Course Code: SOE-B-MA305

O P JINDAL UNIVERSITY

B. Tech. III Semester Regular Examinations

Advanced Engineering Mathematics

(Offered to B. Tech.(META))

Time: 3 Hrs. **Max. Marks: 100**

Answer any one question from each unit

All questions carry equal marks

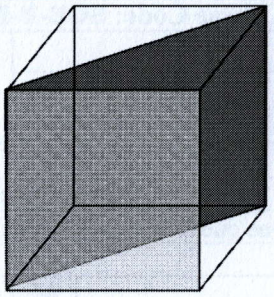
			M	CO	KL
Section-A					
1	a.	Define Analytic function with example.	2	CO1	KL1
	b.	Define Isolated singularity with example.	2	CO2	KL1
	c.	What is the inverse Laplace transform of $L^{-1}\left\{\frac{1}{(s-a)^n}\right\}$?	2	CO4	KL1
	d.	Write condition for the existence of Laplace Transform.	2	CO3	KL1
	e.	The real root of the equation $f(x)=x^3-4x-9$, using bisection method(one stage).	2	CO5	KL1
	f.	Apply Euler's method to solve $y'=x+y, y(0)=0$, choosing the step length= 0.2(find y_1).	2	CO6	KL1
	g.	Write a short note on measure of central tendency.	2	CO7	KL1
	h.	Define interquartile range.	2	CO8	KL1
	i.	Define discrete probability distribution and continuous probability distribution.	2	CO9	KL1
	j.	What is Binomial distribution.	2	CO10	KL1
Section-B: Unit-I					
2	a.	If $w=\phi+i\psi$ represents the complex potential for an electric field and $\psi=x^2-y^2+\frac{x}{x^2+y^2}$, determine the function φ.	8	CO1	KL3
	b.	If $f(z)$ is a holomorphic function of z, show that $(i)\left\{\frac{\partial}{\partial x}\lvert f(z)\rvert\right\}^2+\left\{\frac{\partial}{\partial y}\lvert f(z)\rvert\right\}^2=\lvert f'(z)\rvert^2$	8	CO1	KL2
OR					

3	a.	Evaluate $\int_C \frac{z+1}{z^4-4z^3+4z^2}dz$, where C is $\|z-2-i\|=2$.	8	CO2	KL2
	b.	Find the Laurent's series expansion of $\frac{z}{(z^2-1)(z^2+4)}$ for (a) $\|z\|<1$ (b) $1<\|z\|<2$.	8	CO2	KL2
Unit-II					
4	a.	Evaluate (i) $\int_0^\infty te^{-2t}\cos tdt$ (ii) $\int_0^\infty \frac{e^{-at}-e^{-bt}}{t}dt$.	8	CO3	KL2
	b.	Use the convolution theorem to find $L^{-1}\frac{s^2}{(s^2+a^2)(s^2+b^2)}$.	8	CO3	KL2
OR					
5	a.	Solve by the method of transforms, the equation $y'''+2y''-y'-2y=0$ given $y(0)=y'(0)=0$ and $y''(0)=6$.	8	CO4	KL3
	b.	Find the inverse Laplace transform of $\frac{s^2}{s^4+4a^4}$.	8	CO3	KL2
Unit-III					
6	a.	Find a root of the equation $x^3+x^2+x+7=0$ by Secant method correct to three decimal places	8	CO5	KL2
	b.	Find a real root of equation $x\log_{10}x=1.2$ by Regula-Falsi method correct to four decimal places.	8	CO5	KL2
OR					
7	a.	Evaluate $y(0.1)$ correct to six places of decimals by Taylor's series method if $y(x)$ satisfies $y'=xy+1, y(0)=1$.	8	CO6	KL2
	b.	Given $\frac{dy}{dx}=x^2(1+y)$ and $y(1)=1, y(1.1)=1.233, y(1.2)=1.548, y(1.3)=1.979$. Evaluate $y(1.4)$ by Adams-Bashforth method.	8	CO6	KL2
Unit-IV					

