END TERM EXAMINATION

FIRST SEMESTER [B. TECH] JANUARY 2024

Paper Code: BS-103   Subject: Applied Chemistry

Time: 3 Hours   Maximum Marks: 60

Note: Attempt five questions in all including Q. No.1 which is compulsory. Internal Choice is indicated. Assume missing data, if any.

Q1   Attempt all questions:-   **(2.5x8=20)**

(a) Calculate the LCV of a fuel which has 9% hydrogen & HCV is 6250 cal/g. Given the latent heat of steam is 587cal/g.

(b) Write a short note on proximate analysis.

(c) Explain the term component. How many components are present in the following system?
   (i) Water ⇌ water vapour
   (ii) KCl ⇌ KCl hydrate

(d) Give the mechanism of addition & condensation polymerization.

(e) Determine the $CaCO_3$ equivalent of 83 mg of Mg $(HCO_3)_2$. [Mol. Weight =146].

(f) What is Calgon conditioning? How scale formation can be prevented by using this internal water treatment method?

(g) Impure metal corrode faster than pure metal under identical conditions. Give reason.

(h) Define Zero Waste technology with a suitable example.

Q2

I   Attempt any one part between I & II.

(a) Give an account of the determination of calorific value of gaseous fuel by Boy's gas calorimeter with the help of a neat diagram. **(4)**

(b) How is compressed natural gas (CNG) different from the liquified natural gas (LPG). **(3)**

(c) Out of straight-chain hydrocarbons & aromatics, which one would have high anti-knocking properties? **(3)**

OR

II

(a) A sample of coal containing 92% C,5% H , 3% ash , when coal was tested in the laboratory for its calorific value in bomb calorimeter, the following data were obtained:-
   Weight of coal burnt =0.95 gm, Weight of water taken =700 gm,
   Water equivalent of bomb & calorimeter =2000 gm
   Rise in temperature =2.48° C, Cooling correction =0.2° C,
   Fuse wire correction =10 cal, Acid correction =60.0 cal
   Calculate the gross & net calorific values of the coal in cal/gm. (Latent heat of condensation of steam as 580 cal/gm). **(6)**

(b) Describe the manufacture of metallurgical coke by Otto Hoffmann process. **(4)**

Q3

I   Attempt any one part between I & II.

(a) State phase rule & define the terms involved. Explain Sulphur system based on phase rule. **(4)**

(b) Write the structural unit & two important applications of each of the following:-
   (i) Urea-formaldehyde
   (ii) Nylon 6,6
   (iii) PVC **(3)**

(c) What is ultra-thin molecular weight polythene? Write their unique properties & applications. **(3)**

P.T.O.

[-2-]

OR

II

(a) Define conducting polymer, their types & applications of conducting polymer in engineering. **(6)**

(b) Give an example of a two-component system which form compound with congruent melting point. **(4)**

Q4

I   Attempt any one part between I & II.

(a) Calculate the amount of Lime (92% pure) & Soda (98% pure) required for the treatment of 50,000 liter of water whose analysis is as follows: **(4)**
   $Ca(HCO_3)=$ 42.5ppm, $Mg(HCO_3)_2 =$ 36.5 ppm, $MgSO_4 =$ 30 ppm.
   $CaSO_4 =$ 34.0 ppm, $CaCl_2 =$ 27.75 ppm, $NaCl=10.0$ppm

(b) Write the important steps involved in the defluoridation of water. **(3)**

(c) How the hardness of water is determined by EDTA titration method? **(3)**

OR

II

(a) Explain with reactions & diagram, the ion-exchange resins process for the softening of water. How can they be regenerated after getting exhausted? **(6)**

(b) A sample of water was alkaline both phenolphthalein and methyl -orange alkalinity. 100 ml of this water sample required 20 mL of 50 H_2SO_4 for the phenolphthalein endpoint and 15 mL for complete neutralization. Calculate the type of alkalinity in ppm. **(4)**

Q5

I   Attempt any one part between I & II.

