GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

SUMMER- 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - THREE PROGRAM : MECHANICAL ENGINEERING
COURSE CODE :- MEG303/MEF303
COURSE NAME :- MACHINE DRAWING.
MAX. MARKS : **80** TIME : **04 Hrs** DATE :-21/5/2024

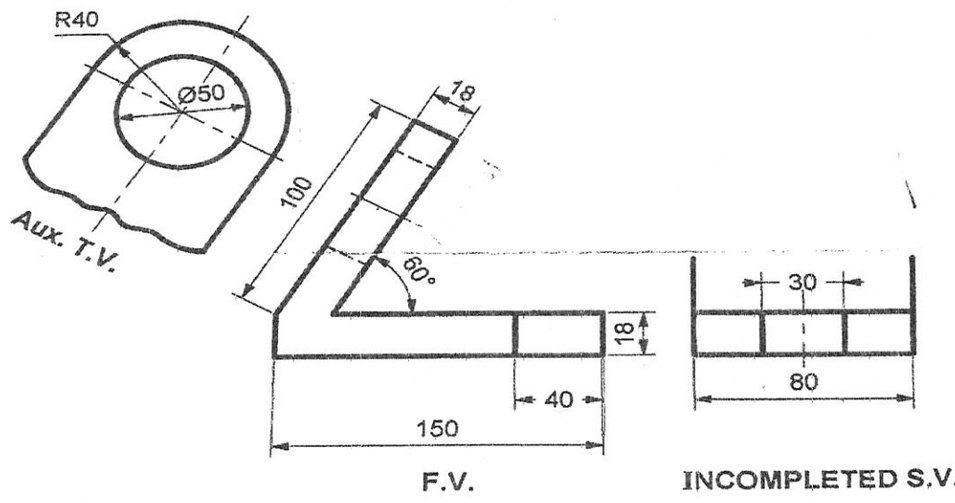
Instruction :-

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.

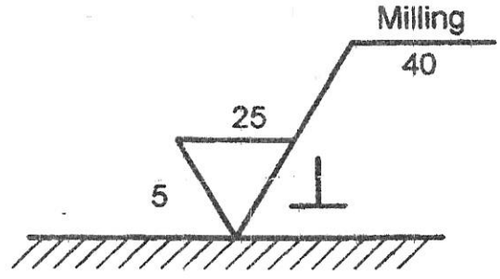
QN	SQN	Question Text	R/U/A	Co	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Draw conventional representation of the following. Counter bore.	R	2	
	b)	Splined shaft.			
	c)	Diamond knurling			
	d)	Rectangular section.			
	e)	Reducing socket			
	f)	Cast iron.			
Q.2		Attempt any **TWO:**			**16**
	a)	Figure 2.1 shows Front View and Auxiliary top view and incomplete side view. Draw given views and complete the side view	U	1	
	b)	i. State meaning of symbol shown in figure 2.2. ii. The shaft size is $\phi 35^{0.04}$ and hole size is $\phi 35^{0.00}$. determine type of fit between them.	U A	4 4	
	c)	A vertical cone diameter of base 80mm and axis 90mm long is completely penetrated by cylinder of 44mm diameter. The axis of cylinder is parallel to H.P. and V.P. and intersecting the axis of cone at a point 25mm above the base. Draw projections showing curves of intersection.	A	3	
Q.3		Attempt any **TWO:**			**16**
	a)	Figure 3.1 shows front view and side view of a block. Draw the given views and project an auxiliary view in direction of M.	U	1	
	b)	i. Draw the symbol for following features. a) Symmetry b) Parallelism c) Total run out d) Position. ii. Draw welding symbol of following. a) Single bevel butt b) Seam weld. c) Square butt d) Fillet	U	4	
	c)	A cylinder 75mm diameter is penetrated by another cylinder of 50mm diameter, the axis of which is parallel to both H.P. and V.P.	A	3	

		and are 9mm apart. Draw the projection of two cylinder showing curves of intersection. Assume axis length for both cylinders.			

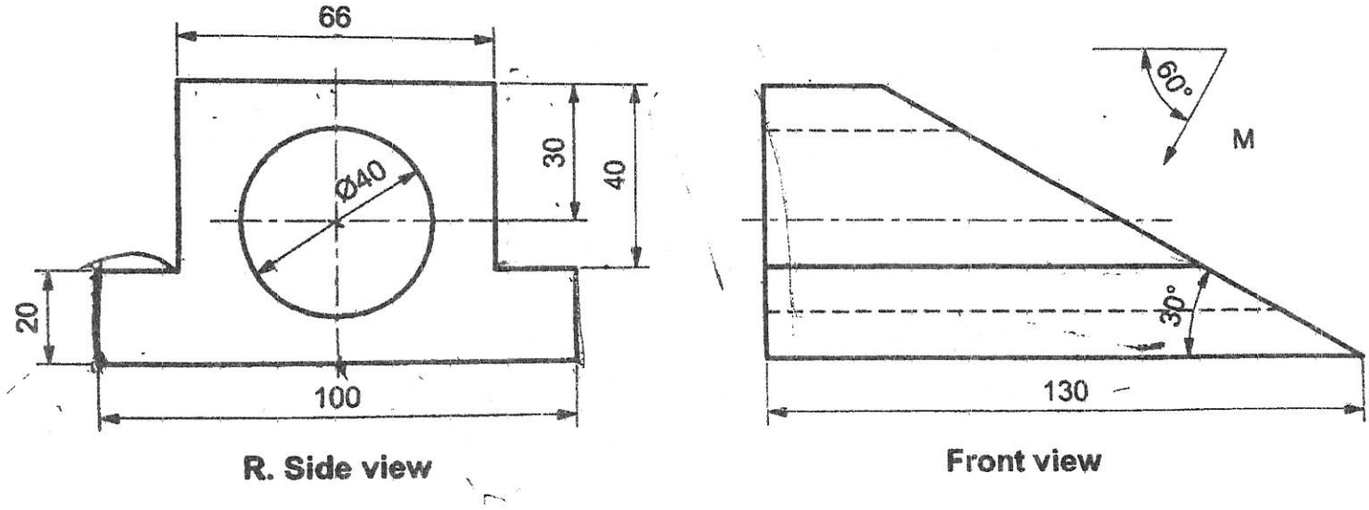
P.T.O.



Q 2 (a) Figure 2.1



Q 2 (b) Figure 2.2

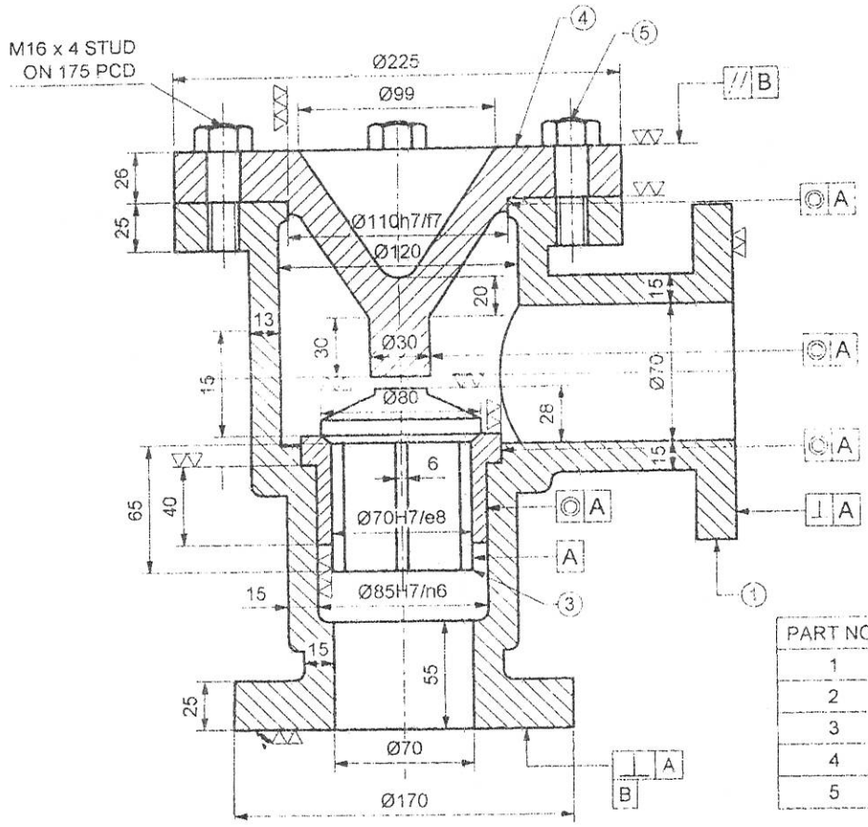


Q 3 (a) Figure 3.1

P.T.O.

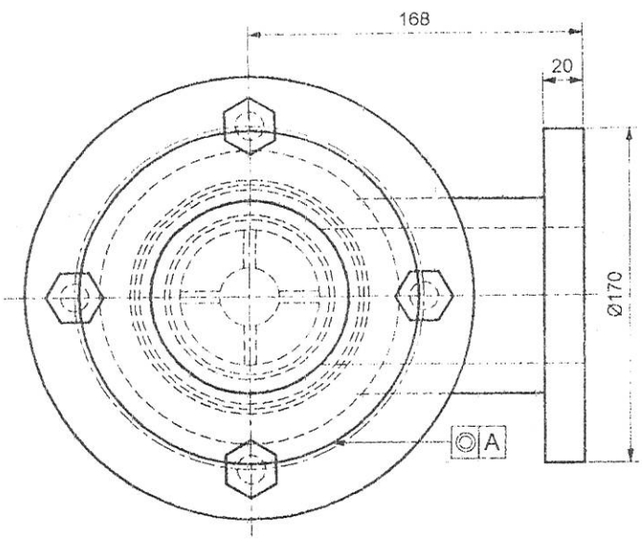
QN	SQN	Question Text	R/U/A	Co MEG 303	Marks
Q.4		Fig. I shows assembly of Non-return valve. Draw the detail drawing of following :- i) Body (Sectional F.V.) ii) Cover (Sectional F.V.) iii) Valve iv) Valve seat.	U & A	5	**20**
Q.5		Attempt any **ONE:**			**20**
	a)	Fig. II shows the details of screw jack draw the following. i) Sectional front view. ii) Top view. iii) Prepare part list.	U & A	5	 08 08 04
	b)	Fig. III shows the details of universal coupling. Draw the following views of assembly. i) Sectional front view. ii) Top view. iii) Prepare part list.	U & A	5	 08 08 04

P.T.O. 3/6



PART LIST

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

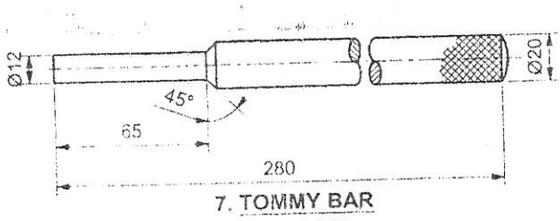


FIT CHART

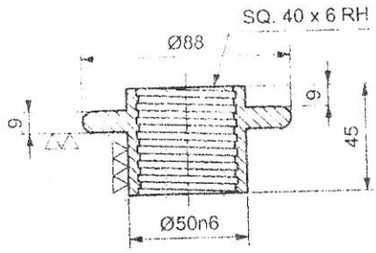
110H7/f7 = CLEARANCE FIT
100H7/g6 = CLEARANCE FIT
85H7/n6 = TRANSITION FIT
70H7/e6 = CLEARANCE FIT