8	a.	Write the importance of Central Tendency and below are Amaya's subjects and the corresponding number of units and grades she got for the previous 8grading period. Compute her average grade point Subject | Unit | Grade Hindi | .9 | 86 English | 1.5 | 85 Mathematics | 1.5 | 88 Science | 1.8 | 87 Social Science | .9 | 86 TLE | 1.2 | 83 MAPEH | 1.2 | 87	8	C07	KL2
	b.	Define Mode and find the modal class and the actual mode of the data set below: Number | Frequency 1-3 | 7 4-6 | 6 7-9 | 4 10-12 | 9 13-15 | 2 16-18 | 8 19-21 | 1 22-24 | 2 25-27 | 3 28-30 | 2	8	CO7	KL1
		OR			
9	a.	Write a short note on Variance and Standard Deviation. Calculate the Standard Deviation for the following data: x: 0 1 2 3 4 5 6 7 8 9 10 f: 2 1 2 0 2 4 9 11 13 8 8	8	CO8	KL2
	b.	What is the coefficient of variation and calculate the coefficient of variation for the following data set: The price, in cents, of a stock over five trading days was 52, 58, 55, 57, 59.	8	CO8	KL2
		Unit-V			
~~9~~ 10	a.	Define Random Variables and Expectation. X is a continuous random variable with probability function given by $f(x) = kx (0 \le x < 2)$ $= 2k (2 \le x < 4)$ $= -kx + 6k (4 \le x < 6)$	8	CO9	KL2

		Find k and mean value of X.			
	b.	Define Moment Generating Function and find the moment generating function of the exponential distribution $f(x)=\frac{1}{c}e^{-\frac{x}{c}}$, $0 \le x \le \infty$, $c > 0$ Hence find it's mean and Standard Deviation.	8	CO9	KL2
		OR			
9	a.	Define Binomial Distribution. In 256 sets of 12 tosses of a coin, in how many cases, one can expect 8 heads and 4 tails.		CO10	KL3
	b.	Define Poisson Distribution. If the probability of a bad reaction from a certain injection is 0.001, determine the chance that out of 2000 individuals more than two will get a bad reaction.		CO10	KL3

Program code: 01UG050; Course Code: SOE-B-MME301					
O P JINDAL UNIVERSITY					
B. Tech. III Semester Regular Examinations					
INTRODUCTION TO PHYSICAL METALLURGY					
(Offered to Metallurgy)					
Time: 3 Hrs.				**Max. Marks: 100**	
Section A: All Questions are compulsory, **Section B:** Answer any one question from each unit					
All questions carry equal marks					
			M	**CO**	**KL**
Section-A					
1	a.	State Gibbes phase rule. What is the maximum number of phases can exist in a pure substance	2	CO 2	i
	b.	Explain Peritectic Reaction	2	CO 2	ii
	c.	Calculate the atomic packing factor for FCC crystal System	2	CO 1	v
	d.	Show the (111) plane and [110] direction in a crystal system	2	CO 1	i
	e.	Calculate the planner density for (111) plane of FCC crystal system	2	CO 1	v
	f.	Give the classification and explain the rules for the formation of solid solutions	2	CO 4	iv
	g.	Distinguish between Hardness and Hardenability	2	CO 3	iv
	h.	Explain the differences between TTT and CCT diagram	2	CO 2	ii
	i.	Draw a neat sketch of cooling curve for alloy system and mention various zone	2	CO 2	ii
	j.	If the lattice parameter of Iron is 286 pm than calculate the atomic radius?	2	CO 1	iv
Section-B: Unit-I					
2	a.	Explain the type of void in crystal system? Draw and discuss the tetrahedral & octahedral void for BCC & FCC structure?	8	CO 1	iv, v
	b.	Explain Symmetry and their types. Mention the 7-crystal system in terms of symmetry.	8	CO 1	iv
OR					
3	a.	Explain your understanding on miller indices. How are they determined? Calculate the miller indices of the mentioned plane.	8	CO 1	v, vi