(a) Explain the mechanism of hydrogen evolution & oxygen absorption in electrochemical corrosion. **(4)**

(b) Discuss the Atom economy concept. Calculate atom economy in an addition reaction. **(3)**

(c) Discuss the sacrificial anodic protection. What is the condition for a metal to act as a sacrificial anode to iron? **(3)**

OR

II

(a) Explain the underlying principles of the BET method and how it measures the surface area of nanoparticles. Explain the applications of Nanotechnology in different fields. **(6)**

(b) What are the twelve principles of green chemistry, and how do they guide sustainable chemical practices? **(4)**

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END TERM EXAMINATION

FIRST SEMESTER [B.TECH] JANUARY 2024

Paper Code: BS-105   **Subject: Applied Physics-I**

Time: 3 Hours   **Maximum Marks: 60**

Note: Attempt five questions in all including Q.No.1 which is compulsory. Select one question from each unit. Symbols have their usual meanings. Assume missing data, if any.

Q1   Attempt all questions:

a) Show that work done for a perfect gas can be given by $W = Cv(T_1 - T_f)$ for adiabatic process. **[2]**

b) Distinguish between displacement and conventional current. **[2]**

c) Find the resultant of superposition of two waves $Y_1 = 2 \sin \omega t$ and $Y_2 = 5 \sin(\omega t + 30^0)$, Symbols have their usual meanings. **[2]**

d) At what speed will an object of length 100 cm be measured as 50 cm to an observer at rest. **[2]**

e) Explain the difference between spatial and temporal coherence. **[2]**

f) Why the grating of large number of lines are preferred? **[2]**

UNIT-1

Q2 a) Prove that the entropy of an ideal gas remains constant in a reversible process. But it is increases in an irreversible process. **[6]**

b) State first law of thermodynamics and show that heat and work are path functions but their difference is a point function. **[4]**

c) Discuss continuum model of thermodynamics. **[2]**

Q3 a) Prove that the efficiency of a Carnot's engine depends only upon the two temperatures between which it works. **[6]**

b) What are the limitations of first law of thermodynamics. State second law of thermodynamics. **[4]**

c) A Carnot's refrigerator absorbs heat from water at 0⁰ C and rejects it at room temperature 37⁰ C. Calculate the amount of work required to convert 10 kg water at 0⁰ C into ice at same temperature [latent heat of ice = 3.4 x 10⁵ J/kg]. Also find the coefficient of performance of the refrigerator. **[2]**

UNIT-II

Q4 a) Prove that the speed of plane electromagnetic wave in isotropic dielectric is less than the speed of electromagnetic wave in free space. Also prove the orthogonality of E, H and k. **[6]**

b) Set up continuity equation and discuss its physical significance. **[4]**

c) Calculate the magnitude of pointing vector at the surface of the sun. Given that power irradiated by the sun = 3.8 x 10²⁶ watt and radius of sun = 7 x 10⁸ m. **[2]**

Q5 a) Write maxwell's equation in integral and differential forms. Discuss in brief the physical meaning of each of these. Also derive Maxwell's third equation in differential form. **[6]**

b) Derive velocity and energy in SHM. Also give graphical representation of it. **[4]**

c) Calculate the skin depth for 3 MHz electromagnetic wave through copper. [given conductivity $\sigma = 6 \times 10^7$ mho/m, $\mu = 4\pi \times 10^{-7}$ Henry/m]. **[2]**

UNIT-III

Q6 a) Explain the formation of fringes in Newton's ring experiment. Give its application to find out wavelength of light. **[6]**

b) Explain the phenomena of double refraction. Describe the working principle of a Nicol prism. How is Nicol prism used to produce circularly polarised light. **[4]**

c) Draw a labelled ray diagram depicting interference by biprism. **[2]**

Q7 a) Derive an expression for intensity of diffracted light in Fraunhofer diffraction at a single slit. **[6]**

b) Explain with a series of neat well labelled diagrams the functioning of the retarding plates: (i) Half wave plate (ii) Quarter wave plate. **[4]**

c) Each slit has a width of 0.15 mm and distance between their centre is 0.75 mm. What are the missing order. **[2]**

UNIT-IV

Q8 a) Describe Michelson Morley experiment. Explain its main conclusions. **[6]**

b) Using Lorentz transformation equations, prove that "Moving clocks appear to go slow". **[4]**

c) Deduce the expression $E=mc^2$. **[2]**

Q9 a) Discuss Einstein's transition probabilities and derive the relation between Einstein's A and B coefficients. **[6]**

b) Describe the working of He-Ne LASER, explain its energy level diagram. **[4]**

c) What is optical pumping? How does it help in achieving population inversion in a LASER. **[2]**

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END TERM EXAMINATION

FIRST SEMESTER [B.TECH] JANUARY 2024

Paper Code: ETPH-103

Subject: Applied Physics-I

Time: 3 Hours

Maximum Marks: 60

Note: Attempt five questions in all including Q.No.1 which is compulsory.
Attempt Draw diagram in support to your answers. Select one question from each unit. Assume missing data, if any.

