Course Code: SOE-M-SE201

OP JINDAL UNIVERSITY

Mid Semester Examination, March-2024

M. Tech. 2nd Semester [01PG011]

Structural Engineering (Civil Engineering)

FEM in Structural Engineering

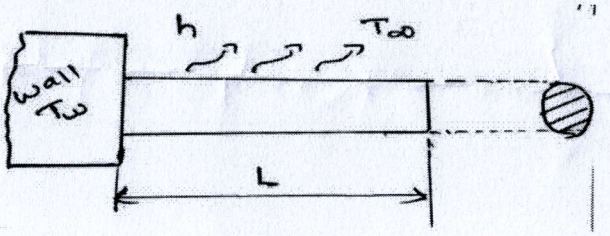
Time: 2 Hrs. **Max. Marks: 50**

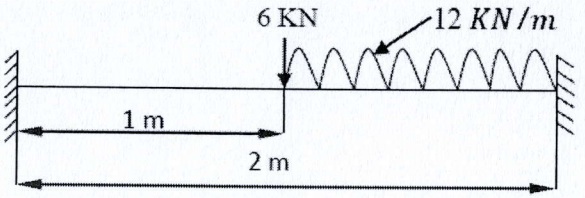
Note: *If any data is missing, then assume it and write down at the beginning of your answer.* This question paper contains **Two** printed pages.

			M	CO	KL
Section A (20 marks) Answer any 4 questions [04 x 05 marks = 20 marks]					
1	a.	(i) Distinguish ID bar element and Beam Element. (ii) Explain stiffness method.	5	I	I
	b.	(i) What is aspect ratio? (ii) What is meant by degrees of freedom?	5	II	I
	c.	(i) What is meant by finite element? (ii) Why polynomials are generally used as shape function?	5	I	I
	d.	(i) What do you mean by Boundary value problem? (ii) State the properties of a stiffness matrix.	5	I	II
	e.	(i) What is discretization? (ii) What do you mean by elements & Nodes?	5	I	I

Section B (30 marks)

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

2	a.	Consider a 1 mm diameter, 50 m long aluminum pin-fin as shown in figure used to enhance the heat transfer from a surface wall maintained at 300 ^{0}C. Calculate the temperature distribution in a pin-fin by using Rayleigh–Ritz method. Take, $k = 200\ {}^{W}/_{m\ ^0C}$ for aluminum $h = 200\ {}^{W}/_{m^2\ ^0C}$, $T_\infty = 30\ ^0C$.  Figure 1	10	I	III
	b.	For the beam and loading shown in Figure 2, calculate the nodal displacements. Take E =210, 000 MPa, I = 6×10^{-6} m^4.	10	I	III

		 Figure 2			
	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) Point collocation method, and (ii) Galerkin's method.	10	I	III

****End****

Course Code: SOE-M-SE202

O P JINDAL UNIVERSITY

Mid Semester Examination, March-2024

M.Tech. 2nd Semester

CIVIL ENGINEERING

THEORY OF PLATES AND SHELLS

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.	Define membrane theory of shell?	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.	What is the use of superposition for asymmetric analysis of circular plates?	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.	Explain Kirchoff's equation?	10	2	4
	c.	Write Asymmetric bending of circular plates?	10	1	1
	d.	Explain rectangular plates under combined lateral and direct loads?	10	3	2

Course Code: SOE-M-SE203

OP JINDAL UNIVERSITY

Mid-Semester Examination, March-2024

M.Tech. 2nd Semester [01PG011]

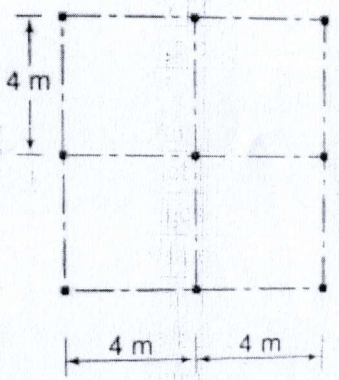
Civil Engineering [Structural Engineering]

ADVANCED STEEL DESIGN

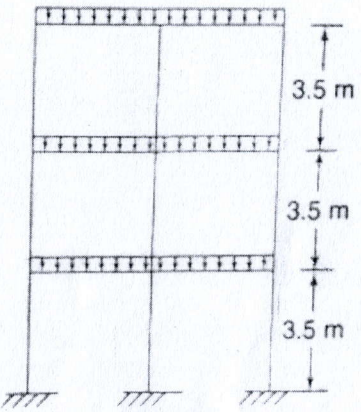
Time: 2 Hrs. **Max. Marks: 50**

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 do you mean by prying forces?	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	3
	d.	The plan and elevation of a three-storey reinforced concrete school building is shown in Figure. The building is located at Kolkata (Z = 0.16). The type of soil encountered is medium stiff and it is proposed to design the building with special moment resisting frame. The intensity of dead load is 10 kN/m² and the floors are to cater imposed load of 3 kN/m². Determine the design seismic loads on the structure by static analysis. Take R=5, I = 1.5.	10	2	3



