GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO. | | | | | | |

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

COURSE CODE: **MEE305/ME205/M205/2205** COURSE NAME: **THEORY OF ENGINEERING DESIGN**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **28/11/2016**

Instruction:-

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

Marks

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

a) State Hook's law.
b) Define strain energy & its SI unit.
c) Define proof resilience & its SI unit.
d) Draw shear force diagram SFD (as shown in fig.no1)
e) State parallel axis theorem.
f) State M.I for Hollow circular section about any axis.

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

a) A bar is as shown in figure no.2 is subjected to an axial load of 5KN. find the total elongation produced in the bar E=200GPa
b) A mild steel rod of 20mm diameter and 500mm long is enclosed centrally inside a hollow copper tube of external diameter 30mm and internal diameter 25mm. The ends of the rod and tube are brazed together and the composite bar is subjected to an axial pull 40KN. find the stress in steel & copper & extension of the rod, if E_S=200GPa, E_{CU}=100GPa.
c) A steel rod of 16mm diameter and 3m length when subjected to a tensile force of 40KN. shows an elongation of 3mm and the reduction in diameter 0.005mm. Calculate the modulus of elasticity and modulus of rigidity.
d) A steel rod 30mm is diameter,1m long is heated through 100^0C and at the same time subjected to a pull P. If the total extension of the rod is 2mm what should be the magnitude of P? $\alpha_{st} = 12\times10^{-6}/^0C$ E_{st}=200GPa.
e) An axial pull of 50KN is suddenly applied to a steel rod 2m long and 1000mm^2 in cross section. Find the maximum stress, elongation and resilience of the bar. E=200GPa.
f) A mild steel bar 2m long and 20mm diameter hangs freely and has a collar fixed at the lower end. Determine the maximum instantaneous elongation and maximum stress produced if a load of 1000N falls on the collar from a height of 100mm. E=200GPa

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

a) Draw shear force diagram (SFD) and Bending moment diagram (BMD) for the beam as shown in fig.no.3
b) Draw SFD & BMD for the beam as shown in fig. no.4

P.T.O

c) A simply supported beam of span 6m, carries a udl of 3KN/m over 2m from left hand support, and point load 6KN at 4m from left hand support. Draw SFD & BMD.

d) Draw BMD and locate the point of contraflexure for the beam as shown in fig.no.5

e) Find the moment of inertia of the angle section ISA 100x100x10mm about both axis xx & yy and radius of gyration.

f) A channel section as shown in fig.no.6 Calculate moment of inertia about both centroidal axis.

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

a) Define 'core of section' and draw for circular section.

b) Write formula for flexure & explain the terms in it.

c) Draw shear stress distribution across 'I' (symmetrical) section.

d) Define 'obliquity in stresses'

e) Write the relationship between principal plane & max.shear plane.

f) A circular shaft rotating with 150rpm with torque 10KN.m. Find out power transmitted by shaft.

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

a) A cast iron rod 20mm x 20mm in section and 600mm long is s/s & fails to central load 2KN. If the same rod is used as cantilever, what will be the point load for which beam will fail?

b) A simply supported beam of I section made up of flanges & web 200 x 10mm is carrying a shear force 100KN. Draw shear stress distribution across the section.

c) Determine Torsional shear stress & angle of twist developed in a shaft having diameter 400mm which it is subjected to torque of 80KN.m length of shaft is 1.8m. take modulus of rigidity is 70GPa

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

a) A rectangular solid rod of c/s 100mm x 50mm is subjected to compressive load of 150KN with 40mm eccentric to axis bisecting 50mm side. Calculate max. &min stresses developed at base. Also draw stress distribution diagram.

b) A particle block is subjected to stresses 150MPa (tensile) & 50MPa (tensile) along with 30MPa shear stress. Calculate

   i) Position of principal planes & principal stresses on it

   ii) Max shear plane & stress.

   Use analytical or graphical method.

c) A hollow circular shaft 200mm external diameter & thickness 25mm is transmitting power at 200rpm. The angle of twist over length of 2m was found to be 1^0. Calculate maximum stress induced & power transmitted by shaft. Take modulus of rigidity of material as 80 KN/mm^2

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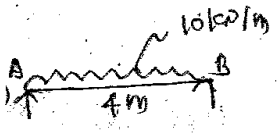
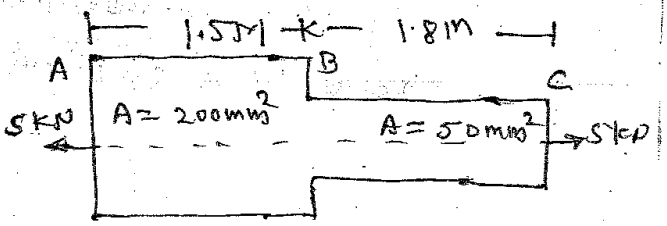
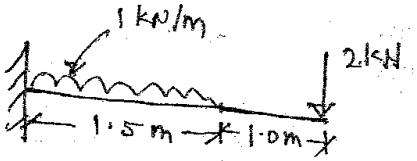


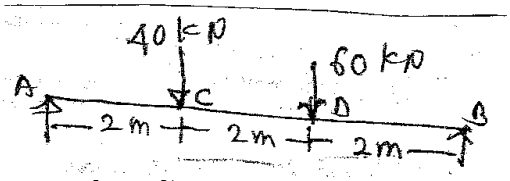
Q1.(d) Fig.No.1



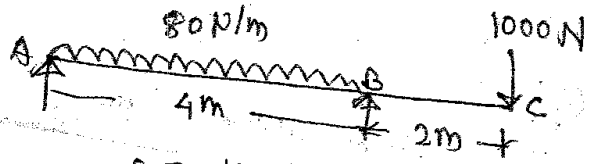
Q2. (a) Fig.No.2



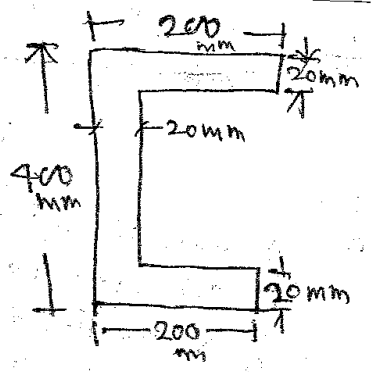
Q3.(a) Fig.No.3



Q3 (b) Fig.No.4



Q3.(d) Fig.No.5



Q3.(f) Fig.No.6

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ODD TERM END EXAM NOV./ DEC -2016

EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **MECHANICAL ENGG.**

COURSE CODE :- **MEE302/ME202/M202/2202**

COURSE NAME :- **THERMAL ENGINEERING**

MAX. MARKS : **80** TIME : **3 HRS.** DATE: - **23 / 11 / 2016**

Instruction:-

1) Answers must be written in the main answer book provided.(and supplements if required)
2) Figure to the right indicate marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
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7) Use of Mobile is strictly prohibited.

Marks

USE STEAMTABLE MOLLIER CHART IS PERMITTED.

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

a) Define thermodynamic work with unit.
b) Define extensive properties of system with suitable example.
c) Explain term internal energy with unit.
d) Define C.O.P. for heat pump.
e) Define zeroth law of thermodynamics.
f) State Charle's law.

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

a) Explain the concept of thermodynamic system with its types.
b) Write steady flow energy equation and apply it to boiler and condenser.
c) Draw P-V & T-S diagram for Isothermal and Adiabatic gas process.
d) 1Kg of gas is heated from 18^0C to 93^0C assuming R=0.264KJ/kgK and r=1.18 for the gas Find :- 1) Specific heats 2) Change in internal energy 3) Change in enthalpy.
e) Write the applications of heat exchangers.
f) A wall of refrigerator of 1.5mm of steel sheet at outer surface, 10mm plywood at inner surface and 2cm of glass wool in between. Calculate the rate of heat flow if the temperature of the inside and outside furfaces are -15^0C & 24^0C.
Take K (for steel) =23.3 W/m^{0}K.
K (for glass) = 0.14 W/m^{0}K.
K (for plywood) = 0.052 W/m^{0}K.)

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

a) Write the differences between heat and internal energy.
b) Define second law of thermodynamics according to Kelvin planks and Clausius statement.
c) Define first law of thermodynamics with its limitations.
d) Explain with neat sketch the heat engine and heat pump.
e) Write the values of polytropic index (n) for various gas processes.
f) Define i) Stefan BoltzMan's Law ii) Black body. iii) Gray body iv) Fourier Law.

[P.T.O.]

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

a) Determine the dryness fraction of the steam of 0.8kg of water is in suspension with 35kg of dry steam.
b) Classify the boilers.
c) Sketch a Bourdon tube pressure gauge.
d) Write the principle of steam turbine.
e) Give the objectives of condenser.
f) What is the need of cooling towers in steam power plant?

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

a) Internal energy of 1kg mass of steam at 10 bar absolute pressure is 2400KJ. Caculate the dryness fraction of the steam at 10bar pressure, data from steam table:
Saturation Temperature, Tsat = 179.91^0C.
Enthaply of water hf = 762.82 KJ/kg.
Enthaply of Saturated steam hg = 2778.1 KJ/kg.
Latent heat hfg = 2015.3 KJ/kg.
Specific volume of steam vg = 0.1944 m^3/mg.

b) Draw H-S chart and show on it. i) Constant pressure process
ii) Constant dryness fraction line.
iii) Constant temperature line.
iv) constant volume line.

c) Differentiate between water tube boiler and fire tube boiler (any four points).
d) Draw a neat sketch of economiser and name its parts.
e) Show the steam pressure and steam velocity distribution for an Impulse turbine.
f) Distinguish clearly between Jet condenser and surface condenser.

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

a) Why compounding of steam turbine is required? Give different methods. Explain any one method.

b) Describe in detail formation of steam from water at 0^0C with the help of temperature enthalpy diagram.

c) i) Draw a neat sketch of Loeffler boiler.
ii) Give the sources and effects of air leakage in the condenser.

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ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO. | | | | | | |

LEVEL: **FIRST** PROGRAM: **COMMON**

COURSE CODE: **CCE108/X107/R110** COURSE NAME: **ENGINEERING DRAWING-II**

MAX. MARKS: **80** TIME: **4 HRS.** DATE: **15/11/2016**

Instruction:-

1) Answers must be written in the main answer book provided. (and supplements if required)
2) Figure to the right indicates marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
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Marks

Q.1 Attempt the following **(16)**

a) Fig. No.1 shows the pictorial view of an object. Using first angle method, draw

i) Front view looking in the direction X - (05 Marks)
ii) Top view (05 Marks)
iii) Side view from the right (04 Marks)
iv) Dimensioning (02 Marks)

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

a) Fig. No. 2 shows the pictorial view of an object, Using first angle method, draw the following views

i) Sectional front view, section on A-A (06 Marks)
ii) Top view (06 Marks)
iii) Side view from left (04 Marks)

b) Fig. No. 3 shows the pictorial view of an object. Using first angle method. Draw the following views

i) Sectional front views, section on A-A (06 Marks)
ii) Top view (06 Marks)
iii) Side view from left (04 Marks)

Q.3 Attempt any **FOUR** of the following **(08)**

a) Square thread
b) Acme thread
c) Capstan nut
d) Wing nut
e) Lewis foundation bolt
f) Hook headed bolt.

P.T.O

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

a) Draw the development of the lateral surface of the frustam of the square pyramid, as shown in figure No.4

b) Draw the development of lateral surface of a cone, whose base diameter is 60mm and height is 70mm.

c) Draw the development of the surface of the part P of the cube, the front view of which is shown in figure No.5

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

a) A cylinder having base diameter 50mm and axis length 70mm, has its base in H.P. A square hole of side equally inclined with H.P and its axis being perpendicular to V.P and bisecting the axis of cylinder. Length of side of square hole is 25. Draw the development of the lateral surface of the cylinder with the hole.

b) Figure No.6 shows front view and top view of an object. Draw its only left hand side view show necessary dimensions in it.

c) Figure No.7 shows front view and top view of an object. Draw its only left hand side view. Show necessary dimension in it.

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

a) Figure no.8 shows front view and top view of an object. Draw its isometric view, taking 'O' as an origin.

b) Figure No.9 shows front view and right hand side view of an object. Draw its isometric projection, taking 'O' as an origin. Use isometric scale.

c) Figure No.10 shows front view and top view of an object. Draw its isometric view, taking 'O' as an origin

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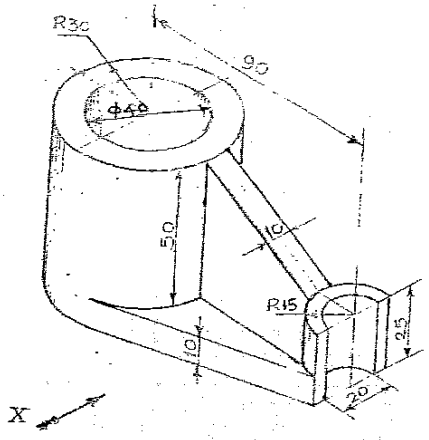
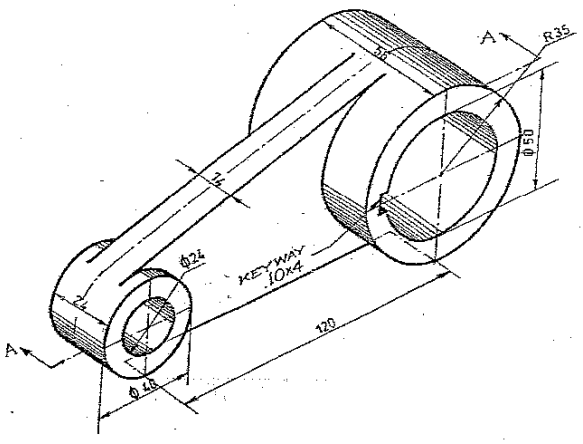
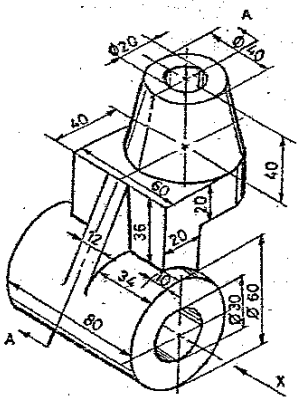


