



SJC INSTITUTE OF TECHNOLOGY

(An Autonomous Institute under VTU, Belagavi)

FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS

JUNE - JULY 2026

Course:	AERODYNAMICS		
Course Code:	BAE401	Branch: AE	
Max Marks:	100	Duration:	03 Hours

Note:

1. Answer any FIVE full questions, choosing one full Question from each Module.
2. Any missing data can be suitably assumed.
3. Use of Gas Tables is permitted

Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	Draw and explain the streamline patterns for the following flows i) Sink flow ii) Source flow iii) Doublet flow.	6	1	L2
	b	Explain why the Kutta condition is applied at the trailing edge of an airfoil.	8	1	L3
	c	In a free cylindrical vortex flow, at a point in the fluid at radius of 200 mm & at a height of 100 mm, the velocity & pressure are 10 m/s & 117.72 KN/m ² absolute. Find the pressure at a radius of 400 mm & at a height of 200 mm. The fluid is air having density is equal to 1.24 kg/m ³ .	6	1	L3
OR					
Q2	a	What is a Starting Vortex? Why is it important. Explain.	6	1	L2
	b	Derive the expression for lift on a thin symmetric airfoil using classical thin airfoil theory.	8	1	L3
	c	Consider the lifting flow over a cylinder with a diameter of 0.5 m. the free stream velocity is 25 m/s and the maximum velocity on the surface of the cylinder is 75 m/s. the free stream conditions are those for a standard altitude of 3 km. calculate the lift per unit span over the cylinder.	6	1	L3
MODULE - 2					
Q3	a	State Helmholtz's vortex theorems with suitable sketches.	6	2	L2
	b	Illustrate the concept of Elliptical Lift distribution with suitable sketch.	8	2	L3
	c	Analyze the effect of downwash on the induced drag of a finite wing.	6	2	L4
OR					
Q4	a	Describe Prandtl's lifting line theory and write the limitations.	6	2	L2
	b	Illustrate the Lift, Drag and Moment characteristics of complete airplane and explain with neat sketches.	8	2	L3
	c	Determine the change in induced drag if the wing aspect ratio is doubled while keeping total lift constant.	6	2	L4

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MODULE – 3					
Q5	a	Discuss lifting line surface theory and vortex lattice method for wings.	6	3	L2
	b	Summarize the classification of swept wing with sketches.	8	3	L3
	c	Paraphrase Transonic area rule for finite wing concept with relevant sketches.	6	3	L4
OR					
Q6	a	With a neat sketch and explain the any two types of flaps as high lift devices	6	3	L2
	b	Describe the formation of flight with a relevant sketch	8	3	L3
	c	Describe the aerodynamics characteristics of subsonic leading edge with suitable sketches.	6	3	L4
MODULE – 4					
Q7	a	Define and write an equation of flow for stagnation temperature, pressure, density and isentropic relations of pressure, temperature.	6	4	L2
	b	Explain De-Laval Nozzle? Obtain Area-Mach number relation with usual notations	8	4	L3
	c	Air ($\gamma = 1.4$, $R = 287.43 \text{ J/kg}\cdot\text{K}$) enters a straight axisymmetric duct at 300 K, 3.45 bar, and 150 m/s, and leaves it at 277 K, 2.058 bar, and 260 m/s. The area of cross-section at entry is 500 cm^2 . Assuming adiabatic flow, determine: i) stagnation temperature ii) maximum velocity iii) mass flow rate iv) area of cross-section at exit.	6	4	L3
OR					
Q8	a	Explain the effect of Mach number on compressibility	6	4	L2
	b	Derive an equation for Steady flow Energy Equation with usual notations and deduce the following equations from the same. i) Energy equation for a non-flow process ii) Energy equation for a flow process	8	4	L3
	c	An aircraft flies at 800 km/hr at an altitude of 10,000 meters ($T = 223.15 \text{ K}$, $P = 0.264 \text{ bar}$). The air is reversibly compressed in an inlet diffuser. If the Mach number at the entry of the diffuser is 0.36, determine i) the velocity, pressure, and temperature of air at the diffuser inlet, ii) the conditions at the diffuser exit."	6	4	L3
MODULE – 5					
Q9	a	Explain how strong compression and expansion waves are formed in a compressible fluid.	6	5	L2
	b	Derive an expressions of Prandtl Meyers relation for normal Shock Wave with usual notations	8	5	L3
	c	The state of a gas ($\gamma = 1.3$, $R = 0.469 \text{ kJ/kgK}$) upstream of a normal shock wave is given by the following data: $M_x = 2.5$, $p_x = 2 \text{ bar}$, $T_x = 275 \text{ K}$. Calculate the Mach number, pressure, temperature and velocity of the gas downstream of the shock; check the calculated values with those given in the Gas tables.	6	5	L4
OR					
Q10	a	Explain and sketch the effect of Obliques Shock Waves over a Wedge with small and large angles.	6	5	L2
	b	Derive an expressions of Rankine Hugoniot relation for oblique Shock Wave with usual notations	8	5	L3
	c	Air approaches a symmetrical wedge ($\delta = 15^\circ$) at a Mach number of 2.0. determine for the strong wave i) Wave angle ii) pressure ratio iii) density iv) temperature ratio and v) downstream Mach number	6	5	L4

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FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS

JUNE - JULY 2026

Course:	AERODYNAMICS		
Course Code:	BAS401	Branch: AS	
Max Marks:	100	Duration:	03 Hours

Note:

1. Answer any FIVE full questions, choosing one full Question from each Module.
2. Any missing data can be suitably assumed.
3. Use of Gas Tables permitted.

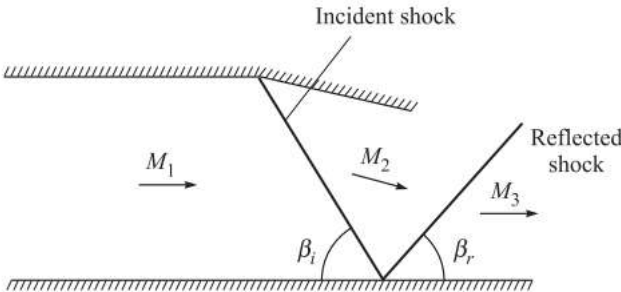
Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	Explain philosophical procedure involved with the development of basic equations of aerodynamics	4	1	L2
	b	Describe various type of fluid flow models with suitable sketch and bring out what type of model leads to what type of governing equations forms	10	1	L3
	c	Using the velocity components, develop the mathematical expression for divergence of velocity and explain its physical meaning	6	1	L3
OR					
Q2	a	Derive an integral form of expression for continuity equation using basic principle of law of conservation.	4	1	L2
	b	Considering two-dimensional body derive an expression for drag in terms of known free stream velocity and flow properties across vertical station of downstream of the body	10	1	L3
	c	Derive Navier stokes equation (Momentum equation) for viscid flow non conservative form of equations	6	1	L3
MODULE - 2					
Q3	a	Explain in detail about elementary flow: uniform flow	4	2	L2
	b	Show that for lifting flow over a cylinder drag is zero regardless of whether or not the flow has circulation about the cylinder	10	2	L3
	c	Derive an expression for velocity potential and stream function for doublet flow	6	2	L3
OR					
Q4	a	Explain about flow over a semi-infinite body (Superposition of a uniform flow and a source)	4	2	L2
	b	Discuss the fundamental equation of thin airfoil theory and estimate the lift coefficient for symmetrical airfoil	10	2	L3

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	c	What is Kutta condition? With respect to finite angle and cusp trailing edge shape summarize the statement of Kutta condition	6	2	L3
MODULE – 3					
Q5	a	Explain effect of down wash and induced drag	4	3	L2
	b	Derive an expression for geometric angle of attack in terms of circulation strength, $\Gamma(y)$ for a finite wing through Prandtl lifting line theory	10	3	L3
	c	Derive an expression for the velocity induced by infinite vortex filament using the Biot-Savart law	6	3	L3
OR					
Q6	a	Discuss the advantages of swept wing in model airplane with a neat sketch	4	3	L2
	b	Derive an expression for the velocity induced at the mid-span point of a tail plane due to wing trailing vortices. Also, With the help of a neat diagram, explain how three identical aircraft flying in a V-formation influence each other's trailing vortices	10	3	L3
	c	Explain the effects of thickness, camber and aspect ratio of wings	6	3	L3
MODULE – 4					
Q7	a	Explain why shocks cannot occur in subsonic flows	4	4	L2
	b	Derive the expression for Rankine -Hugoniot equations of a normal shock wave	10	4	L3
	c	A re-entry vehicle (RV) is at an altitude of 15,000m and has a velocity of 1850m/s. A bow shock wave envelops the RV. Neglecting dissociation, determine the static and stagnation pressure and temperature just behind the shock wave on the RV center line where the shock wave may be treated as normal shock wave. Assume that the air behaves as perfect gas, with $\gamma=1.4$ and $R=287 \text{ J/kg-K}$	6	4	L4
OR					
Q8	a	Explain incident and reflected shock waves	4	4	L2
	b	For a shock tube operation, develop an expression for shock strength P_2/P_1 as a function of diaphragm pressure ratio P_4/P_1 and temperature behind shock.	10	4	L3
	c	If a shock tube filled with air at 300K and 400K in its low and high-pressure chambers respectively, has to generate a shock to traverse air to attain 600K, what should be the shock strength?	6	4	L4

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MODULE – 5

Q9	a	With a neat sketch explain the oblique shock geometry in hydrograph plane and shock polar for a given V_1	4	5	L2
	b	Obtain an expression for $\phi - \beta - M$ relation for oblique shock	10	5	L3
	c	For the flow field shown in Fig.Q9(c) determine β_r , M_2 and M_3 if $M_1=2.0$ and $\beta_1=40^\circ$.  Fig.Q9(c)	6	5	L4/L5
OR					
Q10	a	Explain detached shock waves	4	5	L2
	b	Derive an expression for Prandtl Meyer function in terms of Mach number	10	5	L3
	c	A Mach 1.8 Laval nozzle connected to a settling chamber, maintained at 400 kPa, discharges air into a very large tank provided with pressure control device (vacuum pump) to maintain the tank pressure at any desired level. If a shock of 5 percent strength is formed at nozzle exit determine the static pressure behind the shock.	6	5	L4

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FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS**JUNE - JULY 2026**

Course:	DESIGN AND ANALYSIS OF ALGORITHMS		
Course Code:	BCS401	Branches: CSE, ISE, AIML, CSD and AI&DS	
Max Marks:	100	Duration:	03 Hours

Note: 1. Answer any FIVE full questions, choosing one full Question from each Module.
2. Any missing data can be suitably assumed.

Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	Explain the concepts of Algorithm and explain the different types of asymptotic notation	6	1	L2
	b	Demonstrate an algorithm to search for an element in an array using sequential search. Analyze its best-case, worst-case, and average-case time complexity.	8	1	L2
	c	Apply and Compare the order of growth of the following functions and express them using limits: i) $1/2n(n-1)$ and n^2 ii) $n!$ and $2n$	6	1	L3
OR					
Q2	a	Explain the brute-force string matching algorithm and solve the given example: Text: NOBODY_NOTICED_HIM Pattern: NOT	6	1	L2
	b	Explain the general plan for analyzing recursive algorithms. Develop a recursive algorithm to compute the factorial of a positive integer and determine its time complexity.	8	1	L2
	c	Organize that if $t_1(n) \in O(g_1(n))$ and $t_2(n) \in O(g_2(n))$, then $t_1(n)+t_2(n) \in O(\max(g_1(n), g_2(n)))$	6	1	L3
MODULE – 2					
Q3	a	Sort the following list of elements using: Selection Sort 23,45,56,78,68,78,79 Show all intermediate steps for each pass and determine the total number of comparisons. Also, mention the time complexity.	6	2	L2
	b	Write the Insertion Sort algorithm. Apply it to sort the list: 89, 45, 68, 90, 29, 34, 17. Also analyze its time complexity.	8	2	L3
	c	Apply the Quick sort algorithm on list of characters A,L,G,O,R,I,T,H,M.	6	2	L3
OR					
Q4	a	What is a brute-force algorithm? Explain with an example	6	2	L2
	b	Consider an unsorted array of elements: A = [23, 45, 12, 67, 34, 89, 10] Using the brute force (linear search) method, search for the element 34. Drive its time complexity.	8	2	L3
	c	Apply the Merge Sort on the array: A = [38, 27, 43, 3, 9, 82, 10]	6	2	L3

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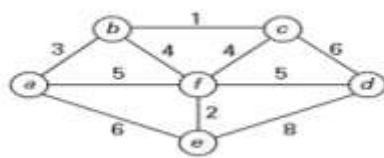
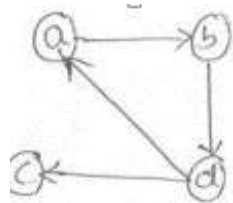
MODULE – 3

Q5	a	Discuss decrease and conquer algorithmic design technique. Explain its variations.	6	3	L2
	b	Apply and describe Horspool's algorithm for string matching. Apply it to find the pattern "BARBER" in the text: JIM_SAW_ME_IN_A_BARBERSHOP	8	3	L3
	c	Explain Heap Sort. Analyze and Construct a bottom-up heap for the elements: 18, 20, 30, 17, 27, 26.	6	3	L3

OR

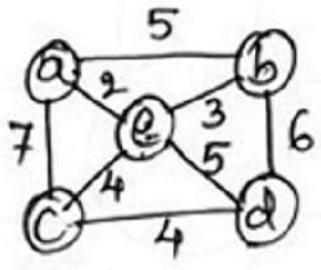
Q6	a	Define heap. Explain the properties of heap along with its representation.	6	3	L2
	b	Define a 2-3 tree. Analyze the worst-case efficiency of its operations. Construct a 2-3 tree for the keys: 8, 4, 7, 2, 1, 3, 6, showing all steps.	8	3	L3
	c	Construct an AVL tree for the items 35, 46, 48, 33, 42, 44, 47.	6	3	L3

MODULE – 4

Q7	a	Define minimum spanning tree. Apply Kruskal's algorithm for the following undirected graph. Find the minimum cost spanning tree.  Fig,Q7(a)	6	4	L3															
	b	Apply the memory function method to solve the following instance of the knapsack problem with capacity M=5 <table> <tr> <th>Item</th> <th>Weight</th> <th>Value</th> </tr> <tr> <td>1</td> <td>2</td> <td>\$12</td> </tr> <tr> <td>2</td> <td>1</td> <td>\$10</td> </tr> <tr> <td>3</td> <td>3</td> <td>\$20</td> </tr> <tr> <td>4</td> <td>2</td> <td>\$15</td> </tr> </table>	Item	Weight	Value	1	2	\$12	2	1	\$10	3	3	\$20	4	2	\$15	8	4	L3
	Item	Weight	Value																	
1	2	\$12																		
2	1	\$10																		
3	3	\$20																		
4	2	\$15																		
c	Define transitive closure of a graph. Apply Warshalls algorithm to compute transitive closure of a directed graph.  Fig.Q7(C)	6	4	L3																

OR

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Q8	a	What are Huffman Trees? Construct the Huffman tree for the following data. <table><tr><td>Character</td><td>A</td><td>B</td><td>C</td><td>D</td><td>-</td></tr><tr><td>Probability</td><td>0.5</td><td>0.2</td><td>0.3</td><td>0.25</td><td>0.25</td></tr></table> (i) Encode the text: ABACABAD (ii) Decode the text: 100010111001010	Character	A	B	C	D	-	Probability	0.5	0.2	0.3	0.25	0.25	6	4	L3			
	Character	A	B	C	D	-														
	Probability	0.5	0.2	0.3	0.25	0.25														
b	Solve all pair shortest path problem using Floyd's approach on the following graph. Write the formula to find the shortest path using Floyd's approach. $W = \begin{matrix} & \begin{matrix} a & b & c & d \end{matrix} \\ \begin{matrix} a \\ b \\ c \\ d \end{matrix} & \begin{bmatrix} 0 & \infty & 3 & \infty \\ 2 & 0 & \infty & \infty \\ \infty & 7 & 0 & 1 \\ 6 & \infty & \infty & 0 \end{bmatrix} \end{matrix}$	8	4	L3																
c	Construct a Minimum Cost Spanning Tree using Prim's algorithm for a given graph.  Fig.Q8(C)	6	4	L3																
MODULE - 5																				
Q9	a	Explain the following with examples: i) P problems ii) NP problems	6	5	L2															
	b	Apply and Construct a state space tree for solving the 4-Queens problem.	8	5	L3															
	c	Define a decision tree. Analyze and Illustrate it for insertion sort with three elements.	6	5	L4															
OR																				
Q10	a	Explain back tracking methods to solve sum of subsets problems for the instance A = {3, 5, 6, 7} and d = 15 Give all possible solution with sate space for construction	6	5	L2															
	b	Show branch and bound method for knapsack problem C=10 <table><tr><td>Items</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>Weights</td><td>4</td><td>7</td><td>5</td><td>3</td></tr><tr><td>Values</td><td>\$40</td><td>\$42</td><td>\$25</td><td>\$12</td></tr></table>	Items	1	2	3	4	Weights	4	7	5	3	Values	\$40	\$42	\$25	\$12	8	5	L3
	Items	1	2	3	4															
Weights	4	7	5	3																
Values	\$40	\$42	\$25	\$12																
c	Construct and explain the state space tree for 4 queens problem.	6	5	L4																



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FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS

JUNE - JULY 2026

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Course:	STRUCTURAL ANALYSIS		
Course Code:	BCV401	Branch: CV	
Max Marks:	100	Duration:	03 Hours

Note:

1. Answer any FIVE full questions, choosing one full Question from each Module.
2. Any missing data can be suitably assumed.

Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	Differentiate between: i) Statically determinate and indeterminate structures ii) Static indeterminacy and kinematic indeterminacy	10	1	L2
	b	Determine the strain energy for shear force and bending moment.	10	2	L3
OR					
Q2	a	Explain the following: i) Loads on structures ii) Classification of structural systems.	10	1	L2
	b	Determine the central deflection of a simply supported beam carrying a concentrated load at mid span using unit load method.	10	2	L3
MODULE – 2					
Q3	a	A three hinged parabolic arch of span 20m and rise 4m carries a UDL of 20kN/m left half of the span. Determine the maximum bending moment for the arch.	10	3	L3
	b	A Suspension bridge of 120m span has a central dip of 12m & supports a UDL of 15kN/m of the span. Determine: (i) Minimum and Maximum tension in the cable. (ii) Size and length of the cable if the permissible stress of the cable is 200 N/mm ²	10	3	L3
OR					
Q4	a	An UDL of intensity 15kN/m longer than span crosses a girder of span 20m from left to right, using ILD determine: i) Max. Reactions ii) SF and BM at a section of 8m from left support	10	3	L3
	b	A point load 80kN crosses a girder of span 15m from left to right, using ILD determine: i) Max. Reactions. ii) SF and BM at a section of 6m from left support.	10	3	L3

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MODULE – 3

Analyze the continuous beam shown in the Fig. Q5(a). by slope-deflection method. Draw BMD, SFD and elastic curve.

Q5

a

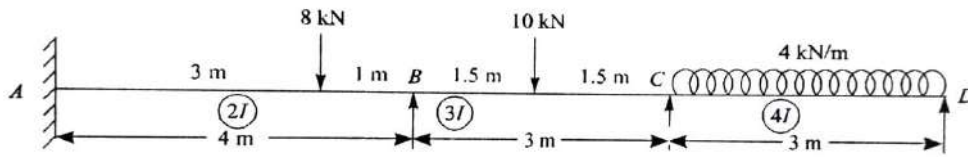


Fig. Q5(a).

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OR

Analyze the frame shown in the Fig. Q6(a). using slope-deflection method. Draw BMD and elastic curve.

Q6

a

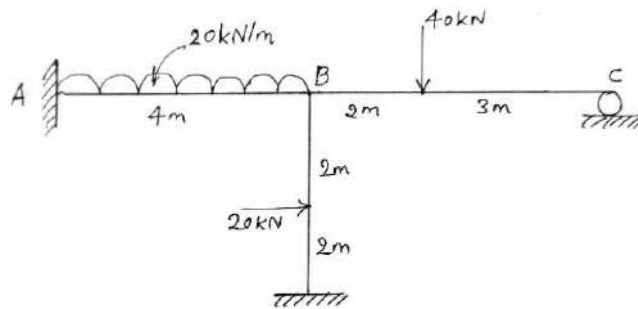


Fig. Q6(a).

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L4

MODULE – 4

Analyze the continuous beam shown in Fig. Q7(a). by moment distribution method. Draw BMD and elastic curve.

Q7

a

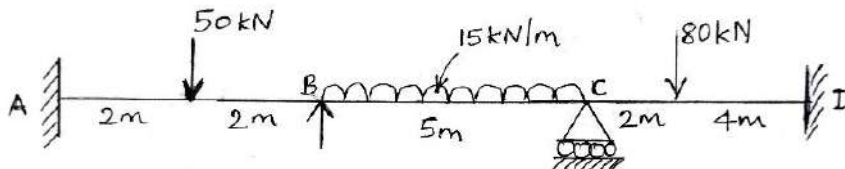


Fig. Q7(a)

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OR

Analyze the portal frame shown in the Fig. Q8(a). by moment distribution method and draw BMD and elastic curve.

Q8

a

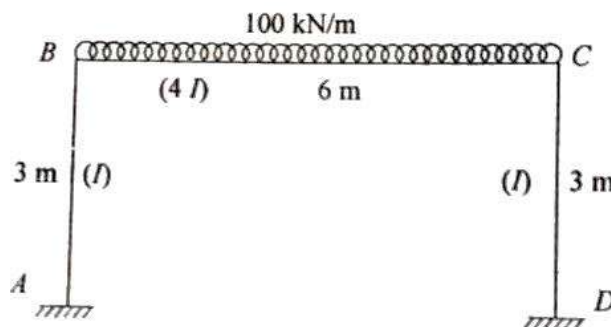


Fig. Q8(a).

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L4

2024 SCHEME

MODULE - 5

Analyze the continuous beam shown in Fig. Q9(a). by flexibility matrix method. Draw SFD and BMD.

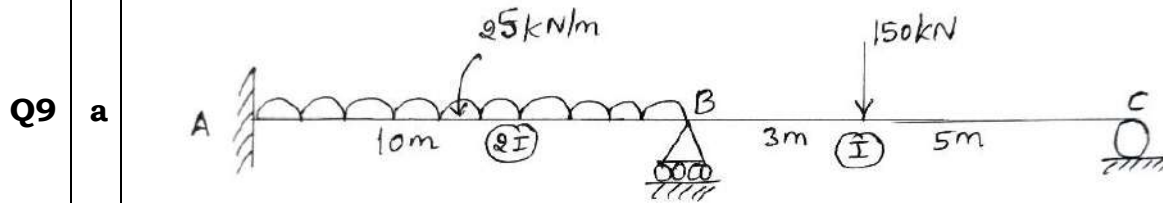


Fig. Q9(a).

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L4

OR

a Analyze the rigid jointed frame shown in Fig. Q10(a). using stiffness matrix method. Draw BMD and elastic curve. Assume uniform flexural rigidity.

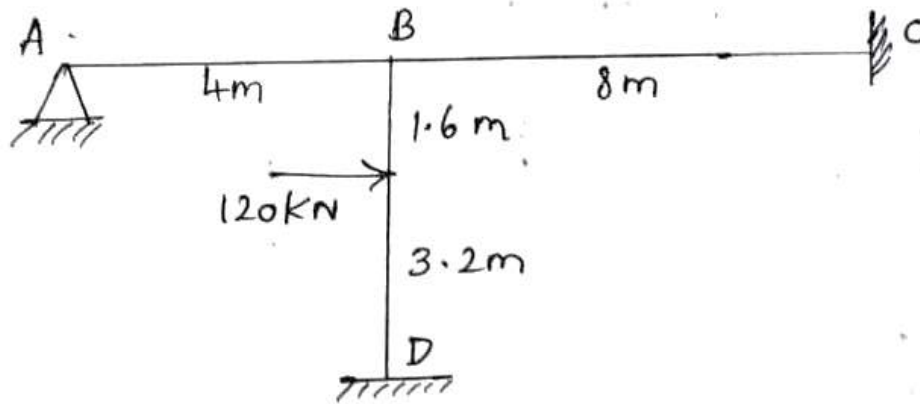


Fig. Q10(a).

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FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS

JUNE - JULY 2026

Course:	SIGNALS AND SYSTEMS		
Course Code:	BEC401	Branch: ECE	
Max Marks:	100	Duration:	03 Hours

Note:

1. Answer any FIVE full questions, choosing one full Question from each Module.
2. Any missing data can be suitably assumed.

Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	Distinguish between (i) Continuous time and Discrete Time signals (ii) Periodic and non-periodic signals	6	1	L2
	b	Given the signal $x[n] = (8 - n)(u[n] - u[n - 7])$, sketch the following signals: (i) $y[n] = x[4 - n]$ (ii) $g[n] = x[-2n + 3]$	8	1	L3
	c	A signal $x(t) = t[u(t) - u(t - a)]$, is applied as input to a differentiator. Obtain the output signal $y(t)$ and sketch the same.	6	1	L3
OR					
Q2	a	Explain the following with an example: (i) Even and odd signal (ii) Time shifting	6	1	L2
	b	Determine whether each of the following signals is periodic or not: If periodic, find the fundamental period: (i) $x[n] = \sin(3n)$ (ii) $x[n] = \cos(0.3\pi n + \pi/4)$ (iii) $x[n] = \sin(7\pi n/37)$ (iv) $x(t) = \sin(4\pi t) + \sin(5t)$	8	1	L3
	c	Sketch the waveforms of the signal $x(t) = u(t + 1) - 2u(t) + u(t - 1)$	6	1	L3
MODULE - 2					
Q3	a	Classify different types of systems and show any two with examples	6	2	L2
	b	Determine whether the system described by the input/output relationship, $y[n] = x[n]u[n + 1]$ is memory less, casual, time-invariant or linear.	8	2	L3
	c	Given $x[n] = \alpha^n u[n]$ and $h[n] = \beta^n u[n - 1]$, obtain $y[n] = x[n] * h[n]$.	6	2	L3
OR					
Q4	a	Prove the following properties of convolution: (i) Commutative (ii) Distributive	6	2	L2
	b	Given $x[n] = \{1, 2, 3, -2\}$, here sample-value 2 appears at time-origin, and $h[n] = \delta[n + 1] - 2\delta[n] + 3\delta[n - 1]$. Obtain $y[n] = x[n] * h[n]$.	8	2	L3

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	c	Following signals represent input and impulse response of a continuous-time Linear and Time-Invariant (LTI): $x(t) = u(t) - u(t - 3)$ and $h(t) = e^{-2t}[u(t + 1) - u(t - 1)]$ Obtain the output for the applied input.	6	2	L3
MODULE - 3					
Q5	a	Describe the effect of frequency scaling on the Fourier series of a signal	6	2	L2
	b	Determine the Fourier series of the signal, $x(t) = 3\cos((\pi/2)t + \pi/3)$. Plot the magnitude and phase spectra.	8	3	L3
	c	Investigate the causality and stability of the following systems: (i) $h(n) = \left(\frac{1}{2}\right)^n u(n)$ (ii) $h(n) = n\delta(n)$	6	2	L4
OR					
Q6	a	Describe the conditions on $h[n]$ that ensure a discrete-time LTI system is: (i) Causal (ii) Stable. (iii) Memory-less	6	2	L2
	b	Given the impulse response $h(t)$ of the following systems, apply the appropriate method to calculate the corresponding step response. (i) $h(n) = \left(\frac{1}{2}\right)^n u(n - 3)$ (ii) $h(t) = t[u(t) - u(t - 1)]$	8	3	L3
	c	Investigate the causality and stability of the following systems: (i) $h(t) = e^{-4 t }$ (ii) $h(t) = u(t + 1) - u(t - 1)$	6	2	L4
MODULE - 4					
Q7	a	Explain the convolution property of the Discrete Time Fourier Transform (DTFT) and illustrate it with proof.	6	3	L2
	b	Using Fourier Transform analysis, compute the Fourier transform of the given signal $x(t) = e^{-at}u(t)$ also sketch magnitude and phase spectrum.	8	3	L3
	c	The DTFT of a real signal is $X(e^{j\Omega})$. Analyze and distinguish the relationships between $X(e^{j\Omega})$ and the DTFT of: (i) $x[-n]$ (ii) $x[n] * x[-n]$	6	3	L4
OR					
Q8	a	Explain the differentiation property of the Discrete Time Fourier Transform (DTFT) and illustrate it with proof.	6	3	L2
	b	Determine the DTFT of the signals: $x(n) = \left(\frac{1}{2}\right)^n u(n)$ Sketch magnitude and phase spectrum.	8	3	L3
	c	The DTFT of a real signal is $X(e^{j\Omega})$. Analyze and distinguish the relationships between $X(e^{j\Omega})$ and the DTFT of: (i) $(-1)^n x[n]$ (ii) $(1 + \cos n\pi)x[n]$	6	3	L4
MODULE - 5					
Q9	a	State shifting and scaling properties of Z-transform	4	4	L1
	b	Find the Z-transform of $x[n] = (0.5)^n u[n] + 2^n u[-n - 1]$.	10	4	L3
	c	A discrete LTI System is characterized by the different equation $y(n) = y(n - 1) + y(n - 2) + x(n - 1)$ Find the system function $H(z)$ and indicate the ROC if the system is stable. Also determine the unit sample response of the stable system	6	4	L4
OR					

2024 SCHEME

Q10	a	What is Region of Convergence (ROC) of Z-Transform? Mention its properties.	4	4	L1
	b	Compute the inverse Z-transform of the signal $X(z) = \frac{(\frac{1}{4})z^{-1}}{(1-\frac{1}{2}z^{-1})(1-\frac{1}{4}z^{-1})}$ for ROC i) $ z > \frac{1}{2}$ ii) $\frac{1}{4} < z < \frac{1}{2}$	10	4	L3
	c	Determine the inverse Z-transform of $X(z) = \frac{z^2-3z-1}{z^2-\frac{1}{2}z-1}$; $1 < z < 2$ Analyze the pole locations and express the result using partial fraction expansion	6	4	L4





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FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS

JUNE - JULY 2026

Course:	ENGINEERING THERMODYNAMICS		
Course Code:	BME401	Branch: ME	
Max Marks:	100	Duration:	03 Hours

Note:

1. Answer any FIVE full questions, choosing one full Question from each Module.
2. Any missing data can be suitably assumed.

