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

43144

BT-3/D-24

OPTICS AND WAVES

Paper : BS-201A

Time : Three Hours] [Maximum Marks : 75

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

UNIT–I

1. (a) Define Travelling waves. What are the characteristics of travelling waves? (7)

(b) What is Group velocity? Develop a mathematical relation between group velocity and phase velocity. (8)

2. (a) Write Maxwell's equations in both differential and integral forms. Explain physical significance of these equations. (8)

(b) Explain law of reflection and Snell's law in case of wave incident obliquely on boundary. (7)

UNIT–II

3. (a) What do you understand by interference of light? Give the conditions for sustained interference. (7)

(b) Describe Fresnel's biprism. How this biprism is helpful to determine wavelength of monochromatic light? (8)

4. (a) Discuss the formation of Newton's rings in reflected light. (7)

(b) Explain principle, construction and working of Michelson's interferometer. (8)

UNIT–III

5. (a) What do you mean by diffraction of light? Explain Fraunhofer diffraction at a single slit. 10

(b) Derive an expression for dispersive power of diffraction grating. 5

6. (a) Define Specific rotation. Describe the construction and working of Biquartz polarimeter. (8)

(b) Explain the construction and working of Nicol prism. How can it be used as an analyzer. (7)

UNIT–IV

7. (a) Explain the terms: Stimulated absorption, Spontaneous emission and Stimulated emission in context of LASER. 7

(b) Discuss Einstein's coefficients. Derive relation between them. 8

8. (a) Describe the principle, construction and working of He-Ne LASER. 10

(b) Explain main components of LASER. 5

Roll No. ..... Total Pages : 3

43156

BT–3/D–24

HIGHER ENGINEERING MATHEMATICS

Paper–BS–204A

Time : 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) Find the Laplace transform of the function

$$e^{2t} + 4t^3 + 2\sin 3t + 3\cos 3t. \quad (8)$$

(b) Find the inverse Laplace transform of the function

$$\frac{2s^2 - 4}{(s+1)(s-2)(s-3)}. \quad (7)$$

2. (a) Find the Laplace transform of the function

$$\frac{1-\cos 2t}{t}. \quad (8)$$

(b) Solve the following differential equation using Laplace Transform :

$$\frac{d^3y}{dt^3} + 2\frac{d^2y}{dt^2} - \frac{dy}{dt} - 2y = 0,$$

where $y = 1, \frac{dy}{dt} = 2 \frac{d^3y}{dt^3} = 2$ at $t = 0$. (7)

UNIT–II

3. (a) Form the partial differential equation (by eliminating the arbitrary function) from

$$z = (x + y)\varphi(x^2 - y^2).$$ (8)

(b) Solve the Partial differential equation

$$x^2(y - z)p + y^2(z - x)q = z^2(x - y).$$ (7)

4. (a) Using Charit's method, solve :

$$z^2 = pqxy.$$ (8)

(b) Solve the equation :

$$r - 4s + 4t = e^{2x+y}.$$ (7)

UNIT–III

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

$$x^2 - x - 11 = 0,$$

correct to four decimal places. (8)

(b) Find the real root of the equation

$$x^4 - x - 9 = 0$$

by Newton-Raphson method, correct to three places of decimal. (7)

6. (a) Using Newton's forward interpretation formula, find y at x = 8 from the following table : (8)

x :	0	5	10	15	20	25
y :	7	11	14	18	24	32

(b) Using Newton's divided difference formula, evaluate f(8) and f(15), given : (7)

x	4	5	7	10	11	13
f(x)	48	100	294	900	1210	2028

UNIT–IV

7. (a) Find the first, second and third derivatives of the function tabulated below at the point x = 1.5 : (8)

x	1.5	2.0	2.5	3.0	3.5	4.0
f(x)	3.375	7.0	13.625	24.0	38.875	59.0

(b) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by using Trapezoidal and Simpson's 1/3 rule. (7)