(a) Plan



(b) Elevation

Course Code: SOE-M-SE204(1)

OP JINDAL UNIVERSITY

Mid Semester Examination, March-2024

M.Tech. 2nd Semester

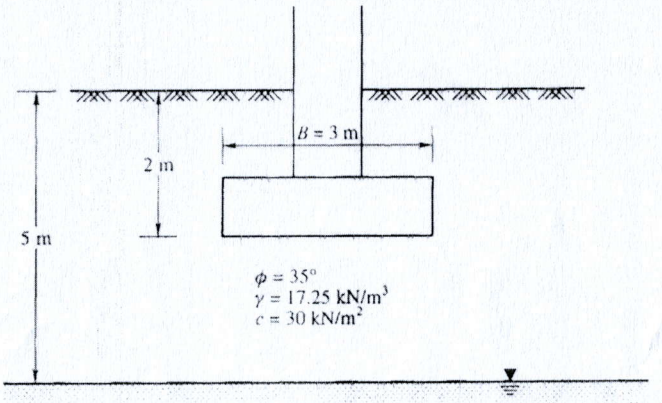
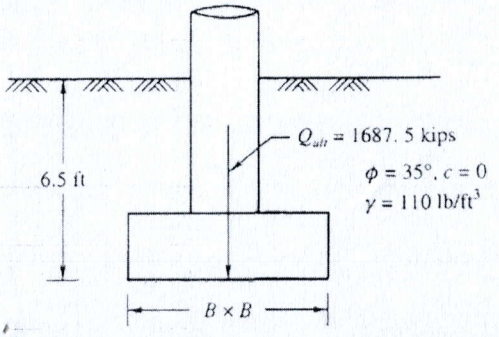
Civil Engineering

Advanced 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 the difference between disturbed and undisturbed soil sample?	2	1	2
	b.	What are the uses of soil exploration?	2	1	2
	c.	Define standard penetration number.	2	1	3
	d.	What is consolidation settlement?	2	2	2
	e.	For which type of foundation, Terzaghi's bearing capacity equation is applicable and Why?	2	2	2
Section B (16 marks)					
Answer any 4 questions [04 x 04 marks=16 marks]					
2	a.	75 mm is the external diameter of a sampling tube. If the area ratio required is 20%, determine the thickness of the sampling tube. In what type of clay would such a high area ratio be required?	4	1	4
	b.	The following dimensions are given for a shelby tube sampler: External diameter = 51 mm, Internal diameter = 48 mm, Determine the area ratio.	4	1	4
	c.	Describe various salient features of a good soil report.	4	1	3
	d.	Give salient points on general, local and punching shear failures with neat sketches.	4	2	2
	e.	Write the guidelines for the selection of foundation.	4	2	3
Section C (24 marks)					
Answer any 3 questions [03 x 08 marks=24 marks]					
3	a.	Explain in detail the geophysical methods of soil explorations with neat sketch.	8	1	3
	b.	Give a detailed account on how Standard Penetration Test is conducted. What are the relevant corrections applied to SPT number?	8	1	4
	c.	A strip footing of width 3 m is founded at a depth of 2 m below the ground surface in a (c - ϕ) soil having a cohesion c = 30 kN/m^2 and angle of shearing resistance ϕ = 35°. The water table is at a depth of 5m below ground level. The moist weight of soil above the water table is 17.25 kN/m^3 . Determine (a) the ultimate bearing capacity of the soil, (b) the net bearing capacity, and (c) the net allowable bearing pressure and the load/m for a factor of safety of 3. Use the general shear failure theory of Terzaghi. Given N_c = 57.8, N_q =41.4, and N_γ = 42.4	8	2	4

					
	d.	Describe the various methods of drilling bore holes for sub surface investigations.	8	1	3
	e.	A square footing fails by general shear in a cohesion less soil under an ultimat e load of Q_{ult} - 1687. 5 kips. The footing is placed at a depth of 6.5 ft below ground level. Given ϕ = 35°, and γ =110 lb/ft^3 , determine the size of the footing if the water table is at a great depth. Given: N_q = 41.4, and N_y= 42.4. 	8	2	4