					
	b.	Define crystal system and their types. Explain the crystal system (with sketch) and Bravais lattices with their geometrical parameters.	8	CO 1	i, ii, vi
Unit-II					
4	a.	What is solidification? Draw the cooling curve for Fe-C alloy system with the changes of different phases at different temperature.	6	CO 4	i, v
	b.	Derive critical radius of nuclei & critical free energy required for homogeneous & heterogeneous nucleation.	10	CO 2	v
OR					
5	a.	Explain your understanding on undercooling and the types of undercooling. Differentiate between smooth & dendrite growth of solid?	8	CO 4	v
	b.	Explain the various imperfections in the crystal system. Explain Critical resolved shear stress and derive Schmid law.	8	CO 3	v
Unit-III					
6	a.	State the Humo Rothery rule that favors the substitutional solid solution. Draw an Isomorphous and eutectic phase diagram with proper example	10	CO 4	v
	b.	Define lever rule and tie line rule. Calculate the fraction of pro-eutectic ferrite for 0.58 % carbon steel at 600°C.	6	CO 3	ii, v
OR					
7	a.	Explain peritectic System. Put an example of peritectic phase diagram and mark different zone. Differentiate between eutectic system and peritectic system.	8	CO 2	v
	b.	Explain the reason of occurring coring prior solidification and the prevention process for coring. Distinguish between solid solution and intermetallic compound.	8	CO 4	iv, v
Unit-IV					
8	a.	Construct the Iron-Cementite phase diagram and explain the invariant reaction, their products and different critical temperature.	8	CO 2	iv, v
	b.	Explain the End Quench Test Method for CCT Diagram. Classify the cast iron and draw the cartoon microstructure of their appearance.	8	CO 2	ii, iv, v
OR					
9	a.	Describe the changes in micro-structure with suitable sketches and phase diagram, when cooled slowly from austenite to room temperature for	8	CO 3	v, vi

		(i) Hypo-eutectoid plain carbon steels (ii) Eutectoid carbon steels and (iii) Hyper-eutectoid plain carbon steels. Construct the cartoon microstructure.			
	b.	Describe the Influence of Alloying Elements on Iron Carbon Diagram based on their classification. Explain the effect of alloying elements on TTT and CCT diagram.	8	CO 3	v
UNIT-V					
10	a.	Draw the phase diagram of Cu-Zn system and mark different zone. Differentiate between Alpha, Beta and Gamma brass	8	CO 2	v
	b.	Sketch and explain the phase diagram of Cu-Sn System. Classify Bronze and their uses in the practical application.	8	CO 2	v
OR					
11	a.	Draw the Al-Si Phase diagram and explain the phase diagram properly with the composition of Si and effect of the composition on the microstructure.	8	CO 2	v
	b.	Draw and explain the phase diagram of Cu-Al System. Explain the types of Aluminium bronze alloy	8	CO 2	v

Program Code: 01UG050		Course Code: SOE-B-MME302			
O P JINDAL UNIVERSITY					
B. Tech. III Semester Regular Examination-January-2023					
METALLURGICAL ENGINEERING					
Subject: Mineral Dressing					
Time: 3 Hrs.			**Max. Marks: 100**		
Section-A is compulsory and answer any one question from each **UNIT** in **Section B (Except UNIT-II)**					
All questions carry equal marks					
			M	**CO**	**KL**
Section-A					
1	a.	Why does mineral show luster property?	2	**C302-01**	**I**
	b.	What is the purpose of size reduction process?	2	**C302-02**	**I**
	c.	Explain some characteristic features of an 'Ideal Crusher'.	2	**C302-02**	**II**
	d.	Choose examples of primary and secondary crushers.	2	**C302-03**	**I**
	e.	With neat sketch build the terms 'Pulson' and 'Suction' related to jigging	2	**C302-03**	**VI**
	f.	How does a settling particle interpret with other forces in a fluid medium?	2	**C302-03**	**V**
	g.	State one example of frother and collector.	2	**C302-02**	**I**
	h.	Define Dia-magnetic and Para-magnetic materials.	2	**C302-02**	**III**
	i.	Differentiate between flotation process and forth flotation process.	2	**C302-03**	**II**
	j.	Assess the relationship between mesh number and particle size.	2	**C302-03**	**V**
Section-B: **Unit-I**					
2	a.	With a neat flowsheet explain the steps of various mineral dressing processes.	8	**C302-01**	**III**
	b.	Interpret the terms 'Isotropism' and ''Polymorphism'.	8	**C302-01**	**II**
OR					
3	a.	What is the main cause of colours in minerals? State some examples.	8	**C302-01**	**I**
	b.	State the definition of specific gravity and also state its relation with mineral properties.	8	**C302-01**	**I**
Unit-II					
4	a.	State the principle of a ball mill. Discuss its features like 'Cascading' and 'Cataracting' phenomenon.	8	**C302-02**	**I**
	b.	A certain crusher accepts a feed of rock having a volume surface mean diameter of 0.75 inch and the discharges product of volume surface mean diameter of 0.20 inch. The power required to crush 12 tons/hour is 9.3 HP. What should be the power consumption if the capacity is reduced to 10 tons/hour and the volume surface mean diameter be 0.15 inch. **Note:** The mechanical efficiency remains unchanged.	8	**C302-03**	**V**

