ME 321 / Lab

Roll No. ..... Total Pages : 04

BT-3/D-23 43144

OPTICS AND WAVES

BS-201A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Section.

Section I

1. (a) Derive the set of Maxwells equations in integral form from fundamental laws for a good conductor. 5

   (b) Explain the relation between field theory and circuit theory and thus obtain an expression for Ohm's law. 10

2. (a) Deduce the expression for electromagnetic wave equation for conducting and perfect dielectric medium. 7

(b) A 6580 MHz uniform plane wave is propagating in a material medium of $\varepsilon r = 2.25$. If the amplitude of the electric field intensity of lossless medium is 500 V/m. Calculate the phase constant ,propagation constant, velocity, wavelength and intrinsic impedance. **8**

Section II

3. (a) Explain, how interference fringes are produced using biprism. **7**

(b) Describe Fresnel's biprism method for the determination of wavelength of light. Obtain an expression for band width of interference fringes produced by biprism. **8**

4. (a) What are Newton's rings ? Show that the radii of the dark rings are in the ratio of square root of natural numbers. **7**

(b) Verify the law of reflection for a spherical wavefront incident on a plane surface using Huygens' wave theory. **8**

Section III

5. (a) Describe the Fraunhofer diffraction due to single slit for central maxima and prove that the relative intensities of the successive maxima are nearly 1 : 1/22 : 1/61.

   (b) Explain the following in brief :

   (i) Secondary Maxima and Secondary Minima

   (ii) Dispersive Power. **15**

6. (a) Define polarization. What are the different types of wave polarization ? Explain them with mathematical expression. **8**

   (b) Describe, how to produce polarized light by reflection ? Explain the construction and working of Laurent's half shade polarimeter. **7**

Section IV

7. (a) Using the correct expressions, infer the relation between Einstein's coefficient of spontaneous and stimulated emissions. **7**

   (b) With the help of an energy diagram, illustrate the construction and working of a four level solid state laser, where the Nd3+ ions act as the active centers. **8**

8. (a) Outline the principle, construction and working of an Nd-YAG laser. List any three advantages of Nd-YAG laser. 7

(b) List the different pumping schemes for creating population inversion. Explain the principle, construction and working of a semiconductor diode laser. 8

Roll No. ..... Total Pages : 03

BT-3/D-23 43156

HIGHER ENGINEERING MATHEMATICS

BS-204A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting *one* at least question from each Section. All questions carry equal marks.

Section A

1. (a) Find the Laplace transform of the function $t^2 \sin t$.

   (b) Find the Laplace transform of the function $e^{-2t} \cos 5t$.

2. (a) Find the inverse Laplace transform of :

$$\frac{s}{\left(s^2+1\right)^2}$$

using convolution.

   (b) Using Laplace transformation solve the initial value problem :

$$y'' - 4y' + 4y = 16 \sin 2t,\ y(0) = 0,\ y'(0) = 1$$

Section B

3. (a) Solve the partial differential equation $\left(p^2+q^2\right)y-qz=0$ using Charpits' method.

   (b) Form the partial differential equation of the surface :

$$z=f\left(x^2-y^2\right)$$

4. (a) Solve the Lagrange equation :

$$y^2p-xyq=x(z-2y)$$

   (b) Solve the partial differential equation :

$$\frac{\partial^3 z}{\partial x^3}-3\frac{\partial^3 z}{\partial x^2\partial y}+4\frac{\partial^3 z}{\partial y^3}=e^{x+2y}$$

Section C

5. (a) Using bisection method find the roots of the equation :

$$x^3-x-4=0$$

   correct to two decimal places.

   (b) Using the Newton-divided difference formulas to calculate $f(3)$ from the following table :

x	0	1	2	4	5	6
$f(x)$	1	14	15	5	6	19

6. (a) Find the roots of the equation $x-e^{-x}=0$, correct to three decimal places using Newton-Raphson method.

(b) Using Lagrange interpolation formula find the unique polynomial P(x) of degree 2 or less such that : P(1) = 1, P(3) = 27, P(4) = 64.

Section D

7. (a) Consider the initial value problem :

$$y' = x(y+x) - 2, y(0) = 2$$

Use Euler's method with step sizes h = 0.2 to compute approximations of $y(0.4)$ (3 decimals).

(b) Dividing the range into 10 equal parts, find the approximate value of :

$$\int_0^1 \frac{1}{1+x}\, dx$$

using Trapezoidal Rule.