Fig. I

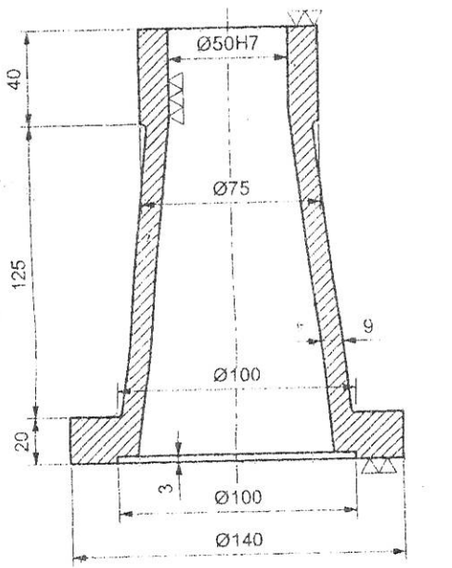
P.T.O. 4/6



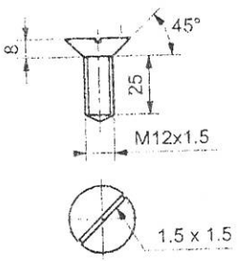
7. TOMMY BAR
M.S., 1-OFF



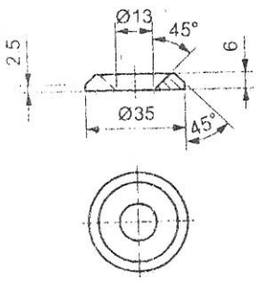
2. BUSH
M.S., 1-OFF



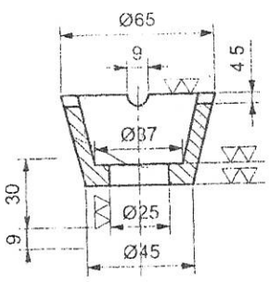
1. BODY
C.I., 1-OFF



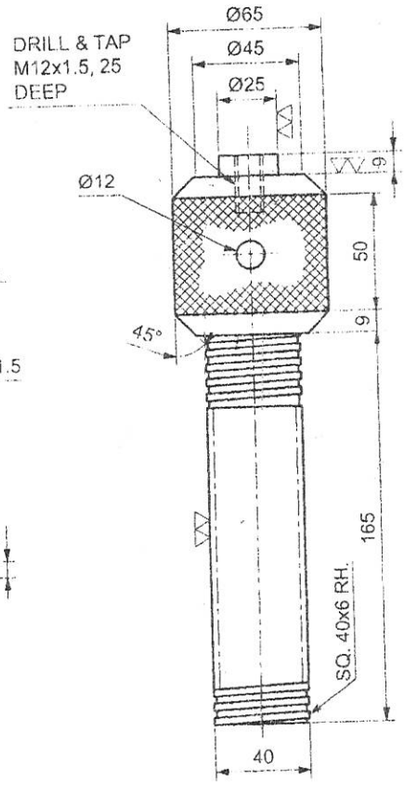
6. SET SCREW
M.S., 1-OFF



5. WASHER
M.S., 1-OFF



4. CUP
C.I., 1-OFF



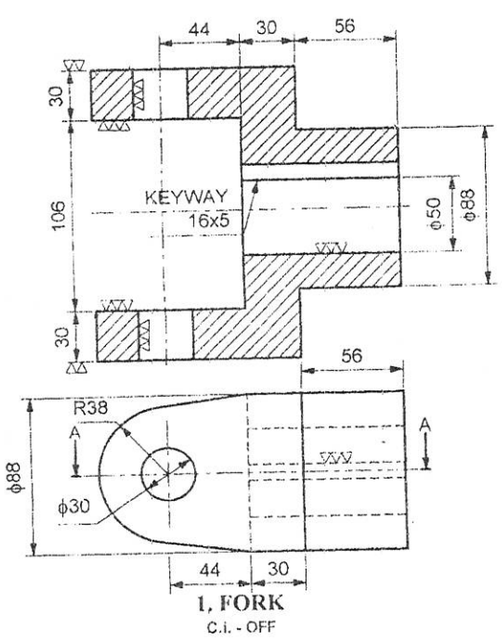
3. SCREW
M.S., 1-OFF

TOLERANCE CHART

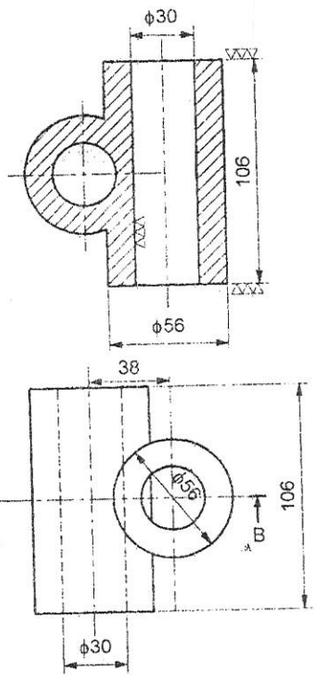
50H7 = $^{+0.030}_{+0.000}$	50n6 = $^{+0.039}_{+0.020}$

Fig. II

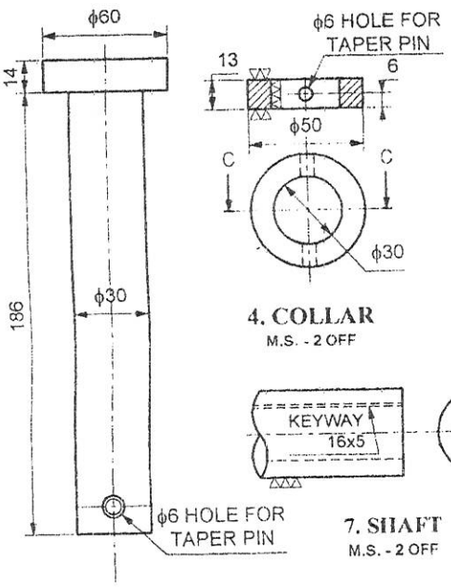
P.T.O. 5/6



1. FORK
C.I. - OFF



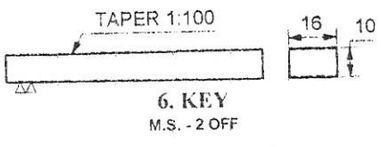
2. CENTER BLOCK
C.I. - OFF



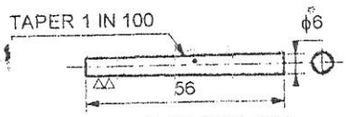
3. PIN
M.S. - 2 OFF

4. COLLAR
M.S. - 2 OFF

7. SHAFT
M.S. - 2 OFF



6. KEY
M.S. - 2 OFF



5. TAPER PIN
M.S. - 2 OFF

Fig. III

P.T.O. 6/6.

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EVEN TERM END EXAM SUMMER -2024

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MEG314/MEF407**

COURSE NAME **ENGINEERING METROLOGY**

MAX. MARKS : **80** TIME : **03Hrs.** DATE :- **20/ 05 / 2024**

Instruction :-

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

QN	SQN	Question Text	R/U/A	Co MEG 314	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	List different types of errors arise during measurements.	R	1	
	b)	Write precautions in using measuring instruments.	U	1	
	c)	Draw GD & T symbols for i) perpendicularity ii) Parallalism.	R	3	
	d)	List out various parts of CMM.	A	3	
	e)	Define i) Sensitivity ii) calibration.	U	2	
	f)	List out any two advantages of end standard.	A	2	
Q.2		Attempt any **FOUR:**			**16**
	a)	List the characteristic of measuring instruments (any eight)	R	1	
	b)	Write advantages and disadvantages of pneumatic comparators.	R	2	
	c)	Justify need of Geonetric Dimensioning and tolerancing (GD & T)	A	3	
	d)	Explain Taylor's principle of gauge design.	A	2	
	e)	Define 'tolerance'. State different types of tolerances with example.	U	2	
	f)	Explain hole basis system with sketch.	U	2	
Q.3		Attempt any **FOUR:**			**16**
	a)	Describe the working of sigma comparator with neat sketch.	R	1	
	b)	State any eight characteristics of Good comparator.	R	1	
	c)	Explain in details CMM design factors.	A	3	
	d)	Explain construction and working of dial indicator.	U	3	
	e)	Explain the need of inspection in industries.	R	1	
	f)	Differentiate between live standard and end standard.	A	2	

P.T.O

QN	SQN	Question Text	R/U/A	Co MEG 314	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Define runout error in gear Sine	R	4	
	b)	State any four types of error in thread.	R	3	
	c)	Enlist the various instruments used to measure elements of screw thread.	R	3	
	d)	Define the following terms i) Sampling length ii) Lay.	R	4	
	e)	In the measurement of surface roughness, heights 12 successive peaks and valleys measured from datum are as follow: 45,30,35,45,55,38,35,52,48,32,36,42 microns. If these measurements made over a length of 20mm determine CLA value.	A	3	
	f)	State any two applications of angle gauges.	R	5	
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain in detail importance of calibration of measuring instruments.	R	6	
	b)	A 100mm sine bar is to be set an angle of $42^0 10'6''$. Find the length of slip gauge combination required.	U	3	
	c)	Enlist and explain any two various techniques of qualitative analysis of surface finish.	A	3	
	d)	Write the principle of gear tooth vernier caliper with neat sketch for measurement of width of thread.	A	4	
	e)	Explain the procedure to measure the major diameter of external screw thread using floating carriage dial micrometer.	A	3	
	f)	Write in detail, analytical and functional inspection of gear.	U	4	
Q.6		Attempt any **FOUR:**			**16**
	a)	Explain primary and secondary texture with neat sketch.	R	3	
	b)	Describe the importance of surface finish in engineering application.	U	3	
	c)	Write the procedure for calibration of micrometer.	A	6	
	d)	Explain with neat sketch working principle of "Parkinson gear tester".	A	4	
	e)	Enlist and explain the various pitch errors in screw thread.	U	3	
	f)	Explain thread gauge micrometer principle with neat sketch for measurement of effective diameter of screw thread.	A	3	

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SUMMER 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - 4TH PROGRAM : MECHANICAL ENGINEERING

COURSE CODE :- MEG402 / MEF402

COURSE NAME :- Machine Design

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 18/5/2024

Instruction :-

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

QN	SQN	SECTION -I	R/U/A	Co	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	What is the job of an industrial designer?	R	MEG402-1	
	b)	Represent Man -machine Relationship in ergonomics.	R	MEG402-1	
	c)	calculate torsional shear stress in a bar subjected to 425 Nm torque and 60mm dia.	A	MEG402-2	
	d)	Define Principal Normal stress theory.	U	MEG402-2	
	e)	List any four advantages of power screw	R	MEG402-3	
	f)	Calculate the torque required to apply for a bolt of 20mm dia. to a produce of 5000N preload. [Assume torque coefficient, k = 0.20)	A	MEG402-3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Describe the steps involved in mechanical engineering design process	U	MEG402-1	
	b)	Explain the factors that should be considered for selecting the material for designing	U	MEG402-1	
	c)	A round bar of diameter 40 mm is subjected to bending moment of 320 N.m. calculate the bending stress in a beam .	A	MEG402-1	
	d)	A cotter joint is used to transmit 55 KN load. the permissible stresses are as follows. shear stress = 40 N/mm2, tensile stress = 18 N/ mm2, compressive stress = 100 N/ mm2. design spigot of cotter joint. Assume rod dia(d)= 30 mm and cotter thickness =0.4 x d	A	MEG402-2	
	e)	A nominal Diameter of a double threaded square screw is 50 mm and pitch is 8 mm. the screw is used to raise a load of 15 kN. The collar has outer diameter 100 mm and inner diameter 60 mm. calculate total torque required to raise the lord. The coefficient of friction of thread surface is 0.15 and caller friction is 0.17	A	MEG402-3	
	f)	A bolted assembly is subjected to tension load. the Bolt has a initial load of 3000 N and external force acting on joint 8000 N. the Bolt has permissible tensile stress of 150 N/ mm2 the ratio of km/kb = 3 (km = stiffness of member and kb = stiffness of bolt) determine the size of bolt	A	MEG402-3	
Q.3		Attempt any **FOUR:**			**16**
	a)	Discuss the selection of preferred numbers in design	U	MEG402-1	
	b)	A 60 mm diameter bar is subject to bending moment of 420 N.m and torsion of 250 N.m. calculate principal normal stress induced in a bar	A	MEG402-1	
	c)	Knuckle joint is to carry a load of 25 kN and permissible stresses are as below tensile stress = compressive stress 100 N/ mm2 and shear stress= 50 N/ mm2 design a knuckle pin in different type of failures	A	MEG402-2	
	d)	Explain any four forms of thread used in power screw and give its relative merits and demerits	U	MEG402-3	
	e)	A double threaded screw Jack has nominal diameter 50 mm and pitch 8 mm. the screw Jack is used to lift a load of 12 kN. the coefficient of friction at thread surface is 0.12 and collar friction is negligible calculate principal shear stress in screw	A	MEG402-3	
	f)	Explain with neat sketch bolts of uniform strength	U	MEG402-3	

P.T.O.

