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SJC INSTITUTE OF TECHNOLOGY

(An Autonomous Institute under VTU, Belagavi)

SECOND SEMESTER M.Tech DEGREE SEMESTER END EXAMINATIONS

JULY - AUGUST 2026

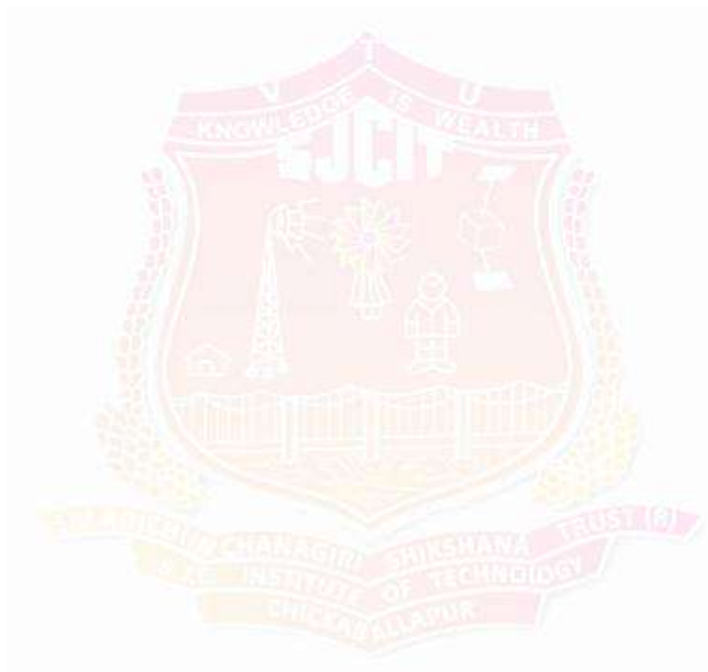
Course:	ADVANCED OPERATING SYSTEMS			
Course Code:	MCS201	Program:	M.Tech in Computer Science & Engineering	
Max Marks:	100	Duration:	03 Hours	

Note:

1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.
2. Any missing Data can be suitably assumed.

Q. No.	MODULE - 1		Marks	CO	RBTL
Q1	a	Explain the main motivations for a multiprocessor system	4	1	L2
	b	Apply OS design principles to identify key issues in design of multiprocessor operating systems.	8	1	L3
	c	Demonstrate the Data structures and Algorithms used to Implement Mach virtual memory system	8	1	L3
MODULE - 2					
Q2	a	Explain centralized and distributed clock synchronization algorithms	4	1	L2
	b	Create a model to detect deadlocks using resource allocation graph.	8	1	L3
	c	Compare synchronous and asynchronous communication models.	8	1	L4
MODULE - 3					
Q3	a	Explain advantages of distributed shared memory	4	2	L2
	b	Demonstrate different mechanisms for building distributed file system	8	2	L3
	c	Use a block diagram to explain distributed file system architecture and access mechanisms	8	2	L2
OR					
Q4	a	Explain issues in task migration	4	2	L2
	b	Demonstrate load sharing policies in the V-System and The Spirit System	8	2	L3
	c	Illustrate Sun NFS distributed file systems with example	8	2	L2
MODULE - 4					
Q5	a	Describe distributed database system model with advantages.	4	2	L2
	b	Explain the Two-Phase Locking (2PL) protocol in detail What are its advantages and disadvantages?	8	2	L2
	c	Demonstrate optimistic concurrency control algorithm (Kung-Robinson)	8	2	L3

OR					
Q6	a	List requirements of database operating systems	4	2	L2
	b	Explain the key requirements of a database operating system. Why are these requirements important for database applications	8	2	L2
	c	Analyze Centralized locking concurrency control algorithm with an example	8	2	L3
MODULE – 5					
Q7	a	Explain the working of the Binder IPC mechanism in Android.	10	3	L2
	b	Evaluate the impact of runtime issues such as memory constraints and garbage collection on mobile app performance	10	3	L4
OR					
Q8	a	Infer the role of Dynamic Voltage and Frequency Scaling (DVFS) in mobile power management	10	3	L2
	b	Analyze how the Android Runtime (ART) improves app performance compared to Dalvik	10	3	L4



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SECOND SEMESTER M.Tech DEGREE SEMESTER END EXAMINATIONS

JULY - AUGUST 2026

Course:	STRUCTURAL DYNAMICS & EARTHQUAKE RESISTANT STRUCTURE			
Course Code:	MCV201	Program:	M.Tech in Structural Engineering	
Max Marks:	100		Duration:	03 Hours

Note:

1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.
2. Any missing Data can be suitably assumed.
3. Use of Code Books is permitted

Q. No.	MODULE - 1		Marks	CO	RBTL
Q1	a	Define Critically damped system, Over damped system and Under damped system with a sketch.	5	1	L1
	b	A simply supported rectangular beam has a span of 1 m. It is 100 mm wide and 10 mm deep. It is connected at mid-span of a beam by means of a linear spring having a stiffness of 100 kg/cm and a mass of 300 kg is attached at the other end of spring. Determine the natural frequency of the system. Take $E = 2.1 \times 10^6 \text{ kg/cm}^2$. Fig. Q1(b)	5	1	L3
	c	Obtain equation of motion for an undamped single degree of freedom system under free vibration by energy principle. Also find the various solutions of that equation.	10	1	L3
MODULE - 2					
Q2	a	State the relationship between Dynamic Magnification Factor and Frequency ratio with a graph.	5	2	L1
	b	A 1000kg machine is mounted on 4 identical springs of total spring constant k and having negligible damping. The machine is subjected to a harmonic external force of amplitude $F_0=490\text{N}$ and frequency 180rpm. Determine the amplitude of motion of the machine of maximum force transmitted to the foundation because of unbalanced force when $k=1.96 \times 10^6 \text{ N/m}$	5	2	L3
	c	Derive an expression for undamped harmonic excitation.	10	2	L3
MODULE - 3					
Q3	a	Explain the concept of shear building and discuss the assumptions	10	3	L2

in multi storey building.

Determine the natural frequency and mode shape of the given system.

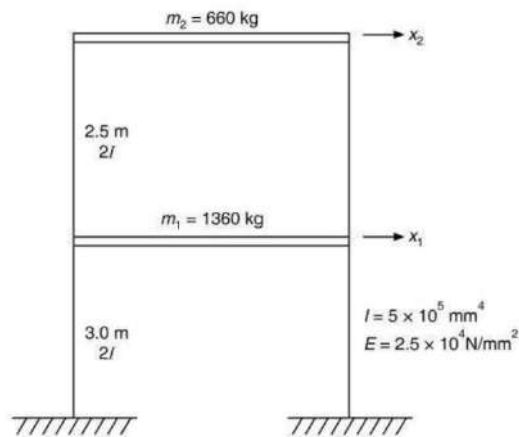


Fig.Q.3(b)

10

3

L3

OR

a Derive the conditions for orthogonality principle.

5

3

L2

Q4

b

Determine the natural frequency and mode shape of the given system.

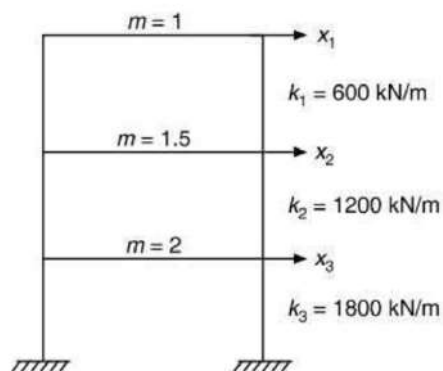


Fig.Q.4(b)

15

3

L3

MODULE - 4

a Explain the concept of plan irregularities and vertical irregularities with neat sketches.

10

4

L2

Q5

b

Design an unreinforced 6-m high and 4.9-m wide masonry shear wall (center lines of walls), as shown based on the following data.

Unit weight of wall = 20,000 N/m³

Prism strength of masonry f_m = 10 MPa

Seismic force at roof level H = 30 KN

Height above roof level = 0.5 m

No superimposed load is applied on the wall.

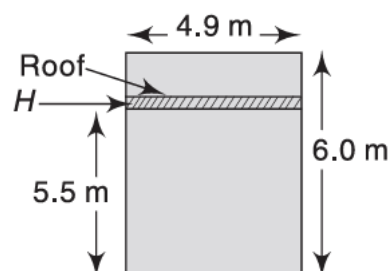


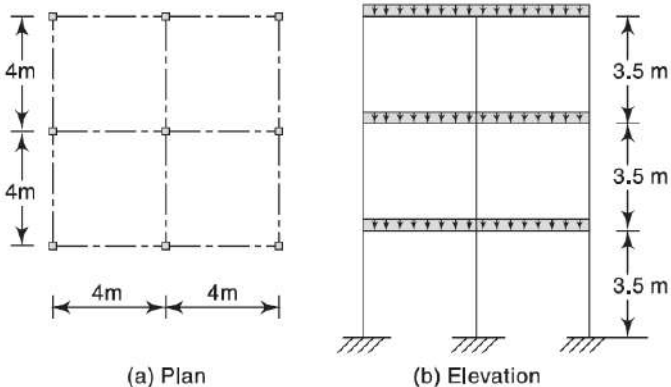
Fig.Q.5(b)

10

4

L3

OR

Q6	a	Explain the problems associated with the configuration of buildings and its possible remedial measures.	10	4	L2
	b	The plan and elevation of a three-storey RCC school building is shown. The building is located in seismic zone V. The type of soil encountered is medium stiff and it is proposed to design the building with a special moment resisting frame. The intensity of DL is 10 KN/m² and the floors are to cater to an IL of 3 KN/m². Determine the design seismic loads on the structure by static analysis.  (a) Plan (b) Elevation Fig.Q.6(b)	10	4	L3
MODULE – 5					
Q7	a	Explain qualitative and analytical methods of seismic evaluation.	10	5	L2
	b	Apply the methodology of seismic retrofitting for strengthening of an RC building.	10	5	L3
OR					
Q8	a	Explain seismic response control concepts.	10	5	L2
	b	Apply performance-based design principles to evaluate structural performance using nonlinear analysis.	10	5	L3



(An Autonomous Institute under VTU, Belagavi)

JULY - AUGUST 2026

Note:

1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.
2. Any missing Data can be suitably assumed.

Page 1 of 2

	b	Describe the Yagi Uda array antenna. List design steps using a specific example.	8	4	L2
	c	A 10-turn helical beam antenna has a circumference of $c = 0.92 \lambda$, where $L = 23.75\text{cm}$, the pitch angle of a 130° . Calculate i) Spacing between turns ii) H.P iii) Gain.	8	4	L3
MODULE – 4					
Q5	a	Define Gain and Aperture Efficiency for an Aperture Antenna.	4	4	L1
	b	Interpret the principle of Parabolic Reflector Antenna	8	4	L2
	c	Analyze the Axisymmetric Parabolic Reflector Antenna design with all relevant equations	8	4	L3
OR					
Q6	a	How can a dual reflector be formed? Explain with neat diagram.	4	4	L1
	b	Interpret General feed model for reflector.	8	4	L2
	c	With the help of expressions, analyze the various efficiencies involved in the calculation of gain.	8	4	L3
MODULE – 5					
Q7	a	Define CEM. Write a neat diagram depicting the categories within CEM.	4	3	L1
	b	Derive the Pocklington's Integral equation.	8	3	L3
	c	Analyze the effect of user hand and head proximity on mobile antenna performance.	8	3	L3
OR					
Q8	a	State the difference between PIFA and PMA in mobile phone.	4	3	L1
	b	Calculate the Carrier-to-noise ratio, if a system noise temperature $T_{\text{sys}} = 125\text{ K}$, the received power P_D is $2 \times 10^{-12}\text{ W}$ and effective signal bandwidth $\Delta f = 20\text{ MHz}$. ($k = 1.38 \times 10^{-23}$)	8	3	L3
	c	Compare active and passive testing methods for evaluating mobile antenna performance.	8	3	L3

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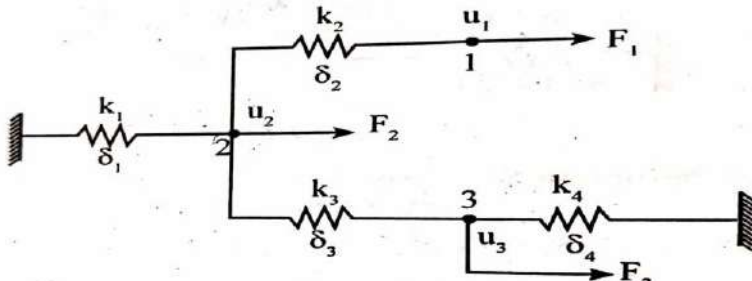
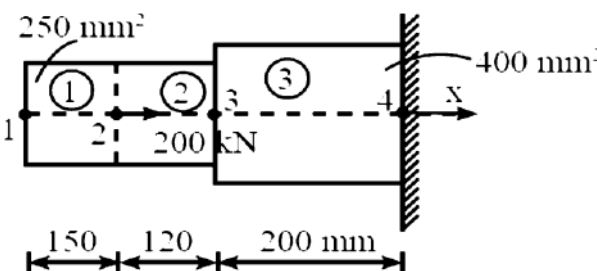
SECOND SEMESTER M.Tech DEGREE SEMESTER END EXAMINATIONS

JULY - AUGUST 2026

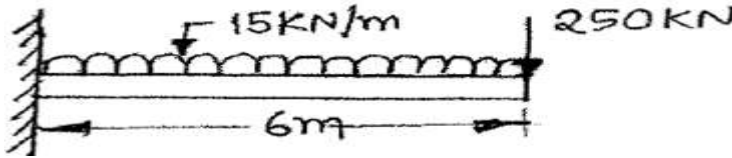
Course:	ADVANCED FINITE ELEMENT METHODS AND APPLICATIONS			
Course Code:	MME201	Program:	M.Tech in Machine Design	
Max Marks:	100		Duration:	03 Hours

Note:

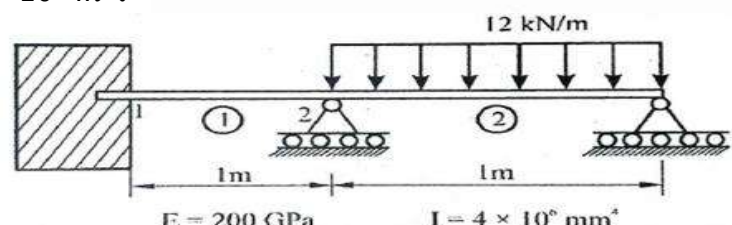
1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.
2. Any missing Data can be suitably assumed.

Q. No.	MODULE - 1		Marks	CO	RBTL
Q1	a	Elucidate the concept of Principal of Virtual work	6	1	L1
	b	Explain the concept of spring assemblage using two spring elements connected in series.	6	2	L2
	c	Using the principle of minimum potential energy determine the displacements at the nodes for a spring system shown in figure. Consider $K_1=40$ N/m, $K_2=60$ N/m, $K_3=80$ N/m, $K_4=100$ N/m, $F_1=60$ N, $F_2=80$ N, $F_3=40$ N.  Fig.Q.1(a)	8	2	L3
MODULE - 2					
Q2	a	Derive Stiffness matrix for Truss element	10	2	L3
	b	Consider a stepped bar as shown in figure. Determine the nodal displacement, Stress in the element and reaction at the fixed support. Take $E=200$ GPa.  Fig. Q 2(b)	10	3	L4

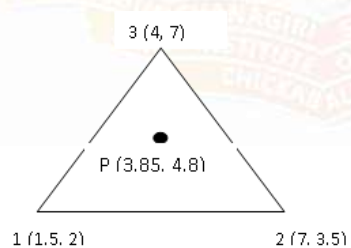
MODULE - 3

Q3	a	Derive Shape functions for the Beam element	10	2	L3
	b	For the beam element shown in Fig. Determine the slopes, Deflections and reaction at the support. Take $E=110\text{GPa}$ and $I=5*10^{-4}\text{ mm}^4$.  Fig. Q3(b)	10	2	L4

OR

Q4	a	Derive Stiffness matrix for the beam element	10	2	L3
	b	For the beam shown in Fig. Determine the slopes, Deflections and Displacement at mid span of the UDL. Take $E=2 * 10^5 \text{ N/mm}^2$ and $I = 4 * 10^6 \text{ m}^4$.  Fig. Q4(b)	10	3	4

MODULE - 4

Q5	a	Derive Shape Functions for Quad-4 element using lagrangian method.	10	3	L3
	b	Evaluate the shape functions N_1 , N_2 and N_3 at interior point P for the Triangular Element shown below.  Fig.5(b)	10	3	L4

OR

Q6	a	Derive the Strain Displacement Matrix for CST Element	10	3	L3
	b	For a triangular element shown in fig, obtain the strain displacement matrix, Jacobian matrix and determine the strains and stress components using the nodal displacements $Q_1= 0.001$, $Q_2 = -0.002$, $Q_3 =0.003$, $Q_4 = 0.002$, $Q_5 =-0.002$, $Q_6 = 0.005$. Consider plane stress condition with $E =200\text{Gpa}$ and $\mu=0.25$.	10	3	L5

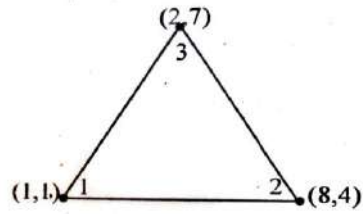
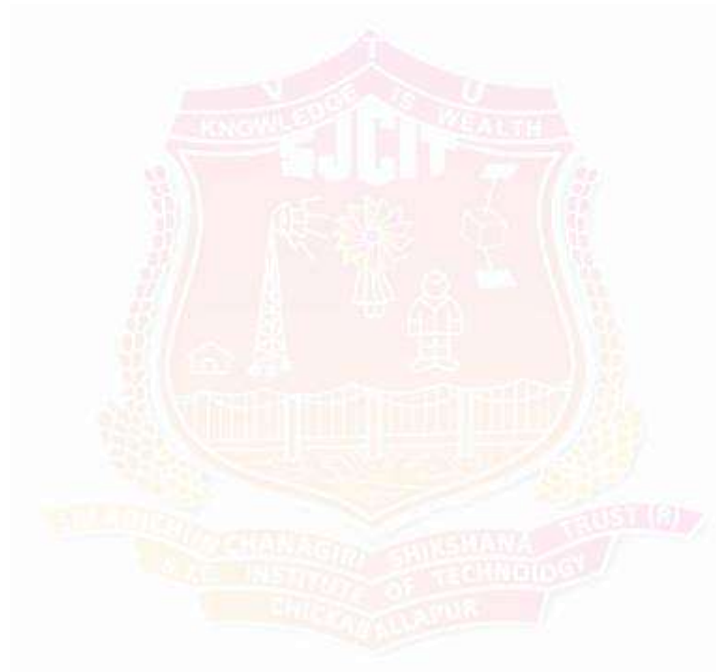


