ME Lib

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

BT-3/D-22 **43161**

OPTICS AND WAVES

Time : Three Hours] [Maximum Marks : 75

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

Unit I

1. (a) Describe the characteristics of real light waves. 7

   (b) Derive the expression for energy density and Poyinting vector for propagating light waves. 8

2. (a) Derive a relation for reflection coefficient and transmission coefficient in context of wave incident normally on boundary. 8

   (b) Define the terms phase velocity and group velocity. Derive relation between them. 7

Unit II

3. (a) Explain the construction and working of Michelson's interferometer. 8

   (b) Explain the phenomenon of interference by division of amplitude by giving an example. 7

4. (a) How one can determine the wavelength of monochromatic light by utilizing Fresnel's Biprism. 8

(b) Explain the formation of Newton's rings in reflected system. 7

Unit III

5. (a) Describe principal maxima, secondary maxima and number of orders of spectra in a plane transmission diffraction grating. 8

(b) Explain the construction and working of Biquartz polarimeter. 7

6. (a) Explain the phenomenon of double refraction. 7

(b) Explain dispersive and resolving power of plane transmission diffraction grating. 8

Unit IV

7. (a) Explain with neat diagram the working and principle of Ruby Laser. 8

(b) Describe various applications of Laser. 7

8. (a) Explain the terms : 8

(i) Population inversion

(ii) Pumping in laser.

(b) Discuss various characteristics of LASER light. 7

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

BT-3/D-22 43162

BASIC ELECTRONICS ENGINEERING

Mechanical 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

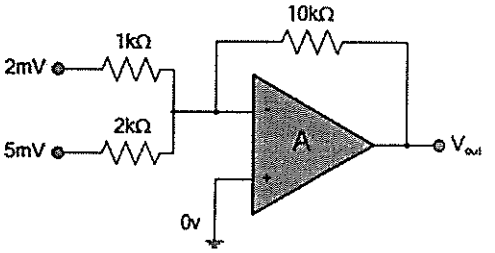
1. (a) Discuss the working of the p-n junction diode and explain its V-I characteristics. **8**

   (b) Discuss the working of BJT as a Common Emitter Amplifier. **7**

2. Discuss the principle and working of full wave bridge rectifier and compute its efficiency. Also differentiate between half wave and full wave rectifier. **10+5**

Unit II

3. Discuss the principle of adder using op-amp. Calculate the output of the given circuit, given A= 20,000. **5+10**



4. Discuss the astable and monostable operation of the 555 timer in detail. Explain the basic principle of oscillators. **10+5**

Unit III

5. Simplify using K-map F(A, B, C, D) = $\Sigma m(1, 2, 6, 7, 8, 13, 14, 15) + d^*(3, 4, 5, 12)$ and draw its circuit using AND-OR Gates. Note : * is don't care. **15**

6. Write short notes on the following : **5+5+5**

   (a) Full adder

   (b) J-K Flip Flop

   (c) Counter.

Unit IV

7. Discuss in detail the cellular concept and block diagram of the GSM system. **15**

8. Discuss the need of modulation in the communication system. Discuss one AM and one FM modulation techniques in detail. **5+10**

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

BT-3/D-22 **43163**

HIGHER ENGINEERING MATHEMATICS

BS-204-A

Group I, Opt. 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. (a) Only state the following properties of the Laplace Transform : **7.5**

   (i) First shifting property

   (ii) Multiplication property

   (iii) Division property

   (iv) Derivative property

   (v) Integral property.

   (b) (i) Find the Laplace transform of $\left(\frac{\sin^2 t}{t}\right)$.

(ii) Find the Inverse Laplace transform of

$$\frac{s}{s^2+5s+20}.$$ 3+4.5

2. (a) Using Convolution theorem, evaluate : 7.5

$$L^{-1}\left(\frac{1}{\left(s^2+4\right)\left(s^2+25\right)}\right)$$

(b) Using the Laplace transform, solve the differential equation $\frac{d^2y}{dx^2}+y=t\cos 2t$, given that $y(0)=y'(0)=0$. 7.5

Unit II

3. (a) Form the Partial differential equation for the function : 7.5

$$z=f(y+2x)+g(y-3x).$$

(b) Solve the differential equation using Charpit's Method, $2xy-px^2-2qxy+pq=0$. 7.5

