

Course Code: SOE-M-SE-101

OP JINDAL UNIVERSITY

Mid Semester Examination, November-2023

M.Tech. 1st Semester [Program Code: SOE-M-SE-101]

Civil Engineering

Introduction to Earthquake Engineering

Time: 2 Hrs.

Max. Marks: 50

Note:

M CO KL

Section A (10 marks)

All Questions are compulsory [05 x 02 marks=10 marks]

1	a.	Why do earthquakes happen?	2	1	2
	b.	How are Earthquake Magnitudes Measured?	2	2	2
	c.	What are different types of faults?	2	1	1
	d.	What is intensity?	2	2	1
	e.	What are the causes of volcanic earthquake?	2	2	1

Section B (16 marks)

Answer any 4 questions [04 x 04 marks=16 marks]

2	a.	Describe briefly direct and indirect effect of earthquake.	4	1	2
	b.	Describe two measures of an earthquake.	4	2	2
	c.	Distinguish between body wave and surface wave.	4	1	2
	d.	Calculate the moment magnitude of an earthquake with the rupture area dimensions of length 35km, width 15km and slip 1meter. Assume modulus of rigidity, $\mu = 3.5 \times 10^{10} \text{ N/m}^2$.	4	2	4
	e.	What is elastic rebound theory?	4	2	1

Section C (24 marks)

Answer any 3 questions [03 x 08 marks=24 marks]

3	a.	Discuss the main characteristics of seismic wave.	8	2	1
	b.	What are plate tectonics and how are they related to continental drift and sea floor spreading?	8	1	2
	c.	Describe internal structure of earth.	8	1	2
	d.	Write short note on (i) Seismic wave (ii) Subduction zone.	8	1,2	2
	e.	Describe an earthquake seismograph with a schematic diagram.	8	2	2

Best of Luck

Course Code: SOE-M-SE102		
OP JINDAL UNIVERSITY		
Mid Semester Examination, November-2023		
M. Tech. 1st Semester [Program Code: 01PG011]		
Civil Engineering (Structural Engineering)		
Advanced Solid Mechanics		
Time: 2 Hrs.	Max. Marks: 50	
Note: This question paper contains <u>Two</u> Pages. If any data is missing, then assume it and mention it at the starting point of your answer. All the best!!!		
	M	CO
		KL

Section A (20 marks)

Answer any 4 questions [04 x 05 marks = 20 marks]

1	a.	(i) What do you mean by principle plane and principal stress? (ii) What do you mean by the 'state of pure shear'?	5	1	I
	b.	(i) Write down the stress invariants in terms of principal stresses? (ii) Write down differential equations for equilibrium for 3D state?	5	1	I
	c.	The following state of strain exists at a point P $[\varepsilon_{ij}] = \begin{bmatrix} 0.02 & -0.04 & 0 \\ -0.04 & 0.06 & -0.02 \\ 0 & -0.02 & 0 \end{bmatrix}$ In the direction PQ having direction cosines $n_x = 0.6, n_y = 0$ and $n_z = 0.8$. (i) Determine ε_{ij} ? (ii) Find the cubical dilation at a point P?	5	1	I
	d.	(i) Explain the plain stress and strain with one example each? (ii) Write down the stress matrix for the same.	5	1	II
	e.	The displacement field for a body is given by $u = (x^2 + y)i + (3 + z)j + (x^2 + 2y)k$ What is the deformed position of a point originally at (3, 1, -2)?	5	1	I

Section B (30 marks)

Answer any 3 questions [03 x 10 marks = 30 marks]

2	a.	A rectangular steel bar having a cross-section 2 cm × 3 cm is subjected to a tensile force of 6000 N. If the axes are chosen as shown in the below Figure, evaluate the normal and shear stresses on a plane whose normal has the following direction cosines: i. $n_x = n_y = \frac{1}{\sqrt{2}}, n_z = 0$ ii. $n_x = 0, n_y = n_z = \frac{1}{\sqrt{2}}$ iii. $n_x = n_y = n_z = \frac{1}{\sqrt{2}}$	10	1	V
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b.	<p>The following state of strain exists at a point P</p> $[\varepsilon_{ij}] = \begin{bmatrix} 0.02 & -0.04 & 0 \\ -0.04 & 0.06 & -0.02 \\ 0 & -0.02 & 0 \end{bmatrix}$ <p>In the direction PQ having direction cosines $n_x = 0.6$, $n_y = 0$ and $n_z = 0.8$. Determine the principal strains and the directions of the maximum and minimum principal strains.</p>	10	1	V
c.	<p>(i) Construct the Mohr's circles for the three-dimensional stress state of stress and briefly describe the significance of each point. (ii) Write the generalized Hooke's law for an isotropic material?</p>	10	1	III
d.	<p>Using strain energy method, determine the deflection at free end of the cantilever beam AB (end A is fixed) of length L.</p>	10	1	III

Course Code: SOE-M-SE103

OP JINDAL UNIVERSITY
Mid Semester Examination, November-2023
M.Tech. 1st Semester [Program Code: 01UG020]
Civil Engineering
Structural Dynamics



Time: 2 Hrs.

Max. Marks: 50

Note:

M CO KL

Section A (20 marks)

Answer any 4 questions [04 x 05 marks=20 marks]

1	a.	State D'Alemberts principle?	5	1	6
	b.	Explain in brief force system?	5	1	3
	c.	What is the elementary part of vibrational system?	5	2	4
	d.	What is critical damped system and write down equation of it?	5	1	1
	e.	Explain types of vibration at least four types with example?	5	2	2

Section B (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]

2	a.	Explain springs in parallel and in series with diagram and equations?	10	2	2
	b.	Explain harmonic excitation for damped system?	10	2	1
	c.	Explain response spectra in details?	10	2	1
	d.	Explain free vibrational analysis of MDOF system?	10	1	4



JINDAL UNIVERSITY
M.B.A. Semester Examination November 2022
MBA 111 Semester Program Code: B11C001
Financial Economics
Time: 1 Hour

Time: 1 Hour
Page: _____

Name: _____
Roll No.: _____

Section A (20 marks)

Answer any 4 questions (04 x 05 marks each)

1	State the independent variables	5
2	Explain the role of interest rate	5
3	What is the relationship between the money market and the bond market?	5
4	What is the effect of an increase in the money supply on the interest rate?	5
5	Explain the role of the central bank in the financial system.	5

Section B (20 marks)

Answer any 3 questions (03 x 07 marks each)

1	Explain the role of the central bank in the financial system.	7
2	Explain the role of the government in the financial system.	7
3	Explain the role of the private sector in the financial system.	7

Course Code: SOE-M-SE104

OP JINDAL UNIVERSITY

Mid Semester Examination, November-2023

M.Tech. 1st Semester [Program Code: 01PG011]

Structural Engineering

MMSA

Time: 2 Hrs.

Max. Marks: 50

Note:

M CO KL

Section A (10 marks)

All Questions are compulsory [05 x 02 marks=10 marks]

1	a.	What is stiffness of the member	2	1	KL1
	b.	Write equilibrium equations for plane frame	2	1	KL1
	c.	Enlist various stiffness	2	1	KL1
	d.	What is degree of indeterminacy	2	2	KL1
	e.	What is free body diagram	2	2	KL2

Section B (16 marks)

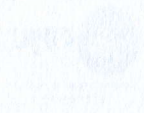
Answer any 4 questions [04 x 04 marks=16 marks]

2	a.	Explains sign conventions for axial force, shear force and bending moment in structural analysis	4	2	KL2
	b.	explain significance of flexibility with example.	4	1	KL2
	c.	What is difference between plane frame and space frame	4	1	KL1
	d.	Write expression for strain energy due to axial force	4	2	KL2
	e.	Find x, y and z using matrix method $2x-12z=28$, $4x+9y-5z=14$, $6y+25z=32$.	4	2	KL2

Section C (24 marks)

Answer any 3 questions [03 x 08 marks=24 marks]

3	a.	State points of evident from multiplication of the two matrices	8	1	KL2
	b.	Solve the following simultaneous equations using matrix method $5x-13y=15$, $8x+4y-9z=21$, $7y+18z=29$.	8	2	KL2
	c.	Two members PQ and QR are connected in series having equal cross sectional area 25 sq.mm. Calculate axial flexibility and axial stiffness for both members. Also develop flexibility matrix. Take $E=200 \text{ KN/Sq.mm}$	8	2	KL2
	d.	Explain Maxwell's Reciprocal Theorem with proof.	8	1	KL1
	e.	Write expression for strain energy due to shear force and bending moment	8	1	KL1



UNIVERSITY OF MICHIGAN
MEDICAL CENTER
DEPARTMENT OF RADIOLOGY
RADIOLOGY

Page 2 of 2

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Course Code: SOE-M-SE-105

OP JINDAL UNIVERSITY

Mid Semester Examination, November-2023

M.Tech. 1st Semester [Program Code: 01PG011]

Civil Engineering (Structural Engineering)

Structural Health Monitoring

Time: 2 Hrs.