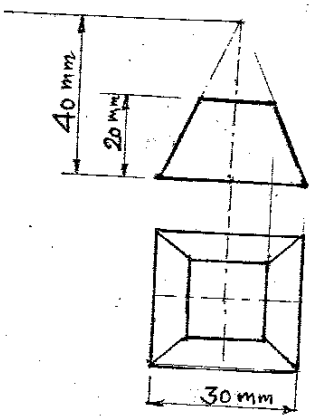
Que 1 (a) Fig. No: 1



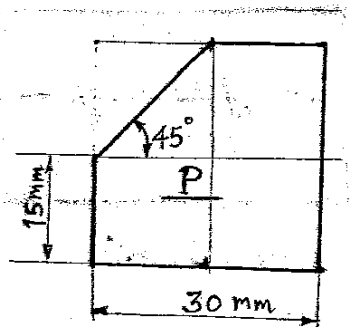
Que 2 (a) Fig. No: 2



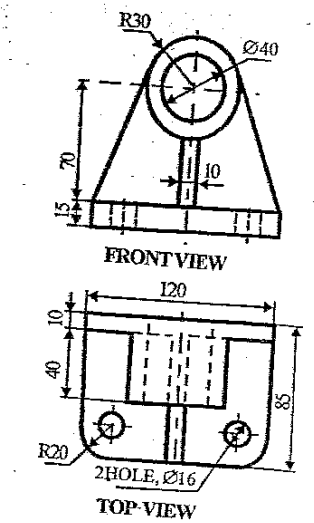
Que 2 (b) Fig. No: 3



Que 4: (a) Fig. No: 4

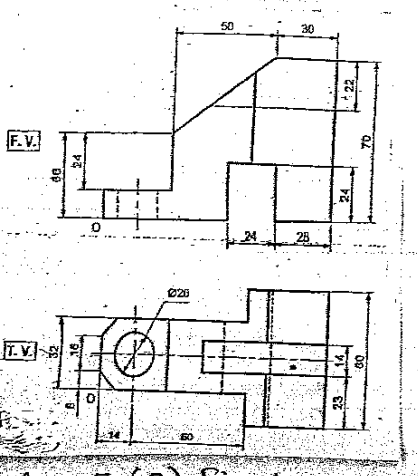


Que 4: (c) Fig No: 5

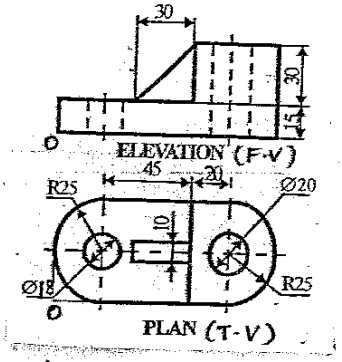


Que 5: (b) Fig. No: 6

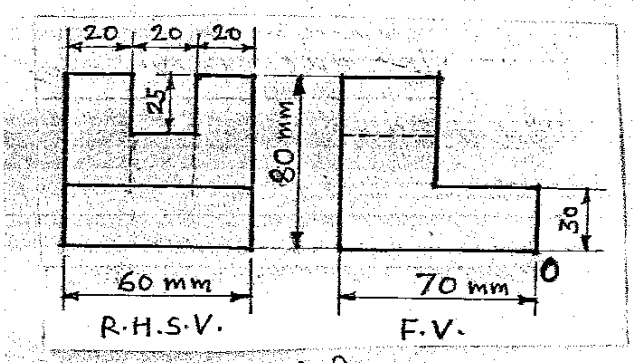
[P.T.O.]



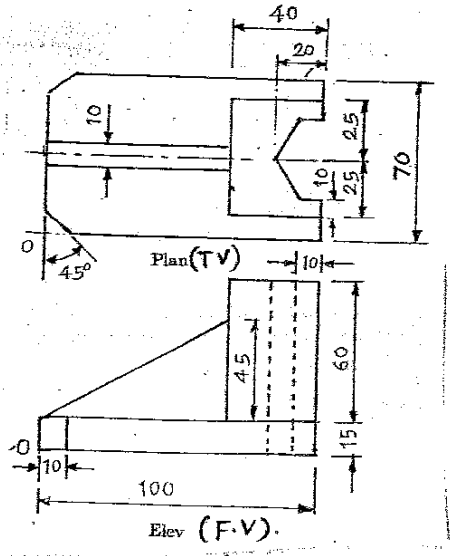
Que 5 (c) Fig. No: 7



Que 6: (a) Fig. No: 8



Que 6 (b) Fig. No: 9



Que 6 (c) Fig. No: 10

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ODD TERM END EXAM NOV./ DEC -2016

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MEE306/ME206/M206**

COURSE NAME :- **MACHINE TOOLS**

MAX. MARKS : **80** TIME : **3 HRS.** DATE: - **01 / 12 / 2016**

Instruction:-

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

Marks

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

a) List the types of chips and explain them with neat sketches.

b) How will you classify lathe machines?

c) Define cutting speed, feed, depth of cut and machining time with respect to drilling machine with formula.

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

a) Describe the taper turning method by swivelling compound rest with neat sketch.

b) What do you mean by Grooving? Explain various grooving operations with neat sketches.

c) Differentiate between orthogonal cutting and oblique cutting with neat sketch sketches.

d) Show the following elements and angles on a single point cutting tool.

i) Flank ii) Side Cutting Edge Angle iii) Side rake angle iv) Shank

e) Explain the following operations with neat sketch i) Drilling ii) Boring.

f) How will you specify Radial Drilling machine?

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

a) Describe various elements and angles of a twist drill nomenclature with neat sketches.

b) i) Explain the types of cutting fluids. (04)

ii) What are the purposes to use cutting fluids? (04)

c) i) Describe with functions the following lathe parts 1) The Bed 2) Carriage. (06)

ii) List the remaining Basic Parts of Lathe Machine. (02)

(P.T.O.)

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

a) How slotting machine is specified?

b) Enlist basic parts of planners.

c) Define grit and grade.

d) Clasify various super finishing processes.

e) What is butting process?

f) Enlist atleast four broaching operations.

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

a) Enlist basic parts of shapers and explain the specifications.

b) Explain honing process with it's set up required.

c) Describe the burnishing process with advantages and applications.

d) Differentiate between polishing and buffing process.

e) Enlist basic parts of horizontal broaching machine and give the functions.

f) Explain any two broaching methods.

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

a) Describe the working of Quick return mechanism used for shaping machine with sketch.

b) Explain the working and applications of tool and cutter grinder with sketch.

c) Explain the various factors considered for selection of grinding wheels.

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ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO. | | | | | | |

LEVEL: FIFTH. PROGRAM: MECHANICAL ENGG.

COURSE CODE:MEE510/ME411. COURSE NAME: INDUSTRIAL HYDRAULIC & PNEUMATICS

MAX. MARKS: 80 TIME: 3 HRS. DATE: 03/12/2016.

Instruction:-

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

Section – I

Marks

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

a) What is a function of accumulator?

b) Enlist four industrial applications of hydraulic system.

c) What are the basic components of hydraulic system?

d) Classify hydraulic fluids.

e) Enlist at least four pumps used in hydraulic system.

f) What is positive displacement pump?

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

a) Draw a neat sketch of sequencing circuit and give its application.

b) Explain the working of gear pump with simple sketch.

c) Draw a general layout of oil hydraulic system.

d) Enlist and explain at least eight properties of good hydraulic oil.

e) Draw a neat sketch of $\frac{3}{2}$ D.C.V. and explain.

f) Classify various oil filters used in hydraulic system and explain any one with sketch.

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

a) 1) Hydraulic circuit for shaper machine. Draw and explain workings.

2) What care and maintenance required in hydraulic system? Explain in brief.

b) Explain meter in meter out circuit. Draw & give their specific application in industries.

c) Why accumulator is used in hydraulic circuit? What are types of accumulator? Explain diaphragm type accumulator.

P.T.O.

Section – II

Marks

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

a) Enlist various components of pneumatic system.

b) Draw symbols of following components.

1)FRL unit 2) Shuttle valve.

c) Why is compressed air costly?

d) Classify compressors used in pneumatic systems.

e) Draw symbol of time delay valve.

f) Enlist different pipe materials used in pneumatic systems.

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

a) State any four merits and demerits of pneumatic systems.

b) Explain with neat sketch construction and working of screw compressor.

c) Draw and explain pneumatic circuit to operate single acting cylinder using $^{3}/_{2}$ direction control value.

d) Draw and explain working of variable type flow control valve.

e) Draw labelled diagram of air cylinder.

f) Draw a simple pneumatic circuit to operate single acting cylinder using a shuttle valve and two $^{3}/_{2}$ D.C. valves.

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

a) Compare Hydraulic and pneumatic systems.

b) Explain with neat sketch working of time delay valve.

c) Explain with neat sketch working of air filter.

d) State advantages of air motors.

e) Draw speed control circuit for double acting cylinder.

f) Draw position based sequencing circuit.

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ODD TERM END EXAM NOV./ DEC -2016

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MEE309/ME209/M209/2209**

COURSE NAME :- **ELECTRICAL TECHNOLOGY**

MAX. MARKS : **80** TIME : **3 HRS.** DATE: - **30 / 11 / 2016**

Instruction:-

1) Answers must be written in the main answer book provided.(and supplements if required)
2) Figure to the right indicate marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
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Marks

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

a) Define active and passive networks.
b) State advantage of using Clip-on-Meter.
c) Define average value of alternating quantity.
d) Define capacitance reactance. State its unit.
e) What is earthing?
f) Draw circuit for 3phase, 4wire star connected supply system.

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

a) Find equivalent resistance between terminals AB.

b) State and explain Kirchoff's laws.

c) Draw symbol and state the use of Wattmeter and ammeter.

d) For R-L series circuit.

1) Draw the circuit diagram. 2) Write the voltage and current equations.
3) Draw vector diagram. 4) Draw impedance triangle.

e) Explain generation of three phase voltages in brief.

f) Draw neat sketch for plate earthing.

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

a) State relation between line voltage and phase voltage of star and delta connected system. Also state the active and reactive power relations in both loads.
b) Define the following terms:
i) Wave form ii) Crest Value iii) periodic time iv) Instantaneous value.
c) Draw diagram, vector diagram and state current voltage relations for purely capacitive circuit.
d) State and explain the laws of electromagnetic induction.
e) Define i) Inductance ii) Resistance.
Also state their units.
f) Compare series and parallel circuits.

(P.T.O.)

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

a) Define transformer, state on which principle it works.

b) Classify d.c. motors.

c) State any two applications of induction heating.

d) State inverse square law of illumination.

e) How direction of rotation of 3-phase induction motor be reversed?

f) State illumination level for i) Study room ii) Workshop.

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

a) State types of rotors used in 3- phase induction motor. Describe any one in detai.

b) State vracions losses taken place in transformer.

c) Give classification of d.c. motor and draw their schematic diagram.

d) Describe with neat sketch, working of any one type of induction furnace.

e) Draw and explain D.O.L starter.

f) Explain in brief Dielectirc heating, state its principle and applications.

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

a) Explain with neat circuit diagram, the procedure to find efficiency of a given single phase transformer by direct loading method.

b) State working principle of stepper motor, explain its constructional details. State its applications.

c) Explain with neat sketch star-delta starter used for 3-phase induction motor.

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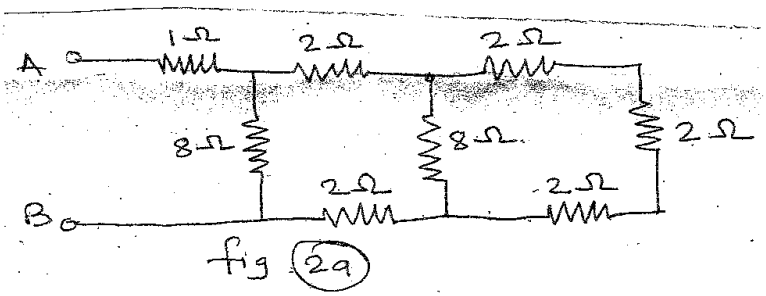

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ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO. | | | | | | |

LEVEL: **FIRST** PROGRAM: **COMMON**

COURSE CODE: **CCE106/X110/R108/0108** COURSE NAME: **ENGINEERING MATH'S**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **23/11/2016**

Instruction:-

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

Marks

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

a) Find the centroid of the triangle whose vertices are (2, -1) (8, -2) & (8, 6)

b) Find the slope, x intercept and y- intercept of the line $2x+y-5=0$

c) Find the perpendicular distance from the point (3,4) on the line $3x+4y=7$

d) Find the acute angle between the lines whose slopes are $-\frac{1}{3}$ *and* $\frac{1}{2}$

e) Find the center and radius of a circle $x^2+y^2+6x-4y-12=0$

f) Find the equation of a circle whose diameter is seg AB where A(2, 4) & B(-3, 5)

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

a) Find the area of ΔABC where $A\equiv(2,3)$, $B\equiv(4,1)$, $C\equiv(-1,2)$

b) Find the equation of straight line though (3, 4) and parallel to a line with x intercept 5 and y intercept 10.

c) Find the equation of a straight line passing through the point of intersection of the lines $4x+3y=8$ *and* $x+y=1$ and perpendicular to the line $2x-3y+5=0$

d) Find k if the line joining the points (-4, k) and (5, 2) is parallel to the line joining the points (0, k+1) and (6, 1)

e) Find the equation of the circle which passes through the points (-2, -1), (2, 3) and whose center lies on the line $2x+y+1=0$

f) Find the equation of tangent and normal to the circle $x^2+y^2+4x-12y+15=0$ *at* $(1,2)$

Q.3 Attempt any **TWO** **(08)**

A] i) Find $\sqrt[3]{10}$ by Bisection method (upto 4 iterations)

ii) using Regula falsi method find the root of the equation $xe^x-3=0$ (upto 3 iterations only)

iii) Find $\frac{1}{\sqrt[3]{67}}$ by Newton-Raphson method (upto 3 iterations only)

B] Attempt any **TWO**

i) Solve the equation $5x-2y+z=4$, $7x+y-5z=21$ *and* $3x+7y+4z=-16$ by Gauss- Elimination method. **(08)**

P.T.O

ii) Solve the following equations by Gauss-seidel method $25x+6y-z=82,\ 6x+15y+5z=75,\ x+4y+40z=66$ (Three Iterations only)

iii) Use Jacobi's method to solve the equations $5x-2y+z=4,\ x+4y+z=12,\ x+2y+5z=20$