4. Solve the equation, $\left(D^2-DD'-2D'^2\right)z=(y-1)e^x$. 15

Unit III

5. (a) Find the root of the equation $x^3-2x-5=0$, correct to three decimal places, by Newton-Raphson method. 7.5

(b) Evaluate $\Delta^2\left(\frac{5x+12}{x^2+5x+6}\right)$ and prove that : 7.5

$$\Delta^n e^{3x+5} = \left(e^3 - 1\right)^n e^{3x+5}.$$

6. (a) From the following table, find $y(7.5)$ using Bessel's formula : 7.5

x	$y(x) = x^3$
3	27
5	125
7	343
9	729
11	1331

(b) Apply Newton's divided difference formula to find $y_{(2)}$, given : 7.5

$y_{(-3)} = -30,\ y_{(-1)} = -22, y_{(0)} = -12, y_{(3)} = 330, y_{(5)} = 3458.$

Unit IV

7. (a) From the following table find the values of first and second derivatives at $x = 2.2$. 7.5

x	$f(x)$
1.6	2.979
1.7	3.144
1.8	3.283

1.9	3.391
2.0	3.463
2.1	3.997
2.3	4.491

(b) For the equation $\frac{dy}{dx} = \frac{2y^2}{x}$ with $y(1) = 2$, estimate $y(2)$ using Modified Euler's method, taking $h = 0.25$. **7.5**

8. Find an approximate value of $y(0.1)$ and $y(0.2)$, if $\frac{dy}{dx} = -y$, $y(0) = 1$, by Runge-Kutta Method of order two and order four, and compare the results. **15**

Roll No. .....

Total Pages : 04

BT-3/D-22

43164

MECHANICS OF SOLIDS-I

Mechanical Engineering

MEC-203A

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. (a) Three forces of magnitude 30 kN, 10 kN and 15 kN are acting at a point O. The angles made by 30 kN force, 10 kN force and 15 kN force with x-axis are 60°, 120° and 240° respectively. Determine the magnitude and direction of the resultant force. 7

   (b) Find the moment of inertia of the lamina with a circular hole of 30 mm diameter about the axis AB as shown in Fig. 1 : 8

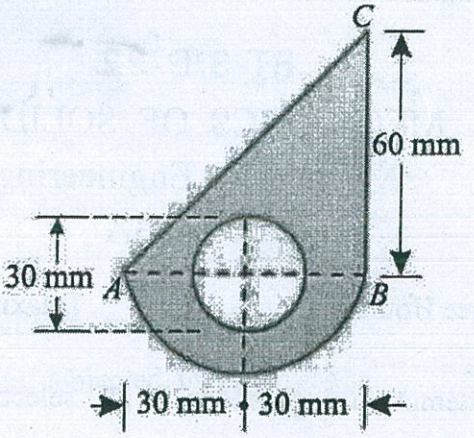


Fig. 1

2. A solid steel bar of 70 mm diameter and 0.5 m long is placed inside an aluminium tube having 75 mm inside diameter and 100 mm outside diameter. The aluminium cylinder is 0.15 mm longer than the steel bar. An axial compressive load of 600 kN is applied to the bar and the cylinder through the rigid cover plates. Find the stresses developed in the steel bar and the aluminium cylinder. Take E_s = 200 GN/m^2 and E_c = 70 GN/m^2. **15**

Unit II

3. A rectangular block of material is subjected to a tensile stress of 100 MN/m^2 on one plane and a tensile stress of 50 MN/m^2 on a plane at right angles, together with the shear stresses of 60 MN/m^2 on the same planes.

Find :

(a) The magnitude of the principal stresses

(b) The direction of the principal planes

(c) The magnitude of the greatest shear stress. **15**

4. A beam ABCD is simply supported at B and C, 5 m apart, and the overhanging parts AB and CD are 1.5 m long respectively. The beam carries a U.D.L. of 3 kN between A and C and there is concentrated load of 2 kN at D. Draw the S.F. and B.M. diagrams. Calculate the position of maximum B.M. between B and C. **15**

Unit III

5. What power can be transmitted at 300 rpm by a hollow steel shaft of 7.5 cm external and 5 cm internal diameters, when permissible shear stress for the steel is 70 MN/m^2 and maximum torque is 1.3 times the mean ? Compare the strength of this hollow shaft with that of a solid shaft of the same material, weight and length. **15**