8. (a) Using Runge-Kutta method of fourth order, find the numerical solution at x = 0.8 for the initial value problem :

$$\frac{dy}{dx} = \sqrt{+y}, y(0.4) = 0.41$$

with the step length h = 0.2.

(b) Define Taylor Series Method for the solution of an initial value problem.

Roll No. ..... Total Pages : 02

BT-3/D-23 43162

BASIC ELECTRONICS ENGINEERING
ES-203 A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit.

Unit I

1. Differentiate between half wave and full wave rectifier. Discuss the working principle in detail. Also calculate Average voltage in both the cases. 15

2. (a) Discuss the working of zener diode as a voltage regulator.

   (b) Discuss and draw the input and output characteristics of common emitter configuration. 15

Unit II

3. Discuss the working of Op-amp as the following : 15
   (a) Non–inverting amplifier
   (b) Integrator
   (c) Adder

4. (a) Differentiate between practical op-amp and ideal Op-amp.

(b) Explain the following terms :

(i) Astable and monostable mode of IC-555

(ii) R-C phase shift oscillator

(iii) Wein bridge oscillator 15

Unit III

5. (a) Differentiate between analog and digital signals.

(b) What are Universal gates ? Why these are called Universal ? Draw AND & OR gate using NOR. 15

6. (a) Differentiate between half-adder and full adder.

(b) Draw and solve the K-map for the following : 15

$Y(A, B, C) = \Sigma m(7, 6, 5, 1)$

Unit IV

7. Write short notes on the following : 15

(a) Elements of communication system

(b) Transmission media

(c) GSM

8. What is Modulation ? What is the need for modulation ? Discuss in brief AM and FM modulation principle in brief with proper diagrams. 15

Roll No. ..... Total Pages : 03

BT-3/D-23 43164

THEORY OF MACHINES
MEC-201A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Describe inversions of four bar chain.

   (b) Describe various kinematic pairs as per nature of contact and nature of relative motion. **15**

2. (a) Describe velocities in four bar mechanism.

   (b) Describe Kennedy's Theorem. **15**

Unit II

3. (a) The crank of the slider crank mechanism rotates clockwise at a constant speed of 300 r.p.m. The crank is 150 mm and the connecting rod is 600 mm long. Determine :

(i) Linear velocity and acceleration of the mid point of the connecting rod, and

(ii) Angular velocity and angular acceleration of the connecting rod, at a crank angle of 45° from inner dead centre position.

(b) Explain acceleration Diagram for a link. **15**

4. Draw the profile of a cam operating a knife-edge follower having a lift of 30 mm. the cam raises the follower with SHM for 150° of the rotation followed by a period of dwell for 60°. The follower descends for the next 100° rotation of the cam with uniform velocity, again followed by a dwell period. The cam rotates at a uniform velocity of 120 rpm and has a least radius of 20 mm. what will be the maximum velocity and acceleration of the follower during the lift and the return ? **15**

Unit III

5. Write short notes on the following terms : **15**

(a) Explain slider crank mechanism.

(b) Equilibrium of two and three force members.

6. (a) Why is balancing necessary for rotors of high speed engines ?

(b) Describe Balancing of multi cylinder inline engines. **15**

Unit IV

7. (a) What is creep of belt ?

(b) Derive the relations for ratios of belt tensions in a flat belt drive. **15**

8. (a) Explain the minimum number of teeth on gear and pinion to avoid interference.

(b) Explain simple gear train with neat sketch. **15**

Roll No. ..... Total Pages : 04

BT-3/D-23 **43165**

MECHANICS OF SOLIDS-I

MEC-203-A

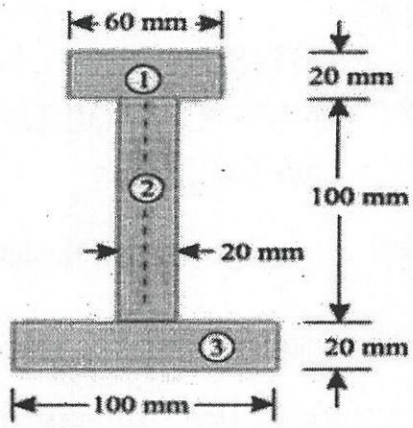
Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks. Assume any missing data suitably.