8. Apply Runge-Kutta fourth order method, to find an approximate value of y when x = 1.2, in steps of 0.1, given that :

$$\frac{dy}{dx} = x^2 + y^2 \text{ and } y(1) = 1.5. \quad (15)$$

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

43162

BT-3/D-24

BASIC ELECTRONICS ENGINEERING

Paper : ES-203A

Time : Three Hours] [Maximum Marks : 75

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

UNIT–I

1. Discuss the working principle of p-n junction diodes. Discuss the I-V characteristics of diodes. Discuss the concept of zener diode in detail. (5+5+5=15)

2. Discuss the working principle of BJT. Discuss the input output characteristics of BJT. Discuss the application of BJT as a common emitter amplifier. (5+5+5=15)

UNIT–II

3. Discuss the working principle of the operational amplifier. Discuss the applications of operational amplifiers as adder, subtractor and differentiator. (5+10=15)

4. Discuss the concept of oscillator and Barkhausen's criteria for oscillation. Discuss the circuit and working of Wein Bridge oscillators. Discuss the astable mode of operation of the 555 timer. (5+5+5=15)

UNIT–III

5. Minimize using K-map F(A, B, C, D) = Σm (0, 1, 2, 3, 4, 6, 8, 9, 10, 11, 12, 14) and draw its circuit using NAND Gates only. (15)

6. Discuss the concept of Full adder and basic counters in detail. (15)

UNIT–IV

7. Discuss in detail the concept of modulation. Discuss amplitude and frequency modulation in detail. (5+10=15)

8. Discuss the concept of a GSM system using block diagrams. Discuss the basic elements of communication system in detail. (8+7=15)

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

43164

BT-3/D-24

THEORY OF MACHINES

Paper–MEC-201A

Time : Three Hours] [Maximum Marks : 75

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

UNIT–I

1. (a) Explain Four Bar Chain.

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

2. (a) How do we determine link velocities?

(b) Explain methods for locating instantaneous centres. (15)

UNIT–II

3. (a) Explain coriolis acceleration component.

(b) Explain the acceleration of a point on a link. (15)

4. (a) How do we classify cams.

(b) Draw the displacement, velocity and acceleration diagrams when the follower moves with uniform velocity. (15)

UNIT–III

5. (a) Explain Static equilibrium; also explain equilibrium of two and three force member.

   (b) Explain dynamic analysis of slider crank mechanism. (15)

6. (a) Explain static and dynamic balancing.

   (b) Explain balancing of multi-cylinder in line engines. (15)

UNIT–IV

7. (a) Determine the ratio of tensions in flat belt drive. (8)

   (b) Write a note on chain drives and its classification.

   OR

   Describe the law of belting. (7)

8. (a) How do we classify the Gear, also write the terminology used in Gears? (8)

   (b) Explain compound gear train with neat sketch. (7)

Roll No. ..... Total Pages : 3

43165

BT-3/D-24

MECHANICS OF SOLIDS-I

Paper : MEC-203-A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all, selecting at least *one* question from each unit. Assume any missing data suitably.

UNIT–I

1. (i) Two forces equal to 2P and P respectively act on a particle, if the first be doubled, and the second increased by 12 N the direction of the resultant is unaltered, find the value P. 7

(ii) A body consists of a right circular solid cone of height 18 cm and radius 15 cm placed on a solid hemisphere of radius 15 cm of the same material. Find the position of c.g. 8

2. (i) A straight bar 450 mm long is 10 mm in diameter for the first 200 mm length and 20 mm in diameter for the remaining length. If the bar is subjected to an axial pull of 10 kN, determine decrease in length of the bar. Take $E = 2 \times 10^5$ N/mm^2. 8

(ii) A tensile load of 56 kN was applied to a bar of 30 mm diameter with 300 mm gauge length. Measurements showed 0.12 mm increase in length and the corresponding 0.0036 mm contractions in diameter. Make calculations for the Poisson's ratio and the values of three moduli. 7

UNIT–II

3. Prove that in a general bi-axial stress system, the maximum shear stress is given by half the algebraic difference of principle stresses. 15