Q1 Attempt all of the following: **(2x10=20)**

a) Why two indepenent sources cannot produce observable interference pattern?

b) What is the conditioin of missing order spectra in diffraction grating?

c) Distinguish between fresnel and fraunhofer class of diffraction.

d) What are the advantages of cyclotron over linear accelerator?

e) A 10 cm long tube contains 10% sugar solution and produces an optical rotation of 13.2°. Calculate the specific rotation.

f) What is the differance between ordinary and extraordinary ray?

g) Distinguish between spontaneous and stimulated emission.

h) An optical fibre has NA of 0.15 and a cladding refractive index is equal to 1.50. Find the refractive index of the fiber in a liquid of refractive index 1.30.

i) Write down the postulates of special theory of relativty.

j) A quartz crystal of thickness 0.001 m is vibrating at resonance. Find the fundamental frequency, given Y for quartz = 7.9x10¹⁰ W/m² and ρ for quratz = 2650 kg/m³

UNIT-I

Q2 a) Explain the formation of interference fringes by means of Fresnel biprism when a monochromatic source of light is used and derive the expression for fringe width. How will you measure a wavelength of monochromatic lights using biprism method. **(5)**

b) Newton's rings are formed between a plane surface of glass and lens. The diameter of third dark ring is 10⁻² m. When a light of wavelength 5890 x 10⁻¹⁰m is used at such an angle that the light passes through the air film at an angle of 30° to the normal. Find the radius of the lens. **(5)**

Q3 a) Describe Fraunhofer diffraction due to single slit and deduce the position of maxima and minima. Show that the relative intensities of successive maxima are nearly **(5)**

$$1, \frac{1}{22}, \frac{1}{61}, \frac{1}{121}$$

UNIT-II

b) How many orders will be visible if the wavelength of the incident radiation is 4800Å and the number of lines are the grating is 2500 lines per inch. **(5)**

Q4 a) State Brewsters law. Show that when a ray is incident at Brewster angle the reflected ray is perpendicular to refracted ray. **(5)**

P.T.O.

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b) A polariser and analyser are oriented so that maximum amount of light is transmitted. To what fractioin of its maximum value is the intensity of transmitted light reduced when the analyser is rotated through 22.5°. **(5)**

UNIT-III

Q5 a) What are the conditions of laser action. Explain the construction and working of He-Ne laser. **(5)**

b) Calculate the numerical aperture acceptance angle and critical angle of a fibre having core refractive index 1.5 and cladding refractives index 1.45. **(5)**

Q6 a) Describe the Michelson-Morley experiment and show how the negative results obtained from the experiment was interpreted.**(5)**

b) Find the velocity that an electron must be given so that its momentum is 10 times its rest mass times the speed of light. What is the energy at this speed. **(5)**

Q7 a) Explain in details the acoustic grating method for determination of velocity of ultrasonic waves in a given liquid. **(5)**

b) An electron has a momentum that is 90% larger than its classical momentum. Find the speed of electron. **(5)**

UNIT-IV

Q8 a) Explain the term mean life time of a radioactive substance. Show that the life of a radioactive substance is reciprocal to its decay constant. Hence obtain the relation between mean life and half life time of a radioactive substance. **(5)**

b) The half life of a given radioactive nuclide is 138.6 days. What is the mean life of this nuclide? After how much time will a given sample of this radioactive nuclide get- reduced to only 12.5% of its initial value. **(5)**

Q9 a) Differentiate between
i) Nuclear fission as Nuclear Fusion.
ii) Alpha decay, Beta decay, Gamma decay **(5)**

b) In a linear accelerator, proton accelerated thrice by a potential of 40 KV leaves a tube and enters an accelerating space of length 30cm before entering the next tube. Calculate frequency of the RF voltage and length of the tube entered by the proton. **(5)**

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END TERM EXAMINATION

FIRST SEMESTER [B. TECH] JANUARY 2024

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Paper Code: ES-107	**Subject: Electrical Science**
Time: 3 Hours	**Maximum Marks: 60**

Note: Attempt five questions in all including Q. No.1 which is compulsory. Select one question from each unit. Assume missing data, if any.