Max. Marks: 50

Note:

M | CO | KL

Section A (20 marks)

Answer any 4 questions [04 x 05 marks=20 marks]

1	a.	What do you understand by Structural Health Monitoring? Explain in detail.	5	1	1
	b.	What do you mean by deterioration? Explain the mechanism of deterioration in concrete structures?	5	1	1
	c.	Differentiate structural & non-structural cracks. Explain causes of distress in structural members.	5	1	4
	d.	What are sensors? How sensors are used in Structural Health Monitoring?	5	2	2
	e.	What do you mean by Nondestructive Testing (NDT)? How is the NDT used for Structural Health Monitoring?	5	2	2

Section B (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]

2	a.	Explain the applications of Structural Health Monitoring in Bridge Structures?	10	1	2
	b.	Explain Piezo generated Elastic Waves for Structural Health Monitoring?	10	2	2
	c.	Explain the Role of Optical Fibre Sensors in Structural Health Monitoring System?	10	2	2
	d.	What is the role of Vibration in Structural Health Monitoring?	10	1	1



OP JINDAL UNIVERSITY

Mid Semester Examination November-2023
 M.Tech. 1st Semester (Program Code: 01PG011)
 Civil Engineering (Structural Engineering)

Structural Health Monitoring

Max. Marks: 50

Time: 2 Hrs.

Note:

M CO-1 ET

Section A (20 marks)

Answer any 4 questions [04 x 05 marks=20 marks]

1	1	5	a. What do you understand by structural Health Monitoring? Explain in detail.
1	1	5	b. What do you mean by deterioration? Explain the mechanism of deterioration in concrete structure?
4	1	5	c. Differentiate between & non-structural cracks. Explain causes of distress in structural members.
3	2	5	d. What are sensors? How sensors are used in Structural Health Monitoring?
3	2	5	e. What do you mean by Non-destructive Testing (NDT)? How is the NDT used for Structural Health Monitoring?

Section B (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]

1	1	10	a. Explain the applications of Structural Health Monitoring in Bridge structures?
2	2	10	b. Explain Piezo-resistive strain gauges for Structural Health Monitoring?
3	2	10	c. Explain the Role of Optical Fiber Sensors in Structural Health Monitoring System?
1	1	10	d. What is the role of Vibration in Structural Health Monitoring?

OP JINDAL UNIVERSITY

Mid-Semester Examination, November-2023

M.Tech. 1st Semester [Program Code: 01PG021]

Computer Science & Engineering

Advanced Mathematics

Time: 2 Hrs.

Max. Marks: 50



Note:

M CO KL

Section A (20 marks)

Answer any 4 questions [04 x 05 marks=20 marks]

1	a.	u and v are given as $(1, -2, 3)$ and $(1, -2, 3)$. Find $d(u, v)$, the angle between u and v , and projection of u onto v .	5	CO 1	K1
	b.	Let $u = 2\hat{i} - 3\hat{j} + 4\hat{k}$, $v = 3\hat{i} + \hat{j} - 2\hat{k}$, $w = \hat{i} + 5\hat{j} + 3\hat{k}$. Find (i) $2u - 3v + 4w$, (ii) $u \cdot v$ and $u \cdot w$ (iii) $\ u\ $.	5	CO 1	K1
	c.	Let V the vector space of functions $f: \mathbb{R} \rightarrow \mathbb{R}$. Show that W is a subspace of V , where $W = \{f(x) : f(1) = 0\}$, all functions whose value at 1 is 0.	5	CO 2	K2
	d.	Express the vector $u = (4, 9, 19)$ as a linear combination of $u_1 = (1, -2, 3)$, $u_2 = (3, -7, 10)$, $u_3 = (2, 1, 9)$.	5	CO 1	K2
	e.	Determine whether or not the following homogeneous system has a nonzero solution $\begin{aligned} x + y - z &= 0 \\ 2x - 3y + z &= 0 \\ x - 4y + 2z &= 0. \end{aligned}$	5	CO 2	K2

Section B (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]

2	a.	Let V be the set of all ordered pairs (x, y) , where x, y are real numbers. Let $a = (x_1, y_1)$ and $b = (x_2, y_2)$ be two elements in V . Define the addition as $a + b = (x_1, y_1) + (x_2, y_2) = (2x_1 - 3x_2, y_1 - y_2)$ and the scalar multiplication as $\alpha(x_1, y_1) = (\frac{\alpha x_1}{3}, \frac{\alpha y_1}{3})$. Show that V is not a vector space. Which of the properties are not satisfied?	10	CO 1	K2
	b.	Let $A = \begin{bmatrix} 3 & -4 \\ 2 & -6 \end{bmatrix}$. Find all eigenvalues and corresponding eigenvectors.	10	CO 1	K2
	c.	Apply Gauss elimination method to solve the system of linear equations $\begin{aligned} x - 3y - 2z &= 6 \\ 2x - 4y - 3z &= 8 \\ -3x + 6y + 8z &= -5. \end{aligned}$	10	CO 2	K3
	d.	Suppose the mapping $F: \mathbb{R}^2 \rightarrow \mathbb{R}^2$ is defined by $F(x, y) = (x + y, x)$. Show that F is linear.	10	CO 2	K2



ANNA UNIVERSITY

2014 Semester Examination, November 2014
M.Tech. I Semester Program Code: MTECH14
Computer Science & Engineering
Advanced Mathematics

Max. Marks: 75

Time: 3 hrs

Part A (30 marks)

Part A (30 marks)

Answer any 10 questions (10 x 3 = 30 marks)

Q.No	Q.No	Q.No	Q.No	Q.No	Q.No	Q.No	Q.No	Q.No	Q.No
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Course Code: SOE-B-CSE202

OP JINDAL UNIVERSITY

Mid-Semester Examination, October-2023

M.Tech. 1st Semester [SOE-M-CSE102]



CSE

Advanced-Data Structures and Algorithms

Time: 2 Hrs.

Max. Marks: 50

Note:

M CO KL

Section A (20 marks)

Answer any 4 questions [04 x 05 marks=20 marks]

1	a.	What are the data structures? Differentiate between primitive data structures and non-primitive data structures.	5	1	KL1
	b.	Explain the different operations to be performed on the data structures.	5	1	KL1
	c.	Explain the concept of Big O and Theta Notations.	5	1	KL2
	d.	What is a doubly-linked list? Give some examples.	5	2	KL2
	e.	WAP to find the sum of the first ten natural numbers using recursion.	5	1	KL2

Section B (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]

2	a.	WAP to check if the entered number is a prime number or not.	10	1	KL2
	b.	What are the advantages of a linked list over an array? In which scenarios do we use Linked List and when Array?	10	2	KL2
	c.	WAP to implement priority queues using a pointer.	10	2	KL2
	d.	Lists the operation to be performed on a binary tree and writes an algorithm for post-order traversal.	10	2	KL2



OP JSC UNIVERSITY

Post Graduate Examination (2023-2024)
M.Sc. in English (2023-2024)

Advanced Data Structures and Algorithms

Time: 3 Hours

Page: 2/2

M | CO | XI

Section A (20 marks)

Answer any 4 questions (10 marks each)

1	1	10	What are the time complexities of different sorting algorithms?
2	1	10	Explain the difference between a linked list and an array.
3	1	10	What is a hash table? How does it work?
4	1	10	Describe the working of a binary search tree.
5	1	10	What is a graph? Define its types.

Section B (20 marks)

Answer any 2 questions (10 marks each)

1	1	10	Write a program to find the sum of all even numbers in an array.
2	1	10	Write a program to check if a string is a palindrome.
3	1	10	Write a program to find the maximum element in a binary tree.
4	1	10	Write a program to find the shortest path between two nodes in a graph.

OP JINDAL UNIVERSITY

Mid Semester Examination, November-2023

M.Tech. Ist Semester (Program Code:01PG021)

Computer Science & Engineering

Fundamentals of Data Analytics

Time: 2 Hrs.

Max. Marks: 50

Note: Please write your answers neat and clean.

M	C	KL
	O	

Section A (20 marks)

Answer any 4 questions [04 x 05 marks=20 marks]

1	a.	Explain normal probability distribution.	5	1	KL1
	b.	Explain regression with the help of suitable example.	5	1	KL1
	c.	Define features in the data set. How multicollinearity play an important role in data analysis?	5	1	KL1
	d.	Explain mean, standard deviation and variance.	5	2	KL1
	e.	Explain overfitting and underfitting in context of data model.	5	2	KL1

Section B (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]

	a.	Explain data science. Mention any four application areas where data science plays an important role.	10	2	KL1														
	b.	Explain K-Means clustering algorithm. Plot the following data in python. <table border="1" style="margin: 10px auto;"> <thead> <tr> <th>DATA</th> <th>X</th> <th>Y</th> </tr> </thead> <tbody> <tr> <td>Sample 1</td> <td>1</td> <td>1</td> </tr> <tr> <td>Sample 2</td> <td>2</td> <td>1</td> </tr> <tr> <td>Sample 3</td> <td>4</td> <td>3</td> </tr> <tr> <td>Sample 4</td> <td>5</td> <td>4</td> </tr> </tbody> </table>	DATA	X	Y	Sample 1	1	1	Sample 2	2	1	Sample 3	4	3	Sample 4	5	4	10	1
DATA	X	Y																	
Sample 1	1	1																	
Sample 2	2	1																	
Sample 3	4	3																	
Sample 4	5	4																	
	c.	Discuss KNN in data science. Data from questionnaires survey has been collected to classify whether a bathing soap is good or bad based on smell and soapsuds. The training samples are given as	10	1	KL3														

This examination is to be taken on the date indicated on the cover of this examination.

Section A (20 points)

Answer each question in the space provided.