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

a) If $f(x)=16^x+\log_2^x$, find the value of $f(1/4)$

b) Evaluate $\lim_{x\to\infty}\left(\frac{x-1}{x}\right)^x$

c) Find the point on the curve $y=3x-x^2$ at which slope is -5

d) If $y=\sqrt{\frac{1-\cos 2x}{1+\cos 2x}}$ *find* $\frac{dy}{dx}$

e) Find $\frac{dy}{dx}$ *if* $x=r.\cos\theta,\ y=r.\sin\theta$

f) Find $\frac{dy}{dx}$, *if* $y=x.\sin x+\cos x$

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

a) A manufacturer can sell x items at price of RS (380- x) each. The cost of productions x items in RS is $x^2+10\ x+12$. How many items must be sold so that his profit is maximum?

b) If $f(x)=\frac{x-4}{4x-1}$, then show that $f[f(x)]=x$

c) Evaluate $\lim_{x\to\infty}\left(\sqrt{x^2+1}-x\right)$

d) If $e^x+e^y=e^{x+y}$, *find* $\frac{dy}{dx}$

e) If $x=3\sin\theta-2\sin^3\theta,\ y=3\cos\theta-2\cos^3\theta$ *find* $\frac{dy}{dx}$ *at* $\theta=\pi/4$

f) Differentiate $\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ *w.r.t* $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$

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

a) A particle starting with velocity 6 m/s has an acceleration (1-t^2) m/s^2. When does if first come to rest? How far has if then travelled?

b) If $f(x)=\log(1+\tan x)$ *show that* $f\left(\frac{\pi}{4}-x\right)=\log 2-f(x)$

c) Evaluate $\lim_{x\to a}\frac{\sin x-\sin a}{\sqrt{x}-\sqrt{a}}$

d) If $y=a.\cos(\log x)+b\sin(\log x)$, prove that $x^2\frac{d^2y}{dx^2}+x\frac{dy}{dx}+y=0$

e) Find $\frac{dy}{dx}$ *if* $y=x^{\sin x}+(\tan x)^x$

f) If $\log\sqrt{x^2+y^2}=\tan^{-1}\left(y/x\right)$, *find* dy/dx

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ODD TERM END EXAM NOV. / DEC 2016

EXAM SEAT NO. | | | | | | |

LEVEL : - **FOURTH** PROGRAM : **MECHANICAL ENGINEERING**
COURSE CODE :- **MEE403/ME303/M303/2303**
COURSE NAME :- **ADVANCED MACHINING PROCESSES**
MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **25 / 11 / 2016**

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

Section – I Marks

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

a) Explain with neat sketch basic parts of column and knee type vertical milling machine.

b) Write, what is plain type and Pallet type transfer machine?

c) Explain with figure, how gears are manufactured on milling machine.

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

a) Explain in brief why non-conventional machining processes are necessary.

b) How milling machines are specified? Write in detail.

c) Explain with neat sketch working of 'Electron Beam Machining'.

d) Write different methods of gear finishing and explain gear-shaving process in it.

e) Differentiate between Up milling and Down milling operation

f) What are the different methods of indexing in case of gear manfacturing and explain direct indexing method?

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

a) What are the different operations performed on milling machine? Explain side milling operation with figure.

b) What are the functions of dielectric fluid used in EDM process?

c) With neat sketch, explain working of wire cut EDM process.

d) Explain with heat sketch Pinion cutter generating process of gear on shaping machine.

e) What are the advantages of EDM process?

f) State the advantages and disadvantages of transfer machines.

P.T.O.

Section – II	Marks

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

a) Define CNC. How it differs from DNC?

b) Describe principal parts of Horizontal machining center with a neat sketch.

c) Enlist advantages and limitations of CNC.

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

a) Describe CNC systems based on control system features.

b) Describe incremental coordinate system with an example.

c) How will you identify axes in CNC machines?

d) Define n words, G words, S words, F word and T words used in CNC programming.

e) Describe Miscelleneous Functions with suitable codes. (any four)

f) Describe threading canned cycle with an example.

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

a) Describe subroutines with an example.

b) What do you know about cutter radius compensation? Describe with G codes used for it.

c) Describe fixed block format and tab sequential format with suitable example.

d) Write about Repair Cycle analysis.

e) State the importance of maintenance. Enlist the various tpyes.

f) What you know about maintenance record?

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ODD TERM END EXAM NOV./ DEC -2016

EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **MECHANICAL ENGG.**

COURSE CODE :- **MEE304/ME204/M204**

COURSE NAME :- **MANUFACTURING PROCESSES**

MAX. MARKS : **80** TIME : **3 HRS.** DATE: - **24 / 11 / 2016**

Instruction:-

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

Marks

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

a) What is pattern? What are the common pattern making materials?

b) Draw the neat sketch of green sand mould and label its principal parts.

c) List the various forging operations. Explain Bending Operations by forging with neat sketch.

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

a) Explain the following casting defects with their causes and remedies.

i) Shift ii) Drop.

b) Explain shell Moulding with neat sketches.

c) Describe Dry Sand Moulding with neat sketches.

d) Explain Machine Forging with neat sketch.

e) List the various forgeable materials with their forgeability.

f) What are the types of patterns? Explain with neat sketch Sweep Pattern.

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

a) Draw the neat sketch of Cupola Furnace and Label the parts. Show the various zones on it and explain them in brief.

b) Give the classification of Moulding Machines. Explain the working principle of squeezer machine with neat sketch.

c) Why allowances are provided on pattern? Describe with neat sketchs the various pattern allowances.

[P.T.O.]

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

a) Sketch a pilot. State its use.

b) Show a bending operation with a neat sketch.

c) What is a coated welding electrode?

d) Define hot rolling.

e) List differant types of plastics.

f) State the advantages of plastic moulding.

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

a) Sketch a power press and label it.

b) Sketch a stripper. State its use.

c) Write about welding defects.

d) What do you know about gas welding techniques?

e) Describe shielded metal arc welding process.

f) Define soldering and brazing. Give examples of each.

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

a) Describe indirect extrusion with a neat sketch.

b) State the advantages of cold rolling.

c) Sketch different types of mills used in rolling.

d) State the limitations of extrusion.

e) Describe compression moulding process.

f) What is blow moulding?

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ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO. | | | | | | |

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

COURSE CODE: **MEE410/ME309** COURSE NAME: **MECHANICAL MEASUREMENT & MECHATRONICS**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **01/12/2016**

Instruction:-

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

Section – I **Marks**

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

a) Define Accuracy and precision

b) State Seebeck effect

c) Define overshoot and fidelity.

d) Distinguish between Threshold and Resolution

e) Define Gauge factor

f) Define force and torque

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

a) Describe classification of methods of measurements.

b) Explain the construction and working of potentiometer.

c) Describe Hot wire anemometer with neat sketch.

d) Explain Drag cup tachometer with neat diagram.

e) Explain Generalized measurement system.

f) Explain absorption hygrometer.

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

a) State the various sources of errors.

b) Explain photo-electric pick-up tachometer.

c) Explain Radiation pyrometer.

d) Explain with a neat sketch the capacitive system for liquid level measurement.

e) Write selection and installation of strain gauge.

f) Explain Electrodynamic microphone.

Section – II

Marks

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

a) State the significance of mechatronics in mechanical engineering field.

b) What are buses in microprocessor system?

c) What do you understand by microcontroller?

d) State the role of EPROM and ALU in microprocessor.

e) Write any four applications of solenoids.

f) State any four features of mercury Reed Relay.

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

a) Draw block diagram of 8051 microcontroller. State it's any four specific features in its architecture.

b) What are the common types of Register in microprocessor? State their functions.

c) What is microprocessor? Compare microprocessor with microcontroller in any three points.

d) Define PLC. Draw block diagram of PLC.

e) Explain data acquisition system with its general block diagram.

f) Explain the working of successive Approximation A/D converter.

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

a) Explain data logger system with its block diagram.

b) Write working of stepper motor with its sketch.

c) State any eight parameters in the selection of motor and explain them in short.

d) Explain field current interaction principle and working of D.C motor.

e) Draw hydraulic system and state the function of its various components.

f) State Electromagnetic principle. Draw neat sketch of Electromagnetic Relay and explain its working in short.

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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ODD TERM END EXAM NOV./ DEC -2016

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MEE307/ME207/M207**

COURSE NAME :- **APPLIED ELECTRONICS**

MAX. MARKS : **80** TIME : **3 HRS.** DATE: - **02 / 12 / 2016**

Instruction:-

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

Marks

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

a) Draw a symbol of BJT types.

b) Define extrinsic semiconductor.

c) Give any four application of FET.

d) Draw a characteristic of PN junction diode.

e) Define rectifier.

f) Define line regulation of zener diode.

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

a) Draw and explain single stage common emitter amplifier.

b) Explain operation of PN junction diode.

c) Explain with diagram and waveform operation of halfwave rectifier.

d) With diagram and waveform explain operation of C filter.

e) Explain with diagram fold back current limiting circuit.

f) Draw a block diagram of UPS and explain its operation.

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

a) Describe the working of N channel JFET with diagram.

b) Give any four differences between FET & transistor.

c) Compare half wave and full wave rectifier with any four point.

d) With diagram and waveform explain bridge rectifier.

e) Draw a block diagram of switch mode power supply and explain its working.

f) With diagram, explain the concept of constant current sources.

(P.T.O.)

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

a) Convert the following expression into canonical SOP form. $Y = (A\ \overline{B})\ (\overline{B}\ \overline{C})$

b) Convert following expression into cannonical POS form Y= (A+ B) (A+ C)

c) Define Decoder.

d) List any two applications of register.

e) What is race around conditionin JK FF?

f) Define Latch.

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

a) Draw and explain D-flip flop.

b) Draw and explain Half adder.

c) With neat diagram, explain SISO register.

d) Convert $(105.42)_{10}$ into binary equivalent.

e) State and explain Demorgan's first theorem.

f) Maximize the following expression using K-map

$F(A,B,C,D) = \pi\ M(0,1,2,3,4,5,7,8,9,12)$

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

a) Simplify the following expression with Boolean Laws

i) $\overline{A}\ \overline{B}\ \overline{C}\ \overline{D} + \overline{A}\ \overline{B}\ \overline{C}\ D + \overline{A}\ \overline{B}\ C\ D + \overline{A}\ \overline{B}\ C\ \overline{D} = \overline{A}\ \overline{B}$

ii) $\overline{A}\ \overline{B}\ \overline{C} + \overline{A}\ B\ \overline{C} + A\ \overline{B}\ \overline{C} = \overline{C}(\overline{A} + \overline{B})$

b) Draw and explain four bit asynchronous Up counter.

c) i) What is the necessity of demultiplexer? State working principle of demultiplexer.
ii) Define decoder. Draw a neat block diagram of an decoder and explain it.

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ODD TERM END EXAM NOV./ DEC -2016

EXAM SEAT NO. | | | | | | |

LEVEL : - **THIRD** PROGRAM : **MECHANICAL ENGG.**

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

COURSE NAME :- **THEORY OF MACHINES AND MECHANISM**

MAX. MARKS : **80** TIME : **3 HRS.** DATE: - **18 / 11 / 2016**

Instruction:-

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

Marks

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

a) Explain with a sketch incompletely constrained motion.

b) Compare between machine and structure.

c) What are the properties of instantaneous centres?

d) What are applications of single slider crank chain?

e) State different types of instantaneous centres.

f) What is pantograph? State its two applications?

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

a) i) Explain with neat sketch working of Whitworth quick return mechanis.
ii) Classify Kinematic pairs based on the type of relative motion between the elements, suggest one example for each.

b) i) What is condition for correct steering? Sketch and explain any one type of Steering gear mechanis.
ii) Classify followers according to the surface in contact. Draw suitable sketches.

c) A single slider mechanism is shown below. It has crank OA = 200mm, AP= 700mm & angular velocity of crank OA is 10 rad/sec. Find velocity and accleration of Piston P, angular velocity of link PA and the velocity of point B at a distance of 25cm from A on link AP when angle of crank is 45^0.

[P.T.O.]

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

a) Construct the profile of Cam to suit the following specification.
   i) Cam shaft diameter = 40mm
   ii) Least radius of Cam = 25mm.
   iii) Diameter of roller = 25mm.
   iv) Angle of lift = 120^0.
   v) Angle of fall = 150^0.
   vi) Lift of the follower= 40mm.
   vii) Number of dwells are two of equal interval between motions during the lift motion is S.H.M. during the fall the motion is uniform acceleration and de-acceleration. The speed of cam shaft is uniform the line of stroke of the follower is offset 12.5 mm from the centre of cam.

b) i) Sketch & explain working of bull engine.
   ii) Sketch and explain Scott Russell's mechanism in detail.

c) In a slider cank mechanism, crank OA is 30mm long and length of connecting rod is 120mm. The crank makes an angle of 30^0 with IDC and rotates with unifrom speed of 200 rpm clock wise.
   Determine i) Angular acceleration of connecting rod. ii) Acceleration of slider.

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

a) What is the effect of centrifugal tension on power transmission? State the condition for maximum power to be transmitted by belt drive.

b) State the expression for power transmitted by belt drive.

c) Two shafts with centre to centre distance between them as 3 metre, are having two pulleys with radii equal to 240mm and 320mm respectively. Find the length of belt required for cross belt drive.

d) What do you understand by gear train? Define train value.

e) State the functional difference between governor and flywheel.

f) Define sensitiveness of governor.

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

a) Derive an expression for the ratio of tight side tension to slack side tension in case of belt drive.

b) Compare flat belt and 'V' belt drive in eight points.

c) V belt is used on a set of pulleys running at 15m/sec.
   The maximum tension is 1350N, designed for maximum power condition. Angle. of contact is 160^0 and coefficient of friction as 0.25. The groove angle is 45^0.
   Calculate the power tramsmitted.

d) Describe with neat sketch, the working of multiplate clutch in short.

e) Derive an expression for torque by uniform wear consideration, in case of single plate clutch.

f) A single plate clutch, with both sides effective, has outer and inner diameters 300mm and 200mm respectively. The maximum intensity of pressure at any point in the contact surface is not to exceed $0.1N/mm^2$. If the coefficient of friction is 0.3, determine the power transmitted by a clutch at a speed of 2500rpm.

