

II B.Tech II Semester Regular & Supple. Examinations, April-2026

Sub Code: R23CC2202

PROBABILITY & STATISTICS

Time: 3 hours

(CSE, IT, CSE(AIML), AI, AIML)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define Kurtosis.	1	1	2M
	b	Find the mode for the following data 2, 2, 3, 18, 20, 2.	2	1	2M
	c	Write the normal equations for fitting a parabola $y = a + bx + cx^2$.	1	2	2M
	d	Write the formula for rank correlation.	1	2	2M
	e	State total probability theorem.	1	3	2M
	f	What are the values of 1 and 2 standard deviations of normal distributions?	1	3	2M
	g	State central limit theorem.	1	4	2M
	h	A population consists of five numbers 2, 3, 10, 16, 20. Find the population mean.	1	4	2M
	i	Explain Type I and Type II errors.	1	5	2M
	j	Write any four attribute phrases to χ^2 -test.	1	5	2M

PART-B: Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No	Questions										KL	CO	M	
2	Unit-I													
	a	i) Write down the differences between the primary and secondary data?										3	1	5M
		ii) Calculate mean for the following frequency distribution										3	1	5M
		Class Interval	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40				
		Frequency	9	12	15	16	17	15	10	13				
	OR													
	b	i) Calculate Karl Pearson's coefficient of skewness for the following data:										4	1	5M
		X	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40				
		f	2	5	7	13	21	16	8	3				
		ii) Calculate the Variance and Standard Deviation of the following continuous frequency distribution										4	1	5M
Class		30-40	40-50	50-60	60-70	70-80	80-90	90-100						
frequency	3	7	12	15	8	3	2							
3	Unit-II													
	a	i)Use least-squares method to fit a curve of the form $y=a+bx$ to the data:										4	2	5M
		x	1	2	3	4	5							
		y	14	27	40	55	68							
		ii) Calculate the coefficient of correlation from the data given below:										4	2	5M
		x	4	6	8	10	12							
y	2	3	4	6	10									