Q1 Attempt all questions:-
- (a) Distinguish between dependent and independent sources. How do you transform a voltage source into current source? **(2)**
- (b) Show that power consumed in a purely inductive circuit is zero when sinusoidal voltage is applied across it. **(2)**
- (c) Why a series resonant circuit is called as an acceptor circuit and a parallel resonant circuit as a rejector circuit? **(2)**
- (d) Why is induced emf in a dc motor called the back or counter emf? **(2)**
- (e) What is the difference between an ideal and practical transformer? **(2)**
- (f) What type of damping is provided in PMMC instruments? **(2)**

UNIT-I

Q2
- (a) Find the Thevenin's equivalent circuit at terminals AB for the given network and also determine the power dissipated in a 5 Ω resistor connected between A and B. **(7)**
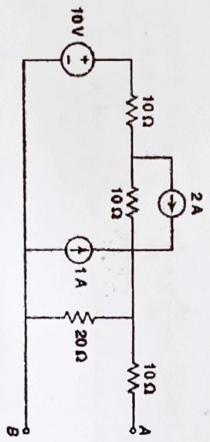
- (b) Derive the expression for converting a star network to a delta equivalent network. **(5)**

Q3
- (a) Using the superposition theorem, find the voltage across the 20 Ω resistor of the given circuit. **(7)**
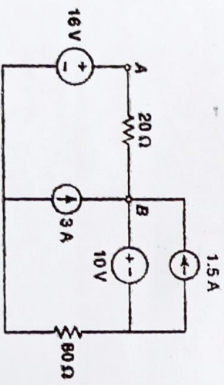
- (b) State and explain Norton's theorem. Show that Thevenin's and Norton's theorems are dual to each other. **(5)**

[-2-]

UNIT-II

Q4
- (a) A series circuit consists of a capacitor and a coil takes a maximum current of 0.314 A at 200 V, 50 Hz. If the voltage across the capacitor is 300 V at resonance. Determine the capacitance, inductance, resistance and Q of the coil. **(7)**
- (b) Define parallel resonance with suitable phasor diagram. Calculate the resultant current and quality factor at resonance in terms of the pameters of a circuit. **(5)**

Q5
- (a) A choke coil having a resistance of 10 Ω and inductance of 0.05 H is connected in series with a condenser of 100 μF. The whole circuit has been connected to 200 volt, 50 Hz supply. Calculate:
  (i) Impedance (ii) Current (iii) Power factor (iv) Power input (v) Apparent and Reactive power of circuit. **(7)**
- (b) Define quality factor in a series R-L-C circuit. Determine the half power frequencies in terms of quality factor and the resonant frequency for series R-L-C circuit. **(5)**

UNIT-III

Q6
- (a) A 220 V, dc shunt motor takes a line current of 20 A. Resistance of shunt field winding is 200 Ω and resistance of the armature is 0.3 Ω. Find the armature current and back emf. **(7)**
- (b) Derive the emf equation of a dc generator. Draw and explain different types of dc generator with suitable diagram. **(5)**

Q7
- (a) A 3-phase, 50 Hz induction motor has 6 poles and operates with a slip of 5% at a certain load. Determine. **(7)**
  (i) The speed of the rotor with respect to the stator.
  (ii) The frequency of rotor current
  (iii) The speed of the rotor magnetic field with respect to rotor.
  (iv) The speed of the rotor magnetic field with respect to stator.
- (b) What are the various methods of starting the single phase induction motor? Explain them in brief with relative advantages and disadvantages. **(5)**

UNIT-IV

Q8
- (a) In a 25 KVA, 2000/200 V transformer the iron and full load copper losses are 350 W and 400 W respectively. Find the efficiency at unity power factor at (a) full load (b) half load. Determine the load for maximum efficiency. **(7)**
- (b) Explain the working principle of Attraction type and Repulsion type moving iron instruments with the help of suitable diagrams. **(5)**