Best of Luck

Course Code: SOE-M-CSE201

OP JINDAL UNIVERSITY

Mid Semester Examination, March-2024

M.Tech. 2nd Semester [Program Code: 01PG020]

Computer Science & Engineering

Next Generation Databases

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.	Write Limitations of Traditional Databases.	5	1	1
	b.	Write SQL vs NOSQL in detail.	5	1	1
	c.	Draw Distributed Transactions architecture and explain.	5	1	1
	d.	Define Parallelism in Databases?	5	2	2
	e.	What is Bully Algorithm? Explain with example.	5	2	2
Section B (30 marks) Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	Explain Shared Disk Architecture?	10	1	1
	b.	What is Homogeneous Distributed Databases? Give example and explain in detail.	10	1	3
	c.	Explain CAP theorem in details?	10	2	3
	d.	Write difference between Column family data model and Key-value data model?	10	2	3

Course Code: SOE-M-CSE202

OP JINDAL UNIVERSITY

Mid Semester Examination, March-2024

MTech. 2nd Semester [Program Code: 01PG021]

Computer Science & Engineering

Business Intelligent & Machine learning

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 business intelligence? Also explain business intelligence architecture.	5	CO1	KL1
	b.	Explain the role of BI in Decision Modelling.	5	CO2	KL1
	c.	Write the Importance of data visualization.	5	CO1	KL2
	d.	Explain the common characteristics of Enterprise dashboard.	5	CO1	KL1
	e.	Write a short note on future of business intelligence.	5	CO2	KL2
Section B (30 marks) Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	Write the applications of BI like Financial analysis, statistical analysis, sales analysis.	10	CO3	KL3
	b.	Explain the responsibilities of BI analysts by focusing on creating data visualizations and dashboards.	10	CO2	KL2
	c.	Explain the design of enterprise dashboards, and the common pitfalls of dashboard design.	10	CO2	KL3
	d.	Explain the Excel Modeling capabilities to solve business problems.	10	CO2	KL2

Course Code: SOE-M-CSE211(2)

OP JINDAL UNIVERSITY

Mid Semester Examination, March-2024

M.Tech. 2nd Semester [Program Code: 01PG020]

Computer Science & Engineering

Digital Image 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.	Explain the concept of brightness adaptation in the context of the human visual system.	5	1	1
	b.	Define an image as a 2D data representation and explain its significance in digital imaging.	5	1	1
	c.	Describe the process of thresholding and its applications in image segmentation.	5	1	1
	d.	Define an image histogram and explain its significance in image analysis.	5	2	1
	e.	Explain the concept of spatial filtering and its role in image enhancement.	5	2	1
Section B (30 marks) Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	Describe the structure and function of the human eye in processing visual information.	10	1	2
	b.	Discuss the process of representing color images digitally using RGB channels.	10	1	2
	c.	Discuss the differences between correlation and convolution in the context of spatial filtering.	10	2	2
	d.	Discuss the purpose of high pass filtering in image processing and its effects on image sharpness.	10	2	2

Course Code: SOE-M-CSE-213(2)

OP JINDAL UNIVERSITY

Mid Semester Examination, March-2024

M.Tech. 2nd Semester [Program Code: 01PG021]

Computer Science & Engineering

Soft Computing

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 soft computing? Write at least five industrial application of soft computing?	5	1	1
	b.	What is the need of AI and ML?	5	1	1
	c.	What do you understand by fuzzy computing?	5	1	1
	d.	Compare biological neural network and artificial neural network?	5	2	2
	e.	List the five characteristics of ANN?	5	2	2
Section B (30 marks)					
Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	What is Genetic Algorithm? Explain with example?	10	1	1
	b.	Compare at least Five optimization algorithm in two different parameters?	10	1	1
	c.	What is back propagation? Explain the architecture of it?	10	2	2
	d.	Write short notes on: i. Supervised Learning ii. Unsupervised Learning iii. Reinforcement Learning iv. Activation Function	10	2	2