4. A beam ABCD, 6 m long is supported at B and C, 3 m apart with overhangs AB = 2 m and CD = 1 m. The beam carries a uniformly distributed load of 100 kN/m. Find the maximum magnitudes of bending moment and shear force. 15

UNIT–III

5. Two solid shafts A and B are made of the same material and transmit the same power. Shaft A runs at 200 rpm, while the shaft B turns 2000 rpm. If the maximum shear stress developed in each shaft is same, determine the ratio of diameter of the two shafts. Comment on the results. 15

6. Derive expressions for the equivalent bending moment and equivalent torque for a circular shaft subjected simultaneously to bending M and torque T. 15

UNIT–IV

7. Derive an expression for the Euler's buckling load for a column with one end fixed and the other end pinned. 15

8. A simply supported beam of 8 m span is acted upon by a 8 kN concentrated load at the centre in addition to 32 kN of load uniformly distributed over the entire span. Determine the central deflection and slope at each end. Take $E = 200\ GN/m^2$ and $I = 1 \times 10^{-4}\ m^4$. 15

Roll No. ..... Total Pages : 4

43166

BT-3/D-24

THERMODYNAMICS

Paper - MEC-205A

Time : Three Hours] [Maximum Marks : 75

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

UNIT–I

1. (a) Answer the following True or False. Explain.

(i) A closed system always contains the same matter; there is no transfer of matter across its boundary. 2

(ii) The volume of a closed system can change. 2

(iii) Temperature is the property that is the same for each of two systems when they are in thermal equilibrium.. 2

(iv) When a closed system undergoes a process between two specified states, the change in temperature between the end states is independent of details of the process. 2

(v) Body organs, such as the human heart, whose shapes change as they perform their normal functions can be studied as control volumes.2

(b) State Zeroth law of Thermodynamics and explain how it helps in the measurement of temperature. 5

2. (a) State the First Law of Thermodynamics and prove that for a non-flow process, it leads to the energy equation $Q = \Delta U + W$. 5

(b) What is the mechanical equivalent of heat ? Write down its value when heat is expressed in kJ and work is expressed in N-m. 5

(c) Explain clearly the difference between a non-flow and a steady flow process. 5

UNIT–II

3. An insulated cylinder of volume capacity 4 m^3 contains 20 kg of nitrogen. Paddle work is done on the gas by stirring it till the pressure in the vessel gets increased from 4 bar to 8 bar. Determine :

(i) Change in internal energy,

(ii) Work done,

(iii) Heat transferred, and

(iv) Change in entropy.

Take for nitrogen :

$c_p = 1.04$ kJ/kg K, and $c_v = 0.7432$ kJ/kg K. (15)

4. (a) Give the following statements of second law of thermodynamics :

(i) Clausius statement.

(ii) Kelvin-Planck statement. (10)

(b) Define heat engine, refrigerator and heat pump. What is the perpetual motion machine of the second kind? (5)

UNIT–III

5. (a) Derive an expression for availability in non-flow systems. (5)

(b) Derive an expression for availability in steady flow systems. (5)

(c) Differentiate between availability function and Gibb's energy function. (5)

6. (a) What is the critical state? Explain the terms critical pressure, critical temperature and critical volume of water? (5)

(b) A steam boiler initially contains 5 m^3 of steam and 5 m^3 of water at 1 MPa. Steam is taken out at constant pressure until 4 m^3 of water is left. What is the heat transferred during the process? (10)

UNIT–IV

7. For the following given differential equations,

$du = Tds - pdv$

and $du = Tds + vdp$

prove that for perfect gas equation,

$$\left(\frac{du}{\partial p}\right)_T = 0 \text{ and } \left(\frac{dh}{\partial p}\right)_T = 0.$$

8. An I.C. engine operating on the dual cycle (limited pressure cycle) the temperature of the working fluid (air) at the beginning of compression is 27°C. The ratio of the maximum and minimum pressures of the cycle is 70 and compression ratio is 15. The amounts of heat added at constant volume and at constant pressure are equal. Compute the air standard thermal efficiency of the cycle. State three main reasons why the actual thermal efficiency is different from the theoretical value. (15)

ME 5th/Lib.