1. Let X_1, X_2, \dots, X_n be independent and identically distributed random variables with mean μ and variance σ^2 . Let $\bar{X}_n = \frac{1}{n} \sum_{i=1}^n X_i$ be the sample mean. Find the limiting distribution of $\sqrt{n}(\bar{X}_n - \mu)$ as $n \rightarrow \infty$.

2. Let X_1, X_2, \dots, X_n be independent and identically distributed random variables with mean μ and variance σ^2 . Let $\bar{X}_n = \frac{1}{n} \sum_{i=1}^n X_i$ be the sample mean. Find the limiting distribution of $\sqrt{n}(\bar{X}_n - \mu)$ as $n \rightarrow \infty$.

3. Let X_1, X_2, \dots, X_n be independent and identically distributed random variables with mean μ and variance σ^2 . Let $\bar{X}_n = \frac{1}{n} \sum_{i=1}^n X_i$ be the sample mean. Find the limiting distribution of $\sqrt{n}(\bar{X}_n - \mu)$ as $n \rightarrow \infty$.

4. Let X_1, X_2, \dots, X_n be independent and identically distributed random variables with mean μ and variance σ^2 . Let $\bar{X}_n = \frac{1}{n} \sum_{i=1}^n X_i$ be the sample mean. Find the limiting distribution of $\sqrt{n}(\bar{X}_n - \mu)$ as $n \rightarrow \infty$.

Section B (30 points)

Answer each question in the space provided.

1. Let X_1, X_2, \dots, X_n be independent and identically distributed random variables with mean μ and variance σ^2 . Let $\bar{X}_n = \frac{1}{n} \sum_{i=1}^n X_i$ be the sample mean. Find the limiting distribution of $\sqrt{n}(\bar{X}_n - \mu)$ as $n \rightarrow \infty$.

2. Let X_1, X_2, \dots, X_n be independent and identically distributed random variables with mean μ and variance σ^2 . Let $\bar{X}_n = \frac{1}{n} \sum_{i=1}^n X_i$ be the sample mean. Find the limiting distribution of $\sqrt{n}(\bar{X}_n - \mu)$ as $n \rightarrow \infty$.

3. Let X_1, X_2, \dots, X_n be independent and identically distributed random variables with mean μ and variance σ^2 . Let $\bar{X}_n = \frac{1}{n} \sum_{i=1}^n X_i$ be the sample mean. Find the limiting distribution of $\sqrt{n}(\bar{X}_n - \mu)$ as $n \rightarrow \infty$.

4. Let X_1, X_2, \dots, X_n be independent and identically distributed random variables with mean μ and variance σ^2 . Let $\bar{X}_n = \frac{1}{n} \sum_{i=1}^n X_i$ be the sample mean. Find the limiting distribution of $\sqrt{n}(\bar{X}_n - \mu)$ as $n \rightarrow \infty$.

5. Let X_1, X_2, \dots, X_n be independent and identically distributed random variables with mean μ and variance σ^2 . Let $\bar{X}_n = \frac{1}{n} \sum_{i=1}^n X_i$ be the sample mean. Find the limiting distribution of $\sqrt{n}(\bar{X}_n - \mu)$ as $n \rightarrow \infty$.

6. Let X_1, X_2, \dots, X_n be independent and identically distributed random variables with mean μ and variance σ^2 . Let $\bar{X}_n = \frac{1}{n} \sum_{i=1}^n X_i$ be the sample mean. Find the limiting distribution of $\sqrt{n}(\bar{X}_n - \mu)$ as $n \rightarrow \infty$.

7. Let X_1, X_2, \dots, X_n be independent and identically distributed random variables with mean μ and variance σ^2 . Let $\bar{X}_n = \frac{1}{n} \sum_{i=1}^n X_i$ be the sample mean. Find the limiting distribution of $\sqrt{n}(\bar{X}_n - \mu)$ as $n \rightarrow \infty$.

8. Let X_1, X_2, \dots, X_n be independent and identically distributed random variables with mean μ and variance σ^2 . Let $\bar{X}_n = \frac{1}{n} \sum_{i=1}^n X_i$ be the sample mean. Find the limiting distribution of $\sqrt{n}(\bar{X}_n - \mu)$ as $n \rightarrow \infty$.

9. Let X_1, X_2, \dots, X_n be independent and identically distributed random variables with mean μ and variance σ^2 . Let $\bar{X}_n = \frac{1}{n} \sum_{i=1}^n X_i$ be the sample mean. Find the limiting distribution of $\sqrt{n}(\bar{X}_n - \mu)$ as $n \rightarrow \infty$.

10. Let X_1, X_2, \dots, X_n be independent and identically distributed random variables with mean μ and variance σ^2 . Let $\bar{X}_n = \frac{1}{n} \sum_{i=1}^n X_i$ be the sample mean. Find the limiting distribution of $\sqrt{n}(\bar{X}_n - \mu)$ as $n \rightarrow \infty$.

Smell	Soapsuds	Class label
9	9	Bad
9	8	Bad
5	8	Good
3	8	Good
4	6	Good

Now the factory produces a new bathing soap with smell=5 and strength=10. Classify the new soap. (Assume $K=3$)

d. Explain classification and clustering. What are difference between classification and clustering.

10 2 KL2

OP JINDAL UNIVERSITYMid Semester Examination, ~~October~~ 2023 *November, 23*

M.Tech. 1st Semester [01PG021]



Computer Science & Engineering

Data Mining and Warehousing

Time: 2 Hrs.

Max. Marks : 50

Note:

M CO KL

Section A (20 marks)**Answer any 4 questions [04 x 05 marks=20 marks]**

1	a.	What is Data Warehouse. What are the characteristics of Data warehouse as stated by Bill Inmon	5	CO1	KL1
	b.	What is Data Mining. State its need and applications	5	CO2	KL1
	c.	Explain various scales of measurement-Nominal, Ordinal, Ratio and Interval Scale	5	CO1	KL2
	d.	What is dimensionality reduction. List the techniques of Dimensionality Reduction	5	CO2	KL2
	e.	What is Data Science. List different areas where Data science can be applied.	5	CO1	KL2

Section B (30 marks)**Answer any 3 questions [03 x 10 marks=30 marks]**

2	a.	List the components used in Data Preprocessing in Data Mining. Explain Data Cleaning component with example	10	CO2	KL2
	b.	Calculate Mean, Median and Mode of following given data 11, 15, 16, 17, 17, 18, 19, 21, 21, 23	10	CO1	KL3
	c.	Explain Steps of Knowledge Discovery in Databases (KDD)	10	CO1	KL2
	d.	Discuss in brief the various normalization techniques used in Data Mining. Normalize the following group of data – 1500, 2500, 3500, 9500 using Min-Max Normalization by setting min: 0 and max: 1	10	CO2	KL3

OF THE UNIVERSITY

November 2019

DATA RECORD AND OBSERVATIONS

Sl. No.	Time	Observation
1	10:00	Initial temperature of water is 25°C.
2	10:05	After adding 5g of NaOH, temperature rises to 35°C.
3	10:10	After adding 5g more NaOH, temperature rises to 45°C.
4	10:15	After adding 5g more NaOH, temperature rises to 55°C.
5	10:20	After adding 5g more NaOH, temperature rises to 65°C.

ANSWER AND EXPLANATION (10 x 10 marks)

1	Q.1	Explain the difference between physical and chemical changes.
2	Q.2	Write the balanced chemical equation for the reaction of sodium metal with water.
3	Q.3	Define the term 'endothermic reaction' and give an example.
4	Q.4	What is the law of conservation of mass? Illustrate with an example.
5	Q.5	Explain the difference between a mixture and a compound.

Course Code: SOE-M-CSE-105(2)

OP JINDAL UNIVERSITY

Mid Semester Examination, October-2023

M. Tech. 1st Semester [01PG021]

Computer Science & Engineering

Introduction to IoT

Time: 2 Hrs.

Max. Marks: 50



M	CO	KL
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Section A (20 marks)

Answer any 4 questions [04 x 05 marks=20 marks]

1	a.	Define sensor. What is transducers?	5	CO1	K1
	b.	What is Connectivity Technology and its types? Also write its application.	5	CO2	K1
	c.	Define IoT and What are the different components of IoT.	5	CO1	K1
	d.	What is 6LoWPANS and what are the features of it.	5	CO2	K1
	e.	What are the different challenges of IoT.	5	CO1	K1
	f.	What is the working principle of RFID and its features with application?	5	CO2	K1
	g.	Write down the difference between ZigBee and Z-wave.	5	CO2	K1

Section B (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]

2	a.	Explain actuator with their different types.	10	CO2	K2
	b.	Explain the types of sensors.	10	CO1	K2
	c.	Explain MQTT protocol with features, components and application.	10	CO2	K2
	d.	Define COAP? What is the working of COAP protocol and its features?	10	CO1	K2
	e.	Define XMPP. What is the advantages, disadvantages and its application?	10	CO2	K2

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OP JINDAL UNIVERSITY, RAIGARH (C.G.)

