01/05/23 07

Course Code: SOE-M-SE201

OP JINDAL UNIVERSITY

Mid Semester Examination, May-2023

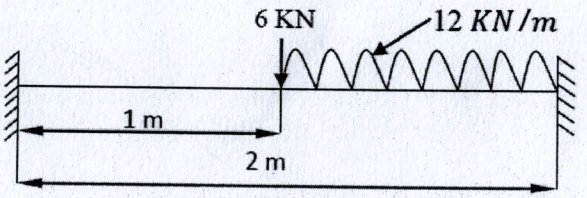
M. Tech. 2nd Semester [01PG011]

Structural Engineering (Civil Engineering)

FEM in Structural Engineering

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

Note: *If any data is missing, then assume it and write down at the beginning of your answer.*

			M	CO	KL
Section A (20 marks)					
Answer any 4 questions [04 x 05 marks = 20 marks]					
1	a.	(i) What is meant by finite element? (ii)What is meant by node or joint?	5	I	I
	b.	(i) What is aspect ratio? (ii) Name any three FEA software.	5	II	I
	c.	(i) Name (any three) weighted residual methods? (ii) Why polynomials are generally used as shape function?	5	I	I
	d.	What do you mean by weak formulation? State its advantages?	5	I	II
	e.	(i) What is discretization? (ii) During discretization, mention the places where it is necessary to place a node?	5	I	I
Section B (30 marks)					
Answer any 3 questions [03 x 10 marks = 30 marks]					
2	a.	A simply supported beam subjected to uniformly distributed load over the entire span (L) and it is also subject to a point load at the center of the span. Calculate the bending moment and deflection at mid-span by using Rayleigh–Ritz method.	10	I	III
	b.	For the beam and loading shown in Figure 1, calculate the nodal displacements. Take E =210 GPa, I = 6×10^{-6} m^4.  Figure 1	10	I	III
	c.	What is constitutive relationship? Express the constitutive relations for a linear elastic isotropic material including initial stress and strain.	10	I	II
	d.	Find the deflection at the centre of a simply supported beam of span length "L" subjected to uniformly distributed load throughout its length using (i) Least squares method, and (ii) Galerkin's method.	10	I	III

****End****

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Course Code: SOE-M-SE202

O P JINDAL UNIVERSITY

Mid Semester Examination, May-2023

M.Tech. 2nd Semester

CIVIL ENGINEERING

THEORY OF PLATES AND SHELLS [SOE-M-SE202]

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

			M	CO	KL
Section A (20 marks)					
Answer any 4 questions [04 x 05 marks=20 marks]					
1	a.	What is the use of superposition for asymmetric analysis of circular plates?	4	1	5
	b.	What is the application of shells in engineering structure?	4	3	1
	c.	Write the common structure of circular plates?	4	2	2
	d.	Define membrane theory of shell?	4	2	2
	e.	What is momentless state of stress?	4	1	5
	f.	What do you mean by theory of plates?	4	1	4
Section B (30 marks)					
Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	Write Levi's solution for single series?	10	1	5
	b.	Write Asymmetric bending of circular plates?	10	2	4
	c.	Explain Kirchoff's equation?	10	1	1
	d.	Explain rectangular plates under combined lateral and direct loads?	10	3	2

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Course Code: SOE-M-SE204 (1)

OP JINDAL UNIVERSITY

Mid Semester Examination, May-2023

B.Tech. 2nd Semester [SOE-M-SE204(1)]

Civil Engineering

Advance Design of Foundation

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 site investigation?	2	1	2
	b.	What do you understand about disturbed and undisturbed samples?	2	1	2
	c.	Define gross safe bearing capacity.	2	2	2
	d.	Choice of a particular foundation depends upon which criteria?	2	2	3
	e.	Write difference between foundation and footing.	2	2	1
Section B (16 marks) Answer any 4 questions [04 x 04 marks=16 marks]					
2	a.	How would you conduct an in -situ vane shear test? What is its use?	4	1	1
	b.	Describe open excavation methods of exploration .What are their advantages and disadvantages?	4	1	1
	c.	What are the assumptions made in the derivation of the Terzaghi's bearing capacity theory? Write the equation for the ultimate bearing capacity.	4	2	4
	d.	Differentiate between the general shear failure and the local shear failure. How ultimate bearing capacity of local shear is determined?	4	2	3
	e.	Describe different types of shallow foundation with appropriate diagram.	4	2	2
Section C (24 marks) Answer any 3 questions [03 x 08 marks=24 marks]					
3	a.	Describe various methods of drilling holes for subsurface investigations.	8	1	1
	b.	Discuss standard penetration tests. What are the various corrections? What is the importance of the test in geo-technical engineering?	8	1	3
	c.	Determine the allowable gross load and net allowable load for a square footing of 2m side and a depth foundation of 1.0m.Use Terzaghi's theory and assume local shear failure. Take a factor of safety of 3.0.The soil at the site has Υ =18kN/m^3, c'=15kN/m^2 and Φ'=25^0. N_c=14.8, Nq=5.6, N_Υ=3.2.	8	2	5
	d.	A footing 2m square is laid at a depth of 1.3m below the ground surface. Determine the net ultimate bearing capacity using IS code method. Take Υ=20kN/m^3, Φ'=30^0 and C'=0. (Nc =30.14, Nq=18.4, N_Υ=22.4).	8	2	5
	e.	Write a short note on (i)geophysical exploration (ii)effect of water table on bearing capacity of soil.	8	1,2	2

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Course Code: SOE-M-SE203

OP JINDAL UNIVERSITY

Mid Semester Examination, May-2023

M.Tech. 2nd Semester [01PG011]

Civil Engineering [Structural Engineering]

ADVANCED STEEL DESIGN

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

Note: IS 800:2007, IS1893:2016 and Steel Table allowed.