<table>
<tr><td colspan="6">Unit-III</td></tr>
<tr><td rowspan="2">6</td><td>a.</td><td>State the theme of 'Terminal velocity.</td><td>8</td><td>C302-03</td><td>V</td></tr>
<tr><td>b.</td><td>Stepwise deduce the equation of 'Stroke's law of Settling'.</td><td>8</td><td>C302-03</td><td>V</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td rowspan="2">7</td><td>a.</td><td>State the principle of classification process.</td><td>8</td><td>C302-02</td><td>I</td></tr>
<tr><td>b.</td><td>What is 'Grizzling' process and 'Tromel' process. Recall the screening parameters.</td><td>8</td><td>C302-02</td><td>I</td></tr>
<tr><td colspan="6">Unit-IV</td></tr>
<tr><td rowspan="2">8</td><td>a.</td><td>Explain the jigging cycle following sine curve phenomenon.</td><td>8</td><td>C302-03</td><td>V</td></tr>
<tr><td>b.</td><td>Draw and explain the working principle of Harz Jig and establish its Velocity-Time relation in a graphical mode.</td><td>8</td><td>C302-03</td><td>IV</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td rowspan="2">9</td><td>a.</td><td>Classify various types of magnetic separators and how does a magnetic separator work on?</td><td>8</td><td>C302-02</td><td>I</td></tr>
<tr><td>b.</td><td>"In case of jigging, initial acceleration of the immersed particles is independent of size and dependent on density"- Justify this statement.</td><td>8</td><td>C302-03</td><td>V</td></tr>
<tr><td colspan="6">UNIT-V</td></tr>
<tr><td rowspan="2">10</td><td>a.</td><td>Establish the contact angle following Young-Dupre equation and state its limitations.</td><td>8</td><td>C302-03</td><td>VI</td></tr>
<tr><td>b.</td><td>State the principle of froth flotation process. Draw and explain the working principle of froth flotation process.</td><td>8</td><td>C302-02</td><td>I</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td rowspan="2">11</td><td>a.</td><td>A Copper ore initially contains 2.09% Copper. After carrying out a froth flotation separation, the products are tabulated below:
Asses of feed = 2.09% Cu
Actual Feed = 100%
<table>
<tr><th>Product</th><th>% Weight</th><th>% of Copper Assay</th></tr>
<tr><td>Feed</td><td>100</td><td>2.09</td></tr>
<tr><td>Concentrate</td><td>10</td><td>20.0</td></tr>
<tr><td>Trailing</td><td>90</td><td>0.1%</td></tr>
</table>
Calculate Ratio of concentration, % of metal recovery, % of metal loss and % of yield.</td><td>8</td><td>C302-03</td><td>VI</td></tr>
<tr><td>b.</td><td>Briefly discuss the role of collectors and frothers in froth flotation process.</td><td>8</td><td>C302-02</td><td>I</td></tr>
</table>