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

a) Explain various terminologies of gear with neat labelled sketch.

b) The gearing of a machine tool is shown infigure no.1 the motor shaft is connected to A and rotates at 975rpm. The gear wheels B, C, D and E are fixed to parallel shafts rotating together. The final gear F is fixed on the output shaft G. What is the speed of F? the number of teeth on each wheel are as given below

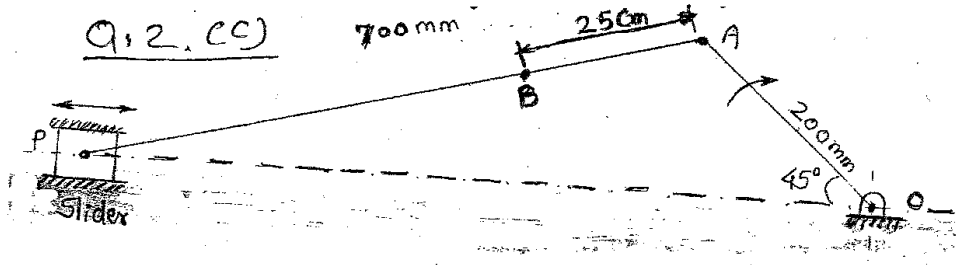
Gear	A	B	C	D	E	F
No. of Teeth	20	50	25	75	26	65

c) Explain the difference between simple gear train and compound gear train with neat sketch.

d) Explain the working of Pickering governor with neat sketch.

e) Draw a neat sketch of Hartnell governor and explain it.

f) Explain the principle of working of centrifugal governor with neat sketch.



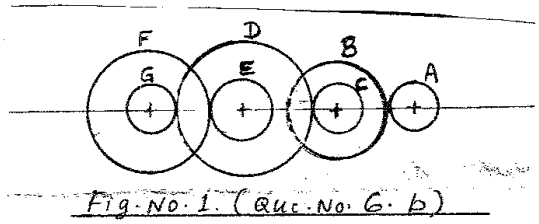


Fig. No. 1. (Que. No. 6. b)

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ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO. | | | | | | |

LEVEL: **FIRST** PROGRAM: **COMMON**

COURSE CODE: **CCF110/X111/R112/0116** COURSE NAME: **APPLIED MECHANICS**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **10/12/2016**

Instruction:-

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

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

a) Define i) static ii) dynamic

b) State Varignon's Theorem

c) Explain in brief free body diagram with field example.

d) Explain any two advantages of Graphical method.

e) Define static friction & dynamic friction.

f) Define angle of repose & state any one field example.

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

a) Find orthogonal components of forces with sketches

i) 200N acting due North-East

ii) 150KN acting 30^0 of East of South

b) Find the magnitude & direction of resultant force 20N, 25N, 30N and 35N making an angle 30^0, 100^0, 220^0 and 325^0 with +ve x-axis measured in anticlockwise direction respectively.(solve by analytical method)

c) Solve Q.No.2 (b) by graphical method.

d) A sphere weighing 150N is resting in a smooth channel. The sides of channel is inclined at 60^0 &70^0 to the horizontal. Find reacting offered by channel surface at contact point.

e) Find support reaction of cantilever beam of span 3m carrying udl of 2KN/m over entire span with 5KN concentrated load at its free end vertically downword direction.

f) A force of 250N pulls a body of weight 400N up on inclined plane the 20^0 to horizontal. Find the coefficient of friction & total frictional force.

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

a) Find resultant in magnitude & direction of regular pentagon with forces 5KN, 10KN, 15KN and 20KN on its side in anticlockwise direction respectively. The side of pentagon is 3m.

P.T.O

b) A simply supported beam of span 6m carries three point load 20KN, 50KN & 40KN from LHS at the distance 1.5m, 2.5m & 5m respectively with udl of 5KN/m on over entire span of beam. Find the support reaction by analytical method.

c) Solve Q.No.3 (b) by graphical method.

d) A beam of span 5m carries 10KN force from left hand hinge support at distance 1m and inclined point load of 8KN 30^0 anticlockwise direction to horizontal from roller support at distance 2m. Find support reaction by graphical method.

e) A body of weight 80N is handled along a rough horizontal plane by pull acting an angle of 12^0 to horizontal find the pulling force if coefficient of friction between body & rough surface is 0.3.

f) The ladder weighing 100N is resting on smooth wall and rough horizontal surface with 60^0 to horizontal. Find the reactions at contact surface of ladder if the man weighing 700N is standing on solid way of 5m long ladder.

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

a) Define kinetics & kinematics.

b) Define torque

c) State law of conservation of energy

d) Define power & energy.

e) Define ideal machine

f) State law of simple machine

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

a) A 'T' section has flange 200x20mm & a web of 15x240mm. Find the position of the centroid from bottom.

b) Find the centroid of an area, which consist of a square & a equilateral triangle constructed on it, having base of triangle as side of square. Take side of the square as 150cm refer following figure.no.1

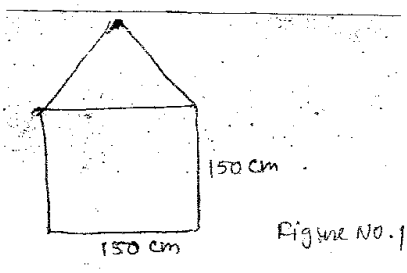

Figure No.1

c) A stone is allowed to fall from the top of a tower of 100m high. After what time it will reach at ground? & what will be it's velocity?

d) A flywheel rotating at 800rpm & slows down uniformly to 400rpm. Completing 400 revolutions during this retardation. Find total time of retardation.

e) A watertank of size 10mx6mx4m has its bottom 5m above the ground. Find workdone in filling this tank.

f) In a machine an effort of 15N cam lift a load of 300N & an effort of 3oN can lift a load of 600N. Find law of machine. & Also find effort required to lift the load 1000N & maximum efficiency of machine if velocity ratio of machine is 40.

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

a) A ball is thrown up vertically from the base of a building & caught by a man on the top of the building of height 20m. Find minimum velocity with which the ball should be thrown & also find time taken for it.

b) A shaft of an electric motor rotates at 1200rpm & at a particular instant on cutting the power it rotates at 6 rps with completing 78 revolutions. Find retardation of shaft in rpm^2 & rad/sec^2.

c) A hemisphere of radius 80mm is removed from a cube of 200mm side, from the top face of the cube. Reminder remains symmetrical about y-y axis. Find center of gravity of the remainder body from the bottom. Refer fig.no.2

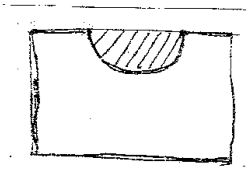

Fig. No. 2

d) A man weighing 600N climbing over a ladder of length 10m kept inclined at 70^0 to the vertical. If man requires 30 seconds to climb ladder. Find workdone by the man & power consumed by the man.

e) The following are the observations made on a certain machine which has velocity ratio=20

Load-effort

100N-10N

200N-15N

Find i) law of machine ii) effort lost in friction iii) load lost in friction

f) In a lifting machine an effort of 150N raised a load of 7700N. What is the mechanical advantage? And the velocity ratio if the efficiency at this load is 60%. If by the same machine a load of 13,200N is raised by an effort of 250N. What is the efficiency?

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO. | | | | | | |

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

COURSE CODE: **MEE310/ME210/2213/M211** COURSE NAME: **ENGINEERING METALLURGY & MATERIALS**

MAX. MARKS: **80** TIME: **3 HRS.** DATE:**02/12/2016**

Instruction:-

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

Marks

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

a) What is an extractive metallurgy?

b) How the study of physical metallurgy is important for mechanical engineering student?

c) State the role of metallurgist in engineering field.

d) State the peritectoid reaction.

e) State two properties and applications of Heat Resisting steel

f) Write any two effects of alloying elements like nickel, manganese and copper on Fe-C diagram.

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

a) What are the space lattice and unit cell. State the various crystal structures of metal, along with the relationships between various parameter in their unit cell.

b) Determine the packing factor of B.C.C lattice structure. State the metals processes BCC lattice structure.

c) Distinguish between substitutional and interstitial solid solution in eight points.

d) Draw a phase diagram of Eutectic system and explain it.

e) Describe the dendritic structure formation during solidification of metal.

f) How the equilibrium diagram is constructed? Draw it for solid solution system.

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

a) i) Explain eutectoid reaction and peritectic reaction. State their general equation and draw the nature of appearance of their phase diagram.

ii) Write the various types of plain carbon steel, their composition and applications.

b) i) Explain allotropic transformation of pure iron, along with cooling curve.

ii) Draw Iron-Iron carbide equilibrium diagram. State and explain briefly, the peritectic and eutectoid reaction in it.

c) i) Draw and explain various changes in microstructures during slow cooling of hyper eutectoid steel.

ii) Write the various types of cast iron, their properties and applications.

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

a) Write any two uses of TTT diagram.

b) Define Hardenability. How it is measured?

c) State purpose of heat treatment

d) Give four advantages of Nickel & its alloys.

e) What are different non destructive testing?

f) Enlist four advantages of Brasses.

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

a) Explain the construction of a TTT diagram for Eutectoid steel.

b) Explain normalising process with respect to microstructure changes advantages & limitations.

c) What is surface hardening? Write limitations of induction hardening.

d) Give the composition, properties and applications of aluminum and its alloys.

e) Explain difference between brass & bronze and write its applications.

f) Explain Dye Penetrant method of non destructive testing with neat sketch.

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

a) Draw a schematic TTT diagram and superimpose various heating & cooling curve to represent different heat treatment processes on the diagram.

b) What is Austempering & martempering? What are the microstructure changes involved in the process?

c) Describe the process of carbonitriding with reference to process details, advantages and limitations.

d) Give the composition, properties, and applications of magnesium and its alloys.

e) What is a super alloy? Give its properties and applications.

f) Explain ultrasonic method of non destructive testing with neat sketch.

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO. | | | | | | |

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

COURSE CODE: **MEE401/ME301/M301/2301** COURSE NAME: **POWER ENGINEERING**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **18/11/2016**

Instruction:-

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

Section – I **Marks**

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

a) Define (i) Bore (ii) Compression ratio related to I.C. Engine.
b) Draw P-V and T-S chart for Otto cycle.
c) Enlist any four flues used in I.C engine.
d) State any two effects of pre-ignition.
e) Define (i) Indicated power (ii) Volumetric efficiency related to I.C Engine.
f) Enlist four pollutants in exhaust gases of C.I engines.

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

a) Draw actual valve timing diagram of 4-stroke petrol engine.
b) State the purpose of scavenging. Explain any one method of scavenging with neat sketch.
c) A petrol engine working on Otto cycle has compression ratio 8 and consumes 1 kg of air per minute. If the maximum temperature during the cycle is 2000k and minimum temperature is 300k, find the air standard efficiency of the cycle.
d) Draw a neat sketch of battery ignition system and state function of any two components.
e) Distinguish between Air and water cooling system.
f) An engine uses 7kg of fuel per hour of calorific value 28000KJ/kg. If the break power of the engine is 25KW and mechanical efficiency is 85% calculate
   1) Indicated thermal efficiency.
   2) Brake thermal efficiency.

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

a) Distinguish between C.I and S.I engine on the basis of
   i) Thermodynamic cycle.
   ii) Fuel used
   iii) Air fuel ratio
   iv) Application
b) State two objectives of super charging. Enlist any two effects of supercharging.
c) If compression ratio of Otto cycle is changed from 5 to 6, What is the percentage increase in efficiency?
d) Draw a neat sketch of simple carburetor & name its parts.
e) State the effects of pollutants on human body and environment.

[P.T.O.]

f) A single cylinder 4 stroke diesel engine gave following results on maximum load.
Speed of engine =400rpm
Net Load on brake=400N
Diameter of break drum=1.2m
Fuel consumption =3kg/hr
Calorific value of fuel=42000KJ/kg.
Dia. Of cylinder =160mm
Stroke of piston =200mm
Calculate (i) Brake Power
(ii) Break specific fuel consumption.

Section – II **Marks**

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

a) Write function of air compressor & define the term "Free Air Delivered".
b) Write any four applications of Gas Turbine.
c) State principle of working of Jet propulsion & write classification of Jet propulsion system.
d) Write any four advantages of rotary compressor.
e) State the factors affecting volumetric efficiency of air compressor.
f) Write industrial uses of compressed air.

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

a) Compare reciprocating compressor with rotary compressor.
b) With neat sketch, describe construction & working of two stage reciprocating air compressor with inter-cooler.
c) With neat sketch, explain working of closed cycle gas turbine.
d) Draw only a labelled sketch of liquid propellant rocket engine.
e) Compare closed cycle gas turbine with open cycle gas turbine.
f) A single stage reciprocating air compressor delivers air at 5 bar. The suction temperature & pressure is at 20^0C & 1 bar respectively. Volume of air entering the compressor is $2m^3$/min. The index of compression is 1.2. Calculate
i) Indicated power
ii) Isothermal power.

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

a) i) Explain with meat sketch working of ramjet. .
ii) Explain with neat sketch regeration method to improve thermal efficiency of gas turbine.
b) i) Explain any four methods of energy saving in compressor
ii) Write advantages of multistage compressor.
c) A two stage single acting reciprocating air compressor with complete intercooling delivers 9kg/min of air at 15 bar. The suction occurs a 1 bar & 15^0C. The index of compression is 1.25. Calculate isothermal efficiency if compressor runs at 400 rpm.

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ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO. | | | | | | |

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

COURSE CODE: **CCF101/CCE101/X102/X108/R103/R104**

COURSE NAME: **ENGINEERING PHYSICS**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **09/12/2016**

Instruction:-

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

Marks

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

a) Define i) specific mass ii) specific weight of a liquid

b) What is the effect of temperature and impurity on surface tension?

c) Define i) viscous drag (force) ii) viscosity

d) Define i) molecular range ii) sphere of influence

e) State any two applications of nanotechnology in the field of environment.

f) Define i) nanometer ii) nanoscale

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

a) State and explain Hooke's law. Define bulk modulus and write down its unit.

b) Explain the molecular theory of surface tension.

c) i) State and explain Stoke's law of viscosity.

ii) Define velocity gradient & give its SI unit.

d) What is capillary action? Give any three examples of capillary action.

e) Define longitudinal wave. State any three of its characteristics.

f) A weight extents a force of 120N on a steel wire of diameter 0.4mm. Find the extension produced in the wire if original length of wire is 5m. Given Y=2 x $10^{12}N/m^2$

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

a) Explain the behavior of wire under continuously increasing load.

b) Derive an expression for coefficient of viscosity using Stoke's method.

c) Define angle of contact. Explain the significance of angle of contact.

d) Define linear SHM mention any three of its characteristics.

e) Give any four applications of nanotechnology in the field of medicine.

f) Define resonance. Mention any three examples of resonance.