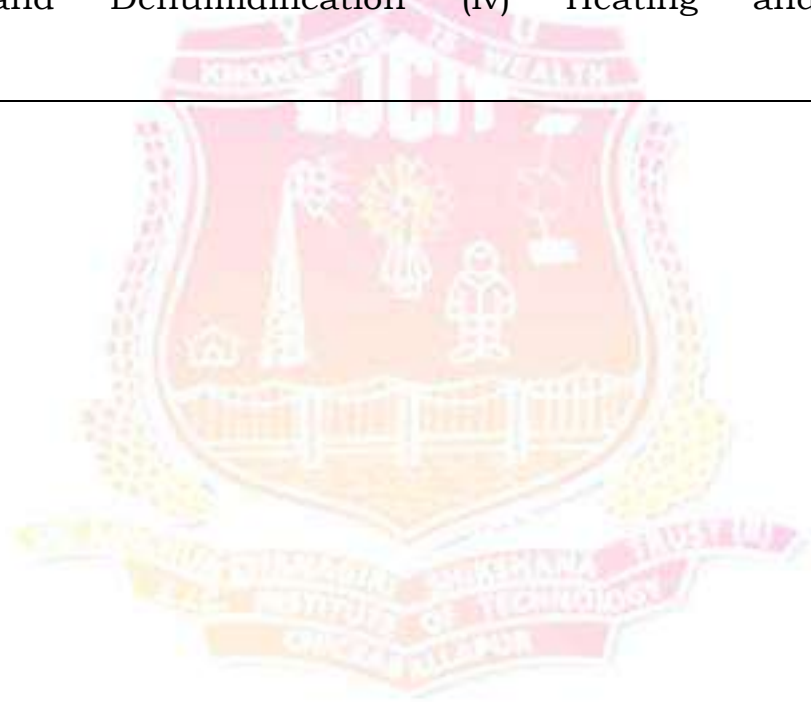
Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	Define Thermodynamics.Explain Intensive and Extensive Properties with examples	6	1	L1
	b	The Temperature T on a thermometric scale is defined as $T = a \log K + b$ where a and b are constants. The values of K are found to be 1.83 and 6.78 at 0°C and 100°C respectively. Calculate the temperature for a value of $K = 2.42$.	8	1	L3
	c	Explain Thermometric property and Celsius Temperature scale.	6	1	L2
OR					
Q2	a	Define the following terms : i) Cyclic process ii) Non-cyclic process iii) Diathermic wall iv) Quasi-static process. v) Thermodynamic cycle (vi) Thermal equilibrium	6	1	L1
	b	Design a temperature scale to measure temperature T in terms of property P according to the relation $T = a \ln P + b$ where a and b are constants. It is found that the ice point and steam point are 0°C and 100°C respectively With the instrument showing the value of P as 1.86 and 6.81 respectively. Evaluate the temperature corresponding to the value of $P = 2.8$.	8	1	L3
	c	With a neat sketch and explain the working of Constant pressure gas thermometer	6	1	L2
MODULE - 2					
Q3	a	Define Thermodynamic work and heat with S I units.	4	2	L1
	b	Write the steady flow energy equation for an open system and explain the terms involved in it. Simplify the SFEE for the following systems (i) Steam Turbine (ii) Nozzle.	10	2	L3
	c	Derive work done expression for the following process through P-V diagram i) Isochoric ii) Isobaric iii) Isothermal iv)Polytrophic	6	2	L3

2024 SCHEME

OR					
Q4	a	Explain Briefly Joule's paddle wheel experiment	4	2	L1
	b	Derive an equation for work done during an Adiabatic process	10	2	L3
	c	Show the similarities and dissimilarities of work and heat.	6	2	L3
MODULE - 3					
Q5	a	Define Entropy and Prove that it is a property of the system.	6	3	L1
	b	A heat engine absorbs 200kJ/s of heat at 227 ⁰ C and rejects heat at 27 ⁰ C. Three separate cases of heat rejection are reported. i)180KJ/s heat rejected ii)120KJ/s heat rejected iii) 60kJ/s heat rejected. Classify each cycle.	8	3	L3
	c	Represent the Carnot heat engine on a p-v diagram and discuss all the processes derive an expression for the efficiency of the Carnot Cycle	6	3	L4
OR					
Q6	a	Define the following terms with schematic representation (i) Heat engine (ii) Heat Pump (iii) Efficiency (iv) COP	6	3	L1
	b	State and Prove Clausius inequality	8	3	L3
	c	An engineer claims to have developed an engine producing 4.5 kW power when working between temperature limits of 1400 ⁰ C and 350 ⁰ C, consuming 0.5kg of fuel per hour with a calorific value of 42000 KJ/Kg, comment on the engineers claim.	6	3	L4
MODULE - 4					
Q7	a	Define Gas turbine and write the assumptions in Brayton cycle.	4	4	L1
	b	With a neat sketch and T-S diagram, explain how 'regeneration' increase thermal efficiency of a gas turbine plant.	10	4	L3
	c	Analyze the Brayton cycle using P-V and T-S diagrams, and derive the air-standard efficiency. Further, examine the effect of pressure ratio on the efficiency of the cycle.	6	4	L4
OR					
Q8	a	Define Air Standard Cycle and write its Assumptions	4	4	L1
	b	With a neat sketch and T-S diagram, explain how 'Intercooling' increase thermal efficiency of a gas turbine plant.	10	4	L3
	c	Derive the air-standard efficiency of the Dual cycle and analyze how variations in compression ratio, cut-off ratio, and pressure ratio affect cycle performance.	6	4	L4

2024 SCHEME**MODULE – 5**

Q9	a	Explain the following terms with respect to refrigeration: (i) Refrigerating effect (ii) Unit of refrigeration (iii) C.O.P. iv) Ton of Refrigerant v) Refrigerant	10	5	L2
	b	Analyze the working of a Vapour Compression Refrigeration (VCR) system using a neat sketch, and examine how each component contributes to the refrigeration effect. Also, analyze the basic principle governing refrigeration.	10	5	L4
OR					
Q10	a	Define Psychrometry and explain the working principle of window type air conditioning system.	10	5	L2
	b	Analyze the following processes by showing them on the Psychrometric chart: (i) Sensible Cooling (ii) Humidification (iii) Cooling and Dehumidification (iv) Heating and Humidifying	10	5	L4



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FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS**JUNE - JULY 2026**

Course:	MECHANICS OF MATERIALS		
Course Code:	BAE402	Branch: AE	
Max Marks:	100	Duration:	03 Hours

Note:

1. Answer any FIVE full questions, choosing one full Question from each Module.
2. Any missing data can be suitably assumed.

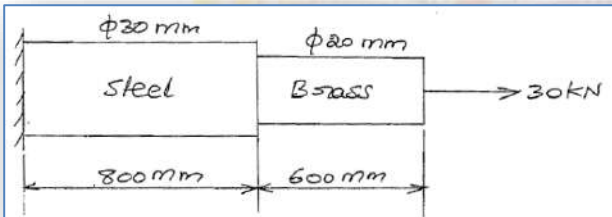
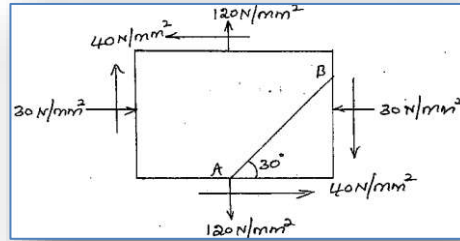
2. Any missing data can be suitably assumed.						
Q. No.		MODULE - 1	Marks	CO	RBTL	
Q1	a	Explain stress-strain behavior of ductile and brittle materials with a neat sketch.	6	1	L2	
	b	Derive an expression for extension of uniformly tapering circular bar.	8	1	L3	
	c	A circular rod of diameter 16 mm and 500 mm long is subjected to a tensile force 40 kN. The modulus of elasticity for steel may be taken as 200 kN/mm ² . Find stress, strain and elongation of the bar due to applied load.	6	1	L3	
OR						
Q2	a	State and explain hooks law.	6	1	L2	
	b	Derive the relationship between Modulus of Elasticity and Modulus of Rigidity.	8	1	L3	
	c	The Composite Bar Shown in the figure below is made-up of two different materials. The Steel has young's modulus of 2×10^5 N/mm², find the young's modulus of brass. The bar is under the pull of 30 kN, the extension observed is 0.74 mm.  Fig.Q.2.c	6	1	L3	
MODULE - 2						
Q3	a	Explain plane stress, principal stresses and principal planes.	6	2	L2	
	b	Analyze the state of stress at a point in a strained material where the stress components are as shown in the given figure. Based on the stress transformation relationships, determine: i.The normal stress and shear stress acting on the inclined plane AB. ii.The principal stresses and the orientation of the principal planes. iii.The maximum shear stress developed at the point and the plane on which it occurs.	8	2	L4	

Fig. Q.3(b)

Page 2 of 3

2024 SCHEME

		support. Analyze the deflection behavior of the beam and determine deflection under each load Take, $E=200 \text{ GPa}$, $I = 85 \times 10^6 \text{ mm}^4$. Adopt Macaulay's method.			
OR					
Q8	a	Compare strength of solid and hollow shaft of same material and weight.	6	4	L2
	b	Derive torsion equation with usual notations.	8	4	L3
	c	A solid circular shaft is required to transmit 1000 kW of power at 120 rpm. The allowable shear stress of the material is 80 MPa. The maximum torque is 1.25 times the mean torque. i. Analyze the torque transmission requirements and determine the diameter of the solid shaft, considering the relationship between power, speed and torque. ii. If the shaft is replaced by a hollow shaft with an internal diameter equal to 0.6 times the external diameter, evaluate the dimensions required to safely transmit the same power under identical material and stress conditions.	6	4	L4
MODULE – 5					
Q9	a	Explain different end conditions of columns.	6	4	L2
	b	Derive crippling load for column hinged at both the ends.	8	4	L3
	c	A solid alloy tube 5m long with an diameter of 60mm was found to extend by 6 mm under an axial tensile load of 60kN. Find the Euler's buckling load for the tube when used as a strut with both ends fixed. Also determine the safe load the column can carry if factor of safety is equal to 4.	6	4	L3
OR					
Q10	a	Explain the types of fracture.	6	4	L2
	b	Interpret S–N curve and determine the fatigue life at a specific stress level.	8	4	L3
	c	Draw a typical creep curve and apply your understanding to explain the physical changes occurring in the material during each stage.	6	4	L3

2024 SCHEME

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FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS

JUNE - JULY 2026

Course:	AIRCRAFT PROPULSION			
Course Code:	BAS402	Branch: AS		
Max Marks:	100	Duration:	03 Hours	

Note:

1. Answer any FIVE full questions, choosing one full Question from each Module.
2. Any missing data can be suitably assumed.

Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	Explain the terms stagnation pressure and stagnation temperature.	4	1	L2
	b	The ratio of net work to turbine work of an ideal gas turbine plant is 0.563. Take the inlet temperature to the compressor as 300 K. Calculate the temperature drop across the turbine if the thermal efficiency of the unit is 35%. Assume a mass flow rate of 10 kg/s, $C_p = 1 \text{ kJ/kg K}$ and $\gamma = 1.4$.	10	1	L3
	c	Discuss the advantages of gas turbines over reciprocating engine	6	1	L3
OR					
Q2	a	State the relationship between enthalpy and internal energy?	4	1	L2
	b	A gas turbine plant works between temperature limits of 300 K and 900 K. The pressure limits are 1 bar and 4 bar. Estimate the thermal efficiency of the plant and the shaft power available for the external load in kW. Assume mass rate of flow of air to the compressor as 1600 kg/min.	10	1	L3
	c	Describe the working principle of Turbojet engine.	6	1	L2
MODULE - 2					
Q3	a	Explain the primary function of an inlet duct in a gas turbine engine.	6	2	L2
	b	A gas turbine engine operates at a flight Mach number of 0.8. Discuss how the design of its inlet might differ from one operating at a flight Mach number of 2.0, focusing on the aerodynamic Principles involved.	8	2	L3
	c	Define the terms "pressure recovery" and "total pressure ratio" as they relate to inlet performance.	6	2	L2
OR					
Q4	a	How does Mach number influence the design considerations for a gas turbine inlet?	6	2	L2
	b	Illustrate with a neat sketch and brief explanation, the flow Characteristics through a supersonic inlet diffuser, indicating the position of shock waves.	8	2	L3

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	c	Name and briefly explain two methods used to control the boundary layer within an inlet duct.	6	2	L2
MODULE - 3					
Q5	a	Briefly discuss the differences between an axial flow compressor and a centrifugal compressor.	6	3	L2
	b	Define the Degree of Reaction. Derive its mathematical expression using standard notations.	8	3	L3
	c	A centrifugal compressor has an inlet eye 15 cm diameter. The impeller revolves at 20,000 rpm and the inlet air has an axial velocity of 107 m/s, inlet stagnation temperature 294 K and inlet pressure 1.03 kg/cm ² . Determine (i) theoretical angle of the blade at this point and (ii) Mach number of the flow at the tip of the eye.	6	3	L4
OR					
Q6	a	Explain what do you understand by pressure compounding of a multistage impulse turbine.	6	3	L2
	b	What do you understand by blade and stage efficiency? Derive an expression for blade efficiency.	8	3	L3
	c	In a single-stage impulse turbine the nozzle discharges the fluid on to the blades at an angle of 65° to the axial direction and the fluid leaves the blades with an absolute velocity of 300 m/s at an angle of 30° to the axial direction. If the blades have equal inlet and outlet angles and there is no axial thrust, estimate the blade angle, power produced per kg/s of the fluid and the blade efficiency.	6	3	L4
MODULE - 4					
Q7	a	Explain the classification of combustion chambers used in gas turbine engines.	6	4	L2
	b	A gas turbine engine operates with a can-type combustion chamber. Compare its performance and design considerations with an annular combustion chamber.	8	4	L3
	c	Explain the combustion process in a gas turbine combustion chamber.	6	4	L2
OR					
Q8	a	What are the various functions of an exhaust nozzle?	6	4	L2
	b	Explain the following performance coefficients: (i) nozzle coefficient, (ii) cross thrust coefficient, (iii) flow coefficient, (iv) velocity coefficient	8	4	L3
	c	Describe the phenomenon of flame stabilization and the role of flame holders in combustion chambers.	6	4	L2
MODULE - 5					
Q9	a	Explain the operating principle of a ramjet engine.	6	5	L2
	b	A ramjet engine operates at Mach 2.0. Discuss how inlet operation differs between sub-critical and supercritical regimes, with aerodynamic reasoning.	8	5	L3
	c	Define Ramjet performance and explain how it is evaluated.	6	5	L2
OR					
Q10	a	Describe the combustion process in a ramjet engine.	6	5	L2
	b	With a neat sketch, illustrate the flow characteristics through a Scramjet inlet diffuser, indicating the position of shock waves.	8	5	L3
	c	Explain the preliminary concepts of supersonic combustion in simple terms.	6	5	L2

2024 SCHEME

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FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS**JUNE - JULY 2026**

Course:	COMPUTER GRAPHICS AND VISUALIZATION		
Course Code:	BCG402	Branch: CSD	
Max Marks:	100	Duration:	03 Hours

Note:

1. Answer any FIVE full questions, choosing one full Question from each Module.
2. Any missing data can be suitably assumed.

Q. No.	MODULE - 1		Marks	CO	RBTL
Q1	a	Explain any four Applications of Computer graphics	4	1	L2
	b	Construct Bresenham's line drawing algorithm. Make use of Bresenham's algorithm to calculate the pixel position for the screen coordinate (9, 18) and (14, 22).	10	1	L3
	c	Identify and explain the OpenGL Point function and its Attributes with an example	6	1	L3
OR					
Q2	a	Describe the different OpenGL Libraries	4	1	L2
	b	Identify and explain the OpenGL Line function and its Attributes with an example	10	1	L3
	c	What is Fill-Area Attributes, Identify Fill-Area Attributes Function with steps	6	1	L3
MODULE - 2					
Q3	a	Outline the OpenGL raster transformation.	6	2	L2
	b	Define 2D Rotation. Explain Rotation transformation techniques with Matrix representation and outline the code for Rotation transformation	8	2	L2
	c	Define 2D Translation. Apply Translation transformation techniques using Matrix representation	6	2	L3
OR					
Q4	a	Explain the Homogeneous Coordinates representation?	6	2	L2
	b	Explain 3- D Transformation techniques with Matrix representation.	8	2	L2
	c	Define 2D scaling. Apply scaling transformation techniques using Matrix Representation	6	2	L3

2024 SCHEME**MODULE – 3**

Q5	a	Explain how an event driven input can be performed for keyboard and mouse device	6	3	L2
	b	Explain request mode and event mode with figures	8	3	L2
	c	Identify the logical classifications of input devices with examples	6	3	L3

OR

Q6	a	Outline the OpenGL Menu functions with suitable example.	6	3	L2
	b	Illustrate an OpenGL program on rotating or spinning a cube.	8	3	L2
	c	Identify the various features that a good interactive program should include	6	3	L3

MODULE – 4

Q7	a	Explain the different types of light sources supported by OpenGL.	6	4	L2
	b	Develop the Cohen Sutherland Line Clipping program using OpenGL.	8	4	L3
	c	Compare RGB and CMY color models with suitable diagram.	6	4	L4

OR

Q8	a	Describe Phong lighting model with example.	6	4	L2
	b	What are display lists? Identify the steps to develop interactive models and animating interactive programs.	8	4	L3
	c	Classify the various illumination models with suitable diagrams.	6	4	L4

MODULE – 5

Q9	a	List the 3D viewing coordinate parameter and explain.	6	5	L2
	b	Identify the general-perspective transformation equation and explain the special cases of perspective projection equation.	8	5	L3
	c	What is 3D viewing? Analyze 3D viewing pipeline architecture with a block diagram.	6	5	L4

OR

Q10	a	Give the Difference between parallel and Perspective Projection.	6	5	L2
	b	Illustrate and apply the depth-buffer algorithm with a step-by-step example.	8	5	L3
	c	Analyze the orthogonal projection in detail.	6	5	L4

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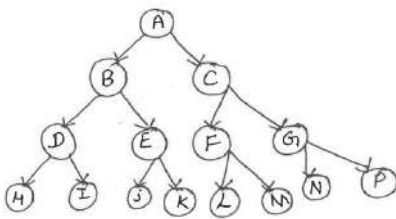
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FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS**JUNE - JULY 2026**

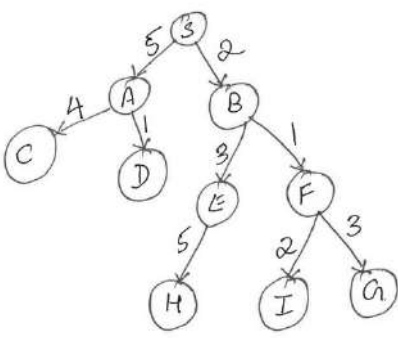
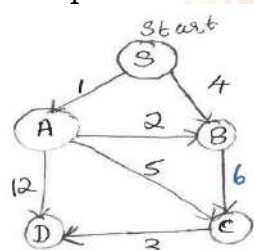
Course:	ARTIFICIAL INTELLIGENCE		
Course Code:	BCI402	Branch: AIML and AI&DS	
Max Marks:	100	Duration:	03 Hours

Note:

1. Answer any FIVE full questions, choosing one full Question from each Module.
2. Any missing data can be suitably assumed.

Q. No.	MODULE - 1		Marks	CO	RBTL
Q1	a	Discuss the four approaches of AI	6	1	L2
	b	Illustrate how the concept of rationality is used by a vacuum cleaner agent.	8	1	L3
	c	Analyze how the components of the foundational framework for intelligent agents interact within a navigation system	6	1	L4
OR					
Q2	a	Describe the structure of an intelligent agent	6	1	L2
	b	Classify different types of task environments with suitable examples	8	1	L3
	c	Analyze the PEAS description of the Hospital Management system and examine how each component contributes to its functionality.	6	1	L4
MODULE - 2					
Q3	a	Describe the problem formulation of the 8-puzzle real world problem.	6	2	L2
	b	Explain the execution of Depth First Search (DFS) with pruning on a given graph. Starting from the source node A, trace all intermediate steps, apply pruning wherever applicable, and determine the path to reach the goal node P.  Fig.Q3(b)	8	2	L2
	c	Evaluate the efficiency of different formulations of the 8-queens problem	6	2	L4
OR					
Q4	a	Write an algorithm for Breadth First Search and explain with an example	6	2	L2
	b	Relate the components of a well-defined problem and examine how each component contributes to the formulation and solution of a problem with a suitable example.	8	2	L3

2024 SCHEME

	c	Evaluate the infrastructure search algorithm with an example.	6	2	L4																						
MODULE – 3																											
Q5	a	Explain the architecture of knowledge-based agent with a neat diagram	6	3	L2																						
	b	Apply the Greedy best first search to find the solution path from S to G.  Fig.Q5(b) <table border="1" data-bbox="825 378 1080 806"><thead><tr><th>NODE</th><th>H(n)</th></tr></thead><tbody><tr><td>A</td><td>12</td></tr><tr><td>B</td><td>4</td></tr><tr><td>C</td><td>7</td></tr><tr><td>D</td><td>3</td></tr><tr><td>E</td><td>8</td></tr><tr><td>F</td><td>2</td></tr><tr><td>H</td><td>4</td></tr><tr><td>I</td><td>9</td></tr><tr><td>S</td><td>13</td></tr><tr><td>G</td><td>0</td></tr></tbody></table>	NODE	H(n)	A	12	B	4	C	7	D	3	E	8	F	2	H	4	I	9	S	13	G	0	8	3	L3
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G	0																										
c	Examine the syntax and semantics of propositional logic with suitable example.	6	3	L4																							
OR																											
Q6	a	Explain the PEAS description for the Wumpus World problem.	6	3	L2																						
	b	Explain the process of converting a given propositional logic expression into Conjunctive Normal Form and identify each transformation step involved $A \rightarrow (B \leftrightarrow C)$	8	3	L2																						
	c	Given a graph with heuristic values, analyze A* search algorithm to find the optimal path from the start node to the goal node D.  Fig.Q6(c) <table border="1" data-bbox="825 1256 1048 1458"><tbody><tr><td>S</td><td>7</td></tr><tr><td>A</td><td>6</td></tr><tr><td>B</td><td>2</td></tr><tr><td>C</td><td>1</td></tr><tr><td>D</td><td>0</td></tr></tbody></table>	S	7	A	6	B	2	C	1	D	0	6	3	L4												
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MODULE – 4																											
Q7	a	Explain various ambiguities in Natural Language processing with examples and summarize in the form of a table about formal languages and their ontological and epistemological commitments	6	4	L2																						
	b	Explain the following with respect to the first order logic. i) Assertions and Queries in first order logic. ii) The Kinship domain	8	4	L2																						
	c	Analyse the differences between forward chaining and backward chaining with suitable examples.	6	4	L4																						
OR																											
Q8	a	Explain unification and lifting in detail with a suitable example.	6	4	L2																						
	b	Define Universal and Existential Instantiation and give examples for both. Interpret the following using Backward and Forward chaining: "As per the law, it is a crime for an American to sell weapons to hostile nations. Country E, an enemy of America, has some missiles, and all the missiles were sold to it by Solan, who is an American citizen." Prove that "Solan s criminal."	8	4	L2																						

2024 SCHEME

	c	Analyse how First Order Logic can be applied to represent knowledge and reasoning in the Wumpus World, focusing on how logical sentences help an agent infer safe paths and detect dangers.	6	4	L4
MODULE – 5					
Q9	a	Explain basic probability notation in detail.	6	5	L2
	b	Write the representation of Bayes Theorem. In a class, 70% children were fall sick due to Viral fever and 30% due to Bacterial fever. The probability of observing temperature for Viral is 0.78 and for Bacterial is 0.31. If a child develops high temperature, find the child's probability of having viral infection.	8	5	L2
	c	Given that bus arriving late=0.3 and a student oversleeping probability is 0.4, find the probability that student gets late.	6	5	L4
OR					
Q10	a	Explain the main components of an expert system and their roles.	6	5	L2
	b	Explain uncertain knowledge in the context of artificial intelligence. Discuss the challenges an agent focus when acting under uncertainty with the example of diagnosing a dental patient's toothache.	8	5	L2
	c	Correlate marginalization and normalization with a full joint distribution of(toothache, catch, cavity)	6	5	L4



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FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS

JUNE - JULY 2026

Course:	MICROCONTROLLERS AND EMBEDDED SYSTEMS			
Course Code:	BCS402	Branch: CSE		
Max Marks:	100	Duration:	03 Hours	

Note:

1. Answer any FIVE full questions, choosing one full Question from each Module.
2. Any missing data can be suitably assumed.

Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	Outline the ARM design philosophy. Also show how ARM instruction set differs from pure RISC definition.	6	1	L2
	b	Explain with a neat diagram the hardware components of an embedded system device based on the ARM Core.	8	2	L2
	c	Construct a neat diagram showing the pipeline stages of different versions of ARM also identify function of each stage.	6	2	L2
OR					
Q2	a	Label the various fields in the Current Program Status Register (CPSR) and interpret the content of bits in cpsr = nzCvqjiFt_SVC.	6	1	L2
	b	Outline the banked registers available in the ARM processor and brief different processor modes.	8	2	L2
	c	Make use of the ARM Core Data Flow Model to identify and organize each operation steps during execution.	6	2	L2
MODULE - 2					
Q3	a	List different mnemonics of Branch instructions in ARM. Find r0 after BIC r0, r1, r2 instruction executes, if r1=0b1111, r2=0b0101.	6	3	L2
	b	Illustrate with an example the working of Barrel Shifter operation in ARM processor with a neat diagram.	8	3	L2
	c	Build an ALP to find the largest (or) smallest element in an array of 32-bit numbers and write necessary comments.	6	3	L3
OR					
Q4	a	Describe Program Status Register instruction and Coprocessor instructions.	6	2	L2
	b	Illustrate with suitable examples any two logical and any two comparison instructions in ARM.	8	3	L2
	c	Develop a ALP program to count the number of 1s and 0s in an array of two 32-bit numbers stored in successive memory locations.	6	3	L3
MODULE - 3					
Q5	a	List different data types of C-compiler supported by embedded C in ARM and describe briefly Load/Store instructions available in different versions of the ARM family.	6	3	L1

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	b	Explain with code how the short data type problem in Checksum Version-3 is resolved in Version-4.	8	4	L2
	c	Apply decrement for-loop in checksum code and identify the improvement obtained by switching from increment to decrement for-loop.	6	3	L3
OR					
Q6	a	Describe Function Calls and Pointer Aliasing in ARM embedded C.	6	3	L1
	b	List and explain the issues encountered when porting C code to ARM.	8	4	L2
	c	With a test case identify the problem faced by the compiler for function argument types and inspect the roles of caller and callee functions, wide calls and narrow calls.	6	3	L3
MODULE - 4					
Q7	a	What is firmware and bootloader? Differentiate between them in ARM-based systems.	6	4	L1
	b	Describe the different methods of returning from an IRQ or FIQ exception handler with an example.	8	5	L2
	c	Organize and discuss ARM processor exceptions and its associated modes.	6	4	L2
OR					
Q8	a	Describe the Vector Table, its forms, addresses, and priority levels.	6	4	L1
	b	Organize the standard procedure that hardware follows when IRQ or FIQ occurs. Also illustrate the same for FIQ.	8	4	L2
	c	Outline the Sandstone directory layout, identify its execution flow steps and build the code for any one step.	6	5	L2
MODULE - 5					
Q9	a	Compare General Purpose Computing System and Embedded System.	4	1	L2
	b	Differentiate between: i) Microprocessor & Microcontroller ii) CISC & RISC	8	2	L2
	c	Label the segments of 7-Segment LED display and inspect the code to generate any one character to display.	8	5	L3
OR					
Q10	a	Define Sensors and Actuators. Give examples.	4	1	L2
	b	With a neat diagram, explain the elements of an embedded system.	8	2	L2
	c	Construct 2-phase Unipolar Stepper Motor, identify current flow in coils and also show how to interface motor to microcontroller.	8	5	L3

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FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS**JUNE - JULY 2026**

Course:	FLUID MECHANICS AND HYDRAULIC MACHINES		
Course Code	BCV402	Branch: CV	
Max Marks:	100	Duration:	03 Hours

Note:

1. Answer any FIVE full questions, choosing one full Question from each Module.
2. Any missing data can be suitably assumed.

Q. No.	MODULE - 1		Marks	CO	RBTL
Q1	a	Define dynamic Viscosity. Derive an expression for the dynamic viscosity of a liquid.	6	1	L2
	b	A differential manometer is connected at two point A and B of two pipes as shown figure. The pipe A contains a liquid of specific gravity 1.5 while pipe B contains $S=0.90$. The pressures at A & B are $9.81 \times 10^4 \text{ N/m}^2$ and $17.66 \times 10^4 \text{ N/m}^2$ respectively. Find the difference in mercury level in the differential manometer.	8	1	L3
	c	Calculate the specific weight, density and specific gravity of one liter of a liquid which weighs 7N.	6	1	L3
OR					
Q2	a	With a neat sketch explain differential U tube manometer.	6	1	L2
	b	Calculate the capillarity rise in a glass tube of 2.5mm diameter when immersed vertically in a) water b) mercury. Take surface tension $=0.0725 \text{ N/m}$ for water and 0.52 N/m for mercury in contact with air. The specific gravity for mercury is given by 13.6 and angle of contact $= 130^\circ$.	8	1	L3
	c	Calculate the hydrostatic forces acting on a vertical rectangular plane surface (2 m wide and 3 m deep) submerged in water. It lies in vertical plane in water. Determine the total pressure and position of center of pressure on the plane surface when its upper edge is horizontal a) Coincides with the water surface b) 2.5 m below the free water surface.	6	1	L3
MODULE - 2					
Q3	a	Distinguish between (i) Steady flow and Unsteady flow. (ii) Uniform flow and Non-uniform flow	6	2	L2
	b	State and derive Bernoulli's equation stating from the Euler's equation of motion.	8	2	L2

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	c	A horizontal venturimeter with inlet diameter 20cm and throat diameter 10cm is used to measure the flow of oil of specific gravity as 0.80. the discharge of oil through venturimeter is 60Lps. Find the reading of the oil – mercury differential manometer. Take coefficient of discharge = 0.98.	6	2	L3
OR					
Q4	a	With a neat sketch explain Pitot Tube.	6	2	L2
	b	Derive an expression for rate of flow through venturimeter.	8	2	L2
	c	An orifice meter with orifice diameter 15cm is inserted in a pipe of 30cm dia. The pressure difference measured by a mercury oil differential manometer on the two sides of the orifice meter gives a reading of 50cm of mercury. Find the rate of flow of oil of specific gravity 0.80. when the coefficient of discharge of the orifice meter = 0.64.	6	2	L3
MODULE - 3					
Q5	a	Define notches and weirs	6	3	L1
	b	Derive an expression for discharge over a triangular notch.	8	3	L2
	c	Water flows over a rectangular weir 1m wide at a depth of 150mm and after wards passes through a triangular right-angled weir. Taking coefficient of discharge for the rectangular and triangular weir as 0.62 and 0.59 respectively. Find the depth over the triangular weir.	6	3	L3
OR					
Q6	a	Define water hammer. What are the factors influencing water hammer.	6	3	L1
	b	Deduce an expression for time required to empty a reservoir or a tank with a rectangular weir.	8	3	L2
	c	A crude oil of kinematic viscosity 0.4 stokes is flowing through a pipe of diameter 300mm at the rate of 300LPS. Find the head lost due to friction for a length of 50m of the pipe.	6	3	L3
MODULE - 4					
Q7	a	What is Specific Energy Curve? Write equations for critical depth and critical velocity for a rectangular channel.	6	4	L2
	b	What is meant by most economical section of channel? Derive the condition for most economical section of a rectangular channel	8	4	L2
	c	A trapezoidal channel has a bed width of 6 m, water depth of 3 m, and side slopes of 3H : 4V. The discharge flowing through the channel is 30 m ³ /s. Assume Chezy's constant, C = 70. Analyze the channel geometry and hydraulic parameters to determine the required bed slope of the channel. Also examine how the side slopes influence the wetted perimeter and hydraulic radius.	6	4	L4
OR					

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Q8	a	What is meant by hydraulic jump? State the assumptions made in expression for depth of hydraulic jump.	6	4	L2
	b	Determine the maximum discharge of water through a circular channel of diameter 1.5m when the bed slope of the channel is 1 in 1000. $C=60$	8	4	L3
	c	A hydraulic jump forms at the downstream end of a spillway carrying a discharge of $7.93 \text{ m}^3/\text{s}$. The depth of flow before the jump is 0.8 m. Analyze the hydraulic jump phenomenon and determine the sequent depth (depth after jump) and the energy loss across the jump.	6	4	L4
MODULE - 5					
Q9	a	With a neat sketch and label the components of Pelton wheel Turbine.	6	5	L2
	b	Derive an expression for force exerted by a jet on stationary curved plate.	8	5	L2
	c	A double-acting reciprocating pump operates at 40 rpm and discharges $0.016 \text{ m}^3/\text{s}$ of water. The pump has a stroke length of 400 mm and a piston diameter of 200 mm. The delivery head and suction head are 20 m and 5 m respectively. Analyze the operating performance of the reciprocating pump to determine the slip of the pump and the power required to drive it.	6	5	L4
OR					
Q10	a	With a neat sketch label the components of a centrifugal pump.	6	5	L2
	b	A jet of water of diameter 75mm moving with a velocity of 25 m/s strikes a fixed Flat plate in such a way that the angle between the jet and plate is 60° . Find the force exerted by the jet on the plate. i) in the direction normal to the plate ii) in the direction of the jet.	8	5	L3
	c	A pelton wheel is to be designed for the following specifications: Shaft power = 11772KW. Head = 380m. Speed = 750rpm, efficiency = 86%, jet diameter is not exceed one sixth of the wheel diameter. Determine i) The wheel diameter ii) the number of jets required, iii) diameter of jet. Assume $K_v 0.985$ and $K_u = 0.45$.	6	5	L4

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FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS
JUNE - JULY 2026

Course:	PRINCIPLES OF COMMUNICATION SYSTEMS			
Course Code:	BEC402	Branch: ECE		
Max Marks:	100	Duration:	03 Hours	

Note:

1. Answer any FIVE full questions, choosing one full Question from each Module.
2. Any missing data can be suitably assumed.

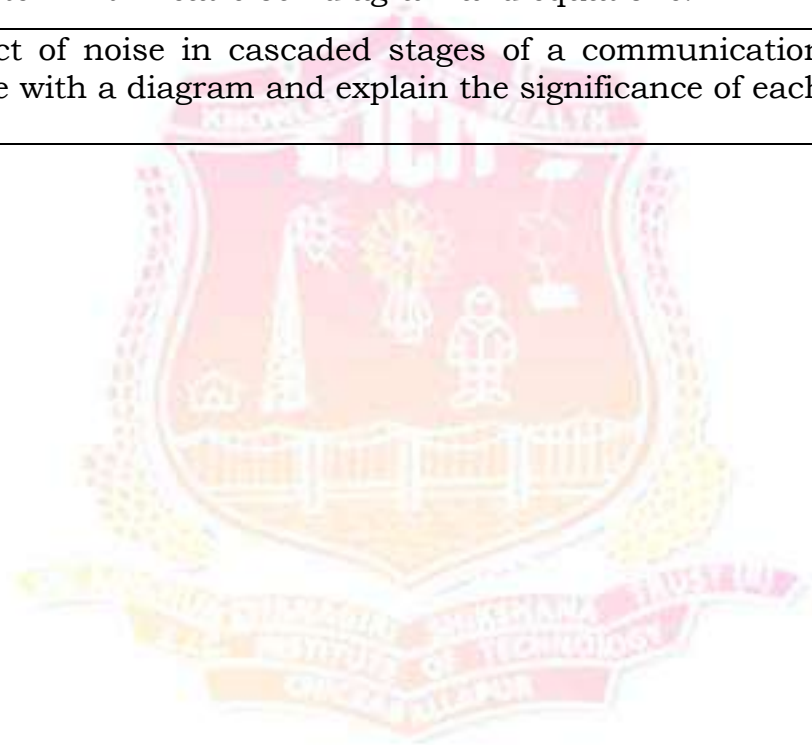
Q. No.	MODULE - 1		Marks	CO	RBTL
Q1	a	Define Probability. Illustrate the relationship between sample space, events and probability.	6	1	L1
	b	Consider the coin-tossing experiment where the probability of a head is p. Let X be a random variable that takes the value 0 if the result is a tail and 1 if it is a head. We say that X is a Bernoulli random variable. The probability mass function of a Bernoulli random variable is $P(X=x) = \begin{cases} 1-p & x=0 \\ p & x=1 \\ 0 & \text{otherwise} \end{cases}$ Illustrate the moments of a Bernoulli random variable.	8	1	L2
	c	Show that, if a Gaussian process X(t) is applied to a stable linear filter, then the random process Y(t) developed at the output of the filter is also Gaussian.	6	1	L3
OR					
Q2	a	Define the autocorrelation and cross-relation functions. Infer the properties of autocorrelation function.	6	1	L1
	b	Outline random processes and illustrate an ensemble of sample functions with a neat diagram.	8	1	L2
	c	A random variable is said to be uniformly distributed over the interval (a,b). Determine the probability density function of uniformly distributed RV.	6	1	L3
MODULE - 2					
Q3	a	Define amplitude modulation (AM). Explain its representation in the time domain and frequency domain with necessary expressions and diagrams.	6	1	L1
	b	Describe high-level collector modulator with a neat block diagram.	8	1	L2
	c	An SSB transmitter using the filter method operates at a carrier frequency of 4.2 MHz. The voice frequency range is 300 Hz to 3400 Hz.	6	1	L3

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		Determine: i)The upper sideband (USB) frequency range ii)The lower sideband (LSB) frequency range iii)The approximate center frequency of the band pass filter to select the lower sideband			
OR					
Q4	a	An antenna has an impedance of 40Ω . An unmodulated AM signal produces a current of 4.8 A. The modulation is 90 percent. Calculate (a) the carrier power, (b) the total power, and (c) the sideband power	6	1	L1
	b	Illustrate with neat diagrams, the working principle of Lattice-type balanced modulator.	8	1	L2
	c	Write a Scilab code to generate Amplitude Modulation and draw the relevant waveforms.	6	1	L3
MODULE – 3					
Q5	a	Find a method used to convert a phase-modulated (PM) signal into a frequency-modulated (FM) signal.	6	2	L1
	b	Explain the Pre-emphasis and de-emphasis in FM system with relevant diagrams.	8	2	L2
	c	The input to an FM receiver having an S/N of 2.8. The modulating frequency is 1.5 kHz. The maximum permitted deviation is 4 kHz. Determine (a) the frequency deviation caused by the noise and (b) the improved output S/N?	6	2	L3
OR					
Q6	a	Define Modulation. List any five differences between Amplitude Modulation and Frequency Modulation.	6	2	L1
	b	Draw the block diagram of a super heterodyne receiver and explain the function of each block.	8	2	L2
	c	Write a Scilab code to generate Frequency Modulated (FM) and demodulated signals.	6	2	L3
MODULE – 4					
Q7	a	What are the advantages of digital signals over analog signals.	6	3	L1
	b	Summarize briefly the midtread and midrise Quantizers with relevant figures.	8	3	L2
	c	Construct a basic Pulse Code Modulation (PCM) system and analyze how a signal is processed through the stages of sampling, quantization, and encoding with the help of a neat block diagram.	6	3	L4
OR					
Q8	a	What is aperture effect in PAM systems? How can it be minimized?	6	3	L1
	b	Draw the waveforms using the concept of line codes for the data stream [01101001], i. Unipolar NRZ ii. Polar NRZ iii. Unipolar RZ iv. Manchester code	8	3	L2

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	c	Analyze multiplexing and its need in communication. Explain the working of Time Division Multiplexing with a neat block diagram.	6	3	L4
MODULE – 5					
Q9	a	Write short notes on External noise and Industrial noise.	6	4	L1
	b	Interpret the following concepts briefly: (i) Nyquist criterion for distortionless transmission. (ii) Baseband M-arry PAM transmission	8	4	L2
	c	Analyze the eye diagram of a digital signal by writing a program in Scilab, and interpret the effects of noise and intersymbol interference on signal quality.	6	4	L4
OR					
Q10	a	Define Noise. Classify the different types of semiconductor noise.	6	4	L1
	b	Define Inter symbol Interference (ISI). Outline Baseband binary data transmission system with neat block diagram and equations.	8	4	L2
	c	Analyze the effect of noise in cascaded stages of a communication system. Illustrate with a diagram and explain the significance of each term.	6	4	L4





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FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS

JUNE - JULY 2026

Course:	PYTHON FOR DATA SCIENCE		
Course Code:	BIS402	Branch: ISE	
Max Marks:	100	Duration:	03 Hours

Note:

1. Answer any FIVE full questions, choosing one full Question from each Module.
2. Any missing data can be suitably assumed.

Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	Demonstrate string concatenation and string replication in python with example programs.	6	1	L2
	b	Demonstrate if, elif, while, for statements in python with example for each.	8	1	L2
	c	Develop a python program to sort four input numbers using minimal if else statements.	6	1	L3
OR					
Q2	a	List and explain primitive data types available in python. Write a python program to demonstrate the use of primitive datatypes	6	1	L2
	b	Demonstrate else, break, continue, sys.exit() statements in python with example for each.	8	1	L2
	c	Write a python program to print first five natural numbers using while loop.	6	1	L3
MODULE – 2					
Q3	a	Differentiate data and information.	4	2	L2
	b	With a neat diagram explain steps involved in Data Analysis Process.	10	2	L2
	c	Outline the key stages of defining a problem in data analysis. Justify why understanding the system is important.	6	2	L3
OR					
Q4	a	Explain the different knowledge domains requires for a data analyst.	4	2	L2
	b	Discuss the importance of deployment in the data analysis process	10	2	L2
	c	Differentiate between Quantitative and Qualitative Data Analysis. Justify which type of analysis is more suitable for medical application.	6	2	L3

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MODULE – 3					
Q5	a	Define array indexing. Illustrate array slicing with an example.	4	3	L2
	b	Outline the structural elements of a DataFrame and discuss its ability to store and process different data types.	10	3	L3
	c	Discuss the methods of stacking and splitting arrays in NumPy with a suitable program.	6	3	L3
OR					
Q6	a	Define "NaN" values in pandas. How they are typically generated during data analysis?	4	3	L2
	b	Demonstrate how to use Pandas functions to calculate correlation and covariance between data structures such as Series or DataFrames.	10	3	L3
	c	Describe how shape manipulation is performed in NumPy and differentiate between reshape(), ravel(), and transpose() in terms of their effect on arrays.	6	3	L3
MODULE – 4					
Q7	a	Compare the two main categories of functions provided by the pandas I/O API with suitable examples.	6	4	L4
	b	Show how to convert a pandas DataFrame into a JSON or dictionary format so that it can be loaded into a NoSQL database such as MongoDB.	8	4	L3
	c	Write a program to store and retrieve data using pickle format.	6	4	L3
OR					
Q8	a	Analyze the four types of joins supported by the pd.merge() function and how they are selected.	6	4	L4
	b	Using Pandas, create a program to read a CSV file, display the first five rows, and show basic information about the dataset (such as column names and data types).	8	4	L3
	c	Write a program to plot points using red color and circle markers ('ro').	6	4	L3
MODULE – 5					
Q9	a	Define Matplotlib. What is the significance of pyplot module?	4	5	L2
	b	Explain how to customize plots using colors, markers, and line styles.	10	5	L2
	c	Develop a program to create a professional chart with title, labels, legend, grid, and formatted text.	6	5	L4
OR					
Q10	a	List and explain features of Matplotlib.	4	5	L2
	b	Explain the architecture of Matplotlib.	10	5	L2
	c	Develop a Python program to Analyze and Visualize Student Exam Data using Pandas and Matplotlib.	6	5	L4



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FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS

JUNE - JULY 2026

Course:	MACHINING SCIENCE AND METROLOGY		
Course Code:	BME402	Branch: ME	
Max Marks:	100	Duration:	03 Hours

Note:

1. Answer any FIVE full questions, choosing one full Question from each Module.
2. Any missing data can be suitably assumed.

Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	List different parts of a lathe and state their functions.	6	1	L2
	b	Explain orthogonal and oblique cutting with neat sketches.	8	1	L2
	c	Select suitable cutting tool material for machining mild steel and justify	6	1	L3
OR					
Q2	a	Describe the elements of single point cutting tool signature.	6	1	L2
	b	Analyze the effect of tool rake angle on cutting force and power consumption.	8	1	L2
	c	Differentiate turret and capstan lathe for production applications.	6	1	L3
MODULE - 2					
Q3	a	Define tolerance, limits and fits.	6	2	L2
	b	Explain the following: i) Line standard ii) End standard iii) Slip gauges iv) Wringing phenomenon	8	2	L2
	c	Compare selective assembly and complete interchangeability.	6	2	L3
OR					
Q4	a	Define the term Measurements and calibration.	6	2	L2
	b	Implement the types of fits with sketches.	8	2	L2
	c	Define metrology and explain its objectives.	6	2	L3
MODULE - 3					
Q5	a	Evaluate advantages and limitations of dry machining vs wet machining.	6	3	L2
	b	Elucidate the critical cutting parameters which effect the tool life.	8	3	L2
	c	Describe cutting fluids and their functions.	6	3	L3
OR					
Q6	a	Explain the concept of tool wear mechanism	6	3	L2
	b	Compare HSS, carbide, ceramic and CBN tools.	8	3	L2
	c	Analyze relationship between machinability and surface finish.	6	3	L3

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MODULE - 4					
Q7	a	Explain up milling and down milling.	6	4	L2
	b	Elucidate the types of drill & drill bit nomenclature	8	4	L2
	c	Describe types of grinding processes.	6	4	L3
OR					
Q8	a	Explain indexing and its need.	6	4	L2
	b	Describe column and knee milling machine construction	8	4	L2
	c	Explain working of radial drilling machine	6	4	L3
MODULE - 5					
Q9	a	Define gauges and explain their classification.	6	5	L2
	b	Compare mechanical, electrical and pneumatic comparators.	8	5	L2
	c	Analyze advantages of air gauges in precision inspection.	6	5	L3
OR					
Q10	a	Describe GO and NO-GO gauges.	6	5	L2
	b	Explain the following with sketches: i) Mechanical Comparator ii) Solex air gauge Comparator	8	5	L2
	c	Explain bevel protractor construction.	6	5	L3



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FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS**JUNE - JULY 2026**

Course:	AIRCRAFT PROPULSION			
Course Code:	BAE403	Branch: AE		
Max Marks:	100	Duration:	03 Hours	

Note:

1. Answer any FIVE full questions, choosing one full Question from each Module.
2. Any missing data can be suitably assumed.

2. Any missing data can be suitably assumed.							
Q. No.		MODULE - 1			Marks	CO	RBTL
Q1	a	Define aircraft propulsion and list the different types of aircraft power plants.			4	1	L1
	b	An aircraft flies at 960 kmph. One of its turbojet engines takes in 40 kg/s of air and expands the gases to the ambient pressure. The air fuel ratio is 50 and the lower calorific value of the fuel is 43 MJ/kg. For maximum thrust power determine i) Jet velocity ii) Thrust iii) Specific thrust iv) Thrust power v) Propulsive thermal and overall efficiencies vi) TSFC.			10	1	L3
	c	Explain the working principle of a four-stroke SI engine with a neat P-V diagram.			6	1	L3
OR							
Q2	a	List the difference between Air breathing and Non- Air breathing engines.			4	1	L1
	b	A turbojet engine uses aviation kerosene, if the mass flow rate of the fuel and mass flow rate of air is 0.45 kg/s and 32 kg/s respectively and the forward velocity is 500 m/s and thrust produced is 12 KN. Calculate the Jet velocity and Thrust power considering fuel-air ratio , also find the calorific value of the fuel, if the heat added is 20 MW.			10	1	L3
	c	Illustrate with a neat schematic diagram the working of a turboprop engine and discuss its advantages and disadvantages.			6	1	L3
MODULE - 2							
Q3	a	Explain the different types of propellers and their applications in aircraft.			4	2	L2
	b	Derive the expression for momentum thrust of a propeller and explain the assumptions involved in the analysis.			10	2	L3
	c	Explain the nature of internal flow and stall in subsonic inlets.			6	2	L3
OR							
Q4	a	What is thrust vectoring and explain the various thrust vectoring methods.			4	2	L2
	b	Derive a relation for minimum area ratio (A_{max}/A_i) in terms of external deceleration and co-efficient of pressure.			10	2	L3
	c	Mention the two types of nozzles used in an aircraft engine? Briefly explain them.			6	2	L3

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MODULE – 3

Q5	a	With a neat sketch, explain the Principle of operation of centrifugal compressor.	6	3	L2
	b	A centrifugal compressor has to deliver 35kg /s. The impeller diameter is 76cm revolving at 11,500 rpm with an adiabatic efficiency of 80%. If the pressure ratio is 4.2:1 estimate the probable axial width of the impeller, at the impeller tip if the radial velocity is 120m/s. The inlet conditions are 1 bar and 47°C.	8	3	L3
	c	Analyze the causes and effects of surging and stalling in an axial flow compressor and explain how they influence compressor performance.	6	3	L4

OR

Q6	a	With a neat sketch, explain the Principle of operation of Axial compressor.	6	3	L2
	b	An axial flow air compressor of 50% reaction design has blades with inlet and outlet angles of 45° and 10° respectively. The Compressor is to produce a pressure ratio of 6:1 with an overall isentropic efficiency of 0.85 when the inlet static temperature is out the compressor. Assuming the value of 200m/s for blade speed find the number of stages required if the work done factor is i) Unity ii) 0.87 for all stages	8	3	L3
	c	Define degree of reaction of an axial flow compressor and Analyze and derive an expression for the degree of reaction in an axial flow compressor.	6	3	L4

MODULE – 4

Q7	a	Explain the important factors affecting combustion chamber design and describe how each factor influences the performance of an aircraft engine.	6	4	L2
	b	Outline the different types of combustion chambers with relevant sketches.	8	4	L2
	c	Analyze the combustion process in a gas turbine engine and its effect on efficiency and performance.	6	4	L4

OR

Q8	a	Define flame stabilization and Explain the role of flame holders.	6	4	L2
	b	Explain the effect of operating variables on the performance of a combustion chamber.	8	4	L2
	c	Compare annular and can-type combustion chambers with respect to their practical applications in gas turbine engines.	6	4	L4

MODULE – 5

Q9	a	Explain the construction and working of a radial turbine, along with its advantages and disadvantages.	4	5	L2
	b	A multistage gas turbine is to be designed with impulse stages and is to operate with an inlet pressure and temperature of 6 bar and 900K and an outlet pressure bar of 1 bar. The isentropic efficiency of the turbine is 85%. All the stages are to have a nozzle outlet angle of 75° and equal outlet and inlet blade angles. Mean blade speed of 250m/s and equal inlet and outlet gas velocities. Estimate the maximum number of stages. Take $\gamma = 1.33$ and $C_p = 1.15 \text{ kJ/kg-K}$ and optimum blade speed ratio.	10	5	L3
	c	Evaluate the effectiveness of different turbine cooling techniques considering heat transfer limitations and material constraints.	6	5	L4

OR

Q10	a	State the thrust equation of a rocket and explain specific impulse.	4	5	L2
	b	Angle is 70° with reference to the exit direction. The rotor blades have equal inlet and outlet angle and the stage operates with optimum blade speed ratio. Assuming that the isentropic efficiency of the nozzles is 0.9 and that the velocity at entry to the stage is negligible, deduce the blade angle used and the mass flow required for this stage to produce 75kW. Take $C_p = 1.15 \text{ kJ/kg K}$	10	5	L3
	c	Evaluate the role of multi-staging in rockets and compare the performance of solid and liquid propellant rockets.	6	5	L4



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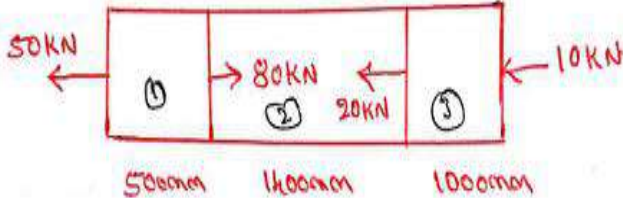
FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS

JUNE - JULY 2026

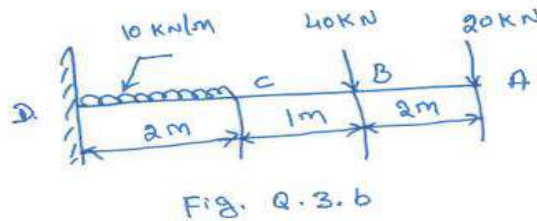
Course:	MECHANICS OF MATERIALS		
Course Code:	BAS403	Branch: AS	
Max Marks:	100	Duration:	03 Hours

Note:

1. Answer any FIVE full questions, choosing one full Question from each Module.
2. Any missing data can be suitably assumed.

Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	Sketch Stress-Strain diagram For Ductile material subjected to tension and show all the salient points on it.	6	1	L1
	b	What are the assumptions made in TOE? Derive the equilibrium equations for the state of stress in 3-Dimensional.	8	1	L2
	c	A specimen of steel 25mm diameter with a gauge length of 200mm is tested to destruction. It has an extension of 0.16mm under a load of 80 KN and the load at elastic limit is 160 KN. The maximum load is 180 KN. The total extension at fracture is 56mm and diameter at neck is 18mm. Find, i)Stress at elastic limit ii)Young's Modulus iii) Percentage Elongation and iv) Ultimate tensile stress	6	1	L3
OR					
Q2	a	Define Young's Modulus and Poisson's ratio	6	1	L1
	b	Derive the total extension in a uniformly tapering circular bar varying the diameters from d_1 to d_2 with Neat Sketch.	8	1	L2
	c	A brass bar having cross sectional area 300mm^2 is subjected to axial force as shown in figure. Find the total extension of the bar. Take $E=84\text{ GPa}$.  Fig. Q 2 (c)	6	1	L3
MODULE - 2					
Q3	a	Classify the different types of Beams.	4	2	L2
	b	Draw the shear force and bending moment diagram for the beam as shown in below figure, indicate all numerical and sections.	10	2	L3

2024 SCHEME



	c	Apply the relationship between load intensity (W), shear force (F), and bending moment (M) to deduce the differential equations that govern the variation of shear force and bending moment along a beam	6	2	L4

OR

Q4	a	Describe the assumptions made in the theory of simple bending	4	2	L2
	b	Illustrate the derivation of bending Stress equation $\frac{M}{I} = \frac{\sigma}{Y} = \frac{E}{R}$	10	2	L3
	c	A beam of an I Section 200mm x 300mm has web thickness 10mm and flange thickness 10mm at carries a Shearing force of 10 kN at a section Sketch the Shear stress distribution across the Section.	6	2	L4

MODULE - 3

Q5	a	Define deflection of a beam. State any two factors affecting the deflection of beams	4	3	L1
	b	Determine the Expression for slope and deflection for a cantilever beam subjected to concentrated load at a free end	8	3	L3
	c	Find the maximum deflection for SSB of span 4 m carries UDL of 5 kN/m over entire span.	6	3	L3

OR

Q6	a	Write a short note on i) Thin cylinder ii) Thick cylinder	4	3	L1
	b	Apply the theory of thick cylinders to derive Lamé's equations for radial stress and circumferential stress in a thick cylinder subjected to internal and external pressure	8	3	L3
	c	A pipe of 400mm internal diameter and 100mm thickness contains a fluid at a pressure of 80 N/mm ² . Find the maximum and minimum hoop stress across the section. Also sketch the radial and hoop stress distribution across the section.	6	3	L3

MODULE - 4

Q7	a	Define Torsional Strength and Torsional Rigidity	4	4	L1
	b	Derive an equation for pure Torsion for a for a circular shaft $\frac{T}{J} = \frac{\tau}{R} = \frac{G\theta}{L}$	10	4	L3
	c	Determine the diameter of a solid shaft which will transmit 440kW at 280 rpm. The angle of twist must not exceed one degree per meter length and the maximum torsional stress is to be limited to 40 N/mm ² . Assume G = 84 k N/mm ²	6	4	L3

OR

2024 SCHEME

Q8	a	Describe the Secant modulus for columns	4	4	L1
	b	Derive an expression for Euler's critical load for a column with both ends pinned.	10	4	L3
	c	Find the Euler's critical load for a column 1.2 m long of rectangular cross section 90mm wide, 60 mm depth with both ends hinged. Modulus of elasticity is 200 Gpa. Compare it with Rankine's critical load taking Rankine's constants $\sigma = 300 \text{ Mpa}$ and $a = \frac{1}{7500}$	6	4	L3
Module – 5					
Q9	a	Explain the concept of Fracture in materials. Differentiate between ductile and brittle fracture with suitable examples.	4	5	L2
	b	Define creep and explain the different stages of creep with the help of a creep curve	10	5	L2
	c	Analyze the various factors affecting Fatigue in materials and evaluate their influence on fatigue life in engineering components	6	5	L4
OR					
Q10	a	Explain the need for failure theories in engineering design.	4	5	L2
	b	Explain the maximum normal stress theory and maximum shear stress theory and their limitations	10	5	L2
	c	Explain the Maximum Distortion Energy Theory. Analyze its limitations	6	5	L4



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FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS

JUNE - JULY 2026

Course:	DATABASE MANAGEMENT SYSTEMS		
Course Code:	BCS403	Branches: CSE, ISE, AIML, CSD and AI&DS	
Max Marks:	100	Duration:	03 Hours

Note:

1. Answer any FIVE full questions, choosing one full Question from each Module.
2. Any missing data can be suitably assumed.

Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	What is a Database? Explain the three-schema architecture with neat diagram.	6	1	L2
	b	Interpret the characteristics of a Database Management System in comparison with the traditional file system.	8	1	L2
	c	Apply constraints on binary relationship types to illustrate cardinality and participation constraints.	6	1	L3
OR					
Q2	a	Define attribute. List and explain the different types of attributes with respect to Entity Relationship (ER) model.	6	1	L2
	b	Explain the component modules of a DBMS and show their interactions using a suitable diagram.	8	1	L2
	c	Design an ER Diagram for Bank Database by considering four entities.	6	1	L3
MODULE – 2					
Q3	a	What is a relation? Explain the characteristics of relation.	6	2	L2
	b	Consider a relation Employee (EID, ENAME, SALARY, DEPT). Write relational algebra expressions for the following queries i. Retrieve the employees who have a salary greater than 55,000. ii. List the names of employees working in the 'HR' department. iii. Find the details of employees who belong to the 'Sales' department and earn more than 40,000. iv. Display the department names of employees whose salary is less than 30,000.	8	2	L3
	c	Convert Company database ER Model into a relational schema using the ER-to-Relational Mapping algorithm.	6	2	L3
OR					
Q4	a	Define the following: i) Key ii) Primary key iii) Relation state iv) Relation Schema v) Domain vi) Arity	6	2	L1

2024 SCHEME

	b	Considering the schema Sailors (sid, sname ,rating, age) Boats (bid, bname, color) Reserves (sid, bid, day) Write relational algebra queries for the following: i)Retrieve the sailor name with age over 20 years and reserved black boat. ii)Retrieve the sailor name who have reserved all boats iii)Retrieve the sailor name who have reserved green boat on Monday iv)Retrieve the number of boats which are reserved v) Retrieve the sailor names who is the oldest sailor with rating 10.	8	2	L3
	c	Analyze and justify the key advantages of the DBMS approach in data management.	6	2	L3

MODULE – 3

Q5	a	Illustrate the concepts of triggers in a database with suitable examples.	4	3	L2
	b	Consider the following schema for a company database : Employee (FName, LName, SSn, Addresss , Sex, Salary, Dno, Super_SSs) Department (Dname , Dnumber , mgr_SSs, mgr_st_date) Project (Pname , Pnumber , Plocation , Dnum) WORKS_on (Essn , Pno , Hours) DEPENDENT (Essn , Dependent name , Sex , Bdate, relationship). Write the SQL queries for the following : i) List the names of managers who have atleast one dependent (use Correlated nested). ii) Retrieve the name of each employee who has a dependent with the same first name and is the same sex as the employee. iii) For each project retrieve the project number , project name and the number of employees who work on that project. iv) Retrieve the SSN of all employees who work on project number 1, 2 or 3. (Use 1N). v) Find the sum of the salaries of all employees of the 'Research' department as well as maximum salary , minimum salary , average Salary in this department.	10	3	L4
	c	Outline constraints in SQL.	6	3	L2

OR

Q6	a	What is anomaly? Explain the types of update anomalies in SQL with an example.	4	3	L2
	b	Consider the schema for COMPANY DATABASE: EMPLOYEE (SSN, NAME, ADDRESS, SEX, SALARY, SUPERSSN, DNO) DEPARTMENT (DNO, DNAME, MGRSSN, MGRSTARTDATE) DLOCATION (DNO, DLOC) PROJECT (PNO, PNAME, PLOCATION, DNO) WORKS_ON (SSN, PNO, HOURS) Write SQL queries to perform the following operations: i. Make a list of all PNO values for projects that involve an employee whose NAME is 'SCOTT', either as a worker or as a manager of the department that controls the project. ii. Show the resulting SALARY values if every employee working on the 'IOT' project is given a 10 percent raise. iii. Find the SUM, MAX, MIN, and AVERAGE of SALARY for all employees of the ACCOUNTS department. iv. For each DNO that has more than five employees, retrieve the DNO and the number of its employees who are making more than 600000.	10	3	L4
	c	Illustrate insert, delete, update, alter & drop commands in SQL.	6	3	L2

2024 SCHEME

MODULE – 4					
Q7	a	Explain informal design guidelines for relational schema design.	6	4	L2
	b	What is functional dependency? Consider the two set of FDs: $F = \{A \rightarrow C, AC \rightarrow D, E \rightarrow AD, E \rightarrow H\}$ and $G = \{A \rightarrow CD, E \rightarrow AH\}$ find they are equivalent or not?	8	4	L3
	c	List and explain inference rules with suitable example.	6	4	L2
OR					
Q8	a	What is the need for normalization? Explain 1NF and 2NF with Examples.	6	4	L2
	b	Consider the Relation $R = \{A, B, C, D, E, F\}$ with the functional dependencies: $\{A \rightarrow C, AC \rightarrow D, E \rightarrow AD, E \rightarrow H\}$. Find the minimal cover for this set of FDs.	8	4	L3
	c	Prove that the following two sets of functional dependencies are equivalent: $F = \{A \rightarrow C, AC \rightarrow D, E \rightarrow AD, E \rightarrow H\}$ $E = \{A \rightarrow CD, E \rightarrow AH\}$	6	4	L2
MODULE – 5					
Q9	a	Define transaction. Explain the ACID properties of a transaction.	6	5	L2
	b	Why concurrency control and recovery are needed? Analyze and explain the types of problems that may occur during the concurrent execution of two transactions in a database system, with suitable examples.	8	5	L3
	c	Explain state transition diagram in transaction.	6	5	L2
OR					
Q10	a	Discuss the concept of a schedule and illustrate how two transactions are executed within a schedule.	6	5	L2
	b	Apply the Two-Phase Locking (2PL) protocol for concurrency control. Illustrate the growing and shrinking phases.	8	5	L3
	c	Explain the need of concurrency control in a database with an example.	6	5	L2



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FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS

JUNE - JULY 2026

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Course:	TRANSPORTATION ENGINEERING		
Course Code:	BCV403	Branch: CV	
Max Marks:	100	Duration:	03 Hours

Note:

1. Answer any FIVE full questions, choosing one full Question from each Module.
2. Any missing data can be suitably assumed.

Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	List the different types of road patterns with examples.	4	1	L1
	b	Explain the factors affecting highway alignment.	8	3	L2
	c	Calculate the safe stopping sight distance on a level road stretch for design speed of 50 kmph for i) two-way traffic on a two lane road ii) two-way traffic on a single lane road. Assume coefficient of friction as 0.37 and reaction time of driver as 2.5 seconds.	8	3	L3
OR					
Q2	a	State the recommendations of the M. R. Jayakar Committee.	4	1	L1
	b	Explain (i) Camber (ii) Carriageway (iii) Median (iv) Shoulder	8	3	L2
	c	Calculate the safe overtaking sight distance for a design speed of 96 kmph. Assume all other data suitably.	8	3	L3
MODULE - 2					
Q3	a	Explain the desirable properties of road aggregates.	6	5	L2
	b	Define pavement. Briefly explain the differences between flexible pavement and rigid pavement.	6	1	L2
	c	Explain: i) Surface drainage system ii) Sub surface drainage system	8	1	L2
OR					
Q4	a	Explain the desirable properties of Bitumen.	6	5	L2
	b	Explain the types of joints used in rigid pavement.	6	1	L2
	c	List various types of cross drainage structures. Explain any two types with neat sketch.	8	1	L2

2024 SCHEME

MODULE – 3

Q5	a	Explain the vehicular characteristics.	6	2	L2																								
	b	Outline the objectives of accident studies.	6	2	L2																								
	c	Spot speed studies were carried out at a certain stretch of a highway and the consolidated data collected are given below.	8	2	L3																								
		<table><tr><td>Speed range (kmph)</td><td>Number of vehicles observed</td><td>Speed range (kmph)</td><td>Number of vehicles observed</td></tr><tr><td>0-10</td><td>12</td><td>50-60</td><td>255</td></tr><tr><td>10-20</td><td>18</td><td>60-70</td><td>119</td></tr><tr><td>20-30</td><td>68</td><td>70-80</td><td>43</td></tr><tr><td>30-40</td><td>89</td><td>80-90</td><td>33</td></tr><tr><td>40-50</td><td>204</td><td>90-100</td><td>9</td></tr></table>				Speed range (kmph)	Number of vehicles observed	Speed range (kmph)	Number of vehicles observed	0-10	12	50-60	255	10-20	18	60-70	119	20-30	68	70-80	43	30-40	89	80-90	33	40-50	204	90-100	9
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0-10		12				50-60	255																						
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20-30	68	70-80	43																										
30-40	89	80-90	33																										
40-50	204	90-100	9																										
Determine																													
(i) The upper & lower values for regulation of mixed traffic flow.																													
(ii) The design speed for checking geometric design elements of the highway.																													

OR

Q6	a	Outline the role of AI in improving road safety and efficiency in modern transportation systems.	6	2	L2													
	b	Define reaction time of driver. Explain PIEV theory with neat sketch.	6	2	L2													
	c	In a moving car observer method of speed and delay on a stretch of a road 1 km long, six runs were made each in up and down directions and the average values are given below: Calculate the average values i) volume ii) journey speed iii) running speed of the traffic stream along each direction	8	2	L3													
		<table><tr><th>Direction</th><th>Journey time (min)</th><th>Stopped time (min)</th><th>Opposing traffic</th><th>Overtaking vehicles</th><th>Overtaken vehicles</th></tr><tr><td>up</td><td>1.0</td><td>0.10</td><td>30</td><td>1.5</td><td>1.0</td></tr><tr><td>down</td><td>1.2</td><td>0.12</td><td>20</td><td>1.8</td><td>0.8</td></tr></table>				Direction	Journey time (min)	Stopped time (min)	Opposing traffic	Overtaking vehicles	Overtaken vehicles	up	1.0	0.10	30	1.5	1.0	down
Direction	Journey time (min)	Stopped time (min)	Opposing traffic	Overtaking vehicles	Overtaken vehicles													
up	1.0	0.10	30	1.5	1.0													
down	1.2	0.12	20	1.8	0.8													

MODULE – 4

Q7	a	Define permanent way. Outline its requirements.	6	3	L2
	b	Outline the functions of sleepers.	6	3	L2
	c	For a rail of 11.89m length, calculate the quantity of material required per 1 km length of the track. Assume sleeper density to be equal to (n+4).	8	3	L3

OR

Q8	a	List and explain the different types of gauges.	6	3	L2
	b	Explain the requirements of ballast.	6	3	L2

2024 SCHEME

	c	If 8° curve track diverges from a main curve of 5° in an opposite direction in the layout of BG yard, calculate the super elevation and the speed on the branch line, if the maximum speed permitted on the main line is 45 kmph.	8	3	L3
MODULE – 5					
Q9	a	State the various elements of an airport.	4	4	L1
	b	What is wind rose diagram? Explain any one method of constructing wind rose diagram.	8	4	L2
	c	The length of runway under standard condition is 1500 m. The airport site is located at an elevation of 350m. Its reference temperature is 35°C . If the runway is to be constructed with an effective gradient of 0.30%, determine the corrected runway length.	8	4	L3
OR					
Q10	a	List the aircraft characteristics affecting design.	4	4	L1
	b	Select a suitable site for an airport by explaining the factors influencing site selection.	8	4	L2
	c	Determine the corrected length of runway for an airport site using the following data: i) Basic runway length = 2600 m ii) Airport elevation = 500 m iii) Airport reference temperature = 21°C iv) Runway effective gradient = 0.2%	8	4	L3

1	S	J							
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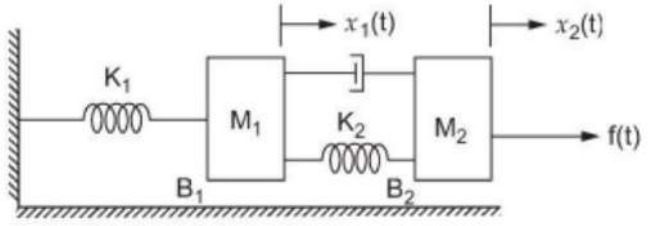
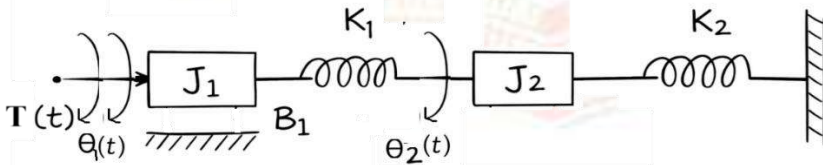
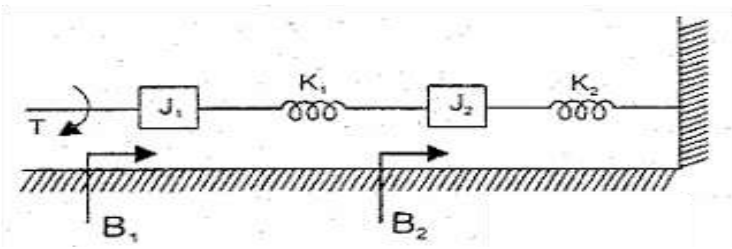
FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS

JUNE - JULY 2026

Course:	CONTROL SYSTEMS		
Course Code:	BEC403	Branch: ECE	
Max Marks:	100	Duration:	03 Hours

Note:

1. Answer any FIVE full questions, choosing one full Question from each Module.
2. Any missing data can be suitably assumed.

Q. No.	MODULE - 1		Marks	CO	RBTL
Q1	a	Elaborate on the controller components of the system.	6	1	L1
	b	Obtain the mathematical model for the mechanical systems shown below based on i) F-V analogy i) F-I analogy. 	8	1	L2
	c	Draw free body diagram, mechanical network and develop an Integro-differential model, for the given mechanical system. 	6	1	L3
OR					
Q2	a	Define control system, discuss the types of control system with example.	6	1	L1
	b	Obtain the mathematical model for the mechanical systems shown below based on i) T-V analogy i) T-I analogy. 	8	1	L2

2024 SCHEME

- c** Draw a free body diagram and mechanical network and develop Integrational differential model, for the given mechanical system.

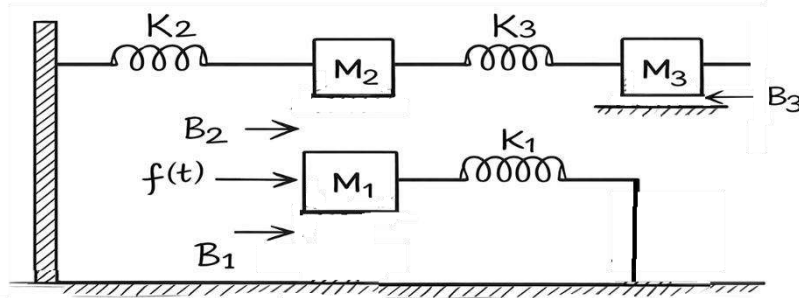


Fig.Q 2(c)

6

1

L3

MODULE - 2

- a** Obtain the transfer function $X(s) / F(s)$ for the given mechanical system below.

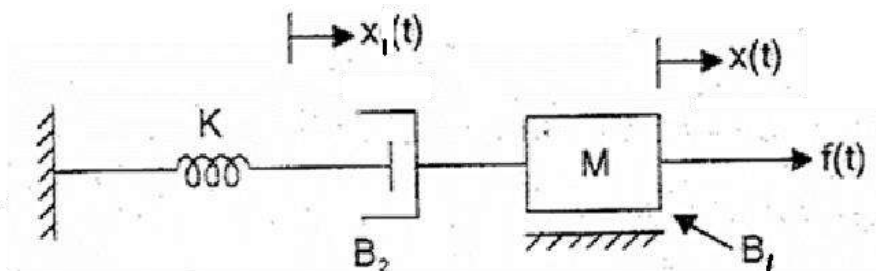


Fig.Q 3(a)

6

1

L2

- b** Make use of block diagram reduction technique, to Find the transfer function $C(s)/R(s)$

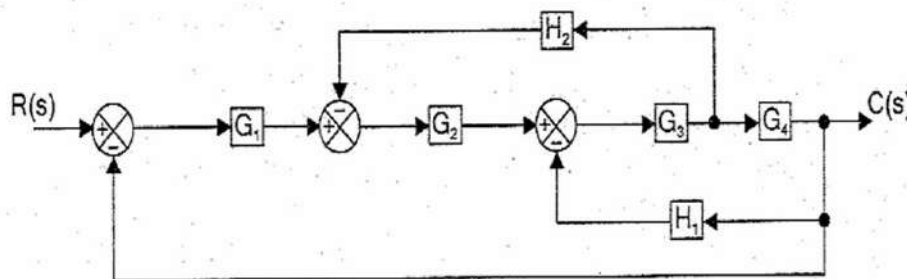


Fig.Q3(b)

8

1

L3

- c** Convert the given block diagram into signal flow graph, and apply Mason's gain formulae find the transfer function $C(s)/R(s)$.

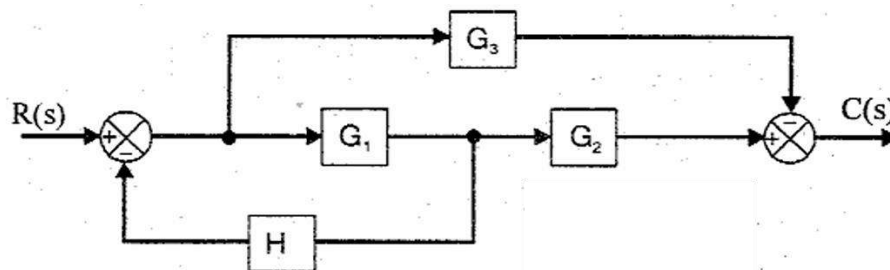


Fig.Q 3(c)

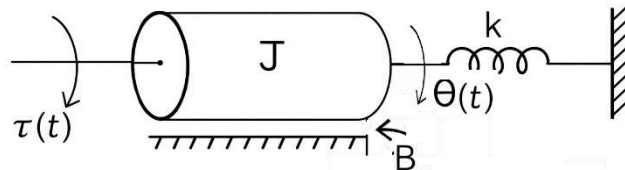
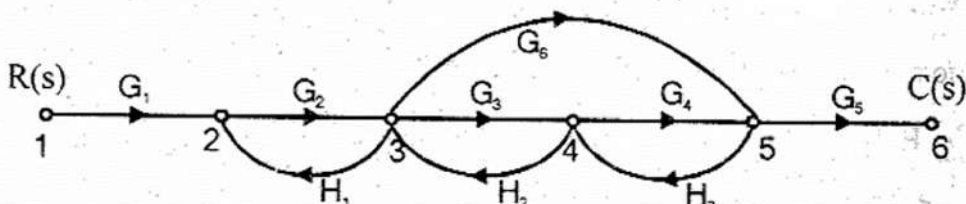
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1

L3

OR

2024 SCHEME

Q4	a	Obtain the transfer function $\theta(S) / F(S)$ for the given mechanical system below.  Fig.Q 4(a)	6	1	L2
	b	Apply Mason's gain formulae, For the given signal flow graph, to find the transfer function $C(S)/R(S)$.  Fig. Q4(b)	8	1	L3
	c	Construct the signal flow graph for the given set of system equation, find the transfer function Y_4/Y_1 using Mason's Gain Formulae. $Y_2=G_1Y_1+ G_3Y_3 \quad Y_3=G_4Y_1+ G_2Y_2+ G_5Y_3 \quad Y_4=G_6Y_2+ G_7Y_3$	6	1	L3
MODULE – 3					
Q5	a	List and discuss the standard test signals used in the control system, write their Laplace transform and also obtain an expression for steady state error.	10	2	L2
	b	Find the expression for time domain response of a 2 nd order system under un-damped and under damped condition with a unit step function as input.	10	2	L3
OR					
Q6	a	Derive an expression for the following i) Rise time ii) peak time iii) peak overshoot, with respect to second order system.	10	2	L2
	b	Determine the expression for time domain response of a 1 st order system for a unit step function.	10	2	L3
MODULE – 4					
Q7	a	Using Routh's Criterion, determine the stability of system for a given characteristic equation. $S^6+ 2S^5+ 8S^4+ 12S^3+ 20S^2+ 16S + 16 = 0$.	10	3	L3
	b	Sketch the complete root locus, for the open loop transfer function is given by $G(s) = K / S (S+1)(S+3)$ and analyze the stability of a system..	10	3	L4
OR					
Q8	a	The characteristic equation of a feedback control system is given by $S^4 + 3S^3 + 3S^2 + 2S + K=0$. Find i) range of values of K for the system to be stable (ii) the system be marginally stable? If so find the required value of K and frequency of sustained oscillations	10	3	L3

2024 SCHEME

	b	Analyze the stability of a control system with characteristic equation $(S^2+2S+2) + K(S+2)$ using Root locus technique.	10	3	L4
MODULE - 5					
Q9	a	Write an octave/Matlab program to analyze the time response of a second-order underdamped system for different damping ratios for the open loop transfer function $G(s) = \frac{\omega_n^2}{s^2 + 2\zeta\omega_n s + \omega_n^2}$	10	5	L2
	b	Develop state transition matrix for $A = \begin{bmatrix} 0 & 1 \\ -8 & -6 \end{bmatrix}$	10	4	L3
OR					
Q10	a	Write an octave/Matlab program to implement and generate the overall transfer function of a given block diagram. Fig.Q 10(a) Assume $G_1 = S$, $G_2 = S+1$, $G_3 = 1/S+1$, $G_4 = G_5 = G_6 = 1$, $H_0 = H_1 = 1$	10	5	L2
	b	Determine the state model for the system represented by the differential equation $\frac{d^3 y(t)}{dt^3} + 6 \frac{d^2 y(t)}{dt^2} + 11 \frac{dy(t)}{dt} + 10 y(t) = 3u(t)$	10	4	L3



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FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS

JUNE - JULY 2026

Course:	FLUID MECHANICS		
Course Code:	BME403	Branch: ME	
Max Marks:	100	Duration:	03 Hours

Note:

1. Answer any FIVE full questions, choosing one full Question from each Module.
2. Any missing data can be suitably assumed.