6. A wooden beam 40 cm × 30 cm is to be flitched by two steel flitches of 30 cm × 2 cm to be firmly fixed one on each side of vertical faces of the beam. Calculate the ratio of moment of resistance of timber and steel. Given $E_s/E_w = 15$. **15**

Unit IV

7. A steel strut, 1 m long is 25 mm in diameter. It is subjected to an axial thrust of 12 kN. In addition, a lateral load W acts at the centre of the strut. If the strut failed at a maximum stress of 320 MN/m^2, determine the magnitude of W. Take : E = 210 GN/m^2. **15**

8. Discuss the Macaulay's method for determining the deflection of a beam subjected to point loads. **15**

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

BT-3/D-22 **43165**

THEORY OF MACHINES

MEC-201A

Group I, Option I

Time : Three Hours] [Maximum Marks : 75

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

Unit I

1. (a) Distinguish between Mechanism and machine. **8**

   (b) Explain Slider Crank Mechanism and its inversions. **7**

2. Write technical notes on the following : **15**

   (a) Crank and lever slotted mechanism

   (b) What is Instantaneous centre of rotation and how do we know the number of instantaneous centre in a mechanism ?

Unit II

3. (a) What is coriolis acceleration component ? How is it determined ?

(b) Describe the procedure to draw velocity and acceleration diagrams of a four link mechanism. **15**

4. (a) How the cams are being classified ? Explain in detail. **8**

(b) Define Base circle, pitch circle, trace point, pitch curve and pressure angle. **7**

Unit III

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

(a) Free body diagram of a mechanism

(b) State and explain D'Alembert's Principle.

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

(b) Write a technical note on Balancing of reciprocating engines. **15**

Unit IV

7. (a) Define and elaborate the law of belting.

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

8. (a) State and derive the law of gearing.

(b) Write a technical note on Gear train and its types. **15**

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

BT-3/D-22 **43166**

THERMODYNAMICS

MEC-205

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. Student can use steam table for numerical solution. Assume missing data, if any.

Unit I

1. (a) Discuss about the working substance. Explain themodynamics work and heat. 7

(b) Define thermodynamics system. Explain the rigid, flexible, diathermic and adiabatic boundary of a system. 8

2. A non-flow reversible process occurs for which pressure and volume are correlated by the expression $PV = 150$, where V is the volume in m^3 and P is the pressure in bar. Make calculation for the work done on or by the system as pressure increases from 10 to 100 bar. Indicate the nature of process, whether expansion and compression. 15

Unit II

3. A heat engine operating between two reservoirs at 1000 K and 300 K is used to drive a heat pump which extracts heat from the reservoir at 300 K at a rate twice then at which the engine rejects heat to it. If the efficiency of the engine is 40% of the maximum possible and the COP of the heat pump is 50% of the maximum possible, what is the temperature of the reservoir to which the heat pump rejects heat ? What is the rate of heat rejection from the heat pump if the rate of heat supply to the engine is 50 kW. **15**

4. One kg. of ice at –10°C is exposed to the atmophere which is at 30°C. The ice melts and comes into thermal equilibrium with the atmosphere. (a) Determine the entropy increase of the universe. (b) What is the minimum amount of work necessary to convert the water back into ice at –10°C. Cp of ice is 2.093 kJ/kg K and the latent heat of fusion of ice is 333.3 kJ/kg and Cp of water is 4.2 kJ/kgK. **15**

Unit III

5. (i) Derive the expression for the loss of available energy due to heat transfer through a finite temperature difference. **7**

   (ii) Explain the Helmholtz and Gibbs function. **8**

6. Steam at 15 bar and 300°C expands isentropically in a stream turbine till the temperature falls to 80°C. Find the condition of steam at the end of expansion process and the work done per kg. of air. If the steam flow rate is 10 kg/s, what power will be produced by the turbine ? **15**

Unit IV

7. Derive an expression for the air standard efficiency and mean effective pressure for of an Otto cycle. State the assumptions made. **15**

8. (i) Explain the need of thermodynamic relations. **5**
   (ii) Explain the process of steam generation at constant pressure using T-v, T-Q, and P-v diagram. **10**

