Explain constant chord method for measuring tooth thickness of gear.	A	4	
	d)	State meaning of (i) Primary texture (ii) Secondary texture.	R	4	
	e)	Draw symbol showing surface finish.	A	4	
	f)	Explain the following with reference to surface finish measurement. i) Touch inspection. ii) Scratch inspection.	U	4	

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EVEN TERM END EXAM JUNE/JULY-2022

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MEG309**

COURSE NAME **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**

MAX. MARKS : **80** TIME : **03.45 HRS.** DATE :- **24/ 06 / 2022**

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	Question Text	R/U/A	Co MEG 309	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	State Faraday's law of Electromagnetic induction.	U	1	
	b)	Define following terms with respect to AC quantity. i) Time period ii) Frequency.	R	2	
	c)	State the working principle of transformer.	A	3	
	d)	Write any two main parts of three phase induction motor.	R	3	
	e)	State two types of earthing.	R	2	
	f)	Define the electrical power and state its unit.	R	1	
Q.2		Attempt any **FOUR:**			**16**
	a)	Compare star and delta connection on basis i) Connection diagram ii) Neutral iii) Line and phase current iv) Line and phase voltage.	U	2	
	b)	Define i) Transformer effieiency. ii) Transformer regulation.	R	3	
	c)	Explain DOL starter in detail.	U	3	
	d)	Explain pipe type earthing in detail.	A	2	
	e)	Calculate the total equivalent resistance between P and Q (See Fig No.1)	A	1	
	f)	Draw schematic diagram of capacitor start capacitor run induction motor. Give its any two applications.	U	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	Compare Electric and Magnetic circuit on the basis of any four points.	U	1	
	b)	Define phase sequence. Write down the advantages of three phase system over the single phase system.	A	2	
	c)	Draw the schematic representation of i) Split phase induction motor. ii) Capacitor start induction motor.	U	3	
	d)	i) State emf equation of transformer. ii) Write down any two applications of distribution transformer.	A	3	
	e)	Explain in detail how emf is generated.	U	2	
	f)	i) How three phase induction motor rotation is reversed? ii) Write down any two applications of squirrel cage induction motor.	A	3	

P.T.O.

Q.4		Attempt any **FOUR:**			**08**
	a)	Enlist any four specifications of resistor.	R	4	
	b)	State two applications of P-N Junction diode.	U	5	
	c)	Draw the neat sketch of centre tap full wave rectifier.	R	5	
	d)	Enlist type of transistor and draw their symbols.	R	6	
	e)	Draw the symbol of inductor and capacitor.	R	4	
	f)	Define α & β of transistor.	R	6	
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain working principle of capacitor with neat diagram.	U	4	
	b)	Calculate the value of resistance with following colour code: i) Red, Red, Orange, Gold. ii) Brown, Black, Black, Silver.	A	4	
	c)	Explain the following terms with respect to rectifier. i) Ripple factor ii) Rectification efficiency iii) Peak inverse voltage.	U	5	
	d)	Explain circuit diagram of bridge rectifier. Draw its input and output waveforms.	A	5	
	e)	Compare CB and CE configuration on the basis of i) Input impedance ii) Output impedance iii) Current gain iv) Application.	U	6	
	f)	Explain the circuit operation of single stage amplifier.	A	6	
Q.6		Attempt any **FOUR:**			**16**
	a)	Describe working principle of centre tapped full wave rectifier with input and output waveform.	A	5	
	b)	Compare P-N Junction diode and Zener diode on the basis of i) Symbol ii) Direction of conduction iii) Reverse breakdown iv) Application.	U	5	
	c)	Describe operating principle of PNP transistor with neat diagram.	A	6	
	d)	Explain with neat diagram how transistor can be used as a switch.	U	6	
	e)	Explain the term i) Self inductance ii) Mutual inductance.	U	4	
	f)	Related to P-N Junction diode: i) Draw symbol ii) Draw forward characteristic. iii) Give direction of current iv) Give one application.	R	5	

Q. 2(e)

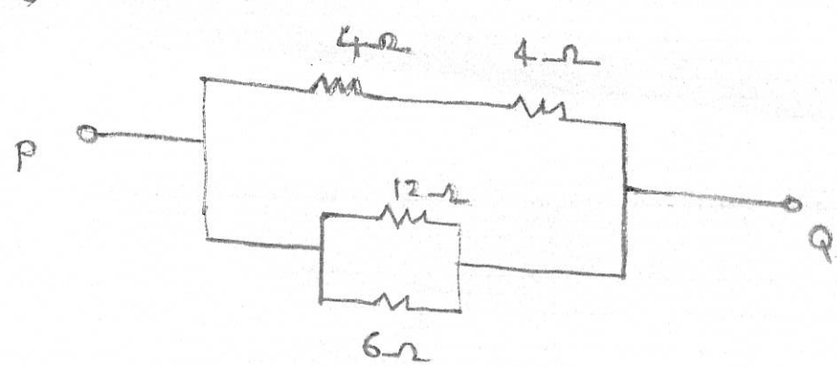

Fig No.1

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EVEN TERM END EXAM JUNE – JULY 2022

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MEF507**

COURSE NAME :- **INDUSTRIAL HYDRAULICS & PNEUMATICS**

MAX. MARKS : **80** TIME : **3.45 HRS.** DATE :- **23/06/2022**

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.
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7) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	SQN	**SECTION - I**	R/U/A	Co MEF 507	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	List any two merits of hydraulic system	R	3	
	b)	Classify hydraulic actuators.	R	4	
	c)	Draw symbol of pressure relief Value.	A	1	
	d)	State function of i) Oil reservoir. ii) Direction control valve	R	4	
	e)	State advantages of screw pump.	R	3	
	f)	Draw neat and labelled sketch of internal gear pump	U	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Define viscosity index and state its significance.	U	1	
	b)	Draw general layout of hydraulic system and explain its working.	U	5	
	c)	Explain any four criteria for selection of pump in hydraulic system.	U	4	
	d)	Explain construction and working of double acting cylinder.	U	4	
	e)	Explain construction and working of 4/2 D.C. valve	U	4	
	f)	Draw and explain in brief hydraulic bleed off circuit	U	5	
Q.3		Attempt any **TWO :**			**16**
	a)	Explain with neat sketch the working of hydraulic circuit for milling machine.	A	5	
	b)	State different types of pressure control valves. What is pressure compensated flow control value? Explain with sketch	U + A	3	
	c)	What is function of filters? Classify the filters and draw any two types of filters.	U + A	5	
QN	SQN	**SECTION - II**	R/U/A	Co MEF 507	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	State any four practical applications of Pneumatic system.	R	2	
	b)	Draw neat sketch of double acting linear actuator.	U	2	
	c)	Draw symbol of 3/2 Pedal operated spring return D.C. Valve.	U	7.7	
	d)	Draw symbol of Time delay valve.	U	7.1	
	e)	Draw symbol of Air Motor.	U	7.1	
	f)	State any four materials used in pneumatic pipes.	R	7.3	

Q.5		Attempt any **TWO** :			**16**
	a)	i) Explain with neat sketch construction & working of Lobe type air compressor ii) Explain with neat sketch construction & working of screw compressor.	U	7.3	
	b)	Describe the function of FRL unit. Explain working of air filter & lubricator with neat sketch.	U	7.3	
	c)	i) Explain with neat sketch construction & working of Time delay valve. ii) Name any Eight pipe & tube fittings write their function in brief.	R	7.3	
Q.6		Attempt any **TWO:**			**16**
	a)	Define Pneumatic system. Draw general layout of Pneumatic system & state function of each part.	U	7.2	
	b)	Explain with neat sketch sequencing of Single acting cylinder & Double acting cylinder using roller operated D.C. Valve.	A	7.5	
	c)	Explain Pneumatic AND circuit to operate single acting cylinder with neat sketch.	A	7.5	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVEN TERM END EXAM JUNE/JULY-2022

EXAM SEAT NO. | | | | | | |

LEVEL : - **FIFTH** PROGRAM : **MECHANICAL ENGINEERING**
COURSE CODE :- **MEF503**
COURSE NAME **INDUSTRIAL ENGINEERING**
MAX. MARKS : **80** TIME : **03.45 HRS.** DATE :- **22/ 06 / 2022**

Instruction :-

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

QN	SQN	SECTION - I	R/U/A	Co MEF 503	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	State the factors which improves productivity.	R	1	
	b)	Explain Break even analysis.	U	1	
	c)	Define Group Technology.	R	2	
	d)	State the significance of process planning.	R	2	
	e)	Enlist functions of Dispatching.	R	3	
	f)	Define scheduling.	R		
Q.2		Attempt any **FOUR:**			**16**
	a)	Explain the principles of material Handling.	U	2	
	b)	There are two industries manufacturing two types of plugs. The standard time per piece is 1.3 minutes. The output of industries is 250 and 325 resp. per shift (8 hours). What is productivity per shift and production of each industry per week (6 day) on the basis of three shift?	A	1	
	c)	Suggest and explain any material handling device used in Mass production.	A	2	
	d)	Explain briefly "stages of inspection in Industry".	U	3	
	e)	Explain the concept of Line Balancing. State its importance and objectives.	U	3	
	f)	Explain routing & sequencing.	A	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain process layout with suitable block diagram.	U	2	
	b)	Prepare an operation sheet to produce a rectangular nut having right hand thread.	A	3	
	c)	Name the material handling devices for following activities. i) To move and stack material at height. ii) To lift heavy stones at height. iii) To move cement bags at a short and fixed distance. iv) To move chemical from tank.	A	2	
	d)	Differentiate between floor inspection and centralized inspection.	U	3	
	e)	Distinguish clearly between routing and scheduling.	U	3	
	f)	State symptoms of bad plant layout.	R	2	

P.T.O.

QN	SQN	SECTION-II	R/U/A	Co MEF 503	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	State the purpose of clamping devices.	U	4	
	b)	Differentiate between jig & fixture.	U	4	
	c)	State four functions of store dept.	R	5	
	d)	Explain material issue process in industry.	A	5	
	e)	Enlist various time study equipments.	R	6	
	f)	State the meaning of PMTS.	R	6	
Q.5		Attempt any **FOUR** :			**16**
	a)	Explain 3-2-1 principle of location.	R	4	
	b)	State design principles of jigs and fixtures.	U	4	
	c)	Explain the concept of merit rating with example.	A	6	
	d)	Explain the concept and uses of flexible manufacturing system.	U	6	
	e)	State the concept of continuous improvement used in industry.	A	6	
	f)	Explain waste reduction using 5 'S' technique.	A	6	
Q.6		Attempt any **TWO:**			**16**
	a)	The elemental times (in minutes) for 4 cycles of an operation using a stop watch are presented below:	R	6	

Elements	Cycle time in minutes			
	1	2	3	4
1	1.5	1.5	1.3	1.4
2	2.6	2.7	2.4	2.6
3	3.3	3.2	3.4	3.4
4	1.2	1.2	1.1	1.2
5	0.51	0.51	0.52	0.49

Calculate standard time for the operation if
i) Elements 2 & 4 are machine elements.
ii) For other elements the operator is rated at 110%.
iii) Total allowances are 15% of the normal time.

	b)	Explain the principles of motion economy.	U	6	
	c)	i) Explain the inventory cost relationship with chart. ii) Describe one bin and two in system of storage.	U A	5 5	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVEN TERM END EXAM JUNE – JULY 2022