Q. No.		MODULE – 1	Marks	CO	RBTL
Q1	a	Define the following with neat line diagram i)Gauge pressure ii) Absolute pressure.	4	1	L1
	b	Derive an expression for total pressure and depth of center of pressure from free surface of liquid of an inclined plane surface submerged in the liquid.	10	1	L3
	c	The right limb of a simple U-tube manometer containing mercury is open to the atmosphere while the left limb is connected to a pipe in which a fluid of sp.gr. 0.9 is flowing. The center of the pipe is 12cm below the level of mercury in the right limb. Find the pressure of fluid in the pipe if the difference of mercury level in the two limbs is 20cm.	6	1	L3
OR					
Q2	a	Define Total pressure and Centre of pressure and also mention their units.	4	1	L1
	b	Derive an expression for total pressure and depth of center of pressure from free surface of liquid, of vertical plane surface submerged in the liquid.	10	1	L3
	c	State and prove Pascal's Law.	6	1	L3
MODULE – 2					
Q3	a	Distinguish between: i) Steady flow and unsteady flow, ii)Uniform and non-uniform flow.	4	2	L1
	b	Derive continuity equation for 3-dimensional flow, in Cartesian co- ordinates.	10	2	L2
	c	The stream function for a two-dimensional flow is given by $\Psi = 2xy$, calculate the velocity at the P (2, 3). Find the velocity potential.	6	2	L4
OR					

2024 SCHEME

Q4	a	Describe Lagrangian and Eulerian approach for fluid particle motion.	4	2	L1
	b	Explain velocity potential function and stream function.	10	2	L2
	c	The velocity components in a two-dimensional field for an incompressible fluid are expressed as $u = (y^3/3) + 2x - x^2y$; $v = xy^2 - 2y - (x^3/3)$, obtain the expression for stream function.	6	2	L4
MODULE - 3					
Q5	a	What are energy losses that occurs in pipe? Give the expression for different minor energy losses.	6	3	L1
	b	Derive the Euler's equation for ideal fluids and hence deduce Bernoulli's equation of motion.	8	3	L3
	c	A 0.3 m pipe carries water at a velocity of 24 m/s. At points A and B measurements of pressure and elevation were respectively 361 kN/m ² and 288 kN/m ² and 30 m and 33 m. For steady flow, find the loss of head between A and B.	6	3	L4
OR					
Q6	a	Define the following hydraulic coefficients: i) Coefficient of discharge and ii) Coefficient of contraction.	6	3	L1
	b	Derive Darcy-Weisbach equation for determining loss of head due to friction in pipe.	8	3	L3
	c	A rectangular channel, which is 1.8m wide, has a discharge of 0.4m ³ /s. The discharge is measured by a right-angled V-notch. For the maximum depth of water not to exceed 0.8m, find the position of the notch apex from the channel bed. Take $C_d = 0.6$	6	3	L4
MODULE - 4					
Q7	a	What is dimensional homogeneity? Explain with example.	6	4	L1
	b	What is boundary layer separation? What are the effect of pressure gradient on boundary layer separation?	8	4	L2
	c	A man descends the ground from an aero plane with the help of a parachute, which is hemispherical having a diameter of 5m against the resist of air with uniform velocity of 25m/s. Find the weight of the man if the weight of the parachute is 9.81N, $C_d = 0.6$.	6	4	L4
OR					
Q8	a	Define the following terms with their SI units: Boundary layer thickness ii) Energy thickness iii) Lift	6	4	L1
	b	State Buckingham π -theorem and explain the procedure to determine π groups.	8	4	L2

2024 SCHEME

	c	A kite of mass 0.5kg and surface area 0.5m^2 is flying in air of density 1.2kg/m^3 . The tension in the string is 12N which makes an angle of 35° with the horizontal. If the wind speed is 30kmph. Determine the coefficient of drag and lift.	6	4	L4
MODULE – 5					
Q9	a	Define the following terms: i) Mach number ii) Mach cone iii) Supersonic flow.	6	5	L1
	b	Derive an expression for stagnation pressure of a compressible fluid in terms of Mach number and pressure.	8	5	L3
	c	An aero plane is flying at an altitude of 15km where the temperature is -50°C . The speed of plane corresponds to Mach number 1.6 Assume $k=1.4$ and $R=287\text{J/kgK}$ for air. Find the speed of plane and Mach angle.	6	5	L4
OR					
Q10	a	Explain the necessity of CFD. Mention the advantages of CFD.	6	5	L1
	b	Obtain an expression for velocity of sound in a compressible fluid in terms of change in pressure and change in density.	8	5	L3
	c	A projectile travels in air of pressure 10.1043 N/cm^2 at 10°C at a speed of 1500Km/hr. Find the Mach number and Mach angle. Take $\gamma=1.4$ and $R=287\text{J/kgK}$	6	5	L4

2024 SCHEME

**SJC INSTITUTE OF TECHNOLOGY**

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FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS**JUNE - JULY 2026**

Course:	BIOLOGY FOR ENGINEERS		
Course Code:	BBI404	Branches: Common to all branches	
Max Marks:	100	Duration:	03 Hours

Note: Answer any FIVE full questions, choosing one full Question from each Module.

Q. No.	MODULE - 1		Marks	CO	RBTL
Q1	a	Compare Eukaryotic and Prokaryotic cell structures with neat diagrams.	10	1	L2
	b	Illustrate the structure and functions of cell with neat labelled diagram.	10	1	L2
OR					
Q2	a	Define Stem Cells? Explain their applications and classification in detail.	10	1	L2
	b	Explain the properties and functions of the following biomolecules i) Proteins ii) Lipids	10	1	L2
MODULE - 2					
Q3	a	Outline the role of carbohydrates in making of PLA's and PHA's bio plastics.	10	2	L2
	b	Explain the development of DNA vaccines for the treatment of rabies.	10	2	L2
OR					
Q4	a	Explain cellulose based water filter and mention its characteristics, advantages and limitations.	10	2	L2
	b	Explain the role of i) Lipids in bio diesel production ii) Whey protein, meat analogues	10	2	L2
MODULE - 3					
Q5	a	Compare the Brain with CPU.	10	3	L2
	b	Draw human eye and label its parts and explain the rods and cone cells in detail.	10	3	L2
OR					
Q6	a	Explain the reasons for blockage of blood vessels and describe the design of stents.	10	3	L2

2024 SCHEME

	b	Explain the structure of the lungs and describe how they function as a purification system, including the process of gas exchange.	10	3	L2
MODULE – 4					
Q7	a	Explain the concept of echolocation to ultrasonography and sonar technology.	10	4	L2
	b	Describe the concept of lotus leaf effect to explain super hydrophobic and self-cleaning surfaces.	10	4	L2
OR					
Q8	a	Compare the photosynthesis process to bionic leaf and photovoltaic cells.	10	4	L2
	b	Explain the concept of Hemoglobin-Based Oxygen Carriers (HBOCs) and Perfluorocarbons (PFCs), and describe how they function in oxygen transport.	10	4	L2
MODULE – 5					
Q9	a	Describe the role of Bio-imaging, and AI in disease diagnosis.	10	5	L2
	b	Write short notes on: i) Bioremediation ii) Biomining via microbial surface adsorption.	10	5	L2
OR					
Q10	a	Explain the concepts of DNA Origami and Biocomputing, with the help of suitable diagrams.	10	5	L2
	b	Outline the bioengineering solutions for muscular dystrophy and osteoporosis with necessary diagrams.	10	5	L2

2024 SCHEME

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FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS**JUNE - JULY 2026**

Course:	DISCRETE MATHEMATICAL STRUCTURES AND LINEAR ALGEBRA		
Course Code:	BAD406A	Branches: AIML and AI&DS	
Max Marks:	100	Duration:	03 Hours

Note:

1. Answer any FIVE full questions, choosing one full Question from each Module.
2. Any missing data can be suitably assumed.

Q. No.	MODULE - 1		Marks	CO	RBTL
Q1	a	Prove that $[(p \vee q) \wedge \{(p \rightarrow q) \wedge (q \rightarrow r)\}] \rightarrow r$ is tautology by constructing the truth table.	6	1	L2
	b	Test the validity of the argument $\begin{array}{l} p \\ p \rightarrow q \\ s \vee r \\ r \rightarrow \sim q \\ \hline \therefore s \vee t \end{array}$	8	1	L3
	c	Give direct proof of the statement "square of an odd integer is an odd integer"	6	1	L4
OR					
Q2	a	Prove that $p \rightarrow (q \rightarrow r) \Leftrightarrow (p \wedge q) \rightarrow r$ by laws of logic.	6	1	L2
	b	Write the following argument in symbolic form and then establish the validity: If I study, then I will not fail in the examination. If I do not watch TV in the evenings, then I will study. I failed in the examination. $\therefore$ I must have watched TV in the evenings.	8	1	L3
	c	Negate and simply each of the following: i) $\exists x, [(p(x) \vee q(x)) \rightarrow r(x)]$ ii) $\forall x, [p(x) \rightarrow q(x)]$ iii) $\exists x, [(p(x) \wedge \sim q(x))]$	6	1	L4
MODULE - 2					
Q3	a	Find the coefficient of x^9y^3 in the expansion of $(x + 2y)^{12}$	6	2	L2
	b	A committee of 12 to be formed from 10 men and 10 women. In how many ways can the selection be carried i) There is no restriction on the choice ii) There must be more women than men iii) There must be 6 men and 6 women.	8	2	L3
	c	All permutations of letter of the word 'AGAIN' are arranged in the order as in dictionary. What is the 49 th word.	6	2	L3

2024 SCHEME

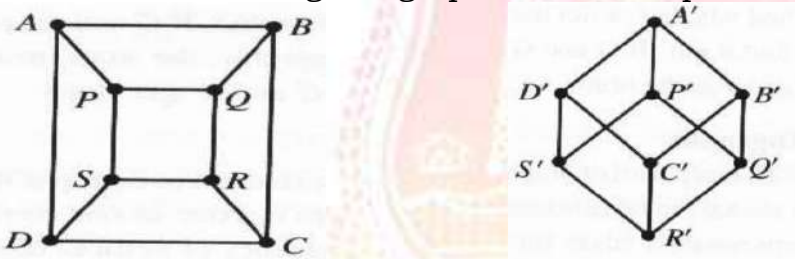
OR

Q4	a	A sequence a_n is defined recursively by $a_1 = 4$, $a_n = a_{n-1} + n \forall n \geq 2$. Find an explicit form.	6	2	L2
	b	The Fibonacci numbers are defined by $F_0 = 0, F_1 = 1$ & $F_n = F_{n-1} + F_{n-2} \forall n \geq 2$. Prove that $\sum_{i=0}^n F_i^2 = F_n \times F_{n+1}$.	8	2	L3
	c	Find the number of permutations of the letter of the word 'MASSASAUGA'. In how many of these i) All A's together ii) Being with S iii) The number of permutations begin and ending with S.	6	2	L3

MODULE - 3

Q5	a	Define i) graph ii) Graph isomorphism iii) Eulerian circuit and Eulerian path.	6	3	L1
	b	Apply the concept of planar graphs: Verify using Euler's formula ($v - e + f = 2$) that K_4 is planar. Also show that K_5 is non-planar.	8	3	L3
	c	Explain any two applications of graph theory with neat diagram and graphical representation.	6	3	L4

OR

Q6	a	Define i) Trail in a graph ii) Isolated vertex iii) pendent vertex With examples.	6	3	L1
	b	Show that the following two graphs are isomorphic. 	8	3	L3
	c	For a graph G with 6 vertices and degree sequence (1,2,3,3,4,5): i) Is such a graph possible? Use Handshaking Lemma to verify. ii) If valid, construct one such graph. iv) Find the number of edges.	6	3	L4

MODULE - 4

Q7	a	Let $A = \begin{bmatrix} 2 & 3 \\ -1 & 2 \end{bmatrix}$ and $f(x) = x^2 - 4x + 7$. Show that $f(A) = 0$. Use the result to find A^4 .	6	4	L2
	b	Find eigen values and eigen vectors of the matrix $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$	8	4	L3
	c	Find Characteristic and minimal polynomial of the matrix $A = \begin{bmatrix} -2 & -6 & -9 \\ 3 & 7 & 9 \\ -1 & -2 & -2 \end{bmatrix}$	6	4	L4

OR

2024 SCHEME

Q8	a	Find eigen values and corresponding eigen vectors for the given matrix $A = \begin{bmatrix} 2 & 1 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{bmatrix}$. What is the dimension of the eigen space of each eigen vector and also mention the basis	6	4	L2
	b	Determine all possible Jordan canonical forms for a linear operator $T: V \rightarrow V$ whose characteristic polynomial is $\Delta(x) = (x - 2)^3(x - 5)^2$.	8	4	L3
	c	Verify Cayley's Hamilton theorem and find inverse for given $A = \begin{bmatrix} 0 & 0 & 1 \\ 3 & 1 & 0 \\ 2 & 1 & 4 \end{bmatrix}$	6	4	L4
MODULE - 5					
Q9	a	Make change of variable $X = PY$ that transform the quadratic form $x_1^2 + 10x_1x_2 + x_2^2$.	10	5	L4
	b	Find the singular value decomposition of $A = \begin{bmatrix} 4 & 11 & 14 \\ 8 & 7 & -2 \end{bmatrix}_{2 \times 3}$	10	5	L4
OR					
Q10	a	Orthogonally diagonalize the matrix $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & -5 & -1 \\ 2 & -1 & -5 \end{bmatrix}$	10	5	L4
	b	Find the principal components of the given vectors $\begin{bmatrix} 3 & 3 & 5 \\ 4 & 7 & 10 \end{bmatrix}$ take as 2 observations.	10	5	L4



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FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS

JUNE - JULY 2026

1	S	J						
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Course:	AIRCRAFT SYSTEMS AND INSTRUMENTATION		
Course Code:	BAS406A	Branch: AE	
Max Marks:	100	Duration:	03 Hours

Note:

1. Answer any FIVE full questions, choosing one full Question from each Module.
2. Any missing data can be suitably assumed.

Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	Write a short note on Extension and Retraction Mechanism.	6	1	L2
	b	Describe the construction and working of an aircraft hydraulic system with a neat block diagram.	8	1	L3
	c	Illustrate the types of landing gears based on its arrangement	6	1	L3
OR					
Q2	a	List and explain the key features of the aircraft fire protection system.	6	1	L2
	b	Discuss the components of aircraft fuel system with their functions	8	1	L3
	c	Illustrate the working of a typical aircraft power plant system and compare piston and jet engine power plants with suitable diagrams.	6	1	L3
MODULE - 2					
Q3	a	Distinguish between mechanical and hydraulic flight control systems.	6	2	L2
	b	Depict and explain the Fly-By-Wire (FBW) system architecture with a neat sketch.	8	2	L3
	c	Explain lateral, longitudinal, directional autopilot with working.	6	2	L3
OR					
Q4	a	Illustrate the working of the Stability Augmentation System (SAS).	6	2	L2
	b	Examine the functions and role of flight computers in modern aircraft.	8	2	L3
	c	Discuss the working of the Automatic Flight Control System (AFCS).	6	2	L3

2024 SCHEME**MODULE – 3**

Q5	a	Compare electromechanical instruments and glass cockpit displays.	6	3	L2
	b	Differentiate between Head Down Display and Head Up Display.	8	3	L3
	c	Discuss the importance of ISIS in emergency conditions.	6	3	L3

OR

Q6	a	With a neat sketch explain the working of CRT displays in modern aircrafts and list its limitations	6	3	L2
	b	Compare HDD, HUD, and HMD in terms of functionality and usage	8	3	L3
	c	Explain the architecture of a modern glass cockpit with neat block diagram.	6	3	L3

MODULE – 4

Q7	a	Describe UHF/VHF communication systems and their frequency ranges.	6	4	L2
	b	With help of neat diagram explain working of TCAS system.	8	4	L3
	c	Illustrate the basic principle of satellite communication in aviation	6	4	L3

OR

Q8	a	Differentiate between HF and VHF communication systems.	4	4	L2
	b	Describe the role of Air Traffic Control (ATC) in aviation safety.	10	4	L3
	c	Compare HF, VHF, and satellite communication systems in aviation	6	4	L3

MODULE – 5

Q9	a	Examine the limitations of ADF and suggest improvements	6	5	L3
	b	Differentiate TACAN and VOR in terms of accuracy and applications	8	5	L2
	c	Analyze the role of navigation aids in modern aircraft systems	6	5	L3

OR

Q10	a	Differ the functions of ADF, VOR, and GPS navigation systems	6	5	L2
	b	Draw GPS satellite constellation and explain its working	8	5	L3
	c	Illustrate the working of Microwave Landing System	6	5	L3



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FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS

JUNE - JULY 2026

1	S	J							
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Course:	ADDITIVE MANUFACTURING		
Course Code:	BAE406B	Branch: AE	
Max Marks:	100	Duration:	03 Hours

Note:

1. Answer any FIVE full questions, choosing one full Question from each Module.
2. Any missing data can be suitably assumed.

Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	Elaborate the need for Additive Manufacturing in modern industries with suitable examples.	6	1	L2
	b	Illustrate the Generic Additive Manufacturing process with neat steps.	8	1	L2
	c	Discuss Additive Manufacturing and Subtractive Manufacturing based on process, accuracy and applications.	6	1	L2
OR					
Q2	a	Explain the machines used in subtractive manufacturing operations.	6	1	L2
	b	Describe the role of computers in Additive Manufacturing systems.	8	1	L2
	c	Explain systematically the Reverse Engineering process.	6	1	L2
MODULE – 2					
Q3	a	Describe different forms of 3D printing raw materials.	6	2	L2
	b	Discuss Gas Atomization and Water Atomization processes.	8	2	L3
	c	Critically analyze and justify the selection of thermoplastic materials based on mechanical, thermal, and processing requirements in Additive Manufacturing.	6	2	L4
OR					
Q4	a	Describe the common post-processing techniques used in FDM printed parts.	6	2	L2
	b	Demonstrate the working principle of Fused Deposition Modeling with a neat sketch and explain the printing process step by step.	8	2	L3
	c	Compare and analyze FDM, Direct Energy Deposition and Sheet Lamination processes with respect to working principle, materials used, advantages, limitations, and industrial applications.	6	2	L4

2024 SCHEME**MODULE – 3**

Q5	a	List the advantages and disadvantages of SLA printing.	6	3	L2
	b	Explain the working principle of Stereolithography 3D printing with a neat sketch.	8	3	L2
	c	Apply suitable post-processing techniques to improve the quality of SLA printed parts.	6	3	L3

OR

Q6	a	Describe the Selective Laser Sintering process with neat steps.	6	3	L2
	b	Summarize the working principle, materials used, and applications of Laser Engineered Net Shaping.	8	3	L2
	c	Apply suitable post-processing methods for improving surface finish and strength of a powder printed metal component.	6	3	L3

MODULE – 4

Q7	a	Describe the challenges involved in selecting an appropriate AM process for manufacturing components.	6	4	L2
	b	Analyze the factors affecting the selection of an AM process for manufacturing complex components.	8	4	L3
	c	Evaluate the importance of post-processing techniques in improving the quality of AM components.	6	4	L4

OR

Q8	a	Discuss the common problems associated with STL files and methods used for STL file manipulation.	6	4	L2
	b	Explain the procedure for converting a CAD model into an STL file and preparing it for the AM process.	8	4	L3
	c	Evaluate the property enhancement techniques in AM using thermal and non-thermal methods.	6	4	L4

MODULE – 5

Q9	a	Explain the difference between additive manufacturing used for prototyping and for manufacturing.	6	5	L2
	b	Discuss the drivers of Direct Digital Manufacturing and explain how they influence modern production systems.	8	5	L3
	c	Assess the future scope and impact of Direct Digital Manufacturing in Industry 4.0.	6	5	L4

OR

Q10	a	Outline the recent trends in 3D printing applications in modern industries.	6	5	L2
	b	Analyze the use of additive manufacturing in medical and healthcare applications.	8	5	L3
	c	Assess the applications and benefits of 3D printing in the oil & gas and construction industries.	6	5	L4



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FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS

JUNE - JULY 2026

1	S	J						
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Course:	INTRODUCTION TO ARTIFICIAL INTELLIGENCE		
Course Code:	BEC406B	Branch: ECE	
Max Marks:	100	Duration:	03 Hours

Note:

1. Answer any FIVE full questions, choosing one full Question from each Module.
2. Any missing data can be suitably assumed.

Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	Explain heuristic search? What are the advantages of Heuristic Search?	6	1	L2
	b	Define production systems and control strategy. Explain the requirements of a good search strategy?	8	1	L2
	c	Apply the concept of state space representation and production rules to solve the Water Jug Problem and illustrate the solution path from initial state to goal state.	6	1	L3
OR					
Q2	a	Outline briefly the four components of production systems. What are the types of control strategies.	6	1	L2
	b	Explain in detail the problem characteristics with an examples for each.	8	1	L2
	c	Apply suitable AI techniques to design an intelligent strategy for the Tic-Tac-Toe problem.	6	1	L3
MODULE - 2					
Q3	a	Define Knowledge Representation in Artificial Intelligence. List the components of its framework and name different Knowledge Representation schemes.	6	2	L1
	b	Explain the various schemes of Knowledge representation with examples.	8	2	L2
	c	Analyze the mutilated checkerboard problem and explain different representation schemes to understand whether 31 dominoes can completely cover a checkerboard after removing two opposite corner squares.	6	2	L4
OR					
Q4	a	What are the different ways to represent class membership. Define each one with examples.	6	2	L1
	b	Explain why propositional logic is insufficient for representing structured real-world relationships compared to First-Order Predicate Logic. Discuss the advantages of predicate logic.	8	2	L2
	c	Compare Declarative Knowledge and Procedural Knowledge in AI architecture on the basis of how execution flow differs between the two approaches with suitable examples.	6	2	L4

2024 SCHEME

MODULE – 3					
Q5	a	Recall the concept of Closed World Assumption used in knowledge-based systems with its applications and advantages.	6	3	L1
	b	Explain the concept of Monotonic and Non-Monotonic Reasoning. Also, outline major differences between the two with real life examples.	8	3	L2
	c	Apply the Bayesian Network algorithm to solve a probabilistic inference problem and explain its advantages in handling uncertainty.	6	3	L3
OR					
Q6	a	Defined reasoning. List the broad methods of reasoning.	6	3	L1
	b	Describe symbolic reasoning under uncertainty and describe the main issues it addresses in AI systems. List any four techniques used in symbolic reasoning under uncertainty.	8	3	L2
	c	Construct the algorithm for Dempster–Shafer theory with a suitable example.	6	3	L3
MODULE – 4					
Q7	a	Define the Minimax algorithm. What is a static evaluation function in game playing?	4	4	L1
	b	Explain the terms machine learning and NLP. Interpret how machine learning improves NLP systems compared to hand-written rules.	8	4	L2
	c	Critically examine whether search-based techniques alone are sufficient for high-level performance across different games such as Chess, Go, and Backgammon.	8	4	L5
OR					
Q8	a	Define Natural Language Processing (NLP) and state the meaning of morphological analysis.	4	4	L1
	b	Explain Alpha (α) and Beta (β) in Alpha–Beta pruning with pruning condition. Compare Alpha–Beta pruning and Minimax search.	8	4	L2
	c	Evaluate the use of the Minimax algorithm on a simple two-level game tree and justify the optimal move for the maximizing player based on the final utility values.	8	4	L5
MODULE – 5					
Q9	a	Recall the concept of learning from taking advise.	4	5	L1
	b	Apply decision tree techniques to explain how learning is performed in an intelligent system.	8	5	L3
	c	Examine the challenges faced by Expert Systems and evaluate their advantages in real-world applications.	8	5	L4
OR					
Q10	a	What is meant by Expert system and Knowledge Acquisition?	4	5	L1
	b	Use an example to show how analogy helps in problem solving in Artificial Intelligence.	8	5	L3
	c	Analyze the effectiveness of inductive learning in constructing class definitions with reference to Winston’s learning program, and explain the Block World concept with suitable examples.	8	5	L4

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FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS

JUNE - JULY 2026

Course:	PROGRAMMING WITH JAVA		
Course Code:	BCS406C	Branches: CSE, ISE and CSD	
Max Marks:	100	Duration:	03 Hours

Note:

1. Answer any FIVE full questions, choosing one full Question from each Module.
2. Any missing data can be suitably assumed.

Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	Explain in detail the three fundamental principles of object-oriented programming.	6	1	L2
	b	Illustrate the concept of classes and objects and explain how classes and objects are declared and instantiated with a suitable example.	6	1	L2
	c	Develop a program illustrating constructor overloading for calculating the area of a rectangle and a circle using appropriate constructors.	8	1	L3
OR					
Q2	a	Explain the features/buzzwords and their significance in Java programming.	6	1	L2
	b	Illustrate the use of following keywords: i) this ii) final	6	1	L2
	c	Develop a program to demonstrate method overloading by creating a class called 'Calculator'. The class should contain three methods named 'Compute' with different types of parameters to perform different operations. Display the computed results for each method.	8	1	L3
MODULE - 2					
Q3	a	Explain the basic types of inheritance in object-oriented programming and illustrate each type with its syntax and a suitable example.	6	2	L2
	b	Illustrate the concept of an interface in Java and explain how it is implemented with appropriate syntax with a suitable example.	6	2	L2
	c	Develop a program to define a class 'Shape' and its subclasses 'Circle', 'Triangle', and 'Square'. Each class should implement the methods draw() and erase(). Demonstrate polymorphism by invoking these methods using appropriate references.	8	2	L3
OR					

2024 SCHEME

Q4	a	Explain how interfaces in Java can be used to achieve multiple inheritance and illustrate with a suitable example.	6	2	L2
	b	Explain the role of abstract class in inheritance and illustrate their use with a suitable example.	6	2	L2
	c	Develop a program to define an interface 'Resizable' with methods <code>resizeWidth(int width)</code> and <code>resizeHeight(int height)</code> to allow resizing of an object. Create a class 'Rectangle' that implements the Resizable interface and provides implementations for these methods.	8	2	L3
MODULE – 3					
Q5	a	Explain the accessibility rules of Java access modifiers with respect to the same class, the same package, subclasses in different packages, and non-subclasses in different packages.	6	3	L2
	b	Explain the usage of throw keyword in Java and illustrate it with a suitable example.	6	3	L2
	c	Develop a program to read two integers a and b, compute and display the result of a/b when b is not zero and handle the case when b is zero by raising an appropriate exception also demonstrate the handling of <code>ArrayIndexOutOfBoundsException</code> using finally clause.	8	3	L3
OR					
Q6	a	Explain the exception handling mechanism in Java and illustrate it with a suitable example.	6	3	L2
	b	Differentiate between checked and unchecked exceptions and provide two examples of each.	6	3	L2
	c	Develop a program and explain how to create a package 'Balance' containing a class 'Account' with a method <code>displayBalance()</code> and import the 'Balance' package in another program to access method of 'Account' class.	8	3	L3
MODULE – 4					
Q7	a	Describe the different stages in the life cycle of a thread and illustrate with a neat diagram.	6	4	L2
	b	Analyze the need for synchronization in multithreading and examine its implementation using appropriate mechanisms with a suitable example.	6	4	L4
	c	Develop a Swing application to demonstrate event handling by creating two buttons, 'Alpha' and 'Beta'. Display the message 'Alpha pressed' when the Alpha button is clicked and 'Beta pressed' when the Beta button is clicked.	8	4	L3
OR					
Q8	a	Identify the components of the MVC architecture in Java Swing and explain the roles of the Model, View and Controller with a suitable example.	6	4	L2
	b	Analyse the roles and interactions of <code>JFrame</code> and <code>JLabel</code> in Java Swing and illustrate how they collaborate to construct a graphical user interface.	6	4	L4
	c	Develop and implement two methods of creating threads in Java, with suitable examples.	8	4	L3

2024 SCHEME

MODULE – 5

Q9	a	Describe the various types of JDBC drivers in Java, giving a brief explanation of each.	6	5	L2
	b	Explain three overloaded methods of getConnection() method of Connection interface.	6	5	L2
	c	Apply the various steps of the JDBC process and demonstrate each step using appropriate code snippets.	8	5	L3
OR					
Q10	a	Summarize the relationship between JDBC data types and their corresponding SQL data types.	6	5	L2
	b	Write short notes on the following: i) ResultSet interface ii) MetaData interface	6	5	L2
	c	Develop a program using JDBC to establish a database connection and retrieve student records.	8	5	L3





SJC INSTITUTE OF TECHNOLOGY

(An Autonomous Institute under VTU, Belagavi)

FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS

JUNE - JULY 2026

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Course:	ALTERNATIVE BUILDING MATERIALS AND TECHNOLOGY		
Course Code:	BCV406C	Branch: CV	
Max Marks:	100	Duration:	03 Hours

Note:

1. Answer any FIVE full questions, choosing one full Question from each Module.
2. Any missing data can be suitably assumed.