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

BT-5/D-22 **45195**

HEAT TRANSFER

Paper–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. (a) A wall of a building is made up of 8 cm of brick (k = 0.069 W/mC), 2 cm of celotex (k = 0.048 W/mC) and 2 cm of an asbestos board (k = 0.74 W/mC). Glass wool (k = 0.038 W/mC) is to be added between the celotex and asbestos in order to reduce the heat flow rate through the wall by 50%. Determine the thickness of the glass wool. 8

(b) A hollow spherical vessel of ID = 19 cm and OD = 20 cm contains a hot fluid. The fluid is to be cooled by exposing the vessel to a surrounding cold fluid when the outside film coefficient is 10 W/m^2 K. If the vessel is to be lagged by mica sheet (k = 0.5815 W/m K), determine the thickness of insulation so that the rate of heat transfer from the hot fluid is maximum. 7

2. (a) A solid sphere of radius 5 cm and conductivity 20 W/m°C is heated uniformly at a rate of 20000 W/m^3 and

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convection heat transfer takes place into the ambient air at 25°C. The heat transfer coefficient is 20 W/m^2°C. Determine the temperature at the centre and the outer surface of the sphere at steady state conditions. 8

(b) A constantan wire of 1 mm diameter originally at 25°C is suddenly exposed to air at 250°C. If the convection heat transfer is 3 W/m^2 K, determine the time required for the wire to reach a temperature of 225°C using lumped parameter analysis.

(k = 22.7 W/m K, $\alpha = 0.612 \times 10^{-5}$ m^2/s) 7

UNIT–II

3. Water is heated while flowing through a 1.5 cm × 3.5 cm rectangular cross-section tube at a velocity of 1.2 m/s. The entering temperature of the water is 40°C, and the tube wall is maintained at 85°C. Determine the length of the tube required to raise the temperature of water to 70°C. Properties of water at the mean bulk temperature of 55°C are : $\rho = 985.5$ kg/m^3; cp = 4.18 kJ/kg K, $\nu = 0.517 \times 10^{-6}$ m^2/s, k = 0.654 W/m K and Pr = 3.26. Use Dittus-Boelter equation. 15

4. (a) What do you mean by hydrodynamic and thermal entry lengths? 5

(b) Draw and explain the temperature variation of a fluid along the flow direction for (i) constant heat flux and (ii) constant wall temperature, boundary conditions. 5

(c) Explain the physical significance of Grashoff Number. 5

UNIT–III

5. (a) State the Lambert's Cosine law and derive the relationship between normal intensity and emissive power. 8

   (b) A black body emits radiation at 2000 K. Calculate (i) monochromatic emissive power at 1 μm wavelength (ii) wavelength at which emissive power is maximum. 7

6. Calculate the net radiant heat exchange per m^2 area for two large parallel plates (ε = 0.9, 0.6) at temperatures of 427°C and 27°C respectively. If a polished aluminium shield is placed between them, find the percentage reduction in the heat transfer (ε = 0.4). 15

UNIT–IV

7. What is the limitation of LMTD method? Derive the expression for the effectiveness in terms of NTU for a counterflow heat exchanger. 15

8. A counterflow heat exchanger is employed to cool 0.55 kg/s (cp = 2.45 kJ/kg°C) of oil from 115°C to 40°C by the use of water. The inlet and outlet temperatures of cooling water are 15°C and 75°C, respectively. The overall heat transfer coefficient is expected to be 1450 W/m^2K. Using the NTU method, calculate the following: (a) The mass flow rate of water, (b) the effectiveness of the heat exchanger and (c) the surface area required. 15

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

BT-5/D-22 **45196**

PRODUCTION TECHNOLOGY

Paper–MEC-303A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all, select atleast *one* question from each unit.

UNIT–I

1. Determine (1) chip reduction coefficient, (2) shear force and normal force at shear plane, (3) shear stress, (4) kinetic coefficient of friction, (5) specific energy of friction, from the following data.