Unit I

1. (a) Three forces acting on a particle are in equilibrium. The angles between the first and second is 90° and that between the second and third is 120°. Find the ratio of the forces. 7

(b) An I-section is made up of three rectangles as shown in Fig. Find the Moment of inertia of the section about the horizontal axis passing through the center of gravity of the section. 8



2. A steel rod of 25 mm diameter is enclosed centrally in a copper hollow tube of external diameter 40 mm and internal diameter 30 mm. The composite bar is then subjected to an axial pull of 4500 N. If the length of each bar is equal to 130 mm, determine :

   (a) The stresses in the rod and tube

   (b) Load carried by each bar.

   Take $E_b = 2.1 \times 10^5$ N/mm^2 and $E_c = 1.1 \times 10^5$ N/mm^2. **15**

Unit II

3. Draw the Mohr's stress circle for direct stresses of 65 MN/m^2 (tensile) and 35 MN/m^2 (compressive) and estimate the magnitude and direction of the resultant stresses on planes making angles of 20° and 65° with the plane of the first principal stress. Find also the normal and tangential stresses on these planes. **15**

4. A 6 m long simply supported beam carries a point load of 25 kN at the end and a uniformly distributed load of 15 kN/m on the whole span. The two supports are 4 m apart, the left hand support being at left end. Draw the shear force and bending moment diagrams. 15

Unit III

5. A solid cylindrical shaft is to transmit 300 kW at 100 rpm.

   (a) If the shear stress is not to exceed 80 MN/m^2, find its diameter.

   (b) What percentage saving in weight would be obtained if this shaft is replaced by a hollow one whose internal diameter equals 0.6 of the external diameter, the length, the material and maximum shear stress being the same. 15

6. Derive the bending equation, clearly stating the assumptions made. 15

Unit IV

7. Derive the Euler formula when one end of the column is fixed and the other is hinged. State the assumptions. 15

8. A cantilever of 3 m length and of uniform rectangular cross section 150 mm wide and 300 mm deep is loaded with a 30 kN load at its free end. In addition to this it carries a uniformly distributed load of 20 kN per metre run over its entire length, calculate :

(a) The maximum slope and maximum deflection

(b) The slope and deflection at 2 m for the fixed end.

Take E = 210 GN/m^2. **15**

Roll No. ..... Total Pages : 04

BT-3/D-23 **43166**

THERMODYNAMICS
MEC-205A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit.

Unit I

1. (a) What is meant by quasi-static process ? Also discuss its physical significance. **6**

(b) State Zeroth law of thermodynamics. Explain, how the Zeroth law of thermodynamics can be used for temperature measurement. **9**

2. Explain the following : **15**

(a) Free expansion

(b) Polytropic process

(c) Hyperbolic process

Also obtain expressions for work in each case.

Unit II

3. (a) State the Kelvin Planck and Clausius statements of the 2nd law of thermodynamics. **5**

   (b) Why is Carnot cycle a theoretical cycle ? Explain. **3**

   (c) A reversible heat engine operates between two reservoirs at 827°C and 27°C. The engine drives a Carnot refrigerator maintaining –13°C and rejecting heat to the reservoir at 27°C. Heat input to the engine is 2000 kJ and the network available is 300 kJ. How much heat is transferred to refrigerant and total heat rejected to reservoir at 27°C ? **7**

4. (a) Explain the difference between isentropic process and adiabatic process. **3**

   (b) How does the second law of thermodynamics overcome the limitations of the first law of thermodynamics ? **5**

   (c) Determine entropy change of universe, if two copper blocks of 1 kg and 0.5 kg at 150°C and 0°C are joined together. Specific heats for copper at 150°C and 0°C are 0.393 kJ/kg K and 0.381 kJ/kg K respectively. 7

Unit III

5. (a) Define availability. Obtain an expression for availability of closed system. 5

(b) Differentiate between useful work and maximum useful work in reference to the availability. 5

(c) What do you understand by the Gibbs function ? How does it differ from the availability function ? 5

6. (a) Write short notes on the following : 8

(i) Sensible heating

(ii) Latent heating

(iii) Critical point

(iv) Triple point.