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SUMMER 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - 4th PROGRAM : MECHANICAL ENGINEERING

COURSE CODE :- MEG 402 / MEF402

COURSE NAME :- MACHINE DESIGN

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 18/5/2024

QN	S QN	SECTION –II	R/ U/ A	Co MEG 402	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Define fatigue failure.	R	1	02
	b)	State the classification of coupling.	R	4	02
	c)	State any four application of spring.	R	5	02
	d)	State advantages of gear drive.	R	5	02
	e)	List any four application of rolling contact bearing.	R	6	02
	f)	Define Dynamic load carrying capacity of a bearing	R	6	02
Q.5		Attempt any **FOUR:**			**16**
	a)	Define stress concentration. List any two methods to reduce it with neat sketch.	U	1	04
	b)	Classify keys. Draw neat sketches of any two types of keys	U	4	04
	c)	A line shaft rotating at 250 r.p.m. is transmit 25 KW. The shaft is an having an allowable shear stress 42 MPa. Find diameter of shaft.	A	4	04
	d)	A helical spring is carrying a load of 120 N With a deflection of 15 mm. The spring material has modulus of rigidity 84000 N/mm² and permissible Shear Stress of 300 N/mm². Spring index is 10. Calculate the wire diameter and mean coil diameter of spring.	A	5	04
	e)	Explain Lewis equation for the strength of gear tooth. Give the meaning of each term.	U	5	04
	f)	Calculate the required basic dynamic load rating 'C' for a ball bearing to carry a radial load of 3 KN from a shaft rotating at 600 rpm. The design life of the bearing is 30,000 hours.	A	6	04
Q.6		Attempt any **FOUR:**			**16**
	a)	A shaft of 2m length has a pulley of a 250 mm dia. at the midpoint of shaft. The pulley has tension on tight side 6000 N. and tension on slack side 2000 N, and weight of pulley is 2000 N. permissible shear stress is 80 N/mm². Calculate diameter of shaft.	A	4	04
	b)	Define the following terms with reference to spring design. i. Solid length ii. Free length iii. Spring index iv. Spring rate(spring stiffness)	U	5	04
	c)	Define i) circular pitch ii) module iii) addendum iv) backlash	U	5	04
	d)	Explain with neat sketch i) deep groove ball bearing ii) cylindrical roller bearing	U	6	04
	e)	Design a rectangular key to be used for a shaft of diameter 48 mm. both are having same material .Take shear stress = 42 MPa and crushing stress = 70 MPa. (Assume b= d/4, h=d/6)	A	4	04
	f)	Explain procedure for selection of bearing from manufactures catalogue.	U	6	04

Q.6 e) Explain the ~~design~~ procedure for design of rectangular key

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SUMMER- 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - Third PROGRAM : ME
COURSE CODE :- MEH301
COURSE NAME :- Manufacturing Processes
MAX. MARKS : 70 TIME : **03 Hrs** DATE :- 18/5/2024

QN	SQN	question Text	R/ U/ A	Co MEH 301	Marks
Q.4		**Attempt any FOUR: (2 X 4)**			**08**
	a)	Define forging operation. Classify it.	R	4	
	b)	State applications of Rolling process.	R	4	
	c)	Draw a neat sketch of Direct extrusion.	R	4	
	d)	Enlist elements of tool signature of single point cutting tool.	R	5	
	e)	Classify various types of lathes.	U	5	
	f)	Classify various types of Drilling machines.	U	6	
Q.5		**Attempt any FOUR: (4 X 4)**			**16**
	a)	Differentiate between Direct Extrusion and Indirect Extrusion	U	4	
	b)	Explain with sketch upset forging operation.	R&U	4	
	c)	Explain with neat sketch punching and blanking operation in press operation.	R&U	4	
	d)	Draw geometry of single point cutting tool and show various angles on it.	R	5	
	e)	Define the following Terms i)Speed ii) feed iii) depth of cut iv) machining time.	R	5	
	f)	Draw a neat sketch of Radial drilling machine and label its parts.	R	6	
Q.6		**Attempt any TWO: (6 X 2)**			**12**
	a)	Enlist the various types of rolling mills. Explain Hot rolling with neat sketch and applications.	R&U	4	
	b)	Draw a neat sketch of lathe machine and label its parts.	R	5	
	c)	Explain with neat sketch following drilling operations : (i) Drilling (ii) Counter Boring ii) Spot Facing	R&U	6	

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SUMMER- 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - Third PROGRAM : Mechanical Engineering

COURSE CODE :- MEH301

COURSE NAME :- MANUFACTURING PROCESS

MAX. MARKS : 70 TIME : **03 Hrs** DATE :- 18/5/2024

Instruction :-

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

QN	S QN	Question Text	R/ U/ A	Co MEH 301	Ma rks
Q.1		**Attempt any THREE: (2 X 3)**			**06**
	a)	State various properties of moulding sand.	R	1	2
	b)	List any four materials used for pattern making.	U	1	2
	c)	State two advantages and disadvantages of investment casting.	R	2	2
	d)	List any four casting defects.	U	2	2
	e)	State the applications of MIG welding.	R	3	2
Q.2		**Attempt any FOUR: (4 X 4)**			**16**
	a)	Explain centrifugal casting with neat sketch.	R&U	2	4
	b)	Explain safety practices to be followed in foundry shop.	R&U	2	4
	c)	Explain with neat sketch the working principle of TIG welding.	R&U	3	4
	d)	Differentiate between soldering and brazing.	U	3	4
	e)	Explain different allowances provided on pattern.	R&U	1	4
	f)	Define welding and classify it.	R	3	4
Q.3		**Attempt any TWO: (6 X 2)**			**12**
	a)	Explain the cold chamber die casting method with neat sketch and state its applications.	R&U	1	6
	b)	Explain the following welding defects with their causes: (a) Porosity (b) Crack in the weld (c) Slag inclusions.	R&U	3	6
	c)	Draw a neat sketch of Gating system. State the functions of any four elements.	R&U	1	6

P. T. O.

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVEN TERM END EXAM SUMMER -2024

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MEG309**

COURSE NAME **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**

MAX. MARKS : **80** TIME : **03Hrs.** DATE :- **17/ 05 / 2024**

Instruction :-

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

QN	SQN	Question Text	R/U/A	Co MEG 309	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define Ohm's law and state its equation.	R	1	
	b)	If R_1, R_2 and R_3 are connected in series, then calculate equivalent resistance across all three $R_1 = 3\Omega$, $R_2 = 7\Omega$, $R_3 = 11\Omega$	A	1	
	c)	Define following terms related to magnetic circuit : i) MMF ii) Reluctance.	R	1	
	d)	State the Faraday's first law of electromagnetic induction and Lenz law.	U	1	
	e)	Define cycle and frequency of AC waveform.	R	2	
	f)	Draw the connection diagram of star connected resistive load and show phase voltage, phase current, line voltage and line current in diagram.	U	2	
Q.2		Attempt any **FOUR:**			**16**
	a)	Find the equivalent resistance Rab as shown in Figure 1.	U	1	
	b)	Explain the applications of clip on meter and digital multimeter.	A	2	
	c)	Explain the concept of generation of EMF in single phase alternator.	A	2	
	d)	Explain the construction of plate earthing with the help of diagram.	U	2	
	e)	Define the following terms related to AC waveform i) Instantaneous value ii) Average value. iii) RMS value iv) Peak value.	R	2	
	f)	Explain the principle of working of transformer.	U	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	Distinguish between core type and shell type transformer.	A	3	
	b)	Explain the construction of three phase induction motor. (Squirrel cage type)	U	3	
	c)	Compare capacitor start and capacitor start capacitor run induction motor.	A	3	

P.T.O

	d)	Explain the working principle of single phase induction motor.	U	3	
	e)	Explain DOL starter with the help of circuit diagram.	U	3	
	f)	Explain the construction of shell type transformer with the help of diagram.	R	3	
Q.4		Attempt any **FOUR:**			**08**
	a)	Draw the symbol of resistor and state its unit.	R	4	
	b)	Draw the V-I characteristics of Zener diode.	U	5	
	c)	Define PIV and ripple factor of half wave rectifier.	R	5	
	d)	Define 'α'. State relation between α & β.	R	6	
	e)	Draw the symbol of PNP and N-P-N transistor.	R	6	
	f)	Draw output characteristics of CE amplifier. Clearly mention region of operation on it.	A	6	
Q.5		Attempt any **FOUR:**			**16**
	a)	Find the values of resistor from the given colour codes: i) Orange, Red, Brown, Silver. ii) Green, Orange, Orange, Gold.	A	4	
	b)	Draw and explain bridge rectifier with capacitor filter with input and output waveforms.	A	5	
	c)	List out different types of inductor and state unit of inductor.	R	4	
	d)	Draw construction diagram of PN junction diode. Explain its operating principle in forward bias and reverse bias mode.	A	5	
	e)	Compare CB, CC and CE configuration of BJT.	U	6	
	f)	With neat diagram explain working of single stage CE amplifier.	U	6	
Q.6		Attempt any **FOUR:**			**16**
	a)	Compare Analog and digital IC's.	U	4	
	b)	Explain half wave rectifier with suitable diagram.	U	5	
	c)	Explain Zener diode as a voltage regulator for line and load regulation.	A	5	
	d)	Define doping. Explain the formation N type semiconductor.	U	5	
	e)	Explain transistor as a switch.	A	6	
	f)	State the need of transistor biasing? Enlist the types.	U	6	

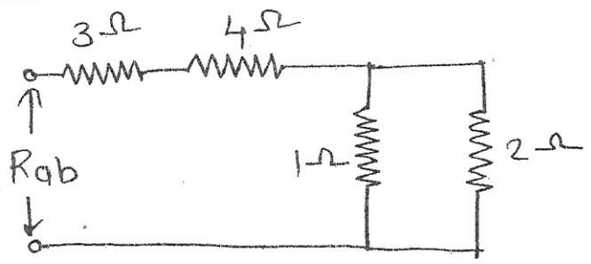

figure 1 (Q2. a)

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

SUMMMER 2024

EXAM SEAT NO. | | | | | | |

LEVEL :- FOURTH PROGRAM : ME

COURSE CODE :- MEG418/MEF502

COURSE NAME :- TOTAL QUALITY MANAGEMENT

MAX. MARKS : **80** TIME : **03 Hrs** DATE : 16/5/2024

Instruction :-

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

QN	SQN	**SECTION -I**	R/ U/ A	CO	MARKS
Q.1		Attempt any **FOUR:**			**08**
	a)	Define Reliability, Maintainability.	R	MEG 418.1	02
	b)	State need of In-Process Inspection.	R	MEG 418.1	02
	c)	Define concept of Quality Circle.	R	MEG 418.2	02
	d)	Define the term Quality Assurance.	R	MEG 418.2	02
	e)	State factor affecting Cost of Quality and Value of Quality.	R	MEG 418.2	02
	f)	List Prevention Costs Categories.	R	MEG 418.2	02
Q.2		Attempt any **FOUR:**			**16**
	a)	State factors to be considered for achieving a reliable design under reliability program activities.	A	MEG 418.1	04
	b)	Explain the various steps/ objectives in Quality Control Program.	U & A	MEG 418.1	04
	c)	State the responsibilities of Quality Assurance.	U & A	MEG 418.2	04
	d)	Explain purpose/ assurance of Quality Audit.	U	MEG 418.2	04
	e)	Explain Appraisal Cost Categories.	U	MEG 418.2	04
	f)	Explain the concept of Cost of Quality and Value of Quality by using suitable graph.	U	MEG 418.2	04
Q.3		Attempt any **FOUR:**			**16**
	a)	Differentiate between Inspection & Quality Control.	U & A	MEG 418.1	04
	b)	Describe the roles of Upper and Middle Management to ensure quality of the product.	A	MEG 418.1	04
	c)	Explain content of Quality Audits.	U & A	MEG 418.2	04
	d)	Explain procedure of problem-solving using Quality Circle.	A	MEG 418.2	04
	e)	Explain Internal and External Failure Cost Categories.	U	MEG 418.2	04
	f)	Describe the economics of Quality of Design and Quality of Conformance with a diagram.	U	MEG 418.1	04

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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SUMMER 2024

EXAM SEAT NO. | | | | | | |

LEVEL :- FOURTH PROGRAM :- DIPLOMA IN MECHANICAL ENGINEERING (ME 02/11)
COURSE CODE :- MEG418 / MEF502
COURSE NAME :- TOTAL QUALITY MANAGEMENT
MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 16/5/2024