Workpiece material C25 steel, tool signature 0-10-6-7-8-90-1 mm, feed 0.2 mm/rev, depth of cut 2 mm, chip thickness 0.38, cutting speed 160 mpm, cutting force 150 kg and feed force 75 kg. 15

2. (a) Briefly explain the elements of the drilling machine. 7

(b) Discuss the Mechanism of Milling Machine. 8

UNIT–II

3. (a) What is tool life also explain the factors affect tool life? 8

(b) Calculate the cutting speed for a tool to have a tool life of 165 mins. The same tool had a life of 8 mins. When cutting at 230 rpm. Take n = 0.2 in the Taylor's life equation. 7

4. Explain the principle of operation of a limit gauge with neat sketch. Also explain its types. 15

UNIT–III

5. (a) Write down the procedure for external thread cutting on a lathe. 7

(b) Discuss various thread rolling methods used in modern industry. 8

6. (a) What are the mandatory requirements of efficient clamping? 8

(b) Discuss the various types of fixtures used in mechanical operations. 7

UNIT–IV

7. (a) What are the major types of gears used in transmission and explain them? 7

(b) Discuss various methods to cut the helical gears. 8

8. (a) Differentiate between NC and CNC Machine. 8

(b) Write a short note on automatic tool changer. 7

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

BT-5/D-22 **45197**

MECHANICAL VIBRATIONS AND TRIBOLOGY

Paper–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. Give classification of Vibration. A precision milling machine, weighing 5000 N, is supported on a rubber mount. The force-deflection relationship of the rubber mount is given by $F = 375x + 0.1x^3$.

Where, the force (F) and the deflection (x) are measured in newtons and millimeters, respectively. Determine the equivalent linearized spring constant of the rubber mount at its static equilibrium position. 15

2. For what value of c is the damping ratio of the system as shown in Fig. 1 equals to 1.25? 15

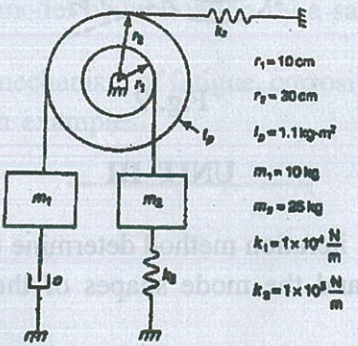


Fig. 1

UNIT–II

3. An air compressor of mass 50 kg is mounted on an elastic support and operates at a speed of 1000 rpm. It has an unbalanced mass of 2 kg at a radial distance (eccentricity) of 0.1 m from the axis of rotation. If the damping factor of the elastic support is ζ, = 0.1, determine the following : (a) the spring constant of the elastic support which transmits no more than 25% of the unbalanced force to the foundation, and (b) the magnitude of the force transmitted to the foundation. 15

4. Find the natural frequencies and mode shapes for the torsional system shown in Fig. 2 for $J_1 = J_0$, $J_2 = 2J_0$, and $k_{t1} = k_{t2} = k_t$. 15

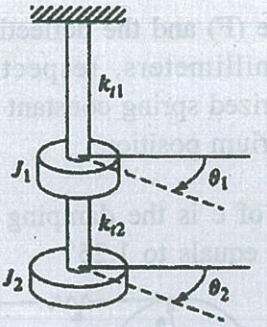


Fig. 2

UNIT–III

5. Using matrix iteration method determine the first two natural frequencies and the mode shapes of the system shown in Fig. 3. 15

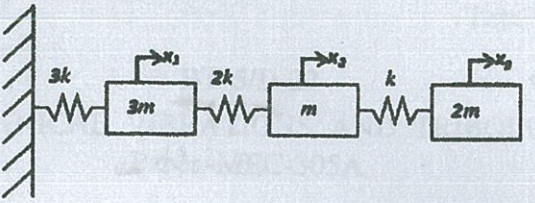


Fig. 3

6. If a string of length 1, fixed at both ends, is plucked at its midpoint as shown in Fig. 4 and then released, determine its subsequent motion. 15