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MEF401**

COURSE NAME :- **POWER ENGINEERING**

MAX. MARKS : **80** TIME : **3.45 HRS.** DATE :- **22/06/2022**

Instruction :-

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

QN	SQN	SECTION-I	R/U/A	Co MEF 401	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Draw a labeled line diagram of opposed cylinder type I.C. Engine	U	1	
	b)	State selection criterion of material for exhaust value of I.C. Engine	R	1	
	c)	The efficiency of an Otto cycle is 50% and r=1.5; Find the compression ratio.	A	3	
	d)	State any four requirements of injection system of Diesel engine	R	2	
	e)	How "retarding ignition timing" helps to reduce pollution from S.I. engine	U	2	
	f)	Find indicated mean effective pressure of a four stroke diesel engine having area of indicator diagram 420 cm^2; length of indicator diagram 62mm and spring number 1.1 bar/mm	A	4	
Q.2		Attempt any **FOUR:**			**16**
	a)	Draw actual indicator diagram of two stoke S.I. engine state the reasons of its deviation from ideal shape	U	1	
	b)	Derive an air standard efficiency equation of Otto cycle	A	1	
	c)	State the advantage of additives when used in lubricant	R	2	
	d)	A certain quantity of air at a pressure of 1 bar and temperature 70°c is compressed reversibly and adiabatically until the pressure is 7 bar in an Otto cycle engine. 460KJ of heat per kg of air is now added at constant volume Determine (a) compression ratio of engine (b) Temp of the end of compression Take for air C_p = 1 KJ /kg K C_v = 0.707 KJ/kg K.	A	1	
	e)	Explain any one method of pollution measurement	U	3	
	f)	A gas engine has piston diameter of 150 mm, length of stoke 400 mm and mean effective pressure 5.5 bar. The engine makes 120 explosions per minute. Determine the mechanical efficiency of the engine if its B.P. is 5kw	A	4	
Q.3		Attempt any **TWO:**			**16**
	a)	Explain with neat sketch water cooling system of I.C. engine? Give its advantages over air cooling.	U	2	

P.T.O.

	b)	The following observations were made during the test on an oil engine. BP of engine = 31.5 kw; Fuel used = 10.5 kg/hr; CV of fuel = 43000 KJ/kg Jacket cooling water = 540 kg/hr; rise in temperature of cooling water = 56°c, water circulated through exhaust calorimeter = 545 kg/hr; rise in temp of water passing the exhaust calorimeter = 36°C; Temperature of exhaust gas leaving the exhaust gas calorimeter = 82°C; A:F ration = 19:1; ambient temp = 17°c; Cp for exhaust gas = 1 KJ /kg K. Draw heat balance sheet on minute basis.	A	3	
	c)	Explain with crank angle – pressure diagram, stages of combustion in C.I. engine.	A	2	
QN	SQN	**SECTION-II**	R/U/A	Co MEF 401	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Write industrial uses of compressed air.	R	5	
	b)	Draw neat sketch of centrifugal compressor.	R	5	
	c)	State two application of rocket.	U	6	
	d)	Define 'Tones of refrigeration'.	U	6	
	e)	Give the function of expansion value and receiver in refrigeration cycle.	R	6	
	f)	State Dalton's law.	R	6	
Q.5		Attempt any **FOUR** :			**16**
	a)	Compare closed cycle gas turbine with open cycle gas turbine.	R	5	
	b)	Draw only a labeled sketch of liquid propellant rocket engine.	U	5	
	c)	With neat sketch explain working of closed cycle gas turbine.	R	5	
	d)	With neat sketch explain air compressor with inter cooler.	R	6	
	e)	Explain with neat sketch lobe type (roots blower) rotary compressor.	R	5	
	f)	Give ideal properties of refrigerant.	U	6	
Q.6		Attempt any **FOUR:**			**16**
	a)	Explain with neat sketch simple vapour absorption system.	R	6	
	b)	Draw neat labeled diagram of window air conditioner.	U	6	
	c)	What is cold storage? Name the refrigerant used in cold storage?	A	6	
	d)	State the advantages of liquid propellant rocket over solid propellant rocket.	U	5	
	e)	What are the limitations / disadvantages of gas turbine?	A	5	
	f)	Draw neat labeled diagram of simple vapour compression refrigeration system.	U	6	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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EVEN TERM END EXAM JUNE/JULY-2022

EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **MECHANICAL ENGINEERING**
COURSE CODE :- **MEG316**
COURSE NAME **MECHANICAL ENGINEERING MEASUREMENT**
MAX. MARKS : **80** TIME : **03.45 HRS.** DATE :- **22/ 06 / 2022**

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) SQN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	SQN	Question Text	R/U/A	Co MEG 316	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define the term i) Drift ii) Sensitivity.	R	2	
	b)	State any four types of displacement transducers.	U	2	
	c)	Define i) Absorption Dynamometer ii) Transmission Dynamometer.	R	2	
	d)	State advantages of ionization gauge.	A	3	
	e)	State different scales of temperature measurement. Convert 40^0C to Kelvin scale.	A	3	
	f)	State advantages of optical pyrometer.	A	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Define Measurement. Explain requirement of measurement.	U	1	
	b)	Explain the various sources of errors in measuring instrument.	U	1	
	c)	Explain with neat sketch, principle and working of LVDT.	U	2	
	d)	Explain with neat sketch Eddy current dynamometer.	A	2	
	e)	Explain with neat sketch strain gauge load cell.	U	2	
	f)	Explain with neat sketch platinum resistance thermometer.	A	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	Classify transducer and explain any one of them in detail.	R	1	
	b)	Compare the term 'accuracy' with 'precision'. (any 4 points)	R	1	
	c)	Write advantages, disadvantages and applications of potentiometer.	A	2	
	d)	A prony brake dynamometer with a lever arm 1m was used to determine power output of engine running at 500rpm. The net load on engine is 245 N. Calculate output brake power.	U	3	
	e)	Explain any one low pressure measurement gauge in detail with sketch.	U	3	
	f)	Give difference between thermocouple and thermistor.	R	3	

P.T.O.

N	SQN		R/U/A	Co ME G316	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	State the materials of tube and float of rotameter.	R	4	
	b)	Classify the strain measurement methods.	R	5	
	c)	State the working principle of sling psychrometer.	R	6	
	d)	List the different types of vibration measuring devices.	U	5	
	e)	State any two applications of electrodynamic microphone.	U	6	
	f)	List any two indirect methods of liquid level measurement.	A	6	
Q.5		Attempt any **FOUR** :			**16**
	a)	Explain with neat sketch working of hot wire anemometer.	R	4	
	b)	Explain with neat sketch working of drag cup tachometer.	R	5	
	c)	State the suitable devices for flow measurement of i) Wind flow ii) paper pulp iii) flow rates in R & D work iv) Slurries.	A	4	
	d)	Explain the construction and working of bonded strain gauge with the help of diagram.	U	5	
	e)	Explain how sound is measured by carbon-microphone.	U	6	
	f)	Explain construction and working of stroboscope for speed measurement.	A	5	
Q.6		Attempt any **FOUR:**			**16**
	a)	Draw a labeled block diagram of FFT analyzer. State any two advantages and applications.	A	5	
	b)	State the applications of orifice meter and pitot tube.	U	4	
	c)	Draw constructional features of hair hygrometer. State its applications.	R	6	
	d)	Explain drag-cup tachometer with neat sketch.	A	5	
	e)	Explain with neat sketch the working of capacitance level indicator for liquid level measurement.	A	6	
	f)	Explain working principle of Doppler flowmeter with neat sketch.	U	4	

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EVEN TERM END EXAM JUNE/JULY-2022

EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **MECHANICAL ENGINEERING**
COURSE CODE :- **CEF313/MEF313/O227/MEF312**
COURSE NAME **NON CONVENTIONAL ENERGY SOURCES**
MAX. MARKS : **80** TIME : **03.45 HRS.** DATE :- **22/ 06 / 2022**

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		R/U/A	Co MEF 312	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	State the significance of alternate energy sources.	R	1	
	b)	State four limitations of flat plate collector.	R	1	
	c)	Define concentration ratio of compound parabolic collector.	R	1	
	d)	State principle of Wind energy conversion.	R	2	
	e)	Define 'power coefficient' related to Wind energy.	R	2	
	f)	Compare horizontal axis and vertical axis Wind machine.	U	2	
Q.2		Attempt any **FOUR:**			**16**
	a)	Explain any four terminologies in solar radiation geometry, with sketch.	U	1	
	b)	Draw neat sketch of Pyranometer and explain its working.	U	1	
	c)	Explain working of flat plate collector with neat sketch.	U	1	
	d)	Draw neat sketch of Solar pond and explain its features.	U	1	
	e)	Illustrate with neat sketch, the solar electric power generation.	U	1	
	f)	Draw neat sketch of solar cooker and state its limitations.	U	1	
Q.3		Attempt any **FOUR:**			**16**
	a)	Draw neat labelled sketch, showing basic components of WECS. Explain their functions in short.	U	2	
	b)	Describe main considerations in selection of site for wind generator installation.	U	2	
	c)	Classify Wind energy conversion system. State two advantages and limitations of WECS.	A	2	
	d)	Explain construction details of Pragati Biogas Plant, with neat sketch.	U	3	
	e)	Distinguish between Wet processes and dry processes of biogas generation.	A	3	
	f)	Identify various factors in correct selection of site for biogas plant.	A	3	

P.T.O.

QN	SQN		R/U/A	Co MEF 503	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Define i) Co-generation ii) energy conservation.	R	5	
	b)	State the need of energy conservation?	U	5	
	c)	State applications of fuel cell?	A	4	
	d)	State the principle of geothermal energy.	R	4	
	e)	State the limitations of tidal power plant.	R	4	
	f)	What is the principle of tidal power plant operation?	R	4	
Q.5		Attempt any **FOUR** :			**16**
	a)	Explain single basin tidal power plant.	R	4	
	b)	State the advantages and applications of geothermal energy power plant.	A	4	
	c)	Explain the principle of magento hydrodynamic power conversion.	R	4	
	d)	How waste heat is recovered from boiler?	A	5	
	e)	Explain i) Return on Investment ii) Life cycle cost.	R	5	
	f)	What are future prospects of magneto hydrodynamic systems?	A	4	
Q.6		Attempt any TWO:			**16**
	a)	i) Define 'energy Audit'. Explain its types. ii) Draw Sankey diagram for energy audit.	R U	5 5	
	b)	Explain with neat sketch the principle of fuel cell. State its advantages and limitations.	R	4	
	c)	Explain with neat sketch open cycle ocean Thermal Energy conversion (OTEC) system. State advantages of OTEC.	R	4	

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EVEN TERM END EXAM JUNE/JULY-2022

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MEF502**

COURSE NAME **QUALITY MANAGEMENT**

MAX. MARKS : **80** TIME : **03.45 HRS.** DATE :- **30/ 06 / 2022**

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)	State objective of Quality control.	R	1	
	b)	State advantages of Inspection.	R	2	
	c)	Define Quality audit.	R	2	
	d)	Define Quality Assurance.	R	2	
	e)	Explain value of product.	R	3	
	f)	Define cost of prevention.	R	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Compare inprocess and central inspection.	U	1	
	b)	Explain methods of improving reliability during designing of product.	U	1	
	c)	Explain how quality is related to the customer.	U	1	
	d)	Describe limitations of quality circle.	U	2	
	e)	Explain the audit procedure of ISO 9000.	U	2	
	f)	Explain the concept of cost of appraisal.	U	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	Justify, 'Every one of the organization is responsible for quality output'.	A	1	
	b)	Explain economics of quality of performance.	U	1	
	c)	Explain procedure of problem solving using quality circle.	U	2	
	d)	Explain how quality audit is to be conducted.	A	2	
	e)	How does the cost of rework and cost of repairs affect the cost of quality?	U	3	
	f)	Explain value of quality.	U	3	

P.T.O.