QN	SQN	**SECTION – II**	R/ U/ A	CO	MARKS
Q.4		Attempt any **FOUR:**			**08**
	a)	Explain in brief importance of SQC (Statistical Quality Control) in Quality Management.	R	MEG 418.3	02
	b)	Define Measures of Central Tendency: Mean and Mode.	R	MEG 418.3	02
	c)	Define Standard Deviation.	R	MEG 418.3	02
	d)	Define TQM (Total Quality Management).	R	MEG 418.4	02
	e)	Define 'Six Sigma".	R	MEG 418.5	02
	f)	Enlist uses of Pareto Diagram in quality.	R	MEG 418.5	02
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain Normal Distribution Curve and its Interpretation.	U & A	MEG 418.3	04
	b)	Describe Process Capability and explain its use in quality.	U & A	MEG 418.3	04
	c)	List four basic elements/ approaches of TOM (Total Quality Management) and explain any one of them.	U & A	MEG 418.4	04
	d)	Describe Deming Philosophy of TQM (Total Quality Management).	U	MEG 418.4	04
	e)	Explain Scatter Diagram with neat sketch.	U	MEG 418.5	04
	f)	Explain Process Flow Diagram.	U	MEG 418.5	04
Q.6		Attempt any **FOUR:**			**16**
	a)	Explain the steps in preparation of 'X Bar' and 'R' Control Charts.	A	MEG 418.3	04
	b)	List Characteristics of Quality leader.	U & A	MEG 418.4	04
	c)	Explain the concept of "Kaizen".	U	MEG 418.4	04
	d)	List the Duties of a Quality Council.	A	MEG 418.4	04
	e)	Describe the Theory of "5S".	U	MEG 418.5	04
	f)	Describe the Benefits and Structure of ISO 9000 Series of Standards.	U	MEG 418.5	04

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SUMMER 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - **Third** PROGRAM : **Mechanical Engineering**

COURSE CODE : **MEG302/MEF302**

COURSE NAME : **Thermal Engineering**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **16 May 2024**

Instruction :-

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

QN	SQN	Question Text	R/ U/ A	CO	Marks
Q.1		**Attempt any FOUR:**			**08**
	a)	Categorize the following thermodynamic properties into intensive and extensive properties, i) Specific volume ii)Pressure iii) Density iv) Temperature	A	1	
	b)	State the Zeroth law of thermodynamics.	R	2	
	c)	A heat engine is supplied at the 45 KJ/sec and produces a power of 14 KW, Determine i) Thermal efficiency of engine.	A	1	
	d)	Explain the term internal energy with unit.	R	1	
	e)	Represent isobaric process on T-S diagram.	A	2	
	f)	Write the function of heat exchanger . List various types of heat exchangers.	R	3	
Q.2		**Attempt any FOUR:**			**16**
	a)	i) Define the term " enthalpy" , write its unit. ii) differentiate between heat and work (any 2 points)	R R	1 1	
	b)	Write limitations of 1st (first) law of thermodynamics.	R	2	
	c)	1kg of gas is heated from 18^0C to 93^0C. Assuming R= 0.264 KJ/kgK and r = 1.18 for the gas , Find :- i) Specific heats ii) Change in internal energy iii) Change in enthalpy	A	2	
	d)	Explain why Cp is always greater than Cv ?	U	2	
	e)	i) State Churl's Law. ii) State Newton's law of cooling.	R R	2 3	
	f)	Give classification of heat exchangers.	U	3	
Q.3		**Attempt any Two:**			**16**
	a)	i) Explain concept of thermodynamic system with its types. ii) Differentiate between Open System and Closed System. (Any 4 points)	U	1	
	b)	i)Write the steady flow energy equation and apply it to boiler and nozzle. ii) Explain the concept of Perpetual motion of second Kind.	A U	2 2	

P.T.O.

	c)	i) Write values of polytropic index (n)for various gas processes. ii) A wall of refrigerator of 1.5mm of steel sheet at outer surface , A 10mm plywood at inner surface and 2 cm of gear wool in between . calculate the rate of heat flow if the temperature of the inside and outside surfaces are -15^0C and 24^0 C . Take K (for steel) = 23.3 W/mk Take K (for glass) = 0.14 W/mk Take K (for plywood) = 0.052 W/mk	R A	2 3	
Q.4		Attempt any **FOUR:**			**08**
	a)	Define wet steam & dry saturated steam.	R	4	
	b)	Define Latent heat.	R	4	
	c)	Define Boiler Accessories & Give two examples of boiler accessories	R	5	
	d)	Give any four Applications of Nozzle.	A	6	
	e)	Define steam nozzle & state types of nozzle.	R	6	
	f)	State " Dalton's Law of partial Pressure".	R	6	
Q.5		**Attempt any FOUR :**			**16**
	a)	Define following terms i) Dryness fraction ii) degree of superheat iii) superheated steam iv) Enthalpy of evaporation of water	R	4	
	b)	Describe in detail formation of steam from water at 0^0 C with the help of temp. enthalpy diagram.	R&U	4	
	c)	Draw neat sketch of Cochran boiler & labeled all the parts.	U	5	
	d)	State the necessity of compounding of steam turbine & show steam pressure & steam velocity distribution for velocity compounding.	R	6	
	e)	Difference Impulse Turbine & Reaction turbine.	R&U	6	
	f)	Define steam condenser & state the function of steam condenser.	R	6	
Q.6		**Attempt any Four:**			**16**
	a)	One kg of steam at 2 bar pressure has a dryness fraction 0.8. How much heat shall have to be supplied at constant pressure to make the steam dry saturated.	A	4	
	b)	Draw H-S Chart (enthalpy –Entropy) & show following on it. i) Constant pressure line ii) Constant temperature line iii) Dryness fraction line iv) Const. volume line	R& U	4	
	c)	State classification of boiler on i) According to flow of hot gases & water. ii) According to method of circulation iii) According to method of firing iv) According to steam pressure.	R	5	
	d)	Differentiate forced draught & Induced draught.	R& U	5	
	e)	Explain Impulse turbine & show the steam pressure & steam velocity distribution for Impulse turbine.	R	6	
	f)	Give the sources of Air leakage in condenser & effect of air leakage in the condenser.	R& U	6	

Pressure	Tempreture	Ethalpy KJ/Kg		
		hf	hfg	hg
2	120.2	504.7	2201.5	2706.3

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SUMMER -2024

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MEG305**

COURSE NAME :- **STRENGTH OF MATERIALS**

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 14/5/2024

Instructions :-

1) Answers to 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 MEG305	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define direct load show stress distribution with neat sketch.	R	1	
	b)	Define composite section with examples.	R	1	
	c)	Draw stress-strain curve for a ductile material showing important points.	R	1	
	d)	Define Bulk modulus and state its SI unit.	R	1	
	e)	State formulae for MI for triangular section having height h and base b about its base .	R	3	
	f)	Define moment of inertia with its unit.	R	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	ACompound steel bar is 900 mm long, made in three parts -40 mm dia ,15mm dia and 30 mm dia with lengths 200mm, 500mm and 200mm respectively from left.. If the bar is subjected to an axial tensile load of 15 kN, find its total extension. Take E=200GPa.	A	1	
	b)	A steel tube has 40 mm external diameter and 30 mm internal diameter is filled with concrete. If the assembly is 2m long and has to carry a compressive load of 250 kN calculate the stress induced in each material. Take Modular ratio = 20.	A	1	
	c)	A steel rod is subjected to an axial pull of 25 kN. Find minimum diameter if the stress is not exceed 100 N/mm^2. The length of rod is 2000 mm and take E = 2.1×10^5 N/mm^2.	A	1	
	d)	A steel rod of 25 mm diameter and 1500 mm long is subjected to a load of 30 kN applied suddenly. Calculate the strain energy stored and modulus of resilience along with change in length. Take E = 2.1×10^5 N/mm^2.	A	2	
	e)	A weight of 2 kN falls on a collar attached at the lower end of a vertical bar 3 m long and 25 mm in diameter. Calculate the height of drop if the instantaneous stress developed is 120 N/mm^2. Also calculate corresponding elongation and strain energy stored in the bar. Take E = 2×10^5 N/mm^2.	A	2	
	f)	State and explain perpendicular axis theorem with neat sketch.	U	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	A bar of 20 mm diameter is subjected to a pull of 45 kN. The measured extension on gauge length of 200 mm is 0.05 mm and change in diameter is 0.0025 mm. Calculate the Poisson's ratio and the value of the modulus of rigidity.	A	1	
	b)	Calculate centroidal moment of inertia about X-X axis of 'symmetrical I' section with flanges 200 mm × 12 mm and web 10 mm × 300 mm.	A	3	
	c)	Define 'radius of gyration' and state its application. Calculate radius of gyration for circular lamina of diameter 300 mm.	A	3	

P.T.O.

	d)	Derive the limits of eccentricity for a circular section to carry the same type of stress associated with loading.	U	4	
	e)	A hollow circular column having external diameter 500 mm and Internal diameter 300 mm carries a vertical load of 200 kN acting at an eccentricity of 60 mm from C.G. Calculate maximum and minimum stresses developed.	A	4	
	f)	Calculate intensity of stresses at base of hollow rectangular column 500 mm × 300 mm external dimension and 50 mm thickness subjected to vertical load of 160 kN with 200 mm eccentricity about axis bisecting 500mm edge of the section..	A	4	

QN	SQN	Question Text	R/U/A	Co MEG 305	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Define shear force at any section for a beam carrying transverse loading.	U	4	
	b)	State the meaning of zero stress fibre in a flexure member.	U	4	
	c)	Comment on principal plane in a loaded member.	R	5	
	d)	State torsion formula, with the meaning of each term involved.	R	6	
	e)	State the maximum SF and BM in a cantilever carrying point land at the free end.	R	4	
	f)	Comment on the ratio of maximum & average shear stress in a circular section carrying shear force.	U	4	
Q.5		Attempt any **FOUR:**			**16**
	a)	A S/S beam 4m between supports and 1m overhang beyond right hand support, carries 20kN point load from LHS and 2kN/m on overhang. Construct SFD and BMD.	A	4	
	b)	A S/S beam 6m span carries a couple of 5kN/m e 2m from the LHS. Construct SFD and BMD. The couple is clockwise.	A	4	
	c)	A cantilever 4m long carries point of 20kN e 2m from the fixed end and UDL of 6kN/m for 2m beyond point load. Construct- SFD and BMD.	A	4	
	d)	State any four assumptions made in the theory of ordinary bending deriving flexure or bending formula.	U	4	
	e)	A rectangular section 200mm X 300mm, has to resist BM of 25kNm. Find the extreme stresses in the section. Plot the stress distribution diagram.	A	4	
	f)	A circular section carries a SF of 30kN. Plot the shear stress distribution if the section is having 50mm diameter.	A	4	
Q.6		Attempt any **TWO:**			**16**
	a)	i) A point in a biaxial loading carries normal stresses 60MPa and 40 MPa on naturally perpendicular planes. Determine Normal and tangential stress on a plane making 30^0 with 60MPa plane. Also find Resultant stress in the given point and maximum shear stress at the given point. ii) Solve the above problem graphically and represent. The answers on Mohr circle.	A	5	
	b)	A circular shaft 3m long carries a torque of 6KMn. Design the shaft if the maximum shear stress in the material is not to exceed 65MPa. Also find the twist in the shaft in radians (G=80GPa).	U	5	
	c)	Find the power transmitted by a shaft, if the maximum torque is 25% more than any torque and speed of the shaft is 60rpm. Find the diameter required if the shear stress in the material is not to exceed 65MPa.	A	6	

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SUMMER- 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - V PROGRAM : Mechanical Engineering.

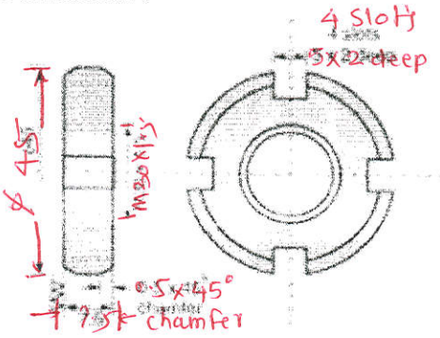
COURSE CODE :- MEG 503 / MEF503

COURSE NAME :- Industrial Engineering

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 14/5/2024

Instruction :-

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

QN	SQN	**SECTION -I**	R/U/A	Co	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	State the types of production systems.	R	1	2
	b)	Draw labelled sketch of process layout.	U	2	2
	c)	State the need of material handling.	U	2	2
	d)	State the factors affecting scheduling	R	3	2
	e)	State the functions of dispatching.	U	3	2
	f)	Define machine capacity and plant capacity.	R	3	2
Q.2		Attempt any **FOUR:**			**16**
	a)	Define batch production. State its advantages and disadvantages.	U	1	4
	b)	State the symptoms of bad plant layout.	U	2	4
	c)	Explain the importance of site selection with suitable example.	U	2	4
	d)	Explain dispatch procedure in production planning and control.	U/A	3	4
	e)	Prepare operation sheet to prepare the ring nut shown in figure from the blank of dia 50 mm and 10 mm thickness . 	U	3	4
	f)	Explain the factors affecting the planning of process.	A	3	4
Q.3		Attempt any **FOUR:**			**16**
	a)	Draw and explain break even chart	A	1	4
	b)	Suggest and explain type of layout for the material and machineries that are required to be placed in sequence.	A	2	4
	c)	Suggest with suitable reasons proper material handling equipments for the following characteristics- i. Bulk Materials ii. Combination of vertical and horizontal movements iii. Close supervision iv. Variable speed.	A	3	4

<table>
<tr><td></td><td>d)</td><td>Five jobs are to be processed on two machines M1 and M2 in the order M1 M2. Processing time in hours are given below. Determine the sequence that minimizes total elapsed time and also calculate idle time.