SOE - M - CSE 210

Course Code: SOE-M-CSE210

OP JINDAL UNIVERSITY

Mid Semester Examination, March-2024

M. Tech. 2nd Semester [Program Code: 01PG020]

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.	Explain the meaning of research. Discuss the various objectives of research.	5	1	K1
	b.	What makes people to undertake research? Discuss the motivation in research.	5	2	K2
	c.	What is research plan and why is it important for a researcher. Enlist the various items that a research plan must contain.	5	2	K2
	d.	What do you mean by 'Sample Design'? What points should be taken into consideration by a researcher in developing a sample design for this research project.	5	2	K2
	e.	Give the advantages of the case study method.	5	2	K2
		Section B (30 marks) Answer any 3 questions [03 x 10 marks=30 marks]			
2	a.	Explain in detail various types of research. Give the main points of the significance of research.	10	2	K2
	b.	Research process consists of series of actions or Steps necessary to effectively carry out research and the desired sequencing of these steps. Explain Research process flow in with the help of a Block Diagram.	10	3	K3
	c.	Researchers in India, particularly those engaged in empirical research, are facing several problems. State the problems that are usually faced by such researchers and Discuss in detail.	10	3	K3
	d.	Enumerate the different methods of collecting data. Which one is the most suitable for conducting enquiry regarding family welfare programme in India? Explain its merits and demerits.	10	3	K3

Course Code: SOE-M-PEP201

O P JINDAL UNIVERSITY

Mid Semester Examination, April-2023

M.Tech. II Semester

ELECTRICAL ENGINEERING

POWER ELECTRONICS CONTROLLED ELECTRIC DRIVES

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

Note:

			M	CO	KL
Unit-I (20 marks) Answer any 4 questions [05 x 04 marks=20 marks]					
1	a.	Explain briefly about Fundamentals of torque equation?	5	1	2
	b.	What is steady state stability of electric drives and explain it briefly.	5	1	3
	c.	Explain Four –quadrant operation of DC motor drive?	5	1	2
	d.	Explain the Principles of DC motor speed control.	5	1	3
	e.	Explain the operation of closed loop speed control with inner current control loop.	5	1	2
Unit-II (30 marks) Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	Derive the expression for torque in a multi-quadrant drive system.	10	1	3
	b.	Explain various braking techniques of the induction motor.	10	2	4
	c.	Explain with neat sketches about DC motors controlled with single phase fully controlled bridge converters.	10	2	4
	d.	A single phase full wave half-controlled bridge converter (semi converter) is used to control the speed of a separately excited shunt motor rated at 220 V, 1500 rpm. The converter is connected to a single phase 220 V, 50 Hz supply. the armature resistance is 0.5 Ohm. The motor voltage constant is 0.1 V/rpm. The motor runs at 1200 rpm and carries an armature current of 16 A. Assume that the motor current is continuous and ripple free, determine: i) The firing angle. ii) The power delivered to the motor. iii) The supply current.	10	2	5
	e.	A DC series motor drives an elevator load controlled by DC step down chopper, it requires a constant torque of 200 N-m, the DC supply voltage is 400 V and the combined resistance of armature and series field winding is 0.75 Ω. If the armature current is 40 A and the duty cycle is 0.5. Calculate: i) The speed of the motor ii) The horse power output and efficiency of the system. iii)The additional losses and the efficiency of the system when the motor speed is controlled by inserting an external resistance.	10	1	5

Course Code: SOE-M-PEP202

OP JINDAL UNIVERSITY

Mid Semester Examination, April-2024

M.Tech. 2nd Semester [01PG031]

Electrical Engineering

Power System 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.	Describe the importance of PSS	5	2	2
	b.	Describe the effects of excitation system on small signal stability	5	2	3
	c.	Describe Lyapunovs methods in small signal stability analysis	5	2	3
	d.	Describe importance of participation factor in small signal stability	5	2	3
	e.	Differentiate between transient and steady state stability	5	1	3
Section B (30 marks) Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	Define power system stability with details classification and explanation	10	1	3
	b.	Derive Swing equation and explain how stability can be analysis using swing equation	10	1	4
	c.	Describe the state space model for small signal stability analysis	10	2	3
	d.	Describe small signal stability of SMIB system	10	2	4

********** Best of Luck **********

Course Code: SOE-M-PEP203

OP JINDAL UNIVERSITY

Mid Semester Examination, March-2024

M.Tech 2nd Semester [Program Code]

Electrical Engineering

Hybrid and Electric Vehicle

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 power flow in Hybrid Electric Vehicle.	5	1	1
	b.	Explain economic and environmental impact of Electric Vehicle	5	1	1
	c.	How the Electric Vehicle evolution takes place.	5	1	2
	d.	Explain Boost converter.	5	1	1
	e.	Explain cuk converter.	5	1	2
Section B (30 marks)					
Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	Explain types of hybrid electric vehicle.	10	2	2
	b.	Briefly explain the components present in electric vehicle.	10	2	2
	c.	With a neat sketch, explain the configuration of series hybrid electric drive train.	10	2	1
	d.	Explain the two-quadrant operation of chopper DC motor drive with suitable waveforms for electric vehicle	10	2	2