Course Code: SOE-B-MME303

O P JINDAL UNIVERSITY

B. Tech. III Semester Regular Examinations

METALLURGICAL THERMODYNAMICS AND KINETICS

DEPARTMENT OF METALLURGICAL ENGINEERING

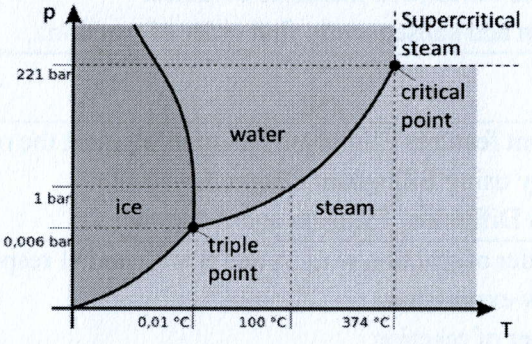
Time: 3 Hrs. **Max. Marks: 100**

Answer any one question from each unit

All questions carry equal marks

			M	CO	KL
Section-A					
1	a.	Define compressibility factor (Z). Plot a diagram for the deviation from ideal to real gas in terms of Z.	2	1	I
	b.	In a vacuum degassing of steel, 10 ppm of dissolved N_2 is in equilibrium with 1 mbar of N_2 gas at 1837 K. At the same temperature, if the pressure is lowered to 0.5 mbar, find the equilibrium N_2 content.	2	4	II
	c.	What do you mean by "Equilibrium Constant"? Write an expression with standard free energy change ($\Delta G°$).	2	3	I
	d.	Construct rate laws for zero, 1st and 2nd order reactions.	2	2	II
	e.	What is reaction Half-life? Write an expression for the Half-life of a 1st order reaction?	2	2	I
	f.	Let us consider a A–B Raoultian Ideal solution, construct a diagram for $\Delta S^{mix,id}$, $\Delta G^{mix,id}$, and $\Delta H^{mix,id}$ with respect to composition.	2	1	III
	g.	Briefly discuss about non-ideal solution.	2	1	I
	h.	Let us consider a chemical reaction; $3A + B \rightarrow 2C$. Determine the rare of reaction (ROR), rate of appearance (ROA) and rate of disappearance (ROD).	2	2	II
	i.	What do you mean by fugacity. Write an expression for molar Gibbs free energy (G) for a non-ideal gas.	2	1	I
	j.	Define thermal entropy and configurational entropy.	2	4	I
Section-B: Unit-I					
2	a.	(i) Ten liters of a monoatomic ideal gas at 25 °C and 10 atm pressures are expanded to a final pressure of 1atm. The molar heat capacity of the gas at constant volume is 3R/2 and is independent of temperature. Calculate the work done, the heat absorbed, and the change in U and in H for the gas if the process is carried out (i) isothermally and reversibly, and (ii) adiabatically and reversibly.	8	2	II
	b.	What is internal energy? Write an expression in differential form of an internal energy at constant temperature, pressure, and volume.	8	1	I

		OR			
3	a.	Derive (i) PV^{γ} = constant and (ii) $T^{\gamma}P^{1-\gamma}$ = constant (where, $\gamma = C_p/C_v$).	8	1	I
	b.	(i) What is Hess's law? (ii) Calculate the standard heat of formation of solid WO_3 from solid W and O_2 gas at 25 °C (298 K) and 1 atm pressure from the following data at 25 °C (298 K) and 1 atm pressure. <W> + (O_2) = <WO_2>; $\Delta H^{o}_{298} = -220$ KCal 3<WO_2> + (O_2) = <W_3O_8>; $\Delta H^{o}_{298} = -190$ Kcal <W_3O_8> + ½ (O_2) = 3<WO_3>; $\Delta H^{o}_{298} = -70.5$ KCal	8	3	II
		Unit-II			
4	a.	(i) Zinc melts at 420 °C and its standard entropy at 25 °C is 9.95 cal/deg/mole. Calculate the standard entropy of Zinc at 750 °C. Given: Heat of fusion of Zn at the melting, $\Delta H_f = 1.74$ Kcal/mole $C_{P,\,<Zn>} = 5.35 + 2.40 \times 10^{-3}$ T cal/deg/mole $C_{P,\,\{Zn\}} = 7.50$ cal/deg/mole (ii) Calculate ΔH^{o}_{298} for the reaction: $2CaO + SiO_2 = Ca_2SiO_4$ Given: ΔH_f^{o} for the formation of CaO, SiO_2, and Ca_2SiO_4 from their elements at 298 K are -634, 910.9 and -2305.3 KJ/mole, respectively.	8	4	II
	b.	(i) Explain Debye's and Dulong–Petit's theories of heat capacity of solids in details. (ii) Explain a diagram between C_p and T.	8	1	I
		OR			
5	a.	(i) Write an expression for Kirchhoff's law. (ii) Calculate the standard heat of formation of PbO from Pb and O_2 at 227 °C from the following data. ΔH^{o} 298, <PbO> = – 50.0 Kcal/mole C_p, <PbO> = 10.6 + 2.0 x 10-3 T cal/deg/mole C_p, <Pb> = 3.63 + 2.33 x 10-3 T cal/deg/mole C_p, <O_2> = 5.16 + 1.0 x 10-3 T – 0.4 x 105 T^{-2} cal/deg/mole	8	4	II
	b.	Plot the diagram between G vs T and T vs t during solidification of pure metal. Explain these diagrams in details.	8	4	I
		Unit-III			
6	a.	Derive Clausius–Clapeyron equation. Why there is decrease in pressure results in increase in melting point of grey cast iron?	8	1	III
	b.	Derive all four Maxwell's relations.	8	2	I