(b) Determine the final condition of steam, work done, heat transferred and change in entropy if 0.5 kg of steam at 1 MPa and 0.8 dry is heated at constant pressure until its volume gets doubled. 7

Unit IV

7. (a) Show that the internal energy and enthalpy of an ideal gas are functions of temperature only. 7

(b) Write down the first and second TdS equation and derive the expression for differences in the heat capacities, C_p and C_v. What does the expression signify ? **8**

8. (a) Discuss the limitations of the Carnot cycle and explain Otto cycle, Diesel cycle and Dual cycle in light of these limitations. **9**

(b) Derive expression for efficiency of Otto cycle, Dual cycle and Diesel cycle. **6**

Roll No. ..... Total Pages : 03

BT-5/D-23 45196

PRODUCTION TECHNOLOGY

MEC-303A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. Describe the mechanism involved in chip formation during metal cutting. Discuss various types of chips formed during metal cutting. Explain which types of chips are preferred for better machining. 15

2. (a) Differentiate between up-milling and down-milling operation. 8

   (b) Describe the important properties desired in a grinding wheel and also enumerate the factors involved in the selection of grinding wheel. 7

Unit II

3. List down the typical requirements of a good cutting tool material. Classify various cutting materials, giving the characteristics of each. 15

4. List various linear and angular measurement methods. Represent diagrammatically the tolerance zone of the following shaft and hole pairs and calculate the size of the GO and NOGO (plug and ring) gauges to inspect them :

Shaft size: $A = 35^{-0.050}_{-0.025}35$

Hole size : $35^{-0.00}_{-0.04}$

Neglect gauge tolerances. **15**

Unit III

5. Illustrate the following methods of screw thread making : **15**
   (a) Thread Chasing
   (b) Thread Milling
   (c) Thread Rolling.

6. (a) Discuss in brief, the main design principle common to jigs and fixtures. Discuss main objectives to be considered while designing jigs and fixtures. **10**
   (b) What do you mean by the concept of SMED ? Describe various applications of SMED in Industries. **5**

Unit IV

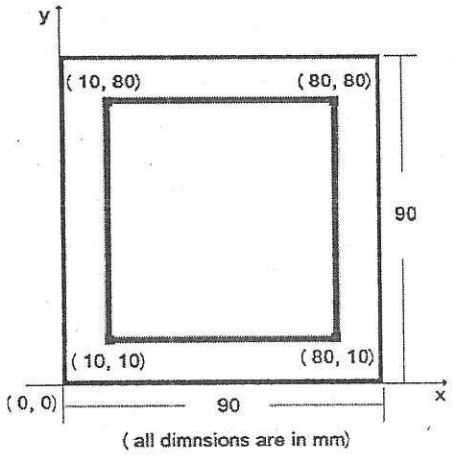
7. (a) Determine how inaccuracies can creep in while manufacturing gear by Hobbing process. For what

types of Jobs Hobbing operation will be preferred for generating gears and where the shaping operation will be preferred ? 10

(b) Discuss various gear finishing methods in brief. 5

8. (a) Describe various modes of operation of a CNC machine. 5

(b) Write a CNC part programme to cut the part as shown in Fig. below using milling cycle subprogram from an aluminium slab of 19 mm thickness and size 90 mm × 90 mm. 10



Roll No. ..... Total Pages : 04

BT-5/D-23 45197

MECHANICAL VIBRATIONS AND TRIBOLOGY

MEC-305-A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Determine the natural frequency of the system shown in Fig. 1. Assume the pulleys to be frictionless and of negligible mass. 8

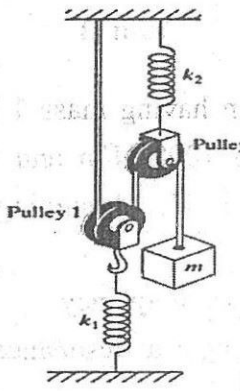


Fig. 1

(b) Define spring stiffness and damping constant. State three different ways of expressing a periodic function in terms of its harmonics. 7

2. For what value of c is the damping ratio of the system as shown in Fig. 2 equals to 1.25 ? 15

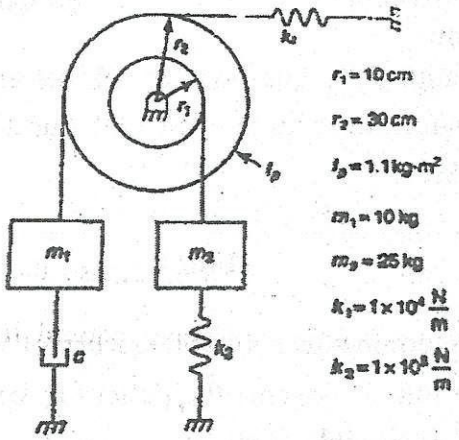


Fig. 2

Unit II

3. A vibrating system having mass 1 kg is suspended by a spring of stiffness 1000 N/m and it is put to harmonic excitation of 10 N. Assuming viscous damping, determine : 15

(a) The resonance frequency

(b) The phase angle at resonance

(c) The amplitude at resonance

(d) The frequency corresponding to the peak amplitude

(e) Damped frequency. Take C = 40 N-sec/m.