Course Code: SOE-M-PEP204 (2)

OP JINDAL UNIVERSITY

Mid Semester Examination, March-2024

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.	What is the difference between renewable and non-renewable energy sources?	5	CO1	KL1
	b.	Name some hybrid renewable energy systems.	5	CO1	KL1
	c.	What are fuel cells?	5	CO1	KL1
	d.	What are the major factors influencing the amount of Carbon Dioxide emissions.	5	CO1	KL1
	e.	Give any two environmental aspect of electric energy conversion.	5	CO1	KL1
Section B (30 marks) Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	Explain the constructional details of SCIG?	10	CO1	KL2
	b.	What are the different types of fuel cells? Explain them with neat diagrams.	10	CO1	KL1
	c.	Draw the schematic of double fed induction generator and explain its construction and principle of operation in detail.	10	CO2	KL2
	d.	Explain the extraction methods of biomass energy	10	CO1	KL2

Course Code: SOE-M-MTA-201/ SOE-M-_PPE-201

OP JINDAL UNIVERSITY

Mid Semester Examination, March-2024

M.Tech. 2nd Semester [Program Code: 01PG042]

Mechanical Engineering

Industrial Instrumentation & Control

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 primary, secondary and tertiary measurements	2	1	1
	b.	What is a seebeck effect?	2	3	1
	c.	What is threshold of the instrument.	2	1	1
	d.	What do you understand LVDT?	2	3	1
	e.	What are the disadvantage of digital instruments?	2	1	1
Section B (16 marks)					
Answer any 4 questions [04 x 04 marks=16 marks]					
2	a.	Describe briefly The Bourdon tube pressure gauge?	4	3	3
	b.	A thermometer idealized as a first order system with a time constant of 2.2 seconds, is suddenly given an input of 160^0C from 0^0C. (i) What will be the reading of the thermometer after 1.2 seconds? (ii) Determine its reading if it is initially held at 20^0C	4	1	3
	c.	Explain the following static characteristics: 1) Accuracy 2) Reproducibility	4	1	3
	d.	Describe gross errors in measuring instruments. How gross errors can be minimized?	4	1	3
	e.	Explain briefly the construction and working of a resistance thermometer?	4	3	3
Section C (24 marks)					
Answer any 3 questions [03 x 08 marks=24 marks]					
3	a.	Draw a block diagram representation of a generalized measurement system. Identify the various elements and point out the functions performed by each element/ component.	8	1	2
	b.	By using a micrometer screw the following readings were taken of a certain physical length: 1.34, 1.38, 1.56, 1.47, 1.42, 1.44, 1.53, 1.48, 1.40, 1.59 mm. Assuming that only random errors are present, calculate the following: Arithmetic mean, Average deviation, Standard deviation, and variance.	8	1	3
	c.	A dynamometer is used to measure the output power of a rotating shaft. The output power is given by the following relation; $P = \frac{2\pi \times 9.81\, FLR}{t \times 10^6}$ kw Where, F=force at the end of torque arm (kg); L= length of torque arm (mm); R= number of revolutions during time t; t=time for test run (s).	8	1	3

		The given test data are: F= 4.58+0.02 kg; L= 397±7.3 mm; R=1202±1.0 revolutions; t=60+0.50*s*. The errors are limiting error. Determine the magnitude of power and magnitude of the limiting error in the computed power.			
	d.	Describe the principle and operation of capacitive transducer for angular displacement measurement.	8	3	3
	e.	Describe with constructional details, the operation of any one pressure measurement instrument.	8	3	3

Course Code: SOE-M-PPE202

OP JINDAL UNIVERSITY

Mid Semester Examination, March-2024

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.	Explain the elements of steam turbine in detail.	5	1	2
	d.	Define degree of reaction and write the mathematical equation.	5	2	1
	e.	Draw the pressure and velocity variation graph for steam flow through impulse turbine.	5	2	2
Section B (30 marks) Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	Draw the layout of modern steam power plant and explain the major circuits involved in it.	10	1	2
	b.	Differentiate the impulse turbine and reaction turbine in various aspects.	10	1	3
	c.	Explain steam turbine governing with its different types in detail.	10	2	2
	d.	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	2	2