<table><tr><th rowspan="2">Job</th><th colspan="2">Processing time (hours)</th></tr><tr><th>M_1</th><th>M_2</th></tr><tr><td>1</td><td>5</td><td>2</td></tr><tr><td>2</td><td>1</td><td>6</td></tr><tr><td>3</td><td>9</td><td>7</td></tr><tr><td>4</td><td>3</td><td>8</td></tr><tr><td>5</td><td>10</td><td>4</td></tr></table></td><td>A</td><td>3</td><td>4</td></tr>
<tr><td></td><td>e)</td><td>Explain the concept of line balancing.</td><td>U</td><td>3</td><td>4</td></tr>
<tr><td></td><td>f)</td><td>State the types of assembly and explain them with suitable example.</td><td>U</td><td>3</td><td>4</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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SUMMER - 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - Vth PROGRAM : Mechanical Engineering.
COURSE CODE : MEG 503/MEF503 COURSE NAME : INDUSTRIAL ENGINEERING
MAX. MARKS : **80** TIME : **3 HRS.** DATE :- 14/5/2024

QN	SQN	Section- II	R/U/A	Co MEF503	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Define Jig and Fixture.	R	4	
	b)	Explain use of Ejector in Jig and Fixture.	U	4	
	c)	Define anthropometry.	R	5	
	d)	Write two uses of Ergonomics in Mechanical Engineering.	A	5	
	e)	Define PMTS.	R	6	
	f)	Define JIT.	R	6	
Q.5		Attempt any **FOUR** :			**16**
	a)	Explain 3-2-1 principle of location in Jig.	U	4	
	b)	Explain various components of Jigs with simple sketch.	U	4	
	c)	Explain the use of functional anatomy data in design of control systems.	A	5	
	d)	Discuss the concept of "Compatibility" in the design of control members.	A	5	
	e)	Explain the concept of 'Rapid Prototyping'.	U	6	
	f)	Write the importance of Modern trends in Industrial Engineering.	A	6	
Q.6		Attempt any **FOUR:**			**16**
	a)	Explain the process of selection of job for work study.	U	6	
	b)	Write and define steps in Method study.	R	6	
	c)	Explain the principles of motion economy.	A	6	
	d)	Explain the complete procedure of calculating standard time.	A	6	
	e)	Define Merit Rating and explain use of Work study in it.	A	6	
	f)	Explain Concept of 'Flexible manufacturing system'.	U	6	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

/ SUMMER 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - IV PROGRAM : MECHANICAL ENGINEERING

COURSE CODE :- MEG403 / MEF403

COURSE NAME :- Advanced Machining Processes

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 13/5/2024

Instruction :-

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

QN	SQN	SECTION -I	R/U/A	Co	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Explain Gang Milling	R	MEG 403.1	
	b)	List the basic parts of milling machine and give its function.	R	MEG 403.1	
	c)	List out four gear finishing methods.	R	MEG 403.2	
	d)	Define indexing.	R	MEG 403.2	
	e)	List two advantages of non-conventional machining processes.	R	MEG 403.3	
	f)	Explain principle of EDM.	R	MEG 403.3	
Q.2		Attempt any **FOUR:**			**16**
	a)	State different Milling operations and draw a neat sketch of any one.	U	MEG 403.1	
	b)	Explain with neat sketch Rack cutter gear generation process.	U	MEG 403.2	
	c)	Explain gear hobbing process with neat sketch.	U	MEG 403.2	
	d)	Differentiate between gear hobbing process and gear shaping process.	U	MEG 403.2	
	e)	Explain LBM with neat sketch. Give two applications of this process.	U	MEG 403.3	
	f)	Give four examples where traditional manufacturing cannot be used and task is completed by non-traditional machining	U	MEG 403.3	
Q.3		Attempt any **TWO:**			**16**
	a)	Draw a simple sketch of Column and Knee type milling machine and explain the function of each part. Write the specifications of milling machine.	U	MEG 403.1	
	b)	Explain with simple sketch – 1) Straddle milling 2) Key way Milling 3) Profile Milling 4) Form Milling	U	MEG 403.1	
	c)	Explain construction and working principle of "Wire cut EDM". Give the applications of this process.	U	MEG 403.3	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

SUMMER 2024.

EXAM SEAT NO. | | | | | | |

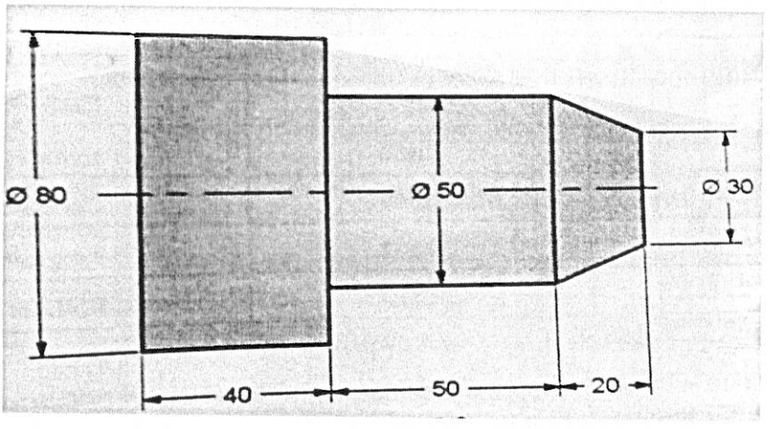
LEVEL : - IV PROGRAM :MECHANICAL ENGG.

COURSE CODE :- MEG403 / MEF403

COURSE NAME :- Advanced Machining Processes

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 13/5/2024

Instruction :-

QN	SQN	SECTION –II	R/U/A	Co	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Classify different types of CNC machines.	R	MEG403-4	
	b)	State any two examples of fixed automation	R	MEG403-5	
	c)	State the meaning of i) G03, ii) G40, iii) M05, iv) M30	R	MEG403-4	
	d)	Name the basic components of a CNC machine.	R	MEG403-4	
	e)	State applications of Robots in Manufacturing Industries.	R	MEG403-5	
	f)	State advantages & limitations of CNC machines.	R	MEG403-4	
Q.5		Attempt any **FOUR:**			**16**
	a)	Differentiate between absolute and incremental co-ordinate system.	U	MEG403-4	
	b)	Explain meaning of following block N20 G03 X12 Y14 Z-0.5 I0 J12 F90 EOB	U	MEG403-4	
	c)	Write CNC programme for turning a component shown in figure 1. Assume suitable data and mention.  **Figure 1**	A	MEG403-4	
	d)	Explain Flexible Manufacturing System (FMS) with neat sketch.	A	MEG403-5	
	e)	Describe fixed and programmable automation.	U	MEG403-5	
	f)	Describe Automatic Tool Changer (ATC) of CNC machine with neat sketch.	A	MEG403-4	
Q.6		Attempt any FOUR:			**16**
	a)	Compare "point to point" and "continuous path" CNC machine	A	MEG403-4	
	b)	Apply right hand thumb rule of axes identification to CNC vertical milling with neat diagram.	U	MEG403-4	
	c)	Justify need of tool length compensation of CNC machine with neat sketch.	U	MEG403-4	
	d)	Justify the need of group technology with layout in today's manufacturing situations.	A	MEG403-5	
	e)	Explain the basic components (Anatomy) of robot with neat sketch.	U	MEG403-5	
	f)	Explain canned cycles with neat diagram.	A	MEG403-4	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004

(An Autonomous Institute of Govt. Of Maharashtra)

SUMMER 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - **Third** PROGRAM : **Mechanical Engineering**
COURSE CODE : **MEG308/MEF308**
COURSE NAME : **Theory of Machine**
MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **13 May 2024**

Instruction :-

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

QN	SQN	Question Text	R/ U/ A	CO	Marks
Q.1		**Attempt any FOUR:**			**08**
	a)	Define the terms kinematic link and kinematic pair.	R	1	
	b)	Draw a neat labeled sketch of Beam Engine Mechanism.	U	1	
	c)	Define the term Lower pair & Higher pair.	R	1	
	d)	Write any two applications of Flywheel .	A	3	
	e)	Classify Centrifugal Governors.	R	3	
	f)	Differentiate between the flywheel & governor.(any two points)	U	3	
Q.2		**Attempt any FOUR:**			**16**
	a)	Explain with neat sketch scotch yoke mechanism.	R &U	1	
	b)	Enlist inversions of four bar crank chain and explain beam engine with neat sketch.	R &U	1	
	c)	The crank and connecting rod of a reciprocating engine are 150mm and 600mm respectively. The crank makes an angle of 60^0 with the inner dead center and revolves at a uniform speed of 300r.p. m. Find , by Klein's construction. i) Velocity and acceleration of the piston. ii) Angular velocity and Angular acceleration of the connecting rod.	A	2	
	d)	Explain with neat sketch working of centrifugal Governor.	R &U	3	
	e)	Explain the method of balancing the single rotating mass by single mass rotating in the same plane.	R &U	3	
	f)	Define the following terms in case of Flywheel. i) Coefficient of fluctuation of energy. ii) Coefficient of fluctuation of speed.	R &U	3	
Q.3		**Attempt any TWO:**			**16**
	a)	The dimensions and configuration of the four bar mechanism ,shown in fig I are as P_1A = 300mm ; P_2B = 360mm ;AB = 360mm and P_1P_2 =600mm ; The angle of A $P_1P_2=60^0$. The crank P_1A has an angular velocity of 10 rad/s and an angular acceleration of 30rad/s^2, both clockwise . Determine the angular velocities and angular accelerations of P_2B, and AB.	A	2	
	b)	In the mechanism, as shown in fig. II , the crank OA rotates at 20rpm anticlockwise and gives motions to the sliding block B and D. The dimensions of various links are OA = 300mm ; AB =1200mm ; BC = 450mm and CD =450mm Determine i) Velocity of sliding at B and D. ii) Angular acceleration of CD.	A	2	
	c)	i)Explain different types of kinematic pairs giving example for each of then. (any four) ii) Explain with neat labeled sketch crank and slotted lever quick return mechanism .	R &U	3	

P. T. O.

Q.4		Attempt any **FOUR:**			**08**
	a)	Define i) Slip of belt ii) creep of belt	R	4	
	b)	State the types of Gear trains.	R	4	
	c)	Draw a neat labeled sketch of internal expanding Brake.	U	5	
	d)	State the function of clutches.	R	5	
	e)	Write the classification of followers.	R	6	
	f)	Enlist different types of follower motion.	R	6	
Q.5		**Attempt any FOUR :**			**16**
	a)	Explain with neat sketch simple gear train.	R& U	4	
	b)	State one application of each . V-belt drive , Flat belt drive, Gear drive and Chain drive.	A	4	
	c)	State the types of clutch and its applications.	R& U	5	
	d)	Draw a neat labeled sketch of multi-plate clutch and state its applications.	U	5	
	e)	State the application of i) Band Brake ii) Disc Brake iii) Internal expanding shoe Brake iv) External shoe Brake	A	6	
	f)	Why roller follower is preferred over knife edge follower.	U	4	
Q.6		**Attempt any Two:**			**16**
	a)	Two parallel shaft connected by a cross belt , are provided with Pulleys 480mm and 640 mm in diameters . The distance between the center line of shaft is 3m. Find by how much the length of belt should be changed if it is desired to alter a direction of rotation of the driven shaft.	A	4	
	b)	Give the classification of different types of Brake , Explain the construction of disc brake with neat sketch.	R& U	5	
	c)	A cam is to be designed for a knife edge follower with following data – i)cam lift = 40mm during 90^0 of cam rotation of with SHM. ii)Dwell for the next 30^0. iii) During the next 60^0 of cam rotation , the follower returns to its original position with SHM. iii)Dwell during remaining 180^0 . Draw the profile of the cam when the line of stroke of follower passes through axis of the cam shaft, the radius of base circle of the cam is 40mm.	A	6	