4. Explain the theory behind co-ordinate coupling ? Including free body diagrams & derive the characteristic equation for co-ordinate coupling. 15

Unit III

5. For a taut string having tension T and three concentrated masses as shown in Fig. 3, use the method of influence numbers to find the three natural frequencies. 15

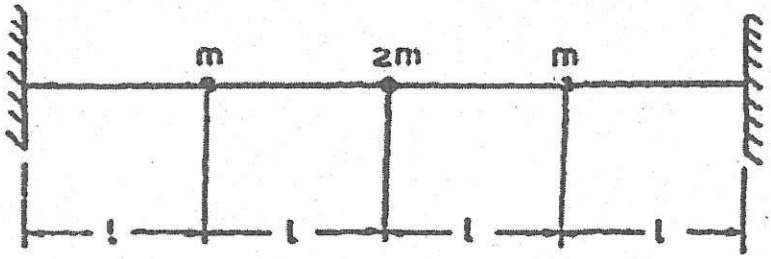


Fig. 3

6. Determine the frequency equation in transverse vibration for a uniform beam of length l, having one end fixed and other simply supported. 15

Unit IV

7. (a) Define Wear. What are the different types of wear ? What are the various factors affecting wear ?

   (b) Elaborate the mechanisms of wear. What methods are used for the measurement of wear ? **15**

8. What are the basic modes of lubrication ? List various physical and chemical properties of lubricants. Elaborate the functions of different types of additives used in lubrication. **15**

Roll No. ..... Total Pages : 03

BT-5/D-23 **45258**

UNIVERSAL HUMAN VALUES–II : UNDERSTANDING HARMONY

HTM-901A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) The prime need of value education is to understand human aspirations, to discover what is truly valuable in life and work out the program for its fulfillment. Elaborate the statement. **7.5**

   (b) For Animals, physical facility is necessary as well as adequate. For human beings, physical facility is necessary, but physical facility alone is not adequate. **7.5**

2. Write a short note on 'Self Exploration'. **15**

Unit II

3. (a) Explain the concept of Imagination. Describe the possible sources of motivation for Imagination. **7.5**

   (b) Trust is the foundational value in relationship. Explain it. **7.5**

4. What is the responsibility of the self towards the body ? How is it fulfilled ? 'The human body is a self organized unit.' How ? **15**

Unit III

5. (a) Explain the various dimensions (systems) of Human Order. Describe the natural outcomes of Right Understanding. **7.5**

   (b) Explain the natural process of a child in an environment of relationship and in an environment of domination. How does 'Justice' leads to mutual happiness ? **7.5**

6. Due to prevailing false assumptions of happiness (like money is everything), people are living with three kinds of obsessions. Describe these kinds of obsessions. What do understand by the concept of Education-Sanskar ? Also explain the goals of human being living in a society. **15**

Unit IV

7. What are the four orders in nature ? How does each order participate in the harmony in the nature ? Explain with suitable examples. 15

8. Write a short note on the Holistic Perception of Harmony in Existence. 15

ME 7th/ Lib

Roll No. ..... Total Pages : 2

BT–7/D-23 **47342**

AIR AND NOISE POLLUTION

Paper–MEO–411A

Time Allowed : 3 Hours] [Maximum Marks : 75

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

UNIT–I

1. Define the Air pollution. Explain the Primary and Secondary Air pollutants. Also, explain the sources and consequence of Air pollutants for the following : 15

   (a) Sulphur-di-oxide. (b) Ozone.

   (c) Dust. (d) Fumes.

2. Write a note on Atmospheric stability. What are the advantages and disadvantages of biodegradation? Also, explain the effects of the Air pollution on Human health and Vegetation. 15

UNIT–II

3. Explain high-volume Air sampler for the particulate matter measurement with the help of a neat sketch. Also, explain any four methods of calculating Air pollution indices for monitoring Air pollutions. 15

4. Explain, how the Oak Ridge Air Quality Index (ORAQI) is calculated if all five major pollutants (CO, SO_2, NO_2, particulates, and photochemical oxidants) are recognized by the EPA are included? 15

UNIT–III

5. Explain the factors affecting the selection of the particulate Air control devices. Also, explain the particulate matter removal by gravity settler with the neat sketch. 15

6. Discuss the use of Catalytic converters in vehicular pollution control. Explain the principle, design and working of Catalytic converters. Also, suggest the possible changes in the engine Design to reduce the vehicular emissions. 15