<table>
<tr><th>QN</th><th>SQN</th><th>SECTION -II</th><th>R/U/A</th><th>Co MEF 502</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>List any two uses of process capability.</td><td>A</td><td>3</td><td></td></tr>
<tr><td></td><td>b)</td><td>Write the purpose of Histogram.</td><td>A</td><td>3</td><td></td></tr>
<tr><td></td><td>c)</td><td>Define “Total Quality Management”.</td><td>R</td><td>4</td><td></td></tr>
<tr><td></td><td>d)</td><td>Describe mission statement for quality.</td><td>U</td><td>4</td><td></td></tr>
<tr><td></td><td>e)</td><td>Write the use of Pareto diagram.</td><td>A</td><td>5</td><td></td></tr>
<tr><td></td><td>f)</td><td>Give the benefit of ISO 9000.</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.5</td><td></td><td>Attempt any FOUR:</td><td></td><td></td><td>16</td></tr>
<tr><td></td><td>a)</td><td>Write the purpose of control chart for variables.</td><td>U</td><td>3</td><td></td></tr>
<tr><td></td><td>b)</td><td>In a capability study of lathe used in a turning a shaft diameter of $12.58^{\pm 0.05}$ mm and a data is recorded as given below. 12.59, 12.57,12.56, 12.60, 12.61. Calculate the process capability index.</td><td>A</td><td>3</td><td></td></tr>
<tr><td></td><td>c)</td><td>Describe the Poka-Yoke.</td><td>A</td><td>5</td><td></td></tr>
<tr><td></td><td>d)</td><td>Discuss the ‘Juran Triology’.</td><td>U</td><td>4</td><td></td></tr>
<tr><td></td><td>e)</td><td>Describe the cause and effect (ISHIKAWA) diagram.</td><td>U</td><td>5</td><td></td></tr>
<tr><td></td><td>f)</td><td>Explain the theory of 5 ‘S’ for process improvement.</td><td>R</td><td>4</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 FOUR:</td><td></td><td></td><td>16</td></tr>
<tr><td></td><td>a)</td><td>Discuss the steps involve in construction of Histogram.</td><td>R</td><td>2.3</td><td></td></tr>
<tr><td></td><td>b)</td><td>The following is $\overline{X}$ and 'R' values for ten subgroups.
<table>
<tr><td>Sub-group</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr>
<tr><td>$\overline{X}$</td><td>7.0</td><td>7.5</td><td>8.0</td><td>9.5</td><td>11.0</td><td>11.5</td><td>6.0</td><td>7.0</td><td>8.5</td><td>10.5</td></tr>
<tr><td>R</td><td>2</td><td>3</td><td>2</td><td>2</td><td>3</td><td>4</td><td>3</td><td>4</td><td>2</td><td>3</td></tr>
</table>
Calculate UCL and LCL for $\overline{X}$ and 'R' chart. Assume $A_2 = 0.58$, $D_3=0$, $D_4= 2.11$.</td><td>A</td><td>3</td><td></td></tr>
<tr><td></td><td>c)</td><td>Write characteristics of quality leaders.</td><td>R</td><td>4</td><td></td></tr>
<tr><td></td><td>d)</td><td>Discuss the Deming philosophy of TQM.</td><td>U</td><td>4</td><td></td></tr>
<tr><td></td><td>e)</td><td>Describe the concept of Benchmarking for quality improvements.</td><td>U</td><td>5</td><td></td></tr>
<tr><td></td><td>f)</td><td>Explain the scatter diagram.</td><td>U</td><td>5</td><td></td></tr>
</table>

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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EVEN TERM END EXAM JUNE/JULY-2022

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MEF410**

COURSE NAME **MECH. MEASUREMENT AND MECHATRONICS**

MAX. MARKS : **80** TIME : **03.45 HRS.** DATE :- **29/ 06 / 2022**

Instruction :-

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

QN	SQN	SECTION -I	R/U/A	Co MEF 410	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	State one example of contact and non-contact type measurement.	R	1	
	b)	Force measuring instrument measures and range of 0-250N with a resolution of 0.1% of full scale. Find the smallest change that can be measured.	A	1	
	c)	List static and dynamic characteristics of instrument.	R	1	
	d)	State four essential requirements of good strain gauge.	R	2	
	e)	List different speed measuring devices.	R	2	
	f)	Draw neat labelled sketch of electrodynamic microphone.	U	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Justify the need of calibration in industry.	U	1	
	b)	Explain sensitivity and linearity of instrument in brief.	U	1	
	c)	Classify errors. Explain environmental and operational error with example.	U	1	
	d)	Draw neat sketch of Optical Pyrometer and state its main parts along with their function.	U	2	
	e)	Draw neat labelled sketch of LVDT and explain its working.	U	2	
	f)	Choose suitable speed measuring device to avoid direct contact of rotating object and explain its working with neat sketch.	A	2	
Q.3		Attempt any **FOUR:**			**16**
	a)	Select suitable device to measure precise angular movement and explain its working with neat sketch.	A	2	
	b)	Compare resistance thermometer with thermistor in four points.	U	2	
	c)	Draw neat labelled sketch of absorption hygrometer and explain its working.	U	3	
	d)	List different Torque measuring devices and explain any one of them with neat sketch.	U	5	
	e)	State use of Ultrasonic flowmeter with neat sketch.		A	**3**
	f)	Explain working of Piezoelectric Crystal type microphone with neat sketch.	U	3	

P.T.O.

QN	SQN	SECTION -II	R/U/A	Co MEF 410	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Classify hydraulic actuators.	R	6	
	b)	List the application of relays.	R	6	
	c)	State the purpose of direction control valve.	R	6	
	d)	List the basic components of hydraulic system.	R	6	
	e)	State the function of memory and give its types.	R	4	
	f)	List the applications of microcontroller.	R	4	
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain with neat sketch data acquisition system.	R	5	
	b)	Compare microcontroller and microprocessor.	R	4	
	c)	State the factors, affecting selection of PLC.	U	4	
	d)	State the advantages and disadvantages of Mechatronics system.	R	4	
	e)	Draw General layout of pneumatic system and state function of each part.	U	6	
	f)	Explain with sketch working of mercury wetted reed relay.	R	6	
Q.6		Attempt any **TWO:**			**16**
	a)	Explain with sketch principle of operation of stepper motor. Also state its advantages and applications.	R	6	
	b)	Explain with block diagram, successive approximation A/D converter.	R	5	
	c)	Draw the block diagram of microcontroller 8051and explain each block in detail.	U	4	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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EVEN TERM END EXAM JUNE/JULY-2022

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MEG310**

COURSE NAME **ENGINEERING METALLURGYAND MATERIALS**

MAX. MARKS : **80** TIME : **03.45 HRS.** DATE :- **29/ 06 / 2022**

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	Question Text	R/U/A	Co MEG 310	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	State the role of Metallurgist in the engineering field.	R	1	
	b)	Enlist four points of Hume Rothery's rules.	R	1	
	c)	State eutectoid reaction in Fe-C diagram.	A	1	
	d)	Write any four properties of cast iron.	R	1	
	e)	Classify steels.	R	1	
	f)	Define substitutional solid solution	R	1	
Q.2		Attempt any **TWO:**			**16**
	a)	i) State seven types of crystal system with lattice parameter relation. ii) State types and applications of plain carbon steel.	U A	1 2	
	b)	i) State and explain Gibb's Phase rule with example. ii) Explain lever arm principle with application.	A U	2 2	
	c)	Draw a neat labelled diagram of Iron-Iron Carbide equilibrium diagram showing various phases and explain various phases and reactions.	A	2	
Q.3		Attempt any **TWO:**			**16**
	a)	Determine the packing factor of BCC and FCC lattice structure. Give two examples of metals who possesses these lattice structure?	A	1	
	b)	Explain eutectoid reaction and peritectic s reaction. State their general equation and draw nature and appearance of their phase.	U	2	
	c)	Draw and explain various changes in microstructures during slow cooling of hypereutectoid steel.	U	2	

P.T.O

Q.4		Attempt any **FOUR:**			**08**
	a)	Write purpose of heat treatment.	U	3	
	b)	Define tempering process.	R	3	
	c)	Explain super alloys.	R	4	
	d)	Give two advantages of Nano - Materials.	U	4	
	e)	Write two limitations of Ultrasonic test.	U	5	
	f)	Explain working principle of eddy current test.	R	5	
Q.5		Attempt any **FOUR:**			**16**
	a)	Draw TTT diagram for eutectoid steel and explain.	R	3	
	b)	Explain the formation of martensite.	U	3	
	c)	Define hardenability and explain measurement of it.	U	3	
	d)	Explain Normalizing process with its applications.	A	3	
	e)	Differentiate between Austempering and Martempering.	U	3	
	f)	Explain induction hardening process with its applications and advantages.	A	3	
Q.6		Attempt any **TWO:**			**16**
	a)	Classify various Aluminium alloys. Give advantages and applications of aluminium.	U	5	
	b)	Write properties and uses of Thermoplastics, Acrylics, Nylons and Bakelite.	U	5	
	c)	Explain Penetrant test with its applications.	A	5	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.
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EVEN TERM END EXAM JUNE – JULY 2022
EXAM SEAT NO. | | | | | | |

LEVEL : - **FIFTH** PROGRAM : **MECHANICAL**
COURSE CODE :- **CCG108/CCF108/CCE108**
COURSE NAME :- **ENGINEERING DRAWING** II
MAX. MARKS : **80** TIME : **05 HRS.** DATE :- **28/06/2022**

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 CCG 108	Marks
Q.1		Attempt any **TWO :**			08 16
	a)	A square pyramid of 40mm side of base and axis length 60mm is kept on H.P on one of the corner of its base such that its axis makes an angle of 30° to H.P and parallel to V.P Draw. i) F.V. ii) T.V. iii) Side view	R/U	1	
	b)	A tetrahedron of 60mm length of edge is kept on H.P on one of its edges in such a way that its axis makes an angle of 45° with H.P and parallel to V.P Draw i) F.V. ii) T.V. iii) S.V.	R/U	1	
	c)	A pentagonal prism base 25mm side and axis 60mm long is standing on a corner of the base on H.P. with its axis inclined at 45° to H.P. and parallel to V.P. Draw i) F.V. ii) T.V. iii) S.V	R/U	1	
Q.2		Attempt any **TWO :**			16
	a)	A cylinder base diameter 60mm and axis length 80mm is kept on the H.P on its base. It is cut by a section plane in such a way that the true shape of the section is the largest possible ellipse. Draw i) Front view ii) Sectional Top view iii) True shape of the section	R/U	2	
	b)	A square pyramid, side of base 30mm and height 50mm is resting on its base with one of the side of base perpendicular to the V.P. It is cut by a section plane, inclined at 45° to the H.P. in such a way that it bisects the axis draw. i) Front View ii) Sectional Top View iii) True shape of the section.	R/U	2	
	c)	A cone base 75mm diameter and axis 80mm long is resting on its base on H.P. It is cut by a section plane perpendicular to the V.P. inclined at 45° to the H.P. and cutting the axis at a point 35mm from the apex. Draw i) Front View ii) Sectional Top View iii) True shape of the section.	A	2	
Q.3		Draw free hand sketch of any **FOUR** from following.			16 08
	a)	Dome Nut.	R	3	
	b)	Hook bolt.	R	3	
	c)	Rag foundation bolt.	R	3	
	d)	Castle Nut.	R	3	
	e)	Single V-bolt weld. Butt	R	3	
	f)	Single Riveted joints.	R	3	

P.T.O.