Fig. Q 6(b)

MODULE – 5

Q7	a	Derive Shape functions for 8noded Quadrilateral element	10	4	L2
	b	Integrate i) $I = \int_{-1}^{+1} \left[3e^{\varepsilon} + \varepsilon^2 + \frac{1}{(\varepsilon+2)} \right] d\varepsilon$ using 1-point and 2-point method.	10	4	L4
OR					
Q8	a	Derive shape function for 3-dimensional Tetrahedral element	12	4	L2
	b	Derive Jacobian matrix for “Tet4” Element	8	4	L4



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SJC INSTITUTE OF TECHNOLOGY
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SECOND SEMESTER MBA DEGREE SEMESTER END EXAMINATIONS
JULY - AUGUST 2026

Course:	HUMAN RESOURCE MANAGEMENT		
Course Code:	MBA201	Program: MBA	
Max Marks:	100	Duration:	03 Hours

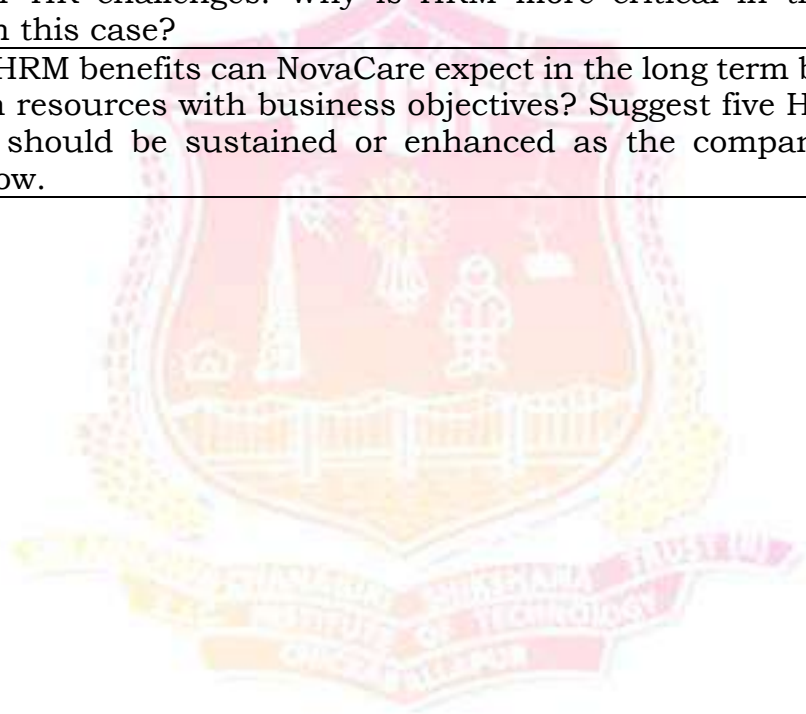
Instructions:

1. Part A and Part C (Case Study) are Compulsory
2. Part B questions are choice based

Q. No	QUESTIONS	Marks	CO	RBTL
PART A				
1	Summarize the factors influencing HRM.	5	1	L2
2	Illustrate the process of Recruitment.	5	1	L2
3	Summarize the common problems of performance appraisal.	5	1	L2
4	Interpret the key challenges of managing a hybrid workforce	5	1	L2
5	Explain Innovative Human Resource Management Practices in India	5	1	L2
6	Interpret the relationship between Sustainable and innovative Human Resource Management.	5	1	L2
PART B				
MODULE - 01				
7	Identify the difference between manpower planning and HR planning in a large manufacturing company like Toyota, especially during the implementation of automation technologies.	8	1	L3
OR				
8	Thirdwave Café employs frontline workers who directly interact with customers, unlike SteelGen Ltd., a manufacturing firm where employees work in back-end production roles. Compare the HRM principles which relates firms like Third wave cafe with manufacturing firms like SteelGen.	8	1	L3
MODULE - 02				
9	Your organization is a startup and wants to ensure that all the employees are working effectively to achieve maximum returns, in this context apply the major functions to be handled by the manager for the smooth working of the organization.	8	2	L3
OR				
10	Softwarepro a software development firm, is undergoing a digital transformation. The employees are struggling to adapt to new roles and processes. Apply these HR competencies that are most important in managing this organizational change and motivate employees to adopt these changes.	8	2	L3
MODULE - 03				
11	A new HR executive in a logistics firm has been asked to explain the difference between direct and indirect compensation to the finance team. Identify the components of compensation for this scenario.	8	3	L3
OR				

12	A software firm is facing difficulty retaining employees, even though it offers competitive salaries. Exit interviews suggest lack of growth, recognition, and work-life balance. Survey how a total rewards system could address these issues beyond salary.	8	3	L3
MODULE - 04				
13	In India, many SMEs are family-run and operate informally. Bright Tailors, a garment unit in Delhi, has unstructured recruitment, unclear job roles, and no formal appraisal system. Inspect this Indian SME context, explain how the absence of structured HRM affects workforce productivity.	8	3	L4
OR				
14	Xerox, a small printing business, refuses to implement HR practices such as structured training or written job descriptions as formal appraisal system, claiming these are "only for big companies." Critically evaluate the impact of weak adoption of HRM practices and appraisal system in SME's like Xerox.	8	3	L4
MODULE - 05				
15	People logics, an analytics firm, uses predictive HR data to improve hiring success and track training ROI. Examine how HR innovation is shaping current HRM trends.	8	4	L4
OR				
16	HirePro Solutions, an Indian recruitment firm, introduced AI-based candidate screening. While it saved time, concerns were raised about bias and transparency. Analyze how AI is transforming HRM.	8	4	L4
MODULE - 06				
17	Urbanspaces Inc. actively recruits employees from diverse backgrounds and fosters an inclusive culture. This has led to more creative ideas and higher team performance. Inspect how diversity and inclusion can fuel innovation in organizations.	8	4	L4
OR				
18	Teamlease employs Boomers, Gen X, Millennials, and Gen Z staff. Managers are finding it hard to align expectations, communication, and work styles. Analyze how HR addresses the challenges of a multi-generational workforce.	8	4	L4
PART C				
19	Organizational Growth – Integrating Business and HR at NovaCare Services Pvt. Ltd. NovaCare Services Pvt. Ltd., a growing healthcare support services company based in Hyderabad, was established in 2017 by two healthcare entrepreneurs. Initially providing medical transcription services, NovaCare gradually expanded into telemedicine coordination, medical billing, and remote diagnostic assistance by 2022, serving both Indian and overseas clients. However, as NovaCare scaled up, it began to experience serious human resource challenges. The company had no formal HR department. Recruitment was handled by team leads without clear job descriptions. Training was on-the-job and inconsistent. There were no structured performance reviews, and employee engagement was minimal. This led to high attrition rates, declining service quality, and low client satisfaction. Recognizing the problem, the founders engaged an HR consultant to streamline people practices. Key issues identified included, Absence of defined job roles and KPIs. Lack of structured onboarding and training. Reactive hiring with no workforce planning.			

	No mechanisms for employee feedback or recognition. The consultant worked with leadership to develop a strategic HR roadmap, including, Setting up a dedicated HR function. Implementing formal recruitment and induction processes. Linking performance to service quality via KPIs. Conducting customer-centric training on communication, empathy, and accuracy. Creating a culture of recognition and peer learning. Within a year, NovaCare saw a drop in employee turnover, faster turnaround times, and higher client satisfaction scores. Employees reported better clarity in their roles and more confidence in their work.			
	a) Compare the approach to Human Resource Management at NovaCare Services before and after the consultant's intervention. How does this shift reflect the difference in HR adoption between SMEs and large firms, especially in the service sector context?	6	4	L5
	b) Given the nature of NovaCare as a service-based SME, analyse how the differences between the service and manufacturing sectors influenced their HR challenges. Why is HRM more critical in the service sector in this case?	6	4	L5
	c) What strategic HRM benefits can NovaCare expect in the long term by aligning human resources with business objectives? Suggest five HR strategies that should be sustained or enhanced as the company continues to grow.	10	4	L5



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SJC INSTITUTE OF TECHNOLOGY
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SECOND SEMESTER MBA DEGREE SEMESTER END EXAMINATIONS
JULY - AUGUST 2026

Course:	FINANCIAL MANAGEMENT		
Course Code:	MBA202	Program: MBA	
Max Marks:	100	Duration:	03 Hours

Instructions:

1. Part A and Part C (Case Study) are Compulsory
2. Part B questions are choice based

Q. No.	QUESTIONS	Marks	CO	RBTL
PART A				
1	Explain the interface of financial management with other functional areas of management.	5	1	L2
2	Outline the Importance of Time Value of Money in Business.	5	1	L2
3	Demonstrate the various steps involved in the capital budgeting process.	5	1	L2
4	Explain the components of cost of capital with suitable examples.	5	1	L2
5	Outline the various factors affecting capital structure.	5	1	L2
6	Explain sustainable finance.	5	1	L2
PART B				
MODULE - 01				
7	"As the newly appointed CFO of a fast-growing tech firm", you are expected to go beyond traditional financial management and play a key role in shaping digital innovation, business transformation, and strategic ability. Organize the role of a finance leader in the context of today's dynamic and technology-driven business environment?"	8	1	L3
OR				
8	"A startup founder from a small town is curious about IPOs". Organize the role of the primary market in mobilizing funds and promoting economic development?"	8	1	L3
MODULE - 02				
9	You are an investment analyst. An investor wants to deposits Rs 10000 in a bank account for 5 years at 8% interest. Find out the amount which he will have in his account if interest is compounded a) annually b) semiannually c) quarterly d) monthly	8	2	L3
OR				
10	Mr. Aditya, a recently retired operations manager, has received a retirement corpus of ₹3,50,000. He plans to invest the amount in a fixed deposit that earns an annual compound interest of 9%. He wishes to withdraw equal annual amounts at the end of every year for the next 12 years, ensuring that the entire amount (including interest) is fully depleted by the end of the term. Discover the withdrawal amount.	8	2	L3

MODULE - 03

11	A logistics firm is considering the installation of a GPS fleet tracking system aimed at optimizing delivery routes and minimizing fuel expenses. The finance department is tasked with analysing the feasibility of this project using the Profitability Index (PI) approach. Key project details are as follows: Initial outlay: ₹3,00,000 Projected annual cash inflows: • Year 1: ₹90,000 • Year 2: ₹1,00,000 • Year 3: ₹1,00,000 • Year 4: ₹1,00,000 Discount rate: 10% Using the Profitability Index method, assess whether this investment is financially viable and advise the company on whether to proceed.	8	2	L3
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OR

12	Electronic private ltd is evaluating two mutually exclusive proposals for new capital investment. The following information about the proposals is available.	8	2	L3																		
	<table><tr><th>Particulars</th><th>Project X</th><th>Project Y</th></tr><tr><td>Net cash outlay</td><td>80000</td><td>100000</td></tr><tr><td>Salvage value</td><td>Nil</td><td>Nil</td></tr><tr><td>Estimated life</td><td>4 years</td><td>5 years</td></tr></table>				Particulars	Project X	Project Y	Net cash outlay	80000	100000	Salvage value	Nil	Nil	Estimated life	4 years	5 years						
	Particulars				Project X	Project Y																
	Net cash outlay				80000	100000																
	Salvage value				Nil	Nil																
	Estimated life				4 years	5 years																
	Depreciation				straight line method																	
	Cut off discount rate				10%																	
	Tax				50%																	
	EBDT (earnings before depreciation and taxes):																					
	<table><tr><th>Year</th><th>X</th><th>Y</th></tr><tr><td>1</td><td>24000</td><td>28000</td></tr><tr><td>2</td><td>28000</td><td>32000</td></tr><tr><td>3</td><td>32000</td><td>36000</td></tr><tr><td>4</td><td>44000</td><td>44000</td></tr><tr><td>5</td><td>-----</td><td>40000</td></tr></table>				Year	X	Y	1	24000	28000	2	28000	32000	3	32000	36000	4	44000	44000	5	-----	40000
	Year				X	Y																
1	24000	28000																				
2	28000	32000																				
3	32000	36000																				
4	44000	44000																				
5	-----	40000																				
You are required to advise the company as to which would be financially viable on the basis of net present value method. The PV factor at 10%.																						

MODULE - 04

13	A company plans to issue 2000 shares of 100 each at par the floatation costs are expected to be 5% of the share price. A company pays a dividend of 10 per share initially and the growth in dividends is expected to be 5%. i) Compute the cost of new equity share. ii) If the current market price of an equity share is 160 calculate the cost of exiting equity share capital.	8	3	L4
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OR

14	Green Power Ltd., a renewable energy company, is planning to launch a new solar park in Gujarat. To finance this project, the company will use a mix of debt and equity. Examine the company's WACC to inspect the project's viability. Capital Structure: Equity capital: ₹40 lakh Debt capital: ₹60 lakh Cost Components: Cost of equity (Ke): 14% (calculated using CAPM) Cost of debt (Kd): 10% Corporate tax rate: 30%	8	3	L4
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MODULE - 05

15	Fresh Nest Ltd., a leading FMCG company, has recorded steady profits over the last decade and has maintained a stable dividend payout ratio. However, the company is planning a major international expansion which would require significant internal funding. Discuss five major factors the finance team should analyse before revising the current dividend policy.	8	3	L4
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OR

16	Alpha limited has an average selling price of Rs 20 per unit. Its variable costs are Rs 14 and fixed costs are Rs 340000. All its assets are financed by equity funds. It pays 35% tax on its income. Gamma ltd is identical to alpha limited in all respects but its assets are financed by 50% equity capital and 50% by debt, the interest on which amounts Rs 40000. Determine the degree of Operating leverage, Financial Leverage and Combined Leverage at 70000 units sales volume and for both the firms and interpret the results.	8	3	L4
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MODULE - 06

17	Fresh Mart is a small neighborhood grocery store. The owner wants to prepare a cash budget for the month of July 2025 to manage cash flow effectively. Data: • Opening Cash Balance (1st July 2025): ₹5,000 • Estimated Sales for July: - o Cash Sales: ₹8,000 - o Credit Sales: ₹12,000 (Collected 50% in July, remaining 50% in August) • Estimated Purchases (Cash): ₹10,000 • Operating Expenses to be paid in July: - o Rent: ₹2,000 - o Salaries: ₹3,000 - o Utilities: ₹500 • Loan Repayment due in July: ₹1,500 • Expected Collection from June's Credit Sales: ₹6,000 Analyze the cash flow components, calculate the budget for July 2025 for Fresh Mart & interpret the results.	8	3	L4
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OR

18	Analyze the role of climate finance in supporting developing countries to achieve their climate goals, provide examples of successful climate finance initiatives and analyze the factors that contributed to their effectiveness in meeting climate targets.	8	3	L4
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PART C

19	A proforma cost sheet of a company provides the following particulars:																			
	<table><tr><th>Particulars</th><th>Amount per unit</th></tr><tr><td>Elements of Cost:</td><td></td></tr><tr><td>Raw materials</td><td>80</td></tr><tr><td>Direct labour</td><td>30</td></tr><tr><td>Overheads</td><td>60</td></tr><tr><td>Total cost</td><td>170</td></tr><tr><td>Profit</td><td>30</td></tr><tr><td>Selling price</td><td>200</td></tr></table>	Particulars	Amount per unit	Elements of Cost:		Raw materials	80	Direct labour	30	Overheads	60	Total cost	170	Profit	30	Selling price	200			
	Particulars	Amount per unit																		
	Elements of Cost:																			
	Raw materials	80																		
	Direct labour	30																		
	Overheads	60																		
	Total cost	170																		
	Profit	30																		
Selling price	200																			

The following further particulars are available: • Raw materials in stock, on average, one month; • Materials in process (completion stage, 50 per cent), on average, half a month; • Finished goods in stock, on average, one month. • Credit allowed by suppliers is one month; • Credit allowed to debtors is two months; • Average time-lag in payment of wages is 1.5 weeks and one month in overhead expenses; one-fourth of the output is sold against cash; • cash in hand and at bank is desired to be maintained at Rs 3,65,000. • Working capital needed to finance a level of activity of 1,04,000 units of production. You may assume that production is carried on evenly throughout the year, and wages and overheads accrue similarly. For calculation purposes, 4 weeks may be taken as equivalent to a month			
a) Estimate the value of current assets	6	4	L5
b) Estimate the value of current liabilities	6	4	L5
c) Evaluate the working capital requirement.	10	4	L5



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SJC INSTITUTE OF TECHNOLOGY

(An Autonomous Institute under VTU, Belagavi)

SECOND SEMESTER M.Tech DEGREE SEMESTER END EXAMINATIONS

JULY - AUGUST 2026

Course:	DATA SCIENCE AND MANAGEMENT			
Course Code:	MCS202	Program:	M.Tech in Computer Science & Engineering	
Max Marks:	100	Duration:	03 Hours	

Note:

1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.
2. Any missing Data can be suitably assumed.

Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	Summarize the Data Science Profile.	6	1	L2
	b	Illustrate the Exploratory Data Analysis in Data Science and List the basic tools of EDA.	6	1	L2
	c	Describe the following concepts with an examples: i) Statistical inference ii) Population & Samples iii) Types of Data	8	1	L2
MODULE - 2					
Q2	a	Interpret k-Nearest Neighbors (k-NN) algorithm with example	6	2	L2
	b	Illustrate with neat diagram Anatomy of a Matplotlib Figure and Plotting data points with multiple markers.	8	2	L2
	c	Apply code for basic pie chart using matplotlib.	6	2	L3
MODULE - 3					
Q3	a	Define Big Data. Summarize with a neat diagram map and reduce MapReduce logical data flow.	6	3	L2
	b	Describe the following i) RDBMS ii) Volunteer Computing iii) Grid Computing	6	3	L2
	c	With a neat diagram illuminate MapReduce data flow with a single reduce task and multiple reduce tasks	8	3	L2
OR					
Q4	a	Infer the Hadoop Filesystems	6	3	L2
	b	Describe HDFS Concepts: i) Name node and Data nodes ii) HDFS Federation iii) HDFS high -availability	8	3	L2
	c	Outline Anatomy of a File Read in Data Flow.	6	3	L2
MODULE - 4					
Q5	a	Summarize Anatomy of a YARN Application Run with a neat diagram.	6	4	L2
	b	What is serialization and why it is needed? Explain the serialization in Hadoop.	6	4	L2

	c	Write a note on compression and codecs. Construct a program to compress data read from standard input and write it to standard output.	8	4	L3
OR					
Q6	a	Illuminate File-Based Data Structures.	6	4	L2
	b	Summarize scheduling in YARN with a neat diagram.	8	4	L2
	c	Illustrate Data Integrity in HDFS.	6	4	L2
MODULE – 5					
Q7	a	Describe the Input Format class hierarchy with an example code.	6	5	L2
	b	Summarize the MapReduce Types with an example.	8	5	L2
	c	Describe how Load balancing between two Agents in FLUME with a diagram.	6	5	L2
OR					
Q8	a	Illustrate the Output Format class hierarchy with a neat diagram.	6	5	L2
	b	Describe the Flume components with an example.	6	5	L2
	c	With a neat diagram, explain how FLUME Agent with a spooling directory source and a logger sink connected by a file channel.	8	5	L2



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SECOND SEMESTER M.Tech DEGREE SEMESTER END EXAMINATIONS

JULY - AUGUST 2026

Course:	COMPUTATIONAL STRUCTURAL MECHANICS – CLASSICAL & FE APPROACH			
Course Code:	MCV202	Program:	M.Tech in Structural Engineering	
Max Marks:	100	Duration:	03 Hours	

Note:

1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.
2. Any missing Data can be suitably assumed.

Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	Show that element stiffness matrix of two noded beam element is symmetric matrix.	8	1	L2
	b	Solve for the nodal displacements of the truss shown in Fig.1.b by direct stiffness method. Fig.Q.1(b)	12	1	L3
MODULE - 2					
Q2	a	Analyse the frame shown in Fig. 2.a using stiffness method. Draw shear force diagram and bending moment diagram. Fig.Q2(a)	20	2	L4

MODULE – 3

Q3	a	Explain the basic steps involved in the finite element method.	6	3	L2
	b	What is band width in FEM? Explain with an example how band width can be reduced.	6	3	L2
	c	Solve for the deflection of a cantilever beam of length 'L' and loaded with vertical load 'P' at the free end by Rayleigh Ritz method.	8	3	L3

OR

Q4	a	Compare the advantages and disadvantages of finite element method.	6	3	L2
	b	Elucidate element aspect ratio and discontinuities.	6	3	L2
	c	Using Rayleigh's – Ritz method, develop an expression for maximum deflection of the simply supported beam with throughout the length. $EI = \text{constant}$.	8	3	L3

MODULE – 4

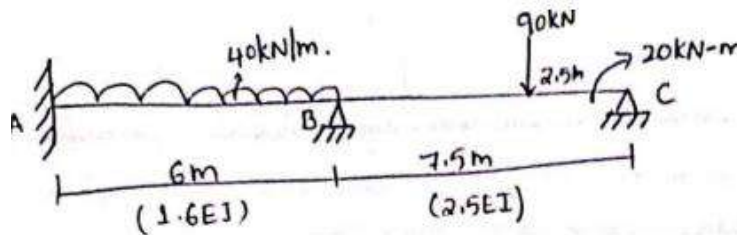
Q5	a	Elucidate isoparametric, subparametric and superparametric elements.	6	4	L2
	b	Define shape function. Summarize its characteristics.	6	4	L2
	c	Develop the shape functions by degrading six noded triangular elements to five noded triangular element in terms of local co-ordinate system.	8	4	L3

OR

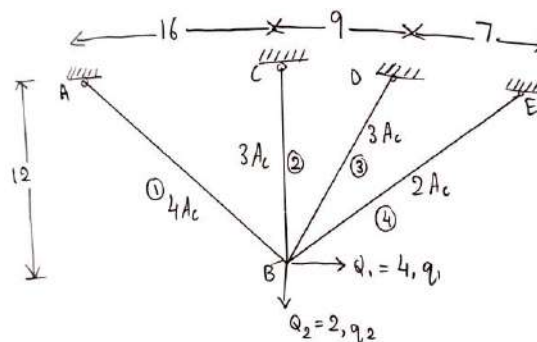
Q6	a	Interpret the compatibility and convergence requirement of displacement model.	6	4	L2
	b	Interpret Geometric invariance and Pascal triangles.	6	4	L2
	c	Develop the shape function for constant strain triangle element.	8	4	L3

MODULE – 5

Q7	a	Analyse the continuous beam shown in Fig.7.a by stiffness method.	20	5	L4
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**Fig.Q.7(a)****OR**

Q8	a	Analyse the four bar truss subjected to forces as shown in Fig.8.a. All forces are in kN and distances are in m.	20	5	L4
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**Fig.Q.8(a)**

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SECOND SEMESTER M.Tech DEGREE SEMESTER END EXAMINATIONS

JULY - AUGUST 2026

Course:	ADVANCED COMMUNICATION SYSTEMS			
Course Code:	MLDN202	Program:	M.Tech in Digital Communication & Networking	
Max Marks:	100		Duration:	03 Hours

Note:

1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.
2. Any missing Data can be suitably assumed.

Q. No.	MODULE - 1		Marks	CO	RBTL
Q1	a	Compare memoryless and memory modulation scheme.	4	1	L1
	b	Describe QAM and bring out mathematical expression for QAM signal waveform.	10	1	L2
	c	A speech signal is sampled at a rate of 8 kHz, and then encoded using 8 bits per sample. The resulting binary data are then transmitted through an AWGN baseband channel via M-level PAM. Evaluate the bandwidth required for transmission when i) M = 4 ii) M = 8 iii) M = 16	6	1	L3
MODULE - 2					
Q2	a	State Dimensionality Theorem and mention the relation between the bandwidth efficiency of a signaling scheme in terms of the constellation size and the dimensionality of the constellation.	6	2	L1
	b	Describe the geometrical interpretation of Optimal (MAP) decision rule for an AWGN Vector channel.	6	2	L2
	c	A Binary digital communication system employs the signals $s_0(t) = 0 \quad \text{for } 0 \leq t \leq T$ $s_1(t) = A \quad \text{for } 0 \leq t \leq T$ for transmitting the information. This is called on-off signaling. The demodulator cross-correlates the received signal $r(t)$ with $s(t)$ and samples the output of the correlator at $t + T$. i) Determine the optimum detector for an AWGN channel and the optimum threshold, assuming that the signals are equally probable. ii) Determine the probability of error as a function of the SNR. How does on-off signaling compare with antipodal signaling?	8	2	L3
MODULE - 3					
Q3	a	Explain non-linear distortion, frequency offset, phase jitter.	6	3	L1
	b	With Suitable Mathematical expression explain <i>eye pattern and the Effect of intersymbol interference on eye opening</i> .	8	3	L2
	c	Evaluate the tap weight coefficients of a three-tap zero-forcing equalizer if the ISI spans three symbols and is characterized by the values $x(0) = 1$, $x(-1) = 0.3$, $x(1) = 0.2$. Also determine the residual ISI at the output of the equalizer for the optimum tap coefficients.	6	3	L3

OR					
Q4	a	State Nyquist condition for zero ISI.	4	3	L1
	b	State and prove Nyquist Pulse Shaping Criterion.	10	3	L2
	c	A binary sequence 001101001 is applied to a duobinary system. Construct the duo binary coder output and corresponding receiver output, without a precoder. Suppose that owing to error during transmission, the level at the receiver input produced by the second digit is reduced to zero. Construct the new receiver output.	6	3	L3
MODULE - 4					
Q5	a	Illustrate basics of OFDM System and its FFT Algorithm implementation.	4	4	L1
	b	With neat block diagram and necessary mathematical expressions, Explain implementation of Filter bank of OFDM receiver	8	4	L2
	c	With Suitable Mathematical equations, explain water-filling interpretation of the optimum power distribution as a function of frequency	8	4	L3
OR					
Q6	a	Bring out the relationship between P_i (power allocated to the i^{th} subcarrier), M_i (constellation size) and total transmitted power P in Multicarrier Modulation.	4	4	L1
	b	Illustrate Mathematically the process of Modulation and Demodulation in an OFDM System.	8	4	L2
	c	Derive the Expression for expression for the channel capacity of a non ideal linear filter channel with additive Gaussian noise	8	4	L3
MODULE - 5					
Q7	a	State the Balance Property, Run Property of a ML Sequence	4	5	L1
	b	Explain the Working of FH/MFSK Transmitter and Receiver.	6	5	L2
	c	In a first FH/MFSK system the signal has the following parameters number of bits per MFSK symbol $K=2$, number of MFSK tones $m=4$, length of PN segment per hop, $K=3$, Total number of frequency hops $=8$, Number of hops for MFSK symbol $=2$, Period of PN sequence $=15$ i) Determine the relation between bit rate and ship rate ii) Sketch the variation of frequency of the transmitted signal with time iii) Assume binary data sequence to be 01101100 and one period of PN sequences is 111100010011010 Sketch the dehopped MFSK signal.	10	5	L3
OR					
Q8	a	Mention the usage of Spread spectrum signals	4	5	L1
	b	With neat Block diagram Explain the spread spectrum digital communication system.	6	5	L2
	c	A Direct Sequence Spread Spectrum modulation, it is required to have a jamming margin greater than 26 dB. The ratio $E_b/N_0=10$. Determine the maximum processing Gain and the minimum number of stages required to generate the maximum length sequence.	10	5	L3

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SECOND SEMESTER M.Tech DEGREE SEMESTER END EXAMINATIONS

JULY - AUGUST 2026

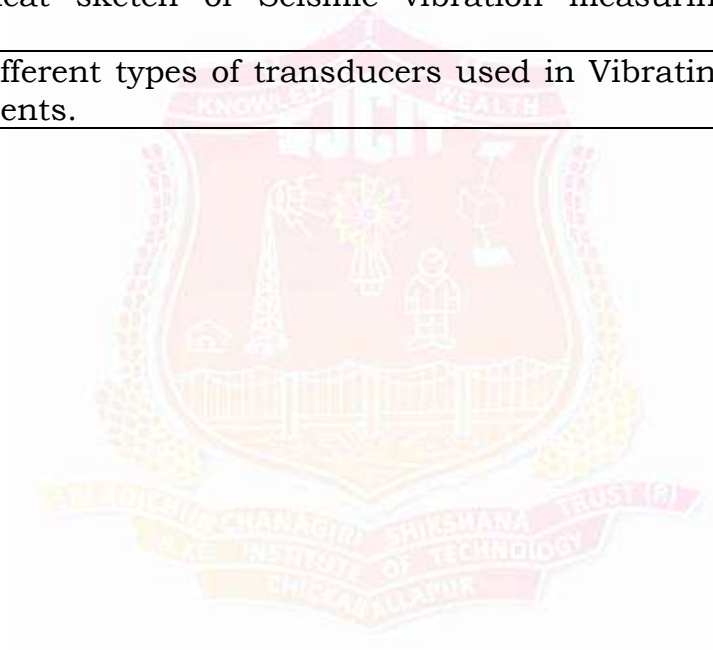
Course:	MODERN VIBRATION THEORY AND APPLICATION			
Course Code:	MME202	Program:	M.Tech in Machine Design	
Max Marks:	100		Duration:	03 Hours

Note:

1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.
2. Any missing Data can be suitably assumed.

Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	Define the following i) Natural Frequency ii) Harmonic motion iii) Phase	6	1	L1
	b	Differentiate between i) Free and Forced Vibrations ii) Damped and Undamped Vibrations	6	1	L2
	c	Derive an equation of Amplitude and phase angle for a Resultant wave motion by adding two SHM by Analytical method.	8	1	L3
MODULE - 2					
Q2	a	List the basic elements used in Vibrating model and explain them.	6	2	L1
	b	Derive an expression for logarithmic decrement of under damped system by analytical and experimental method.	6	2	L2
	c	Determine the Natural frequency of Spring mass system by i) Newton's 2nd law of motion method ii) Energy method iii) Rayleigh method and comment on it	8	2	L3
MODULE - 3					
Q3	a	Derive an expression for a steady state solution spring mass system subjected to harmonic force and also plot Amplitude ratio v/s Frequency ratio for the system.	10	2	L3
	b	Derive an expression for a steady state solution with viscous damping due to harmonic force and also plot Amplitude ratio v/s Frequency ratio for the system.	10	2	L3
OR					
Q4	a	Explain Seismic instrument and derive the amplitude ratio and plot the amplitude ratio verses frequency ratio.	10	2	L3
	b	Derive an expression for Whirling / Critical speed of a shaft.	10	2	L3

MODULE – 4					
Q5	a	A rod carries a disc at its lower end. Derive the expression for the natural frequencies.	10	3	L2
	b	Obtain an expression for general solution of vibration of rod subjected to uniaxial load.	10	3	L3
OR					
Q6	a	Obtain an expression for general solution of vibration of string. The tension T is large and amplitude of vibration is small.	10	3	L3
	b	Determine the natural frequency of vibration of a uniform beam clamped at one end and free at the other.	10	3	L3
MODULE – 5					
Q7	a	State the condition of using Vibrometer and Accelerometer and explain them.	10	4	L2
	b	Explain with a neat sketch of experimental modal analysis with reference to basic idea and necessary equipment.	10	4	L2
OR					
Q8	a	Explain with a neat sketch of Seismic vibration measuring instrument	10	4	L2
	b	List and explain different types of transducers used in Vibrating measuring instruments.	10	4	L2



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SJC INSTITUTE OF TECHNOLOGY
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SECOND SEMESTER MBA DEGREE SEMESTER END EXAMINATIONS
JULY - AUGUST 2026

Course:	RESEARCH METHODOLOGY & IPR		
Course Code:	MBA203	Program : MBA	
Max Marks:	100	Duration:	03 Hours

Instructions:

1. Part A and Part C (Case Study) are Compulsory
2. Part B questions are choice based

Q. No	QUESTIONS	Marks	CO	RBTL
PART A				
1	Illustrate research gap and its significance in business research.	5	1	L2
2	Demonstrate the steps involved in the business research process.	5	2	L2
3	Outline the classification of experimental designs.	5	2	L2
4	Summarize probability and non-probability sampling.	5	3	L2
5	Relate the differences between nominal and ordinal scales with examples.	5	4	L2
6	Infer the nature and characteristics of Intellectual Property Rights.	5	4	L2
PART B				
MODULE - 01				
7	A company has observed a consistent decline in product sales over the past three quarters despite maintaining its pricing and promotional strategies. As a researcher, frame an appropriate research problem and propose a hypothesis to investigate the potential causes of this decline.	8	1	L3
OR				
8	Develop a detailed research proposal to study employee satisfaction in a logistics company, addressing key components such as the title, background, research problem, objectives, hypotheses, methodology, and expected outcomes.	8	1	L3
MODULE - 02				
9	Choose the most suitable research design to study the buying behavior of Gen Z consumers in the fashion retail industry. Justify your choice by explaining how this design helps in capturing their preferences, motivations, and decision-making patterns effectively.	8	2	L3
OR				
10	Construct a questionnaire to understand consumer perception of electric vehicles, focusing on factors such as awareness, perceived benefits, cost concerns, environmental impact, and purchase intent. Ensure your questionnaire includes a mix of close-ended questions using appropriate measurement scales such as Likert or semantic differential.	8	2	L3

MODULE - 03				
11	A research team from a wellness consulting firm is conducting a study on the health habits of urban professionals aged 25–50 in metro cities like Bengaluru, Mumbai, and Delhi. The team wants to assess habits such as sleep patterns, exercise frequency, diet preferences, and stress management techniques. The professionals work in diverse sectors including IT, finance, healthcare, and education. The population is large and heterogeneous in terms of occupation, income levels, and work schedules. As a research analyst, identify the most suitable sampling method for this study and justify your choice. Explain how your chosen method ensures representativeness across different professions and city demographics while minimizing sampling bias.	8	3	L3
OR				
12	PharmaCare Ltd., a pharmaceutical company, is in Phase III clinical trials of a new diabetes medication. The firm needs to conduct a survey and clinical testing on 1,000 patients aged 40–70 who have been medically diagnosed with Type 2 diabetes. The participants should not be currently on experimental medication and must meet strict inclusion criteria. The results of this study will form the basis of the company's application for drug approval from the national regulatory authority. As the lead researcher, identify the most appropriate sampling method to select participants for this drug trial. Justify how the method ensures scientific rigor, reliability of results, and adherence to ethical and regulatory standards in medical research.	8	3	L3
MODULE - 04				
13	A private sector bank has been receiving mixed feedback about its customer service, especially regarding digital banking experiences, staff behaviour, and complaint resolution. The management has decided to conduct a survey to assess customer satisfaction and identify improvement areas. As part of the research team, categorize and design four Likert scale-based attitude statements that can measure customer satisfaction across different service aspects of the bank.	8	3	L4
OR				
14	A food delivery platform wants to understand consumer preferences for five leading fast-food chains—McDonald's, KFC, Domino's, Subway, and Pizza Hut—to improve app recommendations and partner promotions. Examine and recommend a suitable scaling technique to rank these five brands based on consumer preferences. Justify your choice by explaining how the data collected will help in decision-making for product placement and targeted marketing.	8	3	L4
MODULE - 05				
15	A market researcher has collected responses from 300 college students regarding their time spent on online education platforms during weekdays and weekends. The responses were gathered through a structured questionnaire in both Google Forms and Excel. As a research assistant, examine and redraft the contents of the questionnaire	8	4	L4
OR				
16	An FMCG company has completed a consumer survey on the effectiveness of its new eco-friendly packaging. The research team is now preparing a report for presentation to senior executives and potential stakeholders. Prepare a suitable report structure for presenting the key	8	4	L4

	findings. What guidelines would you follow to ensure the documentation is effective and professional?			
MODULE - 06				
17	A start-up in Bengaluru has created a wearable health monitoring device that uses a unique AI-based algorithm and sensor design. The founders are worried that larger firms might copy their design and concept. Analyse and suggest how different types of Intellectual Property Rights can be used to protect the various elements of this innovation. Briefly explain the relevance of the Indian IPR system in this context.	8	4	L4
OR				
18	A researcher working on a government-funded public health project is under pressure from a corporate sponsor to modify data to show favourable outcomes. The researcher is considering submitting the paper to an open-access journal. What are the ethical concerns involved in this situation? Discuss the responsibilities of a researcher regarding plagiarism, data integrity, and publication ethics.	8	4	L4
PART C				
19	VRL Logistics, a prominent transport and logistics firm, was facing inefficiencies in its operations and a decline in customer satisfaction. The company initiated a conclusive research study using both descriptive and experimental research designs to investigate delays in delivery, route planning issues, and customer pain points. Based on data from structured surveys and route simulations, VRL implemented changes such as dynamic routing, revised pricing, and improved digital interfaces. The management credited the success of the transformation to the structured and data-driven approach but raised questions about the long-term reliability and scalability of such research.			
	a) Compare how conclusive research differs from exploratory research and justify why it was appropriate for VRL Logistics in this case.	6	4	L5
	b) Based on the case, determine what type of descriptive research design (cross-sectional or longitudinal) you believe was used, and why.	6	4	L5
	c) As a research consultant, recommend how VRL Logistics can ensure the reliability and validity of data collected in future studies.	10	4	L5

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SECOND SEMESTER M.Tech DEGREE SEMESTER END EXAMINATIONS

JULY - AUGUST 2026

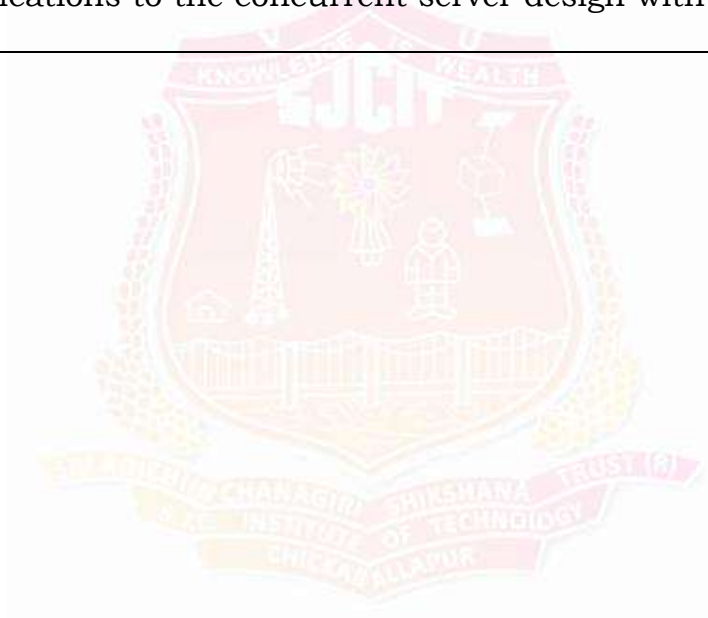
Course:	NETWORK PROGRAMMING			
Course Code:	MCS203	Program:	M.Tech in Computer Science & Engineering	
Max Marks:	100		Duration:	03 Hours

Note:

1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.
2. Any missing Data can be suitably assumed.

Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	Show the forms of Client/Server model handling multiple clients.	4	1	L1
	b	Illustrate client server on same network and different network.	8	1	L2
	c	Identify the type of hardware used by different Operating Systems in internet.	8	1	L3
MODULE - 2					
Q2	a	What are the contents of IPv4 Socket address structure?	4	2	L1
	b	Interpret the timeline scenario that takes place between TCP client and server.	8	2	L3
	c	Compare various socket address structures.	8	2	L2
MODULE - 3					
Q3	a	What is batch input and buffering?	4	3	L1
	b	Compare between blocking and non-blocking I/O model.	8	3	L2
	c	Choose the scenarios where I/O multiplexing is typically used in networking applications.	8	3	L3
OR					
Q4	a	Outline on five I/O models that are available under Unix.	4	3	L2
	b	Show the organization of various states of TCP echo server	8	3	L3
	c	Identify and explain the appropriate functions used in I/O multiplexing to manage multiple clients.	8	3	L3
MODULE - 4					
Q5	a	Show the Unix domain socket address structure.	4	4	L1
	b	Construct the arrangement of the proc, file and socket structure for listening descriptor.	8	4	L3
	c	Identify and describe the flag used for I/O functions.	8	4	L3
OR					

Q6	a	What is preforking? Show a scenario where the parent has preforked N children and two clients are currently connected.	4	4	L1
	b	Identify the strengths and weaknesses of various client designs.	8	4	L3
	c	Consider Unix Domain Datagram echo client (or) server identify the modifications done.	8	4	L4
MODULE – 5					
Q7	a	Analyse the TCP client program for testing various servers.	4	5	L2
	b	List nine different server designs and write outline about each server.	8	5	L2
	c	Examine TCP Iterative server and Concurrent server. (show only required steps of example code)	8	5	L4
OR					
Q8	a	List and Define the Unix server choices for the process control	4	5	L1
	b	Give inference about TCP Preforked Server, File Locking around accept () function.	8	5	L2
	c	Illustrate the modifications to the concurrent server design with an example.	8	5	L2



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SECOND SEMESTER M.Tech DEGREE SEMESTER END EXAMINATIONS

JULY - AUGUST 2026

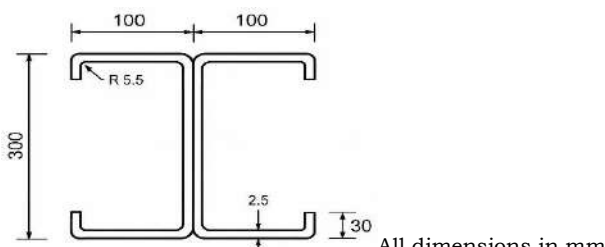
Course:	ADVANCED DESIGN OF STEEL STRUCTURES			
Course Code:	MCV203	Program:	M.Tech in Structural Engineering	
Max Marks:	100	Duration:	03 Hours	

Note:

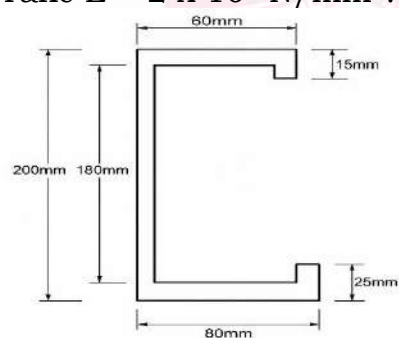
1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.
2. Any missing Data can be suitably assumed.
3. Use of Steel Tables is permitted

Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	Explain the design procedure to calculate the lateral torsion buckling of prismatic members as per IS codal provision.	6	1	L2
	b	Design a simply supported steel joist of 5 m effective span, carrying a uniformly distributed load 12 kN/m if compression flange of the joist is laterally unrestrained.	14	1	L4
MODULE - 2					
Q2	a	A non-sway column in a building frame with flexible joints is 4m high and subjected to the following load and moment: Factored axial load = 500kN Factored moment $M_z = 27\text{kN-m}$ at top $= 45\text{ kN-m}$ at bottom of column Design a suitable beam-column assuming $f_y = 250\text{ N/mm}^2$. Take the effective length of the column as $0.8L$ along both the axes.	20	2	L4
MODULE - 3					
Q3	a	Design a welded plate girder for an effective span of 20m to support an UDL of 20 kN/m in addition to a pair of point loads of 870 kN each of 5m from end of beam (10m apart @ center). Design the plate girder.	20	3	L4
OR					
Q4	a	Design a gantry girder to an industrial shed to support an electric overhead traveling crane using the following data: Crane capacity = 200kN Weight of crab (trolley) = 60 kN Weight of crane girder (excluding trolley) = 260 kN Span of crane girder between rails = 18 m Minimum approach for crane hook = 1.2m Wheel base = 3.2 m Span of gantry girder = 7m Mass of rail section = 300 N/m Height of rail section = 75 mm Yield stress $f_y = 250\text{ N/mm}^2$ Also draw section details	20	3	L4

MODULE – 4

Q5	a	Explain the advantages of cold formed steel sections over hot rolled steel section.	8	4	L2
	b	Analyze the allowable load per meter on a beam with the cross section shown in Fig. Q5(b). The beam has a effective span of 4m and is laterally supported. Also determine the deflection at the allowable load. The steel has a yield point of 235 N/mm². Take $E = 2 \times 10^5$ N/mm²  Fig. Q5(b)	12	4	L4

OR

Q6	a	Explain the role of IS 801 and IS 811 in cold-formed steel design.	8	4	L2
	b	Analyze the allowable load/m on a beam with cross section shown in Fig. Q6(b). The beam has an effective span of 4m. The steel has yield point of 235N/mm². Take $E = 2 \times 10^5$ N/mm².  Fig. Q6(b) Thickness of the beam=10mm.	12	4	L4

MODULE – 5

Q7	a	Explain the concept of fire resistance level and its importance in structural design.	10	5	L2
	b	Analyze the concept of fire resistance level and period of structural adequacy in determining structural safety during fire.	10	5	L4

OR

Q8	a	Explain the difference between protected and unprotected steel members in fire conditions.	10	5	L2
	b	Analyze failure mechanisms of steel structures under fire conditions.	10	5	L4



SJC INSTITUTE OF TECHNOLOGY

(An Autonomous Institute under VTU, Belagavi)

SECOND SEMESTER M.Tech DEGREE SEMESTER END EXAMINATIONS

JULY - AUGUST 2026

Course:	CRYPTOGRAPHY AND NETWORK SECURITY			
Course Code:	MLDN203	Program:	M.Tech in Digital Communication & Networking	
Max Marks:	100		Duration:	03 Hours

Note:

1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.
2. Any missing Data can be suitably assumed.

Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	Explain the model for network security	6	1	L2
	b	Apply Hill-cipher technique and encrypt the message "FINALYEAR" at the sender end and decrypt the message at receiver end. using Hill-cipher $K = \begin{bmatrix} 17 & 17 & 5 \\ 21 & 18 & 21 \\ 2 & 2 & 19 \end{bmatrix}$	8	2	L3
	c	Explain the steps involved in single round of DES algorithm and explain its function in detail.	6	2	L3
MODULE - 2					
Q2	a	Explain the steps in fermats and Euler's theorem	6	1	L2
	b	Solve for X in the given set of congruent equation using CRT $X \equiv 2 \pmod{3}$ $X \equiv 3 \pmod{5}$ $X \equiv 2 \pmod{7}$	8	2	L3
	c	Solve for the encryption and decryption key using RSA Algorithm. for the following. P=17; q=11; e=7; M=88.	6	2	L3
MODULE - 3					
Q3	a	Outline the properties of pseudo random number generator	6	3	L2
	b	Explain the working and significance of a Pseudo Random Generator (PRG) in cryptographic systems.	8	3	L3
	c	Examine the role of A5 in GSM techniques.	6	3	L3
OR					
Q4	a	Explain Linear Congruential Generators.	6	3	L2
	b	Examine the function of Nanoteg and Rambutan	8	3	L2
	c	Explain Gifford algorithm in detail.	6	3	L3

MODULE – 4

Q5	a	State the requirements of Hash functions	6	4	L1
	b	Explain the basic uses of Message authentication code	8	4	L2
	c	Compare the difference between a message authentication code and a one-way hash function?	6	4	L3

OR

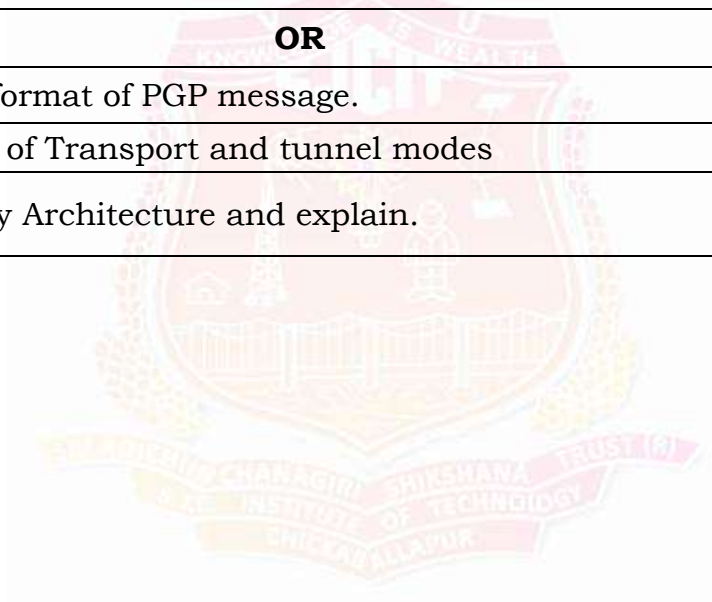
Q6	a	List the difference between MD4 and MD5	6	4	L1
	b	Explain with neat diagram secure hash algorithm	8	4	L2
	c	Apply digital signature standard algorithm for signing and verifying purpose?	6	4	L3

MODULE – 5

Q7	a	Explain different PGP Cryptographic functions.	6	5	L2
	b	Build ESP packet format with relative data in details.	8	5	L3
	c	Construct and explain the functions provided by S/MIME	6	5	L3

OR

Q8	a	Explain the general format of PGP message.	6	5	L2
	b	Explain the function of Transport and tunnel modes	8	5	L3
	c	Construct IP Security Architecture and explain.	6	5	L3



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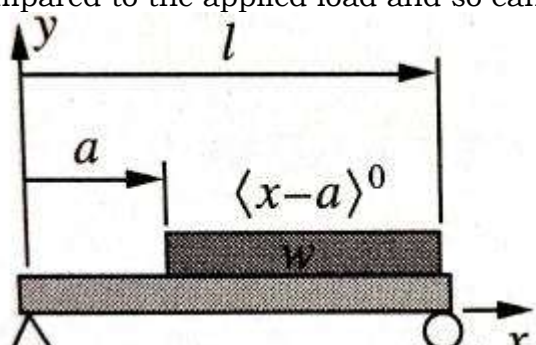
SECOND SEMESTER M.Tech DEGREE SEMESTER END EXAMINATIONS

JULY - AUGUST 2026

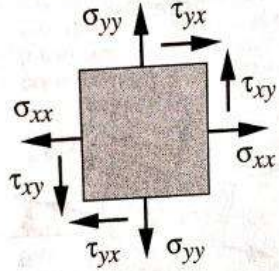
Course:	ADVANCED MACHINE DESIGN			
Course Code:	MME203	Program:	M.Tech in Machine Design	
Max Marks:	100		Duration:	03 Hours

Note:

1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.
2. Any missing Data can be suitably assumed.

Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	Define the following i) Mechanical Engineering Design ii) Standards iii) Codes and iv) Factor of Safety	4	1	L1
	b	With a neat flow diagram explain the phases of Design Process.	8	1	L2
	c	A rod with a cross-sectional area of A and loaded in tension with an axial force of $P=2000$ lbf undergoes a stress of $\sigma = P/A$. Using a material strength of 24 kpsi and a design factor of 3.0. Determine the minimum diameter of a solid circular rod. Determine the rod's diameter and the factor of safety.	8	1	L3
MODULE - 2					
Q2	a	Define the following i) FDB ii) Static load ii) Impact load iv) Beam load	4	2	L1
	b	Explain in detail How 2D static load analysis carried out on Four bar Mechanism.	8	2	L2
	c	Determine and plot the shear and moment functions for the simply supported beam with uniformly distributed load shown in Fig. 2c. Take Beam length $l = 10$ in, and load location $a = 4$ in. The magnitude of the uniform force distribution is $W = 10$ lb/in. The weight of the beam is negligible compared to the applied load and so can be ignored.  Fig.Q 2(c)	8	2	L3

MODULE - 3

Q3	a	Explain the following i) Stress tensor and Strain tensor ii) Plane stress and Plane strain	10	2	L2
	b	A biaxial stress element as shown in Fig 3b. has $\sigma_x = 40000$ psi, $\sigma_y = -20000$ psi and $\tau_{xy} = 30000$ psi ccw. Use Mohr's Circles to determine the principal stresses. Check the result with a numerical method.  Fig.Q 3(b)	10	2	L3

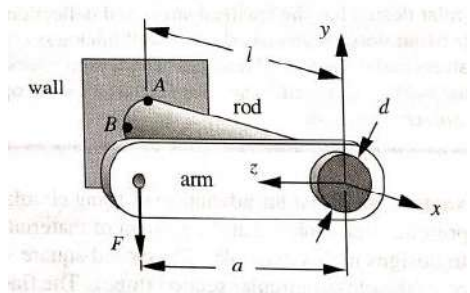
OR

Q4	a	Explain the following with sketch i) Axial Tension and Direct Shear stress ii) Bearing Stress and Tearout	10	2	L2
	b	A biaxial stress element has $\sigma_x = 40000$ psi, $\sigma_y = 20000$ psi and $\tau_{xy} = 10000$ psi ccw. Use Mohr's Circles to determine the principal stresses. Check the result with a numerical method.	10	2	L3

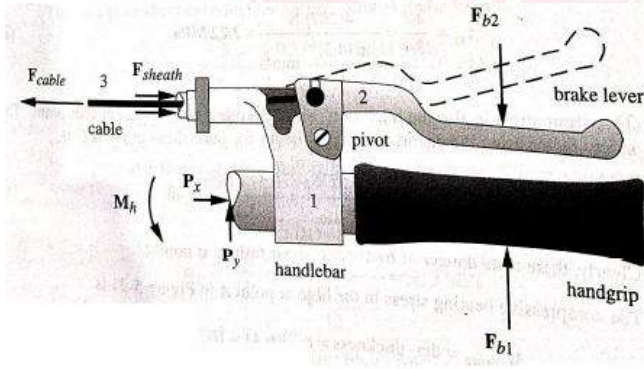
MODULE - 4

Q5	a	Write the following equation and explain each term i) Pure Bending Moment equation ii) Pure Torsional Equation	10	3	L2
	b	Determine and plot the slope and deflection function for the simply supported beam as shown in Fig 2C. The load is uniform over part of the beam length as shown in Fig 5b. Let beam length $l = 10$ in and load location $a = 4$ in. The beam's $I = 0.163$ in ⁴ and $E = 30$ Mpsi. The distributed force is $W = 100$ lb/in.	10	3	L3

OR

Q6	a	Explain the following i) Stress Concentration Factor ii) Stress in Thick cylinder	10	3	L2
	b	Find the most highly stressed location on the bracket shown in Fig 6b. Determine the applied and principle stresses at those locations. Take the length $l = 6$ in and arm $a = 8$ in. The rod outside diameter $d = 1.5$ in. Load $F = 1000$ lb. The load is static and the assembly is at room temperature. Consider shear due to transverse loading as well as other stresses.  Fig.Q.6(b)	10	3	L3