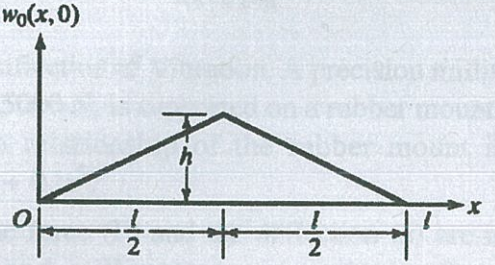


Fig. 4

UNIT–IV

7. What do you understand by extreme pressure lubrication? Explain the model of lubrication by a sacrificial film. 15

8. Explain the mechanism of fatigue, corrosive and fretting wear in detail with examples. 15

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

BT-5/D-22 **45258**

UNIVERSAL HUMAN VALUES–II : UNDERSTANDING HARMONY

Paper–HTM-901A

Time : Three Hours] [Maximum Marks : 75

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

1. (a) 'The prime need of value education is to understand human aspirations, to discover what is truly valuable (human value) in life'. Explain and illustrate. (7.5)
   (b) Explain the role of Education-Sanskar in holistic development. (7.5)

2. What do you mean by Natural acceptance? Explain the process of Self Exploration with the help of diagram. (15)

UNIT-II

3. 'The needs of the Self and the Body are of two different types, so they have to be filled separately. A gross misunderstanding is to assume the two to be the same, and this leads to the feeling of deprivation and exploitation'. Explain. (15)

4. 'Human being is co-existence of the Self and the Body'– elaborate on this statement. (15)

UNIT-III

5. What do you understand by Respect? How do we disrespect others due to lack of right understanding of this feeling? Explain the problems faced due to differentiation in relationship. (15)

6. "When we are assured of the intention of the other and find that the competence is lacking, we become a help to the other. When we doubt the intention of the other, we get into opposition." Explain. (15)

UNIT-IV

7. There is interconnectedness and mutual fulfillment among the four orders in nature. With right understanding only, human being will be self organized, in harmony within and participate in the harmony in the large order. Explain. (15)

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

   (b) Write a short note on 'nature (units) submerged in space'. (7.5)

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

BT–7/D-22 **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. Unless stated otherwise, the Symbols have their usual meaning in context with the subject. Assume suitably and state, additional data required, if any.

Unit–I

1. (a) Describe in detail the various control methods of gaseous pollutants for controlling oxides of sulphur, nitrogen and carbon oxides. 7

   (b) Acid rain is caused by SO*x* and NO*x* emissions. Discuss possible engineering solutions to lake restoration assuming that the damage is done. 8

2. Write a note on atmospheric stability. What are the advantages and disadvantages of biodegradation? 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 pollutants. 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. Determine the allowable emission rate of suspended particulate matter assuming that the following data are given : 15

Ground-level concentration (p) = 150 $\mu g / m^3$

Mean wind speed (u) = 3.8 m/s

Isotropic diffusion coefficient (C^2) = 0.01

Stability parameter (n) = 0.25

Effective stack height (H_e) = 10 m, 20 m, 40 m, 60 m, 80 m, 100 m, 120 m, 140 m, 160 m and 180 m.

Horizontal distance from the stack to the nearest property line (x) = 100 m, 150 m, 200 m, 250 m, 300 m, 500 m, 700 m, 1000 m, 3000 m and 9000 m.

6. (a) Explain briefly the emission of the gasoline driven vehicles and diesel driven vehicles driven vehicles. 7

(b) Discuss the use of catalytic converters in vehicular pollution control. Explain the principle, design and working of catalytic converters. 8

Unit–IV

7. Define Noise pollution. Explain the sources and different methods to control the noise pollution. Also, explain the noise pollution standards. 15

8. Describe the working of various instruments like sound level meter, octave band analyser and noise average meter, used in noise monitoring. 15

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

BT–7/D-22 **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) Explain the ten strategies for automation and process improvement. 8

   (b) Describe the different levels of automation. 7

2. (a) Classify the robot control systems. 8

   (b) Describe the different types of grippers used in Industrial robot applications. 7

Unit–II

3. (a) What are the three methods for solving the problem of grouping parts into part families? 8

   (b) What are the typical objectives when implementing cellular manufacturing. 7

4. What is Flexible manufacturing system? What are the four basic components of a flexible manufacturing system? 15

Unit–III

5. (a) Discuss the two approaches of Computer aided process planning. 8

   (b) What is Artificial intelligence? How does it assist in the process planning? 7

6. Explain the different features of shop floor control. Describe the different types of Data collection systems for the shop floor Data collection. 15

Unit–IV

7. (a) Discuss the classification of NC Machine tools. 7

   (b) Explain the feedback control system in a NC/CNC machine tool. 8

8. Describe the Automatic Storage and Retrieval system and state its application in FMS. 15

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

BT–7/D-22 **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) What are advantages and limitations of CAD/CAM technology? 6