QN	SQN	SECTION - II	R/U/A	Co EEF 502	Marks
Q.4		Attempt any **ONE :**			**08**
	a)	Fig. I shows front view and top view of a bracket. Draw the following. i) Reproduce the front view. ii) Reproduce the top view. iii) Draw lift hand side view.	U	4	
	b)	Fig. II shows front view and left hand side view of an object. Draw the following. i) Reproduce the front view. ii) Reproduce the left hand side view. iii) Draw top view.	U	4	
Q.5		Attempt any **ONE** :			**16**
	a)	Fig III shows front view and top view draw isometric view.	U	5	
	b)	Fig IV shows front view and right had side view. Draw isomeric projection.	U	5	
Q.6		Attempt any **TWO** :			**16**
	a)	A square prism side of base 40mm, axis length 80mm is kept on the H.P. with its sides of base equally inclined with V.P. A circular hole of diameter 40mm is drilled through the prism such that axis of hole is perpendicular to V.P. and parallel to H.P and bisects the axis of square prism. Draw the development of lateral surface of the prism.			
	b)	Refer Fig. V and draw the development of lateral surface of cylinder's part 'S', standing vertically on H.P. The cylinder has the base diameter (Φ) 30mm and axis 45mm long.			
	c)	A Hexagonal pyramid, base 30mm side and axis 75mm long is resting on H.P. with side of base parallel to V.P. It is cut by a section plane, perpendicular to V.P. and inclined at 45° to the H.P. and bisection the axis. Draw front view and development of lateral surfaces. bisecting	A	5	

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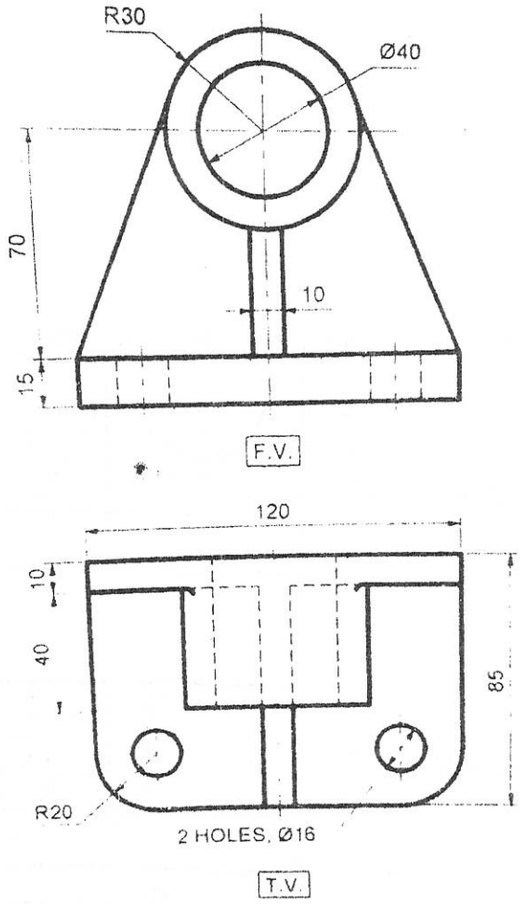
R30
Ø40
70
10
15
F.V.
120
10
40
85
R20
2 HOLES, Ø16
T.V.

Fig. I

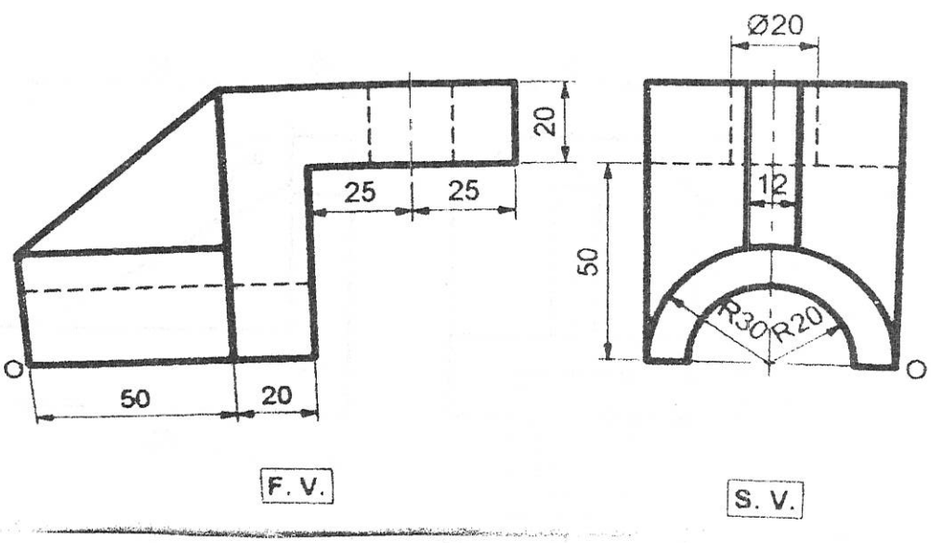
Ø20
20
25
25
12
50
R30
R20
50
20
F. V.
S. V.

Fig. II

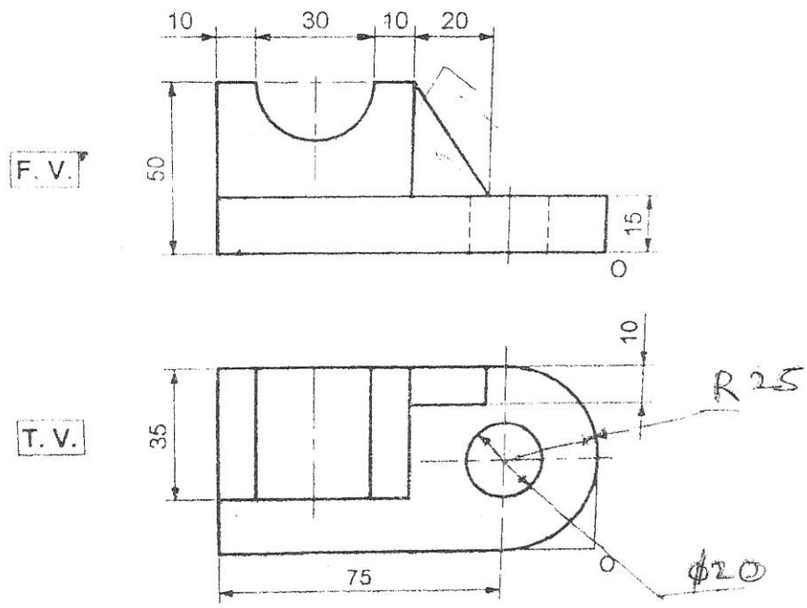

Fig. III

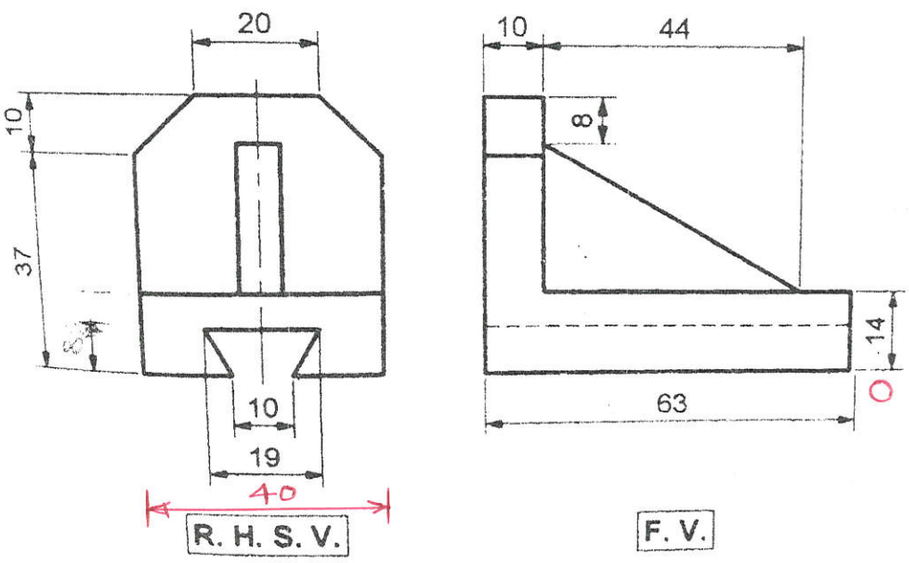

Fig. IV

5/5

Fig. 1

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EVEN TERM END EXAM JUNE/JULY-2022

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MEF407**

COURSE NAME **METROLOGY**

MAX. MARKS : **80** TIME : **03.45 HRS.** DATE :- **27/ 06 / 2022**

Instruction :-

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

QN	SQN	SECTION -I	R/U/A	Co MEF 407	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define metrology and state its necessity.	R	1	
	b)	Define i) Precision ii) Accuracy	R	1	
	c)	Draw the neat sketch of dial Indicator.	R	4	
	d)	Define i) Basic Hole ii) Basic shaft.	R	5	
	e)	Draw a figure showing upper deviation of hole.	R	5	
	f)	Draw a GD & T symbol of i) Angularity ii) Parallelism.	R	4	
Q.2		Attempt any **FOUR:**			**16**
	a)	Explain the following terms used in metrology i) Repeatability ii) Reproducibility	U	1	
	b)	List the four factors affecting Accuracy of the instrument.	U	1	
	c)	Differentiate between line standard and end standard.	U		
	d)	State advantages and disadvantages of mechanical comparator.	U		
	e)	State the types of fit and draw conventional diagram of fits.	U	5	
	f)	State and explain Taylor's principle of gauge design.	U	5	
Q.3		Attempt any **FOUR:**			**16**
	a)	Interpret the meaning of 27 H_5f_6 with respect to fit and basis system.	A	5	
	b)	State the factors to be considered for selection of CMM.	U	4	
	c)	Suggest four desired characteristics of a precision instrument.	A	1	
	d)	Name the comparator which has the highest magnification. Explain its construction and working.	A		
	e)	State the advantages of Limit Gauges (any eight)	U	5	
	f)	Mention any four advantages of CMM.	A	3	

P.T.O.