MODULE - 5

Q7	a	List and explain the failure theories of Ductile Materials.	10	4	L2
	b	Determine the safety factors for the bracket rod as shown in Fig 6b. Based on both the distortion-energy theory and the maximum shear stress theory and compare them. The material is 2024-T4 aluminum with a yield strength of 47000 psi. The rod length $l = 6$ in and arm $a = 8$ in. The rod outside diameter $d = 1.5$ in. Load $F = 1000$ lb. The load is static and the assembly is at room temperature. Consider shear due to transverse loading as well as other stresses.	10	4	L3
OR					
Q8	a	List and explain the failure of Brittle Materials.	10	4	L2
	b	Determine the factors of safety at critical points in the brake lever as shown in Fig 8b. The Stresses are $\sigma_x = 70.9$ MPa, $\sigma_y = 0$ and $\tau_{xy} = 2.22$ MPa. The material of the brake lever is die-cast aluminum alloy ASTM G8A with $S_{ut} = 310$ MPa (45 kpsi) and $S_y = 186$ MPa (27 kpsi). The elongation to fracture is 8%, making it a marginally ductile material. The most likely failure points are the two holes where the pins insert and at the root of the cantilever beam lever handle.  Fig.Q.8(b)	10	4	L3

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SJC INSTITUTE OF TECHNOLOG
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FIRST SEMESTER MBA DEGREE SEMESTER END EXAMINATIONS
JULY - AUGUST 2026

Course:	BUSINESS STATISTICS		
Course Code:	MBA104	Program : MBA	
Max Marks:	100	Duration:	03 Hours

Instructions:

1. Part A and Part C (Case Study) are Compulsory
2. Part B questions are choice based
3. Use of PV Tables is permitted.

Q. No.	QUESTIONS		Marks	CO	RBTL																
PART A																					
1	Interpret the importance of statistics in business and Management.		5	1	L2																
2	Classify the types of correlation.		5	1	L2																
3	Summarize Binomial distribution and its applications.		5	1	L2																
4	Describe the concept of a time series and summarize its importance in business and economic decision-making.		5	1	L2																
5	Differentiate between Type I & Type II error in hypothesis testing		5	1	L2																
6	Illustrate the difference between Nominal, Ordinal and Scale measurement scales used in JASP with examples.		5	1	L2																
PART B																					
MODULE - 01																					
7	A multinational company wants to review the salary structure across its departments to assess fairness and pay dispersion. <table><tr><td>Monthly Salary (₹ '000)</td><td>20-30</td><td>30-40</td><td>40-50</td><td>50-60</td><td>60-70</td><td>70-80</td><td>80-90</td></tr><tr><td>Number of Employees</td><td>10</td><td>25</td><td>40</td><td>55</td><td>35</td><td>20</td><td>15</td></tr></table> Solve Q_1 and Q_3, and interpret the Interquartile Range (IQR) to evaluate salary inequality. How can HR use these insights for designing equitable compensation policies or salary band adjustments		Monthly Salary (₹ '000)	20-30	30-40	40-50	50-60	60-70	70-80	80-90	Number of Employees	10	25	40	55	35	20	15	8	2	L3
Monthly Salary (₹ '000)	20-30	30-40	40-50	50-60	60-70	70-80	80-90														
Number of Employees	10	25	40	55	35	20	15														
OR																					
8	A bank recorded the waiting time (in minutes) for 100 customers at different service counters: <table><tr><td>Waiting Time (minutes)</td><td>0-5</td><td>5-10</td><td>10-15</td><td>15-20</td><td>20-25</td><td>25-30</td></tr><tr><td>No. of Customers</td><td>10</td><td>22</td><td>28</td><td>20</td><td>12</td><td>8</td></tr></table> Management wants to understand the median waiting time to evaluate whether service commitments are being met. Identify mean and median waiting time and interpret its managerial implication for customer satisfaction.		Waiting Time (minutes)	0-5	5-10	10-15	15-20	20-25	25-30	No. of Customers	10	22	28	20	12	8	8	2	L3		
Waiting Time (minutes)	0-5	5-10	10-15	15-20	20-25	25-30															
No. of Customers	10	22	28	20	12	8															

MODULE - 02

9

In a small marketplace, a vendor observed the interplay between the price of his products (X) and the quantity demanded (Y). To better understand how changes in price affect demand, the vendor decided to use regression analysis. He gathered the following data based on past sales:

Price (X)	11	7	9	5	8	6	10
Quantity demanded(Y)	10	8	6	5	9	7	11

8**2****L3**

Predict the quantity demanded (Y) when the price (X) is 12.

Predict the price (X) when the quantity demanded (Y) is 12.

OR

10

M/s Glow and Lovely Company wanted to analyze the relationship between its sales and expenses to understand how changes in one variable might affect the other. The company collected data for ten observations, as shown below:

Sales	50	50	55	60	65	65	65	60	60	60
Expenses	11	13	14	16	16	15	15	14	13	13

8**2****L3**

To investigate further, they decided to Apply the Spearmen correlation coefficient to determine the strength and direction of the relationship between sales and expenses.

MODULE - 03

11

A toy factory finds that 5% of toys produced are defective due to minor manufacturing flaws. In a batch of 20 toys, the manager wants to experiment with the probability that no more than 2 toys are defective using binomial distribution. This helps in maintaining quality assurance and setting acceptable defect limits.

8**3****L3****OR**

12

A systematic sample of 156 pages was taken, and the researchers recorded the number of foreign words per page. The observed frequency distribution was as follows

Words per page(X)	7	6	5	4	3	2	1	0
Sample pages (f)	1	6	32	36	48	24	7	2

8**3****L3**

The researchers wanted to understand the pattern of foreign word occurrences and decided to apply the Binomial distribution model to the frequency of foreign words per page. expected frequencies using Binomial distribution. Also, infer the mean and variance of fitted distribution.

MODULE - 04

13

A manufacturing firm wants a precise estimate of its long-term production trend for capacity planning. The data (in '000 units) is:-

Year	2020	2021	2022	2023	2024
Production ('000 units)	500	530	565	600	640

8**3****L4**

Make use of Least Squares Method to fit a straight-line trend. Utilize the trend equation to support strategic decision-making for operational efficiency.

OR

14	A business school observes variation in student enrolments across academic quarters due to admission cycles, entrance examinations, and academic calendars. To understand recurring seasonal enrolment behavior, the institution compiles quarter-wise admission data over four years. <table><tr><td>Year</td><td>Q1</td><td>Q2</td><td>Q3</td><td>Q4</td></tr><tr><td>2020</td><td>90</td><td>130</td><td>160</td><td>120</td></tr><tr><td>2021</td><td>95</td><td>140</td><td>170</td><td>125</td></tr><tr><td>2022</td><td>100</td><td>150</td><td>180</td><td>130</td></tr><tr><td>2023</td><td>105</td><td>160</td><td>190</td><td>135</td></tr></table> Utilize ratio to moving average method, inspect the seasonal pattern in student admissions and suggest measures for academic planning, faculty deployment, and infrastructure utilization.	Year	Q1	Q2	Q3	Q4	2020	90	130	160	120	2021	95	140	170	125	2022	100	150	180	130	2023	105	160	190	135	8	3	L4
Year	Q1	Q2	Q3	Q4																									
2020	90	130	160	120																									
2021	95	140	170	125																									
2022	100	150	180	130																									
2023	105	160	190	135																									

MODULE - 05

15	Zenith Infotech Pvt. Ltd., Bengaluru has observed differences in satisfaction levels among its departments. To evaluate whether satisfaction levels differ significantly across departments, HR collected the following data:	8	4	L4																				
	<table><tr><td>Department</td><td>Satisfied</td><td>Not Satisfied</td><td>Total</td></tr><tr><td>IT</td><td>40</td><td>10</td><td>50</td></tr><tr><td>Sales</td><td>30</td><td>20</td><td>50</td></tr><tr><td>HR</td><td>35</td><td>15</td><td>50</td></tr><tr><td>Total</td><td>105</td><td>45</td><td>150</td></tr></table>				Department	Satisfied	Not Satisfied	Total	IT	40	10	50	Sales	30	20	50	HR	35	15	50	Total	105	45	150
	Department				Satisfied	Not Satisfied	Total																	
	IT				40	10	50																	
	Sales				30	20	50																	
	HR				35	15	50																	
	Total				105	45	150																	
Using Chi-Square Test at 5% level of significance, inspect whether employee satisfaction is independent of department.																								

OR

16	The company has recorded sales data for each shop before and after the campaign to determine whether the campaign had a significant positive impact on sales. The sales data of an item in six shops before and after a special promotional campaign are as under:	8	4	L4																					
	<table><tr><td>Shops</td><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td></tr><tr><td>Before campaign</td><td>53</td><td>28</td><td>31</td><td>48</td><td>50</td><td>42</td></tr><tr><td>After campaign</td><td>58</td><td>29</td><td>30</td><td>55</td><td>56</td><td>45</td></tr></table>				Shops	A	B	C	D	E	F	Before campaign	53	28	31	48	50	42	After campaign	58	29	30	55	56	45
	Shops				A	B	C	D	E	F															
	Before campaign				53	28	31	48	50	42															
	After campaign				58	29	30	55	56	45															
Examine paired t-test, whether the mean sales before and after the campaign are significantly different at a 5% significance level.																									

MODULE - 06

17	Analyze the theoretical basis of Karl Pearson's correlation coefficient as a statistical measure of linear association between two variables. Outline the analytical steps involved in computing the correlation using statistical software using JASP. Additionally, infer the strength and direction of the relationship based on the obtained correlation results.	8	4	L4
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OR

18	You are tasked with conducting a One-Way ANOVA in JASP to assess whether there is a significant difference in the mean scores of a variable across different groups. Follow the steps below to perform the analysis using an example dataset, infer the results, and draw conclusions based on statistical output.	8	4	L4
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PART C

19	In a bustling city, a socio-economic survey was conducted to study the food expenditure patterns among working-class families in two localities, Place A and Place B. The researchers gathered data on the weekly food expenditure of families and compiled the following frequency distribution: <table><tr><th>Range of expenditure (In 00' Rs per week)</th><th>Number of families Place A</th><th>Number of families Place B</th></tr><tr><td>15-19</td><td>25</td><td>40</td></tr><tr><td>20-24</td><td>280</td><td>260</td></tr><tr><td>25-29</td><td>300</td><td>400</td></tr><tr><td>30-34</td><td>200</td><td>210</td></tr><tr><td>35-39</td><td>60</td><td>70</td></tr><tr><td>40-44</td><td>35</td><td>20</td></tr></table>	Range of expenditure (In 00' Rs per week)	Number of families Place A	Number of families Place B	15-19	25	40	20-24	280	260	25-29	300	400	30-34	200	210	35-39	60	70	40-44	35	20			
	Range of expenditure (In 00' Rs per week)	Number of families Place A	Number of families Place B																						
	15-19	25	40																						
	20-24	280	260																						
	25-29	300	400																						
	30-34	200	210																						
	35-39	60	70																						
	40-44	35	20																						
Assess the mean of food expenditure in each locality.	6	4	L5																						
Assess the standard deviation of food expenditure in each locality.	6	4	L5																						
Interpret the coefficient of variation (CV) to determine which locality has a more consistent food expenditure pattern.	10	4	L5																						

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SJC INSTITUTE OF TECHNOLOGY

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SECOND SEMESTER MBA DEGREE SEMESTER END EXAMINATIONS

JULY - AUGUST 2026

Course:	OPERATIONS RESEARCH		
Course Code:	MBA204	Program : MBA	
Max Marks:	100	Duration:	03 Hours

Instructions:

1. Part A and Part C (Case Study) are Compulsory
2. Part B questions are choice based

Q. No.	QUESTIONS	Marks	CO	RBTL
PART A				
1	Summarize the concept of operation research and classify the operations research models	5	1	L2
2	Illustrate the steps in formulating graphical method for an LPP.	5	1	L2
3	Outline the special cases in Transportation Problem.	5	1	L2
4	Summarize the meaning of pure strategy and Mixed strategy.	5	1	L2
5	Summarize the assumptions generally made in solving sequencing problems.	5	1	L2
6	Explain common errors in drawing networks using suitable diagrams.	5	1	L2
PART B				
MODULE - 01				
7	Elaborate the phases of operations research to optimize the scheduling process in a public transportation system, considering factors like passenger demand, fleet availability, and route efficiency.	8	2	L3
OR				
8	How would you apply quantitative decision-making models to improve inventory management in a retail business facing fluctuating demand and limited storage capacity?	8	2	L3
MODULE - 02				
9	"You are the operations manager at a manufacturing company that produces two models of a product: Model M1 and Model M2. Each Model M1 requires: 4 hours of grinding 2 hours of polishing Each Model M2 requires: 2 hours of grinding 5 hours of polishing The company has: 2 grinders available for 40 hours each per week → 80 grinding hours total. 3 polishers available for 60 hours each per week → 180 polishing hours total. - The profit per unit is ₹3 for Model M1 and ₹4 for Model M2. - All units produced are sold (no storage issues). Can you apply linear programming using the graphical method to: - Formulate the constraints based on grinding and polishing hours. - Define the objective function to represent total weekly profit. - Plot the constraints on a graph to identify the feasible production region. Determine the corner points of the feasible region.	8	2	L3

OR

10	You are managing the allocation of limited resources to two production activities, represented by decision variables x_1 and x_2. Each activity contributes to a total profit given by the objective function: $\text{Max } Z = 5x_1 + 7x_2$ Subject to resource constraints: $x_1 + x_2 \leq 4$ $3x_1 + 8x_2 \leq 24$ $10x_1 + 7x_2 \leq 35$ $x_1, x_2 \geq 0$ Can you apply the graphical method to: 1. Represent the constraints graphically. 2. Identify the feasible region. 3. Identify all corner points. 4. Solve the objective function Z at each corner point. Choose the combination of x_1 and x_2 that gives the maximum profit.	8	2	L3
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MODULE - 03

11	A logistics company operates three warehouses -S1, S2, S3 -to serve demand at three retail outlets - D1, D2, D3,D4 The unit transport costs (₹) between warehouses and outlets are:	8	2	L3																														
	<table><tr><th>Source</th><th>D₁</th><th>D₂</th><th>D₃</th><th>D₄</th><th>Supply</th></tr><tr><td>S₁</td><td>19</td><td>30</td><td>50</td><td>10</td><td>7</td></tr><tr><td>S₂</td><td>70</td><td>30</td><td>40</td><td>60</td><td>9</td></tr><tr><td>S₃</td><td>40</td><td>8</td><td>70</td><td>20</td><td>18</td></tr><tr><td>Demand</td><td>5</td><td></td><td>7</td><td>14</td><td>34</td></tr></table>				Source	D ₁	D ₂	D ₃	D ₄	Supply	S ₁	19	30	50	10	7	S ₂	70	30	40	60	9	S ₃	40	8	70	20	18	Demand	5		7	14	34
	Source				D ₁	D ₂	D ₃	D ₄	Supply																									
	S ₁				19	30	50	10	7																									
	S ₂				70	30	40	60	9																									
	S ₃				40	8	70	20	18																									
Demand	5		7	14	34																													
Examine how Vogel's Approximation Method – allocate shipments step-by-step between hubs and zones, showing the logic behind each choice.																																		

OR

12	Compare and contrast the initial feasible solutions obtained using the North West Corner Method, Least Cost Method for the given transportation problem. Analyze how the structure of cost coefficients and supply-demand values influence the allocation decisions in each method. <table border="1"> <thead> <tr> <th>Plant</th><th colspan="3">Distribution centre</th><th>Production</th></tr> </thead> <tbody> <tr> <td>P1</td><td>6</td><td>4</td><td>12</td><td>10</td></tr> <tr> <td>P2</td><td>10</td><td>6</td><td>5</td><td>80</td></tr> <tr> <td>P3</td><td>15</td><td>16</td><td>8</td><td>70</td></tr> <tr> <td>Demand</td><td>20</td><td>50</td><td>90</td><td></td></tr> </tbody> </table> Examine how the differences in cost matrix influence the selection of cells in each method & which method provides a more cost effective initial solution.	Plant	Distribution centre			Production	P1	6	4	12	10	P2	10	6	5	80	P3	15	16	8	70	Demand	20	50	90		8	2	L3
Plant	Distribution centre			Production																									
P1	6	4	12	10																									
P2	10	6	5	80																									
P3	15	16	8	70																									
Demand	20	50	90																										

MODULE - 04

13	Analyze the cost structure of assigning four industrial tasks (such as packaging, assembly, inspection, and dispatch) to four production employees based on their efficiency costs. Using the Hungarian method, determine the optimal task allocation that minimizes total operational cost. Categorize your assignment with appropriate reasoning and infer the impact of this allocation on cost-efficiency in a real-time manufacturing environment.					8	3	L4		
	Tasks		Persons							
			P1	P2	P3				P4	
			T1	42	35				28	21
			T2	30	25				20	15
			T3	30	25				20	15
T4	24	20	16	12						

OR

14

In In The context of strategic decision-making between two competing players (Player A and Player B), in an industrial market, apply the graphical method for the following two-person zero-sum game. Categorize the optimal mixed strategy for Player A and the corresponding value of the game. Infer the results to guide Player A's strategic action plan in a competitive environment.

8**3****L4**

		Player B				
Player A		1	2	3	4	5
	1	-5	5	0	-1	8
	2	8	-4	-1	6	-5

MODULE - 05

15

A foreman wants to process 4 different jobs on 3 Machines: a shaping machine, drilling machine and tapping machine. The sequence of the operations being shaping-drilling-tapping. Categorize the optimal sequence for the four jobs to minimize the time elapsed and find the total idle time. The processing time in minutes is as given in the table.

8**3****L4**

Jobs	Machine		
	Shaping	Drilling	Tapping
1	13	3	18
2	18	8	4
3	8	6	13
4	23	6	8

OR

16

Analyze the simulation process used in an industrial setting to model complex production or service operations. Examine how simulation helps in improving decision-making and operational efficiency.