Q9
- (a) A single phase transformer has a core whose cross -sectional area is 150 cm²; operates at a maximum flux density of 1.1 Wb/m² from a 50 Hz supply. If the secondary winding has 66 turns, determine the output in KVA when connected to a load of 4 Ω impedance. Neglect any voltage drop in the transformer. **(7)**
- (b) Draw the constructional features of transformer and explain the working in detail. Also derive the emf equation of transformer. **(5)**

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END TERM EXAMINATION

FIRST SEMESTER (B. TECH) JANUARY-2024

Paper Code: BS-111 Subject: Applied Mathematics-I

Time: 3 Hours Maximum Marks: 60

Note: Attempt five questions in all including question no.1 which is compulsory. Select one question from each unit. Assume missing data, if any.

Q1.
a) Find $\dfrac{dy}{dx}$ if $(Cos\ x)^y - (Sin\ y)^x = 0$ (3)

b) Prove that $A^3 - 4A^2 - 3A + 111 = 0$, where $A = \begin{bmatrix} 1 & 3 & 2 \\ 2 & 0 & -1 \\ 1 & 2 & 3 \end{bmatrix}$ (3)

c) Show that the differential $df = x^2 dy - (y^2 + xy)dx$ is not exact, but that $dg = (xy^2)^{-1} df$ is exact (3)

d) Find the directional derivative of $f(x,y,z) = xy^3 + yz^3$ at the point $(2, -1, 1)$ in the direction of vector $\hat{i} + 2\hat{j} + 3\hat{k}$ (3)

UNIT-I

Q2.
a) If $u = f(r)$ where $r^2 = x^2 + y^2 + z^2$, show that $u_{xx} + u_{yy} + u_{zz} = f''(r) + \dfrac{2}{r} f'(r)$ (4)

b) If $u = u\left(\dfrac{y-x}{xy}, \dfrac{z-x}{xz}\right)$, show that $x^2 \dfrac{\partial u}{\partial x} + y^2 \dfrac{\partial u}{\partial y} + z^2 \dfrac{\partial u}{\partial z} = 0$ (4)

c) Locate the stationary points of the function $f(x,y) = (x^2 - 2y^2)\exp\left[-(x^2 + y^2)/a^2\right]$ where a is a non-zero constant (4)

Q3.
a) If $u = x^2 - y^2$, $v = 2xy$ and $x = r\cos\theta, y = r\sin\theta$, find $\dfrac{\partial(u,v)}{\partial(r,\theta)}$ (4)

b) The temperature of a point (x,y) on a unit circle is given by $T(x,y) = 1 + xy$. Find the temperature of the two hottest points on the circle. (5)

c) Evaluate $\displaystyle\int_0^\infty \dfrac{e^{-ax}Sin\ bx}{x}\,dx$ by applying differentiation under integral sign (3)

UNIT-II

Q4.
a) Solve $(1 - x^2)\dfrac{dy}{dx} + xy = xy^2$ (5)

b) Find the orthogonal trajectories of the family of parabola $y = ax^2$ (2)

c) Solve $\dfrac{dy}{dx} = \dfrac{x + 2y - 3}{2x + y - 3}$ (5)

Q5.
a) Find the complete solution for the differential equation $(D^2 - 2D + 1)y = xe^x Sinx$ (5)

b) Show that the solution of $y'' - 2y + 2y = 0$ are linearly independent (2)

c) Apply the method of variation of parameters, to solve $x^2 y'' + xy - y = x^2 e^x$ (5)

UNIT-III

Q6.
a) Determine the rank of the following matrix

$\begin{bmatrix} 0 & 1 & -3 & -1 \\ 1 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & -2 & 0 \end{bmatrix}$ (4)

b) Discuss the consistency of the following of equations for various values of λ: (5)

$2x_1 - 3x_2 + 6x_3 - 5x_4 = 3$

$x_2 - 4x_3 + x_4 = 1$

$4x_1 - 5x_2 + 8x_3 - 9x_4 = \lambda$

c) Solve $x + 2y + 3z = 20, 7x + 3y + z = 13, x + 6y + 2z = 0$ by Gauss Elimination Method (3)