Course Code: SOE-M-PPE203

O P JINDAL UNIVERSITY

Mid Semester Examination, March 2023

M. Tech. 2nd Semester

Department of Mechanical Engineering

Design of Heat Exchangers

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.	Discuss in detail about the common factors that affect both boiling and condensation? why large heat transfers process must involve phase change of the working fluid?	5	1	II
	b.	Define and express boiling heat flux from a solid surface to the fluid and explain the significance of ΔT_{excess} ?	5	1	II
	c.	Illustrate pool boiling regimes with neat diagrams.	5	1	VI
	d.	Discuss the film and dropwise condensation with their respective applications	5	1	III
	e.	Discuss boiling Curve for water at 1 atm. pressure	5	1	III
Section B (30 marks) Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	Illustrate the effect of non-condensable gases on heat transfer in condensers.	10	1	VI
	b.	Air-free saturated steam at T, m 85°C (P = 57.83 kPa) condenses on the outer surface of 225 horizontal tubes of 1.27-cm-OD arranged in a 15-by-15 array. Tube surfaces are maintained at a uniform temperature Tr = 75°C. Calculate the total condensation rate per 1-m length of the tube bundle.	10	1	IV
	c.	Water at atmospheric pressure and saturation temperature is boiled in a 25 cm electrically heated mechanically polished stainless-steel pan. The heated surface of the pan is maintained at a uniform temperature of T_w=116 °C. Calculate the surface heat flux, rate of evaporation from the pan and peak heat flux.	10	1	V
	d.	Discuss the detailed classification of heat exchanger on the basis of construction with minimum one application of each type.	10	1	IV

Course Code: SOE-M-PPE204

OP JINDAL UNIVERSITY

Mid Semester Examination, March-2024

M.Tech. 2nd Semester [Program Code: 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, and what is its primary objective? Additionally, what are the key advantages and disadvantages associated with the CFD technique?	5	1	1
	b.	Describe in detail the three main stages involved in CFD software.	5	1	2
	c.	Explain the key characteristics of the following equations: (i) Elliptic equations (ii) Hyperbolic equations (iii) Parabolic equations	5	1	2
	d.	Solve the following equation by the Gauss-Jordan method. $x + y + z = 9;\ 2x + y - z = 0;\ 2x + 5y + 7z = 52$	5	2	2
	e.	What are the key differences between a direct and iterative method used for solving the system of simultaneous linear equations? Using the Gauss-elimination method, solve the following equations: $2x + 2y + z = 12;\ 3x + 2y + 2z = 8;\ 5x + 10y - 8z = 10$	5	2	2
Section B (30 marks)					
Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	Illustrate the importance of the Reynolds Transport theorem and utilizing it derive the Continuity equation.	10	1	2
	b.	Solve by Jacobi's iteration method, the equations $10x + y - z = 11.19;\ x + 10y + z = 28.08;\ -x + y + 10z = 35.61$ Correct to two decimal places.	10	2	3
	c.	Derive the general integral form of the Energy equation.	10	1	2
	d.	Solve the following equation using Tri Diagonal Matrix Algorithm (TDMA) $20T_1 - 5T_2 = 1100$ $-5T_1 + 15T_2 - 5T_3 = 100$ $-5T_2 + 15T_3 - 5T_4 = 100$ $-5T_3 + 15T_4 - 5T_5 = 100$ $-5T_4 + 10T_5 = 100$	10	2	3

Course Code: SOE-M-PEP205(1)

O P JINDAL UNIVERSITY

Mid-Semester Examination, March-2024

M.Tech. 2nd Semester [Program Code: 01PG041]

Mechanical Engineering

Energy Management & Audit

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.	Explain the energy management and its Economic evaluation.	05	1	1
	c.	Elaborate with example the different types of energy and their sources?	05	1	1
	d.	What are the objectives of energy management? Explain.	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.	Discuss the basic principle of energy conversion and its importance?	10	1	1
	b.	Explain the energy management strategies.	10	1	1
	c.	Explain the roles, responsibilities, and accountability of energy managers.	10	2	2
	d.	Discuss "Energy for the future."	10	2	2

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Course Code: SOE-M-MTA202

O P JINDAL UNIVERSITY

Mid Semester Examination, April-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.	Explain the Design and various phases of the Design Process.	5	1	1
	c.	Describe Solid modelling.	5	2	2
	d.	What do you understand by Assembly modelling? Describe the steps followed and the various constraints used.	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.	Write in brief about Parametric modelling. Describe Geometric modelling.	10	2	1
	b.	Describe the use of Computer-aided technologies in product lifecycle management.	10	1	2
	c.	Describe the Wireframe and Surface modelling.	10	2	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, April-2024