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

BT-5/D-24 **45195**

HEAT TRANSFER
MEC-301A

Time : Three Hours] [Maximum Marks : 75

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

Unit I

1. Derive suitable expressions to show that temperature profile for heat conduction through a wall of constant thermal conductivity is a straight line and in the presence of a uniform heat source it takes the shape of a parabola. **15**

2. A tube 2 cm o.d. maintained at uniform temperature of T_i is covered with insulation (k = 0.20 W/mK) to reduce heat loss to the ambient air at T_a with h_a = 15 W/m^{2}K. Find the critical thickness of insulation. Also calculate the ratio of heat loss from the tube with insulation to that without insulation : **15**

(a) If the thickness of insulation is equal to r_c

(b) If the thickness of insulation is (r_c + 2) cm

Unit II

3. Air at atmospheric pressure and 24°C flows with a velocity of 10 m/s along a flat plate 4 m long, which is maintained at a uniform temperature of 130°C. Assuming $Re_c = 2 \times 10^5$, determine : **15**

   (a) the local heat transfer coefficient at 2 m , 3 m and 4 m from the leading edge

   (b) the average heat transfer coefficient

   (c) the heat transfer rate from the plate.

4. What is thermal boundary layer ? Explain how the thermal boundary layer thickness is related to hydrodynamic boundary layer thickness. **15**

Unit III

5. State the Stefan Boltzmann law. Derive the expression for total emissive power of a surface. **15**

6. Two opposed , parallel , infinite planes are maintained at 420K and 480K respectively. Calculate the net heat flux between these planes if one has an emissivity of 0.8 and the other as emissivity of 0.7. Does it matter which

plate has which emissivity ? How this heat flux will be affected if : 15

(a) The temperature difference is doubled by raising the temperature to 480K and 540K.

(b) The planes are assumed to be black.

Unit IV

7. What is the limitation of LMTD approach of heat exchangers ? Derive the expression for effectiveness of heat exchanger in terms of NTU. 15

8. In an oil cooler, oil enters at 160°C. If water entering at 35°C flows parallel to oil , the exit temperatures of oil and water are 90°C and 70°C respectively. Determine the exit temperatures of oil and water if the two fluids flow in opposite directions. Assume that the flow rates of the two fluids and U_0 remain unaltered. What would be the minimum temperatures to which oil could be cooled in parallel flow and counter flow operations ? 15

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

BT-5/D-24 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. During orthogonal machining of a mild steel part, a depth of cut of 0.8 mm is used at 55 rpm. If the chip thickness is 1.6 mm, determine the chip thickness ration. Also calculate the length of chip removed in one minute if work diameter is 50 mm before the cut is taken. Assume continuous type of chip. **15**

2. (a) Explain the Lathe chucks in detail. **7**
   (b) Discuss the functions of cutting fluid and classify them. **8**

Unit II

3. (a) Calculate the percentage change in cutting speed required to give 65% of reduction in tool life. Assume $n = 0.2$. **8**

(b) What is machinability and discuss factors affecting it ? 7

4. Explain the measurement of external and internal threads in detail. 15

Unit III

5. Discuss the thread milling method and also explain the conventional machines and planetary thread milling machines in detail. 15

6. Explain the Boring jigs and Drill jigs in detail. 15

Unit IV

7. Discuss the following methods of gear cutting :
   (a) Casting
   (b) Stamping
   (c) Rolling process. 15

8. (a) Explain the coordinates of the CNC Machine. 8
   (b) Write a short note on automatic pallet changer. 7

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

BT-5/D-24 45197

MECHANICAL VIBRATIONS AND TRIBOLOGY

MEC-305A

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. Define and explain the following terms : 15
   (i) Natural frequency
   (ii) Degree of freedom
   (iii) SHM
   (iv) Resonance
   (v) Phase difference.