Q7.
a) State Cayley-Hamilton Theorem and Use it to find the inverse of the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{bmatrix}$ (4)

b) Reduce the quadratic form $4xy + 4yz + 4zx$ in to the canonical form and discuss its nature (3)

c) Solve $x + 2y + 3z = 20, 7x + 3y + z = 13, x + 6y + 2z = 0$ by Cramer's rule (5)

UNIT-IV

Q8.
a) Apply Stoke's theorem to evaluate $\int_C (ydx + zdy + xdz)$, where C is the curve of intersection of $x^2 + y^2 + z^2 = b^2$ and $x + z = b$ (8)

b) Show that vector field $\bar{F} = \Delta(x^3 + y^3 + z^3 - 3xyz)$ is irrotational (4)

Q9.
a) Find the divergence and curl of $F = xyz\ \hat{i} + 3x^2 y\ \hat{j} + (xz^2 - y^2 z)\ \hat{k}$ at the point $(2, -1, 1)$ (6)

b) Find the curvature and torsion for the curve $x = a\cos t, y = a\sin t, z = at\cot\alpha$ (6)

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END TERM EXAMINATION

FIRST SEMESTER [B.TECH] JANUARY 2024

Paper Code: ETMA-101   Subject: Applied Mathematics-I

Time: 3 Hours   Maximum Marks: 60

Note: Attempt five questions in all including Q. No.1 which is compulsory. Select one question from each unit. Assume missing data, if any.

Q1   Attempt all questions:-   (1.2x10=12)

(a) Expand $\log_e(1+x)$ in power of x by Maclaurin's theorem.

(b) Find the percentage error in the area of an ellipse when an error of $+1$ percent is made in measuring the major and minor axis.

(c) Find the asymptotes of the curve $x^2y^2 - x^2y - xy^2 + x + y + 1 = 0$.

(d) Find the radius of curvature of the curve $\frac{1}{x^2} + \frac{1}{y^2} = 1$ at $\left(\frac{1}{4}, \frac{1}{4}\right)$.

(e) Define Hermitian matrix with example.

(f) Examine the system of vectors are linearly dependent or linearly independent $x_1 = (1,2,3)$, $x_2 = (2,-2,6)$.

(g) Solve $(x+1)\frac{dy}{dx} - y = e^x(x+1)^2$.

(h) Find $\int_{-1}^{1} x^3 P_4(x)\,dx$.

(i) Write Rodrigue's Formula.

(j) Find $(2.5, 1.5)$.

UNIT-I

Q2 (a) If $y = e^{m\cos^{-1}x}$, show that $(1-x^2)y_{n+2} - (2n+1)xy_{n+1} - (n^2+m^2)y_n = 0$
And hence calculate $y_n(0)$.   (8)

(b) Obtain the first four term in the expansion of $\log \sin x$ in power of $(x-3)$. By Taylor theorem.   (4)

Q3 (a) Find whether the series $\frac{x}{1.2} + \frac{x^2}{3.4} + \frac{x^3}{5.6} + \frac{x^4}{7.8} + \cdots$ $x > 0$. Is convergent or divergent.   (6)

(b) Prove that the series $\frac{2}{1} + \frac{3}{4} + \frac{4}{9} + \frac{5}{16} + \cdots$ is divergent.   (6)

UNIT-II

Q4 (a) Evaluate $\int_0^\infty \sqrt{x}\, e^{-x^3}\,dx$.   (6)

(b) Find the area bounded by the parabola $y^2 = 4ax$ and its latus rectum. (6)

Q5 (a) Trace the curve $r = a\sin 2\theta$.   (8)

(b) Evaluate $\int_0^{\frac{\pi}{2}} \cos^9 \theta\, d\theta$.   (4)

UNIT-III

Q6 (a) Find the inverse of matrix A by Gauss Jordon method if   (6)
$$A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$$

(b) Find the eigen values and eigen vector of matrix   (6)
$$A = \begin{bmatrix} 4 & 2 & -2 \\ -5 & 3 & 2 \\ -2 & 4 & 1 \end{bmatrix}$$

Q7 (a) Verify Cayley Hamilton theorem of the matrix $A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$ and hence find The value $A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 - 2A + 1$.   (8)