			M	CO	KL
Section A (20 marks) Answer any 4 questions [04 x 05 marks=20 marks]					
1	a.	Write a short note on High-Performance Steel?	5	1	1
	b.	What is meant by Ductility? Why and where is it important?	5	1	1
	c.	Distinguish between Elastic and Plastic Analysis?	5	1	4
	d.	What are Composite Structures?	5	2	1
	e.	Define a) Plastic hinge b) Shape factor	5	1	2
Section B (30 marks) Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	Explain any five Structural Steel Products?	10	1	2
	b.	What are the advantages of Steel as a Structural Material?	10	1	2
	c.	What are the various lateral load resisting systems? State its applications.	10	2	4
	d.	Design a simply supported beam of span 4m carrying a reinforced concrete floor capable of providing lateral restraint to the top compression flange. The uniformly distributed load is made up of 20KN/m imposed load and 20 KN/m dead load (section is tiff against bearing). Assume Fe 410 grade steel.	10	2	6

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Course Code: SOE-M-CSE207

OP JINDAL UNIVERSITY

Mid Semester Examination, May-2023

M.Tech. 2nd Semester [01PG21]

Computer Science & Engineering

Next Generation Databases

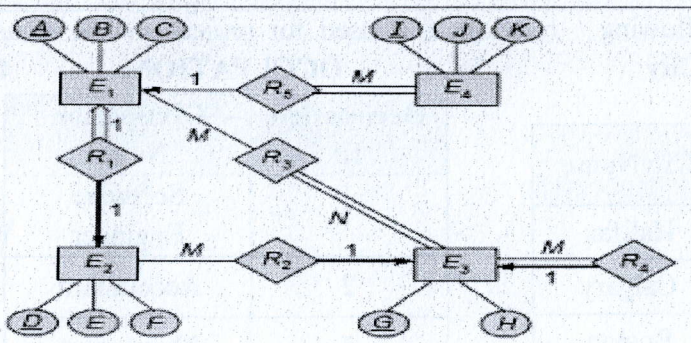
Time: 2 Hrs. **Max. Marks: 50**

Note:

			M	CO	KL
Section A (10 marks)					
All Questions are compulsory [05 x 02 marks=10 marks]					
1	a.	What are the differences between instances and schema?	2	1	1
	b.	How prime attribute of a weak entity will have represented in ER Diagram? Can a composite key become primary key?	2	2	1
	c.	What do you mean by data type ? how many categories of data type exist in c? give their names .	2	2	1
	d.	What is foreign key? how is it different from primary key?	2	1	2
	e.	What is "weak entity"?	2	1	2
Section B (16 marks)					
Answer any 4 questions [04 x 04 marks=16 marks]					
2	a.	How ER diagram will be converted into Relation (Table)?	4	1	1
	b.	Why atomicity and redundancies can be controlled using Relational model instead of file management system. Write other advantages of using database management over file management system	4	1	2
	c.	Find all functional dependencies of given table. find the highest normal form of the relation.	4	2	2
	d.	Consider the following relations with keys underlined: Street (name, location, city) , House (house_number, street _name) , Lives (name, house_number) For the above relations write relational algebra expression for following .	4	2	2

A	B	C	D
2	1	C1	D0
3	2	C2	D1
2	1	C1	D2
4	5	C3	D3
2	1	C1	D0

		a) Get the names of persons who live in the street named "Mahatma Gandhi" b) Get the numbers of houses which are not occupied. c) Get the house numbers street wise.			
	e.	Consider a data base system for a baseball organization such as the major leagues. The data requirements are summarized as follows: a The personnel involved in the league include players, coaches, managers and umpires. Each is identified by a unique personnel id. They are also described by their first and last names along with the date and place of birth. b Players are further described by other attributes such as their batting orientation (left, right, or switch) and have a lifetime batting average (BA). c Within the players group is a subset of players called pitchers. Pitchers have a life time ERA (earned run average) associated with them. d Teams are uniquely identified by their names. Teams are also described by the city in which they are located and the division and league in which they play (such as Central division of the American league). e Team has one manager, a number of coaches, and a number of players. f Game are played between two teams with one designated as the home team and the other the visiting team on a particular date. The score (runs. Hits, and errors) are recorded for each team. The team with the most runs is declared the winner of the game. g With each finished game, the number of hits(singles , doubles, triples, and home runs) obtained by each player is also recorded. <u>Design an enhanced Entity Relationship Diagram for the BASEBALL database</u>	4	1	3
Section C (24 marks) Answer any 3 questions [03 x 08 marks=24 marks]					
3	a.	Find the minimum no of tables to implement this ER diagram (justify your answer)	8	1	2

					
	b.	A. Given a relation R={A,B,C,D,E,H} and having the following functional dependency(FDs) {(A→BC),(CD→E),(E→C),(D→AEH),(ABH→BD),(DH→BC) Then answer the following a Prove that A is not a candidate key. b Prove that H is a prime attribute. c Prove that a composite key exists in this relation. d Find the set of candidate key. e Prove that this relation possesses transitive dependency. list all transitive dependencies.	8	2	3
	c.	Convert the following from relational calculus to relational algebra. a. select A1, A2 from r1, r2 where A1>60 ^ A2>=A1 b. select avg (balance) from account where branch_name = 'Perryridge' c. loan natural join borrower d. select loan_number, branch_name, amount * 100 from loan e. select customer_name from depositor) union (select customer_name from borrower)	8	2	2

	d.	Consider the following relations (P used for projection , R is user for Selection) **City**, **OCCUPATION**, **User** **City** **CityId** | **CityName** 1 | Halifax 2 | Calgary 3 | Boston 4 | New York 5 | Toronto **OCCUPATION** **Occupation Id** | **Occupation Name** 1 | Software Engineer 2 | Accountant 3 | Pharmacist 4 | Library Assistant **User** **Id** | **Name** | **Age** | **Gender** | **OccupationId** | **CityId** 1 | John | 25 | Male | 1 | 3 2 | Sara | 20 | Female | 3 | 4 3 | Victor | 31 | Male | 2 | 5 4 | Jane | 27 | Female | 1 | 3 Solve the following relational expressions for above relations and write the SQL query for each. **a.** $P_{Name}(R_{Age>25}(User))$ **b.** $R_{Id>2 \vee Age!=31}(User)$ **c.** $R_{User.OccupationId=Occupation.OccupationId}(User \times Occupation)$ **d.** $User \bowtie Occupation \bowtie City$ **e.** $P_{Name,Gender}(RCityName="Boston"(User \bowtie City))$	8	2	3
	e.	What are the various advantages of DBMS Over file management System	8	1	1