Q. No.		MODULE - 1	Marks	CO	RBTL
Q1	a	Explain embodied energy and life-cycle energy in building materials. Discuss their environmental significance.	10	1	L2
	b	Draw a schematic diagram of a rainwater harvesting system and explain the procedure for harvesting water.	10	1	L3
OR					
Q2	a	Explain the impact of the construction industry on global warming.	10	1	L2
	b	Apply the various codal provisions for sustainable building practices and briefly explain them.	10	1	L3
MODULE – 2					
Q3	a	List various alternative materials used in place of cement and fine aggregates.	4	2	L1
	b	Describe stabilized mud blocks and their characteristics in urban building construction.	6	2	L2
	c	Apply suitable alternative masonry units in different construction applications and their suitability based on properties.	10	2	L3
OR					
Q4	a	List characteristics of Fal-G blocks and properties of fine aggregates.	4	2	L1
	b	Compare stabilized mud blocks and Fal-G blocks based on properties.	6	2	L2
	c	Apply codal provisions for mortar and masonry in construction practices.	10	2	L3
MODULE – 3					
Q5	a	Explain properties of manufactured aggregates & FRP materials.	10	3	L2
	b	Demonstrate the application of polymer mortar in concrete repairs and its effectiveness compared to conventional mortar.	10	3	L3

2024 SCHEME

OR					
Q6	a	Explain the suitability of agro-based materials for sustainable construction.	10	3	L2
	b	Apply suitable methods for the reuse of construction and demolition (C&D) waste in construction.	10	3	L3
MODULE - 4					
Q7	a	Explain construction methods of AAC walls and top-down construction method.	10	4	L2
	b	Analyze alternative roofing and construction systems and compare their suitability for different building conditions.	10	4	L4
OR					
Q8	a	Explain cavity wall construction and filler slab concept.	10	4	L2
	b	Distinguish between the manufacturing methods of precast blocks and stabilized blocks by analyzing their processes.	10	4	L4
MODULE - 5					
Q9	a	Apply the concepts of precast and cast-in-situ construction to different projects and compare their suitability.	10	5	L3
	b	Analyze various cost-saving techniques in construction and justify their suitability for different project conditions.	10	5	L4
OR					
Q10	a	Apply various equipment's in the production of alternative building materials.	10	5	L3
	b	Distinguish between conventional and alternative materials analyzing its cost.	10	5	L4

2024 SCHEME

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**SJC INSTITUTE OF TECHNOLOGY**

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FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS**JUNE - JULY 2026**

Course:	MECHATRONICS		
Course Code:	BME406D	Branch: ME	
Max Marks:	100	Duration:	03 Hours

Note:

1. Answer any FIVE full questions, choosing one full Question from each Module.
2. Any missing data can be suitably assumed.

Q. No.	MODULE - 1		Marks	CO	RBTL
Q1	a	What is Mechatronics? Summarize evolution of mechatronics.	5	1	L2
	b	Illustrate of basic elements of a closed loop control system with a block diagram.	8	1	L2
	c	Analyse with the block diagram, how a microprocessor can be utilized in working of automatic washing machine.	7	1	L3
OR					
Q2	a	Define Transducer and List the Classification of Transducers.	5	1	L2
	b	Describe the construction and operation of a Linear Variable Differential Transformer (LVDT) using a neat sketch	8	1	L2
	c	State the Principle of working and applications of Hall Effect sensor with a sketch.	7	1	L3
MODULE - 2					
Q3	a	What is signal conditioning? List functionalities of signal conditioner in measurement system.	6	2	L2
	b	Elucidate the Supervisory control and Data acquisition (SCADA) System.	8	2	L2
	c	Apply the concept of an Analog-to-Digital Converter to explain the function of each block in its block diagram.	6	2	L3
OR					
Q4	a	Define Solenoids. Explain two types of solenoids	6	2	L2
	b	Illustrate the operation of a Brushless DC Motor by applying its construction and working principle.	8	2	L2
	c	Apply the principle of electromagnetic interaction to explain the step-by-step rotation of a hybrid stepper motor for a given pulse sequence.	6	2	L3
MODULE - 3					
Q5	a	List the key differences between Microprocessor and Microcontroller.	6	3	L1
	b	Draw the construction of 8085A microprocessor architecture and analyze the functional role of each block in the 8085A architecture.	14	3	L3

OR

MODULE – 4

OR

MODULE – 5

OR

Page 2 of 2

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Version: A

SJC INSTITUTE OF TECHNOLOGY

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FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS

JUNE - JULY 2026

Course:	UNIVERSAL HUMAN VALUES		
Course Code:	BUH407	Branches: Common to all Branches	
Max Marks:	50	Duration:	1 Hour

INSTRUCTIONS TO THE CANDIDATES

1. Use only **Black ball point pen** for writing/ darkening the circle
2. Answer all the **fifty** questions, each question carries one mark.
3. For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the **OMR** sheet.
4. Darkening two circles for the same question makes the answer invalid.

Q. NO.	Questions	Marks	CO	RBTL
1.	What are the basic human aspirations? A. Happiness and Prosperity B. Happiness and Respect C. Prosperity and Health D. Prosperity and Peace	1	1	L1
2.	Contents of self-exploration are A. Desire and needs B. Program and Needs C. Program and practical D. Desire and program	1	1	L1
3.	Value Education enable us: A. To understand our needs B. Visualize our Goals Correctly C. Indicate the direction of their fulfilment D. All the above	1	1	L1
4.	Self-exploration demands examination and _____ of our belief again and again. A. Validation B. Presentation C. Demonstration D. Representation	1	1	L1
5.	The needs of the self are fulfilled by A. Right understanding B. Right feeling C. Both right understanding and right feeling D. Cannot ensured	1	1	L1
6.	What helps human beings to transform from animal consciousness to human consciousness? A. Right attitude B. Prosperity C. Wealth D. Right understanding	1	1	L1
7.	Right understanding in self along with Recognition of required physical facility and its fulfilment with rest of nature lead to A. Mutual happiness B. Mutual prosperity C. Excitement D. All of the above	1	1	L1

8.	Which is NOT the part of Basic Guideline(s) prepared for value education: It must be A. Universal B. Rational C. Verifiable D. Leading to disharmony	1	1	L1
9.	What is the relationship between self-exploration and value education? A. Self-exploration is irrelevant to value education B. Value education promotes self-exploration C. Self-exploration is a separate field of study D. Value education discourages self-exploration	1	1	L1
10.	Today's education has very less role to play in order to ensure harmony in A. Individual B. Family C. Society D. All the above	1	1	L1
11.	What are the four levels of living? A. Individual, family, society and nature B. Thought, behaviour, work and realization C. Material, pranic, animal and human D. None	1	2	L1
12.	Realization is the activity of A. Self B. Body C. Both self and Body D. None of these	1	2	L1
13.	Body is a _____ unit while the self is a _____ unit. A. Material, Consciousness B. Consciousness, Material C. Material, Material D. Consciousness, Consciousness	1	2	L1
14.	Harmony should be maintained in _____. A. Between Body and Life B. Between Self and Society C. Between Life and Environment D. All of the above	1	2	L1
15.	Need of self is A. Quantitative B. Temporary C. Qualitative D. None	1	2	L1
16.	Human being is the co-existence of _____. A. Self (I) and Physical facilities B. Suvidha and Body C. Self (I) and Body D. Wealth and Prosperity	1	2	L1
17.	Which one is a conscious unit (consciousness)? A. Body B. Wealth C. Self D. Self and body both	1	2	L1
18.	Needs of the body are fulfilled by _____. A. Right Understanding and Right Feelings B. Relationship C. Physical Facilities D. All of the above	1	2	L1
19.	Which of the following programs aims to ensure self-regulation and health? A. Emotional intelligence training B. Yoga and meditation sessions C. Physical fitness routines D. Nutritional counselling	1	2	L1
20.	Happiness means A. To be in a state of harmony B. Fulfilment of desired expectations from others C. Fulfilment of desired feelings from others D. Fulfilment of desired sensations from body	1	2	L1
21.	Society is an extension of A. Friends B. City C. Family D. Individual	1	3	L1
22.	Trust, respect and happiness etc. are the needs of A. Self B. Body C. Both (a) and (b) D. None of the above	1	3	L1
23.	The feeling of responsibility for nurturing, protection and right utilizing the body is A. Sanyam B. Swasthya C. Both a and b D. None	1	3	L1

24.	The feeling of responsibility to ensure health of body of other is related with A. Self-regulation B. Care C. Guidance D. Affection	1	3	L1
25.	Right evaluation of each other's intension and competence is called A. Affection B. Love C. Respect D. Trust	1	3	L1
26.	If I say I am good for nothing it is a kind of A. Under evaluation B. Right evaluation C. Otherwise evaluation D. Over evaluation	1	3	L1
27.	Under evaluation causes A. Ego B. Self-confidence C. Depression D. Preconditioning	1	3	L1
28.	Disrespect leads to A. Ego B. Depression C. Acrimony D. All the above	1	3	L1
29.	We can feel being related to other when we have feeling for other A. Affection and gratitude B. Care and respect C. Trust and respect D. Reverence and glory	1	3	L1
30.	_____ is our ability to fulfill the aspiration. A. Competence B. Purpose C. Potential D. Program	1	3	L1
31.	Acceptance of excellence in others is called A. Gratitude B. Reverence C. Glory D. Love	1	4	L1
32.	"Other's is similar to me" it is the minimum content of A. Care B. Guidance C. Respect D. Reverence	1	4	L1
33.	Human – rest of nature interaction is called A. Behaviour B. Work C. Production D. All	1	4	L1
34.	According to quantity, space which of the following is true for the orders in nature? A. Bio-order>> Physical order>> Animal Order>> Human Order B. Animal Order>> Bio-order>> Physical order>> Human Order C. Physical order>> Bio-order >> Animal Order>> Human Order D. Human Order>> Bio-order>> Physical order>> Animal Order	1	4	L1
35.	The activities in human body are A. Composition/Decomposition and Growth B. Existence and Growth C. Existence and Respiration D. Composition/Decomposition and Respiration	1	4	L1
36.	The third order of nature is A. Animal Order B. Material Order C. Human Order D. Bio Order	1	4	L1
37.	Sah-astitva means A. Corporate Identity B. Co-existence C. Co-option D. Co-operation	1	4	L1
38.	Nature is in _____ size, and Space is _____ A. Limited, Unlimited B. Unlimited, Unlimited C. Unlimited, Limited D. Limited, Limited	1	4	L1
39.	What is harmony in the context of nature? A. Balancing forces of nature B. Perfect symmetry in natural patterns C. Coexistence and interconnectedness D. Elimination of all conflicts	1	4	L1
40.	What is the outcome of harmony in nature? A. Conflict and destruction B. Sustainable coexistence C. Chaos and disorder D. Isolation and segregation	1	4	L1

41.	How does harmony in nature impact human wellbeing? A. It has no effect on human life B. It promotes physical and mental health C. It increases material wealth for humans D. It leads to increased conflicts	1	5	L1
42.	What is the outcome of harmony in nature? A. Environmental degradation B. A constant state of competition C. A stable and sustainable ecosystem D. Isolation of species from each other	1	5	L1
43.	Ethical conduct of profession means A. Right utilisation of one's professional skills B. Fulfilment of comprehensive human goals C. Meaningfully participate in the larger order D. All of the above	1	5	L1
44.	Human conduct means A. A conduct that a human being must ensure in job B. A conduct that ensures continuity of mutual happiness and prosperity C. A conduct that ensures profit of human being D. All of the above	1	5	L1
45.	Why a person act unethically? A. Because of lack of correct understanding about happiness and prosperity B. He is forced by some external powers C. It is the right way to behave D. It is the basic nature of human being	1	5	L1
46.	What could be the entry point to ensure humanistic tradition? A. Universal Human Order B. Human Constitution C. Human Conduct D. Human Education	1	5	L1
47.	Why is competence in professional ethics essential for practitioners? A. It helps them manipulate ethical principles for personal gain B. It ensures they can make informed and responsible decisions C. It guarantees job promotions D. It allows them to avoid ethical dilemmas altogether	1	5	L1
48.	What role does a universal human order play in professional ethics? A. Promoting cultural relativism B. Ensuring uniformity in decision-making C. Establishing common ethical principles for all human beings D. Excluding certain groups based on their beliefs	1	5	L1
49.	What is a key characteristic of a value-based professional? A. Pursuing self-interest without regard for others B. Balancing ethical principles with professional success C. Manipulating ethical guidelines for personal gain D. Ignoring the impact of decisions on others	1	5	L1
50.	What do typical case studies in professional ethics help to achieve? A. Identifying shortcuts to success B. Understanding the complexities of ethical decision making C. Proving the superiority of one ethical framework over others D. Demonstrating the power of technology	1	5	L1

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Version: B



SJC INSTITUTE OF TECHNOLOGY
(An Autonomous Institute under VTU, Belagavi)
FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS
JUNE - JULY 2026

Course:	UNIVERSAL HUMAN VALUES		
Course Code:	BUH407	Branches: Common to all Branches	
Max Marks:	50	Duration:	1 Hour

INSTRUCTIONS TO THE CANDIDATES

1. Use only **Black ball point pen** for writing/ darkening the circle
2. Answer all the **fifty** questions, each question carries one mark.
3. For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the **OMR** sheet.
4. Darkening two circles for the same question makes the answer invalid.

Q. NO.	Questions	Marks	CO	RBTL
1.	What are the four levels of living? A. Individual, family, society and nature B. Thought, behaviour, work and realization C. Material, pranic, animal and human D. None	1	2	L1
2.	Realization is the activity of A. Self B. Body C. Both self and Body D. None of these	1	2	L1
3.	Body is a _____ unit while the self is a _____ unit. A. Material, Consciousness B. Consciousness, Material C. Material, Material D. Consciousness , Consciousness	1	2	L1
4.	Harmony should be maintained in _____. A. Between Body and Life B. Between Self and Society C. Between Life and Environment D. All of the above	1	2	L1
5.	Need of self is A. Quantitative B. Temporary C. Qualitative D. None	1	2	L1
6.	Human being is the co-existence of _____. A. Self (I) and Physical facilities B. Suvidha and Body C. Self (I) and Body D. Wealth and Prosperity	1	2	L1
7.	Which one is a conscious unit (consciousness)? A. Body B. Wealth C. Self D. Self and body both	1	2	L1
8.	Needs of the body are fulfilled by _____. A. Right Understanding and Right Feelings B. Relationship C. Physical Facilities D. All of the above	1	2	L1
9.	Which of the following programs aims to ensure self-regulation and health? A. Emotional intelligence training B. Yoga and meditation sessions C. Physical fitness routines D. Nutritional counselling	1	2	L1

10.	Happiness means A. To be in a state of harmony B. Fulfilment of desired expectations from others C. Fulfilment of desired feelings from others D. Fulfilment of desired sensations from body	1	2	L1
11.	Society is an extension of A. Friends B. City C. Family D. Individual	1	3	L1
12.	Trust, respect and happiness etc. are the needs of A. Self B. Body C. Both (a) and (b) D. None of the above	1	3	L1
13.	The feeling of responsibility for nurturing, protection and right utilizing the body is A. Sanyam B. Swasthya C. Both a and b D. None	1	3	L1
14.	The feeling of responsibility to ensure health of body of other is related with A. Self-regulation B. Care C. Guidance D. Affection	1	3	L1
15.	Right evaluation of each other's intension and competence is called A. Affection B. Love C. Respect D. Trust	1	3	L1
16.	If I say I am good for nothing it is a kind of A. Under evaluation B. Right evaluation C. Otherwise evaluation D. Over evaluation	1	3	L1
17.	Under evaluation causes A. Ego B. Self-confidence C. Depression D. Preconditioning	1	3	L1
18.	Disrespect leads to A. Ego B. Depression C. Acrimony D. All the above	1	3	L1
19.	We can feel being related to other when we have feeling for other A. Affection and gratitude B. Care and respect C. Trust and respect D. Reverence and glory	1	3	L1
20.	_____ is our ability to fulfill the aspiration. A. Competence B. Purpose C. Potential D. Program	1	3	L1
21.	Acceptance of excellence in others is called A. Gratitude B. Reverence C. Glory D. Love	1	4	L1
22.	"Other's is similar to me" it is the minimum content of A. Care B. Guidance C. Respect D. Reverence	1	4	L1
23.	Human – rest of nature interaction is called A. Behaviour B. Work C. Production D. All	1	4	L1
24.	According to quantity, space which of the following is true for the orders in nature? A. Bio-order>> Physical order>> Animal Order>> Human Order B. Animal Order>> Bio-order>> Physical order>> Human Order C. Physical order>> Bio-order >> Animal Order>> Human Order D. Human Order>> Bio-order>> Physical order>> Animal Order	1	4	L1
25.	The activities in human body are A. Composition/Decomposition and Growth B. Existence and Growth C. Existence and Respiration D. Composition/Decomposition and Respiration	1	4	L1
26.	The third order of nature is A. Animal Order B. Material Order C. Human Order D. Bio Order	1	4	L1
27.	Sah-astitva means A. Corporate Identity B. Co-existence C. Co-option D. Co-operation	1	4	L1

28.	Nature is in _____ size, and Space is _____ A. Limited, Unlimited B. Unlimited, Unlimited C. Unlimited, Limited D. Limited, Limited	1	4	L1
29.	What is harmony in the context of nature? A. Balancing forces of nature B. Perfect symmetry in natural patterns C. Coexistence and interconnectedness D. Elimination of all conflicts	1	4	L1
30.	What is the outcome of harmony in nature? A. Conflict and destruction B. Sustainable coexistence C. Chaos and disorder D. Isolation and segregation	1	4	L1
31.	How does harmony in nature impact human wellbeing? A. It has no effect on human life B. It promotes physical and mental health C. It increases material wealth for humans D. It leads to increased conflicts	1	5	L1
32.	What is the outcome of harmony in nature? A. Environmental degradation B. A constant state of competition C. A stable and sustainable ecosystem D. Isolation of species from each other	1	5	L1
33.	Ethical conduct of profession means A. Right utilisation of one's professional skills B. Fulfilment of comprehensive human goals C. Meaningfully participate in the larger order D. All of the above	1	5	L1
34.	Human conduct means A. A conduct that a human being must ensure in job B. A conduct that ensures continuity of mutual happiness and prosperity C. A conduct that ensures profit of human being D. All of the above	1	5	L1
35.	Why a person act unethically? A. Because of lack of correct understanding about happiness and prosperity B. He is forced by some external powers C. It is the right way to behave D. It is the basic nature of human being	1	5	L1
36.	What could be the entry point to ensure humanistic tradition? A. Universal Human Order B. Human Constitution C. Human Conduct D. Human Education	1	5	L1
37.	Why is competence in professional ethics essential for practitioners? A. It helps them manipulate ethical principles for personal gain B. It ensures they can make informed and responsible decisions C. It guarantees job promotions D. It allows them to avoid ethical dilemmas altogether	1	5	L1
38.	What role does a universal human order play in professional ethics? A. Promoting cultural relativism B. Ensuring uniformity in decision-making C. Establishing common ethical principles for all human beings D. Excluding certain groups based on their beliefs	1	5	L1

39.	What is a key characteristic of a value-based professional? A. Pursuing self-interest without regard for others B. Balancing ethical principles with professional success C. Manipulating ethical guidelines for personal gain D. Ignoring the impact of decisions on others	1	5	L1
40.	What do typical case studies in professional ethics help to achieve? A. Identifying shortcuts to success B. Understanding the complexities of ethical decision making C. Proving the superiority of one ethical framework over others D. Demonstrating the power of technology	1	5	L1
41.	What are the basic human aspirations? A. Happiness and Prosperity B. Happiness and Respect C. Prosperity and Health D. Prosperity and Peace	1	1	L1
42.	Contents of self-exploration are A. Desire and needs B. Program and Needs C. Program and practical D. Desire and program	1	1	L1
43.	Value Education enable us: A. To understand our needs B. Visualize our Goals Correctly C. Indicate the direction of their fulfilment D. All the above	1	1	L1
44.	Self-exploration demands examination and _____ of our belief again and again. A. Validation B. Presentation C. Demonstration D. Representation	1	1	L1
45.	The needs of the self are fulfilled by A. Right understanding B. Right feeling C. Both right understanding and right feeling D. Cannot ensured	1	1	L1
46.	What helps human beings to transform from animal consciousness to human consciousness? A. Right attitude B. Prosperity C. Wealth D. Right understanding	1	1	L1
47.	Right understanding in self along with Recognition of required physical facility and its fulfilment with rest of nature lead to A. Mutual happiness B. Mutual prosperity C. Excitement D. All of the above	1	1	L1
48.	Which is NOT the part of Basic Guideline(s) prepared for value education: It must be A.Universal B.Rational C.Verifiable D. Leading to disharmony	1	1	L1
49.	What is the relationship between self-exploration and value education? A. Self-exploration is irrelevant to value education B. Value education promotes self-exploration C. Self-exploration is a separate field of study D. Value education discourages self-exploration	1	1	L1
50.	Today's education has very less role to play in order to ensure harmony in A. Individual B. Family C. Society D. All the above	1	1	L1

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Version: C



SJC INSTITUTE OF TECHNOLOGY
(An Autonomous Institute under VTU, Belagavi)
FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS
JUNE - JULY 2026

Course:	UNIVERSAL HUMAN VALUES		
Course Code:	BUH407	Branches: Common to all Branches	
Max Marks:	50	Duration:	1 Hour

INSTRUCTIONS TO THE CANDIDATES

1. Use only **Black ball point pen** for writing/ darkening the circle
2. Answer all the **fifty** questions, each question carries one mark.
3. For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the **OMR** sheet.
4. Darkening two circles for the same question makes the answer invalid.

Q. NO.	Questions	Marks	CO	RBTL
1.	Acceptance of excellence in others is called A. Gratitude B. Reverence C. Glory D. Love	1	4	L1
2.	"Other's is similar to me" it is the minimum content of A. Care B. Guidance C. Respect D. Reverence	1	4	L1
3.	Human – rest of nature interaction is called A. Behaviour B. Work C. Production D. All	1	4	L1
4.	According to quantity, space which of the following is true for the orders in nature? A. Bio-order>> Physical order>> Animal Order>> Human Order B. Animal Order>> Bio-order>> Physical order>> Human Order C. Physical order>> Bio-order >> Animal Order>> Human Order D. Human Order>> Bio-order>> Physical order>> Animal Order	1	4	L1
5.	The activities in human body are A. Composition/Decomposition and Growth B. Existence and Growth C. Existence and Respiration D. Composition/Decomposition and Respiration	1	4	L1
6.	The third order of nature is A. Animal Order B. Material Order C. Human Order D. Bio Order	1	4	L1
7.	Sah-astitva means A. Corporate Identity B. Co-existence C. Co-option D. Co-operation	1	4	L1
8.	Nature is in _____ size, and Space is _____ A. Limited, Unlimited B. Unlimited, Unlimited C. Unlimited, Limited D. Limited, Limited	1	4	L1

9.	What is harmony in the context of nature? A. Balancing forces of nature B. Perfect symmetry in natural patterns C. Coexistence and interconnectedness D. Elimination of all conflicts	1	4	L1
10.	What is the outcome of harmony in nature? A. Conflict and destruction B. Sustainable coexistence C. Chaos and disorder D. Isolation and segregation	1	4	L1
11.	How does harmony in nature impact human wellbeing? A. It has no effect on human life B. It promotes physical and mental health C. It increases material wealth for humans D. It leads to increased conflicts	1	5	L1
12.	What is the outcome of harmony in nature? A. Environmental degradation B. A constant state of competition C. A stable and sustainable ecosystem D. Isolation of species from each other	1	5	L1
13.	Ethical conduct of profession means A. Right utilisation of one's professional skills B. Fulfilment of comprehensive human goals C. Meaningfully participate in the larger order D. All of the above	1	5	L1
14.	Human conduct means A. A conduct that a human being must ensure in job B. A conduct that ensures continuity of mutual happiness and prosperity C. A conduct that ensures profit of human being D. All of the above	1	5	L1
15.	Why a person act unethically? A. Because of lack of correct understanding about happiness and prosperity B. He is forced by some external powers C. It is the right way to behave D. It is the basic nature of human being	1	5	L1
16.	What could be the entry point to ensure humanistic tradition? A. Universal Human Order B. Human Constitution C. Human Conduct D. Human Education	1	5	L1
17.	Why is competence in professional ethics essential for practitioners? A. It helps them manipulate ethical principles for personal gain B. It ensures they can make informed and responsible decisions C. It guarantees job promotions D. It allows them to avoid ethical dilemmas altogether	1	5	L1
18.	What role does a universal human order play in professional ethics? A. Promoting cultural relativism B. Ensuring uniformity in decision-making C. Establishing common ethical principles for all human beings D. Excluding certain groups based on their beliefs	1	5	L1
19.	What is a key characteristic of a value-based professional? A. Pursuing self-interest without regard for others B. Balancing ethical principles with professional success C. Manipulating ethical guidelines for personal gain D. Ignoring the impact of decisions on others	1	5	L1

20.	What do typical case studies in professional ethics help to achieve? A. Identifying shortcuts to success B. Understanding the complexities of ethical decision making C. Proving the superiority of one ethical framework over others D. Demonstrating the power of technology	1	5	L1
21.	What are the basic human aspirations? A. Happiness and Prosperity B. Happiness and Respect C. Prosperity and Health D. Prosperity and Peace	1	1	L1
22.	Contents of self-exploration are A. Desire and needs B. Program and Needs C. Program and practical D. Desire and program	1	1	L1
23.	Value Education enable us: A. To understand our needs B. Visualize our Goals Correctly C. Indicate the direction of their fulfilment D. All the above	1	1	L1
24.	Self-exploration demands examination and _____ of our belief again and again. A. Validation B. Presentation C. Demonstration D. Representation	1	1	L1
25.	The needs of the self are fulfilled by A. Right understanding B. Right feeling C. Both right understanding and right feeling D. Cannot ensured	1	1	L1
26.	What helps human beings to transform from animal consciousness to human consciousness? A. Right attitude B. Prosperity C. Wealth D. Right understanding	1	1	L1
27.	Right understanding in self along with Recognition of required physical facility and its fulfilment with rest of nature lead to A. Mutual happiness B. Mutual prosperity C. Excitement D. All of the above	1	1	L1
28.	Which is NOT the part of Basic Guideline(s) prepared for value education: It must be A. Universal B. Rational C. Verifiable D. Leading to disharmony	1	1	L1
29.	What is the relationship between self-exploration and value education? A. Self-exploration is irrelevant to value education B. Value education promotes self-exploration C. Self-exploration is a separate field of study D. Value education discourages self-exploration	1	1	L1
30.	Today's education has very less role to play in order to ensure harmony in A. Individual B. Family C. Society D. All the above	1	1	L1
31.	What are the four levels of living? A. Individual, family, society and nature B. Thought, behaviour, work and realization C. Material, pranic, animal and human D. None	1	2	L1
32.	Realization is the activity of A. Self B. Body C. Both self and Body D. None of these	1	2	L1
33.	Body is a _____ unit while the self is a _____ unit. A. Material, Consciousness B. Consciousness, Material C. Material, Material D. Consciousness , Consciousness	1	2	L1

34.	Harmony should be maintained in _____. A. Between Body and Life B. Between Self and Society C. Between Life and Environment D. All of the above	1	2	L1
35.	Need of self is A. Quantitative B. Temporary C. Qualitative D. None	1	2	L1
36.	Human being is the co-existence of _____. A. Self (I) and Physical facilities B. Suvidha and Body C. Self (I) and Body D. Wealth and Prosperity	1	2	L1
37.	Which one is a conscious unit (consciousness)? A. Body B. Wealth C. Self D. Self and body both	1	2	L1
38.	Needs of the body are fulfilled by _____. A. Right Understanding and Right Feelings B. Relationship C. Physical Facilities D. All of the above	1	2	L1
39.	Which of the following programs aims to ensure self-regulation and health? A. Emotional intelligence training B. Yoga and meditation sessions C. Physical fitness routines D. Nutritional counselling	1	2	L1
40.	Happiness means A. To be in a state of harmony B. Fulfilment of desired expectations from others C. Fulfilment of desired feelings from others D. Fulfilment of desired sensations from body	1	2	L1
41.	Society is an extension of A. Friends B. City C. Family D. Individual	1	3	L1
42.	Trust, respect and happiness etc. are the needs of A. Self B. Body C. Both (a) and (b) D. None of the above	1	3	L1
43.	The feeling of responsibility for nurturing, protection and right utilizing the body is A. Sanyam B. Swasthya C. Both a and b D. None	1	3	L1
44.	The feeling of responsibility to ensure health of body of other is related with A. Self-regulation B. Care C. Guidance D. Affection	1	3	L1
45.	Right evaluation of each other's intension and competence is called A. Affection B. Love C. Respect D. Trust	1	3	L1
46.	If I say I am good for nothing it is a kind of A. Under evaluation B. Right evaluation C. Otherwise evaluation D. Over evaluation	1	3	L1
47.	Under evaluation causes A. Ego B. Self-confidence C. Depression D. Preconditioning	1	3	L1
48.	Disrespect leads to A. Ego B. Depression C. Acrimony D. All the above	1	3	L1
49.	We can feel being related to other when we have feeling for other A. Affection and gratitude B. Care and respect C. Trust and respect D. Reverence and glory	1	3	L1
50.	_____ is our ability to fulfill the aspiration. A. Competence B. Purpose C. Potential D. Program	1	3	L1

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Version: D



SJC INSTITUTE OF TECHNOLOGY
(An Autonomous Institute under VTU, Belagavi)
FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS
JUNE - JULY 2026

Course:	UNIVERSAL HUMAN VALUES		
Course Code:	BUH407	Branches: Common to all Branches	
Max Marks:	50	Duration:	1 Hour

INSTRUCTIONS TO THE CANDIDATES

1. Use only **Black ball point pen** for writing/ darkening the circle
2. Answer all the **fifty** questions, each question carries one mark.
3. For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the **OMR** sheet.
4. Darkening two circles for the same question makes the answer invalid.