M.Tech. 2nd Semester

Flexible Manufacturing Systems

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

			M	CO	KL
Section A (20 marks) Answer any 4 questions					
1	a.	What do you understand by the word 'Flexible' used in conjunction with the Manufacturing System? Explain how a Flexible Manufacturing System is different from a Manufacturing System.	5	1	1
	b.	Write a brief note on types of flexibilities.	5	3	2
	c.	What are the different types of FMS? Elaborate your answer.	5	2	1
	d.	Enlist the aims and objectives of FMS.	5	4	2
	e.	Write the difference between FMS and FMC.	5	3	3
Section B (30 marks) Answer any 3 questions.					
2	a.	What are the basic components of FMS? Elaborate your answer.	10	4	3
	b.	Write a detailed note on types of FMS layouts.	10	3	1
	c.	What are the factors influencing the FMS layouts?	10	5	3
	d.	Do you think process planning is one of the most important factors in the FMS? Elaborate your answer.	10	5	2

Course Code: SOE-M-MTA204

OP JINDAL UNIVERSITY

Mid Semester Examination, March-2024

MTech. MTA 2nd Semester [Program Code: 01PG042]

Mechanical Engineering

Quality Engineering in Manufacturing

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.	Define quality. What is quality assurance?	5	1	1
	b.	Explain the concept of a loss function in quality engineering.	5	1	1
	c.	Differentiate between N-type, S-type, and L-type tolerances.	5	1	1
	d.	Explain how functional limits differ from specification limits.	5	2	1
	e.	What do you understand by term "optimization"?	5	2	1
Section B (30 marks) Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	What are the three aspects that are associated with defining quality? Explain with examples.	10	1	1
	b.	A specification for the length of an auto part at Adams fabricating is 15.0±1.75 centimetres. It costs $65 to scrap a part. Determine the Taguchi loss function. Then, determine the expected loss of the process mean is found to be 15.03cm with a variance of 0.65cm^2.	10	1	2
	c.	Provide real-world examples where N-type, L-type, and S-type characteristics are applied in tolerance design.	10	2	2
	d.	Discuss the factors that influence the distribution of tolerances among multiple components.	10	2	1

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Course Code: SOE-M-MTA205(4)

OP JINDAL UNIVERSITY

Mid Semester Examination, March-2024

M.Tech. 2nd Semester [Program Code: 01PG042]

Mechanical Engineering

Industry 4.0

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

Note:

- Each question starts from a fresh page.
- Follow the same sequence to answer the questions.

			M	CO	KL
Section A (20 marks) Answer any 4 questions [04 x 05 marks=20 marks]					
1	a.	Explain all the Industrial Revolution.	5	1	1
	b.	How about Industry 4.0 digitization and opportunities for sustainability?	5	1	1
	c.	Explain the relevance of Industry 4.0 in the field of Mechanical engineering.	5	1	1
	d.	Explain the augmented reality and its key features.	5	2	2
	e.	How are augmented reality and virtual reality technology useful in the manufacturing industry?	5	2	2
Section B (30 marks) Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	What is Industry 4.0's impact on the economy?	10	1	2
	b.	Explain the sensors, their characteristics and their classification.	10	2	2
	c.	Explain the key components and different types of virtual reality.	10	2	2
	d.	Explain the key components and application of augmented reality.	10	2	2

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

OP JINDAL UNIVERSITY

Mid Semester Examination, April-2023

M. Tech. 2nd Semester [01PG051]

MATERIAL SCIENCE AND TECHNOLOGY

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

Modelling and Simulation of Metallurgical Processes

			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

Course Code: SOE-M-MST202

OP JINDAL UNIVERSITY

Mid-Semester Examination, April 2024

M.Tech 2nd Semester [01PG051]

Metallurgical Engineering

Advances in 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 is meant by steel? How can you differentiate steel and cast iron based on carbon content? Differentiate plain carbon steels and alloy steels based on % C and % Alloying addition.	5	1	1
	b.	What does Acid and basic refer to in the Acid and Basic Bessemer process? What is the refractory lining used in both processes? What is the refining media and raw materials used in the Bessemer process? What are the limitations of the Acid and basic Bessemer process?	5	2	1
	c.	What are the raw materials used in the Open hearth process? Why is it called open hearth and what is the refractory lining used in the open hearth process? What is the principle on which it works and what are its limitations? What does carbon boil and ore boil mean in the open hearth process?	5	2	1
	d.	What is the full form of LD and what are the other names for this process? What is the refractory lining used in the LD converter and why? What are the raw materials used in this process? What is the nozzle design used in the LD converter, and what material is used for the lance tip, and why?	5	2	1
	e.	What are the parts of EAF? What is meant by delta region and what is the refractory lining used in EAF? What are the raw materials used in EAF and what is meant by skull? What type of electrodes are used and why? How can you differentiate between AC and DC furnaces?	5	2	1
Section B (30 marks)					
Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	What is meant by JFN and what is meant by lance height? What does soft and hard blow mean when we prefer both? What is meant by slopping, and explain the reason for slopping in the LD converter. Mention the conditions for desulphurization and dephosphorization in the LD process.	10	2	1
	b.	Explain any 5 developments in the EAF process	10	2	2
	c.	In steelmaking, dissolved oxygen (O) reacts with carbon (C) to produce CO (g), at 1atm pressure according to the reaction C+O = CO(g). The equilibrium constant for this reaction is log K = (1160/T) + 2.003, where T is in Kelvin. Assuming the Henrian activity coefficient of both O & C to be unity, the dissolved oxygen content (in wt%) of a steel melt with 0.7 wt% C at 1600 °C is?	10	2	3