02/05/23
05

Course Code: SOE-M-CSE202

OP JINDAL UNIVERSITY

Mid Semester Examination, May-2023

M.Tech. 2nd Semester [01PG021]

Computer Science & Engineering

Business Intelligence & Machine Learning

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 sigmoid activation function**	2	CO1	2
	b.	**What is dimensionality reduction**	2	CO1	2
	c.	**What is classification**	2	CO1	2
	d.	**Define ensemble techniques**	2	CO2	2
	e.	**What is outlier detection**	2	CO2	2
Section B (16 marks)					
Answer any 4 questions [04 x 04 marks=16 marks]					
2	a.	**Differentiate between machine learning and traditional programming**	4	CO1	2
	b.	**What is supervised learning? Explain with example.**	4	CO1	2
	c.	**What is clustering? Explain with example.**	4	CO2	2
	d.	**Describe 2X2 confusion matrix**	4	CO1	3
	e.	**Differentiate between classification and regression**	4	CO1	2
Section C (24 marks)					
Answer any 3 questions [03 x 08 marks=24 marks]					
3	a.	**Differentiate between classification and regression**	8	CO1	3
	b.	**Classify the tuple X = {age=senior, income = high, student = yes, credit_rating=fair} with the help of Naïve Bayes classifier. Use following dataset.**	8	CO2	3

RID	age	income	student	credit_rating	Class: buys_computer
1	youth	high	no	fair	no
2	youth	high	no	excellent	no
3	middle_aged	high	no	fair	yes
4	senior	medium	no	fair	yes
5	senior	low	yes	fair	yes
6	senior	low	yes	excellent	no
7	middle_aged	low	yes	excellent	yes
8	youth	medium	no	fair	no
9	youth	low	yes	fair	yes
10	senior	medium	yes	fair	yes
11	youth	medium	yes	excellent	yes
12	middle_aged	medium	no	excellent	yes
13	middle_aged	high	yes	fair	yes
14	senior	medium	no	excellent	no

c.	**Find out whether the person whose details are mentioned in the tuple X has diabetes or not using K-Nearest Neighbor classifier. Use following dataset. Assume K=3.** **X={age = 88, Fasting Sugar Level = 64, PP sugar Level =185 }**	8	CO1	3
d.	**Describe Decision Tree classifier using an example**	8	CO2	3
e.	**Describe Hierarchical clustering algorithm with the help of an example.**	8	CO2	3

S.No.	Age	Fasting Sugar level	PP Sugar level	Diabetic
1	30	70	289	Yes
2	34	78	125	No
3	56	80	122	No
4	78	81	233	Yes
5	45	82	200	Yes
6	68	88	198	Yes
7	43	67	159	No
8	44	75	153	No
9	67	80	128	NO
10	56	84	132	Yes

03/05/23
05

Course Code: SOE-M-CSE203(1)

OP JINDAL UNIVERSITY

Mid Semester Examination, May-2023

M.Tech. 2nd Semester [01PG021]

Computer Science & Engineering

Signal Processing and Data Analytics

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 an image?	5	1	1
	b.	What is difference between gray and black image?	5	2	1
	c.	Differentiate between image and video signal.	5	2	2
	d.	Explain the concept of fast Fourier transform?	5	2	1
	e.	Why shifting of frequency spectrum to center in frequency domain necessary in analyzing the spectrum of transformed signal?	5	1	1
Section B (30 marks) Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	Explain the concept of sampling and quantization in digitizing the continuous signal.	10	1	1
	b.	What are the importance of Data preprocessing?	10	1	1
	c.	Explain the usefulness of data science. Why it is having huge demand?	10	2	1
	d.	How data visualization plays an important role analyzing data. What are the different data visualization tools available?	10	2	1

04/05/25 05
SOE-B-CSE-204(1)

Course Code: ~~SOE-B-CSE602~~ 05(1)

O P JINDAL UNIVERSITY

Mid Semester Examination, April-2023

M.Tech. 2nd Semester

COMPUTER SCIENCE & ENGINEERING

Cloud Computing and Applications

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

Note: Section A: Write answer in 500 words
Section B: Write answer in 1000 words

Section A (20 marks)

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

			M	CO	KL
1	a.	Define virtualization with example?	5	1	1
	b.	What is virtual machine? Write any two advantages of virtual machine?	5	2	1
	c.	Write any five advantages of cloud computing?	5	2	1
	d.	What are the different business values of cloud computing?	5	2	1
	e.	What do you understand by cloud workload and workload lifespan?	5	2	1

Section B (30 marks)

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

			M	CO	KL
2	a.	How cloud computing helps to reduce the issues from traditional IT infrastructure?	10	1	2
	b.	State the different cloud computing technological values?	10	1	1
	c.	What are the pros and cons of cloud deployment architectures?	10	2	2
	d.	What decision factors helps to opt cloud deployment models?	10	1	2

04/05/22 (05)

Course Code: SOE-M-CSE204(1)

OP JINDAL UNIVERSITY

Mid Semester Examination, May-2023

M.Tech. 2nd Semester [01PG021]