8**3****L4****MODULE - 06**

17

Given the following activity details for an industrial project schedule, analyze the project network by constructing a network diagram (including any necessary dummy activities). Examine the interdependencies among tasks, critical path, and total project duration. Infer the results to assess potential scheduling resource efficiency.

risks and allocation

8**3****L4**

Activity	Predecessor	Duration
A	-	2
B	A	3
C	A	4
D	B,C	6
E	-	2
F	E	8

OR

18

In the context of managing a complex industrial project, analyze the following activity data using the Program Evaluation and Review Technique (PERT). Examine the critical path and compute the project's variance and standard deviation. The probabilities of project completion under different scheduling scenarios and assess potential project risk is given;

Activity	Estimated Duration		
	Optimistic	Most likely	Pessimistic
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

8**3****L4**

	i) Categorize the project network diagram by identifying task dependencies. Find the expected duration and variance for each activity what is the expected project length. ii) Infer the results to find probabilities of finishing early, on-time, or late using normal distribution concepts. a. At least 4 weeks earlier than expected time. b. No more than 4 weeks later than expected time c. If the project due date is 19 weeks what is the probability of the meeting the due date.																																
PART C																																	
19	a) Evaluate the suitability of PERT and CPM techniques for managing large-scale industrial projects with varying levels of activity uncertainty. Justify which method would be more effective for a project with high variability in task durations and provide reasons based on project objectives and risk management considerations. Logistics company operates three warehouses—S1, S2, S3—to serve demand at three retail outlets—D1, D2, D3. The unit transport costs (₹) between warehouses and outlets are: <table border="1"> <thead> <tr> <th></th><th colspan="3">Destination</th><th rowspan="2">Supply</th></tr> <tr> <th></th><th>D1</th><th>D2</th><th>D3</th></tr> </thead> <tbody> <tr> <td>S1</td><td>8</td><td>6</td><td>10</td><td>300</td></tr> <tr> <td>S2</td><td>12</td><td>16</td><td>10</td><td>400</td></tr> <tr> <td>S3</td><td>14</td><td>10</td><td>12</td><td>300</td></tr> <tr> <td>Demand</td><td>450</td><td>350</td><td>200</td><td></td></tr> </tbody> </table>		Destination			Supply		D1	D2	D3	S1	8	6	10	300	S2	12	16	10	400	S3	14	10	12	300	Demand	450	350	200		6	4	L5
	Destination			Supply																													
	D1	D2	D3																														
S1	8	6	10	300																													
S2	12	16	10	400																													
S3	14	10	12	300																													
Demand	450	350	200																														
	b) Interpret & Assess the LCM-based initial allocation provided—identify which warehouse-market pairings were chosen and assess how supply and demand constraints were addressed.	6	4	L5																													
	c) Interpret the Modified Distribution (MODI) method to determine u-v potentials and opportunity costs for unused routes. Identify any negative opportunity costs and interpret their meaning in this logistical context. Judge whether the manager's LCM plan is optimal.	10	4	L5																													

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SJC INSTITUTE OF TECHNOLOGY

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SECOND SEMESTER M.Tech DEGREE SEMESTER END EXAMINATIONS

JULY - AUGUST 2026

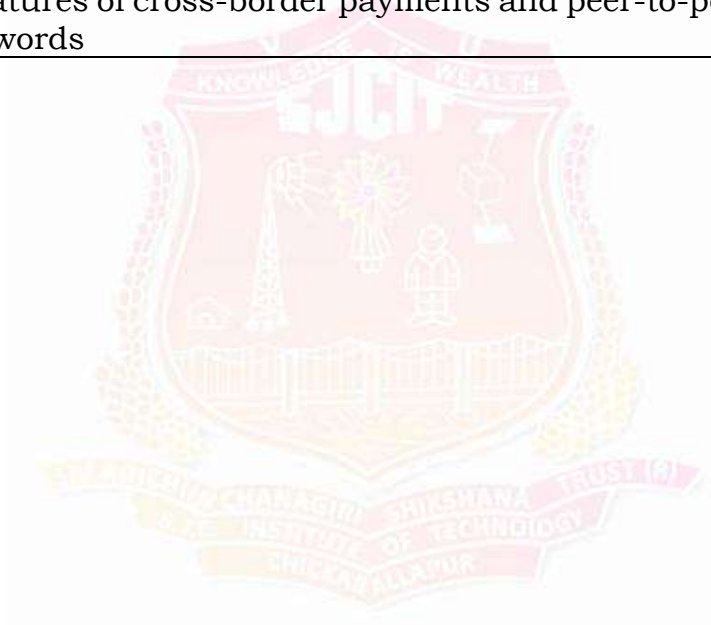
Course:	BLOCK CHAIN TECHNOLOGY		
Course Code:	MCS204A	Program:	M.Tech in Computer Science & Engineering
Max Marks:	100		Duration: 03 Hours

Note:

1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.
2. Any missing Data can be suitably assumed.

Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	Define block chain technology and list its main components.	4	1	L1
	b	Summarize the network view of Block chain with a neat diagram.	8	1	L2
	c	Identify the relevance of the CAP theorem in block chain design, with a focus on scenarios where consistency and partition tolerance are prioritized.	8	1	L3
MODULE – 2					
Q2	a	What is Hash function? List the properties of hash functions depending on the level of the requirements of integrity.	4	1	L1
	b	Outline asymmetric cryptography with suitable diagrams	8	1	L2
	c	Construct the various methods of decentralization.	8	1	L3
MODULE – 3					
Q3	a	What are the main types of transactions in Bit coin?	4	2	L1
	b	Interpret the Transaction structure in the Bit coin	8	2	L2
	c	Construct the composition of a block chain block and detail the elements contained within its block header.	8	2	L3
OR					
Q4	a	What is the purpose of mining in Bit coin?	4	2	L1
	b	Differentiate between a hard fork and a soft fork.	8	2	L2
	c	Apply the Merkle root in a block header to verify that a specific transaction is included in a block?	8	2	L3
MODULE – 4					
Q5	a	Define Ethereum, and how does it extend the functionality of Bitcoin's block chain model?	4	2	L1
	b	Compare and contrast Ricardian contracts with smart contracts	8	2	L2
	c	Utilize the concept of the Ethereum blockchain to show how a transaction changes the system state, using a state transition diagram to illustrate the process	8	2	L3

OR					
Q6	a	What is an Ethereum client? Name and describe at least two widely used Ethereum clients.	4	2	L1
	b	Describe the world state in the Ethereum	8	2	L2
	c	Apply the key components of the Ethereum high-level ecosystem and their interconnections.	8	2	L3
MODULE – 5					
Q7	a	Which technology ensures tamper-proof patient records ? Why.	4	3	L1
	b	Explain the benefits of IoT and block chain convergence	8	3	L2
	c	Analyze the components of IoT architecture and illustrate them with a simple diagram	8	3	L4
OR					
Q8	a	What is the role of block chain in IoT device security	4	3	L1
	b	Explain the application architecture of the room rent IoT application with a neat diagram	8	3	L2
	c	Discover the key features of cross-border payments and peer-to-peer loans in your own words	8	3	L4



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SECOND SEMESTER M.Tech DEGREE SEMESTER END EXAMINATIONS

JULY - AUGUST 2026

Course:	MECHANICS OF DEFORMABLE BODIES & FRACTURE MECHANICS			
Course Code:	MCV204	Program:	M.Tech in Structural Engineering	
Max Marks:	100	Duration:	03 Hours	

Note:

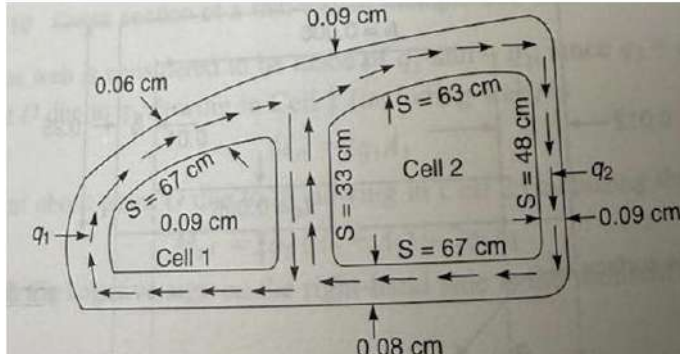
1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.
2. Any missing Data can be suitably assumed.
3. Use of Steel Tables is permitted

Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	Derive the differential equation of equilibrium in 3D Cartesian coordinates.	10	1	L3
	b	The components of strain at a point in a body are as follows: $\epsilon_x = c_1 z(x^2 + y^2)$, $\epsilon_y = x^2 z$, $\gamma_{xy} = 2c_2 xyz$ where c_1 and c_2 are constants, check whether the strain fields are compatible.	10	1	L3
MODULE - 2					
Q2	a	The strain components at a point with respect to xyz coordinate system are $\epsilon_x = 0.1$, $\epsilon_y = 0.2$, $\epsilon_z = 0.3$, $\gamma_{xy} = \gamma_{yz} = \gamma_{zx} = 0.16$. If the coordinate axes are rotated about the z axis through 45° in the anticlockwise direction, determine the new strain components.	10	2	L3
	b	When the stress tensor at a point with reference to axis (x,y,z) given by the array $\begin{bmatrix} 4 & 1 & 2 \\ 1 & 6 & 0 \\ 2 & 0 & 8 \end{bmatrix}$ MPa, show that by transformation of the axis by 45° about the z axis, the stress invariants remain unchanged.	10	2	L3
MODULE - 3					
Q3	a	Discuss the effect of a circular hole on stress distribution in a rectangle plate subjected to tensile stress in X direction and hence evaluate stress concentration factor.	20	3	L3
OR					
Q4	a	Prove that the following are Airy's stress functions and examine the stress distribution represented by them $\phi = Ax^2 + By^2$.	10	3	L2
	b	Given the stress function $\phi = -(\frac{F}{h^3}) xy^2 (3h - 2y)$. Determine the stress components and sketch their variations in a region included in $y=0$, $y=h$, $x=0$, on the side x positive.	10	3	L3

MODULE - 4

Q5	a	Derive the Poisson's equation $\nabla^2\phi = -2G\theta$ for the torsion of prismatic bars of non-circular cross section.	10	4	L3
	b	A hollow circular torsion member has an outside diameter of 22mm and inside diameter of 18mm, with a mean diameter $D=20\text{mm}$ and $t/D=0.1$. Calculate the torque and angle of twist per unit length. If shearing stress at mean diameter is 70MPa. Calculate this value if a cut is made through the wall thickness along the entire length $G=77.5\text{MPa}$.	10	4	L3

OR

Q6	a	Derive the expression for torsion of circular cross section.	10	4	L3
	b	A two-cell tubular section shown below is formed by conventional air foil shape having an interior web twisting moment 10000Nm. Determine the shear for distribution and shear stress area of cell 1=680 cm² and area of cell 2=2000 cm². 	10	4	L3

MODULE - 5

Q7	a	What is fracture mechanics and how does it apply to concrete structures?	6	5	L1
	b	Explain why Linear Elastic Fracture Mechanics (LEFM) cannot be directly applied to concrete and state its limitations.	6	5	L2
	c	Analyze how the quasi-brittle nature of concrete influences its failure behavior.	8	5	L4

OR

Q8	a	State the behavior of concrete under tensile and compressive loads.	6	5	L1
	b	Explain how fracture energy is measured experimentally and the factors affecting its value.	6	5	L2
	c	Analyze how softening behavior affects the design and analysis of concrete behavior.	8	5	L4



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SECOND SEMESTER M.Tech DEGREE SEMESTER END EXAMINATIONS

JULY - AUGUST 2026

Course:	WIRELESS SENSOR NETWORKS			
Course Code:	MLDN204	Program:	M.Tech in Digital Communication & Networking	
Max Marks:	100		Duration:	03 Hours

Note:

1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.
2. Any missing Data can be suitably assumed.

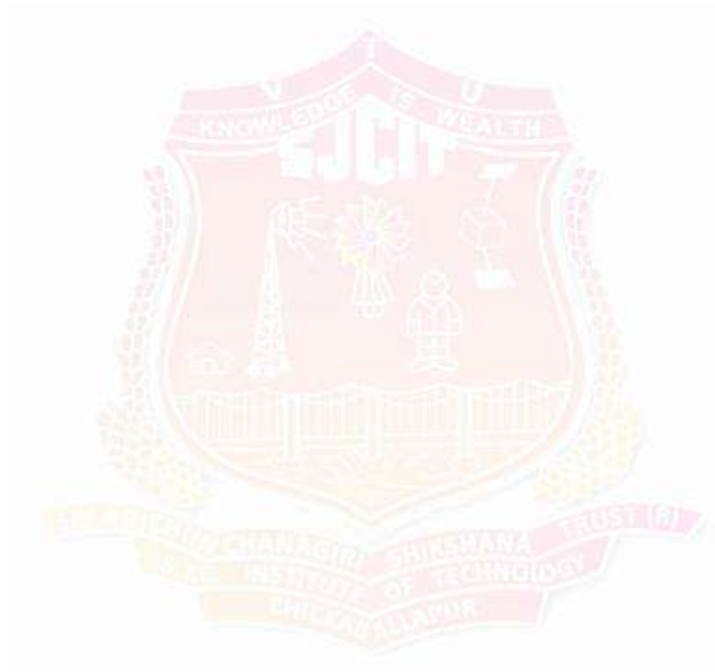
Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	Illustrate and explain the protocol stack used in WSN with a diagram.	10	1	L3
	b	Analyze the advantages and challenges of using smart dust for detecting enemy movement versus traditional surveillance methods in military operations.	10	1	L2
MODULE - 2					
Q2	a	Evaluate the trade-offs between energy efficiency and network reliability when selecting a WSN topology.	10	2	L3
	b	Evaluate the effectiveness of channel coding techniques in reducing the bit error rate in wireless sensor networks.	10	2	L2
MODULE - 3					
Q3	a	Explain how the CSMA mechanism helps to avoid collisions in WSNs.	10	3	L2
	b	Describe the setup phase of Z-MAC, including topology construction and time slot distribution.	10	3	L3
OR					
Q4	a	Describe the role of cluster heads in hierarchical WSN protocols.	10	3	L2
	b	Explain why energy efficiency is a critical challenge in WSN routing.	10	3	L3
MODULE - 4					
Q5	a	Illustrate with an example how nodes in PSFQ request missing data segments from neighbors.	10	4	L2
	b	Apply the core construction concept to optimize routing paths in WSNs using GARUDA.	10	4	L3
OR					
Q6	a	Explain the step-by-step phases involved in TAG's query distribution and collection process.	10	4	L2
	b	Explain the role of SNMS in managing wireless sensor networks.	10	4	L3

MODULE – 5

Q7	a	Using any three major design issues in operating systems, explain their significance and illustrate how they impact the overall functionality of an OS.	10	5	L2
	b	Explain how TOSSIM simulates TinyOS applications for wireless sensor networks.	10	5	L3

OR

Q8	a	Describe the priority levels used in MANTIS OS thread management.	10	5	L2
	b	Explain how PicOS's coroutine-based multitasking works differently from traditional threading.	10	5	L3



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SECOND SEMESTER M.Tech DEGREE SEMESTER END EXAMINATIONS

JULY - AUGUST 2026

Course:	SUSTAINABILITY ENGINEERING			
Course Code:	MME204C	Program:	M.Tech in Machine Design	
Max Marks:	100		Duration:	03 Hours

Note:

1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.
2. Any missing Data can be suitably assumed.

Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	Define the term sustainable development. How does renewable energy technology contribute to sustainable Development?	6	1	L1
	b	Explain the concept of environmental sustainability with an example.	6	1	L3
	c	Apply the concept of sustainability to urban planning. How does it impact infrastructure?	8	1	L3
MODULE - 2					
Q2	a	Define Environmental pollution. List out the different types of Environmental pollution. Explain any two.	6	2	L1
	b	State the full form of the 3Rs in solid waste Management. List any four major sources of water pollution.	8	2	L2
	c	Apply the 3R concept in managing waste at your school or home. Give examples.	6	2	L3
MODULE - 3					
Q3	a	Explain IS)14001:2015 frame work and benefits of Environmental Management Standards.	10	3	L2
	b	How can an industry implement ISO14001:2015 in its daily operations?	10	3	L3
OR					
Q4	a	Discuss the scope of Life Cycle Analysis (LCA) in environmental studies.	10	3	L2
	b	Suggest a step-by-step plan to integrate ISO14001:2015 in a manufacturing company.	10	3	L3
MODULE - 4					
Q5	a	What are conventional energy resources? Give two Examples.	6	4	L1
	b	Distinguish between Conventional and Non-Conventional Energy resources.	6	4	L2
	c	Design a simple model using solar panels to power a street light. Mention components used.	8	4	L4

OR

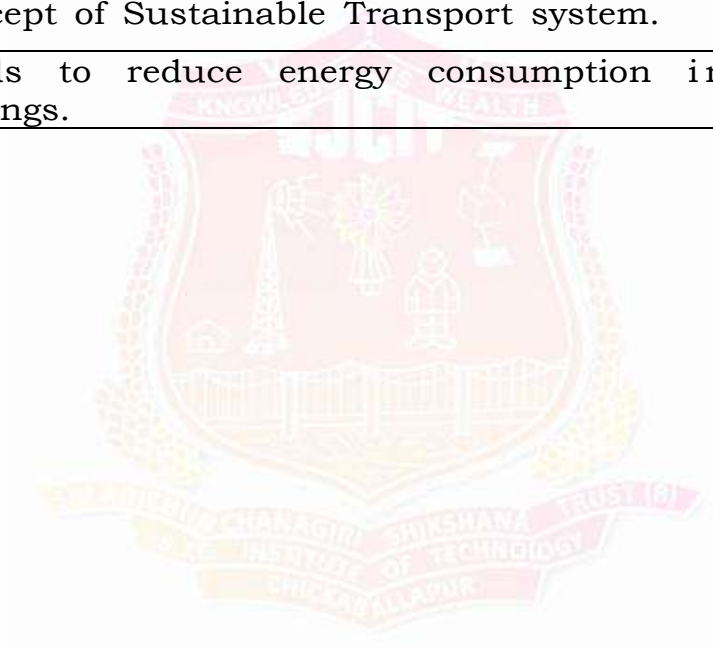
Q6	a	What are Non-conventional energy resources? Give two examples.	6	4	L1
	b	Write a short notes on Biofuels and Hydro plants.	6	4	L2
	c	Write the advantages, Limitations and applications of Solar and wind energy in the current trend.	8	4	L4

MODULE - 5

Q7	a	List any four renewable energy sources used in sustainable buildings. Mention any two passive design strategies used in sustainable construction.	6	5	L1
	b	Explain the basic principles of a sustainable habitat.	6	5	L3
	c	Propose ways to utilize natural ventilation in a school	8	5	L4

OR

Q8	a	What do you mean by sustainable development goals? List its goals.	6	5	L1
	b	Explain the concept of Sustainable Transport system.	6	5	L3
	c	Suggest methods to reduce energy consumption in residential buildings.	8	5	L4





SJC INSTITUTE OF TECHNOLOGY
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SECOND SEMESTER MBA DEGREE SEMESTER END EXAMINATIONS
JULY - AUGUST 2026

Course:	CORPORATE STRATEGY		
Course Code:	MBA205	Program : MBA	
Max Marks:	100	Duration:	03 Hours

Instructions:

1. Part A and Part C (Case Study) are Compulsory
2. Part B questions are choice based

Q. No.	QUESTIONS	Marks	CO	RBTL
PART A				
1	Explain how strategic management helps organizations respond to external challenges.	5	1	L2
2	Outline the main steps involved in performing an external audit.	5	1	L2
3	Classify various types of benchmarking.	5	1	L2
4	Relate a company use Blue Ocean Strategy in strategic decision making to create new market opportunities?	5	1	L2
5	Interpret any two major issues faced during strategy implementation.	5	1	L2
6	Extend the importance of strategic evaluation.	5	1	L2
PART B				
MODULE - 01				
7	"A good strategy is useless without proper execution and alignment with the business model." Apply this statement by explaining the link between a company's strategy and its business model.	8	2	L3
OR				
8	"Strategic Management provides direction, discipline, and control to decision-making." Solve this statement with reference to the benefits and key terms of strategic management.	8	2	L3
MODULE - 02				
9	"Porter's Five Forces is a tool, not a solution." Discuss this in the context of its application in strategic decision making.	8	2	L3
OR				
10	"Identifying and focusing on Key Success Factors are vital for survival and growth with in competitive industries." Choose the different KSF's with relevant examples.	8	2	L3
MODULE - 03				
11	A company is failing to execute its strategy despite having a clear vision and strong leadership. Apply the 7 S model and discuss the framework.	8	3	L3
OR				
12	Organize the process of Value Chain Analysis (VCA) and its role in identifying internal strength and weakness.	8	3	L3

MODULE - 04				
13	Diversification strategy aims to reduce risk by creating multiple revenues streams and can lead to increased market share and profitability. Examine the different ways of diversification strategy.	8	3	L4
OR				
14	Compare and contrast integration strategies and intensive strategies. How do organizations decide? Which to adopt?	8	3	L4
MODULE - 05				
15	“Strategy implementation is more difficult than strategy formulation.” Critically examine this statement by discussing key issues involved in strategy implementation.	8	3	L4
OR				
16	“Restructuring helps a company adapt to external changes, while re-engineering improves internal processes.” Test this statement in the context of strategy implementation.	8	3	L4
MODULE - 06				
17	The Balanced Scorecard (BSC) serves as a strategic management framework that converts an organization’s vision into specific, measurable objectives. Examine the advantages and drawbacks of using the Balanced Scorecard and support your answer with a neat diagram.	8	4	L4
OR				
18	Can ESG goals are feasible to integrate into corporate strategic planning? Analyze the benefits and challenges associated with this integration?	8	4	L4
PART C				
19	Hotstar: Is It Winning the Indian Streaming War? Hotstar (now rebranded as Disney+ Hotstar) has emerged as one of India’s leading over-the-top (OTT) streaming platforms, dominating the market with its vast content library, live sports offerings, and strategic pricing. Launched in 2015 by Star India, Hotstar quickly gained traction by providing free and premium access to TV shows, movies, and live sports, particularly cricket, which holds a massive fanbase in India. Its acquisition by Disney in 2019 further strengthened its position, integrating Disney+ content alongside Hotstar’s existing offerings. However, with increasing competition from global giants like Netflix, Amazon Prime Video, and homegrown players like ZEE5 and SonyLIV, the question arises: Is Hotstar truly winning the Indian streaming war? One of Hotstar’s biggest strengths is its focus on localization and regional content. India is a diverse market with varied linguistic preferences, and Hotstar has successfully tapped into this by offering content in multiple languages, including Hindi, Tamil, Telugu, Bengali, and more. Additionally, its exclusive streaming rights for major cricket tournaments, such as the Indian Premier League (IPL) and ICC events, have been a game-changer, attracting millions of viewers. The platform also leveraged affordable pricing, introducing a VIP subscription at just ₹399 per year, making premium content accessible to a broader audience. However, Hotstar faces significant challenges. The loss of HBO content in 2022 due to Warner Bros. Discovery’s partnership with Amazon Prime Video was a major setback. Furthermore, rising competition from Jio Cinema, which secured IPL streaming rights in 2023, has threatened Hotstar’s dominance in live sports. Netflix and Amazon Prime Video, though pricier, continue to lure urban audiences with high-quality originals and global content. Despite these hurdles,			

Hotstar maintains a strong user base, reporting over 57 million paid subscribers as of 2023, making it India's largest subscription-based OTT platform. The future of Hotstar hinges on its ability to retain cricket viewership, expand its regional and original content, and innovate with pricing models to stay ahead. While it currently leads in terms of subscribers, the dynamic nature of India's OTT market means that continuous adaptation is necessary to sustain its dominance.			
a) Determine the key factors behind Hotstar's dominance in the Indian OTT market?	6	4	L5
b) How has the loss of IPL rights and HBO content impacted Hotstar's growth? Interpret your answer	6	4	L5
c) Can Hotstar sustain its leadership in India's OTT market amid rising competition? Justify your answer.	10	4	L5



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SECOND SEMESTER M.Tech DEGREE SEMESTER END EXAMINATIONS

JULY - AUGUST 2026

Course:	ADVANCES IN SOFTWARE ENGINEERING			
Course Code:	MCS205B	Program:	M.Tech in Computer Science & Engineering	
Max Marks:	100		Duration:	03 Hours

Note:

1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.
2. Any missing Data can be suitably assumed.

Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	Explain how a UML class diagram represents the structure and relationships within a software system in the context of software engineering. Illustrate your answer with key features shown in a typical class diagram.	4	1	L2
	b	Analyze how the implementation of key management activities in software project management can affect the level of software quality achieved. Support your analysis with specific examples or case scenarios that demonstrate the relationship between these management activities and high-level software quality.	6	1	L3
	c	Analyse the Air Traffic Control System domain using Object Oriented Modelling.	10	1	L4
MODULE - 2					
Q2	a	List and explain the requirement elicitation activities.	4	2	L2
	b	Categorize the nonfunctional requirements.	6	2	L3
	c	With UML activity diagram analyse the example of a revision process in Client Sign-Off.	10	2	L4
MODULE - 3					
Q3	a	Discuss the three control flow mechanisms helpful in sequencing actions.	4	3	L2
	b	Apply any one of the three approaches to design an access matrix for a multi-user operating system and explain how your chosen approach enforces access control.	6	3	L3
	c	Analyze the UML component diagram of the WebServer to explain how the provided and required interfaces interact, and evaluate the role of the HttpService class in realizing the HTTP interface	10	3	L4
OR					
Q4	a	With the help of UML activity diagram explain the activities of system design.	4	3	L2
	b	Explain a closed architecture in the Reference Model of Open Systems Interconnection (OSI Model)	6	3	L3
	c	Analyze the tradeoff between the storage management techniques which help in making decisions for selecting them	10	3	L4

MODULE – 4					
Q5	a	Describe an inheritance UML Class diagram with an example.	4	4	L2
	b	Design an UML diagram with a JAVA code for Adapter design pattern for sorting Strings in an Array.	6	4	L3
	c	Analyse the situation “define a stable architecture to deal with complexity, but we also want to allow flexibility to deal with change later in the development process.” Provide a solution to the above conflict problem.	10	4	L4
OR					
Q6	a	Interpret the Liskov Substitution Principal for “If an object of type S can be substituted in all the places where an object of type T is expected, then S is a subtype of T.”	4	4	L2
	b	Describe object design document. Briefly explain the three approaches to documenting	6	4	L2
	c	Analyse an Adapter Design Pattern for Convert the interface of a legacy class into a different interface expected by the client, so that the client and the legacy class can work together without changes.	10	4	L4
MODULE – 5					
Q7	a	Recite the principles in detail that involved to avoid introducing new errors.	4	5	L2
	b	Describe the Object Design Document (ODD). List and brief the three main approaches to documenting	6	5	L3
	c	Analyse the key activities involved in interface specification and explain how they ensure compatibility and coordination between different system components.	10	5	L4
OR					
Q8	a	Show how Facade simplifies the client interface with a neat diagram	4	5	L2
	b	Design and explain the UML class diagram for model elements used during testing.	6	5	L3
	c	Analyse the principal concepts of interface specification and explain how they contribute to defining clear contracts between system components.	10	5	L4

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SJC INSTITUTE OF TECHNOLOGY

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SECOND SEMESTER M.Tech DEGREE SEMESTER END EXAMINATIONS

JULY - AUGUST 2026

Course:	ADVANCED FOUNDATION ENGINEERING			
Course Code:	MCV215A	Program:	M.Tech in Structural Engineering	
Max Marks:	100	Duration:	03 Hours	

Note:

1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.
2. Any missing Data can be suitably assumed.
3. Use of Steel Tables is permitted

Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	List the different methods of site investigation.	4	1	L1
	b	Explain the Steps involved in Preparing Geotechnical Investigation Report	8	1	L2
	c	A square footing of size 2 m × 2 m is founded at a depth of 1.5 m in sand having $C=0$, $\phi=30^\circ$, $\gamma=18\text{kN/m}^3$. Water table is well below foundation level. Use Terzaghi's bearing capacity equation and FOS = 3. Bearing capacity factors: $N_q=18.4$, $N_\gamma=15.7$. Calculate the safe bearing capacity.	8	1	L3
MODULE - 2					
Q2	a	List the types of foundations considered in SSI analysis.	4	2	L1
	b	Explain the contact pressure distribution under foundations.	8	2	L2
	c	Illustrate the application of elastic continuum concepts to foundation problems.	8	2	L3
MODULE - 3					
Q3	a	State the purpose of IS code provisions for pile design.	4	3	L1
	b	Explain the classification of deep foundations.	8	3	L2
	c	A concrete pile of diameter 0.4 m and length 12m is driven in to clayey soil. Unit skin friction= 40kN/m^2 . End bearing resistance = 600kN/m^2 . Factor of safety =2.5. Calculate the safe load carrying capacity of the pile.	8	3	L3
OR					
Q4	a	Define pile group efficiency and skin friction in pile.	4	3	L1
	b	Differentiate between end-bearing and friction piles.	8	3	L2
	c	Calculate the load carrying capacity of a pile group.	8	3	L3

MODULE – 4

Q5	a	List the practical applications of mat(raft) foundations.	4	4	L1
	b	Explain rigid and flexible raft foundations with neat sketches.	8	4	L2
	c	Analyze the structural behavior of a square raft foundation of size 4 m × 4 m supporting a column load of 800 kN and determine the required reinforcement using M20 concrete and Fe 500 steel.	8	4	L4

OR

Q6	a	State the purpose of providing beam-slab and cellular slab foundations.	4	4	L1
	b	Explain the selection of raft foundations over pile foundations for specific conditions.	8	4	L2
	c	Analyse the given site conditions of soft soil, closely spaced columns, and potential differential settlement, and justify the selection of a beam-slab raft foundation for the proposed structure.	8	4	L4

MODULE – 5

Q7	a	List the objectives of ground improvement techniques.	4	5	L1
	b	Explain how grouting strengthens soil.	6	5	L2
	c	Assess the suitability of various geosynthetic materials for different geotechnical engineering applications.	10	5	L5

OR

Q8	a	Name common stabilizing agents used in soil stabilization.	4	5	L1
	b	Explain the need for ground improvement in weak soils.	6	5	L2
	c	Evaluate different chemical stabilization methods for improving problematic soils used in foundation engineering.	10	5	L5



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SECOND SEMESTER M.Tech DEGREE SEMESTER END EXAMINATIONS

JULY - AUGUST 2026

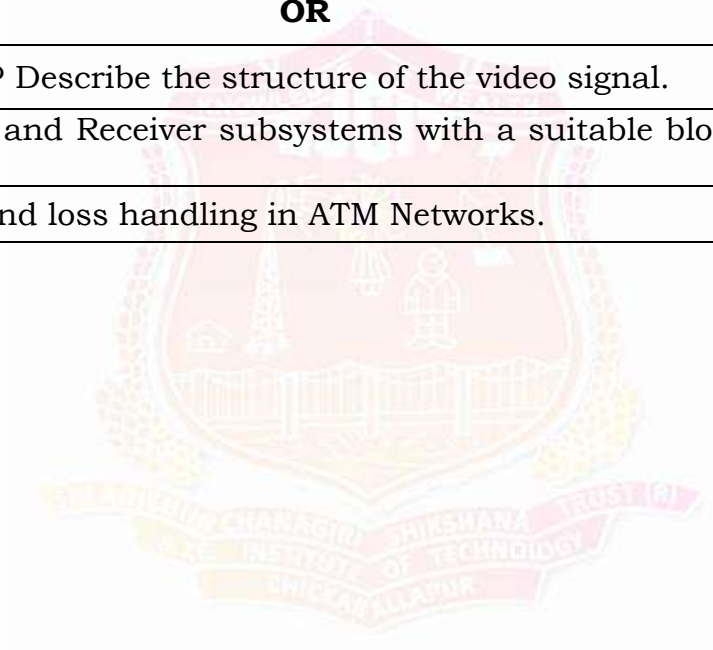
Course:	MULTIMEDIA OVER COMMUNICATION LINKS			
Course Code:	MLDN215A	Program:	M.Tech in Digital Communication & Networking	
Max Marks:	100		Duration:	03 Hours

Note:

1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.
2. Any missing Data can be suitably assumed.

Q. No.	MODULE - 1		Marks	CO	RBTL
Q1	a	List and explain the functionality of set of standards in multimedia communications.	6	1	L1
	b	Define a Reference Model. Explain the role of each layer in TCP/IP reference model with a neat diagram.	8	1	L2
	c	Apply H.223 multiplex principles to explain structure of the multiplexed byte stream and usage of multiplex table	6	1	L3
MODULE - 2					
Q2	a	Define and Explain a block scheme of a summarized DMS.	6	2	L1
	b	Illustrate the typical structure of an IP network.	8	2	L2
	c	Compare ATM Protocol stack and OSI Protocol stack.	6	2	L3
MODULE - 3					
Q3	a	List and explain the distinguishing features that make digital media superior to the analog media.	6	3	L1
	b	Describe Absolute threshold of hearing and Critical band frequency analysis with relevant diagrams.	8	3	L2
	c	Make use of Audio Subband Coders to explain Wavelet decomposition with a relevant diagram.	6	3	L3
OR					
Q4	a	Define multimedia signal processing? Outline the block diagram for digital audio signal processing.	6	3	L1
	b	Define MDCT? Explain the Transform Domain-Weighted Interleave Vector Quantization (TWIN-VQ) encoder with a neat diagram.	8	3	L2
	c	Make use of Audio Subband Coders to explain Wavelet packet decomposition with a relevant diagram.	6	3	L3
MODULE - 4					
Q5	a	What is MPEG-1? Explain the block diagram of a basic DCT encoder and decoder structure.	6	3	L1
	b	Describe the data flow in the decoder for SNR scalability in MPEG-2 with a neat diagram.	8	3	L2

	c	Identify the main components of the Object Descriptor (OD) and explain it briefly.	6	3	L3
OR					
Q6	a	List the requirements for the MPEG-4 video standard.	6	3	L1
	b	Discuss the scope of the MPEG-2 Systems standard in relation to the video and audio parts and the broadband equipment with a relevant diagram.	8	3	L2
	c	Make use of System Decoder Model (SDM) to explain Elementary Stream (ES) Synchronization with a relevant diagram.	6	3	L3
MODULE – 5					
Q7	a	Define NTI and CTI. Discuss the two basic approaches of the reconstruction process.	6	4	L1
	b	Explain the layer structure of a network-based multimedia system with a neat diagram.	8	4	L2
	c	Analyze why the information is delayed in ATM networks and explain the example of multiplexing w.r.t frame-based interleaving scheme.	6	4	L3
OR					
Q8	a	Define Packet Video? Describe the structure of the video signal.	6	4	L1
	b	Outline Transmitter and Receiver subsystems with a suitable block diagram.	8	4	L2
	c	Analyze the Errors and loss handling in ATM Networks.	6	4	L3



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SECOND SEMESTER M.Tech DEGREE SEMESTER END EXAMINATIONS

JULY - AUGUST 2026

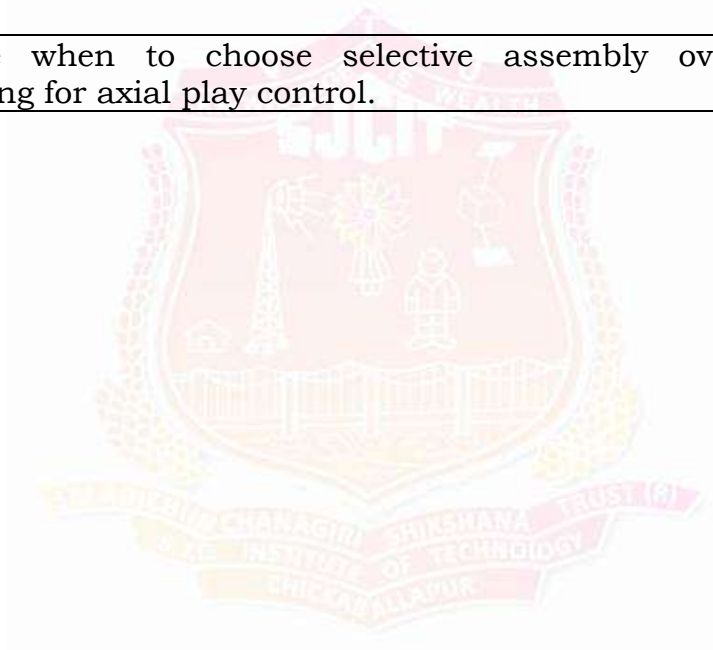
Course:	DESIGN FOR MANUFACTURING AND ASSEMBLY			
Course Code:	MME205C	Program:	M.Tech in Machine Design	
Max Marks:	100	Duration:	03 Hours	

Note:

1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.
2. Any missing Data can be suitably assumed.

Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	List any four advantages of applying Design for Manufacture and Assembly (DFMA).	4	1	L1
	b	Describe the advantages of applying Design for Manufacturing and Assembly (DFMA) during the design phase.	8	1	L2
	c	Compare injection molding and die casting in terms of material compatibility, cost, and production rate.	8	1	L3
MODULE - 2					
Q2	a	List the types of machining tools used in component design.	4	2	L1
	b	Describe the role of datum features in ensuring proper alignment during machining.	8	2	L2
	c	Suggest modifications to reduce machining areas in a complex component design.	8	2	L3
MODULE - 3					
Q3	a	What is the difference between cast holes and machined holes?	4	3	L1
	b	Define a mould in sand casting and list its essential features.	6	3	L2
	c	Suggest a component design modification to avoid using sand cores.	10	3	L3
OR					
Q4	a	What is importance of design components to avoid the use of sand cores?	4	3	L1
	b	Explain the function of sand cores in casting processes.	6	3	L2
		Modify a component to reduce machining effort after casting.	10	3	L3
MODULE - 4					
Q5	a	What is the purpose of a mold in injection molding?.	4	4	L1
	b	List commonly used materials in injection molding with their key properties.	6	4	L2
	c	Select a suitable material for manufacturing a mobile phone body using injection molding and justify your choice.	10	4	L3

OR					
Q6	a	What is insert molding? Define the injection molding cycle.	4	4	L1
	b	What is meant by 'mold flow' in injection molding?	6	4	L2
	c	Choose appropriate mold type for high-volume production of bottle caps and explain your selection.	10	4	L3
MODULE – 5					
Q7	a	Define selective assembly and state its main purpose.	4	5	L1
	b	What is meant by selective assembly in interchangeable part manufacturing?	6	5	L2
	c	Compare selective assembly with post-process fitting methods like hand-lapping.	10	5	L4
OR					
Q8	a	List any two methods used for controlling axial play in assemblies.	4	5	L1
	b	Describe how mating part tolerances affect selective assembly grouping.	6	5	L2
	c	Critically examine when to choose selective assembly over secondary machining for axial play control.	10	5	L4



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SJC INSTITUTE OF TECHNOLOGY
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SECOND SEMESTER MBA DEGREE SEMESTER END EXAMINATIONS
JULY - AUGUST 2026

Course:	ENTREPRENEURSHIP DEVELOPMENT		
Course Code:	MBA206	Program : MBA	
Max Marks:	100	Duration:	03 Hours

Instructions:

1. Part A and Part C (Case Study) are Compulsory
2. Part B questions are choice based

Q. No	QUESTIONS	Marks	CO	RBTL
PART A				
1	Outline the functions of an entrepreneur.	5	1	L2
2	Explain the Osterwalder Business Model Canvas.	5	1	L2
3	Illustrate the different fund-raising strategies	5	1	L2
4	Summarize the functions of DIC.	5	1	L2
5	Interpret the Key Features of One Person Company.	5	1	L2
6	Extend the emerging trends in entrepreneurship development in India.	5	1	L2
PART B				
MODULE - 01				
7	The government of Karnataka launched an entrepreneurship scheme to encourage local youth to start small-scale food processing units using locally grown millets and forest produce. Apply your understanding of the role of entrepreneurs in economic development.	8	2	L3
OR				
8	A group of MBA students in Bangalore has launched a food delivery app targeting hostels and PG accommodations. Develop the stages they are likely to go through in the entrepreneurial process from idea generation to business launch and growth.	8	2	L3
MODULE - 02				
9	You are part of a startup simulation challenge where your team has launched GreenBasket, a farm-to-doorstep organic fruits and vegetables delivery platform in Bangalore. Your business focuses on promoting healthy lifestyles, supporting local farmers, and embracing eco-friendly, zero-waste packaging solutions. Green Basket as a sustainable and scalable new venture.	8	2	L3
OR				
10	You are planning to launch a premium chai café chain in Bangalore. Construct the key steps involved in the business planning process from idea generation to financial forecasting.	8	2	L3
MODULE - 03				
11	Rohith is the founder of a promising startup that has gained significant traction in the market, with a growing customer base and positive user engagement. However, the business has not yet started generating profits. To sustain operations and accelerate growth, Rohith is exploring	8	3	L3

	funding opportunities. Identify the different funding sources that are available to Rohith.			
OR				
12	Two recent college graduates have been operating a freelance tech service, offering web development and IT solutions to small businesses. Encouraged by growing demand and long-term potential, they now wish to convert their informal freelance venture into a formal and legally recognized business entity. They are considering registering their startup company to attract investors and scale operations professionally. Develop the different startup stages.	8	3	L3
MODULE - 04				
13	Mr. Advaith, a software engineer, has started a robotics MSME. He's ready to scale but needs structured financing and ecosystem support. Inference your understanding to explain how SIDBI can support Advaith in growing his MSME.	8	3	L4
OR				
14	Ms. Malini runs a handmade jewellery startup but struggles with limited funding, poor marketing exposure, and family opposition. Discover the typical challenges faced by women entrepreneurs like Ms. Malini and suggest appropriate interventions.	8	3	L4
MODULE - 05				
15	A startup named "EcoHarvest Technologies" has developed an innovative solar-powered irrigation device along with a mobile app for remote control. They have also designed a distinctive logo and brand name. As their Intellectual Property (IP) consultant, examine the various types of intellectual property protection available in India to help them safeguard their inventions and brand identity before the official launch.	8	4	L4
OR				
16	A group of young entrepreneurs from Bangalore plans to launch a private limited company to manufacture eco-friendly consumer products. They want to know how to legally establish the company in India, the timeline involved, and the documents required. Acting as their legal advisor, Build the step-by-step registration process of a Private Limited Company in India.	8	4	L4
MODULE - 06				
17	Anita, a homemaker from Jaipur, learned digital marketing during the COVID-19 pandemic. She now runs a successful Instagram-based business selling handmade décor items. Seeing its growth, she wants to scale by launching a full-fledged digital platform and targeting national and international markets. Examine the scope and opportunities available for digital entrepreneurship in India based on Anita's journey.	8	4	L4
OR				
18	Samar, a corporate professional, left his high-paying job to create a non-profit that addresses malnutrition among children in tribal areas. Despite limited funding, he is deeply committed and continues to find innovative solutions with community support. Analyse the motivations that might have influenced Samar's transition into social entrepreneurship.	8	4	L4
PART C				
19	The entrepreneurial landscape in India has witnessed a significant transformation over the past few decades, with women increasingly taking the helm of businesses, breaking traditional barriers, and achieving remarkable success. One such inspiring story is that of			

Jaishree Kabra, the driving force behind Kothari Silk, a renowned name in the textile industry. This case study is designed to explore Jaishree Kabra's entrepreneurial journey, focusing on her strategies for managing crises and achieving success in a competitive market. Kothari Silk, based in Varanasi, India, is a well-established player in the silk fabric industry. Founded by Jaishree Kabra's husband, the company has a rich history of producing high-quality silk fabrics. After her husband's untimely demise, Jaishree Kabra took over the reins of the business. With no prior experience in business management, Jaishree faced numerous challenges, from managing the workforce to dealing with the financial constraints of the company. Upon Jaishree's entry into the business, Kothari Silk was facing a severe crisis. The company was on the verge of bankruptcy due to accumulated losses and a significant decline in sales. The market was witnessing a shift towards more contemporary and affordable fabrics, leaving traditional silk manufacturers like Kothari Silk struggling to adapt. Moreover, the global financial crisis of 2008 had further exacerbated the situation, leading to a decrease in demand for luxury goods like high-end silk fabrics. Jaishree Kabra's journey as an entrepreneur was defined by her unwavering determination to revive Kothari Silk during a period of crisis. Despite lacking formal business training, she exhibited a strong instinct for innovation and leadership. One of her key strategies was the diversification of the product line, where she introduced a range of silk fabrics that blended traditional craftsmanship with contemporary designs, appealing to the evolving preferences of the younger generation. Understanding the growing influence of the internet, she embraced digital marketing by launching an e-commerce website and actively promoting the brand on social media platforms, thereby expanding the company's reach to a wider audience. Jaishree also prioritized sustainability and ethical practices in the production process, which not only reduced the company's environmental footprint but also resonated with environmentally conscious consumers. Furthermore, she placed great emphasis on employee empowerment, focusing on team building and offering training and development opportunities. This inclusive and supportive approach significantly improved employee morale and productivity, contributing to the overall growth and success of Kothari Silk. Under Jaishree's leadership, Kothari Silk not only overcame the crisis but also achieved significant growth. The company's sales witnessed a substantial increase, and it was able to regain its position in the market. Jaishree's success story has been an inspiration to many women entrepreneurs in India, demonstrating that with determination and the right strategies, it is possible to overcome adversity and achieve success.	a) Evaluate the lessons that aspire women entrepreneurs in India learnings from Jaishree Kabra's journey b) Determine the challenges faced by women entrepreneurs in India and the strategies they can employ to overcome these challenges. c) Defend the importance of adapting to changing market conditions and innovating to stay competitive	6 6 10	4 4 4	L5 L5 L5
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SECOND SEMESTER M.Tech DEGREE SEMESTER END EXAMINATIONS

JULY - AUGUST 2026

Course:	DESIGN OF PLATES AND SHELLS			
Course Code:	MCV216A	Program:	M.Tech in Structural Engineering	
Max Marks:	100	Duration:	03 Hours	

Note:

1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.
2. Any missing Data can be suitably assumed.
3. Use of IS 456 provisions is permitted

Q. No.	MODULE - 1		Marks	CO	RBTL
Q1	a	Define corner reaction in plates with a neat sketch.	4	1	L1
	b	Explain the different types of boundary conditions in plate theory.	6	1	L2
	c	Demonstrate that the directions of zero slope & maximum slope are orthogonal to each other.	10	1	L3
MODULE - 2					
Q2	a	List the boundary conditions required for applying Navier's solution.	4	2	L1
	b	Compare Whitney's method and the beam method for folded plate analysis.	6	2	L2
	c	Determine the deflections of a simply supported rectangular plate subjected to hydrostatic loading in the x-direction using Navier's solution, where load intensity varies linearly with maximum at $x = a/2$.	10	2	L3
MODULE - 3					
Q3	a	Define folded plate Structures and list their types.	4	3	L1
	b	Explain the assumptions made in folded plate analysis.	6	3	L2
	c	Determine the structural behavior of a folded plate roof using relevant principles.	10	3	L3
OR					
Q4	a	State the advantages and disadvantages of folded plates over shells.	4	3	L1
	b	Explain the different types of folded plates with neat sketches.	6	3	L2
	c	Design the longitudinal and transverse reinforcement for a V-shaped folded plate covering an industrial building of dimensions 8×20 m, using plates of 120 mm thickness inclined at 45° to the horizontal. Consider live load and finishes as 1.5 kN/m^2 . Analyze the folded plate using a suitable method and compute the required reinforcement using M25 grade concrete and Fe-500 steel. Sketch the reinforcement details.	10	3	L3

MODULE – 4

Q5	a	Define a shell. List the advantages and disadvantages of shell structures.	4	4	L1
	b	Differentiate between long shells and short shells.	6	4	L2
	c	Determine the membrane forces in a simply supported cylindrical shell subjected to its self-weight.	10	4	L3

OR

Q6	a	Define Gaussian curvature in terms of principal curvatures.	4	4	L1
	b	Explain the design criteria as per IS: 2210 recommendations for shells.	6	4	L2
	c	Determine the membrane forces in a simply supported circular cylindrical shell subjected to snow load g_0 per unit area acting on the horizontal projected area.	10	4	L3

MODULE – 5

Q7	a	Define a conical shell & circumferential bending.	4	5	L1
	b	Explain the concept of membrane action in domes.	6	5	L2
	c	Analyze the structural behavior of an RC spherical dome of 12 m diameter, rise 2 m, and thickness 100 mm subjected to a uniformly distributed load of 2 kN/m ² including membrane forces. Design the shell and edge beam as per IS 456, and the influence of geometric parameters on stress distribution with a neat sketch.	10	5	L4

OR

Q8	a	Identify the types of stresses acting in shells of revolution.	4	5	L1
	b	Explain the significance of double curvature.	6	5	L2
	c	Analyze the membrane stresses in a spherical dome (shell) subjected to snow load g_0 /unit area distributed on the horizontal projection, given that the radius of the dome 'a'.	10	5	L4



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SECOND SEMESTER M.Tech DEGREE SEMESTER END EXAMINATIONS

JULY - AUGUST 2026

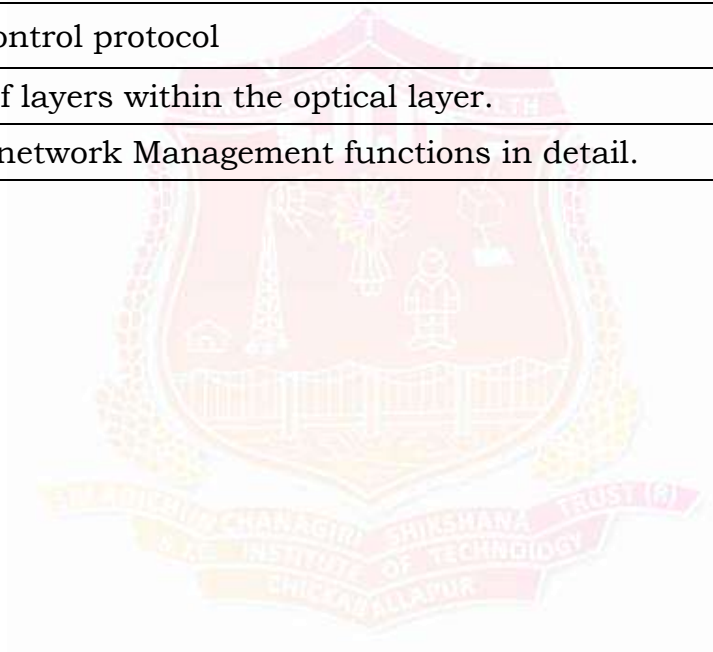
Course:	OPTICAL COMMUNICATION AND NETWORKING			
Course Code:	MLDN216C	Program:	M.Tech in Digital Communication & Networking	
Max Marks:	100		Duration:	03 Hours

Note:

1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.
2. Any missing Data can be suitably assumed.

Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	Define Solitons and significance role in optical fibers	4	1	L1
	b	Make use of a coupler in an optical network, explain the setup and describe its functions	8	1	L3
	c	Distinguish between isolators and circulators with respect to signal directionality.	8	2	L4
MODULE - 2					
Q2	a	Explain different types of photo detector used in optical system and explain.	4	2	L1
	b	Outline the concept of an optical preamplifier in a long-haul system.	8	2	L3
	c	Analyze the difference between coherent and incoherent detection techniques.	8	2	L4
MODULE - 3					
Q3	a	Explain the components of WDM Link? And draw its block diagram	4	3	L1
	b	Describe the importance of SONET/SDH in optical networks.	8	3	L2
	c	Apply the concept of WDM to illustrate how a transmitter and receiver setup can be used to increase data capacity in an optical fiber communication system and explain the role of key components at both ends	8	3	L3
OR					
Q4	a	Define Cross talk in WDM system? And explain the two form of cross talk	4	3	L1
	b	Describe the SONET/SDH layers and frame structure with a neat sketch.	8	3	L2
	c	Identify the fields in the ATM header Structure and discuss the different function of ATM with an neat sketch.	8	3	L3
MODULE - 4					
Q5	a	State the features of wavelength routing mesh network?	4	3	L1
	b	Explain Optical cross connects with a neat diagram	8	5	L2

	c	Make Use a block diagram of an OADM to illustrate how it adds and drops selected optical channels while allowing others to pass through unaltered.	8	3	L3
OR					
Q6	a	State the different light path topologies deployed over a fiber ring topology? And draw its diagram	4	3	L1
	b	Illustrate the problems of Routing and Wavelength Assignment (RWA)	8	5	L2
	c	Apply the function of an Optical Line Terminal (OLT) to explain how it manages upstream and downstream data transmission in a Passive Optical Network (PON)	8	3	L3
MODULE – 5					
Q7	a	Discuss about Management Protocol	4	4	L1
	b	Illustrate the Alarm Management in the network model	8	4	L2
	c	Compare the different configuration management techniques	8	4	L4
OR					
Q8	a	Explain open fiber control protocol	4	4	L1
	b	Illustrate the types of layers within the optical layer.	8	4	L2
	c	Classify the various network Management functions in detail.	8	4	L4



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SECOND SEMESTER M.Tech DEGREE SEMESTER END EXAMINATIONS

JULY - AUGUST 2026

Course:	MECHANICS OF COMPOSITE MATERIALS			
Course Code:	MME206	Program:	M.Tech in Machine Design	
Max Marks:	100		Duration:	03 Hours

Note:

1. Answer ONE question from each MODULE and Question 1 & 2 is compulsory.
2. Any missing Data can be suitably assumed.

Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	Classify the different fiber forms used in composite manufacturing.	4	1	L1
	b	Explain the importance of fiber-matrix compatibility in composites.	8	1	L2
	c	Illustrate with an example how corrosion resistance is a key factor in material selection.	8	1	L3
MODULE - 2					
Q2	a	Define volume fraction and mass fraction in composite materials.	4	2	L1
	b	Describe the difference between Mode I and Mode II fracture toughness.	8	2	L2
	c	Compare the intralaminar shear strength and in-plane shear strength in terms of their failure mechanisms.	8	2	L3
MODULE - 3					
Q3	a	Name the three matrices used in the laminate stiffness formulation. Explain briefly	4	3	L1
	b	Compare the behavior of cross-ply and angle-ply laminates under in-plane loading.	8	3	L2
	c	Analyze the effect of increasing the fiber orientation angle on laminate modulus using a universal carpet plot.	8	3	L4
OR					
Q4	a	What are the local coordinate directions in a unidirectional composite ply?	4	3	L1
	b	Explain why transformation of stress-strain components is required in off-axis plies.	8	3	L2
		Analyze the effect of laminate symmetry on the B matrix. What happens if the laminate is not symmetric?	8	3	L4
MODULE - 4					
Q5	a	Explain the difference between the Maximum Stress Criterion and Maximum Strain Criterion.	4	4	L1
	b	Briefly explain ply strength in composite materials?	8	4	L2

	c	Critically analyze the limitations of using the Maximum Strain Criterion alone for predicting ply failure in anisotropic laminates.	8	4	L3
OR					
Q6	a	What is meant by First Ply Failure (FPF) and how is it identified?	4	4	L1
	b	Explain the difference between the Maximum Stress Criterion and Maximum Strain Criterion.	8	4	L2
	c	Describe how the Last Ply Failure (LPF) differs from First Ply Failure and its relevance in laminate design.	8	4	L3
MODULE – 5					
Q7	a	Describe the hand layup process and list its common applications.	4	5	L1
	b	Explain how vacuum pressure is used in bag molding and why it is important	8	5	L2
	c	Evaluate the suitability of various manufacturing processes for producing a high-strength, hollow aerospace component. Justify your choice.	8	5	L4
OR					
Q8	a	What is a prepreg, and how is it used in the prepreg layup process?	4	5	L1
	b	Discuss how resin flows in Resin Transfer Molding (RTM) and how mold design affects the final part quality.	8	5	L2
	c	Differentiate between pultrusion and filament winding in terms of product geometry, reinforcement alignment, and typical end-use products.	8	5	L4