P.T.O

	d.	In BOF steel making, 5 metric tons of lime containing 90 wt% CaO is used to refine 100 metric tons of hot metal containing 93.2 wt% Fe. The slag produced during refining contains 40 wt% CaO and 22 wt% FeO. Neglecting material losses, the yield of Fe (in %) is?	10	2	3

P.T.O

Course Code: SOE-M-MST203

OP JINDAL UNIVERSITY

Mid Semester Examination, March-2024

M.Tech 2nd Semester [Program Code: 01PG051]

Metallurgical Engineering

Design and Selection of Materials

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 influences the product design?	5	1	1
	b.	Explain the benefits of design for the quality of the products.	5	2	5
	c.	How to select the process for manufacturing the products?	5	3	1
	d.	What are the factors for selecting materials for components?	5	1	1
	e.	What do you understand by reliability? Explain the criteria to quantify the reliability.	5	3	1
Section B (30 marks) Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	Discuss the general approach to developing a material index for different applications. Explain the material index used to select a suitable material for the vehicle body.	10	4	6
	b.	What do you mean by Failure Mode and Effect Analysis (FMEA)? Discuss the steps for conducting FMEA.	10	3	1
	c.	Enlist and explain the design tools for product development.	10	5	4
	d.	Construct and explain the design flow chart for identification and clarification of tasks through concept, embodiment, and detailed analysis of a product specification.	10	2	3

O.P. JINDAL UNIVERSITY

MID Semester Examination, April -2024

M.Tech (MST) 2nd Semester

METALLURGICAL ENGINEERING

Advanced Material Processing [SOE-M-MST 204]

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

Note: Please attempt the questions in sequence, and attempt three questions from Unit II.

Unit I (20 marks)		
1	a.	What are the different types of defects in metal welding? Discuss broadly .
	b.	What is the role of compaction? Discuss the mechanism of compaction in the powder metallurgy process. What precautions are required during the compaction of metallic samples?
	a.	Discuss the process steps for powder metallurgy. How to fabricate powders, explain it briefly.
	b.	What is sintering? Discuss broadly the mechanism of sintering and also how to decide the sintering temperature.
Unit II (30 marks)		
2	a.	What is Oxyacetylene Welding (OFW)? Discuss its technical advantages
	b.	Explain broadly Electron beam welding with its advantages, limitations, and specification indispensable applications.
	a.	Explain broadly Resistance Welding with its advantages, limitations, and specification indispensable applications.
	b.	What are the characteristics of an oxidizing flame in gas welding? Explain its use in the steel industry.

Course Code: SOE-M-MST205(2)

OP JINDAL UNIVERSITY

Mid Semester Examination, March-2024

M.Tech. 2nd Semester

MME (Materials Science and Technology)

Artificial Intelligence in Steel Industries

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 data-driven model and list important parameters associated.	5	1	1
	b.	Explain automation in industries, advantages and disadvantages.	5	3	3
	c.	Define/Explain artificial intelligence.	5	2	2
	d.	Define supervised and unsupervised machine learning.	5	2	2
	e.	Give examples of application of artificial intelligence in industry (name units).	5	5	3
Section B (30 marks) Answer any 3 questions [03 x 10 marks=30 marks]					
2	a.	Explain the working of an artificial neural network. Draw a sketch of ANN and provide the governing equation.	10	2	1
	b.	Explain Industry 1.0, Industry 4.0, Industry 3.0 and Industry 4.0.	10	5	1
	c.	Explain the advantages of application of artificial intelligence algorithm or data driven modelling approach for a complex process like an ironmaking blast furnace.	10	4	3
	d.	Explain the importance of modelling at different length and time scales or multi-scale modelling.	10	1	2