Computer Science & Engineering

Research Methodology

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.	Define and explain the term "Research". Explain its importance and objectives.	5	CO1	K2
	b.	Explain meaning and scope of the educational research?	5	CO1	K2
	c.	Discuss the meaning and types of hypothesis.	5	CO2	K2
	d.	Discuss the concept and sources of literature review.	5	CO2	K2
	e.	State the characteristics of good hypothesis.	5	CO2	K2
Section B (30 marks)					
Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	Discuss the basic structure of a research report.	10	CO1	K3
	b.	Explain with suitable examples of cluster.	10	CO2	K3
	c.	Discuss interview as a techniques of data collection.	10	CO1	K3
	d.	Explain the stages in data processing.	10	CO2	K3

01/05/22 (07)

Course Code: SOE-M-PEP201

OP JINDAL UNIVERSITY

OPJU
University of Steel Technology and Management

Mid Semester Examination, May-2023

M.Tech. 2nd Semester

Electrical Engineering

Power Electronics Controlled Electric Drives

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.	Describe various advantages of electrical drives.	5	1	3
	b.	Explain the concept load equalization.	5	1	2
	c.	Disclose the DC series motor characteristics.	5	1	2
	d.	What are the various speed control of DC motor?	5	2	1
	e.	A 220 V, 24A, 1000 RPM, DC separately excited motor has an armature resistance of 2 Ω. The motor is controlled by a Chopper with a frequency of 500 Hz from a supply of 230 V. Calculate the duty ratio δ for 1.2 times the rated Torque and 500 RPM.	5	3	2
Section B (30 marks)					
Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	Elaborate the basic elements of electric drives	10	1	3
	b.	Explain the four quadrant operation of electric drive	10	2	4
	c.	Elaborate Single Phase Full Converter Drive feeding a Separately Excited DC Motor	10	3	3
	d.	Explain three phase Semi Converter drive connected to a DC separately excited motor.	10	2	3

OP JINDAL UNIVERSITY

MSt Semester Examination, May-2023

M.Tech. 3rd Semester

Electrical Engineering

Power Electronics Controlled Electric Drives

Time: 2 Hrs. Max. Marks = 50

Note:

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Course Code: SOE-M-PEP202

OP JINDAL UNIVERSITY

Mid Semester Examination, May-2023

M.Tech. 2nd Semester

Electrical Engineering

POWER SYSTEMS DYNAMICS AND CONTROL

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 power system stability, and why is it essential in the operation of power systems? Describe the different types of power system stability and their significance	5	CO 1	KL 2
	b.	Explain the concept of transient stability, and how it is affected by fault conditions in the power system.	5	CO 1	KL 2
	c.	Describe the role of power system stabilizers (PSS) in improving power system stability.	5	CO 2	KL 2
	d.	What are the challenges faced by power system operators in maintaining system stability, and how can they be addressed?	5	CO 1	KL 2
	e.	Define steady state stability and derive the expression for synchronizing power.	5	CO 2	KL 2
Section B (30 marks)					
Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	Explain the states of operation and system security in a power system.	10	CO 1	KL 3
	b.	A generator is connected to an infinite bus through an external impedance of jx_e. The generator is represented by a voltage source $E_g\angle\delta$ in series with a reactance x_g. If $E_g = E_b$(infinite bus voltage) = 1.0, x_e = -0.5 x_g= 0.3 (all in p.u.), for p_b = 1.0 p.u., find the equilibrium values of δ, in the range of $(-\pi, +\pi)$. Test their stability (p_b is the received power at the infinite bus). Assume infinite bus angle as zero.	10	CO 2	KL 3
	c.	Derive swing equation and explain its significance.	10	CO 2	KL 3
	d.	Explain equal area criterion for stability of power system subjected to change in mechanical input.	10	CO 2	KL 3

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Course Code: **SOE-M-PEP203**

OP JINDAL UNIVERSITY

Mid Semester Examination, May-2023

M.Tech. 2nd Semester [Program code]

Electrical Engineering

Hybrid and Electric Vehicles

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.	Define the hybrid Electric Vehicle?	5	1	2
	b.	Why Regenerative Braking used in Electric Vehicle?	5	2	1
	c.	Compare the conventional and hybrid electric vehicle?	5	1	1
	d.	What is concept of hybridization in hybrid vehicle?	5	2	3
	e.	What are the components of energy management system	5	3	3
Section B (30 marks)					
Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	Draw a general lay out of an EV and discuss the transmission characteristics.	10	2	2
	b.	Draw six different configurations of drivetrains in electric vehicles. Briefly explain each configuration.	10	3	4
	c.	Explain rolling resistance and aerodynamic drag in vehicles.	10	2	2
	d.	What is the typical value for Induction Motors used in HEV applications?	10	1	1

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Course Code: SOE-M-PEP204 (2)

OP JINDAL UNIVERSITY

Mid Semester Examination, May-2023

M.Tech. 2nd Semester [01PG031]

Electrical Engineering

Power Electronic Applications in Renewable Energy

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.	Brief the salient features of renewable energy resources.	5		
	b.	Name some hybrid renewable energy systems.	5		
	c.	What are fuel cells?	5		
	d.	What are the major factors influencing the amount of GHG emissions.	5		
	e.	Give any two environmental aspect of electric energy conversion.	5		
Section B (30 marks)					
Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	What are the constructional differences between SCIG and DFIG?	10		
	b.	What are the different types of fuel cells? Explain them with neat diagrams.	10		
	c.	Draw the schematic of double fed induction generator and explain its construction and principle of operation in detail.	10		
	d.	Explain the extraction methods of biomass energy	10		