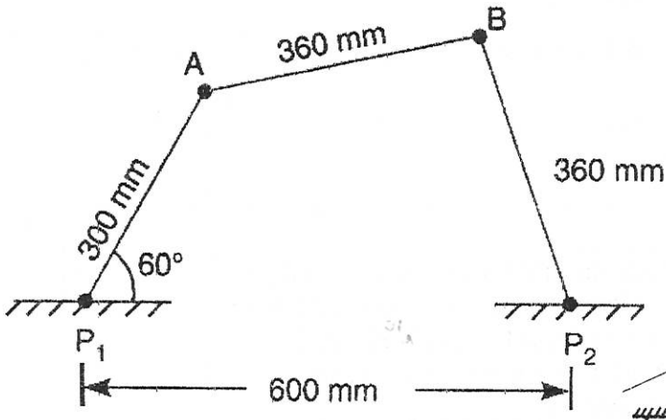

Fig. I

Q. 3 a)

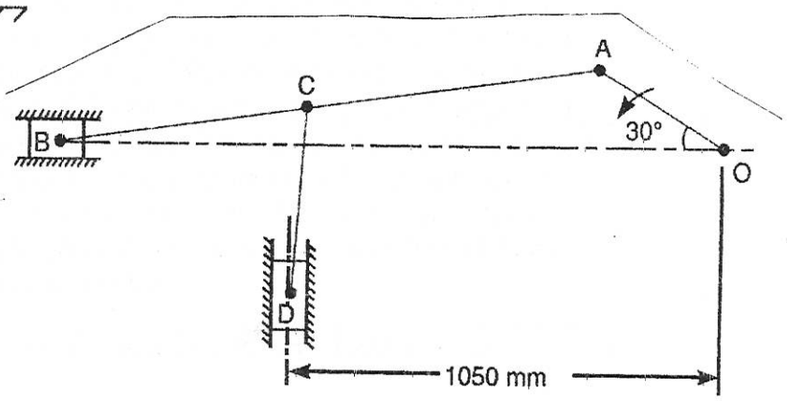

Fig. II

Q. 3 b)

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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SUMMER- 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - 3 PROGRAM : MECHANICAL ENGINEERING

COURSE CODE :- MEG304/MEF304

COURSE NAME :- MANUFACTURING PROCESSES

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 11/5/2024

QN	SQN	Question Text	R/U/A	Co	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	State the factors which govern the selection of a proper material for pattern making.	U	MEG 304-1	02
	b)	Enlist various pattern making materials in foundries.	R	MEG 304-2	02
	c)	State different types of moulding sands used in foundries.	R	MEG 304-3	02
	d)	State the specific use of Core and Core print.	A	MEG 304-3	02
	e)	State two advantages and disadvantages of Die Casting process.	R	MEG 304-4	02
	f)	Suggest suitable remedies to prevent Blowholes in casting.	A	MEG 304-4	02
Q.2		Attempt any **FOUR:**			**16**
	a)	Draw neat sketch of Sweep Pattern and explain its features.	U	MEG 304-2	04
	b)	Explain the need of Draft allowance. State other allowances used in pattern making.	U	MEG 304-2	04
	c)	State and explain colour coding for pattern and core boxes with its importance.	U	MEG 304-2	04
	d)	Draw neat sketch of Shell moulding. State its specific applications.	A	MEG 304-3	04
	e)	Explain Jolt machine in machine moulding with neat sketch.	U	MEG 304-3	04
	f)	State composition and application of Core sand.	A	MEG 304-3	04
Q.3		Attempt any **FOUR:**			**16**
	a)	State four advantages and disadvantages of Green sand moulding..	U	MEG 304-3	04
	b)	State and explain any eight casting defects, their causes and remedies .	A	MEG 304-4	04
	c)	Explain various zones in Cupola Furnace.	U	MEG 304-4	04
	d)	Draw neat labelled sketch of Cupola Furnace and explain its operation.	U	MEG 304-4	04
	e)	Explain Induction Furnace with its application.	A	MEG 304-4	04
	f)	Explain cold chamber die casting method with neat sketch.	U	MEG 304-4	04

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QN	SQN	Question Text	R/U/A	Co MEG 304	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	State the application of TIG Welding.	A	1,5	
	b)	Classify various types of Welding Flames in gas welding.	R	1,5	
	c)	Give classification of Press.	R	1	
	d)	Name any four operations that are performed on press.	U	1	
	e)	Write the type of rolling mills.	U	1	
	f)	State various applications of Rolling in farming process.	A	1	
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain submerged arc welding with neat sketch.	U	1,5	
	b)	Explain with neat sketch spot welding.	U	1,5	
	c)	List any four welding defects and their causes.	A	1,5	
	d)	Enlist the various steps involved in soldering operation.	U	1,5	
	e)	Explain Notching and Lancing operation with sketch.	U	1	
	f)	Explain punching and blanking with sketch.	U	1	
Q.6		Attempt any **FOUR:**			**16**
	a)	Explain Drop forging with neat sketch.	U	1	
	b)	Write any two forging operations and explain any one of them with neat sketch.	A	1	
	c)	Explain principles of rolling with neat sketch.	U	1	
	d)	Draw a neat sketch of direct extrusion and explain its working.	U	1	
	e)	State application of extrusion process.	A	1	
	f)	Draw a neat sketch of Three high rolling mill.	U	1	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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WINTER/SUMMER- 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - **05** PROGRAM : ME

COURSE CODE :- MEG506 / MEF506

COURSE NAME :- AUTOMOBILE ENGINEERING

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 10/5/2024

Instruction :-

1) Answers of two sections must be written in separate section answer book provided.
2) Illustrate your answers with sketches wherever necessary.
3) Assume and mention suitable additional data if necessary.
4) Use of Mobile is strictly prohibited.
5) QN- Question No., SQN-Sub Question No. R- Remembering, U- Understanding, A- Application.

QN	SQN	SECTION -I	R/U/A	CO	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	State types of vehicle layouts.	U	MEG 506.1	2
	b)	State function of differential.	R	MEG 506.2	2
	c)	State application of diaphragm spring type clutch.	U	MEG 506.2	2
	d)	State types of braking system.	R	MEG 506.3	2
	e)	Enlist any four requirements of steering system in automobile.	U	MEG 506.3	2
	f)	State the classification of automobile.	R	MEG 506.1	2
Q.2		Attempt any **FOUR:**			**16**
	a)	State importance of aerodynamic shape body of an automobile.	A	MEG 506.1	4
	b)	Explain coil spring type clutch with neat sketch.	R	MEG 506.2	4
	c)	Explain with neat sketch working of synchromesh mesh gear box.	U	MEG 506.2	4
	d)	Explain pneumatic braking system with neat sketch.	U	MEG 506.3	4
	e)	Explain with neat sketch working of differential.	R	MEG 506.2	4
	f)	Explain toe -in and toe -out with neat sketch.	U	MEG 506.3	4
Q.3		Attempt any **FOUR:**			**16**
	a)	Differentiate between framed and frameless vehicle.	R	MEG 506.1	4
	b)	Explain with neat sketch construction and working of Torque converter.	U	MEG 506.2	4
	c)	Explain construction and working of recirculating ball type steering gearbox with neat sketch.	R	MEG 506.3	4
	d)	Differentiate between single plate clutch and multi plate clutch.	A	MEG 506.2	4
	e)	Compare disc brake and drum brake.	U	MEG 506.3	4
	f)	Explain working of overdrive with neat sketch.	U	MEG 506.2	4

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER/SUMMER- 2024

EXAM SEAT NO. | | | | | | |

LEVEL: - Fire (05) PROGRAM: ME
COURSE CODE: - MEG506/MEF506
COURSE NAME: - **AUTOMOBILE ENGNEERING**
MAX. MARKS: **80** TIMES: **03 Hrs.** DATE: -10/5/2024

QN	SQN	SECTION –II	R/U/A	Co MEG 506	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Classify Suspension system in an Automobile.	R	04	
	b)	Draw a neat labeled sketch of double wishbone type suspension system..	R	04	
	c)	Enlist the Importance of Suspension system in an Automobile.	R	04	
	d)	Define wheel alignment.	R	05	
	e)	State the importance of tire specification.	R	05	
	f)	Define battery rating.	R	06	
Q.5		Attempt any **FOUR:**			**16**
	a)	With neat labeled Sketch, Explain Construction & working of wishbone type suspension system.	U/	04	
	b)	Compare Tubed & Tubeless tires.(any four points)	R/U/	05	
	c)	Differentiate between Battery ignition system and Magneto ignition system.	R/U/	06	
	d)	Draw a typical wiring diagram of an automobile.	U/	06	
	e)	Explain with a neat sketch, cast light alloy wheel.	U	05	
	f)	Explain with a suitable diagram, Air Suspension system in an Automobile.	U	04	
Q.6		Attempt any **FOUR:**			**16**
	a)	With a neat labeled Sketch, Explain McPherson Suspension System.	A	04	
	b)	State & Explain various factors affecting Tire Life.	A	05	
	c)	Compare Radial & Cross ply tires.	U/A	05	
	d)	How color coding helps in the wiring system of automobile electric systems.	A	06	
	e)	Explain with a neat sketch working of batteries used in an automobile.	U/A	06	
	f)	Explain the working of water temperature gauge, in an Automobile	A	06	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

SUMMER- 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - Four PROGRAM : MECHANICAL ENGINEERING

COURSE CODE :- MEG406

COURSE NAME :- FLUID MECHANICS & MACHINERY

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 9/5/2024

Instruction :-

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

QN	S QN	SECTION -I	R/ U/ A	CO MEG 406	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define Dynamic viscosity. State its unit.	R	1	
	b)	State Bernoulli's theorem and write its equation.	R	2	
	c)	Define: 1) Total Pressure 2) Center of Pressure	R	1	
	d)	State any two limitations of piezometer.	R	1	
	e)	Define Gauge pressure and Vacuum pressure.	R	1	
	f)	Define: 1) Uniform Flow 2) Laminar Flow	R	2	
Q.2		Attempt any **FOUR:**			**16**
	a)	Differentiate between Simple manometer and Differential manometer.	U	1	
	b)	Explain with neat sketch the procedure for measuring velocity in pipe using Pitot tube.	U	2	
	c)	State the laws of fluid friction for Laminar and Turbulent flow.	R	3	
	d)	Different pressure gauges shows following sets of readings: 1) 100 psi 2) 200 kgf/cm^2 3) 25 bar 4) 700 mm of Hg. Convert these values into N/m^2.	A	1	
	e)	An oil of specific gravity 0.81 is flowing through Venturimeter having inlet diameter 7 cm and throat diameter 4 cm, The oil-mercury differential manometer shows a reading of 5 cm. Calculate discharge of oil through the horizontal Venturimeter. Take C_d = 0.98.	A	2	
	f)	Find the diameter of a pipe of length 2000 m when the rate of flow of water through the pipe is 200 litres/s and the head lost due to friction is 4 m. Take the value of C = 50 in Chezy's formulae.	A	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain the terms: a) Surface Tension b) Capillarity.	U	1	
	b)	A pipe of diameter 500 mm & length 3000 m is used for transmission of power by water, The total head of inlet of pipe is 400 m. Find maximum power available at the outlet of pipe (Take f=0.003)	A	3	
	c)	Explain with neat sketch the working principle of Orifice meter.	U	2	
	d)	The right limb of a simple U-tube manometer containing mercury is open to the atmosphere, while the left limb is connected to a pipe in which a fluid of specific gravity 0.8 is flowing. The center of the pipe is 15 cm below the level of mercury in the right limb. Find the pressure of fluid in the pipe , if the difference of mercury level in the two limbs is 25 cm.	A	1	
	e)	Explain the causes of water hammer in pipes and the procedure for reducing its effect.	U	3	
	f)	A circular plate 1.5 m diameter is placed vertically in water so that center of the plate is 3 m below the free surface. Determine the depth of center of pressure and total pressure on the plate.	A	1	

P.T.O.