(b) For which value of "a" the rank of the matrix $A = \begin{bmatrix} 1 & 5 & 4 \\ 0 & 3 & 2 \\ a & 13 & 10 \end{bmatrix}$ is 2   (4)

UNIT-IV

Q8 (a) Prove that $J_{\frac{5}{2}}(x) = \sqrt{\frac{2}{\pi x}}\left[\left(\frac{3-x^2}{x^2}\right)\sin x - \frac{3\cos x}{x}\right]$.   (6)

(b) Solve $(y^4 + 2y)dx + (xy^3 + 2y^4 - 4x)dy = 0$.   (6)

Q9 (a) Solve $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = xe^x \cos x$.   (6)

(b) Solve $x^2\frac{d^2y}{dx^2} - x\frac{dy}{dx} + 4y = \cos(\log x) + x\sin(\log x)$.   (6)

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(Please write your Exam Roll No.)

Exam No. 09117711623

END TERM EXAMINATION

FIRST SEMESTER [B. TECH] JANUARY 2024

Paper Code: HS-113	Subject: Communication Skills
Time: 3 Hours	Maximum Marks: 60

Note: Attempt six questions in all including Q.No.1 which is compulsory.

Q1 Write Short Notes on the following:-
- a) Grapevine **(2)**
- b) Completeness of message **(2)**
- c) Audio Visual aids in Presentation. **(2)**
- d) Telephone etiquette **(2)**
- e) Memorandum **(2)**

Q2 Define the role and importance of effective communication in the professional realm. Explain how it contributes to organizational success. **(10)**

Q3 Differentiate between formal and Informal communication. Why is informal communication used in modern organizations? **(10)**

Q4 a) What are the key elements of an impactful speech? Explain how factors like content, delivery, and engagement contribute to making a speech effective. **(5)**

b) Fill in the blanks with appropriate words. **(5)**

"Jim was walking _____ (across, over) the campus _____ (in, at) noon when he met a friend _____ whom he had not seen (since, during) summer. They stopped _____ (in front of, around) the gymnasium and sat down _____ (in, on) the steps. After they had talked (for, during) about ten minutes, Jim said, "I must go _____ (toward, to) Jefferson Hall this semester. Why don't you drop by some afternoon _____ (over, after) classes?"

Q5 a) Write a letter to your bank requesting a loan facility of Rs. 15 lakhs for a new business. Also, give the necessary details of your project. **(5)**

b) What are the primary differences between a circular and a memorandum in terms of their purpose, audience, and distribution within an organization? **(5)**

P.T.O.

[-2-]

Q6 a) What are the barriers to communication? How can they be overcome? Explain with a suitable example. **(5)**

b) Change as directed : **(5)**
- I. What a Surprise! [Assertive Sentence]
- II. How stupid you are! [Declarative sentence]
- III. I know her. [Passive Voice]
- IV. Love fills my heart. [Passive Voice]
- V. A Honda car was bought by me. [Active Voice]

Q7 a) Change into the Indirect Narration **(5)**
- I. I said to the teacher, "Mira stole my pen."
- II. He said to me, " Learn your book."
- III. She said to me, " Let us go for a walk."
- IV. " Will you save me from death?" Said the patient to the doctor.
- V. She said, ' Man is mortal."

b) Define non-verbal communication. How is it related to verbal communication? **(5)**

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END TERM EXAMINATION

FIRST SEMESTER (B.TECH) JANUARY-2024

Paper Code: ES-119

Subject: Manufacturing Process

Time: 3 Hours

Maximum Marks :60

Note: Attempt five questions in all including question no.1 which is compulsory. Select one question from each unit. Assume suitable missing data, if any.

Q1   Short questions:-   **(2x10=20)**

(a)   Explain various constituents of molding sand.

(b)   Differentiate between hot working and cold working.

(c)   Differentiate among Stiffness, ductility, and toughness with some examples.

(d)   How is forging different from casting with respect to properties obtained in a product?

(e)   Explain the term DCSP and DCRP in arc welding.

(f)   What is spring back in sheet metal.

(g)   Why flux is not required in electric resistance welding.

(h)   What is edge preparation in Welding.

(i)   Differentiate between thermosetting and thermoplastic polymer with some examples.

(j)   What is rotational moulding of plastics? Name the parts made by rotational moulding.