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

a) Define echo & reverberation.

b) Give full form of laser.

c) Give the statement of Ohm's law.

d) State any two applications of X-rays.

e) Define ultrasonic wave.

f) Define refraction of light.

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

a) A concrete hall of volume $2500m^3$ has total surface absorption of 205. Find reverberation time.

b) State four properties of laser.

c) Explain with neat diagram the construction & working of photoelectric cell.

d) Derive expression for equivalent resistance when number of resistance are connected in parallel.

e) Describe spontaneous emission & population inversion in case of laser.

f) Explain with neat ray diagram, the refraction of light through a glass prism.

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

a) For an equilateral prism, the angle of minimum deviation is 40^0. Calculate the refractive index of prism.

b) State & explain photoelectric effect.

c) Explain the production of ultrasonic wave using Piezoelectric method.

d) What is Wheatstone's network? Obtain balancing condition of Wheatstone's network.

e) What is photon? State two properties of photon.

f) Explain production of X-rays by using Coolidge tube?

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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ODD TERM END EXAM NOV. / DEC 2016

EXAM SEAT NO. | | | | | | |

LEVEL : - **FIFTH** PROGRAM : **MECHANICAL ENGG.**

COURSE CODE :- **MEE502/ME403/M403/2403**

COURSE NAME :- **IND. ORGANIZATION & MANAGEMENT**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **19 / 11 / 2016**

Instruction :-

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

Section – I

Marks

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

a) Define Management.

b) Give classification of business organizations.

c) State advantages of government undertakings.

d) Define control function of management.

e) Differentiate between responsibilities and authorities.

f) What are the objectives of Human Resource Management?

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

a) List down principles of management and explain any two.

b) Define and describe planning function of management.

c) Explain in brief objectives of management.

d) What are the essential managnial competencies? Explain.

e) Explain with a neat sketch functional organization.

f) What are differetn forms of ownership? Explain partnership.

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

a) Explain importance of good management.

b) State and descrone difference hardles to effective communication.

c) Explain in brief function of Human Resource Management.

d) Explain the process of recuritment and selection of employees.

e) Describe losses of accidents and the cost involved.

f) Explain need of good housekeeping.

P. T. O.

Section – II	Marks

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

a) What is the significance of "purchasing" function in an organization?

b) What do you understand by materials management?

c) What is Financial Management?

d) State the object of industrail act.

e) State the significance of C.P.M.

f) What is lean maufacturing?

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

a) Explain the purchase procedure.

b) State the functions of purchasing department.

c) Write a short note on "Working capital".

d) Explain the welfare provisions for employees in a factory.

e) Explain briefly the steps to prevent air pollution.

f) Explain three-times estimates for PERT.

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

a) Explain the scope and importance of materials management.

b) What is over-capitalization? What are the reasons to result over cpitalization? State its disadvantages.

c) What is PERT? Differentiate between CDM & PERT. Construct and explain a network diagram for painting in a two storeys building.

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO. | | | | | | |

LEVEL:**FOURTH.** PROGRAM: **MECHANICAL ENGG.**

COURSE CODE:**MEE402/ME302/M302.** COURSE NAME: **MACHINE DESIGN.**

MAX. MARKS: **80.** TIME : **3 HRS.** DATE: **22/11/2016.**

Instruction:-

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

Section – I **Marks**

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

a) Draw stress-strain diagram for mild steel.
b) Define Machine design.
c) What is the condition for self locking?
d) State types of thread profile used for power transmission.
e) What is standardization?
f) Define principal stress.

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

a) What are the steps involved in general design procedure? Explain.
b) State ant four factors that govern the selection of material while designing a machine components.
c) State the various theories of elastic failure. Explain Rankines theory.
d) Why square thread are used for power transmission? Give reasons.
e) Define the following terms related screwed joints.
   1) Major diameter. 2)Thread angle.
   3) Lead. 4)Pitch
f) Explain :
   1) Transverse shear stress.
   2) Bending stress.

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

a) Explain the design procedure of a cotter joint with neat sketch.
b) A vertical 2-start square threaded screw of 120 mm mean diameter and 24 mm pitch, supports a vertical load of 20 KN. The axial thrust in screw is taken by coller bearing of 300 mm outside & 150 mm inside diameter. Find the force required at the end of the lever, which is 400 mm long in order to lift and lower the load. Coefficient of friction for screw & nut is 0.18 & for collar bearing is 0.25.
c) A wall bracket is attached to a wall by means of four bolts, two at a distance of 50 mm from the lower edge & remaining two at a distance of 450 mm from the lower bolts. It supports a load of 50 KN at a distance of 500 mm from the wall. Sketch the arrangements & estimate the diameter of bolts. Assume working stress in tension as 80 N/mm^2.

Section – II

Marks

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

a) Represent completely reverse stress on stress-time diagram.

b) Define fatigue failure in engineering materials.

c) Represent Soderberg and Goodman diagram.

d) State the function of coupling. Give its use.

e) Draw neat sketch of pair of Helical gear and list its advantage.

f) Enlist the advantage of 20^0 pressure angle system.

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

a) A standard cross-section of flat key is 16mm X 10mm and fitted in a 60 mm diameter shaft. The key is transmitting 30 KW at 1200 rpm. The key is made of steel of yield strength 210 $N/mm^2$and F.O.S. is 3. Calculate length of key.

b) A rigid coupling is used to connect 32 KW at 840 rpm motor to pump. There design torque is 20 % more than rated torque. There are four bolts, and pitch circle dia of location of bolt is 150mm. The permissible shear stress of bolt material is 80 N/mm^2.Determine the diameter of bolt.

c) List the advantages of gear drive compared to chain or belt drive.

d) A 16 tooth spur pinion has a module of 2 mm and runs at a speed of 1600 rpm. The driven gear has 64 teeth. Calculate.

1) Speed of driven gear.
2) Diameter of pinion and gear.
3) Circular pitch.

e) Derive a relation for combined stiffness for spring arranged in series and parallel.

f) Draw a neat sketch of styles of end of spring and give a relation between effective turn and total turn.

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

a) A section of commercial shafting 4 m long between bearing carries 2400 N weight pulley at its midpoint. The pulley is keyed to shaft and receive 35 KW at 350 rpm. The belt drive is horizontal and sum of belt tension is 4400 N. Assume $k_b = k_t = 1.5$ and permissible shear stress is 50 N/mm^2. Calculate diameter of shaft.

b) A Railway wagon moving at a velocity of 2m/sec is brought to rest by two helical compression spring arranged in parallel. The mass of wagon is 800 kg. The spring is compressed to 150 mm. Assume, spring index =6, modulus of rigidity is 82500 N/mm^2, permissible shear stress is 625 N/mm^2, square & ground end. Calculate.

1) Wire diameter 2) Mean coil diameter.3) No. of active turns. 4) Total number of active turns 5) Free length 6) pitch of coil.

c) 1) Define: static load carrying capacity of bearing and dynamic load carrying capacity of bearing. (04 marks.)

2) Describe a general selection procedure for a bearing. (04 marks.)

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GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO. | | | | | | |

LEVEL: **THIRD.** PROGRAM: **MECHANICAL ENGG.**

COURSE CODE: **MEE303/ME203/M203.** COURSE NAME: **MACHINE DRAWING.**

MAX. MARKS: **80** TIME: **4 HRS.** DATE: **19/11/2016**

Instruction:-

1) Answers must be written in the main answer book provided. (and supplements if required)
2) Figure to the right indicates marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
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6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

Marks

Q.1 Draw conventional representation of any **FOUR** of the following. **(08)**

a) Concrete.

b) Splined shaft.

c) Diamond knurling.

d) Internal screw thread.

e) Tension spring.

f) Globe valve.

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

a) Fig.1.shows an angle plate 10 mm thick, 60^0 angle having a circular hole of 30mm diameter on an inclined surface as shown. Using first angle projection method, draw its front auxiliary view.

b) Fig.2.shows front view, incomplete top view and partial auxiliary view of a Bevel washer. Redraw the given views and complete the top view.

c) I) The shaft size is given as $40^{-0.02}_{-0.04}$ and the hole size is $40^{+0.02}_{-0.04}$ .Determine the type of fit between them.

II) Represent the welding drawing of two shafts with equal diameter welded end to end by means of square butt weld with convex counter at site

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

a) A vertical square prism having its faces equally inclined to the V.P. is completely penetrated by a horizontal cylinder, the axis of which is parallel to the V.P. and 6mm away from that of prism. Draw the projections of the solids showing curves of intersection. The length of the sides of the base of the prism is 50 mm and diameter of the cylinder is 40 mm. The length of the axis of prism and cylinder is 100 mm.

P.T.O

b) A vertical cone diameter of base 80 mm and axis 90 mm long is completely penetrated by a cylinder of 44 mm diameter. The axis of the cylinder it's parallel to HP and VP and intersects the axis of the cone at a point 25 mm above the base. Draw the projections showing curves of intersection.

c) 1) Ref. Fig.3 .What is the meaning of symbol 'X' and 'Y'.

2) Draw the symbol of the following.

I) Straightness II) Circularity III) Angularity IV) Coaxiality.

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

a) Fig.4.a shows the assembly of Tail-stock. Draw the following details mentioning appropriate dimensional tolerance,tolarance grade etc. on part if required.

1) Body- Sectional front view and side view. (06 marks)

2) Center. (02 marks)

b) Refer Fig.4.b.which shows assembly of drill jig. Draw the following details showing appropriate dimensional and geometrical tolerances etc. if required.

1) Stem - Sectional front view (04 marks).

2) Jig plate – Sectional front view and top view (04 marks)

Q.5 Fig.5. shows the assembly of pedestal bearing. Draw the detailed drawing of the following. **(12)**

1) Body – Sectional front view and top view. (08 marks).

2) Brass – Sectional front view and top view. (08 marks).

Q.6 Attempt any **ONE** **(20)**

a) Fig. 6. (a) Shows the details of universal coupling. Draw the following views of assembly.

1) Sectional front view.

2) Top view.

3) Prepare bill of material.

b) Fig.6 (b) Shows the details of lathe tool post. Draw sectional front view and top view of the assembly. Prepare bill of material and indicate the type of Fit.

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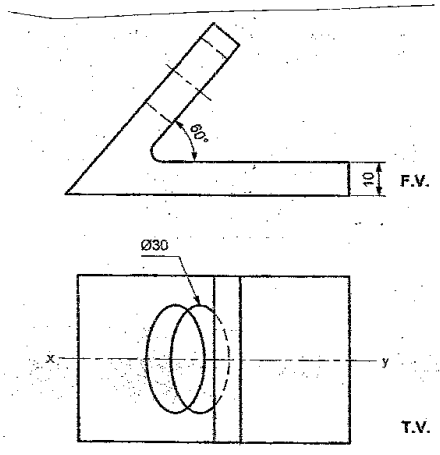
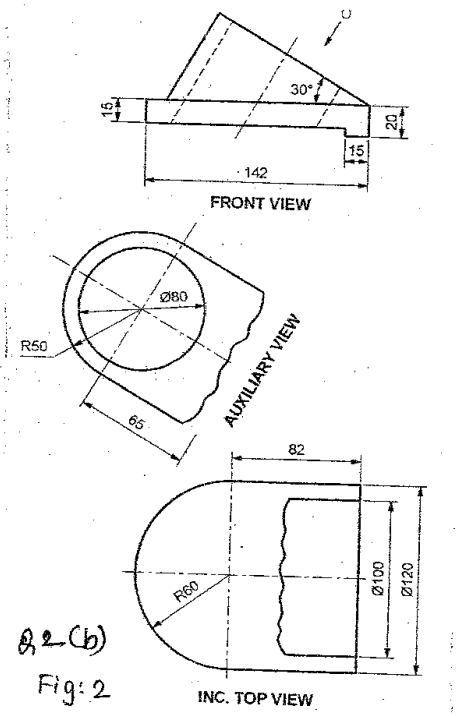
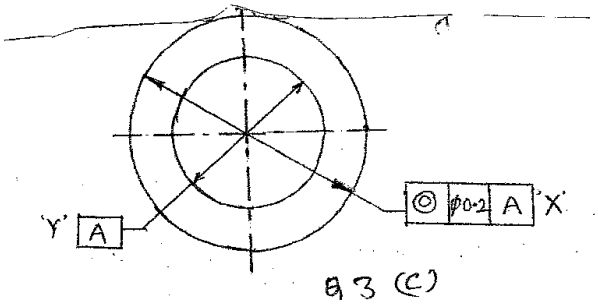


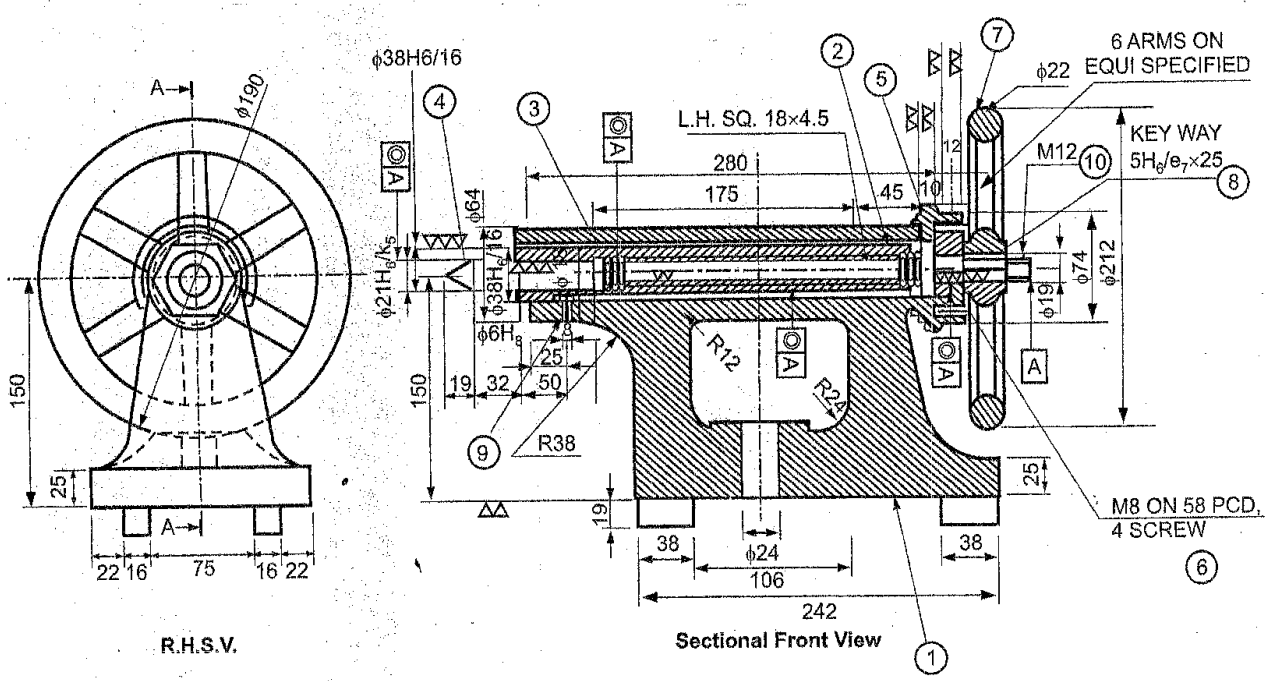
Q2 (a) Fig: 1



Q2 (b)
Fig: 2



Q3 (c)