Course Code: SOE-M-PPE201

O P JINDAL UNIVERSITY

Mid Semester Examination, May-2023

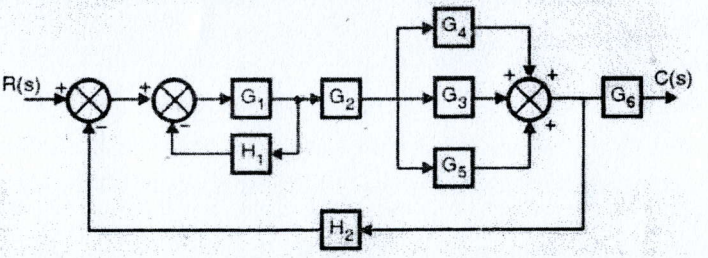
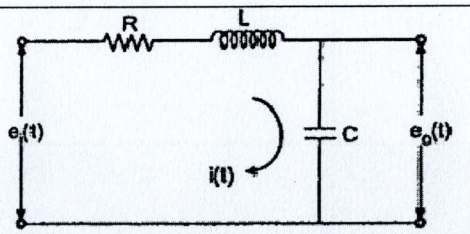
MTECH-II Semester

MECHANICAL ENGINEERING

Industrial Instrumentation & Control [01UG040]

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

Note: Solve all sections

			M	CO	KL
Section A (10 marks) All Questions are compulsory [05 x 02 marks=10 marks]					
1	a.	List the basic elements used for modeling mechanical translational system?	2	4	1
	b.	Give advantages of transfer function	2	4	1
	c.	Give one example of closed loop control system with reason?	2	4	1
	d.	List the elements of closed loop transfer function.	2	4	1
	e.	What is relative stability, explain with neat sketch.	2	4	2
Section B (16 marks) Answer any 4 questions [04 x 04 marks=16 marks]					
2	a.	What is the difference between closed loop and open loop control system	4	4	2
	b.	What is time response and steady state response system	4	5	1
	c.	Reduce the block diagram in fig and obtain its transfer function. 	4	4	3
	d.	Find the transfer function of given system 	4	4	3
	e.	For the given transfer function, Find: (i) Poles (ii)Zeros (iii) Pole-zero Plot (iv) Characteristics Equation $T.F = \frac{k(s+6)}{s(s+2)(s+5)(s^2+7s+12)}$	4	5	1
Section C (24 marks) Answer any 3 questions [03 x 08 marks=24 marks]					
3	a.	A unity feedback system has $G(s) = \frac{40(s+2)}{s(s+1)(s+4)}$; determine type of the system, All error coefficients, and error for ramp input with magnitude 4.	8	5	3
	b.	A unity feedback system has $G(s) = \frac{100}{s(s+5)}$; if it is subjected to unit step input, determine (1) Damped frequency of oscillations, (2) Time for first overshoot, (3) Settling Time (4) Maximum Peak Overshoot	8	4	3
	c.	Determine the range of k for stable system. $s^4 + 5s^3 + 5s^2 + 4s + k = 0$	8	5	2
	d	A second order control system has $F(s) = s^2 + 2.4s + 9$, if step input is applied to it, determine time domain specification. Sketch the response.	8	5	2

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Course Code: SOE-M-PPE202

OP JINDAL UNIVERSITY

Mid Semester Examination, May-2023

M.Tech. 2nd Semester [01PG041]

Power Plant Engineering & Energy Management (Mechanical)

Advanced Steam and Gas Turbine 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.	Classify the steam turbine on the basis of various aspects of steam turbine.	5	1	2
	b.	Draw the schematic diagram of heat cycle of steam turbine power plant with T-s diagram.	5	1	2
	c.	Draw the pressure and velocity variation graph for steam flow through impulse turbine.	5	2	2
	d.	Define degree of reaction and write the mathematical equation.	5	2	1
	e.	Explain the elements of steam turbine in detail.	5	2	2
Section B (30 marks) Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	Explain the principle of steam turbine with velocity diagram of blade.	10	1	2
	b.	In a De-Laval turbine steam issues from the nozzle with a velocity of 1200 m/s. The nozzle angle is 20°, the mean blade velocity is 400 m/s, and the inlet and outlet angles of blades are equal. The mass of steam flowing through the turbine per hour is 1000 kg & the blade velocity coefficient = 0.8. Calculate: (i) Blade angles. (ii) Relative velocity of steam entering the blades. (iii) Tangential force on the blades.	10	1	3
	c.	Explain Steam Turbine Governing with its different types in detail.	10	2	2
	d.	Differentiate the impulse and reaction turbine.	10	2	2

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Course Code: SOE-M-PPE203

O P JINDAL UNIVERSITY

Mid Semester Examination,- May 2023

M. Tech. 2nd Semester

Department of Mechanical Engineering

Design of Heat Exchangers

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

Note: Use of steam tables is permitted in the exam HMT data book is also permitted to be used in the exam

			M	CO	KL
Section A (10 marks)					
All Questions are compulsory [05 x 02 marks=10 marks]					
1	a.	Compare boiling with evaporation. What factors directly influence boiling?	2	1	V,I
	b.	Write the expression for boiling heat flux from a solid surface to the fluid. What is ΔT_{excess} ?	2	3	I
	c.	What are the different regimes in pool boiling process?	2	3	I
	d.	Define 'burnout' during boiling. How can burnout be avoided?	2	5	I
	e.	What are different classifications of fins?	2	5	I
Section B (16 marks)					
Answer any 4 questions [04 x 04 marks=16 marks]					
2	a.	Explain rate of heat transfer in the nucleate boiling regime as given by Rosenhow equation. Also discuss the application and limitation of the equation w.r.t. nucleate boiling.	4	4	II,VI
	b.	What are peak and minimum heat flux, write the respective expressions for both with nomenclature.	4	3	I
	c.	Illustrate film boiling process with relevant expressions w.r.t. heat transfer process involved. Also discuss how heat transfer can be enhanced in pool boiling process?	4	4	II
	d.	Explain the term fin effectiveness. When is the use of fins not justified?	4	4	II, V
	e.	Fins 12 in number havoing k=75 W/mk and 0.75 mm thickness protrude 25 mm from a cylindrical surface of 50 mm diameter and 1 m length placed in an atmosphere of 40 °C. IF The cylindrical surface is maintained at 150 C and the heat transfer coefficient is 23 W/m^{2}K calculate the rate of heat transfer across the fins surface to the surroundings.	4	4	V
Section C (24 marks)					
Answer any 3 questions [03 x 08 marks=24 marks]					
3	a.	Discuss in detail the flow boiling process w.r.t. the fluid velocity. Also discuss the internal flow boiling phenomenon with suitable diagram.	8	3	VI
	b.	The condenser of a steam power plant operates at a pressure of 7.38 kPa. Steam at this pressure condenses on the outer surfaces of horizontal tubes through which cooling water circulates. The outer diameter of the pipes is 3 cm, and the outer surfaces of the tubes are maintained at 30°C. Determine (*a*) the rate of heat transfer to the cooling water circulating in the tubes and (*b*) the rate of condensation of steam per unit length of a horizontal tube.	8	4	V
	c.	Compare film and drop wise condensation with examples. Give an example of non-boiling two phase heat transfer and justify the need to study the same.	8	1	V
	d.	Derive and explain expression for heat transfer through triangular fins.	8	3	II,V
	e.	An Aluminum alloy fin (k=200 W/mK), 3.5 mm thick and 2.5 cm long protrudes from a wall. The base is at 420 C and ambient air temperature is 30 C. The heat transfer coefficient may be taken as 11 W/m2K. Find the heat loss and fin efficiency if the heat loss from fin tip is negligible.	8	4	V