		OR			
7	a.	 Explain the transformations from ice → water; water → steam; ice → steam on the basis of Clausius – Clapeyron equation.	8	4	II
	b.	Derive (i) Gibbs – Helmholtz relationship and (ii) Gibbs – Duhem equation.	8	3	I
		Unit-IV			
8	a.	Calculate Equilibrium constant and Equilibrium partial pressure of oxygen for the reaction, $ZrO_2 \rightarrow Zr + O_2$. $\Delta G° = 259000 + 4TlogT - 50.12T$ Cal at 1727 °C. Also, predict the possibility of decomposing a pure Zirconia crucible under vacuum of 10^{-5} mm Hg at that temperature.	8	2	II
	b.	(i) Define activity and find out the relation with fugacity. (ii) Derive Van't Hoff equation.	8	1	I
		OR			
9	a.	Calculate the Equilibrium constant for the reaction <NiO> + (H_2) = <Ni> + (H_2O) at 750 °C from the following data. <Ni> + ½(O_2) = <NiO>, $\Delta G° = -58,000 + 20T$ Cal $(H_2) + ½ (O_2) = (H_2O)$, $\Delta G° = -60,000 + 10T$ Cal Could pure Ni sheet be annealed at 750 °C in an atmosphere containing 95% H_2O and 5% H_2 by volume without oxidation?	8	2	II
	b.	Write an expression for heat capacity at constant pressure and constant volume. Prove $C_p - C_v = R$.	8	1	I
		UNIT-V			
10	a.	List out the factors that influence the rate of reaction.	8	2	II
	b.	Let us consider a chemical reaction A + 2B + 4C → Products. Three conditions are given: (i) when volume of container is doubled, rate of reaction decreases	8	3	III

		8 times; (ii) when concentration of A, i.e. [A] is doubled and [B] is halved then rate of reaction increases 4 times; (iii) when concentration of C, i.e. [C] increases 4 times then rate of reaction increases 64 times. Write rate law expression and subsequently find order of reaction.			
		OR			
11	a.	(i) Discuss some important features Ellingham Diagram. Explain the reduction of Hematite to pure Fe by using Ellingham Diagram. (ii) Comparison between Diffusion, Effusion and Adhesion.	8	3	II
	b.	2A + 3B → Products. Order of reaction w.r.t. A and B are 2 and -1 respectively. (i) Write the rate law expression. (ii) Calculate the order of reaction. (iii) What is the effect on rate when A. Concentration of A is doubled alone B. Concentration of B is halved alone C. Concentration of both A and B both is doubled D. Volume of container increases 3times.	8	2	III

12/01/23
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Course Code: SOE-B-MME304