UNIT–IV

7. What are Noise pollution standards? Explain in detail the outdoor noise propagation and indoor noise propagation in relation with noise pollution and control. 15

8. Describe the control and preventive measures to be taken for noise pollution at Commercial complexes. 15

Roll No. ..... Total Pages : 6

BT-7/D-23 **47343**

AUTOMATION IN MANUFACTURING

Paper–MEC-401A

Time Allowed : 3 Hours] [Maximum Marks : 75

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

UNIT–I

1. (a) Define automation in production system. Explain the basic principles and strategies of automation. 7

   (b) Explain the basic elements of an automated manufacturing system. 8

2. (a) Discuss the basic configurations commonly available in commercial industrial robots. 8

   (b) Explain the various elements of a material handling system in brief. 7

UNIT–II

3. (a) What are the different features of parts classification and coding system? 7

   (b) Apply the rank order clustering technique to the part-machine incidence matrix in the following table to

identify logical part families and machine groups. Parts are identified by letters, and machines are identified numerically. 8

Parts

Machines	A	B	C	D	E	F	G	H	I
1	1			1				1	
2					1				1
3			1		1				1
4		1				1			
5	1							1	
6			1						1
7		1				1	1		

Figure 1

4. Define FMS. What are the different types flexibility in manufacturing? 15

UNIT–III

5. What do you understand by the term process planning? Explain the various features, applications and advantages of using computer aided process planning. 15

6. What is shop floor control System ? What are its features ? Discuss the different types of Data collection systems for the shop floor data collection. 15

UNIT–IV

7. The part shown in figure 2 below is to be drilled on a turret type drill press. The part is 15 mm thick. There are three drill sizes to be used 8 mm, 10 mm and 12 mm. These drills are to be specified in the part program by tool turret positions T01, T02, T03. All tooling is high speed steel. Cutting speed = 75 mm/min and feed = 0.08 mm/rev. Use the lower left corner of the part as the origin in the x-y axis system. Write the part program using absolute positioning. You can use handout of G codes and M codes for reference. 15

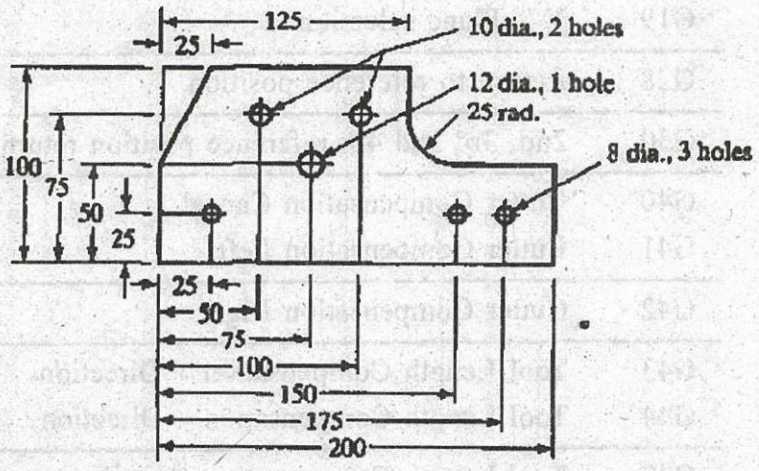


Figure 2: All dimensions are in mm.

8. (a) Describe the Automatic Storage and Retrieval system and state its application in FMS. 8

(b) Discuss the different types of guidance systems by which AGVS pathways are defined. 7

Handout of G Codes and M Codes

CNC Milling G Code List

G Code	Description
G00	Rapid Traverse
G01	Linear Interpolation
G02	Circuluar Interpolation CW
G03	Circuluar Interpolation CCW
G04	Dwell
G17	X Y Plane selection
G18	Z X Plane selection
G19	Y Z Plane selection
G28	Return to reference position
G30	2nd, 3rd and 4th reference position return
G40	Cutter Compensation Cancel
G41	Cutter Compensation Left
G42	Cutter Compensation Right
G43	Tool Length Compensation + Direction
G44	Tool Length Compensation – Direction
G49	Tool Length Compensation Cancel
G53	Machine Coordinate system selection
G54	Workpiece Coordinate System 1 selection
G55	Workpiece Coordinate System 2 selection