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Course Code: SOE-M-PPE204

OP JINDAL UNIVERSITY

Mid Semester Examination, May-2023

M.Tech. 2nd Semester [01PG041]

Mechanical Engineering

Computational Fluid 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.	What is CFD? State its objective and list down the advantages of CFD over experimental methods.	5	1	1
	b.	What is the basic difference between linear and nonlinear equations? Discuss in brief the various methods available to solve the linear equations.	5	2	2
	c.	Give a detailed classification of partial differential equations and mention basic characteristics of each. Identify the nature of the given partial differential equation. $$\frac{\partial c}{\partial t} + u\frac{\partial c}{\partial x} = D\frac{\partial^2 c}{\partial x^2} - Kc^{1.25}$$	5	1	2
	d.	Apply Gauss elimination method to solve the following equations: $$x + 4y - z = -5;\ x + y - 6z = -12;\ 3x - y - z = 4$$	5	2	2
	e.	How do you classify boundary conditions? Also discuss their importance in solving a problem numerically.	5	1	1
Section B (30 marks) Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	Explain the significance of Reynolds Transport theorem; using the same derive the Continuity equation.	10	1	2
	b.	Apply Gauss Siedal iteration method to solve the following equations: $$20x + y - 2z = 17;\ 3x + 20y - z = -18;\ 2x - 3y + 20z = 25$$	10	2	3
	c.	List down the different types of forces encountered by a fluid during flow and derive the Cauchy's Momentum Equation.	10	1	2
	d.	What do you understand by a banded matrix. Solve the following equation using Tri Diagonal Matrix Algorithm $$3x - y = -1$$ $$-x + 3y - z = 7$$ $$-y + 3z = 7$$	10	2	3

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Course Code: SOE-M-PEP205(1)

O P JINDAL UNIVERSITY

Mid-Semester Examination, May-2023

M.Tech. 2nd Semester

MECHANICAL ENGINEERING

Energy Management & Audit [Program Code: 01PG041]

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

			M	CO	KL
Section A (20 marks) Answer any 4 questions [05 x 04 marks=20 marks]					
1	a.	Discuss energy audit and its need.	05	1	1
	b.	Discuss the Economic evaluation of energy management.	05	1	1
	c.	What are the different types of energy and their sources? Discuss with example.	05	1	1
	d.	Define energy management and its objective.	05	2	1
	e.	What is the need of energy policies at national and state levels? Discuss.	05	1	1
Section B (30 marks) Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	What is the basic principle of energy conversion and its importance? Discuss.	10	1	1
	b.	Discuss in detail the energy management strategies.	10	1	1
	c.	Discuss the roles, responsibilities, and accountability of energy managers.	10	2	2
	d.	Discuss "Energy for the future."	10	2	2

Course Code: SOE-M-PPE201

O P JINDAL UNIVERSITY

Mid Semester Examination, May-2023

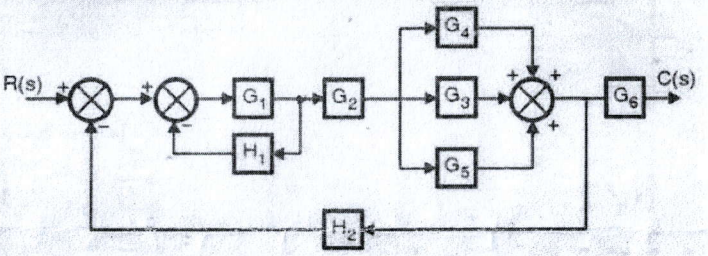
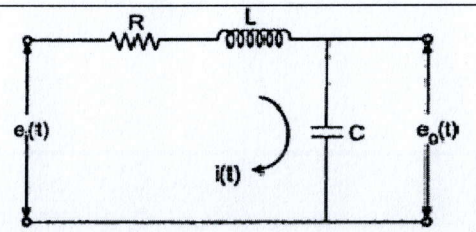
M.Tech. 2nd Semester

MECHANICAL ENGINEERING

Industrial Instrumentation & Control [01UG040]