MID-SEMESTER EXAMINATION, OCTOBER 2023



Program Name: **M. Tech**

Time: **02 Hrs.**

Semester: **1st**

Branch: **Electrical Engineering**

Max. Marks: **50**

Course Code: **SOE-M-PEP201** Course Name: **Energy Management System**

Note: Section A: All Questions are compulsory [05 x 02 marks=10 marks]

Section B: Answer any 4 questions out of 5 [04 x 04 marks=16 marks]

Section C: Answer any 3 questions out of 5 [03 x 08 marks=24 marks]

Q. 1.	Section [A]	CO
a)	Enlist the major sources or methods of power generation.	2
b)	What are the different sources of energy?	1
c)	What do you understand by commercial energy sources?	2
d)	What is energy conservation?	1
e)	How is economic growth linked to energy consumption?	2

Q. 2.	Section [B]	CO
a)	What are the different forms of energy? Explain primary and secondary sources of energy?	2
b)	What constitutes an energy crisis?	1
c)	What is the per capita energy consumption in India?	2
d)	What do you understand by BEE? Explain its role.	3
e)	What is the Energy Conservation Act, 2001? Enlist its features.	2

Q. 3.	Section [C]	CO
a)	Enlist some salient features of the Electricity Act, 2003.	1
b)	Explain the photo voltaic system in detail. Write its advantages and disadvantages.	2
c)	How is wind energy generated? Enlist some characteristics of it.	3
d)	What is the energy strategy for the future? Explain the immediate-term, medium-term, and long-term strategy in detail.	2
e)	Write a short note about the various reforms in the energy sector.	1



UNIVERSITY OF JEDDAH

ADMISSIONS DEPARTMENT

Page No.

Date

Department Name

Section

Student Name

Registration No.

Q1

Q2

Q3

OP JINDAL UNIVERSITY

Mid Semester Examination, November-2023

M.Tech. 1st Semester

Electrical Engineering

Power Electronic Devices & Circuits

Max. Marks: 50

Time: 2 Hrs.

Note:

M	CO	KL
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Section A (20 marks)

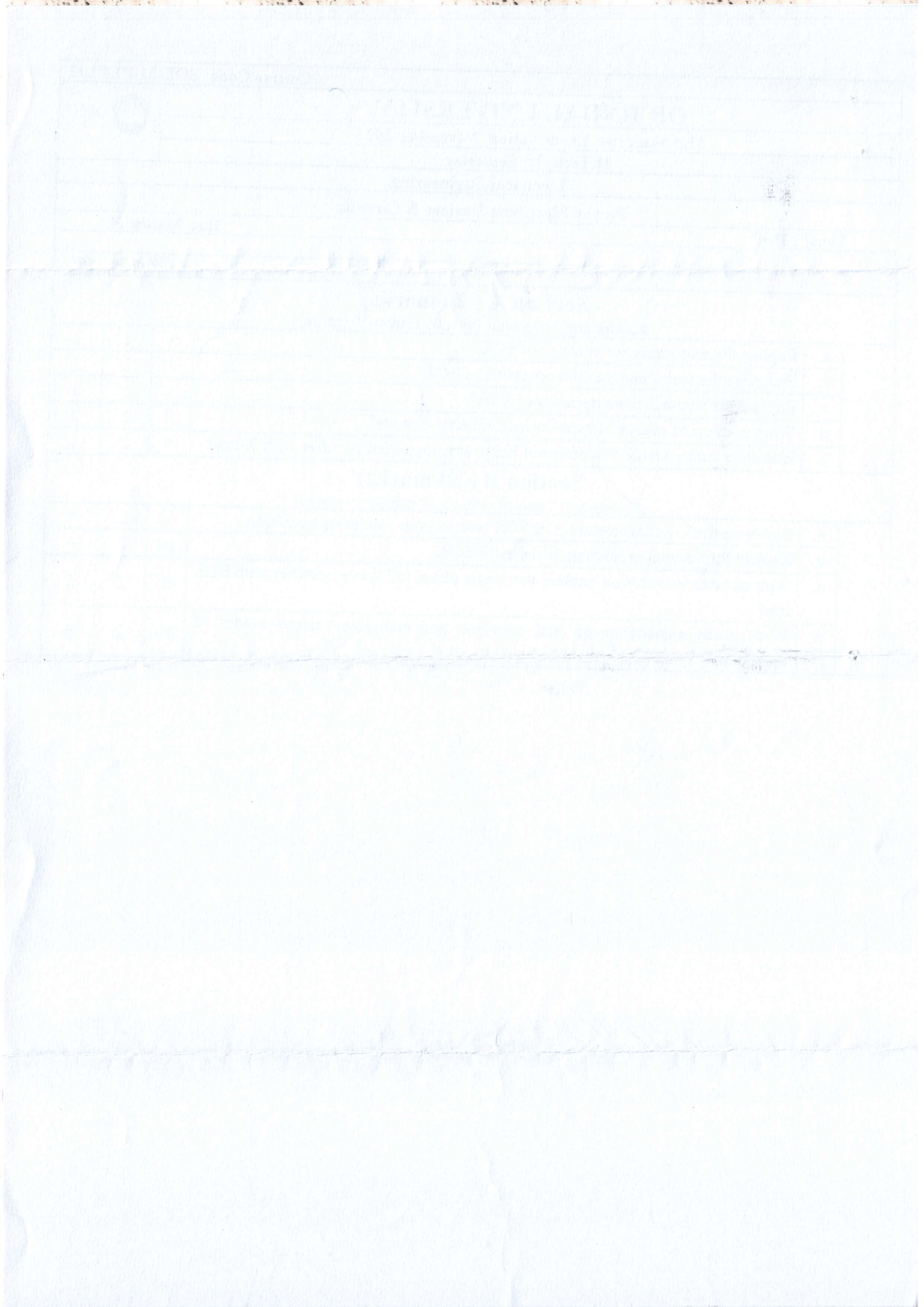
Answer any 4 questions [04 x 05 marks=20 marks]

			5	1	3
1	a.	Explain the two transistor analogy of SCR?	5	1	3
	b.	Elaborate the series and parallel operation of SCR?	5	2	2
	c.	Explain the turn-off characteristics of SCR?	5	2	3
	d.	What is effect of source inductance on converter circuits?	5	1	2
	e.	Elaborate with suitable waveform of half wave controlled rectifier with R-load.	5	2	3

Section B (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]

			10	1	5
2	a.	Elaborate the V-I characteristics of SCR with various modes of operation.	10	1	5
	b.	Explain the various protection schemes of SCR.	10	2	4
	c.	With suitable waveforms explain the single phase full wave rectifier with RLE load.	10	2	5
	d.	What is the importance of dual converter and elaborate various modes of operation.	10	2	6



OP JINDAL UNIVERSITY



Mid Semester Examination, November-2023

M.Tech. 1st Semester [Program Code: 01PG031]

Electrical Engineering

Advance Power System Analysis

Time: 2 Hrs.

Max. Marks: 50

Note: Incase of any data missing you can make assumption

M CO KL

Section A (20 marks)

Answer any 4 questions [04 x 05 marks=20 marks]

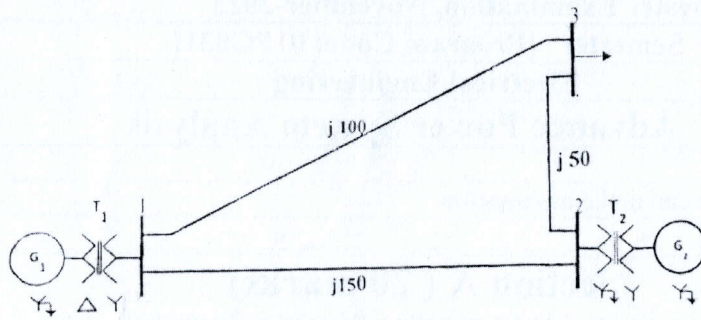
1	a.	Explain why analysis of power transmission networks requires solution of a set of non-linear power flow equations, whereas, solution of normal electrical circuit analysis is carried out using a set of linear equations of the form: $[I] = [Y][V]$?	5	2	3
	b.	State the fast decoupled power flow and compare it with other methods	5	2	2
	c.	Determine the sequence network of synchronous machine	5	1	3
	d.	Describe the various reactive power compensation techniques	5	1	3
	e.	Derive the relationship for sequence currents and voltages for a single line to ground fault and hence the connection between the sequence networks. Discuss the assumptions made while conducting short circuit studies of a large power system?	5	1	3

Section B (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]

2	a.	Determine the fault current if a line to ground fault at bus 2 takes place through a fault impedance of 1Ω . Values in Figure are on 100 MVA base and a base voltage of 765 kV on the line. 	10	1	4
	b.	Write Short Notes on (any two) <ul style="list-style-type: none"> Gauss Siedal Method Unit Commitment Bus Admittance Matrix 	10	2	2
	c.	Draw reactance diagram for the following system with all values in pu on a base of 20 MV A, 6.6 k V for generator G1. The system data are: Generator G1: 10 MVA, 6.6 kV, 10% reactance Generator G2: 20 MVA, 11.5 kV, 10% reactance Transformer T1: 10 MVA, 6.6 delta/115 Y kV, 15% reactance	10	1	3

Transformer T2: Single phase units each rated 10 MVA, 75/7.5 kV, 10% reactance Line reactance data in (Ω) are provided in the figure.



d. A load flow study for a 4-bus power system is required using Newton-Raphson method. Ybus matrix and operating parameters of the system are provided below considering a base of 100 MVA, 230 kV. Write the unknown vector and obtain the values for first row of the jacobian for the method.