G56	Workpiece Coordinate System 3 selection
G57	Workpiece Coordinate System 4 selection
G58	Workpiece Coordinate System 5 selection
G59	Workpiece Coordinate System 6 selection
G68	Coordinate rotation
G69	Coordinate rotation cancel
G73	Peck Drilling Cycle
G74	Left-Spiral cutting circle
G76	Fine boring cycle
G80	Canned Cycle Cancel
G81	Drilling cycle, spot boring cycle
G82	Drilling cycle or Counter boring cycle
G83	Peck drilling cycle
G84	Tapping cycle
G85	Boring cycle
G86	Boring cycle
G87	Back Boring cycle
G88	Boring cycle
G89	Boring cycle
G90	Absolute Command
G91	Increment Command
G92	Setting for work Coordinate system or clamp at maximum spindle speed

G98	Return to initial point in canned cycle
G99	Return to R point in canned cycle

CNC Milling M Code List

M Code	Description
M00	Program stop
M01	Optional Program stop
M02	End of Program
M03	Spindle start forward CW
M04	Spindle start reverse CCW
M05	Spindle Stop
M06	Too Change
M07	Coolant ON-Mist Coolant/Coolant thru spindle
M08	Coolant ON-Flood Coolant
M09	Coolant OFF
M19	Spindle orientation
M28	Return to origin
M29	Rigid Tap
M30	End of Program (Reset)
M41	Low gear select
M42	High gear select
M94	Cancel mirrorimage

Roll No. ..... Total Pages : 2

BT-7/D-23 **47344**

COMPUTER AIDED DESIGN

Paper–MEP–401A

Time Allowed : 3 Hours] [Maximum Marks : 75

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

UNIT–I

1. (a) Explain the utilization of typical CAD/CAM system in an Industrial Environment. 9

   (b) What are the challenges for Engineers in the field of CAD/CAM? 6

2. (a) What is LAN? Give the advantage of LAN. 7

   (b) What is plotter? How plotter works? 8

UNIT–II

3. Write short notes on the following : 15

   (a) Network Data Base

   (b) Object oriented data base

   (c) Relational data base.

4. Perform a 30 degree rotation of triangle A (1, 1), B (5, 2), C (3, 3) : 15

   (a) About the origin

   (b) About point (1,1).

UNIT–III

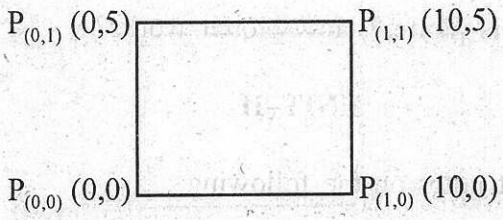
5. (a) What are the different modelling techniques in CAD? And compare them. 8

   (b) List properties of good geometric model. 7

6. Draw a Bezier spline for the control points (0, 0), (5, 6), (9, 0), (10, 5). 15

UNIT–IV

7. Find the equation of the Coons surface with four corner points as shown. Find the midpoint point of the surface. 15



8. What do you understand by shape based data exchange formats and product data based data exchange format? 15

Roll No. ..... Total Pages : 2

BT–7/D-23 **47348**

INDUSTRIAL ROBOTICS

Paper–MEP–409A

Time Allowed : 3 Hours] [Maximum Marks : 75

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

UNIT–I

1. (a) Write a brief history of Robotics, the robotics market and its future prospects. 7½

   (b) Write a technical note on Automation and Robotics. 7½

2. (a) What are Robot drive systems? 6

   (b) Describe in brief precision of movement and end effectors with regards to Robot. 9

UNIT–II

3. (a) Explain the various types of sensors in robots. Also describe in brief exteroceptors or external sensors. 7

   (b) Write a technical note on tactile, proximity and range sensors. 8

4. Write short notes on the following : 3×5=15

(a) Robotics in Science Fiction.

(b) Characteristics of end of arm tooling.

(c) Machine Vision Sensor.

UNIT–III

5. (a) Write short notes on Machine loading and unloading with regards to material transfer. 8

(b) Explain in detail General consideration in Robot material handling. 7

6. Discuss in detail tool selection of Gripper, Gripper mechanism and types of Grippers. Also explain Vacuum and Magnetic Grippers. 15

UNIT–IV

7. Describe in brief Robot Cell layouts, multiple Robots and Machine interface. Also explain interlocks and the Work cell controllers. 15

8. Write short notes on the following with regards to robot :

(a) Robot Dynamics and Manipulator path control. 7½

(b) Configuration of Robot control. 7½

ME 8th/Lib

Roll No. ..... Total Pages : 2

48368

BT-8/D-23

SUPPLY CHAIN MANAGEMENT

Paper : MEO-402A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt any *five* questions, selecting at least *one* question from each unit.