QN	SQN	SECTION -II	R/U/A	Co MEF 407	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Define the term 'Roundness'. List various methods of roundness.	R	1	
	b)	State importance of calibration' of measuring instruments.	U	3	
	c)	Write the working principle of stylus probe type surface texture measuring instrument.	U	3	
	d)	Write the names of different elements of gear tooth which are measured for accuracy of gear.	R	1	
	e)	Write any two causes of periodic pitch error.	R	2	
	f)	List various elements required to be measured to determine the accuracy of screw thread.	A	4	
Q.5		Attempt any **FOUR** :			**16**
	a)	Define the term 'calibration'. Explain the procedure for calibration of Vernier caliper.	U	3	
	b)	Explain the method used for measurement of Roundness using V-block.	U	3	
	c)	In the measurement of surface roughness heights of 20 successive peaks and troughs were measured from a datum and were 35,25,40,22,35,18,42,25,35,22,36,18,42,22,32,21,37,18,35,20 microns. If these measurements were obtained over a length of 20mm, determine the C.L. A. & R.M.S. values of the rough surface.	A	4	
	d)	Define the term 'Back lash' related to gears. Why backlash is necessary in gears?	R	1	
	e)	Write the name of measuring instrument for measurement of following elements of screw thread i) Major Diameter of external thread. ii) Minor Diameter of internal thread. iii) Pitch of external screw thread. iv) Effective diameter of external screw thread.	A	4	
	f)	Write any four causes of progressive pitch error.	R	1	
Q.6		Attempt any FOUR:			**16**
	a)	Define the term 'squareness'. Explain with sketch squareness testing of an axis of rotation with given plane.	R	1	
	b)	Explain the procedure for calibration of micrometer.	U	3	
	c)	Explain Primary Texture & Secondary Texture related to surface finish.	R	1	
	d)	Explain the following techniques of qualitative analysis for surface finish i) Centerline Average Method. (C.L.A) ii) Root mean Square Method. (R.M.S.)	A	4	
	e)	Explain with sketch rolling test for inspecting gears.	U	3	
	f)	List various types of pitch errors in thread. Explain with neat sketch Drunken error.	R	1	

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EVEN TERM END EXAM JUNE/JULY-2022

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MEG304/MEF304**

COURSE NAME **MANUFACTURING PROCESSES**

MAX. MARKS : **80** TIME : **03Hrs.45 min.** DATE :- **07/ 07 / 2022**

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	Question Text	R/U/A	Co MEG 304	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Write four advantages of casting process.	R	1	
	b)	Enlist any four moulding tools.	R	3	
	c)	State the function of core in moulding.	U	3	
	d)	Enlist any four Zones in cupola furnace.	U	3	
	e)	Define pouring of molten metal.	U	3	
	f)	State any four types of pattern.	R	1	
Q.2		Attempt any **FOUR:**			**16**
	a)	Enlist the various pattern allowances. Explain draft allowance in detail.	U	1	
	b)	Describe colour code system used in pattern making.	U	1	
	c)	Explain any four properties of moulding sand.	A	2	
	d)	Explain i) Pit moulding ii) Core sand.	U	2	
	e)	Draw a neat sketch of cupola furnace and show important parts and different zones on it.	U	3	
	f)	Explain with neat sketch Hot chamber die casting process.	U	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	State the function of core print also enlists all type of core print.	R	1	
	b)	State various machines use for moulding process. Explain any one with neat sketch.	U	2	
	c)	Differentiate between Green sand moulding and dry sand moulding.	U	2	
	d)	Explain in detail any fore casting defects.	U	3	
	e)	State the advantages of die casting process.	U	3	
	f)	Describe the operation of induction furnace or crucible furnace.	A	3	

P.T.O

Q.4		Attempt any **FOUR:**			**08**
	a)	State the applications of rolling.	R	1	
	b)	Define forging, state its types.	R	1	
	c)	List any four welding defects.	R	5	
	d)	State any four application of Arc welding.	R	5	
	e)	Write the classification of presses.	R	1	
	f)	List any four press working operations.	R	1	
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain the working principle of submerged arc welding.	U	5	
	b)	State the advantages and limitations of brazing.	U	5	
	c)	Explain upset forging operation with sketch.	U	1	
	d)	Differentiate between direct and indirect extrusion process.	U	1	
	e)	Explain notching and lancing operation in press operation.	U	1	
	f)	Write short note on punch and die shoe use in press operations.	U& A	1	
Q.6		Attempt any **FOUR:**			**16**
	a)	Differentiate between hot rolling and cold rolling processes.	U& A	1	
	b)	Explain four high roll mills with a neat sketch.	U& A	1	
	c)	Write short note on drop forging.	U& A	1	
	d)	Explain blocking operation with neat sketch.	U& A	1	
	e)	Explain various oxy-acetylene gas flames with neat sketch.	U& A	5	
	f)	Explain seam welding with neat sketch.	U& A	5	

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EVEN TERM END EXAM JUNE/JULY-2022

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MEG306/MEF306**

COURSE NAME **MACHINE TOOLS**

MAX. MARKS : **80** TIME : **03Hrs.45 min.** DATE :- **06/ 07 / 2022**

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	Question Text	R/U/A	Co MEG 306	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	What is built up edge?	R	2	
	b)	Classify various types of lathes.	U	1	
	c)	Classify various types of drills.	U	1	
	d)	State the disadvantages of built up edge.	R	2	
	e)	Draw a neat sketch "step turning" operation and explain in short.	A	2	
	f)	State purpose of countersinking operation. Draw a neat sketch showing the operation.	A	2	
Q.2		Attempt any **FOUR:**			**16**
	a)	Describe tool signature with examples.	A	2	
	b)	Differentiate between orthogonal cutting and oblique cutting.	U	1	
	c)	Draw a light duty lathe and show basic parts on it.	R	1	
	d)	Sketch a single point cutting tool and show various angles on it.	A	2	
	e)	State need of 'chip breakers'. Sketch different types of chip breakers.	U	1	
	f)	List basic parts of lathe. State function of each part.	R	1	
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain following operations performed on drilling machine with simple sketch i) Reaming. ii) Counter boring.	R	1	
	b)	Describe various elements and angles of a twist drill nonenclosure with eat sketches.	U	2	
	c)	Define and state unit of cutting speed, feed and depth of cut in case of lathe.	U	2	
	d)	Describe "parting off" operation with a neat sketch.	R	1	
	e)	How will you arrive to calculate machining time on a drilling machine?	A	2	
	f)	Give specification of Lathe machine.	A	2	

P.T.O

Q.4		Attempt any **FOUR:**			**08**
	a)	Write the two limitations of polishing process.	U	4	
	b)	Define Machining time in case of shaping machine.	U	2	
	c)	Write the definition of brushing operation.	U	2	
	d)	State the advantages of honing process.	R	4	
	e)	Define cutting speed in case of shaper.	U	2	
	f)	Define brushing process.	U	4	
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain with neat Horizontal broaching machine	U	2	
	b)	Explain with neat sketch quick return mechanism of shaping machine.	U	2	
	c)	Enlist different methods of super finishing processes and explain any one with sketch.	U	2	
	d)	Give Advantages and Limitations of superfinishing process.	A	4	
	e)	Give the detail classifications of grinding machine.	U	2	
	f)	List different types of abrasive and explain it.	U	2	
Q.6		Attempt any **FOUR:**			**16**
	a)	Define cutting speed, feed, Depth of cut and machining time for shaper machine.	U	2	
	b)	List various advantages and disadvantages of Broaching operations.	U	2	
	c)	Explain with neat sketch tool and cutter grinder.	U	2	
	d)	Give detail classifications of shaping machine.	U	2	
	e)	Explain with neat sketch any two broaching operations.	U	2	
	f)	Explain designation of grinding wheels as per SS1-1954.	R	2	

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EVEN TERM END EXAM JUNE/JULY-2022

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MEF506**

COURSE NAME **AUTOMOBILE ENGINEERING**

MAX. MARKS : **80** TIME : **03Hrs.45 min.** DATE :- **04/ 07 / 2022**

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 506	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	List various types of gear box.	R	2	
	b)	Define the term Automobile' and list various types of automobile.	U	1	
	c)	Write any two functions of clutch.	R	1	
	d)	Draw a neat sketch of propeller shaft and label its parts.	U	2	
	e)	Write any two requirements of steering system.	R	2	
	f)	Enlist safety features in automobile.	U	2	
Q.2		Attempt any **FOUR:**			**16**
	a)	Give classification of automobiles.	U	1	
	b)	With neat sketch explain working of transfer case.	R	1	
	c)	With neat sketch, explain working of rack and pinion type gear box.	U	1	
	d)	Explain the working of rear side differential with neat sketch.	R	2	
	e)	With neat sketch explain construction and working of hydraulic braking system.	U	2	
	f)	Define the following terms related to wheel alignment. i) Camber ii) Caster iii) Kingpin inclination iv) Toe-in and Toe-out.	R	2	
Q.3		Attempt any **FOUR:**			**16**
	a)	Give detail classification of automobile with application.	R	2	
	b)	With neat sketch explain power transmission in automobile.	U	2	
	c)	What is clutch? Explain any one type.	R	2	
	d)	List various types of rear and front axles and explain any one type.	U	3	
	e)	Compare disc brake with drum brake.	R	3	
	f)	Explain with neat sketch working of power steering.	U	3	

P.T.O.

QN	SQN	SECTION –II	R/U/A	Co MEF 506	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	How automobile tyres are specified?	U	4	
	b)	Define 'Wheel balancing'.	R& U	4	
	c)	Define 'battery capacity'.	R	5	
	d)	Enlist the properties of good tyre.	R	5	
	e)	State advantages of Capacitive Discharge Ignition (CDI) system.	R	5	
	f)	Draw a neat sketch of Tubeless tyre.	U	4	
Q.5		Attempt any **FOUR:**			**16**
	a)	List types of suspension system and give its applications.	R& A	4	
	b)	Compare tubed tyres with tubeless tyres.	R& A	4	
	c)	Explain the working of battery used in Automobiles.	U& R	4	
	d)	Explain with neat sketch construction and working of leaf spring.	U	4	
	e)	Explain with neat sketch cast light Alloy Wheel.	R	4	
	f)	Differentiate battery ignition system and magento ignition system.	R& A	5	
Q.6		Attempt any **FOUR:**			**16**
	a)	With neat sketch explain the working of telescopic shock absorber.	U	4	
	b)	Explain with neat sketch the working of Battery ignition system.	U& R	5	
	c)	Draw a typical wiring diagram of automobile.	R	5	
	d)	With the neat sketch explain the working of wishbone type suspension system.	U	4	
	e)	State various factors affecting tyre life.	R	4	
	f)	Explain with neat sketch Water temperature guage.	U & R	5	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.
(An Autonomous Institute of Govt. Of Maharashtra)
EVEN TERM END EXAM JUNE – JULY 2022

EXAM. SEAT NO.						

LEVEL: -**FOURTH** PROGRAM: **MECHANICAL ENGINEERING**
COURSE CODE: - **MEF402**
COURSE NAME: - **MACHINE DESIGN**
MAX. MARKS: **80** TIMES: **3Hrs.45 Min.** DATE: - **02/07/2022**

Instruction:-

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

QN	SQN	**Section-I**	R/U/A	Co MEF 402	Marks
Q.1		Attempt any **FOUR :**			**08**
	a)	List the steps involved in general design procedure.	R	1	
	b)	Write any four advantages of 'Standardization'.	R	1	
	c)	Draw stress strain diagram for ductile material.	R	1	
	d)	A load of 5KN is to be raised by means of steel wire. Find minimum wire diameter required for safe stress of 100MPa.	U	2	
	e)	Enlist basic types of screw fastening.	R	3	
	f)	Write any four advantages of screwed joints.	R	3	
Q.2		Attempt any **FOUR :**			**16**
	a)	Discuss aesthetic considerations in design for a product.	R	1	
	b)	Explain principal stresses with equation of maximum & minimum principal stress.	U	2	
	c)	Explain different modes of failure of a component.	U	2	
	d)	Write the applications of following types of power screw a) Screw Jack. b) Lead screw of Lathe. c) Vice. d) Universal testing machine.	R	3	
	e)	Explain the terms: self – locking and overhauling of screw.	U	3	
	f)	Explain with neat sketch the bolt of uniform strength.	R	3	
Q.3		Attempt any **FOUR.**			**16**
	a)	Explain the following material specification i) F_eE230 ii) FG200 iii) 35C8 iv) 20Cr18Ni2	R	1	
	b)	State the design procedure of a pin in knuckle joint with neat sketch.	U	2	
	c)	Two rods connected are subjected to 20KN load. Calculate the dimensions of the socket, if maximum permissible stresses are 46N/mm^2 in tension, 35N/mm^2 in shear & 70N/mm^2 in crushing.	A	2	
	d)	Explain the stress induced in bolt for a joint subjected to tensile load.	U	3	
	e)	Discuss type of threads used in power screw.	U	3	
	f)	A lead screw of lathe has single start square thread of 24mm outside diameter & 5mm pitch in order to drive tool change, the screw exerts an axial pressure of 2.5 KN. Find efficiency of screw & power required to drive the screw, if it rotates at 300r.p.m. Neglect bearing friction. Take $\mu = 0.12$.	A	3	