PART LIST

PART NO.	PART NAME	MATERIAL	QUANTITY
1.	BODY	C.I.	1
2.	BARREL	M.S.	1
3.	SPINDLE	M.S.	1
4.	CENTER	C.S.	1
5.	SPINDLE BEARING	C.I.	1
6.	SCREW	M.S.	1
7.	HANDAL WHEEL	C.I.	1
8.	KEY	M.S.	1
9.	FEATHER	M.S.	1
10.	NUT	M.S.	1

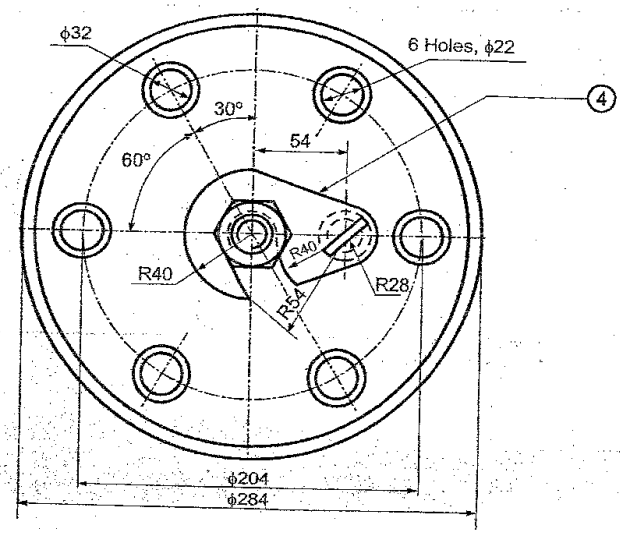
FIT CHART

$21H_6/k_5$	TRANSITION FIT
$5H_8/e_7$	CLEARANCE FIT
$38H_6/f_6$	CLEARANCE FIT
$6H_8/e_7$	CLEARANCE FIT

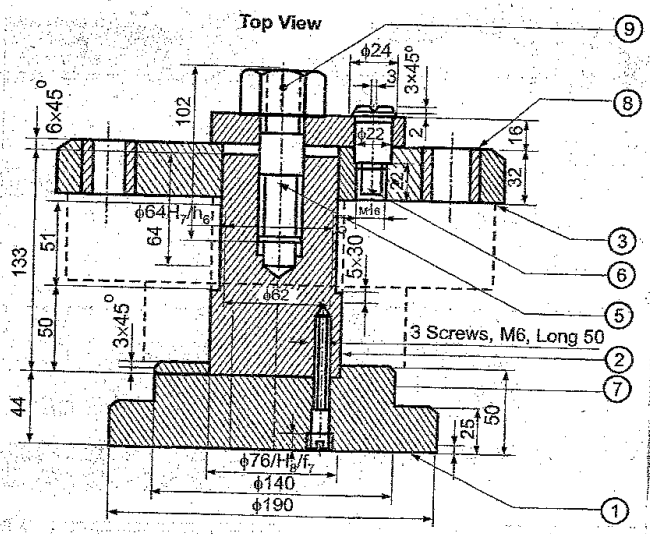
TOLERANCE CHART

$38H_6$ =	+ 0.016 / + 0.000	21H6 =	+ 0.013 / + 0.000
$38f_6$ =	− 0.025 / − 0.040	21k5 =	+ 0.011 / + 0.002
$6H_8$ =	+ 0.08 / + 0.000	5H6 =	+ 0.008 / + 0.000
$6e_7$ =	− 0.020 / − 0.032	5e7 =	− 0.020 / − 0.032

Q.4.a. Fig. 4.a. Assembly of Tailstock



Top View



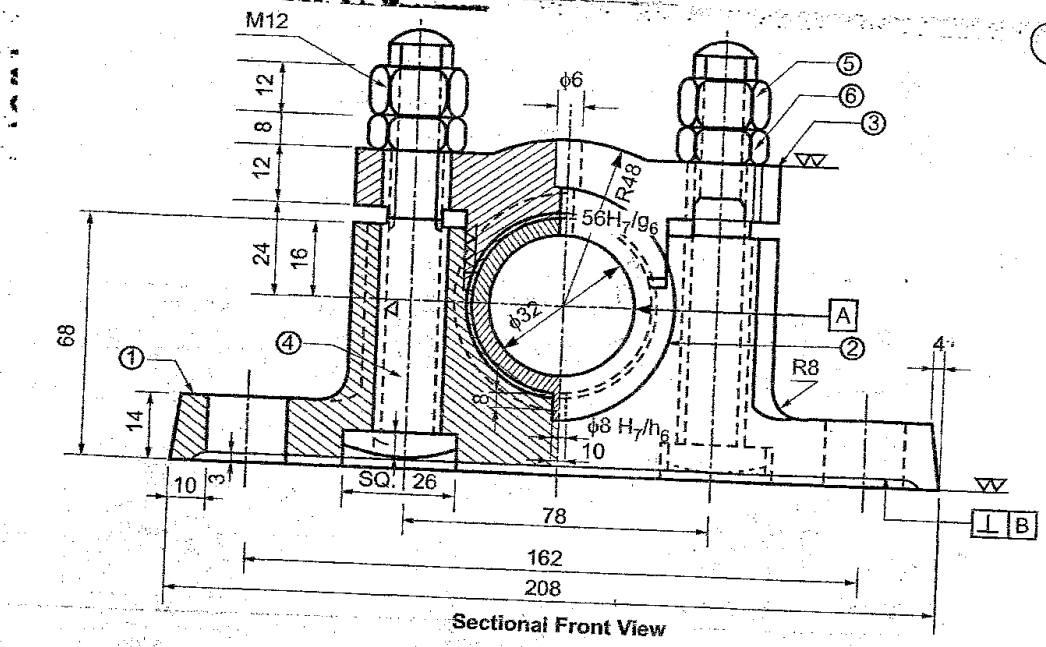
Sectional Front View

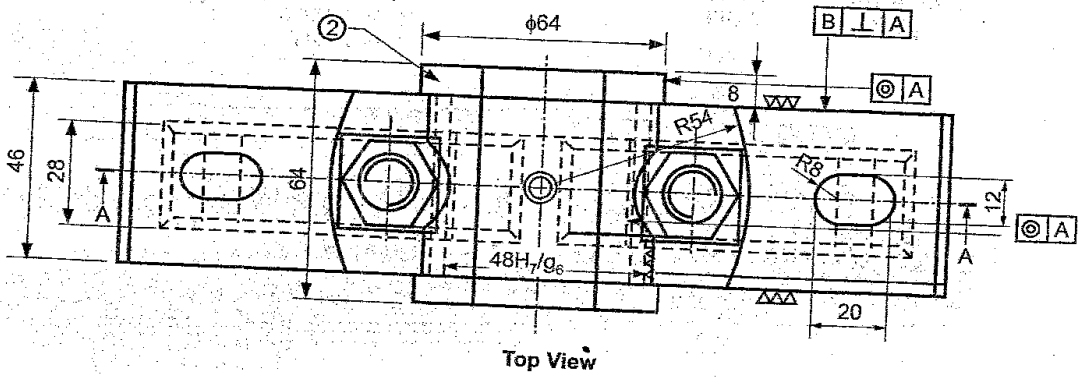
Bill of Material

Sr. No.	Part Name	Material	Quantity
1.	Base plate	C.I.	1
2.	Locating peg	M.S.	1
3.	Jig-plate	C.I.	1
4.	Latch washer	M.S.	1
5.	Stud	M.S.	1
6.	Pin	M.S.	1
7.	Cap screw	M.S.	3
8.	Bush	C.S.	6
9.	Nut	M.S.	1