Q. NO.	Questions	Marks	CO	RBTL
1.	Society is an extension of A. Friends B. City C. Family D. Individual	1	3	L1
2.	Trust, respect and happiness etc. are the needs of A. Self B. Body C. Both (a) and (b) D. None of the above	1	3	L1
3.	The feeling of responsibility for nurturing, protection and right utilizing the body is A. Sanyam B. Swasthya C. Both a and b D. None	1	3	L1
4.	The feeling of responsibility to ensure health of body of other is related with A. Self-regulation B. Care C. Guidance D. Affection	1	3	L1
5.	Right evaluation of each other's intension and competence is called A. Affection B. Love C. Respect D. Trust	1	3	L1
6.	If I say I am good for nothing it is a kind of A. Under evaluation B. Right evaluation C. Otherwise evaluation D. Over evaluation	1	3	L1
7.	Under evaluation causes A. Ego B. Self-confidence C. Depression D. Preconditioning	1	3	L1
8.	Disrespect leads to A. Ego B. Depression C. Acrimony D. All the above	1	3	L1
9.	We can feel being related to other when we have feeling for other A. Affection and gratitude B. Care and respect C. Trust and respect D. Reverence and glory	1	3	L1
10.	_____ is our ability to fulfill the aspiration. A. Competence B. Purpose C. Potential D. Program	1	3	L1
11.	Acceptance of excellence in others is called A. Gratitude B. Reverence C. Glory D. Love	1	4	L1

12.	“Other’s is similar to me” it is the minimum content of A. Care B. Guidance C. Respect D. Reverence	1	4	L1
13.	Human – rest of nature interaction is called A. Behaviour B. Work C. Production D. All	1	4	L1
14.	According to quantity, space which of the following is true for the orders in nature? A. Bio-order>> Physical order>> Animal Order>> Human Order B. Animal Order>> Bio-order>> Physical order>> Human Order C. Physical order>> Bio-order >> Animal Order>> Human Order D. Human Order>> Bio-order>> Physical order>> Animal Order	1	4	L1
15.	The activities in human body are A. Composition/Decomposition and Growth B. Existence and Growth C. Existence and Respiration D. Composition/Decomposition and Respiration	1	4	L1
16.	The third order of nature is A. Animal Order B. Material Order C. Human Order D. Bio Order	1	4	L1
17.	Sah-astitva means A. Corporate Identity B. Co-existence C. Co-option D. Co-operation	1	4	L1
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19.	What is harmony in the context of nature? A. Balancing forces of nature B. Perfect symmetry in natural patterns C. Coexistence and interconnectedness D. Elimination of all conflicts	1	4	L1
20.	What is the outcome of harmony in nature? A. Conflict and destruction B. Sustainable coexistence C. Chaos and disorder D. Isolation and segregation	1	4	L1
21.	How does harmony in nature impact human wellbeing? A. It has no effect on human life B. It promotes physical and mental health C. It increases material wealth for humans D. It leads to increased conflicts	1	5	L1
22.	What is the outcome of harmony in nature? A. Environmental degradation B. A constant state of competition C. A stable and sustainable ecosystem D. Isolation of species from each other	1	5	L1
23.	Ethical conduct of profession means A. Right utilisation of one’s professional skills B. Fulfilment of comprehensive human goals C. Meaningfully participate in the larger order D. All of the above	1	5	L1
24.	Human conduct means A. A conduct that a human being must ensure in job B. A conduct that ensures continuity of mutual happiness and prosperity C. A conduct that ensures profit of human being D. All of the above	1	5	L1

25.	Why a person act unethically? A. Because of lack of correct understanding about happiness and prosperity B. He is forced by some external powers C. It is the right way to behave D. It is the basic nature of human being	1	5	L1
26.	What could be the entry point to ensure humanistic tradition? A. Universal Human Order B. Human Constitution C. Human Conduct D. Human Education	1	5	L1
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33.	Value Education enable us: A. To understand our needs B. Visualize our Goals Correctly C. Indicate the direction of their fulfilment D. All the above	1	1	L1
34.	Self-exploration demands examination and _____ of our belief again and again. A. Validation B. Presentation C. Demonstration D. Representation	1	1	L1
35.	The needs of the self are fulfilled by A. Right understanding B. Right feeling C. Both right understanding and right feeling D. Cannot ensured	1	1	L1
36.	What helps human beings to transform from animal consciousness to human consciousness? A. Right attitude B. Prosperity C. Wealth D. Right understanding	1	1	L1

37.	Right understanding in self along with Recognition of required physical facility and its fulfilment with rest of nature lead to A. Mutual happiness B. Mutual prosperity C. Excitement D. All of the above	1	1	L1
38.	Which is NOT the part of Basic Guideline(s) prepared for value education: It must be A.Universal B.Rational C.Verifiable D. Leading to disharmony	1	1	L1
39.	What is the relationship between self-exploration and value education? A. Self-exploration is irrelevant to value education B. Value education promotes self-exploration C. Self-exploration is a separate field of study D. Value education discourages self-exploration	1	1	L1
40.	Today's education has very less role to play in order to ensure harmony in A. Individual B. Family C. Society D. All the above	1	1	L1
41.	What are the four levels of living? A. Individual, family, society and nature B. Thought, behaviour, work and realization C. Material, pranic, animal and human D. None	1	2	L1
42.	Realization is the activity of A. Self B. Body C. Both self and Body D. None of these	1	2	L1
43.	Body is a _____ unit while the self is a _____ unit. A. Material, Consciousness B. Consciousness, Material C. Material, Material D. Consciousness , Consciousness	1	2	L1
44.	Harmony should be maintained in _____. A. Between Body and Life B. Between Self and Society C. Between Life and Environment D. All of the above	1	2	L1
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47.	Which one is a conscious unit (consciousness)? A. Body B. Wealth C. Self D. Self and body both	1	2	L1
48.	Needs of the body are fulfilled by _____. A. Right Understanding and Right Feelings B. Relationship C. Physical Facilities D. All of the above	1	2	L1
49.	Which of the following programs aims to ensure self-regulation and health? A. Emotional intelligence training B. Yoga and meditation sessions C. Physical fitness routines D. Nutritional counselling	1	2	L1
50.	Happiness means A. To be in a state of harmony B. Fulfilment of desired expectations from others C. Fulfilment of desired feelings from others D. Fulfilment of desired sensations from body	1	2	L1

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**SJC INSTITUTE OF TECHNOLOGY**

(An Autonomous Institute under VTU, Belagavi)

FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS**JUNE - JULY 2026**

Course:	3-D PRINTING		
Course Code:	BME408A	Branch: ME	
Max Marks:	50	Duration:	1 Hour

INSTRUCTIONS TO THE CANDIDATES

1. Use only **Black ball point pen** for writing/ darkening the circle
2. Answer all the **fifty** questions, each question carries one mark.
3. For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the **OMR** sheet.
4. Darkening two circles for the same question makes the answer invalid.

Q.NO.	Questions	Marks	CO	RBTL
1.	Which device is used in 3D scanning? A. 3D scanner B. Projector C. Printer cable D. CPU fan	1	1	1
2.	Which process converts a 3D digital model into layers for printing? A. Rendering B. Slicing C. Scanning D. Extruding	1	1	1
3.	Which of the following is a slicing software? A. Cura B. Excel C. Word D.) VLC	1	1	1
4.	Which parameter controls the internal structure of the printed object? A. Infill density B. Screen resolution C. Fan speed D. Internet speed	1	1	1
5.	Which file format is most commonly used in 3D printing? A. STL B. PDF C. DOCX D. TXT	1	1	1
6.	Which stage comes after 3D modeling before printing? A. Cooling B. Model preparation C. Packing D. Polishing	1	1	1
7.	Which material is commonly used in FDM printing? A. PLA B. Steel B. Glass D. Copper	1	1	1
8.	3D scanning converts: A. Digital object to physical B. Physical object to digital model C. Image to video D. Text to image	1	1	1
9.	Example of 3D modelling software: A. SolidWorks B. Word C. Excel D. Notepad	1	1	1
10.	Printer nozzle extrudes: A. Filament B. Air C. Light D. Water	1	1	1
11.	Which of the following is not a basic additive manufacturing process? A. FDM B. CNC Machining C. SLA D. SLS	1	2	1
12.	What is the primary material used in Stereolithography (SLA)? A. Metal powder B. Liquid resin C. Paper sheets D. Thermoplastic wire	1	2	1
13.	Which of the following is NOT a common 3D printing material? A. PLA B. ABS C. PVC D. Nylon	1	2	1
14.	Support material is used to: A. Increase part density B. Hold overhangs C. Speed up printing D. Dye the part	1	2	1

2024 SCHEME

15.	Additive manufacturing uses much less material than other subtractive manufacturing processes. A. True B. False	1	2	1
16.	Wire is pulled through a A. Die B. Mold C. Roller D. Punch	1	2	1
17.	Paper is A. Biodegradable B. Non-biodegradable C. Radioactive D. Metallic	1	2	1
18.	Metals generally have A. High conductivity B. Low strength C. Low density D. Transparency	1	2	1
19.	Wood is a A. Natural material B. Synthetic material C. Metal D. Ceramic	1	2	1
20.	Material selection depends on A. Cost B. Properties C. Application D. All of these	1	2	1
21.	Which print head type uses a resistance heater to create a bubble? A. Piezoelectric B. Thermal Inkjet ("Bubblejet") C. Electrostatic D. Continuous inkjet	1	3	1
22.	In CIJ, what happens to uncharged drops? A. They are printed B. They are caught in a gutter C. They evaporate D. They are deflected	1	3	1
23.	Which of the following is crucial for proper inkjet ejection? A. High ink viscosity B. Low surface tension C. Controlled ink density D. All of the above	1	3	1
24.	What is the fundamental working principle of an inkjet printer? A. Laser scanning B. Ejecting droplets of ink onto a medium C. Impact printing D. Thermal transfer	1	3	1
25.	Which component moves the print head to the correct location? A. Print bed B. Ink cartridge C. Positioning system D. Stepper motor	1	3	1
26.	What ensures the print head moves accurately across the medium? A. Only gravity B. Servos and motion control algorithms C. Manual alignment D. Ink pressure	1	3	1
27.	Which of the following is NOT a component of the positioning system in an inkjet printer? A. Grating disk sensor B. Paper feed components C. Deflection plate D. Carriage motor	1	3	1
28.	Which type of fabrication uses inkjet technology to bind layers of material? A. Liquid based B. Powder based (Colorjet) C. Thermal based D. Continuous jet	1	3	1
29.	What is the function of the grating disk sensor in an inkjet printer? A. Heating the ink B. Monitoring ink levels C. Tracking head movement/position D. Cleaning nozzles	1	3	1
30.	The "3D Unit 3" document suggests that for layer-by-layer printing, which of the following is crucial? A. High-pressure air supply B. Constant ink flow C. Precision in motion control D. Rapid ink cooling	1	3	1
31.	Laser light is monochromatic, which means it: A. Is highly directional B. Consists of a single wavelength C. Has high intensity D. Is coherent	1	4	1
32.	What is the function of the pump source in a laser? a) To cool the laser medium b) To achieve population inversion c) To deflect the laser beam d) To modulate the beam intensity	1	4	1
33.	Semiconductor lasers are popular because they have: A. Low efficiency B. High divergence C. High efficiency D. Large size	1	4	1

2024 SCHEME

34.	Which of the following is a characteristic of laser light? A. Incoherence B. Polychromatic C. Collimated D. Divergent	1	4	1
35.	In a laser, metastable states are used to: A. Decrease population inversion B. Increase the lifetime of excited electrons C. Increase scattering D. Reduce power output	1	4	1
36.	Which of the following is a solid-state laser? A. Argon laser B. Ruby laser C. Carbon dioxide laser D. Dye laser	1	4	1
37.	Laser beam divergence is: A. Very high B. Very low C. Zero D. Unaffected by distance	1	4	1
38.	Which laser is commonly used for industrial cutting and welding? A. Helium-Neon laser B. Ruby laser C. Carbon Dioxide (CO ₂) laser D. Dye laser	1	4	1
39.	Which pump source is used in a Ruby laser? A. Electrical discharge B. Optical pumping C. Chemical reaction D. X-ray	1	4	1
40.	LASER stands for: A. Light Absorption by Stimulated Emission of Radiation B. Light Amplification by Stimulated Emission of Radiation C. Light Amplification by Spontaneous Emission of Radiation D. Light Absorption by Spontaneous Emission of Radiation	1	4	1
41.	Printed electronics mainly involves: A. Printing circuits on paper/plastic substrates B. Printing books electronically C. Printing metals using lasers D. Printing mechanical parts	1	5	1
42.	Which printing technique is widely used in printed electronics? A. Inkjet printing B. Screen printing C. Gravure printing D. All of the above	1	5	1
43.	Printed electronics are commonly used in: A. Flexible displays B. Smart labels C. RFID tags D. All of the above	1	5	1
44.	Biopolymers are mainly derived from: A. Petroleum products B. Natural biological sources C. Synthetic chemicals D. Metals	1	5	1
45.	Biopolymers are widely used in: A. Packaging B. Medical implants C. Drug delivery D. All of the above	1	5	1
46.	Which material is used in flexible displays? A. Plastic substrates B. Glass C. Wood D. Steel	1	5	1
47.	Biodegradable food packaging helps to: A. Reduce plastic waste B. Increase pollution C. Increase cost only D. None of the above	1	5	1
48.	Which industry uses biodegradable films for food wrapping? A. Food industry B. Mining industry C. Automobile industry D. Aviation	1	5	1
49.	Medical devices using printed electronics include: A. Wearable sensors B. Smart bandages C. Health monitoring patches D. All of the above	1	5	1
50.	Nanotechnology plays an important role in: A. Drug delivery systems B. Medical imaging C. Biosensors D. All of the above	1	5	1

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SJC INSTITUTE OF TECHNOLOGY

(An Autonomous Institute under VTU, Belagavi)

FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS

JUNE - JULY 2026

Course:	AIRCRAFT MAINTENANCE AND OVERHAUL		
Course Code:	BAS408D	Branch: AS	
Max Marks:	50	Duration:	1 Hour

INSTRUCTIONS TO THE CANDIDATES

1. Use only **Black ball point pen** for writing/ darkening the circle
2. Answer all the **fifty** questions, each question carries one mark.
3. For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the **OMR** sheet.
4. Darkening two circles for the same question makes the answer invalid.

Q.NO.	Questions	Marks	CO	RBTL
1.	What is the full form of CAMP? A. Continuous Air Mileage Program B. Continuous Air Maintenance Program C. Continuous Airworthiness Maintenance Program D. Continuous Airworthiness Mileage Program	1	1	L1
2.	Who is responsible to review the airworthiness certificate, maintenance records, and other required paperwork to verify that the aircraft is airworthy? A. Copilot B. Aircraft Maintenance Engineer C. Purser D. Pilot	1	1	L1
3.	Which one of the following is not true with respect to line maintenance? A. Quick turnaround time B. Aircraft is refueled C. Critical instruments are checked for defects D. Performed at MRO sites	1	1	L1
4.	What is the full form of SRM? A. Structure Repair Manual B. Structure Record Manual C. Systematic Record Maintenance D. System Repairing Manual	1	1	L2
5.	Which is considered as aircraft cycle? A. Takeoff and landing B. Landing C. Takeoff D. Flying hours	1	1	L2
6.	A maintenance release can also be called as _____ A. Certificate of release to service (CRS) B. Maintenance release certificate C. Release certificate D. Certification of release to service	1	1	L2
7.	A weld shows undercutting at the toe and insufficient penetration. What is the most likely issue? A. Proper welding technique B. Excess filler material C. Poor welding technique or incorrect parameters	1	1	L2

2024 SCHEME

	D. Correct heat input			
8.	A technician uses a very small torch tip for welding thick metal. What will likely happen? A. Excessive melting B. Proper penetration C. Insufficient heat leading to weak fusion D. No effect	1	1	L3
9.	Which joint would be most suitable for maximum strength under load distribution? A. Lap joint B. Edge joint C. Butt joint D. Corner joint	1	1	L3
10.	A welder chooses to exceed 15 psi acetylene pressure for faster welding. Evaluate this decision. A. Safe and efficient B. Improves weld quality C. Dangerous due to explosion risk D. Reduces gas consumption	1	1	L4
11.	What are the two general classifications of clear plastics used in aircraft? A. Thermoplastics and thermosetting plastics B. Acrylics and cellulose acetates C. Epoxy and polyester D. Fiberglass and carbon fiber	1	2	L1
12.	Which type of plastic softens when heat is applied and can be reshaped? A. Thermosetting plastic B. Thermoplastic C. Composite plastic D. Reinforced plastic	1	2	L1
13.	What is the primary load-carrying component in composite materials? A. Matrix B. Resin C. Fiber D. Adhesive	1	2	L1
14.	Why is plastic preferred over glass in aircraft windows? A. Higher cost B. Better electrical conductivity C. Lower weight and higher impact resistance D. Higher melting point	1	2	L2
15.	Why should solvents like acetone not be used on plastic surfaces? A. They increase strength B. They cause crazing and weaken the plastic C. They improve clarity D. They cool the plastic	1	2	L2
16.	What is the function of the matrix in composite materials? A. Carry tensile loads only B. Provide color C. Support and bind fibers together D. Reduce weight only	1	2	L2
17.	A plastic sheet cracks during cutting. What is the most likely reason? A. Excessive cooling B. Insufficient marking C. Excessive stress or improper cutting technique D. Proper tool usage	1	2	L2
18.	A composite laminate shows distortion after curing. What is the likely cause? A. Proper symmetry B. Balanced lay-up C. Lack of symmetry and balance in layers D. Correct fiber orientation	1	2	L3
19.	Which material would be most suitable for high-strength, lightweight aircraft structures? A. Fiberglass B. Acrylic plastic C. Carbon fiber composite D. Cellulose acetate	1	2	L3
20.	A technician must choose between fiberglass and carbon fiber for a structural component requiring high stiffness. What is the best choice? A. Fiberglass, due to lower cost B. Carbon fiber, due to higher strength and stiffness C. Either material performs equally D. Cellulose acetate	1	2	L4
21.	What is aircraft rigging? A. Manufacturing of aircraft parts B. Alignment of aircraft parts for proper flight characteristics C. Painting of aircraft surfaces D. Fuel system installation	1	3	L1

2024 SCHEME

22.	Which component is usually assembled first in final aircraft assembly? A. Wings B. Landing gear C. Fuselage D. Tail section	1	3	L1
23.	Which primary control surface controls roll motion? A. Rudder B. Elevator C. Aileron D. Flap	1	3	L1
24.	Why should correct hardware be used during aircraft assembly? A. To reduce weight B. To improve appearance C. To prevent failure and ensure safety D. To reduce cost	1	3	L2
25.	Why is leveling required before rigging an aircraft? A. To improve painting B. To ensure correct alignment of components C. To reduce fuel consumption D. To install landing gear	1	3	L2
26.	What is the function of trim tabs? A. Increase lift only B. Reduce pilot control effort C. Increase drag only D. Control engine speed	1	3	L2
27.	An aircraft shows increased drag and reduced speed during flight. What is the most likely cause? A. Proper rigging B. Excess fuel C. Misalignment of wings or fuselage D. Correct control settings	1	3	L2
28.	If a pilot experiences adverse yaw during roll, what is the cause? A. Equal lift on both wings B. Drag difference between up and down ailerons C. Incorrect fuel mixture D. Excess engine thrust	1	3	L3
29.	Which method is most appropriate for establishing aircraft level accurately? A. Visual estimation B. Random measurement C. Using spirit levels or plumb bob methods D. Guessing alignment	1	3	L3
30.	A technician must choose between using correct-length bolts or stacking washers. What is the best decision? A. Use washers B. Use correct-length bolts C. Either is acceptable D. Avoid bolts	1	3	L4
31.	Which landing gear configuration has a nose wheel and two main wheels? A. Conventional gear B. Tandem gear C. Tricycle gear D. Bicycle gear	1	4	L1
32.	What is a heat exchanger? A. Device that produces fuel B. Device that transfers heat between systems C. Device that increases pressure D. Device that stores heat	1	4	L1
33.	Why is retractable landing gear used? A. To reduce aircraft weight B. To reduce aerodynamic drag C. To increase lift D. To improve braking	1	4	L1
34.	Why must exhaust heating systems be inspected regularly? A. To improve speed B. To prevent exhaust gases entering cabin C. To increase fuel efficiency D. To reduce noise	1	4	L2
35.	Why are torque links used in landing gear? A. To absorb shock B. To align wheels and prevent rotation C. To reduce drag D. To increase lift	1	4	L2
36.	If cabin air is not heating properly in a light aircraft, which system should be checked first? A. Fuel system B. Exhaust heating system C. Hydraulic system D. Landing gear system	1	4	L2
37.	An aircraft shows poor ground stability during taxi. What is the likely reason? A. Tricycle gear B. Conventional gear configuration C. Proper alignment D. Correct tire pressure	1	4	L2
38.	Which landing gear type is best for reducing drag during flight? A. Fixed gear B. Retractable gear C. Skid gear D. Float gear	1	4	L3

2024 SCHEME

39.	Design a safety procedure to prevent failure of landing gear during operation. Which step is MOST critical? A. Increase aircraft speed before landing B. Perform regular inspection of shock struts and linkages C. Avoid using landing gear frequently D. Reduce tire pressure	1	4	L3
40.	You are tasked with designing an improved cabin heating system. Which feature would BEST enhance safety and efficiency? A. Direct exhaust gases into cabin B. Use heat exchanger with separate airflow paths C. Increase fuel flow without control D. Remove temperature sensors	1	4	L4
41.	Aircraft fire protection systems consist of: A. Only extinguishing system B. Only detection system c) Detection and extinguishing systems D. Fuel and hydraulic systems	1	5	L1
42.	Which is commonly used fire-extinguishing agent in modern aircraft? A. Water B. Halon 1301 C. Sand D. Oxygen	1	5	L1
43.	Why are fire warning systems required to give both visual and audible signals? A. To reduce pilot workload B. To ensure immediate awareness of danger C. To save electrical power D. To reduce system cost	1	5	L1
44.	Why are continuous-loop detectors preferred in large aircraft? A. They are cheaper B. They cover larger areas effectively C. They consume less fuel D. They increase speed	1	5	L2
45.	A fire detection system activates due to rapid temperature rise. Which system is likely used? A. Thermal switch system B. Thermocouple system C. Smoke detector D. Pressure switch	1	5	L2
46.	During inspection, a technician finds low pressure in a deicing system. Which component should be checked first? A. Fuel pump B. Pressure regulator/reliever C. Landing gear D. Cabin heater	1	5	L2
47.	If a smoke detector fails to activate despite visible smoke, what is the likely cause? A. Excess airflow B. Fault in photoelectric or ionization sensor C. High fuel pressure D. Low engine thrust	1	5	L2
48.	A deicing boot inflates but does not deflate properly. What is the probable issue? A. Excess fuel B. Vacuum system failure C. Engine overheating D. Hydraulic leak	1	5	L3
49.	Design an improved ice protection system for high-altitude aircraft. Which feature is MOST critical? A. Use only manual inspection B. Combine electronic ice detection with automatic deicing/anti-icing C. Increase engine power D. Reduce wing size	1	5	L3
50.	Which of the following is the most extensive maintenance check to be performed on an aircraft? A. A-Check B. D-Check C. B-Check D. C-Check	1	5	L1

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Version: A

SJC INSTITUTE OF TECHNOLOGY

(An Autonomous Institute under VTU, Belagavi)

FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS

JUNE - JULY 2026

Course:	METAPHYSICAL SCIENCE		
Course Code:	BMP409	Branches: Common to all Branches	
Max Marks:	50	Duration:	1 Hour

INSTRUCTIONS TO THE CANDIDATES

1. Use only **Black ball point pen** for writing/ darkening the circle
2. Answer all the **fifty** questions, each question carries one mark.
3. For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the **OMR** sheet.
4. Darkening two circles for the same question makes the answer invalid.