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

Note: Solve all sections

			M	CO	KL
Section A (10 marks) All Questions are compulsory [05 x 02 marks=10 marks]					
1	a.	List the basic elements used for modeling mechanical translational system?	2	4	1
	b.	Give advantages of transfer function	2	4	1
	c.	Give one example of closed loop control system with reason?	2	4	1
	d.	List the elements of closed loop transfer function.	2	4	1
	e.	What is relative stability, explain with neat sketch.	2	4	2
Section B (16 marks) Answer any 4 questions [04 x 04 marks=16 marks]					
2	a.	What is the difference between closed loop and open loop control system	4	4	2
	b.	What is time response and steady state response system	4	5	1
	c.	Reduce the block diagram in fig and obtain its transfer function. 	4	4	3
	d.	Find the transfer function of given system 	4	4	3
	e.	For the given transfer function, Find: (i) Poles (ii)Zeros (iii) Pole-zero Plot (iv) Characteristics Equation $T.F = \frac{k(s+6)}{s(s+2)(s+5)(s^2+7s+12)}$	4	5	1
Section C (24 marks) Answer any 3 questions [03 x 08 marks=24 marks]					
3	a.	A unity feedback system has $G(s) = \frac{40(s+2)}{s(s+1)(s+4)}$; determine type of the system, All error coefficients, and error for ramp input with magnitude 4.	8	5	3
	b.	A unity feedback system has $G(s) = \frac{100}{s(s+5)}$; if it is subjected to unit step input, determine (1) Damped frequency of oscillations, (2) Time for first overshoot, (3) Settling Time (4) Maximum Peak Overshoot	8	4	3
	c.	Determine the range of k for stable system. $s^4 + 5s^3 + 5s^2 + 4s + k = 0$	8	5	2
	d	A second order control system has $F(s) = s^2 + 2.4s + 9$, if step input is applied to it, determine time domain specification. Sketch the response.	8	5	2

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Course Code: SOE-M-MTA202

O P JINDAL UNIVERSITY

Mid Semester Examination, May-2023

M. Tech 2nd Semester

MECHANICAL ENGINEERING

DIGITAL MANUFACTURING [SOE-M-MTA202]

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

			M	CO	KL
Section A (20 marks) Answer any 4 questions [05 x 04 marks=20 marks]					
1	a.	What is Digital Manufacturing	5	1	1
	b.	What are the applications of Digital Manufacturing in the Automotive Industry and Aerospace & Defense Industries	5	1	1
	c.	What do you understand by Assembly modelling? Describe the steps followed and the various constraints used.	5	2	2
	d.	Describe Solid modelling.	5	2	1
	e.	Write about Render the appearance of a product.	5	2	1
Section B (30 marks) Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	Describe Geometric modelling. Write in brief about Parametric modelling	10	2	1
	b.	Describe the Wireframe and Surface modelling.	10	2	2
	c.	Describe the use of Computer-aided technologies in product lifecycle management.	10	1	2
	d.	Discuss about the Concept generation.	10	1	2

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Course Code: SOE-M-MTA203

OP JINDAL UNIVERSITY

Mid Semester Examination, May-2023

MTech. 2nd Semester [01PG042]

Department of Mechanical Engineering

Flexible Manufacturing System

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

Note: Attempt all sections.

			M	CO	KL
Section A (20 marks)					
Answer any 4 questions [04 x 05 marks=20 marks]					
1	a.	What do you mean by Flexible Manufacturing System (FMS)?	5	1	1
	b.	What are the basic components of FMS?	5	1	1
	c.	Explain about various types of FMS?	5	1	1
	d.	Write a note on Hierarchy of Computer Control.	5	2	1
	e.	Explain in detail about composition of FMS?	5	2	1
Section B (30 marks)					
Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	What is flexibility in manufacturing? Explain all three levels of manufacturing flexibility.	10	1	1
	b.	Explain in detail about FMS Layout, elaborate all five layouts.	10	1	2
	c.	Explain in detail about various steps involved in single product scheduling problem?	10	1	1
	d.	What is the primary functions of the subassembly/main assembly line control computers?	10	2	2

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Course Code: SOE-M-MTA204

OP JINDAL UNIVERSITY

Mid Semester Examination, May-2023

M. Tech. 2nd Semester

Mechanical Engineering

Quality Engineering in Manufacturing

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 production quality and how to Improve Production Quality Processes?	5	CO1	KL1
	b.	Explain ISO 9001:2015 and other QMS standards.	5	CO1	KL2
	c.	What will be the Industrial influence on quality and standardization?	5	CO1	KL1
	d.	What types of Elements and requirements of a QMS?	5	CO2	KL1
	e.	Explain Signal to Noise ration	5	CO2	KL2
Section B (30 marks) Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	What are the Benefits of improving production quality.	10	CO1	KL1
	b.	How to improve production quality processes	10	CO1	KL1
	c.	Explain N-type, S-type and L-type tolerance.	10	CO2	KL2
	d.	Explain one case study on parameter and tolerance design.	10	CO2	KL2

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Course Code: SOE-M-MTA205(5)

OP JINDAL UNIVERSITY

Mid-Semester Examination, May-2023

M.Tech. 2nd Semester

Mechanical Engineering Department

Lean Manufacturing

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

			M	CO	KL
Section A (20 marks) Answer any 4 questions [04 x 05 marks=20 marks]					
1	a.	Name the tool where '6M' are used, Discuss it in detail.	5	2	2
	b.	Write a note on Statistical Data types.	5	4	1
	c.	What is DPMO? Discuss it in detail.	5	4	3
	d.	Write a note on Lean Manufacturing.	5	1	1
	e.	Enlist and Explain the types of waste.	5	5	2
Section B (30 marks) Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	Mention and Elaborate on the Project Identification Themes.	10	4	3
	b.	Elaborate on each among DMAIC.	10	2	3
	c.	Prepare a VSM (consider any suitable case) and discuss it in detail.	10	5	2
	d.	Write a detailed Note on the History of Six Sigma.	10	3	1