Q. 4.b. Fig. 4.b.

Assembly of Drill Jig





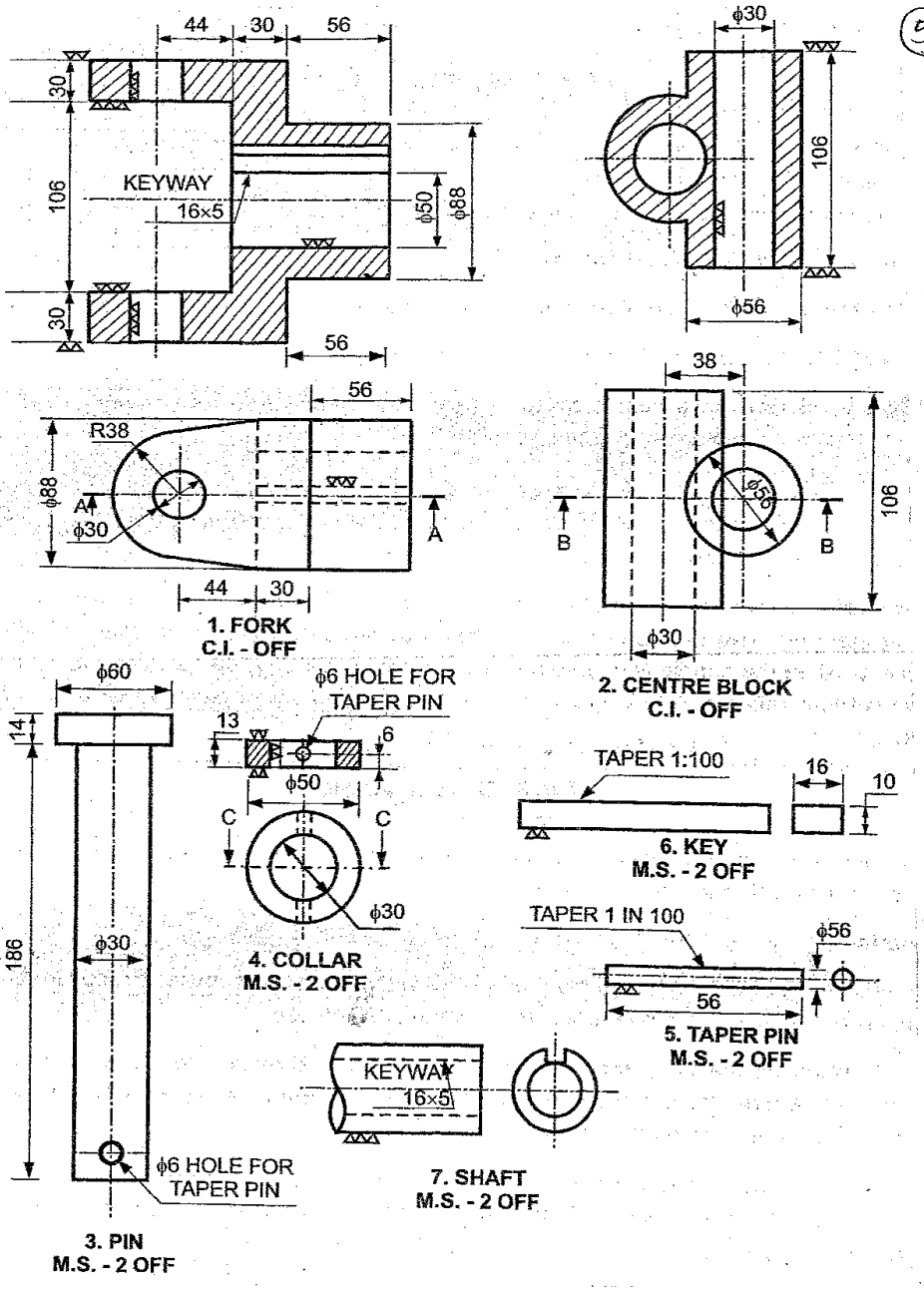
FIT CHART

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

PART LIST

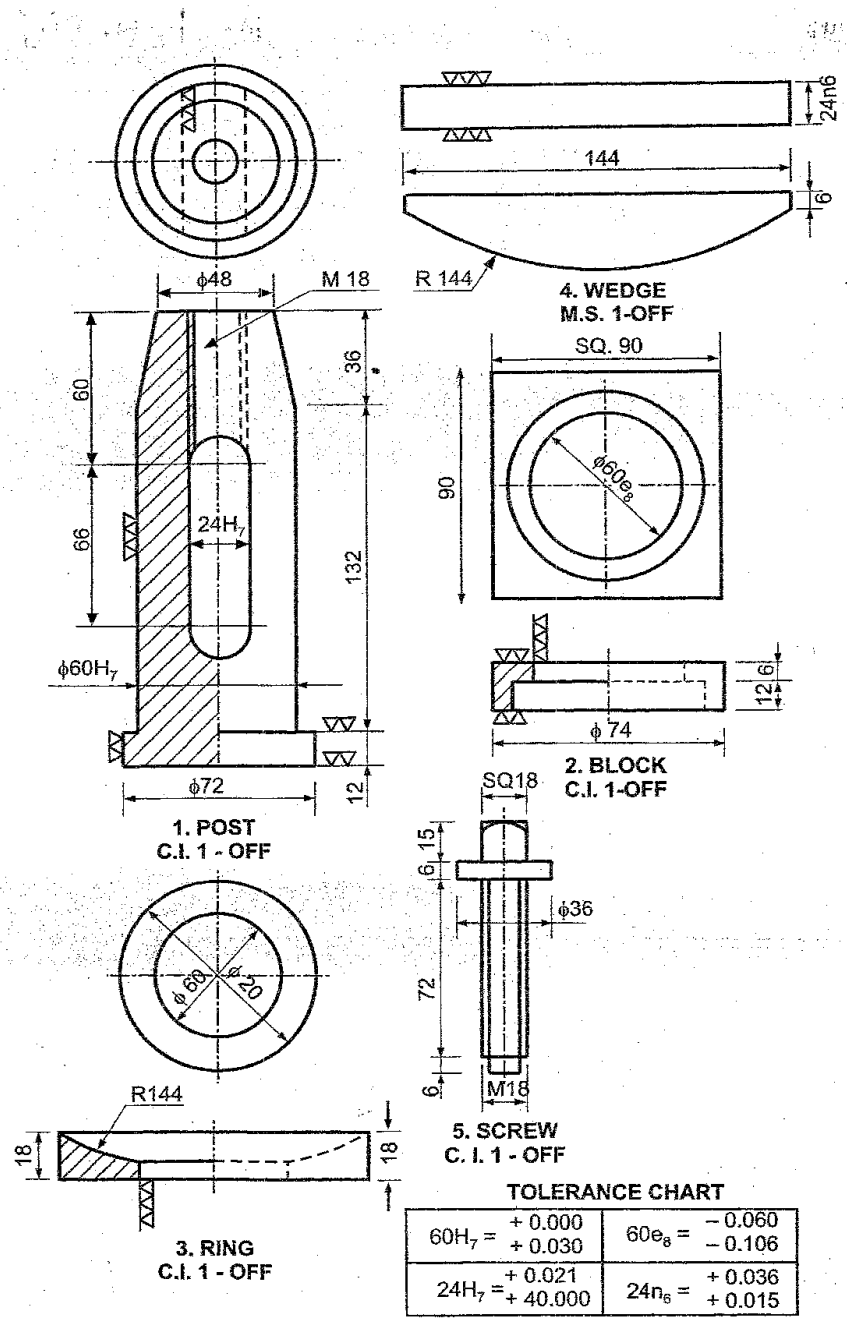
Part No.	Part Name	Material	Quantity
1.	BODY	C.I.	1
2.	BRASS	G.M.	1
3.	CAP	C.I.	1
4.	BOLT	M.S.	2
5.	NUT	M.S.	2
6.	LOCK NUT	M.S.	2

Q.5. Fig. 5. Assembly of Pedestal Bearing



Q.6.a. Fig. 6.9.

Details of Universal Coupling



TOLERANCE CHART

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

Q.6.b. fig. 6.b.

Details of Lathe tool post.

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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ODD TERM END EXAM NOV./ DEC -2016

EXAM SEAT NO. | | | | | | |

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

COURSE CODE :- **MEE505**

COURSE NAME :- **COMPUTER INTEGRATED MANUFACTURING**

MAX. MARKS : **80** TIME : **3 HRS.** DATE: - **05 / 12 / 2016**

Instruction :-

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

Section – I

Marks

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

a) What are the advantages of CAD/CAM?

b) List the major input/output devices used in CAD/CAM.

c) Give classificaation of various types of surfaces used in geometirc modelling.

d) What is meant by automated entry?

e) What are the advantages of DNC?

f) Give the classification of CNC machine.

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

a) Write short note on printers (any two)

b) Write short note on LCD display.

c) Give comparsion between line model with surface model.

d) Explain with figure surface modelling.

e) What are the advantages and limitations of CNC systems?

f) Compare straight line control and contouring control

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

a) What is wireframe modelling? Explain its advantages, drawbacks and its applications.

b) What is solid modelling?

c) Write any four properties desired in any geometric modelling (solids) system.

d) Compare open loop and closed loop NC systems.

e) How CNC is classified based on axes of motion and co-ordinate system?

f) Write a short note on DNC.

Section – II

Marks

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

a) First block of a part programme on CNC is as follows:- N0001 P121 G90 G71 G94 M03 S800 EOB. Explain various terms in this programme.

b) Explain six major degrees of freedom of a robotic system with neat sketch.

c) Define automation. What is the need of automation with respect to productivity, labour cost and product quality?

d) Explain the terms preparatory function and Miscllaneous function stating where these are used in a part programme.

e) Enlist any two advantages and disadvantages of cartesian co-ordinated robot.

f) Define FMS. Explain the necessity of adopting flexibility in production on the basis of change of product and change in demand of product.

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

a) What are the different statements used to write a part programme using Automatically Programmed Tools (APT)? Discuss each statement with the help of suitable examples.

b) Define robotics. Explain the following components of a robotic system.
i) Manipulator, ii) Power supply, iii) Controller.

c) Explain following components of FMS – i) Machine tools and related equipments ii) material handling equipments. iii) Computer conrol system. iv) Human labour.

d) State and explain different power sources used for industrial robots.

e) What are the advantages of using interchangable fingers in end effectors over fingers integrated with end effectors? Explain the two ways of constraining a part in end effectors.

f) Differentiate between fixed automation and flexible automation based on – production rate, flexibility to product design variation, Reprogramming ability.

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

a) Write a part programme for a job as shown in Fig. 1 Take only finish cut. Spindle Speed= 1200rpm, feed rate = 150mm/min. Assume suitable machining data if required.

OR

Refer Fig. 2 of a component. Direction of cut is in anticlockwise. Z=0 is at the top of surface of workpiece. Take feed = 65mm/min, speed=1000rpm and depth of cut= 10mm. Write a part programme for CNC milling.

b) Why do industries are preferring robots for process operations like drilling, grinding, water jet cutting, riveting? Enlist any other four applications of industrial robots and explain any one of them.

c) What are the basic elements of automation? Explain them with suitable examples and sketches.

d) Enlist any four functions of sensors used in industrial robots. Classify the sensors based on functions performed.

e) Explain following types of FMS :_
i) Flexible munufacturing units. ii) Flexible manufactruing transfer line.

f) What are the benefits of FMS related to i) Machine utilization ii) Work in progress iii) Manufacturing lead times. iv) Labour productivity. v) Production scheduling.

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Q. 6 a)

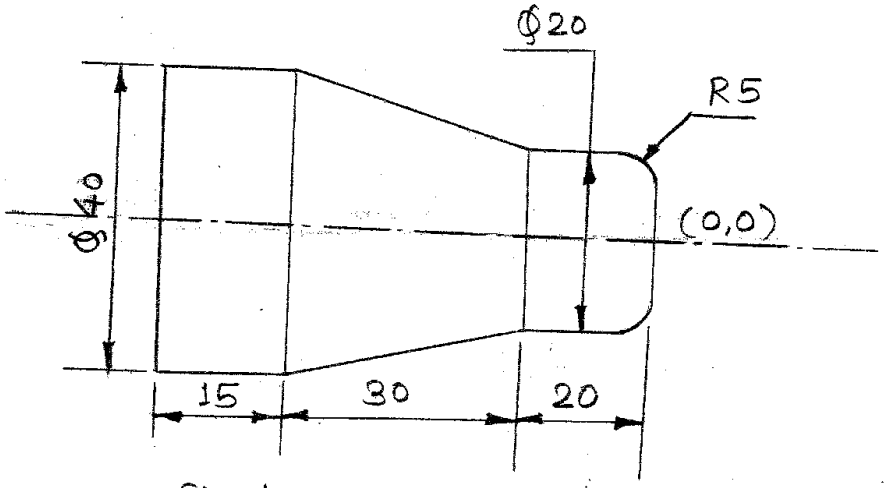

fig. 1

All dimensions are in mm

Q. 6 a)

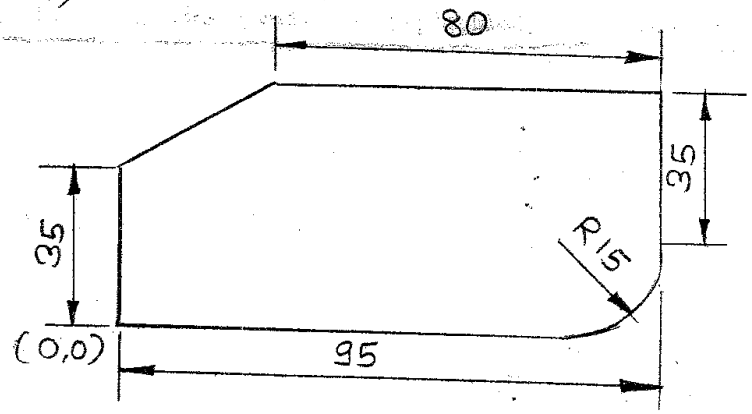

fig. 2

All dimensions are in mm

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ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO. | | | | | | |

LEVEL: FOURTH PROGRAM: MECHANICAL ENGINEERING

COURSE CODE: ME409 COURSE NAME: REFRIGERATION & AIR CONDITIONS

MAX. MARKS: 80 TIME: 3 HRS. DATE: 30/11/2016

Instruction:-

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

Section – I **Marks**

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

a) Define refrigeration.

b) Draw neat labelled T-S diagram of reversed Carnot cycle.

c) Draw schematic representation of a Heat pump.

d) Classify refrigeration based on working principle.

e) Define unit of refrigeration.

f) Name types of refrigeration compressors.

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

a) Explain Bell Coleman air refrigeration.

b) Explain ICE refrigeration with neat sketch.

c) Explain screw compressor with neat sketch.

d) Explain Electrolux refrigeration system,(Domestic)

e) Describe Evaporative condenser with neat labeled diagram.

f) Write desirable thermodynamic properties of the refrigerants.

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

a) Compare vapour compression system with vapour absorption system.

b) Explain vortex tube refrigeration system with neat sketch.

c) Explain concept of Green House effect.

d) Draw neat labelled diagram of automatic expression valve.

e) Draw basic Aircraft cycle

f) Explain dry expansion evaporator with neat sketch.

Section – II **Marks**

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

a) Define sensible heating & sensible cooling.

b) State major sources of heat-load for cold storage.

c) List different types of outlets used in air distribution.

d) Write advantages of central Air-conditioning system.

e) Define effective temperature.

f) State different types of unitary air-conditioning system

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

a) Define i) Air-Conditioning ii) Psychrometry

b) Explain factors affecting human comfort.

c) Classify air conditioning systems. Write applications air conditioning system.

d) Write neat-sketch describe radial perimeter duct system used in Air-conditioning.

e) Compare viscous filters with dry filters.

f) State various type of losses occur in air conditioning system. Explain any one type of loss.

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

a) With neat sketch, explain construction & working of central Air-conditioning system.

b) Air is dehumidified from an initial condition of 32^0C DBT & 80% RH to 25^0C DBT & 15^0CWBT. Find moisture removed, drop in enthalpy per kg of dry air, show process on psychometric chart.

c) State methods of applying insulation. Explain any one type of method with neat sketch.

GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO. | | | | | | |

LEVEL: **FIFTH.** PROGRAM: **MECHANICAL ENGG.**

COURSE CODE:**MEE503/ME404/M404/2309.** COURSE NAME: **QUALITY MANAGEMENT.**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **30/11/2016.**

Instruction:-

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

Section – I **Marks**

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

a) Why quality is given importance?

b) What is inspection?

c) What is quality of design?

d) What is maintainability?

e) What is quality assurance?

f) Explain in brief. 'Internal failure cost'.

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

a) Explain the concept of quality

b) Differentiate between Inspection and Quality control.

c) What are the step involved in planning inspection?

d) What is the role of management in Quality control?

e) List 8 steps of Quality assurance.

f) What are the functions of Quality circles'?

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

a) What is the concept of Quality Assurance?

b) Explain how Quality circle helps to improve Quality.

c) Why quality audit is necessary? Explain how it is done?

d) List parameters for balance the cost of quality and value of quality.

e) Explain App-raisal cost inview of quality.

f) How internal & external failure cost affects cost of quality?

P.T.O.

Section – II

Marks

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

a) Define SQC (Statistical Quality Control)

b) A hardware store sale following dimensions circular saws,

80, 80, 100, 80,120,100,100,120,100,100 What is the value of mode?

c) Give the purpose of histogram in manufacturing process.

d) Define "TQM".

e) Write the name of 5 'S'.

f) Give the purpose of scatter diagram.

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

a) Following data were obtained for 10 days period to prepare $\overline{X}$ and' R' charts.

Sample no	1	2	3	4	5	6	7	8	9	10
$\overline{X}$	177.6	176.6	178.4	176.6	177.0	179.4	178.6	178.6	178.8	172.2
R	23	8	22	12	7	8	15	6	7	12

Calculate control limits for $\overline{X}$ and R chart.(Assume A_2=0.58, D_3=0,D_4=2.11.)

b) Explain the normal distribution curve.

c) Describe Deming philosophy of TQM.

d) List the duties of quality council.

e) Give any eight characteristics of successful team.

f) Discuss the use of Pareto diagram in quality.

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

a) Explain "Process Capability".

b) Discuss the concept "Kaizan"

c) Describe the cause and effect diagram.

d) Write reading "Benchmarking "of organization.

e) Discuss ISO 9000 series of standards.

f) Describe concept of "six Sigma."

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.
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ODD TERM END EXAM NOV./ DEC -2016
EXAM SEAT NO. | | | | | | |

LEVEL : - FIRST PROGRAM : MECHANICAL ENGG.
COURSE CODE :- MEE101
COURSE NAME :- FUNDAMNETALS OF MECHANICAL ENGG.
MAX. MARKS : 80 TIME : 3 HRS. DATE: - 17 / 11 / 2016

Instruction:-
1) Answers must be written in the main answer book provided.(and supplements if required)
2) Figure to the right indicate marks.
3) Illustrate your answers with sketches wherever necessary.
4) Use of non-programmable pocket calculator is permissible.
5) Mathematical and other tables shall be made available on request.
6) Assume additional suitable data necessary.
7) Use of Mobile is strictly prohibited.

Marks

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

a) Define properties of the system.

b) Define i) Heat ii) Work.

c) Define entropy.

d) List I.C. Engine parts.

e) Name fuel supply system used in I.C. engine.

f) Define refrigerating effect.

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

a) Define i) State ii) Process iii) Statistical thermodynamics iv) Macroscopic thermodynamics.

b) Explain Otto cycle with P-V & T-S diagram.

c) Classify air conditioning systems.

d) Explain Vapour Compression refrigeration system.

e) Explain types of thermodynamic system.

f) Explain construction and working of two stroke engine (petrol)

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

a) Write limitations of first law of thermodynamics.

b) Compare SI and CI engine.

c) Explain important refrigerants with their functions (any four)

d) Classify I.C. engine on the basis of i) Thermodynamic cycle. ii) Working Cycle. iii) Number of cylinder iv) Field of applications.

e) Explain summer and winter air conditioning system.

f) Explain cooling systems used in I.C. engine.