UNIT-I

Q2   (a)   What is die casting? Explain the difference between hot chamber and cold chamber die casting with neat sketch.   **(5)**

(b)   Discuss five major casting defects along with their remedies.   **(5)**

Q3   (a)   Discuss the five types of pattern allowances considered in casting.   **(5)**

(b)   Explain any five tools used in moulding process with diagrams.   **(5)**

UNIT-II

Q4   (a)   What is the difference between TIG and MIG welding. Explain with diagrams and their applications.   **(6)**

(b)   What do you mean by weldability? What are the pros and cons of welded joints over other joints.   **(4)**

Q5   (a)   Explain with diagram the working, advantages, limitations and applications of submerged arc welding.   **(6)**

(b)   Explain any four welding defects with its remedies.   **(4)**

UNIT-III

Q6   (a)   Sketch and explain the difference between hydrostatic extrusion and tube extrusion with their applications.   **(5)**

(b)   Explain any five tools used in sheet metal shop with diagrams.   **(5)**

Q7   (a)   With the help of neat sketches explains the difference among the drop, press and machine forging.   **(6)**

(b)   Explain the difference between embossing and coining giving sketches.   **(4)**

UNIT-IV

Q8   (a)   Discuss the working principle of compression molding with its pros and cons. What are the various factors affecting compression molding.   **(6)**

(b)   Differentiate among blending, compacting and Sintering.   **(4)**

Q9   (a)   Explain conventional single stage plunger type injection molding with its neat sketch.   **(5)**

(b)   What are the different materials used for processing plastics. Explain any four with its functions.   **(5)**

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END TERM EXAMINATION

FIRST SEMESTER (B.TECH) JANUARY-2024

Paper Code: ETME-105	Subject: Manufacturing Processes

Time: 3 Hours   **Maximum Marks :75**

Note: Attempt five questions in all including question no.1 which is compulsory. Select one question from each unit. Assume suitable missing data.

Q1.   Answer questions   (2.5x10=25)
- (a) Define Stiffness, Toughness and Resilience.
- (b) What type of shrinkage does the riser take care off? Explain.
- (c) Mention the composition of Mild steel.
- (d) What do you understand by 'Mechanical Working' and 'Plastic Flow' of a material?
- (e) Explain the threading operation used in Fitting.
- (f) Classify different type of Welding processes used in industry.
- (g) List any 4 important functions of flux used in fusion welding.
- (h) Which type of flame would you suggest for welding of Copper and Aluminum?
- (i) What are the different methods of producing metal powders?
- (j) Name any 6 tools used in Sheet Metal shop.

UNIT-I

Q2.   (a) Summarize the important reactions occurring in different zones of Cupola furnace **(6.5)** with the help of a neat sketch.
(b) How carbon steels are classified on the basis of carbon percentage? List at least one **(6)** application for each type.

Q3.   (a) What is the difference between Mould and Pattern? Discuss any 4 types of pattern. **(6.5)**
(b) Explain the important steps in production of Lost Wax Casting with a neat sketch. **(6)**

UNIT –II

Q4   (a) How are files classified? Explain. **(6.5)**
(b) How does Hot extrusion differ from Cold extrusion? Discuss their relative merits and **(6)** demerits

Q5   (a) Explain various operations performed in Fitting shop with neat sketches. **(6.5)**
(b) Why are forgings sometimes heat treated? What main considerations will you follow **(6)** in designing a forging?

UNIT –III

Q6.   (a) What is the difference between an Arc and a Spark? Explain the working of **(6.5)** Submerged Arc Welding with a neat sketch.
(b) List the common welding defects along with their causes and remedies. **(6)**

Q7.   (a) What is the role of polarity in Welding? Explain the principle of Atomic Hydrogen **(6.5)** Welding with a neat sketch.
(b) What is the governing equation for Resistance Welding? How is spot welding **(6)** different from seam welding?

UNIT IV

Q8.   (a) List the different types of sheet metal operations and explain any 3 in detail. **(6.5)**

(b) What is Powder Metallurgy? Explain the various secondary finishing operations used **(6)** in Powder Metallurgy?

Q9.   (a) Describe the process of wire drawing and deep drawing with neat sketches. **(6.5)**
(b) What are the main stages of Powder Metallurgy process? Explain the Atomization **(6)** process in detail.

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