2. (a) Briefly explain various types of Computer memory devices you are familiar with. 7

   (b) Briefly explain various techniques that can be used for image generation on Computer terminals. 8

Unit–II

3. (a) Discuss the contents of a database for a line, a circle and an arc. 7

   (b) Define non orthogonal WCS? How is the three point definition interpreted by software? 8

4. Find the reflection matrix when axis of reflection is $y = 2x + 3$. 15

Unit–III

5. (a) What is solid modelling? Explain its advantages, drawbacks and its applications. 8

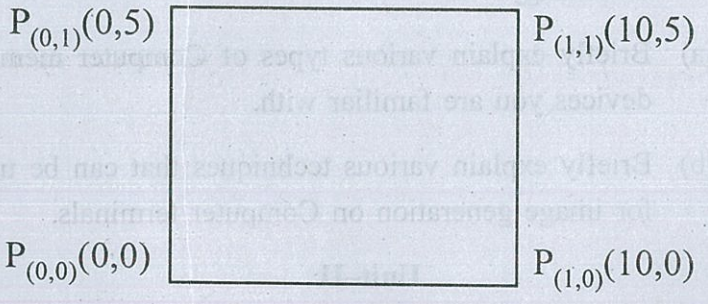
   (b) What are the solid model construction techniques? Explain any one of them in detail. 7

6. (a) Compare Bezier curve and B-Spline curve. 9

   (b) What is the need of the curve manipulation? 6

Unit–IV

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



8. (a) What is the need of neutral file format? Differentiate between direct and indirect translator. 9

   (b) Explain different subsections of IGES file. 6

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

BT-7/D-22 **47348**

INDUSTRIAL ROBOTICS

Paper–MEP–409 A

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 Automation and Robotics. Also discuss robotics market and the future prospects. 7½

   (b) Write a technical note on robot drive systems. 7½

2. (a) Write any five applications of robot. 5

   (b) Describe in brief robot anatomy and work volume. Also explain end effectors. 10

UNIT-II

3. (a) Discuss types of sensors in robotics. Explain in detail exteroceptors and proximity sensors. 7

   (b) Describe in brief characteristics of end-of-arm tooling. Also write the elements of end of arm tooling. 8

4. Write short notes on the following: $3 \times 5 = 15$

(i) Velocity Sensors

(ii) Position Sensors

(iii) Tactile Sensor.

UNIT-III

5. (a) Write short note on robot material handling. Also discuss material transfer applications. 8

(b) Explain in detail Tool selection of grippers. Also discuss magnetic grippers. 7

6. Discuss in detail gripping mechanism and types of gripper. 15

UNIT-IV

7. Describe in brief multiple robots and machine interface. Also explain the work cell controllers. 15

8. Write short notes on the following with regards to robot : $2 \times 7\frac{1}{2} = 15$

(a) Work cell control Interlocks and Manipulator path control.

(b) Robot cell layout and Configuration of robot control.

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

BT-8/D-22 **48368**

SUPPLY CHAIN MANAGEMENT

Paper–MEO-420A

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 the objectives of Supply Chain. Explain process views of a supply chain in details with a neat sketch. (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 transportation 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. Develop a framework for network design decisions with a neat sketch. (15)

6. Summarize the basic steps in the decision tree analysis methodology. Describe are the major sources of uncertainty that affects the value of supply chain decisions. (15)

UNIT-IV

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

   (b) Explain how quantity discounts can increase the supply chain surplus. (8)

8. (a) What is the impact of aggregation on safety inventory? (7)

   (b) Describe two types of ordering policies and the impact that each of them has on safety inventory. (8)

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

BT-8/D-22 **48372**

TOTAL QUALITY MANAGEMENT

Paper–MEO-410A

Time : Three Hours] [Maximum Marks : 75

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

UNIT-I

1. (i) Define quality. What is total quality management? Describe the basic features of TQM. (7)

(ii) Explain the contribution of 14 points of management of Deming. (8)

2. (i) Discuss the various obstacles in the implementation of TQM. (7)

(ii) What is the importance of customer focus for an organization? Explain the three levels of quality in the model of customer satisfaction? (8)