QN	S QN	SECTION -II	R/ U/ A	Co	Mark
Q.4		Attempt any **FOUR:**			**08**
	a)	Define i) Jet Propulsion ii) Impact of jet	R	MEG 406.4	
	b)	State the functions of Draft tube	R	MEG 406.5	
	c)	State the function of i) Penstock ii) Tail Race	R	MEG 406.5	
	d)	Define NPSH	R	MEG 406.6	
	e)	State the functions of Air Vessel	U	MEG 406.6	
	f)	Define Cavitation	U	MEG 406.6	
Q.5		Attempt any **FOUR:**			**16**
	a)	A jet of water of 50mm diameter strikes a flat plate normally with a velocity of 20m/s. The plate is moving with a velocity of 5m/s in the direction of jet and away from the jet. Find i) Work done by the jet ii) Efficiency of the jet	A	MEG 406.4	
	b)	Draw a neat sketch of Pelton Turbine and Explain the function of Breaking Jet and Casing	R/U	MEG 406.5	
	c)	A pelton wheel operates under a head of 120m and produced 100kW power. The speed of the turbine is 200 rpm and overall efficiency is 88%. Determine i) dia.of the jet ii) dia. of runner iii) jet tatio *(take Cv=0.98, speed ratio = 0.45)*	A	MEG 406.5	
	d)	Draw following Indicator diagram i) Effect of acceleration in suction and Delivery pipe ii) Effect of acceleration and friction in suction and Delivery pipe	R	MEG 406.6	
	e)	The internal and external diameters of the impeller of a centrifugal pump are 300mm and 600mm respectively. The pump is running at 1000rpm. The vane angle at outlet and inlet are 20^0 and 30^0 respectively. The water enters the impeller radially and velocity of flow is constant. Determine the work done by the impeller per unit weight of water .	A	MEG 406.6	
	f)	A jet of water of diameter 100mm moving with a velocity of 20m/s strikes a fixed curved plate tangentially at one end at an angle of 30^0 to the horizontal. The jet leaves the plate at an angle of 20^0 to the horizontal. Find the force exerted by the jet on the plate in the horizontal and vertical direction.	A	MEG 406.4	
Q.6		Attempt any **TWO:**			**16**
	a)	The following data is given for a Francis Turbine: Net Head-70m, speed-600rpm, Shaft Power-367.87kw, overall efficiency=85%, hydraulic efficiency= 95%, flow ratio 0.25, breadth ratio= 0.1, outer diameter of the runner= 2× inner dia. of the runner, the thickness of vane occupy 10% of the circumferential area of the runner. Velocity of flow is constant at inlet and outlet and the discharge is radial at outlet. Determine i) Guide blade angle ii) Runner vane angle at inlet iii) Diameter of the runner at inlet iv) Width of the runner at inlet	A	MEG 406.5	
	b)	Explain with neat sketch working and construction of Kaplan Turbine.	U	MEG 406.5	
	c)	i) Differentiate between Centrifugal pump and Reciprocating pump	U	MEG 406.6	
		ii) A single acting reciprocating pump, running at 50rpm is discharging 250lit/min of water. The diameter of the piston is 150mm and stroke length 300mm The delivery and suction heads are 20m and 5m. respectively. Find i) slip of the pump ii) coefficient of discharge iii) power required to drive the pump	A	MEG 406.6	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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WINTER/SUMMER- 2024

EXAM SEAT NO. | | | | | | |

LEVEL: - FOURTH PROGRAM: Diploma in Metallurgical Engineering

COURSE CODE: - MTG402

COURSE NAME: - Foundry Technology II

MAX. MARKS: **80** TIME: **03 Hrs.** DATE: - 9/5/2024

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 MTG 402	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	State formula of Reynolds Number and its significance.	U	1	02
	b)	State role of pouring basin in gating system.	R	1	02
	c)	Enlist types of riser. What happen when riser not given?	U	2	02
	d)	State how riser is useful to give directional solidification.	R	2	02
	e)	State formula of carbon equivalent. State effect of C.E. on castability property.	R	3	02
	f)	State relation between nodule size and % nodularity.	U	3	02
Q.2		Attempt any **FOUR:**			**16**
	a)	Define gating ratio. Distinguish pressurized & unpressurised gating system.	U	1	**04**
	b)	Draw a neat labeled diagram of different parts in standard gating system.	R	1	04
	c)	State four function of riser.	A	2	04
	d)	Explain Modulus method of riser determination.	U	2	04
	e)	Explain difficulty in Mg addition in molten iron bath for producing S.G iron.	R	3	04
	f)	Enlist different types of cast iron. Give reason why S.G. iron is ductile?	U	3	04
Q.3		Attempt any **FOUR:**			**16**
	a)	Explain Bernoulli's therom. State its importance.	U	1	04
	b)	State continuity equation. Calculate velocity of flowing liquid 50 cm/s through area 25 sq. cm .other end possess area of 10 sq.cm.	R	1	04
	c)	Distinguish between open riser and blind riser.	U	2	04
	d)	Compare composition, properties & uses of Gray Cast Iron & White Cast Iron.	R	3	04
	e)	Explain sandwich method of Mg treatment in S.G iron production.	U	3	**04**
	f)	Explain various difficulties in steel casting production.	R	3	**04**

P.T.O

QN	SQN	SECTION –II	R/U/A	Co MTG 402	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Write the reasons for fluxing & flushing of Aluminium melt.	U	5	
	b)	State the methods of grain refining in Aluminium melts.	R	5	
	c)	State causes of swelling defect in casting.	R	6	
	d)	Write remedies of cold shut defect in casting.	U	6	
	e)	State the equipments used for material handling.	R	7	
	f)	Write the appearance of scabbing defect.	R	6	
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain the advantages of mechanization is foundries.	A	07	
	b)	Differentiate between shrinkage and Blow hole defect.	U	6	
	c)	Explain modification of Al-Si alloys.	U	5	
	d)	Explain the methods of minimizing dross produced in Cu-melt.	U	5	
	e)	What care to be taken during Aluminium melting practice?	A	5	
	f)	Explain mismatch defect in casting with a neat sketch.	U	6	
Q.6		Attempt any **FOUR:**			**16**
	a)	Explain the sources of energy saving in melting furnace operation.	U	7	
	b)	State the remedies of following defects. i) Sand inclusion ii) Slag inclusion.	A	6	
	c)	Describe metal penetration in casting.	U	6	
	d)	Explain gaseous and solid fluxes used in Aluminium melting.	U	5	
	e)	Discuss deoxidation in Cu-melt.	R	5	
	f)	Explain i) Moulding in Cu alloy casting. ii) Mechanization in core making.	A U	5 7	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

EVEN TERM END EXAM SUMMER -2024

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MEG310/MEF310**

COURSE NAME **ENGINEERING METALLURGY AND MATERIALS**

MAX. MARKS : **80** TIME : **03Hrs.** DATE :- **09/ 05 / 2024**

Instruction :-

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

QN	SQN	Question Text	R/U/A	Co MEG 310	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define space lattice and unit cell.	R	1	
	b)	State the need and importance of metallurgy in mechanical industry.	A	1	
	c)	Explain the uses of lever rule.	U	2	
	d)	Define Hypo and Hyper eutectic alloys.	U	2	
	e)	Define Allotropy.	R	1	
	f)	State the meaning of Lower critical temperature point A_1 in iron-carbide equilibrium diagram.	U	1	
Q.2		Attempt any **FOUR:**			**16**
	a)	Explain BCC and FCC lattice structure with sketch.	R	1	
	b)	Describe the mechanism of crystallization for pure metal. Draw neat sketches showing the various stages.	U	1	
	c)	Explain Hume Rothery's Rules of solid solution formation.	U	1	
	d)	Describe the thermal analysis method of constructing binary equilibrium diagram.	R	2	
	e)	Draw a phase diagram when two metals are soluble in the liquid state but completely insoluble in the solid state (Eutectic system) and explain.	U	2	
	f)	State and explain the Lever arm principle.	U	2	
Q.3		Attempt any **TWO:**			**16**
	a)	Explain Iron-Iron carbide equilibrium diagram with neat sketch. State various reactions and phases in it.	U	1	
	b)	State the properties and applications of tool steel, stainless steel and heat resisting steel.	A	1	
	c)	State the properties and applications of Grey, White, Malleable and nodular cast Iron.	A	1	

P.T.O

QN	SQN	Question Text	R/U/A	Co MEG 310	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	State any two purpose of heat treatment.	R	3	
	b)	Enlist any four heat treatment processes.	R	3	
	c)	State any four properties of Aluminium.	R	4	
	d)	Select the appropriate non-destructive test for the following application. i) Measurement of coating thickness of metallic tap coated with a metal. ii) Surface crack of a metallic piston.	A	5	
	e)	State any two properties of super alloys.	R	4	
	f)	Define heat treatment.	R	3	
Q.5		Attempt any **FOUR:**			**16**
	a)	Select heat treatment process required to reduce quenching stresses, occurred in hardened steel and explain the process.	A	3	
	b)	Explain austempering process with its objectives.	U	3	
	c)	Write properties and applications of Butadiene.	U	4	
	d)	Differentiate between normalizing and Annealing.	U	3	
	e)	Explain working principle of eddy current test. Write in application.	U	5	
	f)	Select the non-ferrous alloy for following application: i) I.C. engine piston. ii) Gear iii) Gun barrel. iv) Ships component.	A	4	
Q.6		Attempt any **TWO:**			**16**
	a)	i) Name the material suitable for following application 1) condenser tube ii) Bearing iii) Lenses iv) Mounting of metallurgical specimen. 2) Write composition, properties and application of shape memory alloy. A	A U	4	
	b)	Explain following heat treatment i) Hardening ii) carburizing	A	3	
	c)	i) Explain how ultrasonic test is performed to find the internal defects. ii) Explain Magna flux test with working principle and neat sketch.	U	5	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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SUMMER/WINTER EXAM- 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - THIRD PROGRAM : CIVIL ENGINEERING

COURSE CODE :- CEH 301

COURSE NAME :- BUILDING MATERIAL & CONSTRUCTION

MAX. MARKS : 70 TIME : **03 Hrs** DATE :-04/05/2024

Instruction :-

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

QN	S QN	SECTION -I	R/ U/ A	CO-CEH301	Marks
Q. 1		Attempt any **THREE** of the following			06
	a)	Define- Load bearing structure and Framed structure	R	CO1	
	b)	Define – Through stone and cornice.	R	CO3	
	c)	List the natural and artificial building construction materials any four of each.	R	CO1	
	d)	List the ingredients of Geopolymer cement.	U	CO2	
	e)	State any two purposes of foundation	U	CO3	
Q. 2		Attempt any **FOUR** of the following			16
	a)	Define Seasoning of timber. Explain artificial seasoning with neat sketch	U	CO1	
	b)	Enlist the methods of water proofing. Explain any one in brief.	U	CO2	
	c)	Explain timbering and strutting in excavation.	A	CO3	
	d)	Draw a neat labeled sketch of raft foundation and isolated footing.	U	CO3	
	e)	State the general principles to be observed during construction of good quality stone masonry.	U	CO3	
	f)	State the need of termite proofing. Give name any two types of termite proofing materials with its specific uses.	U/A	CO2	
Q. 3		Attempt any **TWO** of the following			12
	a)	State the precautionary measures to be taken during the constructions of brick masonry, along with their reasons.	A	CO3	
	b)	1) State the necessity of dewatering of foundation trenches. (2m) 2) Enlist any four methods to dewater deep excavation. Explain any one with neat labeled sketch. (4m)	A	CO3	
	c)	State any three applications of Geopolymer cement and acoustic materials of each.	A	CO2	

P.T.O.

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

WINTER / SUMMER- 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - III PROGRAM : CIVIL ENGINEERING

COURSE CODE :- CEH 301

COURSE NAME :- BUILDING MATERIAL AND CONSTRUCTION

MAX. MARKS : **70** TIME : **03 Hrs** DATE :- 04/05/2024

QN	SQN	Question Text	R/U/A	Co	Marks
Q. 4		Attempt any **FOUR: (2 X 4)**			**08**
	a)	Give any two requirements of good formwork.	R	06	
	b)	State any two advantages of timber as a formwork material.	U	06	
	c)	Enlist any four selection criteria for windows.	R	04	
	d)	Draw a neat sketch of garnet hinge.	R	04	
	e)	Discuss the necessity of pointing.	A	05	
	f)	Describe stucco plaster.	A	05	
Q. 5		Attempt any **FOUR: (4 X 4)**			**16**
	a)	Define scaffoldings? State any two types of it with their suitability.	U	06	
	b)	Draw neat labeled sketch of wooden formwork for rectangular column in plan and isometric view.	R	06	
	c)	Explain various component parts of staircase with neat labeled sketch.	U	04	
	d)	Discuss thumb rule for selecting size of windows.	R	04	
	e)	State any four defects in plastering work and give remedies on it.	A	05	
	f)	State various types of floors. Explain any one in detail.	A	05	
Q. 6		Attempt any **TWO: (6 X 2)**			**12**
	a)	Draw labeled sketch of fully paneled door with frame for an opening size of 1200 mm × 2200 mm. Assume suitable scale.	R	04	
	b)	Compare between flat roof and pitched roof (any six points).	A	05	
	c)	Discuss step by step procedure of application of paint on new wooden surface.	A	05	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004

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SUMMER 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - V PROGRAM : MECHANICAL ENGG.
COURSE CODE : MEG507 / MEF507
COURSE NAME : INDUSTRIAL HYDRAULICS AND PNEUMATICS
MAX. MARKS : **80** TIME : **3 HRS.** DATE :- 03/05/2024

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 ME G507 -	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Draw symbols of i) 4/3 lever operated spring return D.C.Valve ii) Temperature and pressure compensated flow control valve.	U	1	
	b)	Define viscosity and viscosity index.	R/	2	
	c)	State any four desirable properties of hydraulic oil.	R	2	
	d)	Define positive displacement pump.	R	3	
	e)	Classify pumps used in hydraulic systems.	U	3	
	f)	State different methods of valve operating.	A	4	
Q.2		Attempt any **FOUR:**			**16**
	a)	State applications of hydraulic systems.	A	2	
	b)	Draw general layout of hydraulic system.	U	2	
	c)	Explain with neat sketch working external gear pump.	A	3	
	d)	State functions of seals and types of seals.	A	4	
	e)	Draw travel dependent hydraulic sequence circuit.	A	5	
	f)	Draw meter out hydraulic circuit and state it's applications.	A	5	
Q.3		Attempt any **FOUR:**			**16**
	a)	Classify valves used in hydraulic systems.	U	4	
	b)	Draw any one type of filter used in hydraulic systems.	A	4	
	c)	Classify actuators used in hydraulic systems.	U	4	
	d)	State difference between pressure relief valve and unloading valve.	U	4	
	e)	Draw bleed off circuit.	A	5	
	f)	Draw motion synchronizing circuit.	A	5	

P.T.O.