O P JINDAL UNIVERSITY

B. Tech. III Semester Regular Examinations

Introduction to Engineering Materials

Department of Metallurgy, School of Engineering

Time: 3 Hrs. **Max. Marks: 100**

Answer any one question from each unit

All questions carry equal marks

			M	CO - 304	KL
Unit-I (20 marks)					
1	a.	Compare crystal system and Bravais lattice? Draw a sketch for a BCC unit cell and show (111) plane along with the atomic positions of the atoms?	10	02	5
	b.	Explain the need for (or Draw a flowchart for) differentiating among various engineering materials on the basis of properties of these materials.	10	01	2
OR					
2	a.	Calculate atomic packing fraction for FCC, HCP and BCC crystals? Show calculations and give examples of elements that belong to these systems?	10	02	5
	b.	Describe the importance of mechanical properties like YS, UTS, elongation, hardness and toughness from industrial point of view. You can take example of products from ferrous or non-ferrous industry.	10	03	6
Unit-II					
3	a.	Explain Gibb's phase rule? Describe the importance of phase diagram in ferrous and non-ferrous industry? What is difference between peritectic, eutectic and eutectoid transformations with respect to phase diagram?	10	02	2
	b.	What are the applications of light metals (/alloys) like magnesium and titanium, (give examples of two (2) of these alloys)? Describe shape memory alloys?	10	03	3
OR					
4	a.	What are the applications of Ni-base superalloys? What are the critical phases in Ni-base superalloys? Describe the role of alloying element in Ni-base superalloys?	10	03	3
	b.	What are the effect of alloying elements in phase transformation in aluminum alloys? You can take example of any one of these grades and write the stable and metastable phases formed as a result of these alloying elements?	10	02	4
Unit-III					
5	a.	Describe application of ceramics in the iron and steel industry? Describe the structure of these ceramics?	10	01	3
	b.	What are methods of manufacturing polymers? Name 3 methods and show a chemical reaction with input and end product?	10	02	6
OR					

6	a.	Differentiate polymers on the basis of application? Differentiate between thermosetting polymers and thermoplastic polymers and their application?	10	01	4
	b.	Describe manufacture of ceramics? What are the important properties for a ceramic from application point of view?	10	03	6
Unit-IV					
7	a.	What is the difference between conductor, resistor, semiconductor, superconductor and dielectric material? Give example for each.	10	02	2
	b.	Draw a B-H curve for a hard magnet and a soft magnet? Give examples of hard and soft magnet?	10	03	2,3
OR					
8	a.	Describe magnetostriction, Curie point, Core loss, Coercivity, and magnetic flux density for magnetic materials?	10	02	4
	b.	What is piezoelectric material? What are the applications of piezoelectric materials and semiconductors?	10	03	1,3
UNIT-V					
9	a.	Name common composite materials in use? Differentiate between various composite materials from application point of use?	10	01	2,4
	b.	Describe the methods of manufacturing sandwich materials? Give examples of 2 sandwich materials and explain its importance?	10	02	6
OR					
10	a.	What is metal matrix composite (MMC)? Give example and describe its importance?	10	01	1
	b.	What is the importance of matrix phase in sandwich materials? What are the common materials used as the matrix phase? Give examples and application?	10	02	2

18/01/23

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Course Code: SOE-B-MME308

O P JINDAL UNIVERSITY

B. Tech. III Semester Regular Examinations

Six Sigma in ManufacturingIndustry

Department of Metallurgy, School of Engineering

Time: 2 Hrs. **Max. Marks: 50**

Answer any one question from each unit

All questions carry equal marks

			M	CO:C308	KL
Unit-I (10 marks)					
1	a.	Explain Statistical Process Control in industry?	5	3	2
	b.	What is Six Sigma?	5	1	1
OR					
2	a.	Describe importance of P-value?	5	2	4
	b.	Compare X bar and R charts?	5	2	2
Unit-II					
3	a.	Describe the importance of control charts?	5	3	6
	b.	What is MAIC in Six Sigma?	5	1	1
OR					
4	a.	Explain various ways of representing data with respect to control chart?	5	3	5
	b.	List different variations that are used in the Six Sigma process?	5	2	4
Unit-III					
5	a.	List three key elements for the six sigma process improvement?	5	1	6
	b.	Explain Fishbone diagram.	5	1	2
OR					
6	a.	Compare Six Sigma DMAIC and DMADV methodologies?	5	3	4
	b.	Compare Lean and Six Sigma in industry?	5	3	5
Unit-IV					
7	a.	What is the difference between Cpk and Ppk?	5	2	1
	b.	List Lean Six Sigma tools.	5	3	6
OR					
8	a.	Explain DFSS in a Six Sigma process?	5	3	2
	b.	List Quality Management tools in Six Sigma.	5	3	4
UNIT-V					
9	a.	What is design of experiments?	5	1	1
	b.	Explain Pareto chart?	5	3	5
OR					
10	a.	Compare Histogram and a Boxplot.	5	1	2
	b.	Describe data collection plan?	5	2	6

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		Six Sigma in ManufacturingIndustry			
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Time: 2 Hrs.				**Max. Marks: 50**	
		Answer any one question from each unit			
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			M	**CO:C308**	**KL**
		Unit-I (10 marks)			
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