Bus	Type	V (pu)	P_g (MW)	Q_g (Mvar)	P_L (MW)	Q_L (Mvar)
1	slack	1.0	--	--	50	31
2	PQ	--	--	0	170	105.4
3	PQ	--	0	0	200	124
4	PV	1.02	318	--	80	49.6

$$Y_{bus} = \begin{bmatrix} 8.98-j44.83 & -3.81+j19.07 & -5.17+j25.84 & 0 \\ -3.81+j19.07 & 8.98-j44.83 & 0 & -5.17+j25.84 \\ -5.17+j25.84 & 0 & 8.19-j40.86 & -3.02+j15.11 \\ 0 & -5.17+j25.84 & -3.02+j15.11 & 8.19-j40.86 \end{bmatrix} \text{ pu}$$

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OP JINDAL UNIVERSITY

Mid Semester Examination, November-2023

M.Tech. 1st Semester

Power Electronics & Power System



Modern Control Theory

Time: 2 Hrs.

Max. Marks: 50

Note: All the question is compulsory

M CO KL

Section A (10 marks)

All Questions are compulsory [05 x 02 marks=10 marks]

1	a.	What are the advantages of state space approach?	2	1	1
	b.	Define the following terms: - State, state Space, State variable and state vector.	2	2	1
	c.	Why PID controller is preferred over other controllers?	2	3	1
	d.	Define: - Transient response and steady state response.	2	1	1
	e.	What are the positional, velocity and acceleration error coefficients? Give their formula with respect to e_{ss} .	2	1	1

Section B (16 marks)

Answer any 4 questions [04 x 04 marks=16 marks]

2	a.	A feedback system having unity feedback has natural frequency of oscillations as 8 radian/second and damping ratio of 0.2. Determine: - Closed loop transfer function, peak overshoot and settling time, rise time.	4	4	2
	b.	For a transfer function $T(S)=\frac{64}{s^2+5s+64}$, for unity step unit determine all the time domain specifications.	4	4	2
	c.	For a system $G(s)H(s)=\frac{K}{s^2(s+2)(s+3)}$. Find the value of K to limit the steady state error to 20 when input to the system is $1+20t+(80/2)t^2$	4	4	2
	d.	Find the Eigen values and Eigen vectors of the matrix:- $A=\begin{vmatrix} 0 & 1 \\ -2 & 3 \end{vmatrix}$	4	2	2
	e.	Test the following system for the controllability using Kalman's test:- $\begin{vmatrix} X1 \\ X2 \end{vmatrix} = \begin{vmatrix} 2 & 3 \\ 6 & -2 \end{vmatrix} \begin{vmatrix} x1 \\ x2 \end{vmatrix} + \begin{vmatrix} 1 \\ -2 \end{vmatrix} u$	4	2	3

Section C (24 marks)

Answer any 3 questions [03 x 08 marks=24 marks]

3	a.	Explain PD controller in detail with neat block diagram. Enlist its effects on the system.	8	3	2
	b.	A second order control system has $F(s) = s^2 + 12s + 100$, if a step is applied to it, determine all time domain specifications. Sketch the response also.	8	3	2
	c.	Explain working of lead compensator along with derivation for transfer function.	8	4	2
	d.	A linear time invariant system is described by the following state variable model:- $\begin{vmatrix} X1 \\ X2 \end{vmatrix} = \begin{vmatrix} -1 & 0 \\ 0 & -3 \end{vmatrix} \begin{vmatrix} x1 \\ x2 \end{vmatrix} + \begin{vmatrix} 0 \\ 1 \end{vmatrix} u$ $Y(t) = \begin{vmatrix} 1 & 3 \end{vmatrix} \begin{vmatrix} x1 \\ x2 \end{vmatrix}$, comment on controllability and observability.	8	2	3
	e.	Obtain the state transition matrix A is given by $A = \begin{vmatrix} 0 & 1 \\ -2 & -3 \end{vmatrix}$	8	2	2

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in the University

Year: 1st Year & 2nd Year

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Section 1 (1st Year)

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Section 2 (2nd Year)

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OP JINDAL UNIVERSITY

Mid Semester Examination, November-2023

M.Tech. 1st Semester [Program Code]

Electrical Engineering

HVDC Power Transmission

Time: 2 Hrs.

Max. Marks: 50

Note:

M CO KL

Section A (20 marks)

Answer any 4 questions [04 x 05 marks=20 marks]

1	a.	Explain the types of HVDC Transmission systems.	5	CO1	KL2
	b.	List out some of the modern trends in DC transmission.	5	CO1	KL1
	c.	List out various applications of the HVDC transmission system.	5	CO1	KL1
	d.	Explain the planning of the HVDC transmission system.	5	CO1	KL2
	e.	Explain the physical phenomena arising in DC insulation.	5	CO5	KL2

Section B (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]

2	a.	Write down the comparison between HVAC and HVDC transmission systems.	10	CO1	KL1
	b.	Write down the economics of DC cables as compared with AC cables.	10	CO1	KL1
	c.	Explain the current scenario of the HVDC system in INDIA.	10	CO5	KL2
	d.	Write the merits and demerits of the HVDC transmission system.	10	CO1	KL1

ORIGINS OF THE UNIVERSITY

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Section 3 (1947)

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OP JINDAL UNIVERSITY

Mid Semester Examination, November-2023

M.Tech. 1st Semester [Program Code: 01PG041]

Mechanical Engineering [PPEM]

Advanced Computational Methods and Optimization Technique

Time: 2 Hrs.

Max. Marks: 50

Note:

M CO KL

Section A (20 marks)

Answer any 4 questions [04 x 05 marks=20 marks]

1	a.	Find the value of the 3 rd approximation of the equation $f(x)$ is given as $x^2 - 4 = 0$, correct to 2 decimal places using Newton Raphson Method. Considering the initial approximation at $x=6$.	5	1	2
	b.	Find the 3 rd approximation root of the equation $x^3 - 4x - 9 = 0$ using bisection method correct to three decimal places.	5	1	2
	c.	Find the 5 th approximation root of the equation $x^3 - 2x - 5 = 0$ using Regula-Falsi method correct to three decimal places.	5	1	2
	d.	Find the root of equation $x^3 - 2x - 5 = 0$ using Secant Method correct to three decimal places.		1	2
	e.	Find the positive root of $x^4 - x = 10$ correct to three decimal places using the Newton-Raphson method.	5	1	2

Section B (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]

2	a.	Solve the following equations using Gauss Elimination Method. $x + 4y - z = -5$ $x + y - 6z = -12$ $3x - y - z = 4$	10	1	2
	b.	Find the root of equation $xe^x = \cos x$ using Secant Method correct to three decimal places.	10	1	2
	c.	Find the real roots of equation $3x = \cos x + 1$ using Newton Raphson Method correct to three decimal places.	10	1	2
	d.	Solve the following equations using the Gauss-Seidal iteration Method. $20x + y - 2z = 17$ $3x + 20y - z = -18$ $2x - 3y + 20z = 25$	10	1	2

UNIVERSITY OF CALIFORNIA

Department of Chemistry
Berkeley, California 94720

Chemistry 135
General Chemistry

Section 135-1

Monday, 10:00 AM
1000 Evans Hall

Professor: [Name]
Lecturer: [Name]

Textbook: [Title]
[Author]

Section 135-2

Tuesday, 10:00 AM
1000 Evans Hall

Professor: [Name]
Lecturer: [Name]

Textbook: [Title]
[Author]

Office Hours: [Time]
[Location]

OP JINDAL UNIVERSITY

Mid Semester Examination, November-2023

M.Tech. 1st Semester [Program Code: 01PG041]

Mechanical Engineering (PPEEM)

Advanced Power Plant Engineering

Time: 2 Hrs.

Max. Marks: 50

Note:

M CO KL

Section A (20 marks)

Answer any 4 questions [04 x 05 marks=20 marks]

1	a.	Compare the conventional and non-conventional energy sources on various aspects.	5	1	2
	b.	Explain the Rankine cycle with schematic & T-s diagram and processes involved.	5	1	2
	c.	Define the term hydrology, run off and surface run off.	5	2	1
	d.	List the name of 5 hydroelectric power plants in India with its state.	5	2	1
	e.	Define the specific speed of turbine and cavitation phenomenon in prime movers.	5	2	1

Section B (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]

2	a.	Explain the modern steam power plant with its 4 major circuits and layout.	10	1	2
	b.	Explain the coal to electricity conversion in thermal power plant in detail.	10	1	2
	c.	Identify the various factors need to be considered for site selection of hydroelectric plant?	10	2	3
	d.	Explain the hydroelectric power plant with the help of neat sketch showing all the important components.	10	2	2

OP JINDAL UNIVERSITY

Mid Semester Examination, November-2023

M.Tech. 1st Semester [Program Code: 01PG041]

Power Plant Engineering & Energy Management, Mechanical Engineering

Power Plant Machines

Time: 2 Hrs.