QN	SQN	Section-II	R/U/A	Co MEF 402	Marks
Q.4		Attempt any **FOUR** :			08
	a)	Draw sketch of sinusoidal fluctuating stress and represent stresses.	U	4	
	b)	Write any two differences of flexible coupling and rigid coupling.	U	4	
	c)	Give four applications of helical springs.	R	5	
	d)	Give any two objectives of combination connection of helical springs.	A	5	
	e)	List any four advantages of gear drive over belt drive.	R	5	
	f)	Define for gear i) Module ii) backlash	A	5	
Q.5		Attempt any **FOUR** :			**16**
	a)	Explain stress concentration and give any two ways to reduce the stress concentration.	U	4	
	b)	Calculate the diameter of shaft transmitting 35KW at 400 r.p.m. and subjected to bending moment of 740 N.m having permissible shear stress of 90 N/mm^2. (Assume $k_b = 2$, $K_t = 1.5$)	A	4	
	c)	A shaft is transmitting 35KW at 400 r.p.m. The angle of twist is 2^0 per meter length. The length of shaft is 1meter and modulus of rigidity is 85,000 N/mm^2. Calculate the diameter of shaft.	A	4	
	d)	A helical spring is carrying load of 120 N with a deflection of 15mm. The spring material has a modulus of rigidity is 8.4×10^4 N/mm^2, permissible shear stress of 300 N/mm^2. Spring index is 10. Calculate the wire diameter and number of active turns of the helical spring.	A	5	
	e)	Name and draw the different styles of ends of spring and give the relation between number of active turns and total number of turns.	A	5	
	f)	A 15 tooth spur pinion has a module of 3mm and runs at a speed of 1600 r.p.m. The driven gear has 60 teeth. Find the speed of driven gear, circular pitch and theoretical centre distance.	U	5	
Q.6		Attempt any **FOUR** :			**16**
	a)	A shaft of 2 meter length has a pulley of 250mm diameter at the midpoint. A belt of pulley has tension on tight side 6000N and a slack side 2000 N and weight of pulley is 1800 N. The permissible shear stress of shaft is 80 N/mm^2. Calculate diameter of shaft.	A	4	
	b)	Find the cross section of flat key for a 40mm diameter shaft is 25KW at 300 r.p.m. The key is made up of steel having permissible shear stress 54 N/mm^2 and permissible compressive stress is108 N/mm^2. Calculate the length of key.	A	4	
	c)	A helical spring of stiffness 12 N/mm placed on the top of other spring having stiffness 8 N/mm, Find the force required to give a total deflection of 50mm.	A	5	
	d)	A spur pinion has 15 teeth with a module of 5mm and face width of 60mm. The pinion rotates at 200 r.p.m. and transmits 5KW power. Calculate the bending stress in a teeth. (Y=0.289)	A	5	
	e)	Explain with neat sketch deep grove ball bearing and cylindrical roller bearing.	R	5	
	f)	Describe the procedure for selection of rolling contact bearing.	U	5	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.
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EVEN TERM END EXAM JUNE – JULY 2022

EXAM. SEAT NO.						

LEVEL: -**THIRD** PROGRAM: **MECHNICAL ENGINEERING**
COURSE CODE: - **MEG308/MEF308**
COURSE NAME: - **THEORY OF MACHINE**
MAX. MARKS: **80** TIMES: **3Hrs.45 Min.** DATE: - **02/07/2022**

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		R/U/A	Co MRG 308	Marks
Q.1		Attempt any **FOUR :**			**08**
	a)	Define higher pair with example.	R	1	
	b)	List the inversions of four bar chain.	R	1	
	c)	Define successfully constrained motion and given one example.	R	1	
	d)	Write importance of balancing .	U	3	
	e)	Define terms used in governor i) Height ii) Sleeve lift	R	3	
	f)	Draw Turing moment diagram for four stroke internal combustion engine.	I	3	
Q.2		Attempt any **FOUR :**			**16**
	a)	Differentiate between machine and structure.	U	1	
	b)	State inversions of double slider crank mechanism. Describe any one with neat sketch.	U/A	1	
	c)	Indentify and define type of pair in following mechanism. i) Mirror Mechanism of vehicle. ii) Cam & follower.	U/R	1	
	d)	In a slider crank mechanism, the length of crank and connection rod are 125mm and 500mm respectively, the crank rotates at 600 r.p.m. in clockwise direction. Find – i) Velocity and acceleration of piston. ii) Angular velocity and angular acceleration of connection rod. When crank makes an angle of 90^{o} to IDC.	A	1	
	e)	Explain the analytical method of balancing of different masses revolving in the same plane.	U	3	
	f)	Explain with neat sketch working of centrifugal clutch.	U	3	
Q.3		Attempt any **TWO.**			**16**
	a)	i) Describe with neat sketch crank lever mechanism with an example ii) Differentiate between fly wheel & governor.	U/A U	1 3	
	b)	i) The engine mechanism shown in Fig. 1 a has a crank OB = 50mm and length of connecting rod AB = 225mm. The centre of gravity of the rod is at G which is 75mm from B. The engine speed is 200 r.p.m., find i) Velocity of G and angular velocity of AB ii) Acceleration of G and angular acceleration of AB	A	2	

P.T.O.

	c)	PQRS is a four bar chain, link PS is fixed and crank PQ rotates at 10 rad/sec in clockwise direction. Lengths of links are PQ = 60mm, QR = RS = 70mm, PS = 120mm when angle QPS = 60° and both Q and R lie on the same side of PS. Find i) Angular velocity of link QR and RS. ii) Angular acceleration of link QR and PS.	A	2	
Q.4		Attempt any **FOUR** :			08
	a)	State the formula for length of 1) Open belt drive. 2) Cross belt drive.	R	4	
	b)	Define :- 1) Backlash 2) Working depth.	R	4	
	c)	Write the application of following 1) Single plate crutch. 2) Multi-plate clutch	A	5	
	d)	Give functions of brakes.	R	5	
	e)	Draw neat sketch of cone clutch.	U	5	
	f)	State the advantages of roller follower over knife edge follower.	R	6	
Q.5		Attempt any **FOUR** :			**16**
	a)	Compare open belt drive and cross belt drive (Any 04 point)	R	4	
	b)	State the different types of Gear trains and explain any one with neat sketch.	U	4	
	c)	A casting weighing 9KN hangs freely from a rope which makes 2.5 turns round a drum of 300mm diameter revolving at 20 r.p.m. The outer end of the rope is pulled by a man. Taking $\mu = 0.25$, determine. i) The force required by the man. ii) The power to raise the casting.	A	4	
	d)	Draw a neat labelled sketch of multi-plate clutch.	U	5	
	e)	State the applications of :- 1) Band Brake 2) Disc brake 3) Internal expanding shoe brake 4) External shoe Brake	R	5	
	f)	Give detailed classification of follower.	R	5	
Q.6		Attempt any **TWO** :			**16**
	a)	i) A pulley is driven by the flat belt running at speed of 600m /min and transmit 4 KW. The coefficient of friction between belt and pulley is 0.3 and angle of lap is 160° . Find maximum tension in the belt. ii) The gearing of a machine tool is shown in Fig. 02 the motor shaft is connected to gear A and rotates at 975 r.p.m. The gear wheels B,C,D and E are fixed to parallel shafts rotating together. The final gear F is fixed on the output shaft. What is the speed of gear F? The number of teeth on each gear are as given below.	A	4	

Gear	A	B	C	D	E	F
No. of Teeth	20	50	25	75	26	65

	b)	i) A multi-plate clutch has to transmit 50KW power at 1750 r.p.m. The co-efficient of friction surfaces is 0.12. The intensity of prenure is limited to 0.15 N/mm^2. The internal radius is 90mm and external radius is 120mm. Find the number of plates to transmit the required torque. ii) Define the following terms: 1) Trace point 2) Pitch curve 3) Prime circle 4) Lift or stroke	R	6	

	c)	Construct the profile of cam to suite the following specifications: Cam shaft diameter = 40mm, Least radius of cam = 25mm, Diameter of Roller = 25mm, Angle of lift = 120^0, Dwell = 45^0. Angle of fall = 150^0, Dwell = 45^0. Lift of the follower = 40mm During the lift motion is SHM, during the fall motion is uniform acceleration and deceleration. The speed of the camshaft is uniform. The line of stroke of the follower is offset by 12.5 mm from the center of the cam.	A	6	

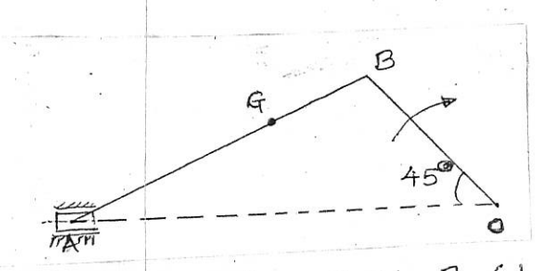

Fig No 1 Q.N. 3 (b) (ii)

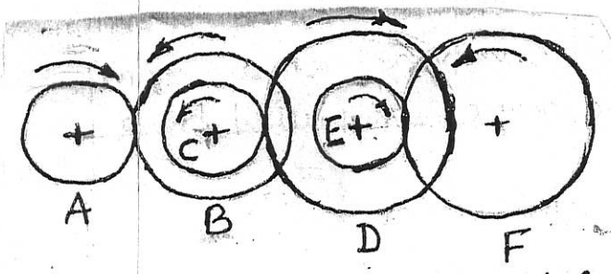

Fig. No. 02, Q.No. (6) (a)(ii)

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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EVEN TERM END EXAM JUNE/JULY-2022

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MEG302/MEF302**

COURSE NAME **THERMAL ENGINEERING**

MAX. MARKS : **80** TIME : **03Hrs.45 min.** DATE :- **09/ 07 /.2022**

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	Question Text	R/U/A	Co MEG 302	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define specific volume. Write its unit.	R	1	
	b)	State the clausius statement of thermodynamics.	R	2	
	c)	Explain the term internal energy with unit.	R	1	
	d)	Define : i) Thermal conductivity of material. ii) Fourier's law of heat conduction.	R	3	
	e)	State Stefan's Boltzmann's Law.	R	3	
	f)	A heat engine is supplied at the rate $45\frac{KJ}{sec}$ and produces a power of 14KW. Determine Thermal efficiency of engine.	A	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Define point function and path function.	R	1	
	b)	Write a steady flow energy equation and apply it to the boiler and condenser.	A	2	
	c)	Explain the concept of perpetual motion machine of second king.	U	2	
	d)	Explain open system and closed system with one example of each.	U	2	
	e)	i) Categorize the following thermodynamic properties into intensive and extensive properties, 1) Specific volume 2) Prenure 3) Density 4) Temperature ii) State two clausius statements of thermodynamics.	A R	1 2	
	f)	A wall of refrigerator of 1.5mm of steel sheet at outer surface, 10mm plywood at inner surface and 2cm of glass wool in between, calculate the rate of heat flow if the temperature of the inside and outside surfaces are -15^0C and 24^0C, Take K (for steel) $= 23.3\frac{W}{mK}$ Take K (for Glass) $= 0.14\frac{W}{mK}$ Take K (for Plywood) $= 0.052\frac{W}{mK}$	A	3	