2. How the moment of inertia and radius of gyration of an object can be determined using Bifilar suspension ? 15

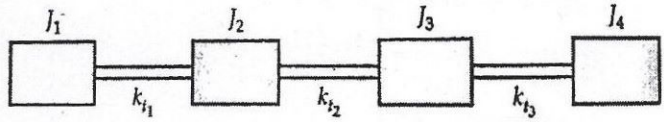
Unit II

3. The support of a spring mass system is vibrating with an amplitude of 5 mm and a frequency of 1150 cycles/min. If the mass weighs 0.9 kg and the spring has a stiffness of 2 kg/cm, determine the amplitude of vibrations of mass. What amplitude will result if a damping factor of 0.2 is included in the system ? **15**

4. Derive the characteristic equation for a two degree of freedom system with multiple damping elements. **15**

Unit III

5. Calculate the natural frequencies of the system as shown in Fig. 1. Use Holzer Method : **15**



Given : $J_1 = 10$ kg-cm-sec^2, $J_2 = J_4 = 2$ kg-cm-sec^2, $J_3 = 15$ kg-cm-sec^2.

$k_{t1} = k_{t3} = 10 \times 10^6$ kg-cm/rad, $k_{t2} = 20 \times 10^6$ kg-cm/rad.

6. A torsional system consists of a shaft with a disc of mass moment of inertia I_0 mounted at its center. If both ends of the shaft are fixed, find the response of the system in free torsional vibration of the shaft. Assume that the disc is given a zero initial angular displacement and an initial velocity of $\dot{\theta}_0$. **15**

Unit IV

7. Explain the chemical and physical properties of lubricants. What ways are used for the disposal of scrap oil ? **15**

8. Explain different friction and wear measurement techniques in detail. **15**

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

BT-5/D-24 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. Discuss the concept of value education. Discuss its importance and its process. Discuss one aspect in your life which you have experientially validated using self exploration ? 5+5+5

2. Discuss the concept of happiness, prosperity and their continuity. Discuss and prioritize the concept of right understanding, relationship and physical facility. 7+8

Unit II

3. Discuss the concept of co-existence of self and body. Discuss and differentiate between self and body based upon needs, activities and response. Discuss possible sources of imagination in self with suitable examples. **5+5+5**

4. Discuss the harmony of self with the body. Discuss the program of self regulation to ensure health of the body. **6+9**

Unit III

5. Discuss the naturally acceptable feelings in human relationship from foundation value to complete value in detail. **15**

6. Discuss the various dimensions (systems) of human order in detail for harmony in the society. **15**

Unit IV

7. Discuss the four orders of nature and harmony between them. Discuss the concept of self regulation in nature with suitable examples. 10+5

8. Discuss the concept of coexistence in all pervasive space in detail. Discuss the strategy to achieve universal human order from the present state. 10+5

ME III/ Lib.

Roll No. ..... Total Pages : 3

BT–7/D-24 **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. (a) Define the Air pollution. Explain Primary and Secondary Air pollutants. 8

   (b) Explain the sources and consequence of Air pollutants for the following : 7

   (i) Sulphur-di-oxide. (ii) Ozone.

   (iii) Dust. (iv) Fumes.

2. (a) Enumerate the effects of the Air pollution on Human health and Vegetation. 8

   (b) Explain the recent techniques for online stack monitoring. 7

UNIT–II

3. (a) What is Air quality? Explain the National and International emissions standards. 7

   (b) Describe EPS's ISC model. 8

4. (a) How you will determine the effective stack height? 8

   (b) What is meant by Air quality monitoring ? Explain any four methods of Calculation of Air pollution indices for monitoring of Air pollutants. 7

UNIT–III

5. (a) Explain the factors affecting the selection of the particulate Air control devices. 8

   (b) Describe the distribution and sources of particulate matter. 7

6. Explain briefly the emission of the Gasoline driven vehicles and Diesel driven vehicles. How emission can be controlled by Engine design changes? 15

UNIT–IV

7. (a) Define the Noise pollution. Explain the sources and different methods to control the Noise pollution. 7

(b) Explain the following : 8

(i) speed of sound.