Course Code: **SOE-M-MST201**

OP JINDAL UNIVERSITY

Mid Semester Examination, May-2023

M. Tech. 2nd Semester [01PG051]

MATERIAL SCIENCE AND TECHNOLOGY

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

			M	CO	KL
Section A (20 marks)					
Answer any 4 questions [04 x 05 marks=20 marks]					
1	a.	Discuss various model also discuss relevant examples.	5	1	ii
	b.	What is CFD simulation? and explain its application towards simulating metallurgical processes.	5	1	iii
	c.	Explain different types of metal forming processes with neat sketch.	5	2	iii
	d.	Differentiate between open die, close die and fleshless die forging.	5	2	ii
	e.	Discuss the advantage of materials modelling. Explain its using suitable examples.	5	1	iii
Section B (30 marks)					
Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	A billet 75 mm long and 25 mm in diameter is to be extruded in a direct extrusion operation with extrusion ratio *re* = 4.0. The extrudate has a round cross section. The die angle (half angle) is 90°. The work metal has a strength coefficient of 415 MPa, and strain-hardening exponent of 0.18. Use the Johnson formula with a = 0.8 and b=1.5 to estimate extrusion strain. Find the pressure applied to the end of the billet as the ram moves forward.	10	2	v
	b.	What is computer simulation techniques and also broadly explain their basic simulation terminology.	10	1	iii
	c.	Explain briefly about multiscale materials modelling in terms of time and length scale using schematically.	10	2	iii
	d.	What do you understand by boundary conditions? and its role in molecular dynamics.	10	1	iv

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Course Code: SOE-M-MST202

OP JINDAL UNIVERSITY

Mid-Semester Examination, May-2023

M.Tech. 2nd Semester [01PG051]

Material Science & Technology

Iron & Steel Making Technology

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 raw materials required for iron making. List out various iron ores	5	1	1
	b.	What is the function of coke and flux in the blast furnace? What is slag?	5	1	1
	c.	What is meant by sintering? Explain what is meant by BTP?	5	1	1
	d.	What is the chemical formula of hematite, magnetite and wustite and calculate the % of Fe in hematite, magnetite and wustite?	5	1	1
	e.	What is the melting point of iron? What happens with the melting point of iron as %C increases? What is the mode of heat transfer which takes place in beehive ovens?	5	1	1
Section B (30 marks) Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	List various agglomeration processes. Why fines cannot be charged into the BF as a feed material? What are the raw materials used for sinter making? What is the size of sinters charged in BF? What is meant by super flux sinters?	10	1	1
	b.	What is meant by coke? Mention various types of ovens used for coke making, Mention various test done to check quality of coke. What is the function of coke inside the BF? What is the significance of M_{40} and M_{10}?	10	1	1
	c.	Explain the mechanism of sintering; Mention the factors affecting sintering process; Mention the name of the sintering machine. What is meant by acid sinters?	10	1	2
	d.	Explain the significance of Caking property and crucible swelling number of coal. Mention the transformation of peat to lignite.	10	1	2

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Course Code: SOE-M-MST203

O P JINDAL UNIVERSITY

Mid Semester Examination, MAY-2023

M.Tech. 2nd Semester

METALLURGICAL ENGINEERING

MATERIALS CHARACTERIZATION

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

Note:

Unit-I (20 marks)

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

			M	CO	KL
1	a.	What is lattice point? Differentiate between lattice point and crystal.	4	1	1
	b.	Distinguish between primitive unit cell and non primitive unit cell.	4	1	5
	c.	What are the various characteristics we can measure by material characterization techniques?	4	3	1
	d.	Justify the reason that no end/base centred cubic unit cell exist.	4	2	5
	e.	What are the various lattice parameter and conditions for monoclinic unit cell	4	2	1

Unit-II (30 marks)

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

2	a.	Draw the following using cubic unit cell	10	3	2

i. (110)	ii. (101)
iii. (112)	iv. (220)
v. (111)	vi. [112]
vii. [111]	viii. [113]
ix. [221]	x. [114]

	b.	Explain the principle of X-rays generation and auger electron generation.	10	1	2
	c.	Determine the condition for diffraction in a FCC unit cell and derive the conditions using structure factor rule?	10	2	5
	d.	Determine the condition for diffraction in a BCC unit cell and derive the conditions using structure factor rule?	10	2	5
	e.	A FCC crystal with a lattice parameter of 0.3615 nm is used to measure the wavelength of monochromatic X-rays: The Bragg angle for the reflection from (111) planes is 21.68°. Determine the wavelength of X-rays (in nm, rounded off to three decimal places) is _____.	10	3	5

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Course Code: SOE-M-MST204

OP JINDAL UNIVERSITY

OPJU
University of Steel Technology and Management

Mid Semester Examination, May-2023

M. Tech. 2nd Semester [01PG051]

Metallurgical Engineering

Advanced Material Processing

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 mean castings? Write different steps in casting processes.	5	01	I
	b.	Discuss design advantages of castings processes.	5	01	II
	c.	Define mechanical alloying (MA) and briefly discuss about milling condition.	5	02	II
	d.	Define powder, powder metallurgy and discuss characteristics of powders.	5	01	II
	e.	Write various methods of powder production.	5	01	I
Section B (30 marks) Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	Write different stages of castings.	10	01	I
	b.	Discuss horizontal and vertical gas atomization with schematic diagram.	10	01	II
	c.	Discuss centrifugal atomization and its various parameter with schematic diagram.	10	02	II
	d.	Write salient features and process variables of gas atomization method.	10	02	I

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Course Code: SOE-M-MST205(1)

OP JINDAL UNIVERSITY

Mid Semester Examination, May-2023

M.Tech 2nd Semester [01PG051]

Material Science & Technology

Nanomaterials and Technology

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 nanomaterials. Do they exist in nature or they are man-made? If yes then justify your answer.	5	1	1
	b.	Distinguish between nanoscience and nanotechnology.	5	1	4
	c.	Discuss the products in which metallic nanoparticles are being used.	5	3	6
	d.	How the nanomaterials differ from bulk materials?	5	1	1
	e.	Enlist the different carbon-based nanomaterials with their applications.	5	2	1
Section B (30 marks)					
Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	Discuss the 0D, 1D, 2D and 3D nanostructured materials.	10	1	6
	b.	Explain one production method of graphene and their applications.	10	3	5
	c.	Classify the types of nanotubes with their properties in brief.	10	2	2
	d.	Explain the top down and bottom-up approaches in nanoparticle synthesis.	10	1	5