	OR																																										
	i)Obtained the equation of the lines of regression from the following data													3	2	5M																											
	<table><tr><td>X</td><td>62</td><td>63</td><td>64</td><td>64</td><td>65</td><td>66</td><td>68</td><td>70</td></tr><tr><td>Y</td><td>64</td><td>65</td><td>61</td><td>69</td><td>67</td><td>68</td><td>71</td><td>65</td></tr></table>													X	62	63	64	64	65	66	68	70	Y	64	65	61	69	67	68	71	65												
X	62	63	64	64	65	66	68	70																																			
Y	64	65	61	69	67	68	71	65																																			
b	Fathers	65	63	67	64	68	62	70	66	68	67	69	71	ii)	3	2	5M																										
	Sons	68	66	68	65	69	66	68	65	71	67	68	70																														
A sample of 12 fathers and their elder sons gave the following data about their elder sons. Calculate the coefficient of rank correlation.																																											
	Unit-III																																										
4	a	i)In a bolt factory machines A, B, C manufacture 20%, 30%, and 50% of the total of their output and 6%, 3% and 2% are defective. A bolt is drawn at random and found to be defective. Find the probabilities that it is manufactured from (i) Machine A (ii)Machine B (iii)Machine C													3	3	5M																										
		ii) A problem of statistics is given to three students A, B and C whose chances of solving it are $\frac{1}{2}$, $\frac{3}{4}$ and $\frac{1}{4}$ respectively. What is the probability that the problem will be solved?													3	3	5M																										
	OR																																										
	b	i) In a normal distribution 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation.													3	3	5M																										
	ii) 20% of items produced from a factory are defective. Find the probability that in a sample of 5 chosen at random (i) none is defective (ii) $p(1<X<4)$ (iii) one is defective													3	3	5M																											
	Unit-IV																																										
5	a	i) A normal population has a mean of 0.1 and standard deviation 2.1. Find the probability that mean of a sample of size 900 will be negative.													3	4	5M																										
		ii) Three masses of means are measured as 62.34 kgs, 20.48 kgs, 35.97 kgs with S.D 0.54kgs, 0.21kgs, 0.46kgs. Find the mean and S.D of the sum of the masses.													3	4	5M																										
	OR																																										
	b	i) In a study of an automobile insurance a random sample of 80 body repair costs had a mean of ₹472.36 and the S.D of ₹62.35. If $\bar{x}$ is used as a point estimate to the true average repair costs, with what confidence we can assert that the maximum error doesn't exceed ₹10.													3	4	5M																										
		ii) A random sample of size 100 has a standard deviation of 5. What can you say about the maximum error with 95% confidence.													3	4	5M																										
	Unit-V																																										
6	a	i) The average marks scored by 32 boys is 72 with a S.D. of 8. While that for 36 girls is 70 with a S.D. of 6. Does this indicate that the boys perform better than girls at level of significance 0.05?													2	5	5M																										
		ii) In a random sample of 125 cool drinkers, 68 said they prefer thumsup to pepsi. Test the null hypothesis $P=0.5$ against the alternative hypothesis $P>0.5$.													2	5	5M																										
	OR																																										
		i) Two horses A and B were tested according to the time (in seconds) to run a particular track with the following results.													3	5	5M																										
	<table><tr><td>Horse A</td><td>28</td><td>30</td><td>32</td><td>33</td><td>33</td><td>29</td><td>34</td></tr><tr><td>Horse B</td><td>29</td><td>30</td><td>30</td><td>24</td><td>27</td><td>29</td><td>--</td></tr></table>													Horse A	28	30		32	33	33	29	34	Horse B	29	30	30	24	27	29	--													
Horse A	28	30	32	33	33	29	34																																				
Horse B	29	30	30	24	27	29	--																																				
Test whether the two horses have the same running capacity.																																											
b	ii) The following table gives the classification of 100 workers according to sex and nature of work. Test whether the nature of work is independent of the sex of the worker.													3	5	5M																											
	<table><tr><td></td><td>Stable</td><td>Unstable</td><td>Total</td></tr><tr><td>Males</td><td>40</td><td>20</td><td>60</td></tr><tr><td>Females</td><td>10</td><td>30</td><td>40</td></tr><tr><td>Total</td><td>50</td><td>50</td><td>100</td></tr></table>														Stable	Unstable	Total	Males	40	20	60	Females	10	30	40	Total	50	50	100														
	Stable	Unstable	Total																																								
Males	40	20	60																																								
Females	10	30	40																																								
Total	50	50	100																																								

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Regular & Supple. Examinations, April-2026

R23

Sub Code: R23CE2202

ENGINEERING GEOLOGY

Time: 3 hours

(CE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define engineering geology and discuss its importance in civil engineering.	K1	1	2M
	b	Name two of the Earth's atmospheric agents responsible for weathering.	K1	1	2M
	c	Define a mineral, a rock.	K1	2	2M
	d	Classify the different types of rocks.	K1	2	2M
	e	Explain the plunge of an anticline.	K2	3	2M
	f	List the different types of folds.	K1	3	2M
	g	Give the classification of various geophysical methods.	K1	4	2M
	h	Explain the Richter scale intensity.	K2	4	2M
	i	What is the Purpose of a Reservoir?	K1	5	2M
	j	Differentiate between a Dam and a Tunnel.	K1	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Highlight the importance of engineering geology in civil engineering works.	K1	1	5M
		How may the weathering of granitic rock in the foundation of a concrete dam create a construction problem?	K2	1	5M
	OR				
	b	i) How and at what stage of a river is an ox-bow lake formed?	K2	1	5M
		What is the main agent of biological weathering? Write how rocks are decomposed by biological weathering.	K2	1	5M
3	Unit-II				
	a	i) Enumerate the six main divisions of minerals based on their physical characteristics. Give a brief description of each division with examples.	K2	2	5M
		ii) Describe briefly the following rock types: granite, dolerite, limestone, marble, and schist.	K2	2	5M
	OR				
	b	i) What are the main rock-forming minerals? Describe their colour, crystal system, lustre, and hardness.	K2	2	5M