P.T.O

Q.3		Attempt any **TWO:**			**16**
	a)	i) Explain the application of the second law of thermodynamics to heat engine and refrigerator. ii) Represent the following processes on P-V and T-S diagram for isentropic process and isobaric process.	U A	2 2	
	b)	i) Explain the concept of black body. ii) Calculate the change in internal energy and change in enthalpy of 2kg of air when temperature changes from 20^0C to 90^0C. Take Cp $= 1 \frac{KJ}{KgK}$ and Cv $= 0.71 \frac{KJ}{KgK}$	U A	3 2	
	c)	i) A quantity of gas is expanded isothermally from initial condition of 0.2 m^3 and 745 KPa to a final pressure of 127KPa. Find 1) Final volume and 2) Work done. ii) State 1) Charl's law 2) Gay Lussac's Law 3) Boyl's Law 4) Ideal gas.	A R	2 2	
Q.4		Attempt any **FOUR:**			**08**
	a)	Define dryness fraction of wet steam.	R	4	
	b)	Define "degree of super heat".	R	4	
	c)	Define Boiler Mounting and give two examples of Boiler Mountings.	R	5	
	d)	Give any four applications of Nozzle.	A	6	
	e)	Define and state significance of Mach Number.	R	6	
	f)	Define steam condenser and state any two functions of steam condenser.	R	6	
Q.5		Attempt any **FOUR:**			**16**
	a)	Draw H-S (enthalpy entropy) chart and show following line on it. i) Constant pressure line. ii) Constant temperature line. iii) Drynessfracton line.	R & U	4	
	b)	Steam at 8 bar and 0.85 dry is expand to 1 bar by constant enthalpy process. Using steam table find dryness fraction (Quality of steam). Also calculate entropy of steam at 8 bars. Steam Table.	A	4	
	c)	State classification of boiler on the following basis i) According to flow of hot gases and water. ii) According to method of circulation. iii) According to method of firing. iv) According to steam pressure.	R	5	
	d)	Explain any one method of compounding of steam turbine with pressure and velocity diagram.	R& U	6	
	e)	Differentiate Impulse Turbine and Reaction Turbine.	R& U	6	
	f)	Give the source of Air leakage in condenser and effect of air leakage in the condenser.	R& U	6	

Pres-sure (bar)	Tempera-ture ^{0}C	Enthalpy KJ/Kg			Entropy KJ/Kg K		
		h_f	h_{fg}	h_g	S_f	S_{fg}	S_g
1	99.63	417.5	2257.9	2675.4	1.303	6.057	7.360
8	170.4	720.9	2046.5	2767.4	2.046	4.614	6.660

P.T.O

Q.6		Attempt any **FOUR:**			**16**
	a)	Describe in detail formation of steam from water at 0^0C with the help of temperature-enthalpy diagram.	R& U	4	
	b)	Draw temperature-entropy (T-S) diagram for formation of steam and show following on it. i) Saturation liquid line ii) Wet Region iii) Critical point iv) Dryness fraction.	R& U	4	
	c)	Differentiate fire tube boiler and water tube boiler.	R& U	5	
	d)	Draw neat sketch of Air pre heater and explain function of Air pre heater.	R& U	5	
	e)	Show the steam pressure and steam velocity distribution for an Impulse turbine and explain working of Impulse Turbine.	R& U	6	
	f)	Explain with neat sketch any one type of cooling tower.	R& U	6	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.
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EVEN TERM END EXAM JUNE – JULY 2022

EXAM. SEAT NO.						

LEVEL: -**THIRD** PROGRAM: **MECHANICAL**
COURSE CODE: - **MEG303/MEF303**
COURSE NAME: - **MACHINE DRAWING**
MAX. MARKS: **80** TIMES: **5Hrs.** DATE: - **11/07/2022**

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		R/U/A	Co MEG 303	Marks
Q.1		Attempt any **FOUR :**			**08**
	a)	Draw conventional representation of any four of the following i) Water ii) Bearings iii) Plug iv) Semi – elliptic leaf spring v) Counter sunk vi) Internal screw thread	R	2	
Q.2		Attempt any **TWO :**			**16**
	a)	Fig. I show partial top view, front view and partial auxiliary view, draw the given views and complete the top view.	U	1	08
	b)	i) Fig. II shows geometric tolerance. State the meaning of symbol.	U	4	04
		ii) The shaft has $\Phi\ 9\ ^{-0.025}_{-0.047}$ and hole has size $\Phi\ 9\ ^{+0.022}_{+0}$ Determine the type of Fit between them.	A	4	04
	c)	A square prism side of base 40mmm, height 75mm is kept on the H.P. on its base with its rectangular faces equally inclined to V.P. It is penetrated by horizontal square prism of side of base 30mm, axis length 75 mm such that the axis of the two prism bisects each other at right angles. The two rectangular faces of the horizontal square prism are equally inclined to H.P. and axis is parallel to both H.P. and V.P. Draw projections of solids showing the lines of intersection.	A	3	08
Q.3		Attempt any **TWO .**			**16**
	a)	Fig. III shows the incomplete F.V., top view and partial auxiliary front view. Draw the given views and complete the front view.	U	1	08
	b)	I) Draw the symbols for the following features which are controlled in geometrical tolerancing. i) Straightness ii) Circularity iii) Angularity iv) Profile of any line	U	4	08
		II) Draw the machining symbol with all parameters.	R	4	

	c)	A vertical square prism, base 50mm side and height 90mm is completely penetrated by a horizontal square prism, base 35mm side and axis length 90mm so that their axes are 6mm apart, The axis of horizontal prism is parallel to V.P. while the faces of both prisms are equally inclined to the V.P. Draw the projections of the prisms showing lines of intersection.	U/ A	3	08
Q.4		Fig – 4.1 Shows assembly of footstep bearing Draw the following details. i) Body sect F.V. and T.V. ii) Bush sect F.V. and T.V. iii) Disc sect F.V. and T.V. iv) Shaft	A	5	20 10 06 02 02
		Attempt Any **ONE** of Question No. 5 & 6			-
Q.5		Fig 5.1 Show details of screw Jack. Draw the following views of assembly i) Sectional F.V. ii) Top View iii) Bill of material	A	5	**20** 12 06 02
		OR			
Q.6		Fig 6.1 shows details of lathe tool post Draw the following views of assembly i) Sectional F.V. ii) Top view. iii) Prepare Bill of material.	A	4	**20** 12 6 2