P.T.O.

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

a) State the materials used for belts.

b) Enlist various sources of biodiesel.

c) Enlist the parts of Pelton turbine.

d) What d o you mean by solar collector?

e) State the applications of compressed air.

f) State different types of gears.

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

a) Explain bevel and rack-pinion gears.

b) State the advantages of fuel cell.

c) Differentiate between centrifugal and reciprocating pump.

d) With neat sketch, explain thermal power plant.

e) How compressors are classified?

f) Explain open and cross belt drive.

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

a) i) Draw a neat sketch of reciprocating pump.
ii) State the advantages of biodiesel.

b) State the principle of pump and explain with neat sketch working of centrifugal pump.

c) With neat sketch, explain biogas plant. State properties and applications of biogas.

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.
(An Autonomous Institute of Govt. Of Maharashtra)
ODD TERM END EXAM NOV./ DEC -2016
EXAM SEAT NO. | | | | | | |

LEVEL : - **FIFTH** PROGRAM : **MECHANICAL ENGINEERING**
COURSE CODE :- **MEE504/ME405/M405/2406**
COURSE NAME :- **INDUSTRIAL ENGINEERING**
MAX. MARKS : **80** TIME : **3 HRS.** DATE: - **03 / 12 / 2016**

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

Section – I

Marks

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

a) Define production and state different types of production systems.

b) What is group technology? State its applications.

c) Define plant capacity and machine capacity.

d) List down steps in progressive control.

e) Define plant layout and state different types of plant layout.

f) State different factors affecting process planning.

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

a) Draw Break Even Chart and indicate sales income line, Fixed cost line, variable cost line, total cost line and break even point on it.

b) What are different objectives of good plant layout.

c) Explain the term material handling. Classify material handling devices

d) What are different factors considered in selection of a machine?

e) Explain centralized and decentralized dispatching.

f) Draw any one type of Gantt chart? What information can be retrived from it?

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

a) Define batch production. State its advantages and limitations with examples

b) List down design principles of plant layout and symptoms of bad plant layout.

c) Write a short note on Automated Guided Vehicles. (AGVs).

d) What do you understand by assembly planning?

e) What do you mean by line of Balancing technique? Explain it in detail.

f) Prepare operation sheet and sequence of operations for the component shown in figure. Assume suitable cutting parameters. Material = M.S.

(P.T.O.)

Section – II | Marks

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

a) Classify various recordig techniques.

b) How work is selected for work study?

c) What is bin card?

d) Enlist the steps in material issue.

e) What are 5 'S'?

f) How inventory can be reduced?

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

a) Explain outline process chart with simple example.

b) Differentiate clearly between Jigs and fixtures.

c) Explain any four general principles of Jig/fixture design.

d) Explain JIT MANUFACTURING.

e) What is single piece production system? Give two features.

f) What is rapid prototyping? Give its advantages.

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

a) Explain the importance of Ergonomics in work place layout with examples.

b) Describe the various allowances. And explain the procedure for calculation of standard time.

c) Explain the EOQ with Model. How EOQ is calculated?

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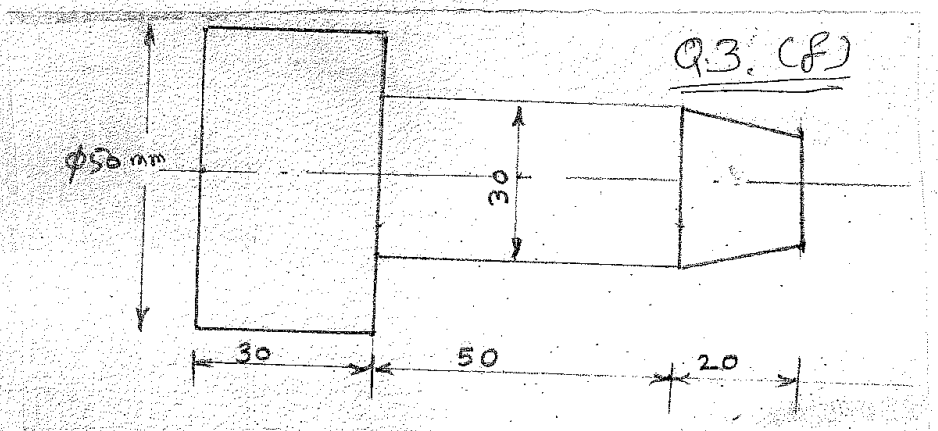

GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO. | | | | | | |

LEVEL: FOURTH PROGRAM: MECHANICAL ENGINEERING

COURSE CODE: MEE407/ME307/M307/2308 COURSE NAME: METROLOGY

MAX. MARKS: 80 TIME: 3 HRS. DATE: 05/12/2016

Instruction:-

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

Section – I **Marks**

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

a) State types of metrology

b) Define i) Sensitivity ii) Calibration

c) List any two advantages of end standards.

d) Define i) Limits ii) Fits

e) State Taylor's principle for gauge design

f) List any four instruments used for angular measurement.

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

a) What is the need of inspection in industries?

b) Differentiate between precision and accuracy. Give examples.

c) Explain construction and working of dial indicator.

d) Explain selective assembly.

e) Explain hole basis system with sketch. Where it is preferred?

f) Explain working of bevel protractor with neat sketch.

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

a) Which characteristics of measuring instrument would be considered while selecting an instrument for particular measurement?

b) What is multi gauging? Explain with suitable example.

c) Built up dimension of 58.975 using following slip gauge set

Range(mm)	Step(mm)	Pieces
1.001-1.009	1.001	9
1.01-1.49	1.01	49
0.5-24.5	0.5	49
25-100	25	4
1.005	-	1

d) For the dimensions given below calculate tolerance and limits

i) 25 ± 0.2

ii) $55^{-0.1}_{-0.2}$

e) Sketch arrangement of sine bar for measurement at angle of

i) Small job

ii) Big job

f) An angle of $117°8'42''$ is to be developed using standard angle gauge set. Show the arrangement with sketch.

Section – II **Marks**

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

a) Define RMS value and Kz value

b) What is Drunken thread?

c) What do you mean by calibration?

d) Define run-out.

e) What is progressive pitch error?

f) State advantages of profile projector.

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

a) Write procedure to measure external diameter (major dia.) by using floating carriage dial micrometer.

b) How to measure run out of a machine spindle?

c) What are the different techniques of Qualitative analysis surface finish?

d) Explain two wire method to measure effective diameter.

e) Explain with neat sketch Parkinson gear tester.

f) State calibration procedure of micrometer.

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

a) Define following terms with reference to surface finish.

i) Texture

ii) Lay

iii) Centre line

iv) Sampling length

b) Explain in brief Tomlinson's surface tester with neat sketch.

c) Discuss errors in gears

d) Explain principle of gear tooth vernier.

e) Explain squareness testing procedure between two planes.

f) Why calibration of measuring instruments is needed?

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GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

(An Autonomous Institute of Govt. Of Maharashtra)

ODD TERM END EXAM NOV. / DEC 2016

EXAM SEAT NO. | | | | | | |

LEVEL : - **FOURTH** PROGRAM : **MECHANICAL ENGG.**

COURSE CODE :- **MEE406/ME306/M306/2307**

COURSE NAME :- **HYDRAULIC MACHINERY**

MAX. MARKS : **80** TIME : **3 HRS.** DATE :- **29 / 11 / 2016**

Instruction :-

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

Section – I

Marks

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

a) Define surface tension and capillarity.
b) Define vapour pressure and cavitation.
c) State various types of manometer and sketch any one.
d) Determine specific gravity of an oil whose specific weight is 8 KN/m^3.
e) State various types of fluid flows and define steady flow.
f) Define specific weight and specific gravity.

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

a) A circular plate of 2m dia is placed vertically in water such that its centre is 2m below free surface of water. Calculate total pressure and centre of pressure.

b) One litre of crude oil weighs 9.6N. Calculate its specific weight, density and specific gravity.

c) A U tube manometer is used to measure pressure of water in a pipe line. The manometer shows readings as shown in fig. Calculate the pressure of water in the pipe line.

d) Explain with neat sketch venturimeter. Give formula for discharge through venturimeter.

e) State Bernoulli's theoram, its applications and limitations.

f) State laws of fluid friction for laminar flow and turbulant flow.

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

a) Find the diameter of pipe of length 2000m when the rate of flow of water through the pipe is 200litres/s and head lost due to friction is 4m. Take value of C=50 in Chezy's formulae.

b) Explain with neat sketch hydraulic gradient line and total energy line.

c) Water is flowing through a venturimeter having inlet and throat dia. as 20cm and 10cm. The water mercury differential manometer shows a reading of 25cm. Calculate the discharge of water through the venturimeter. Take cd=0.98.

[PT-01]

d) A pipe through which water is flowing is having diameters 20cm and 10cm at sections 1 & 2 respectively. The velocity of water at section 1is given as 4.0m/s. Find velocity at section 2 and rate of discharge.

e) Define absolute, vaccum, gauge and atmospheric pressure and show them on a single chart.

f) What are different mechanical pressure measuring devices? Explain any one with neat sketch.

Section – II — Marks

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

a) A jet of water 50mm in diameter strikes a fixed plate normally with a velocity of 20m/s. Find the force experienced by the flat plate.

b) Define Jet propulsion.

c) What are the functions of draft tube?

d) Why the flat plate made as curved vane?

e) Define absolute velocity and relative velocity of jet.

f) Why large pelton wheel are having braking jet?

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

a) A pelton wheel having semicircular buckets and working under head of 140m is running at 600 rpm. The discharge through the nozzles is 500 lps and diameter of wheel is 600mm. Find the power developed by the nozzle and hydralulic η if coefficient of velocity is 0.98.

b) Explain the various types of impeller used in centrifugal pump.

c) Differentiate between impulse and reaction turbine.

d) A centrifugal pump delivers water against net head of 10m at a design speed of 1000 rpm the vanes make an angle of 30^0 at the outer pheriphery the impeller diameter 30cm and has a width of 5cm at the outlet. Determine the discharge of the pump if the manometric efficiency = 95%.

e) Describe the working of Kaplan turbine.

f) Explain the construction and working of double acting reciprocating pump with suitable diagram.

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

a) A Kaplan turbine working under a head of 20m develops 11.772 MW of power. The outer diameter of runner is 3.5m and hub diameter 1.75m. The guide blade angle is 35^0.Hydraulic efficiency and overall efficiency are 88% and 84% respectively. If velocity of/whirl at outlet is 0. Calculate
i) Runner blade angle at inlet and outlte. ii) Speed of turbine.

b) Explain the construction and working of submersible pump.

c) Explain various efficiencies associated with turbine.

d) State the effect and application of air vessel.

e) Describe the working of pelton turbine.

f) Define slip in reciprocating pump. Explain positive slip and negative slip.

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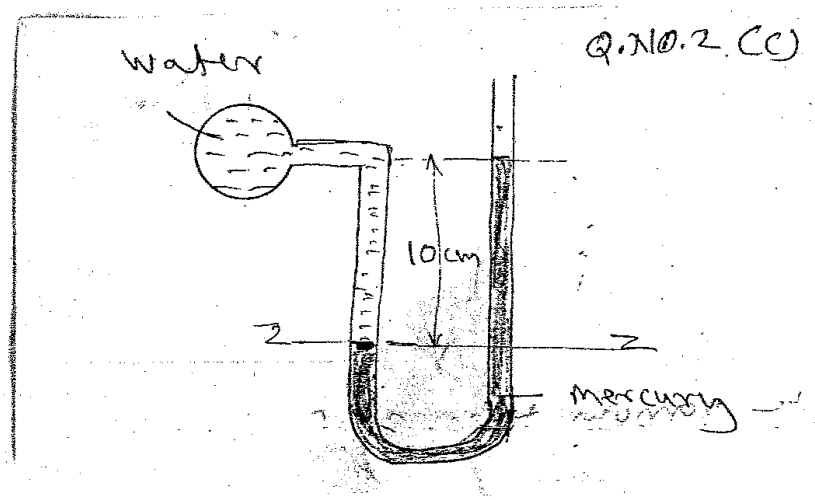
Q.No 0.2 (c)



GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO. | | | | | | |

LEVEL: FIFTH PROGRAM: **MECHANICAL ENGINEERING**

COURSE CODE: **MEE509/ME410/M410** COURSE NAME: **AUTOMOBILE ENGINEERING**

MAX. MARKS: **80** TIME: **3 HRS.** DATE: **28/11/2016**

Instruction:-

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

Section – I **Marks**

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

a) Differentiate frame and chassis.

b) State advantages of four wheel drive.

c) Give classification of clutch.

d) What are functions of propeller shaft?

e) Define Toe IN & Toe OUT

f) Give classification of automobiles.

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

a) Compare front engine and rear engine on four points.

b) Explain working principle of clutch with figure (any one)

c) Explain construction and working of universal joint with figure.

d) Explain with sketch transfer case.

e) Explain torque converter.

f) Explain with sketch working of differential on winding road.

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

a) Explain power steering.

b) Explain construction and working of Rack and pinion steering mechanism.

c) Differentiate drum and disc brake system.

d) How power brakes are classified?

P.T.O

e) Explain construction and working of master cylinder.

f) State function of steering system.

Section – II **Marks**

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

a) What is Rim? List various types of Rims used in automobiles.

b) What is Battery rating? List common battery ratings.

c) Write advantages of air suspension (any four)

d) List various types of Gauges used in automobile.

e) Write functions of suspension system.

f) Write advantages of tubeless tyres.

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

a) Explain necessity of suspension in an automobile.

b) Compare tubed tyres with tubeless tyres.

c) State the purpose of shock absorber in automobile suspension system. Draw a neat sketch of telescopic type of shock absorber & label its parts.

d) Explain with neat sketch working of battery used in automobile.

e) Explain in detail about the colour codes used in Automobile electrical wiring system.

f) With neat sketch, explain working of electronic Ignition system.

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

a) Explain lighting system with wiring diagram of an automobile.

b) Write functions of tyre. Compare Cross Ply Tyre with Radial Ply Tyre.

c) Write classification of suspension system with neat sketch explain construction & working of McPherson strut type suspension.

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