UNIT-II

3. What are the steps in implementing Quality Circle projects? Mention some major objectives of Quality Circle projects. (15)

4. (i) Explain all the elements in 5' S principle and also the implementation procedure of 5' S in a manufacturing company. (10)

(ii) Describe the significance of process capability. (5)

UNIT-III

5. Discuss the various tools and techniques used in TQM. (15)

6. What are the objectives of FEMA? Explain four different stages of FEMA. (15)

UNIT-IV

7. Discuss the evolution of ISO-9000 standards. What are its benefits? How they differ from QS 9000 standards? (15)

8. Explain how TQM is implemented in manufacturing and service sectors. (15)

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

BT-8/D-22 **48375**

AUTOMOBILE ENGINEERING

Paper–MEP-404-A

Time : Three Hours] [Maximum Marks : 75

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

UNIT-I

1. (a) What is the reason of using two stroke petrol engine in two wheelers? Discuss advantages and disadvantages of 2 stroke petrol engine over 4 stroke petrol engine. (7)

(b) Compare petrol and diesel engine based on their applications. What will happen if we use petrol engine for heavy commercial vehicles? (8)

2. (a) Explain the principle of friction clutch. What are the clutch lining and friction materials used in friction clutches? (8)

(b) Give introduction and description of different components of transmission system. (7)

UNIT-II

3. (a) What are the objectives and need of a gear box? Also explain sliding mesh type gear box in detail. (9)

   (b) Explain the working principle of Epicyclic gear box with neat sketch. (6)

4. (a) Explain the construction of a torque tube propeller shaft. (7)

   (b) Explain the construction & working of a differential with a neat sketch. (8)

UNIT-III

5. (a) Explain the working of rear independent suspension system with neat sketch. (7)

   (b) What are different components of differential axle housing? What kind of maintenance is needed for rear axle? (8)

6. (a) What are the aspects which are not valid in respect of disc brakes when compared to drum brakes? (5)

   (b) Explain the functions of automobile brake system and its requirements. (5)

   (c) What are the different types of tyres used in automobile? What are the important parameters that should be considered while selecting a tyre? (5)

UNIT-IV

7. (a) What are the objectives and components of suspension system? (9)

   (b) Discuss about main troubleshooting of suspension systems. Discuss about the main inspection point in case of trouble of suspension system. (6)

8. (a) With regard to steering, what is toe-in & toe-out. (3)

   (b) Explain the Ackerman steering mechanism. (6)

   (c) What is 'under steering' & 'over steering'? (6)

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

BT-8/D-22 **48377**

WELDING TECHNOLOGY

Paper : MEP-408-A

Time : Three Hours] [Maximum Marks : 75

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

UNIT–I

1. Name four metals that were used by early metal-workers. Which metal was the first to be worked? Illustrate the Historical development of different welding processes. 15

2. Explain the working of following processes :
   (a) Braze Welding.
   (b) Thermal Spraying. 15

UNIT–II

3. (a) Illustrate different methods to control output current through welding transformer. 4
   (b) What is meant by self regulation feature of welding power source. Which type of power sources provides self regulation? 4

(c) Explain the role of static volt-ampere characteristics of a welding power source. Sketch and describe different types of static V-I characteristics and the need for them. Also, illustrate the effect of arc length on Arc voltage. 7

4. Illustrate with neat sketches the working of following special welding power sources :
   (a) Multi operator type welding power source.
   (b) Inverter based multi-process power source. 15

UNIT–III

5. (a) Illustrate with neat sketches the working of various types of Gas regulators used on cylinders in Gas welding. 7
   (b) Explain with neat sketches construction and working of various types of Blow pipes used in Gas welding. 8

6. Illustrate the following operations involved in the handling of gas welding equipment :
   (a) Selection of Welding torch tip size. 5
   (b) Selection of welding rod size. 5
   (c) Welding torch position and movement. 5

UNIT–IV

7. Explain the following NDT processes with neat sketches :
   (a) Visual Inspection and Liquid Particle Inspection. 8
   (b) Eddy current testing. 7

8. (a) What is the implication of using too small diameter Tungsten electrode in TIG welding for welding Aluminium in comparison to steel? 3

(b) What do you mean by Aluminium Arc and how it can be avoided? 4

(c) Discuss various modes of metal transfer involved in MIG welding. 8