Max. Marks: 50

Note: **Section A:** All Questions are compulsory [05 x 02 marks = 10 marks]
Section B: Answer any 4 questions out of 5 [04 x 04 marks = 16 marks]
Section C: Answer any 3 questions out of 5 [03 x 08 marks = 24 marks]

M CO KL

Section A (10 marks)

All Questions are compulsory [05 x 02 marks = 10 marks]

1	a.	What is a synchronous machine? Give its classifications.	2	CO1	1
	b.	For a 2-pole, 50 Hz synchronous machine determine the speed at which it rotates at its maximum speed.	2	CO1	2
	c.	What are the features of short chording?	2	CO1	1
	d.	Explain the difference between fans, blowers and compressors?	2	CO3	1
	e.	For heavy dust conditions, which type of fan is ideally suited and why?	2	CO3	1

Section B(16 marks)

Answer any 4 questions [04 x 04 marks = 16 marks]

2	a.	The coil span for the stator winding of an alternator is 150 degrees (electrical). Find the chording factor.	4	CO1	2
	b.	Define the following: - synchronous speed, winding factor, pitch factor and distribution factor. Calculate the distribution factor for 36 slots, 4 poles, and single layer 3-phase winding.	4	CO1	2
	c.	Explain the constructional details of the synchronous machine rotors.	4	CO1	1
	d.	Explain the factors, which can change the system resistance?	4	CO3	2
	e.	Explain the method of flow measurements using pitot tube?	4	CO3	2

Section C(24 marks)

Answer any 3 questions [03 x 08 marks = 24 marks]

3	a.	Derive the EMF equation for a synchronous generator.	8	CO1	2
	b.	A 4 pole, 3 phase star connected alternator with 2 conductors per slot runs at 1500 rpm. Coils are short pitched by 3 slots. If the phase spread is 60 degrees, find the line voltage induced for a flux per pole of 0.70 Wb distributed sinusoidally in space; all turns per phase are in series.	8	CO1	3
	c.	Explain the constructional aspects of synchronous generator along with its operation in power plant.	8	CO1	3
	d.	What are affinity laws as applicable to centrifugal fans?	8	CO3	3
	e.	Explain the different type of flow control strategies?	8	CO3	3



OF ANNA UNIVERSITY

M.Tech. Power System Engineering (PSE-112-103)

Power System Engineering & Energy Management, Mechanical Engineering

For or Final Examinations

Question No. _____
Marks _____

Section A (10 marks)

Answer any 10 questions (10 x 10 marks = 100 marks)

1. Define a synchronous motor. Give its applications.
2. For a 3-phase, 50 Hz synchronous motor, calculate the speed at which it will run at 100% efficiency.
3. What are the functions of damper winding?
4. Explain the importance of field winding and damper winding.
5. Why is the synchronous motor not used for starting and why?

Section B (10 marks)

Answer any 2 questions (2 x 50 marks = 100 marks)

1. The coil span for the main winding of an alternator is 180 degrees. Calculate the pitch factor and the distribution factor. Assume the number of poles is 4 and the number of slots per pole is 12.
2. Explain the importance of field winding and damper winding.
3. Why is the synchronous motor not used for starting and why?

Section C (24 marks)

Answer any 2 questions (2 x 12 marks = 24 marks)

1. Explain the importance of field winding and damper winding.
2. Why is the synchronous motor not used for starting and why?

OP JINDAL UNIVERSITY

Mid Semester Examination, November-2023

M.Tech. 1st Semester [Program Code: 01PG041]

Mechanical Engineering

Advanced Thermodynamics and Combustion

Time: 2 Hrs.

Max. Marks: 50

Note:

M CO KL

Section A (20 marks)

Answer any 4 questions [04 x 05 marks=20 marks]

1	a.	What do you understand by the reversible and irreversible processes? Describe in detail the key reasons which make a process irreversible.	5	1	1
	b.	Explain the following terms: (i) Critical state (ii) Dryness fraction	5	2	1
	c.	Give the expression for reversible work done (useful work) by a closed system if it interacts only with the surroundings and comes to a dead state.	5	1	2
	d.	One kg of water at 273 K is brought into contact with a heat reservoir at 373 K. When the water has reached 373 K find the entropy change of the water, the heat reservoir and that of the universe.	5	1	2
	e.	Explain superheated state and sub-cooled state with the help of a suitable property diagram.	5	2	1

Section B (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]

32	a.	Ten grams of water at 20 ⁰ C is converted into ice at -10 ⁰ C at constant atmospheric pressure. Assuming the specific heat of liquid water to remain constant at 4.2 J/gm.K and that of ice to be half of this value, and taking the latent heat of fusion of ice at 0 ⁰ C to be 335 J/gm, calculate the total entropy change of the system.	10	1	3
	b.	A compressor operating at steady state takes in 1 kg/s of air at 1 bar and 25 ⁰ C and compresses it to 8 bar and 160 ⁰ C. Heat transfer from the compressor to its surroundings occur at the rate of 100 kW. (i) Determine the power input in kW (ii) Evaluate the second law efficiency for the compressor. Neglect KE and PE changes. Take T ₀ = 25 ⁰ C and P ₀ = 1 bar.	10	1	3
	c.	Exhaust gases leave an internal combustion engine at 800 ⁰ C and 1 atm. Pressure, after having done 1050 kJ of work per kg of gas in the engine (c _p of gas = 1.1 kJ/kg.K). The temperature of the surrounding is 30 ⁰ C. (i) How much available energy per kg of gas is lost by throwing away the exhaust gases? (ii) What is the ratio of loss of available energy to the engine work?	10	1	3
	d.	Steam initially at 0.3 MPa, 250 ⁰ C is cooled at constant volume.	10	2	3

	(i)	At what temperature will the steam become saturated vapour?			
	(ii)	What is the quality at 80°C ?			
	(iii)	What is the heat transferred per kg of steam in cooling from 250°C to 80°C ?			

Course Code: SOE-M-PPE105 (1)

OP JINDAL UNIVERSITY

Mid Semester Examination, November-2023

M. Tech. 1st Semester [Program Code: 01PG041]**Mechanical Engineering***with specialization in***Power plant engineering and Energy Management****Design and analysis of power plant equipment****Time: 2 Hrs.****Max. Marks: 50**

Note:

M CO KL

Section A (20 marks)

Answer any 4 questions [04 x 05 marks=20 marks]

1	a.	Elaborate on types of Turbomachinery.	5	1	
	b.	Explain the difference between a fan and a bower. Also give at least two industrial applications for each.	5	1	
	c.	Define the following for a turbomachine (i) Specific speed (ii) Flow coefficient (iii) Power coefficient (iv) Capacity coefficient	5	1	
	d.	Explain Stagnation enthalpy and Stagnation temperature with respective equations.	5	1	
	e.	Briefly explain the major parts of turbomachines	5	1	

Section B (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]

2	a.	A Francis turbine model is built to scale of 1 : 5. <i>Model data</i> <i>Prototype data</i> $P = 4 \text{ kW}$ $P = ?$ $N = 350 \text{ rpm}$ $N = ?$ $H = 2 \text{ m}$ $H = 6 \text{ m}$ Assume that the overall efficiency of the model is 70%. Calculate (a) the speed of the prototype and (b) the power.	10	1	
	b.	Explain the significance of Pi terms in context with a) Head coefficient or Specific Head b) Power coefficient or specific power	10	1	
	c.	A single-stage centrifugal pump works against a height of 30 m, running at 2000 rpm, supplies 3 m ³ /s and has an impeller diameter of 300 mm. Calculate (a) the number of stages and (b) the diameter of each impeller required to pump 6 m ³ /s of water to a height of 220 m when running at 1500 rpm.	10	1	
	d.	Derive the Euler turbine equation.	10	1	



OP JINDAL UNIVERSITY

M.Tech 1st Semester Examination, November-2023

M.Tech 1st Semester Program Code: 011PG011

Mechanical Engineering

with specialization in

Power plant engineering and Energy Management

Design and analysis of power plant equipment

Max. Marks: 50

Time: 2 Hr.

Date:

M | CO | KL

Section A (20 marks)

Answer any 4 questions (out of 05 marks=20 marks)

a	Elaborate on types of Turbomachinery.	2	1
b	Explain the difference between β law and β law. Also give at least two industrial applications for each.	2	1
c	Define the following for a turbomachine (i) Specific speed (ii) Flow coefficient (iii) Power coefficient (iv) Capacity coefficient	2	1
d	Explain stagnation enthalpy and stagnation temperature with respective equations.	2	1
e	Briefly explain the major parts of turbomachines.	2	1

Section B (30 marks)

Answer any 3 questions (out of 10 marks=30 marks)

a	A Francis turbine model is built on scale of 1 : 5. Model data: $P = 11W$ $N = 150 \text{ rpm}$ $W = 0.5 \text{ m}$ Assume that the overall efficiency of the model is 70%. Calculate (a) the speed of the prototype and (b) the power.	10	1
b	Explain the significance of β term in context with β head coefficient or Specific speed β Power coefficient or specific power.	10	1
c	A single stage centrifugal pump works against a height of 25 m. Assume that the impeller diameter is 200 mm. Calculate the diameter of the impeller if the pump is to deliver a flow rate of 100 l/s at a head of 25 m.	10	1
d	Derive the Euler turbine equation.	10	1

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Mid Semester Examination, November-2023

M.Tech. 1st Semester [Program Code: 01PG042]

Mechanical Engineering [MTA]

Computational Methods and Optimization Techniques

Time: 2 Hrs.