Q. NO.	QUESTIONS	Marks	CO	RBTL
1.	Metaphysics is concerned with: A) Observable phenomena only B) Reality beyond physical world C) Engineering systems D) Biological systems	1	1	1
2.	Which philosopher called metaphysics “first philosophy”? A) Plato B) Aristotle C) Kant D) Hume	1	1	1
3.	Abstract entities include: A) Trees B) Numbers C) Rivers D) Mountains	1	1	1
4.	Plato is associated with: A) Empiricism B) Materialism C) Idealism D) Skepticism	1	1	1
5.	Cosmology deals with: A) Mind B) Knowledge C) Universe D) Ethics	1	1	1
6.	Epistemology deals with: A) Reality B) Knowledge C) Morality D) Space	1	1	1
7.	Why is there something rather than nothing?" is a key question categorized under: A) Epistemology B) Ethics C) Metaphysics D) Aesthetics	1	1	1
8.	Which branch studies “being and existence”? A) Epistemology B) Cosmology C) Ontology D) Ethics	1	1	1

9.	The question "How do we know?" belongs to: A) Ontology B) Cosmology C) Epistemology D) Logic	1	1	1
10.	Metaphysical inquiry into "moral values" seeks to understand: A) The chemical reactions in the brain. B) The nature of values as abstract entities. C) The legal code of a specific country. D) The history of warfare.	1	1	1
11.	Materialism claims that: A) Only mind exists B) Only matter exists C) Mind and matter are separate D) Universals are unreal	1	2	1
12.	Dualism holds that reality consists of: A) Only atoms B) Only ideas C) Mind and matter D) Only universals	1	2	1
13.	Coherence theory of truth focuses on: A) Practical results B) Logical consistency C) External facts D) Authority	1	2	1
14.	Which theory argues that reality is mentally constructed? A) Empiricism B) Skepticism C) Constructivism D) Rationalism	1	2	1
15.	Skepticism is the philosophical view that: A) Knowledge is certain B) Doubt is essential in inquiry C) Reality does not exist D) Only science provides truth	1	2	1
16.	In the "Problem of Universals," which position argues that general concepts or "universals" exist as real entities? A) Realism B) Nominalism C) Constructivism D) Skepticism	1	2	1
17.	The statement "Cogito, ergo sum" was proposed by: A) Locke B) Hume C) Descartes D) Kant	1	2	1
18.	Realism vs Nominalism relates to: A) Truth B) Universals C) Mind D) Energy	1	2	1
19.	Correspondence theory of truth means: A) Truth depends on beliefs B) Truth matches reality C) Truth is useful D) Truth is subjective	1	2	1
20.	Skepticism leads to: A) Blind belief B) Critical thinking C) Faith only D) Ignorance	1	2	1
21.	Philosophical cosmology primarily seeks to understand: A) The chemical composition of stars B) Mathematical laws governing galaxies C) Ultimate causes and meaning of the universe D) Technological methods of space observation	1	3	1
22.	Time and space are studied under: A) Ontology B) Cosmology C) Epistemology D) Biology	1	3	1
23.	Taoist cosmology originates from: A) India B) China C) Greece D) USA	1	3	1

24.	Fine-tuning refers to: A) Random universe B) Precise constants C) Evolution D) Chaos	1	3	1
25.	Multiverse theory suggests: A) One universe B) Multiple universes C) No universe D) Static universe	1	3	1
26.	Vedic cosmology is: A) Modern physics B) Ancient spiritual model C) Scientific law D) Mathematical model	1	3	1
27.	Who formalized the cosmological argument in medieval philosophy? A) Thomas Aquinas B) Immanuel Kant C) Socrates D) Bertrand Russell	1	3	1
28.	In cosmology, causality refers to: A) Random events B) Cause-and-effect relationships C) Mathematical equations D) Chemical bonding	1	3	1
29.	The idea that the universe has always existed is called: A) Creationism B) Eternalism C) Dualism D) Idealism	1	3	1
30.	The question "Why does the universe exist?" belongs to: A) Physical cosmology B) Astronomy C) Metaphysical cosmology D) Engineering physics	1	3	1
31.	Consciousness means: A) Awareness B) Matter C) Energy D) Motion	1	4	1
32.	Which theory states that mental states are identical to brain states? A) Behaviorism B) Identity Theory C) Dualism D) Idealism	1	4	1
33.	IIT stands for: A) Intelligent Info Theory B) Internal Info Theory C) Integrated Information Theory D) Intelligent Integrated Theory	1	4	1
34.	AI consciousness refers to: A) Brain B) Energy C) Machine awareness D) Motion	1	4	1
35.	AI consciousness debate asks: A) Can machines feel? B) Can machines think? C) Can machines move? D) Can machines store data?	1	4	1
36.	IIT measures consciousness by: A) Brain size B) Information integration C) Emotions D) Memory	1	4	1
37.	Consciousness plays an important role in: A) Only sleeping B) Decision-making and observation C) Chemical reactions D) Mechanical operations	1	4	1
38.	Western philosophy often views self as: A) Illusion B) Stable identity C) Energy D) Void	1	4	1
39.	Who is the main proponent of dualism? A) Aristotle B) René Descartes C) John Locke D) Karl Marx	1	4	1
40.	The mind is generally defined as: A) A physical organ only B) The seat of thoughts, emotions, and awareness C) A chemical substance D) A mathematical concept	1	4	1

41.	Entanglement refers to: A) Separation B) Connection between particles C) Energy loss D) Isolation	1	5	1
42.	Quantum healing, as proposed by Deepak Chopra, emphasizes: A) Only physical medicine B) Mind-body interaction in healing C) Surgery techniques D) Chemical reactions	1	5	1
43.	Chakras are: A) Organs B) Energy centers C) Cells D) Bones	1	5	1
44.	Energy medicine is based on the idea that: A) Only chemicals heal the body B) The body has energy fields that influence health C) Disease is purely genetic D) Only surgery can cure illness	1	5	1
45.	Which term is often associated with energy medicine? A) DNA replication B) Biofield C) Photosynthesis D) Gravity	1	5	1
46.	Quantum theory suggests consciousness: A) No role B) Static C) Mechanical D) Influences reality	1	5	1
47.	In scientific physics, "quantum" primarily refers to: A) Large-scale structures B) Subatomic particles and energy levels C) Human emotions D) Spiritual energy	1	5	1
48.	Observer effect shows: A) No change B) Measurement affects system C) Energy loss D) Stability	1	5	1
49.	Non-local healing suggests: A) Healing needs proximity B) Healing can occur at distance C) No healing D) Only physical healing	1	5	1
50.	The placebo effect occurs when: A) Medicine fails B) A patient improves due to belief in treatment C) Drugs are toxic D) Surgery is required	1	5	1

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Version: B



SJC INSTITUTE OF TECHNOLOGY
(An Autonomous Institute under VTU, Belagavi)
FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS
JUNE - JULY 2026

Course:	METAPHYSICAL SCIENCE		
Course Code:	BMP409	Branches: Common to all Branches	
Max Marks:	50	Duration:	1 Hour

INSTRUCTIONS TO THE CANDIDATES

1. Use only **Black ball point pen** for writing/ darkening the circle
2. Answer all the **fifty** questions, each question carries one mark.
3. For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the **OMR** sheet.
4. Darkening two circles for the same question makes the answer invalid.

Q. NO.	QUESTIONS	Marks	CO	RBTL
1.	Materialism claims that: A) Only mind exists B) Only matter exists C) Mind and matter are separate D) Universals are unreal	1	2	1
2.	Dualism holds that reality consists of: A) Only atoms B) Only ideas C) Mind and matter D) Only universals	1	2	1
3.	Coherence theory of truth focuses on: A) Practical results B) Logical consistency C) External facts D) Authority	1	2	1
4.	Which theory argues that reality is mentally constructed? A) Empiricism B) Skepticism C) Constructivism D) Rationalism	1	2	1
5.	Skepticism is the philosophical view that: A) Knowledge is certain B) Doubt is essential in inquiry C) Reality does not exist D) Only science provides truth	1	2	1
6.	In the "Problem of Universals," which position argues that general concepts or "universals" exist as real entities? A) Realism B) Nominalism C) Constructivism D) Skepticism	1	2	1
7.	The statement "Cogito, ergo sum" was proposed by: A) Locke B) Hume C) Descartes D) Kant	1	2	1
8.	Realism vs Nominalism relates to: A) Truth B) Universals C) Mind D) Energy	1	2	1

9.	Correspondence theory of truth means: A) Truth depends on beliefs B) Truth matches reality C) Truth is useful D) Truth is subjective	1	2	1
10.	Skepticism leads to: A) Blind belief B) Critical thinking C) Faith only D) Ignorance	1	2	1
11.	Philosophical cosmology primarily seeks to understand: A) The chemical composition of stars B) Mathematical laws governing galaxies C) Ultimate causes and meaning of the universe D) Technological methods of space observation	1	3	1
12.	Time and space are studied under: A) Ontology B) Cosmology C) Epistemology D) Biology	1	3	1
13.	Taoist cosmology originates from: A) India B) China C) Greece D) USA	1	3	1
14.	Fine-tuning refers to: A) Random universe B) Precise constants C) Evolution D) Chaos	1	3	1
15.	Multiverse theory suggests: A) One universe B) Multiple universes C) No universe D) Static universe	1	3	1
16.	Vedic cosmology is: A) Modern physics B) Ancient spiritual model C) Scientific law D) Mathematical model	1	3	1
17.	Who formalized the cosmological argument in medieval philosophy? A) Thomas Aquinas B) Immanuel Kant C) Socrates D) Bertrand Russell	1	3	1
18.	In cosmology, causality refers to: A) Random events B) Cause-and-effect relationships C) Mathematical equations D) Chemical bonding	1	3	1
19.	The idea that the universe has always existed is called: A) Creationism B) Eternalism C) Dualism D) Idealism	1	3	1
20.	The question "Why does the universe exist?" belongs to: A) Physical cosmology B) Astronomy C) Metaphysical cosmology D) Engineering physics	1	3	1
21.	Consciousness means: A) Awareness B) Matter C) Energy D) Motion	1	4	1
22.	Which theory states that mental states are identical to brain states? A) Behaviorism B) Identity Theory C) Dualism D) Idealism	1	4	1
23.	IIT stands for: A) Intelligent Info Theory B) Internal Info Theory C) Integrated Information Theory D) Intelligent Integrated Theory	1	4	1
24.	AI consciousness refers to: A) Brain B) Energy C) Machine awareness D) Motion	1	4	1

25.	AI consciousness debate asks: A) Can machines feel? B) Can machines think? C) Can machines move? D) Can machines store data?	1	4	1
26.	IIT measures consciousness by: A) Brain size B) Information integration C) Emotions D) Memory	1	4	1
27.	Consciousness plays an important role in: A) Only sleeping B) Decision-making and observation C) Chemical reactions D) Mechanical operations	1	4	1
28.	Western philosophy often views self as: A) Illusion B) Stable identity C) Energy D) Void	1	4	1
29.	Who is the main proponent of dualism? A) Aristotle B) René Descartes C) John Locke D) Karl Marx	1	4	1
30.	The mind is generally defined as: A) A physical organ only B) The seat of thoughts, emotions, and awareness C) A chemical substance D) A mathematical concept	1	4	1
31.	Entanglement refers to: A) Separation B) Connection between particles C) Energy loss D) Isolation	1	5	1
32.	Quantum healing, as proposed by Deepak Chopra, emphasizes: A) Only physical medicine B) Mind-body interaction in healing C) Surgery techniques D) Chemical reactions	1	5	1
33.	Chakras are: A) Organs B) Energy centers C) Cells D) Bones	1	5	1
34.	Energy medicine is based on the idea that: A) Only chemicals heal the body B) The body has energy fields that influence health C) Disease is purely genetic D) Only surgery can cure illness	1	5	1
35.	Which term is often associated with energy medicine? A) DNA replication B) Biofield C) Photosynthesis D) Gravity	1	5	1
36.	Quantum theory suggests consciousness: A) No role B) Static C) Mechanical D) Influences reality	1	5	1
37.	In scientific physics, "quantum" primarily refers to: A) Large-scale structures B) Subatomic particles and energy levels C) Human emotions D) Spiritual energy	1	5	1
38.	Observer effect shows: A) No change B) Measurement affects system C) Energy loss D) Stability	1	5	1
39.	Non-local healing suggests: A) Healing needs proximity B) Healing can occur at distance C) No healing D) Only physical healing	1	5	1

40.	The placebo effect occurs when: A) Medicine fails B) A patient improves due to belief in treatment C) Drugs are toxic D) Surgery is required	1	5	1
41.	Metaphysics is concerned with: A) Observable phenomena only B) Reality beyond physical world C) Engineering systems D) Biological systems	1	1	1
42.	Which philosopher called metaphysics "first philosophy"? A) Plato B) Aristotle C) Kant D) Hume	1	1	1
43.	Abstract entities include: A) Trees B) Numbers C) Rivers D) Mountains	1	1	1
44.	Plato is associated with: A) Empiricism B) Materialism C) Idealism D) Skepticism	1	1	1
45.	Cosmology deals with: A) Mind B) Knowledge C) Universe D) Ethics	1	1	1
46.	Epistemology deals with: A) Reality B) Knowledge C) Morality D) Space	1	1	1
47.	Why is there something rather than nothing?" is a key question categorized under: A) Epistemology B) Ethics C) Metaphysics D) Aesthetics	1	1	1
48.	Which branch studies "being and existence"? A) Epistemology B) Cosmology C) Ontology D) Ethics	1	1	1
49.	The question "How do we know?" belongs to: A) Ontology B) Cosmology C) Epistemology D) Logic	1	1	1
50.	Metaphysical inquiry into "moral values" seeks to understand: A) The chemical reactions in the brain. B) The nature of values as abstract entities. C) The legal code of a specific country. D) The history of warfare.	1	1	1

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Version: C



SJC INSTITUTE OF TECHNOLOGY
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FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS
JUNE - JULY 2026

Course:	METAPHYSICAL SCIENCE		
Course Code:	BMP409	Branches: Common to all Branches	
Max Marks:	50	Duration:	1 Hour

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1. Use only **Black ball point pen** for writing/ darkening the circle
2. Answer all the **fifty** questions, each question carries one mark.
3. For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the **OMR** sheet.
4. Darkening two circles for the same question makes the answer invalid.

Q. NO.	QUESTIONS	Marks	CO	RBTL
1.	Consciousness means: A) Awareness B) Matter C) Energy D) Motion	1	4	1
2.	Which theory states that mental states are identical to brain states? A) Behaviorism B) Identity Theory C) Dualism D) Idealism	1	4	1
3.	IIT stands for: A) Intelligent Info Theory B) Internal Info Theory C) Integrated Information Theory D) Intelligent Integrated Theory	1	4	1
4.	AI consciousness refers to: A) Brain B) Energy C) Machine awareness D) Motion	1	4	1
5.	AI consciousness debate asks: A) Can machines feel? B) Can machines think? C) Can machines move? D) Can machines store data?	1	4	1
6.	IIT measures consciousness by: A) Brain size B) Information integration C) Emotions D) Memory	1	4	1
7.	Consciousness plays an important role in: A) Only sleeping B) Decision-making and observation C) Chemical reactions D) Mechanical operations	1	4	1
8.	Western philosophy often views self as: A) Illusion B) Stable identity C) Energy D) Void	1	4	1
9.	Who is the main proponent of dualism? A) Aristotle B) René Descartes C) John Locke D) Karl Marx	1	4	1

10.	The mind is generally defined as: A) A physical organ only B) The seat of thoughts, emotions, and awareness C) A chemical substance D) A mathematical concept	1	4	1
11.	Entanglement refers to: A) Separation B) Connection between particles C) Energy loss D) Isolation	1	5	1
12.	Quantum healing, as proposed by Deepak Chopra, emphasizes: A) Only physical medicine B) Mind-body interaction in healing C) Surgery techniques D) Chemical reactions	1	5	1
13.	Chakras are: A) Organs B) Energy centers C) Cells D) Bones	1	5	1
14.	Energy medicine is based on the idea that: A) Only chemicals heal the body B) The body has energy fields that influence health C) Disease is purely genetic D) Only surgery can cure illness	1	5	1
15.	Which term is often associated with energy medicine? A) DNA replication B) Biofield C) Photosynthesis D) Gravity	1	5	1
16.	Quantum theory suggests consciousness: A) No role B) Static C) Mechanical D) Influences reality	1	5	1
17.	In scientific physics, "quantum" primarily refers to: A) Large-scale structures B) Subatomic particles and energy levels C) Human emotions D) Spiritual energy	1	5	1
18.	Observer effect shows: A) No change B) Measurement affects system C) Energy loss D) Stability	1	5	1
19.	Non-local healing suggests: A) Healing needs proximity B) Healing can occur at distance C) No healing D) Only physical healing	1	5	1
20.	The placebo effect occurs when: A) Medicine fails B) A patient improves due to belief in treatment C) Drugs are toxic D) Surgery is required	1	5	1
21.	Metaphysics is concerned with: A) Observable phenomena only B) Reality beyond physical world C) Engineering systems D) Biological systems	1	1	1
22.	Which philosopher called metaphysics "first philosophy"? A) Plato B) Aristotle C) Kant D) Hume	1	1	1

23.	Abstract entities include: A) Trees C) Rivers B) Numbers D) Mountains	1	1	1
24.	Plato is associated with: A) Empiricism C) Idealism B) Materialism D) Skepticism	1	1	1
25.	Cosmology deals with: A) Mind C) Universe B) Knowledge D) Ethics	1	1	1
26.	Epistemology deals with: A) Reality C) Morality B) Knowledge D) Space	1	1	1
27.	Why is there something rather than nothing?" is a key question categorized under: A) Epistemology C) Metaphysics B) Ethics D) Aesthetics	1	1	1
28.	Which branch studies "being and existence"? A) Epistemology C) Ontology B) Cosmology D) Ethics	1	1	1
29.	The question "How do we know?" belongs to: A) Ontology C) Epistemology B) Cosmology D) Logic	1	1	1
30.	Metaphysical inquiry into "moral values" seeks to understand: A) The chemical reactions in the brain. B) The nature of values as abstract entities. C) The legal code of a specific country. D) The history of warfare.	1	1	1
31.	Materialism claims that: A) Only mind exists C) Mind and matter are separate B) Only matter exists D) Universals are unreal	1	2	1
32.	Dualism holds that reality consists of: A) Only atoms C) Mind and matter B) Only ideas D) Only universals	1	2	1
33.	Coherence theory of truth focuses on: A) Practical results C) External facts B) Logical consistency D) Authority	1	2	1
34.	Which theory argues that reality is mentally constructed? A) Empiricism C) Constructivism B) Skepticism D) Rationalism	1	2	1
35.	Skepticism is the philosophical view that: A) Knowledge is certain C) Reality does not exist B) Doubt is essential in inquiry D) Only science provides truth	1	2	1
36.	In the "Problem of Universals," which position argues that general concepts or "universals" exist as real entities? A) Realism C) Constructivism B) Nominalism D) Skepticism	1	2	1
37.	The statement "Cogito, ergo sum" was proposed by: A) Locke C) Descartes B) Hume D) Kant	1	2	1
38.	Realism vs Nominalism relates to: A) Truth C) Mind B) Universals D) Energy	1	2	1

39.	Correspondence theory of truth means: A) Truth depends on beliefs B) Truth matches reality C) Truth is useful D) Truth is subjective	1	2	1
40.	Skepticism leads to: A) Blind belief B) Critical thinking C) Faith only D) Ignorance	1	2	1
41.	Philosophical cosmology primarily seeks to understand: A) The chemical composition of stars B) Mathematical laws governing galaxies C) Ultimate causes and meaning of the universe D) Technological methods of space observation	1	3	1
42.	Time and space are studied under: A) Ontology B) Cosmology C) Epistemology D) Biology	1	3	1
43.	Taoist cosmology originates from: A) India B) China C) Greece D) USA	1	3	1
44.	Fine-tuning refers to: A) Random universe B) Precise constants C) Evolution D) Chaos	1	3	1
45.	Multiverse theory suggests: A) One universe B) Multiple universes C) No universe D) Static universe	1	3	1
46.	Vedic cosmology is: A) Modern physics B) Ancient spiritual model C) Scientific law D) Mathematical model	1	3	1
47.	Who formalized the cosmological argument in medieval philosophy? A) Thomas Aquinas B) Immanuel Kant C) Socrates D) Bertrand Russell	1	3	1
48.	In cosmology, causality refers to: A) Random events B) Cause-and-effect relationships C) Mathematical equations D) Chemical bonding	1	3	1
49.	The idea that the universe has always existed is called: A) Creationism B) Eternalism C) Dualism D) Idealism	1	3	1
50.	The question "Why does the universe exist?" belongs to: A) Physical cosmology B) Astronomy C) Metaphysical cosmology D) Engineering physics	1	3	1

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Version: D



SJC INSTITUTE OF TECHNOLOGY
(An Autonomous Institute under VTU, Belagavi)
FOURTH SEMESTER B.E DEGREE SEMESTER END EXAMINATIONS
JUNE - JULY 2026

Course:	METAPHYSICAL SCIENCE		
Course Code:	BMP409	Branches: Common to all Branches	
Max Marks:	50	Duration:	1 Hour

INSTRUCTIONS TO THE CANDIDATES

1. Use only **Black ball point pen** for writing/ darkening the circle
2. Answer all the **fifty** questions, each question carries one mark.
3. For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the **OMR** sheet.
4. Darkening two circles for the same question makes the answer invalid.

Q. NO.	QUESTIONS	Marks	CO	RBTL
1.	Philosophical cosmology primarily seeks to understand: A) The chemical composition of stars B) Mathematical laws governing galaxies C) Ultimate causes and meaning of the universe D) Technological methods of space observation	1	3	1
2.	Time and space are studied under: A) Ontology B) Cosmology C) Epistemology D) Biology	1	3	1
3.	Taoist cosmology originates from: A) India B) China C) Greece D) USA	1	3	1
4.	Fine-tuning refers to: A) Random universe B) Precise constants C) Evolution D) Chaos	1	3	1
5.	Multiverse theory suggests: A) One universe B) Multiple universes C) No universe D) Static universe	1	3	1
6.	Vedic cosmology is: A) Modern physics B) Ancient spiritual model C) Scientific law D) Mathematical model	1	3	1
7.	Who formalized the cosmological argument in medieval philosophy? A) Thomas Aquinas B) Immanuel Kant C) Socrates D) Bertrand Russell	1	3	1
8.	In cosmology, causality refers to: A) Random events B) Cause-and-effect relationships C) Mathematical equations D) Chemical bonding	1	3	1

9.	The idea that the universe has always existed is called: A) Creationism B) Eternalism C) Dualism D) Idealism	1	3	1
10.	The question "Why does the universe exist?" belongs to: A) Physical cosmology B) Astronomy C) Metaphysical cosmology D) Engineering physics	1	3	1
11.	Consciousness means: A) Awareness B) Matter C) Energy D) Motion	1	4	1
12.	Which theory states that mental states are identical to brain states? A) Behaviorism B) Identity Theory C) Dualism D) Idealism	1	4	1
13.	IIT stands for: A) Intelligent Info Theory B) Internal Info Theory C) Integrated Information Theory D) Intelligent Integrated Theory	1	4	1
14.	AI consciousness refers to: A) Brain B) Energy C) Machine awareness D) Motion	1	4	1
15.	AI consciousness debate asks: A) Can machines feel? B) Can machines think? C) Can machines move? D) Can machines store data?	1	4	1
16.	IIT measures consciousness by: A) Brain size B) Information integration C) Emotions D) Memory	1	4	1
17.	Consciousness plays an important role in: A) Only sleeping B) Decision-making and observation C) Chemical reactions D) Mechanical operations	1	4	1
18.	Western philosophy often views self as: A) Illusion B) Stable identity C) Energy D) Void	1	4	1
19.	Who is the main proponent of dualism? A) Aristotle B) René Descartes C) John Locke D) Karl Marx	1	4	1
20.	The mind is generally defined as: A) A physical organ only B) The seat of thoughts, emotions, and awareness C) A chemical substance D) A mathematical concept	1	4	1
21.	Entanglement refers to: A) Separation B) Connection between particles C) Energy loss D) Isolation	1	5	1
22.	Quantum healing, as proposed by Deepak Chopra, emphasizes: A) Only physical medicine B) Mind-body interaction in healing C) Surgery techniques D) Chemical reactions	1	5	1
23.	Chakras are: A) Organs B) Energy centers C) Cells D) Bones	1	5	1
24.	Energy medicine is based on the idea that: A) Only chemicals heal the body B) The body has energy fields that influence health C) Disease is purely genetic D) Only surgery can cure illness	1	5	1

25.	Which term is often associated with energy medicine? A) DNA replication B) Biofield C) Photosynthesis D) Gravity	1	5	1
26.	Quantum theory suggests consciousness: A) No role B) Static C) Mechanical D) Influences reality	1	5	1
27.	In scientific physics, "quantum" primarily refers to: A) Large-scale structures B) Subatomic particles and energy levels C) Human emotions D) Spiritual energy	1	5	1
28.	Observer effect shows: A) No change B) Measurement affects system C) Energy loss D) Stability	1	5	1
29.	Non-local healing suggests: A) Healing needs proximity B) Healing can occur at distance C) No healing D) Only physical healing	1	5	1
30.	The placebo effect occurs when: A) Medicine fails B) A patient improves due to belief in treatment C) Drugs are toxic D) Surgery is required	1	5	1
31.	Metaphysics is concerned with: A) Observable phenomena only B) Reality beyond physical world C) Engineering systems D) Biological systems	1	1	1
32.	Which philosopher called metaphysics "first philosophy"? A) Plato B) Aristotle C) Kant D) Hume	1	1	1
33.	Abstract entities include: A) Trees B) Numbers C) Rivers D) Mountains	1	1	1
34.	Plato is associated with: A) Empiricism B) Materialism C) Idealism D) Skepticism	1	1	1
35.	Cosmology deals with: A) Mind B) Knowledge C) Universe D) Ethics	1	1	1
36.	Epistemology deals with: A) Reality B) Knowledge C) Morality D) Space	1	1	1
37.	Why is there something rather than nothing?" is a key question categorized under: A) Epistemology B) Ethics C) Metaphysics D) Aesthetics	1	1	1
38.	Which branch studies "being and existence"? A) Epistemology B) Cosmology C) Ontology D) Ethics	1	1	1

39.	The question "How do we know?" belongs to: A) Ontology B) Cosmology C) Epistemology D) Logic	1	1	1
40.	Metaphysical inquiry into "moral values" seeks to understand: A) The chemical reactions in the brain. B) The nature of values as abstract entities. C) The legal code of a specific country. D) The history of warfare.	1	1	1
41.	Materialism claims that: A) Only mind exists B) Only matter exists C) Mind and matter are separate D) Universals are unreal	1	2	1
42.	Dualism holds that reality consists of: A) Only atoms B) Only ideas C) Mind and matter D) Only universals	1	2	1
43.	Coherence theory of truth focuses on: A) Practical results B) Logical consistency C) External facts D) Authority	1	2	1
44.	Which theory argues that reality is mentally constructed? A) Empiricism B) Skepticism C) Constructivism D) Rationalism	1	2	1
45.	Skepticism is the philosophical view that: A) Knowledge is certain B) Doubt is essential in inquiry C) Reality does not exist D) Only science provides truth	1	2	1
46.	In the "Problem of Universals," which position argues that general concepts or "universals" exist as real entities? A) Realism B) Nominalism C) Constructivism D) Skepticism	1	2	1
47.	The statement "Cogito, ergo sum" was proposed by: A) Locke B) Hume C) Descartes D) Kant	1	2	1
48.	Realism vs Nominalism relates to: A) Truth B) Universals C) Mind D) Energy	1	2	1
49.	Correspondence theory of truth means: A) Truth depends on beliefs B) Truth matches reality C) Truth is useful D) Truth is subjective	1	2	1
50.	Skepticism leads to: A) Blind belief B) Critical thinking C) Faith only D) Ignorance	1	2	1