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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/SUMMER- 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - FIFTH PROGRAM : MECHANICAL ENGINEERING

COURSE CODE :- MEG507 / MEF 507

COURSE NAME :- Industrial Hydraulics and pneumatics .

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 03/05/2024

QN	SQN	**SECTION –II**	R/U/A	Co MEG 507	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	List any four applications of pneumatic system	R	3	2
	b)	Draw symbol of bi-directional air motor.	A	1	2
	c)	State the function of quick exhaust valve.	R	3	2
	d)	State the difference between shuttle and dual pressure valve.	U	3	2
	e)	Classify linear actuators used in pneumatic system.	R	3	2
	f)	Draw neat and labeled sketch of 5/2 DC valve.	U	1	2
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain general layout of pneumatic system.	U	2	4
	b)	State the function of FRL unit. Draw its symbol	U	3	4
	c)	With neat sketch describe construction and working of pneumatic DA cylinder.	U	3	4
	d)	Sketch and explain working of shuttle valve.	U	3	4
	e)	Draw and explain control of single acting cylinder using AND valve.	A	5	4
	f)	List the factors to be considered while selecting pipes for pneumatic system.	U	3	4
Q.6		Attempt any **FOUR:**			**16**
	a)	Draw symbol of a) Air compressor b) flow control valve.	R	1	4
	b)	Explain with neat sketch working of pneumatic circuit using time delay valve.	A	5	4
	c)	Develop a pneumatic circuit for operation of two double acting cylinders such that one operates after other using travel dependent sequencing.	A	5	4
	d)	Draw and explain speed control of pneumatic DA cylinder.	A	5	4
	e)	Explain with neat sketch construction and working of lobe type air compressor	U	3	4
	f)	Name any eight pipe and tube fitting. Write their function in brief.	U	3	4

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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SUMMER/WINTER- 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - FOURTH PROGRAM : MECHANICAL ENGINEERING

COURSE CODE :- MEG401/MEF401

COURSE NAME :- POWER ENGINEERING

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 02/05/2024

Instruction :-

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

QN	SQN	SECTION -I	R/U/A	Co	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Enlist any two objectives of supercharging.	R	401.1	
	b)	State the function of the compression ring and oil ring used with piston in IC engine.	R	401.1	
	c)	State any four effects of detonation in IC engine	R	401.1	
	d)	Define term BSFC and state its unit	R	401.2	
	e)	List any two purposes of IC engine testing	R	401.2	
	f)	State the effect of CO (any one) and SO_2 (any one) on environment and human life	R	401.2	
Q.2		Attempt any **FOUR:**			**16**
	a)	If the compression ratio of the Otto cycle is changed from 4 to 6, find the percentage increase in efficiency	A	401.1	
	b)	Give detailed classification of IC engine	U	401.1,	
	c)	Explain with neat sketch working of four stroke diesel engine	U	401.1,	
	d)	i. List any four different types of fuels used in IC engines (02 marks) ii. Enlist any four objectives of additives used in IC engines (02 marks)	R	401.6 401.1	
	e)	Enlist changes made by automobile manufacturers to achieve BSVI norms in diesel engines with its significance.	R	401.2	
	f)	Compare two stroke and four stroke engine on the basis of following points (any four) -Weight of the fly wheel. -Thermal efficiency. -Number of revolutions of crank for completing one cycle. -Power produced for the same size of engine. -Shape of crown of the piston. -Size of the engine for producing same power	U	401.1, 401.6	
Q.3		Attempt any **TWO:**			**16**
	a)	Explain with a neat sketch CRDI system used in CI engines control by ECU. State it's any two advantages and disadvantages.	U	401.2	

P.T.O.

Q.3	b)	During a trial on a four cylinder 4 stroke petrol engine coupled to a hydraulic dynamometer, at constant speed the following readings were observed. B.P. with all cylinders working is 15.7 KW. B.P. with cylinder number 01 cut off is 10.1 KW. B.P. with cylinder number 02 cut off is 10.5 KW. B.P. with cylinder number 03 cut off is 10.2 KW. B.P. with cylinder number 0R cut off is 10.3 KW. PETROL CONSUMPTION is 5.5 Kg/hr. Calorific value of petrol is 42000 KJ/Kg. Diameter of cylinder is 10cm. Stroke of piston is 14cm. Clearance volume is 0.1 litre. Calculate- i. Mechanical efficiency (4 marks) ii. Relative efficiency on the basis of indicated power (4 marks)	A & U	401.2	
	c)	The following observations were recorded during a trial on a four stroke cycle diesel engine. The duration of the trial is 1 minute. -fuel supplied 0.1 kg -calorific value of fuel is 42000 KJ/Kg -speed of the engine is 400RPM -net load on the break drum is 1000N -effective diameter of the brake drum is 1m -mass of cylinder jacket cooling water is 10 kg -rise in temperature of cylinder jacket cooling water is 25^0C -mass of air supplied is 6 kg -temperature of exhaust gas near engine is 200^0C -ambient temperature is 30^0C -specific heat of exhaust gas is 1 KJ/Kg^{0}K -Specific heat of water is 4.184 KJ/Kg^{0}K Calculate- i. Break power of the engine (2 marks) ii. Heat carried by cooling water (2marks) iii. Heat carried by exhaust gas (2 marks) iv. Draw Heat balance sheet	A & U	401.2	

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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WINTER / SUMMER 2024

EXAM SEAT NO. | | | | | | |

LEVEL : - 4th PROGRAM : Mechanical Engineering

COURSE CODE :- MEG401/ MEF401

COURSE NAME :- Power Engineering

MAX. MARKS : **80** TIME : **03 Hrs** DATE :- 02/05/2024

QN	SQN	SECTION –II	R/U/A	Co	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	Define the following terms with respect to Compressor, i) Compressor capacity, ii) Free air delivered.	**R**	**5**	
	b)	List components of closed cycle gas turbine	**R**	**5**	
	c)	State Dalton's law of partial pressure	**R**	**5**	
	d)	A single stage single acting air compressor is running at 400 rpm. The cylinder diameter is 15 cm and stroke 17.5 cm. Find the theoretical volume of air sucked per second.	**A**	**5**	
	e)	State the advantages of liquid propellant rocket over solid propellant rocket.	**U**	**5**	
	f)	Represent sensible heating and sensible cooling on Psychometric chart.	**A**	**6**	
Q.5		Attempt any **FOUR:**			**16**
	a)	Write any four industrial applications of compressed air	**R**	**5**	
	b)	Compare reciprocating compressors with rotary compressors (any 04 points of each)	**U**	**6**	
	c)	Describe with line diagram, working of gas turbine plant with inter cooling	**U**	**6**	
	d)	Draw a line diagram of vapour compression system and state function of its each part.	**U**	**6**	
	e)	Describe with neat sketch construction and working of ice plant.	**U**	**6**	
	f)	Define air conditioning system and write necessity of air conditioning.	**R**	**5**	
Q.6		Attempt any **FOUR:**			**16**
	a)	Write any four advantages of multi stage compression.	**U**	**5**	
	b)	State any four methods of energy saving in compressors	**R**	**5**	
	c)	State any four limitations of gas turbine.	**R**	**5**	
	d)	A single stage single acting reciprocating air compressor has cylinder bore 200 mm and stroke 300 mm. it receives air at 1 bar and 20 °C. The final pressure is 7 bars. It follows the compression by law $PV^{1.25} = C$. Calculate the power required to drive the compressor if the compressor speed is 100 m/min. Neglect the effect of clearance.	**A**	**5**	
	e)	Define: i) DBT, ii) WBT, iii) DPT, iv) Specific humidity.	**R**	**5**	
	f)	Represent subcooling and superheating on p-h and T-S diagram in Refrigeration.	**A**	**6**	

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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EVEN TERM END EXAM SUMMER -2024

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MEG316/MEF410**

COURSE NAME **MECHANICAL ENGINEERING MEASUREMENT**

MAX. MARKS : **80** TIME : **03Hrs.** DATE :- **02/ 05 / 2024**

Instruction :-

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

QN	SQN	Question Text	R/ U/ A	Co MEG 316	Marks
Q.1		Attempt any **FOUR:**			**08**
	a)	Define the term range and span	R	1	
	b)	Define Repeatability and reproducibility.	R	1	
	c)	Differentiate between active and passive transducer.	U	1	
	d)	State working principle of potentiometer.	U	2	
	e)	State applications of displacement transducer.	A	2	
	f)	Which Instrument is used for measuring temperature of 1400^0Cfurnace and exhaust valve of engine?	R	3	
Q.2		Attempt any **FOUR:**			**16**
	a)	Explain the working principle of application of resistive transducer.	U	1	
	b)	Explain working principle of eddy-current dynamometer.	U	2	
	c)	Explain load cell with application.	U	2	
	d)	State the specification of displacement transducer.	U	2	
	e)	With a neat sketch explain working of ionization gauge for the pressure measurement.	U	3	
	f)	Explain working principle of RTD with neat sketch	A	3	
Q.3		Attempt any **FOUR:**			**16**
	a)	State different types of errors in measurement system. Explain any one in detail.	R & U	1	
	b)	Compare the term accuracy and precision.	A	1	
	c)	Explain with neat sketch working principle of LVDT.	A	2	
	d)	Explain Hydraulic dynamometer with neat sketch.	A	2	
	e)	Explain working principle of Radiation Pyrometer with neat sketch.	A	3	
	f)	Explain with neat sketch working of McLeod gauge.	A	3	

P.T.O

QN	SQN	Question Text	R/U/A	Co MEG 316	Marks
Q.4		Attempt any **FOUR:**			**08**
	a)	State any four flow measuring instruments.	R	4	
	b)	Define gauge factor with mathematical expression.	R	5	
	c)	Enlist all vibration measuring instruments.	R	5	
	d)	Write any four characteristics of sound.	U	6	
	e)	Define humidity and also give its unit.	U	6	
	f)	State principle of electro dynamic microphone.	R	6	
Q.5		Attempt any **FOUR:**			**16**
	a)	Explain the use of pitot tube for measurement of velocity of flow.	U	4	
	b)	Define flow. Give brief classification of flow transducers (Flow Measurement Device)	R	4	
	c)	A resistance wire strain gauge with a gauge factor 2 is used to measure strain steel member having original length 1m and elongated by 1mm. Calculate the percentage change in value of gauge resistance due to applied stress.	A	5	
	d)	Explain the principle and working of velocity pick-up.	U	5	
	e)	Explain electric tachometer in detail.	U	5	
	f)	Explain the working of hair hygrometer; with neat sketch.	U	6	
Q.6		Attempt any **FOUR:**			**16**
	a)	Explain with neat sketch Hot wire Anemometer.	U	4	
	b)	Give Difference between orifice meter and venturimeter.	R	4	
	c)	Explain working of Inductive type transducer with neat sketch.	U	5	
	d)	Explain principle and working of Mechanical tachometer.	A	5	
	e)	Explain the working of carbon microphone; with neat sketch.	U	6	
	f)	Explain any one liquid level measurement method in detail.	R	6	

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