Max. Marks: 50

Note:

M CO KL

Section A (20 marks)

Answer any 4 questions [04 x 05 marks=20 marks]

1	a.	Find the value of the 3 rd approximation of the equation $f(x)$ is given as $x^2 - 4 = 0$, correct to 2 decimal places using Newton Raphson Method. Considering the initial approximation at $x=6$.	5	1	2
	b.	Find the 3 rd approximation root of the equation $x^3 - 4x - 9 = 0$ using bisection method correct to three decimal places.	5	1	2
	c.	Find the 5 th approximation root of the equation $x^3 - 2x - 5 = 0$ using Regula-Falsi method correct to three decimal places.	5	1	2
	d.	Find the root of equation $x^3 - 2x - 5 = 0$ using Secant Method correct to three decimal places.		1	2
	e.	Find the positive root of $x^4 - x = 10$ correct to three decimal places using the Newton-Raphson method.	5	1	2

Section B (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]

2	a.	Solve the following equations using Gauss Elimination Method. $x + 4y - z = -5$ $x + y - 6z = -12$ $3x - y - z = 4$	10	1	2
	b.	Find the root of equation $xe^x = \cos x$ using Secant Method correct to three decimal places.	10	1	2
	c.	Find the real roots of equation $3x = \cos x + 1$ using Newton Raphson Method correct to three decimal places.	10	1	2
	d.	Solve the following equations using the Gauss-Seidal iteration Method. $20x + y - 2z = 17$ $3x + 20y - z = -18$ $2x - 3y + 20z = 25$	10	1	2

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Mid Semester Examination, November-2023

MTech. MTA 1st Semester [Program Code: 01PG042]

Mechanical Engineering

Advanced Manufacturing Processes

Time: 2 Hrs.

Max. Marks: 50

Note: Attempt all sections

M	CO	KL
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Section A (20 marks)

Answer any 4 questions [04 x 05 marks=20 marks]

1	a.	Explain the mechanics of material removal in ECM process.	5	2	1
	b.	In a certain electro chemical dissolution process of iron, a MRR of 2 cm ³ /min was desired. Determine the amount of account of current required for the process. Assume Atomic weight of iron =56gm, Valency at which dissolution occur =2 and Density of iron =7.8 gm/cm ³ .	5	2	3
	c.	Why surface finish obtained in chemical machining of an alloy is poor.	5	1	2
	d.	Classify the non-conventional machining processes. Why Abrasive machining is not suitable for soft materials?	5	1	2
	e.	State the function of electrolyte used in ECM process?	5	2	1

Section B (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]

2	a.	Discuss the effect of following process parameters in AJM process on MRR (i) Stand-off Distance (ii) Effect of abrasive grain size (iii) Effect of Nozzle pressure (iv) Effect of Mixing ratio.	10	1	3
	b.	Draw the schematic of chemical machining and explain various parts of it.	10	2	2
	c.	What is Ultrasonic machining? Explain its working principle and application in the field.	10	1	1
	d.	During the electrochemical machining of Iron (atomic weight equal to= 56, valency =2) at current of 1000 A with 90% current efficiency, the material removal rate was observed to be 0.26gm/s. If Titanium (atomic weight =48, valency = 3) is machined by the ECM process at the current of 2000A with 90% current efficiency, calculate the material removal rate.	10	2	3

OP JINDAL UNIVERSITY

Mid-Semester Examination, November-2023

M.Tech. 1st Semester**Advanced Materials and Processing**

Time: 2 Hrs.

Max. Marks: 50

Note: Question Numbers 2 (a) and 2 (b) are COMPULSORY

M CO KL

Section A (20 marks)

Answer any 4 questions [04 x 05 marks=20 marks]

1	a.	Describe the importance of Engineered Materials from an Engineering Design Perspective.	5	2	2
	b.	Superimpose stress-strain diagrams for ideal metal, ceramic, and polymer, and discuss the trends of the plots.	5	4	2
	c.	Discuss the terms Hardness, Toughness, Brittleness, and Strength of materials and elaborate on the same.	5	1	3
	d.	Discuss in detail, the difference between the terms Stress and Strength.	5	1	1
	e.	Superimpose stress-strain diagrams for Fe-0.1C, Fe-2.5C, and Fe-4.3C, and discuss the trends of the plots.	5	3	2

Section B (30 marks)

Answer any 1 question between c and d.

2	a.	Draw a well-labeled Iron-Iron Carbide phase diagram.	10	4	3
	b.	Propose the composition of material from the iron-iron carbide phase diagram for the below-mentioned products and support your answer with a suitable explanation. 1. Rails, 2. Window Grills, 3. Hammer, 4. Cylinder head of engines, 5. Can of cold drinks	10	3	1
	c.	Discuss the phase change happening while cooling the Eutectic alloy as well as the hypo and hyper compositions of Eutectic alloy.	10	5	2
	d.	Discuss the phase change happening while cooling the Eutectoid alloy as well as hypo and hyper compositions of Eutectoid alloy.	10	5	2

OP JINDAL UNIVERSITY

Mid Semester Examination, October-2023

M.Tech. 1st Semester [01PG042]

Manufacturing Technology & Automation

Industrial Automation & Robotics

Time: 2 Hrs.

Max. Marks: 50

Note:

M CO KL

Section A (10 marks)

All Questions are compulsory [05 x 02 marks=10 marks]

1	a.	What is Industrial Automation	2	1	1
	b.	What are the different costs included in industry in designing the particular product.	2	1	1
	c.	What is low cost automation	2	1	1
	d.	What is the purpose of a shuttle valve in a pneumatic circuit?	2	2	2
	e.	Explain the operation of a check valve with a neat sketch	2	2	2

Section B (16 marks)

Answer any 4 questions [04 x 04 marks=16 marks]

2	a.	Discuss the USA principle in details	4	1	2
	b.	What is an Automation Strategy and why it is important	4	1	2
	c.	What is an automation migration strategy explain with an example?	4	1	2
	d.	Name any five basic components required in a hydraulic circuit and mention their functions	4	2	1
	e.	Explain the working principle of a PLC with neat sketches	4	2	2

Section C (24 marks)

Answer any 3 questions [03 x 08 marks=24 marks]

3	a.	What are the various types of automation explain in detail.	8	1	2
	b.	Explain different Levels of automation.	8	1	2
	c.	Draw and explain hydraulic circuit to show synchronization of 2 double acting cylinders.	8	2	4
	d.	Explain with suitable circuits, how the cylinder speed can be controlled by using flow control valves.	8	2	4
	e.	With sketches, explain the logic of AND and OR gates, used in operation of pneumatic circuits.	8	2	3

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Course Code: SOE-M-MTA-105(3)

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Mid Semester Examination, November-2023

M.Tech. 1st Semester [Program Code: 01PG042]



Manufacturing Technology & Automation

Manufacturing Management

Time: 2 Hrs.

Max. Marks: 50

Note: 1. Section A is a compulsory for 20 Marks
2. Section B: Solve any 3 for 30 Marks

M	CO	KL
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Section A (20 marks)

Answer any 4 questions [04 x 05 marks=20 marks]

1	a.	What is mean by Production? Explain it with examples	5	3	2
	b.	What is mean by Capacity Planning? Explain it with examples how capacity is measured.	5	3	2
	c.	What is mean by Production Planning and control? Explain it needs and objectives.	5	4	2
	d.	What is mean by Manufacturing Resource Planning-1 (MRP-II)? Explain with line diagram.	5	4	3
	e.	Write comparison between Production Planning and Production Control. With examples.	5	3	3

Section B (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]

2	a.	What is mean by Productivity? What are the different measures to increase the productivity of an Organisation	10	3	3
	b.	What is mean by Material Requirement Planning-1 (MRP-I)? Explain with line diagram also state its objectives?	10	3	3
	c.	Explain the difference between 'Lean' and 'traditional thinking' is there is difference in the purposes? If so, what is it?	10	4	3
	d.	What is Just in Time (JIT)? Explain its role in automobile industry with practical examples.	10	4	3

OP JINDAL UNIVERSITY



Mid-Semester Examination, November-2023

M.Tech. 1st Semester [Program Code: 01PG051]

Metallurgical Engineering

Iron Making

Time: 2 Hrs.

Max. Marks: 50

Note:

M CO KL

Section A (20 marks)

Answer any 4 questions [04 x 05 marks=20 marks]

1	a.	Explain the History of Iron making process.	5	1	1
	b.	Mention the raw materials required for iron making. List out various iron ores. What is the chemical formula of hematite, magnetite and wustite and calculate the % of Fe in hematite, magnetite and wustite?	5	1	1
	c.	What is the function of coke and flux in the blast furnace? Explain any one testing procedure to evaluate the quality of coke	5	1	1
	d.	List various agglomeration processes. Why fines cannot be charged to the BF as feed material? What are the raw materials used for sinter making? What is the significance of the hearth layer?	5	1	1
	e.	Explain any one testing procedure to evaluate the quality of the pellet before charging in the Blast furnace.	5	1	1

Section B (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]

2	a.	What is meant by coke? What is the difference between the recovery and non-recovery coke-making process? Mention its advantages and limitations.	10	1	1
	b.	What are the raw materials used for pellet making? mentioned the size of pellets used in the BF. What is meant by growth by assimilation and growth by layering? What is meant by the induration process? Mention various tests done for pellets	10	1	1
	c.	What is the role of the annealing hood in sintering? What is meant by heat front and flame front? What is meant by matching? What is meant by BTP? Distinguish between acid sinters and fluxed sinters.	10	1	1
	d.	Mention the chemical formulae and nature of ore: (1) Limonite (2) Siderite (3) Pyrite (4) Ilmenite (5) Goethite. Also, mention some of the integrated steel plants under the public and private sectors with its products.	10	1	1

Note: Draw neat sketches wherever applicable and label the parts.