UNIT–I

1. Explain the push/pull view of the processes within a supply chain and illustrate with an example. 15

2. Describe the major challenges that must be overcome to manage a supply chain successfully. Why achieving strategic fit is critical to a company's overall success? 15

UNIT–II

3. Classify the role of sourcing in supply chain. Describe key components of pricing decisions that affects supply chain performance. 15

4. Explain six distinct distribution network designs may be used to move products from factory to customers with a neat sketch. 15

UNIT–III

5. Discuss various factors influencing network design decisions. Describe the framework for network design decisions. 15

6. Explain risk management in global supply chains. Also summarize the basic steps in the decision tree analysis methodology. 15

UNIT–IV

7. (a) Explain how do economies of scale lead to reduction in cost of production. 8

   (b) Distinguish between lot size-based and volume-based quantity discounts. 7

8. Discuss the role of safety inventory in a supply chain. Explain the effect of uncertainty on safety inventory. 15

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48372

BT-8/D-23

TOTAL QUALITY MANAGEMENT

Paper : MEO-410A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt any *five* questions in all, selecting at least *one* question from each Section.

SECTION-I

1. Define quality and its significance for customers. Describe the evolution of quality. 15

2. Write briefly on :

(a) Deming's and Juran's philosophy of quality. 8

(b) Barriers to TQM. 7

SECTION-II

3. Briefly write on role of 'Quality Circles', 'Quality Council' and 'Reward Performance Appraisal' in implementing a quality culture. 15

4. Write briefly on :

(a) PDCA Cycle. 5

(b) 5 S. 5

(c) Process Capability. 5

SECTION-III

5. Write briefly on QFD and 'Voice of Customers'. 15

6. Describe various FMEA stages. Write briefly on 'House of Quality'. 15

SECTION-IV

7. Write briefly on steps in 'Internal Audit' needed in implementing ISO 9000 series of standards. How is this audit useful? 15

8. Write briefly on need for ISO 14000 series of standards. Discuss their impact on manufacturing environment. 15

Roll No. ..... Total Pages : 2

BT-8/D-23 **48375**

AUTOMOBILE ENGINEERING

Paper–MEP-404A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt only *five* questions, selecting at least *one* question from each unit.

UNIT–I

1. (a) How do we classify automobile engines? 8

(b) Describe the reasons for using multi cylinder diesel engine for commercial vehicles. 7

2. (a) What are the main parts of a clutch?

(b) Explain various clutch types. 15

UNIT–II

3. Write a technical note on the following :

(a) Maruti 800 Gear Box.

(b) Epicyclic Gear Box. 15

4. (a) Explain the Drive mechanism from gearbox to final drive in cars.

(b) Write a note on GPS vehicle tracking system. 15

UNIT–III

5. (a) Explain Brake actuation mechanism Leading and trailing shoes.

   (b) Explain trouble shooting in differentials. 15

6. Explain the following :

   (a) Types of automobile wheels

   (b) Tyre maintenance. 15

UNIT–IV

7. (a) Explain elements of suspension systems.

   (b) Describe the trouble shooting of suspension system. 15

8. (a) Describe the steering mechanism generally used in some Indian vehicles.

   (b) Explain Ackerman linkage. 15

Roll No. ..... Total Pages : 2

BT-8/D-23 **48379**

QUALITY AND RELIABILITY ENGINEERING

Paper–MEP-412A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions, selecting at least *one* question from each unit.

UNIT–I

1. Define quality; explain the role of quality engineering in product design and production process. 15

2. Explain statistically methods for quality control and improvement. 15

UNIT–II

3. Explain the difference between variables and attributes. Explain any *one* chart for attributes with suitable example. 15

4. Explain the following :

(i) Single.

(ii) Double.

(iii) Sequential.

(iv) Continuous sampling plans. 15

UNIT–III

5. Explain :

(i) Reliability as a function of time.

(ii) Bath Tub Curve.

(iii) MTTF. 15

6. (i) Define Loss Function, Explain L type, N Type and S Type.

(ii) Explain Maintainability and Availability. 15

UNIT–IV

7. Explain the following :

(i) Redundancy and Reliability.

(ii) Hazard rate.

(iii) Advantages of weibull distribution. 15

8. Write technical note on :

(i) Reliability Testing.

(ii) Reliability prediction and system effectiveness. 15