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2/6

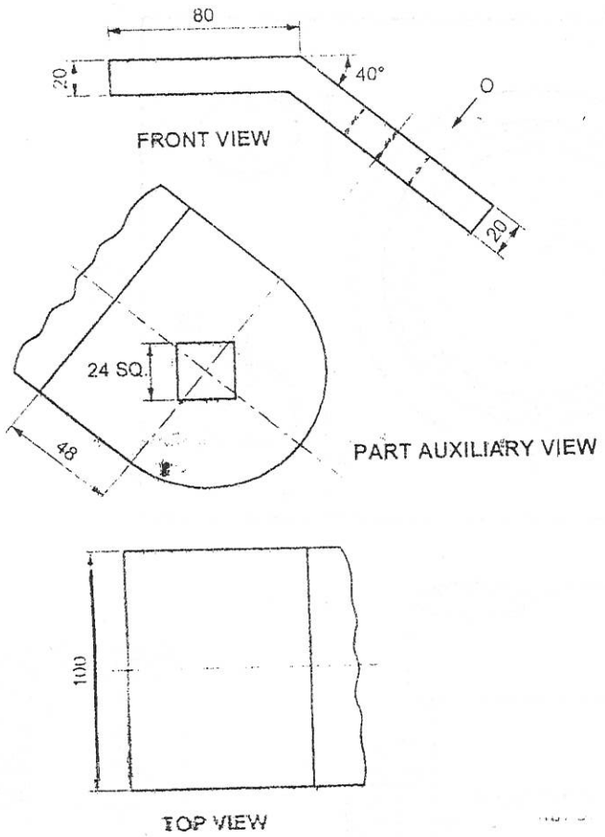


Fig I

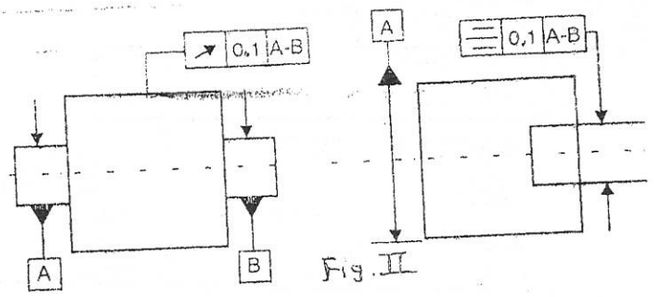


Fig. II

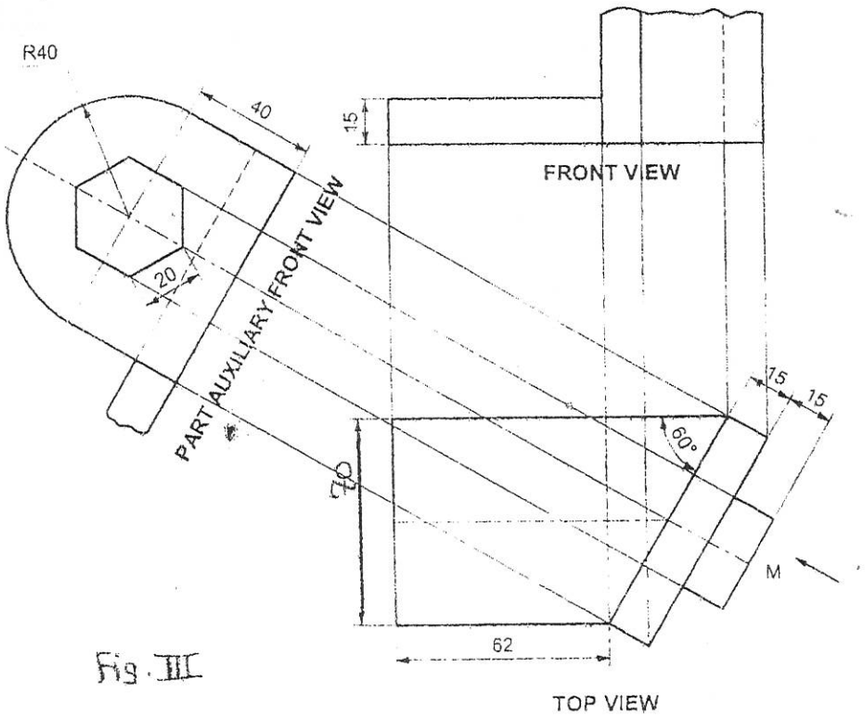
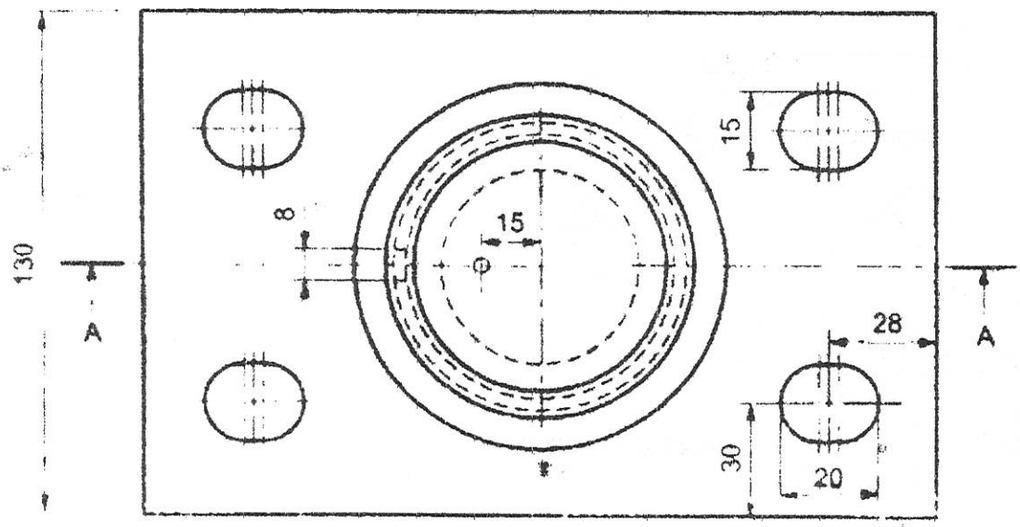
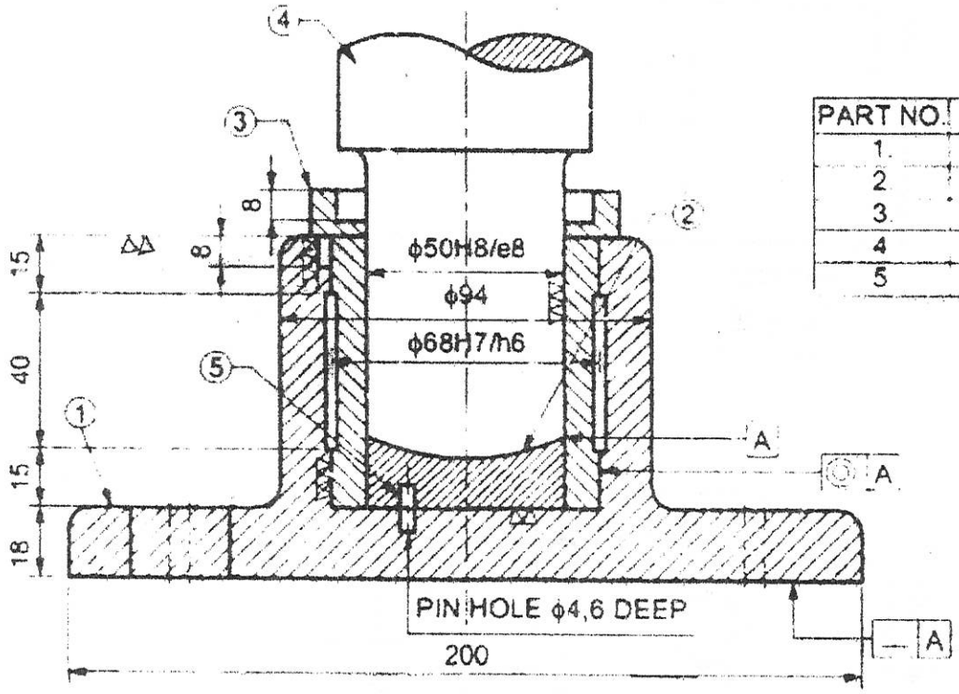


Fig. III



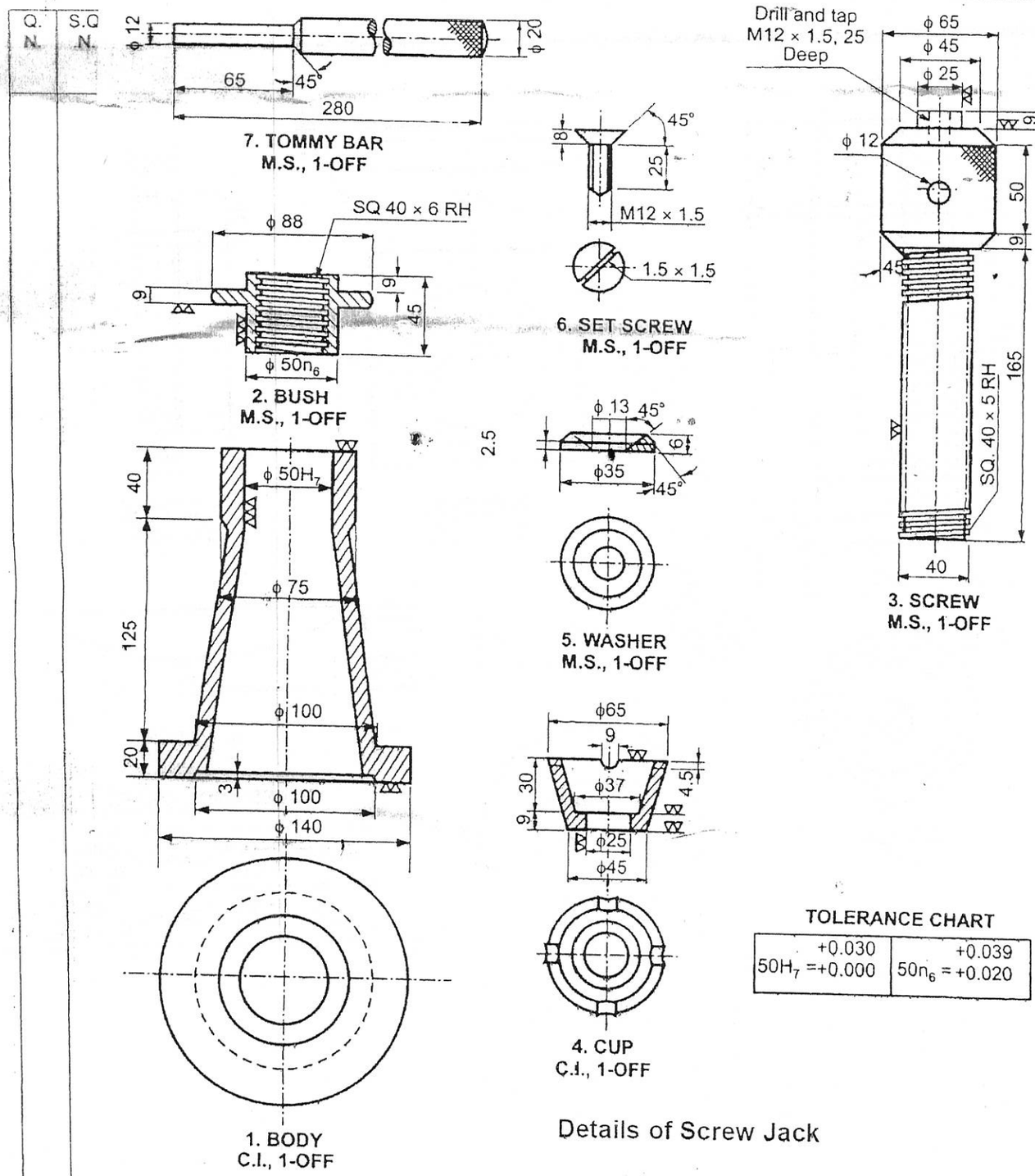


PART LIST

PART NO.	PART NAME	MATL	QTY
1.	BODY	C.I.	1
2	DISC	G.M.	1
3.	BUSH	G.M.	1
4	SHAFT	M.S.	1
5	PIN	M.S.	1

Fig - 4.1 (Q.4)

4/6 P.T.O.

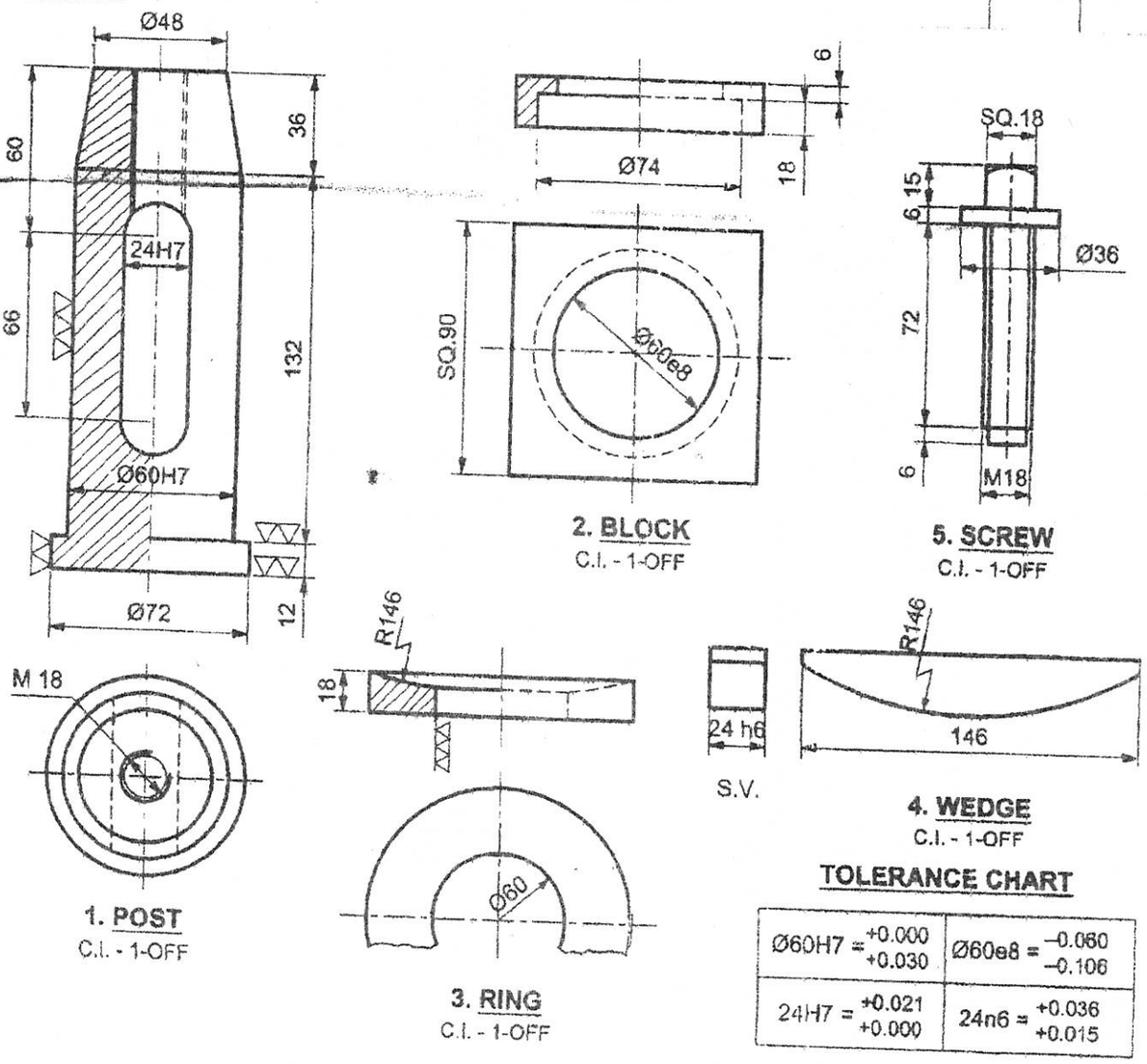


Details of Screw Jack

Fig 5.1 (Q.5)

...0.

S16



TOLERANCE CHART

Ø60H7 = $^{+0.000}_{+0.030}$	Ø60e8 = $^{-0.060}_{-0.106}$
24H7 = $^{+0.021}_{+0.000}$	24n6 = $^{+0.036}_{+0.015}$

Fig 6.1- (9.6)