(ii) sound energy density.

8. (a) Differentiate between the Sound level meter and Octave band analyser. 7

(b) Explain the different Barriers and Enclosure used for sound protection. 8

Roll No. ..... Total Pages : 3

BT–7/D-24 **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) Discuss various types of Automation strategies mentioning their importance. 7

   (b) Define the following terms used in mass production.

   (i) Production rate.

   (ii) Plant capacity 8

2. Classify the Industrial robots and briefly describe it. Describe the types of end effector and gripper mechanisms with simple sketches. 15

UNIT–II

3. Discuss how group technology is used in designing manufacturing cells? Discuss the parts classification and coding structure employed in-group technology. 15

4. Explain the component of FMS and FMS layout configuration. Discuss application, advantages and disadvantages of a FMS. 15

UNIT–III

5. List the Objectives of Planning and Control. What are the benefits of Computer Aided Process Planning? Differentiate the underlying concepts of variant and generative CAPP systems. 15

6. (a) What is meant by Shop floor Control (SFC) ? Describe various phases of SFC. 9

   (b) What are the major types of Data collection systems? 6

UNIT–IV

7. (a) Explain the following in CNC machining : 9

   (i) Linear Interpolation.

   (ii) Circular Interpolation.

   (iii) Cubic Interpolation.

   (b) Define the CNC machine and list the components used in the CNC manufacturing system. Elaborate different types of Numerical Control of machine tools with Historical development. 6

8. (a) What is meant by AGV and write its components? Mention its application. Illustrate with suitable example used in Shop floor. 10

(b) Describe various categories of Automatic storage and retrieval systems used in industries. 5

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

BT-7/D-24 **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 functional area of a basic CAD system and their applications in the design process. 9

   (b) CAD/CAM has its impact on all aspect of product cycle. Explain how? 6

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

   (b) Explain the basic structure of the computer in term of CAD. 8

UNIT–II

3. (a) Write a short note on Data Base coordinate system. 6

   (b) List the advantages and disadvantages of Network database and hierarchical data base. 9

4. Drive the transformation matrix for a 2D translation and scaling. 15

UNIT–III

5. (a) What is wireframe modelling and explain its advantages. 8

   (b) Discuss the role of set theory in solid modelling. 7

6. Discuss the parametric representation of conic and hyperbola. 15

UNIT–IV

7. Drive the derivation for Hermit bicubic surface. 15

8. Write a short note on the following: 15

   (a) Neutral file format

   (b) Data exchange format.

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

BT-7/D-24 **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) Explain in detail Automation and Robotics. 7½

   (b) Write a technical note on Robotics in Science fiction. 7½

2. (a) Write Robot anatomy and Robot drives systems. 7½

   (b) Write a technical note on use of sensors in robots. 7½

UNIT–II

3. (a) Explain in detail machine vision sensors. 7

   (b) Describe in brief Characteristics of end of Arm tooling. 8

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

   (a) Exteroceptors or External Sensors.

   (b) Range and Proximity Sensors.

   (c) Velocity Sensor.

UNIT–III

5. (a) Write short notes on tool selection of gripper. Also explain various types of grippers. 8

   (b) Explain in detail general consideration in robot material handling. Also discuss magnetic grippers. 7

6. Write short notes on machine loading and unloading with regards to material transfer. 15

UNIT–IV

7. Describe in brief 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: 2×7½=15

   (a) Robot Dynamics.

   (b) Robot motion analysis and Control.