M CO KL

Section A (10 marks)

All Questions are compulsory [05 x 02 marks=10 marks]

1	a.	What is Chvorinov's rule?	2	3	1
	b.	Define phase.	2	3	1
	c.	What is the relationship between grain size and yield strength?	2	2	1
	d.	Mention two differences between interstitial and substitutional solid solutions.	2	3	1
	e.	Define Schmid's law.	2	1	1

Section B (16 marks)

Answer any 4 questions [04 x 04 marks=16 marks]

2	a.	Differentiate between Heterogenous and homogeneous nucleation.	4	1	2
	b.	Draw the microstructure of 0.8% C steel, 0.6 % C steel and 1.2 % carbon steel. Label the phases present in it.	4	1	3
	c.	State Hume-Rothery rules for formation of solid solutions.	4	3	2
	d.	What is atomic packing fraction? Calculate the packing fraction in FCC.	4	1	3
	e.	Explain the occurrence of voids in FCC. Please mentioned how many number of these voids in FCC?	4	1	2

Section C (24 marks)

Answer any 3 questions [03 x 08 marks=24 marks]

3	a.	Why defects are necessary in steels? Comment with suitable example.	8	3	3
	b.	Draw a neat sketch of Fe-Fe ₃ C diagram and label all necessary parts.	8	1	2
	c.	What are intermediate alloy phases? Mention their types and explain any two of them in detail.	8	1	1
	d.	For the solidification of iron, calculate the critical radius r^* and the activation free energy ΔG^* if nucleation is homogeneous. Values for the latent heat of fusion and surface free energy are $-1.85 \times 10^9 \text{ J/m}^3$ and 0.204 J/m^2 , respectively. (b) Now calculate the number of atoms found in a nucleus of critical size. Assume a lattice parameter of 0.292 nm for solid iron at its melting temperature. Use the supercooling value $\Delta T = 258 \text{ K}$.	8	1	3
	e.	Explain in brief the importance of constitutional supercooling.	8	3	2



METALLURGICAL ENGINEERING

PHYSICAL METALLURGY OF STEEL IRONING

Time: 3 hrs
 Note: Show neat diagrams wherever appropriate and label the parts.

M. CO. 22
 Section A (10 marks)
 All questions are compulsory (10 x 02 marks = 20 marks)

1	2	3	4	5
1	1	1	1	1

Section B (10 marks)
 Answer any 4 questions (04 x 02 marks = 08 marks)

1	2	3	4	5
1	1	1	1	1

Section C (16 marks)
 Answer any 3 questions (03 x 05 marks = 15 marks)

1	2	3	4	5
1	1	1	1	1

OP JINDAL UNIVERSITY



Mid Semester Examination, Nov-2023

M.Tech. 1st Semester

Metallurgical Engineering

Thermodynamics and Kinetics

Time: 2 Hrs.

Max. Marks: 50

Note:

M CO KL

Section A (20 marks)

Answer any 4 questions [04 x 05 marks=20 marks]

1	a.	Explain 1 st law of thermodynamics in detail. For a thermodynamics process $Q=7000\text{J}$, Work done= 500 Cal , Calculate the change in the internal energy?	5	1	2
	b.	What is entropy. A substance has entropy S_1 and S_2 at 400 K and 600 K respectively. Is $S_1 > S_2$. Justify your response. Explain metastable state.	5	2	4
	c.	i) State 2 nd law of thermodynamics. What are the applications of 2 nd law of thermodynamics? ii) For a system $Q_{rev}=15000\text{ Joules}$, $T=1200\text{K}$, Enthalpy $H=4000\text{ J}$. Calculate the Gibb's free energy?	5	2	4
	d.	i) Calculate the standard heat of reaction for this reaction. $\text{Al} + \text{FeO} \rightarrow \text{Fe} + \text{Al}_2\text{O}_3$ $\Delta H_{298 < \text{FeO} \rightarrow} = -63.3\text{ Kcal/mol}$ and $\Delta H_{298 < \text{Al}_2\text{O}_3} = -400\text{ KCal/mol}$ ii) For the reaction $\text{C} + 1/2\text{O}_2 \rightarrow \text{CO}$ $\Delta H_1 = 100\text{ Kcal/mol}$ & $\text{CO} + 1/2\text{O}_2 \rightarrow \text{CO}_2$: $\Delta H_2 = 150\text{ KCal/mol}$. Then calculate ΔH for the reaction $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$	5	3	4
	e.	Draw the graph between Gibb's free energy vs temperature for solid, gas and liquid for a Metal A. Clearly mention the melting point and boiling point.	5	2	2

Section B (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]

2	a.	Write short notes on i) Systems ii) Hess's law iii) Enthalpy iv) Entropy v) State function	10	2	1
	b.	Write short note on following topic. i) Different type of boundary ii) Internal energy iii) Homogeneous and heterogeneous System iv) Adiabatic system v) Gibb's Free energy	10	3	1
	c.	Zinc melts at 420° C and the standard entropy is 41.63 J/K/mol . Calculate the change in entropy at 600° C . (Given Heat of Fusion $\Delta H_f = 7.28\text{ KJ/K/mol}$, $C_p < \text{Solid Zn} > = 22.38 + 0.010T\text{ J/mol/K}$, $C_p < \text{Liquid Zn} > = 31.38\text{ J/mol/k}$)	10	1	4
	d.	i) What is the criteria for spontaneity of any reaction based on Entropy and Free energy ii) What is the criteria for equilibrium iii) When do we say that system is in thermodynamic equilibrium	10	2	2

Course Code:

O.P. JINDAL UNIVERSITY

Mid-Semester Examination, November -2023

M.Tech (MST) 1st Semester

METALLURGICAL ENGINEERING

Advances in Material Characterization [SOE-M-MST 104]



Time: 2 Hrs.

Max. Marks: 50

Note: Attempt all questions in sequence as numbered in sections.

Section A (20 marks)

Answer any 4 questions [05 x 04 marks=20 marks]

- | | | |
|---|----|--|
| 1 | a. | How can corrosion be defined? Explain the corrosion, mechanism of metal in hydrochloric acid. Also, its chemical and electrochemical reactions can be explained with the help of schematic diagrams. |
| | b. | How concepts of corrosion reversed with extractive metallurgy? Explain its broad discussion with the help of a cycle. |
| | c. | What is the concept of cost of corrosion (COC)? What is the importance of the cost of corrosion? How do calculate it? Also, discuss the value of COC in India. |
| | d. | What are the various characteristics we can measure by material characterization techniques? |
| | e. | What is lattice point? Differentiate between lattice point and crystal. |

Section B (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]

- | | | |
|---|----|--|
| 2 | a. | Explain the principle of X-rays generation and auger electron generation. |
| | b. | What is rusting? How does iron get rusty in the presence of oxygenated water in the atmosphere? If the amount of oxygen in the atmosphere varies, which probably phase form over iron. |
| | c. | What is standard electrode potential? How do calculate the standard potential of unknown metals? Also explains its overall electrochemical reaction during the process. |
| | d. | What is galvanic cell? How do you classify galvanic cells? How do you distinguish anode and cathode in the combination of copper and iron with the same molar concentration? Also show their electrochemical reaction and the overall potential required for galvanic cells. |



UNIVERSITY OF CALIFORNIA
SCHOOL OF MEDICINE
DEPARTMENT OF MEDICAL PHYSICS
LABORATORY OF RADIATION PHYSICS

Section 1.10

The following table shows the results of the measurements made during the experiment. The values are given in units of counts per second (cps) and are the average of three measurements. The error in the measurements is given in parentheses.

Table 1.10

Table 1.10 shows the results of the measurements made during the experiment. The values are given in units of counts per second (cps) and are the average of three measurements. The error in the measurements is given in parentheses.

The following table shows the results of the measurements made during the experiment. The values are given in units of counts per second (cps) and are the average of three measurements. The error in the measurements is given in parentheses.

OP JINDAL UNIVERSITY

Mid Semester Examination, November-2023

M. Tech. 1st Semester [Program Code: 01PG051]**Metallurgical Engineering****Fracture Mechanics****Time: 2 Hrs.****Max. Marks: 50**

Note:

M	CO	KL
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Section A (20 marks)

Answer any 4 questions [04 x 05 marks=20 marks]

1	a.	Differentiate between Brittle and Ductile fracture.	5	1	I
	b.	Differentiate between Linear Elastic Fracture Mechanics (LEFM) & Elastic Plastic fracture Mechanics (EPFM).	5	1	II
	c.	Explain Strain energy as a function of constant load and constant displacement.	5	2	IV
	d.	What are the different modes of fracture. Explain with proper geometrical sketch.	5	1	III
	e.	What are the changes that occur onto a material when a “ crack advances ”? Explain the reason of occurrence of crack tip branch.	5	3	II, V

Section B (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]

2	a.	Explain strain energy as a function of constant displacement and constant load. Derive fracture strength by using Griffith's energy balance theory for a brittle solid.	10	3	V, III
	b.	Explain and derive theoretical cohesive strength.	10	2	V
	c.	Define and explain crack growth mechanism in detail.	10	2	II, IV
	d.	Define Fractography. Explain fractography for ductile and brittle fracture.	10	1	II

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