ME 8th/ Lib

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

BT-8/D-24 **48368**

SUPPLY CHAIN MANAGEMENT
MEO-402A

Time : Three Hours] [Maximum Marks : 75

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

Unit I

1. What is Supply Chain ? Discuss various Supply Chain, also explain process views of a supply chain in detail with a neat sketch ? **15**

2. Discuss the goals of a supply chain also explain how the supply chain decisions affect the success of a firm ? **15**

Unit II

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

4. Discuss the role of distribution supply chain. Describe various factors influencing distribution network design ? **15**

Unit III

5. Discuss various factors influencing network design decisions. Develop the framework for network design decisions with a neat sketch. **15**

6. Explain risk management in global supply chain. Explain different strategies that may be used to mitigate risk of global supply chain. **15**

Unit IV

7. (a) Explain, when are quantity discounts justify in a supply chain ? **8**

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

8. (a) What is the impact of supply uncertainty on safety inventory ? **8**

   (b) Describe two types of ordering policies and the impact that each of them has on safety inventory. **7**

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

BT-8/D-24 48372

TOTAL QUALITY MANAGEMENT

MEO-410A

Time : Three Hours] [Maximum Marks : 75

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

Section I

1. Justify the need for quality in a manufacturing organization and explain, how has quality evolved over the years since Industrial Revolution ? 15

2. Write briefly on the following :
   (a) Customer satisfaction and customer complaints. 8
   (b) Quality costs. 7

Section II

3. (a) Briefly write on role of 'leadership' in implementing a quality culture. 7
   (b) How does Six Sigma help in quality improvement ? 8

4. Write briefly on the following :

(a) Kaizen 7

(b) Supplier selection and supplier rating. 8

Section III

5. Explain the concept of 'House of Quality' and also describe the process of building a 'House of Quality'. 15

6. Write briefly on the following :

(a) POLAYOKE 7

(b) FMEA stages. 8

Section IV

7. Write briefly on requirements for ISO 14000 series of standards and discuss their benefits. 15

8. (a) Write briefly on need for ISO 9000 standards. 8

(b) Discuss the concept of quality auditing. 7

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

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AUTOMOBILE ENGINEERING

MEP-404-A

Time : Three Hours] [Maximum Marks : 75

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

Unit I

1. (a) How do we classify automobile engines, also explain the merits and demerits of vertical and horizontal engines. 8

(b) What are the reasons for using single cylinder two stroke air-cooled petrol engine on two wheelers. 7

2. (a) Explain the main parts of clutch. 8

(b) Describe the functions of a clutch. 7

Unit II

3. (a) Explain the type of Gear Boxes. 7

(b) Write a note on Maruti 800 Gear Box. 8

4. Write technical notes on the following :

(i) ABS 8

(ii) GPS vehicle tracking system 7

Unit III

5. (a) Explain requirement of final drive. **8**

   (b) Describe the working of a Differential. **7**

6. (a) What are the requirements of Brake system ?

   (b) Explain the types of automobile wheels. **15**

Unit IV

7. (a) Describe the needs for a good suspension system.

   (b) What are the elements of a suspension system ? **15**

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

   (b) What is "Understeering and Oversteering" ? **15**

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WELDING TECHNOLOGY

MEP-408A

Group-I

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. List various functions and applications of welding in different industries. **15**

2. Illustrate with neat sketch the working, advantages and limitations of the following fusion welding processes : **15**
   (a) Firecracker welding
   (b) Electrogas welding
   (c) Electroslag welding.

Unit II

3. Distinguish between constant current and constant power sources with applications of each. **15**

4. (a) What is operating point in arc characteristic curve for given welding power sources ? How is operating point affected by arc length ? 5

(b) What is self regulating arc and how can it be achieved in SAW/GMAW processes ? 5

(c) Define the term 'Duty cycle.' What are the factors affecting duty cycle for a power source at a welding current ? 5

Unit III

5. Illustrate with neat sketches, the working of various types of gas welding cylinder regulators. 15

6. Illustrate the following operations involved in the handling of gas welding equipment : 15

(a) Selection of Welding torch tip size

(b) Handling of oxygen and Acetylene cylinders

(c) Lighting Injector type and equal pressure type torch.

Unit IV

7. Explain the following NDT methods :

(a) Magnetic Particle Testing 8

(b) Liquid Penetrant Testing. 7

8. (a) Describe various types of metal transfer modes involved in Metal inert gas welding process. 8

(b) List various differences between MIG welding and TIG welding processes. 7