		ii) Describe briefly the following rock types: pegmatite, sandstone, conglomerate, marble, and phyllite.	K2	2	5M
4	Unit-III				
	a	i) Explain the following with diagrams: (a) Anticline and syncline (b) Fold axis	K2	3	5M
		ii) How do you detect a major fault in a site covered by overburden materials? What types of materials are likely to be present in a fault zone?	K2	3	5M
	OR				
	b	i) Explain the following with diagrams: (a) Axial plane of a fold (b) Plunge of an anticline	K2	3	5M
		ii) How do you identify folded strata? What are the prime problems that may be created by folded rocks when present in a gravity dam, tunnel, and hill slope?	K2	3	5M
5	Unit-IV				
	a	i) State the safety measures that are necessary to adopt to mitigate the disastrous effects of an earthquake.	K2	4	5M
		ii) Describe the seismic method of geophysical study. How does it help in the evaluation of subsurface geology?	K2	4	5M
	OR				
	b	i) What will be your approach to investigate an area affected by landslides to identify the causes of the slides?	K2	4	5M
		ii) Discuss the following geophysical techniques, briefly highlighting their importance. (a) Electrical resistivity method (b) Electromagnetic method	K2	4	5M
6	Unit-V				
	a	i) Describe in detail the different considerations that are required when selecting a dam site.	K2	5	5M
		ii) What are the important geological conditions of site investigation for tunnelling with regard to their safety and stability?	K2	5	5M
	OR				
	b	i) Give an account of the major types of dams and their functions. What is the distinction between a straight gravity dam and an arch gravity dam?	K2	5	5M
		ii) Comment on the problems and associated hazards of tunnelling in the following cases. (a) Normal and reverse faults (b) Strike direction of beds	K2	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Regular & Supple. Examinations, April-2026

Sub Code: R23CY2202 NUMBER THEORY & APPLICATIONS

Time: 3 hours

(CYBER SECURITY)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

R23

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Find the multiplication of $(101101)_2$ with 2^5 .	2	1	2M
	b	State well-ordering property.	1	1	2M
	c	Define linear congruence.	1	2	2M
	d	Interpret For which positive integers m the statement $27 \equiv 5 \pmod{m}$ is true.	2	2	2M
	e	State Euler's theorem.	1	3	2M
	f	Define perfect number.	1	3	2M
	g	If $a \equiv b \pmod{p}$, then prove $\left(\frac{a}{p}\right) = \left(\frac{b}{p}\right)$.	2	4	2M
	h	Define Germain prime and safe prime.	1	4	2M
	i	Define the terms data security and cryptography.	1	5	2M
	j	Explain Stream cipher.	2	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Find G. C. D. (45, 75) by using Euclidean algorithm. (ii) Find the G. C. D. of Fibonacci numbers 34 and 55 by using Euclidean algorithm.	3	1	10M
	OR				
	b	i) Summarize $(111010011100)_2$ from binary to hexa decimal notation (ii) Summarize $(ABCDEF)_{16}$, $(DEFACED)_{16}$ and $(9A0B)_{16}$ from hexadecimal to binary notation. ii) State well-ordering property.	4	1	7M
3	Unit-II				
	a	i) If a, b, c, d, and m are integers such that $m > 0$, $a \equiv b \pmod{m}$, and $c \equiv d \pmod{m}$, then show that (i) $a + c \equiv b + d \pmod{m}$, (ii) $a - c \equiv b - d \pmod{m}$, (iii) $ac \equiv bd \pmod{m}$. ii) Find all solutions of $9x \equiv 12 \pmod{15}$.	3	2	5M
	OR				
	b	Solve $x \equiv 1 \pmod{2}$, $x \equiv 2 \pmod{3}$, $x \equiv 3 \pmod{5}$ using Chinese Remainder theorem.	3	2	10M
4	Unit-III				
	a	i) State and prove Wilson's theorem. ii) Illustrate $\sigma(5^3)$, $\tau(5^3)$, $\sigma(200)$ and $\tau(200)$.	2	3	5M
			4	3	5M

	OR				
	b	Explain Round-Robin tournament and set up a Round-Robin tournament schedule for 7 teams.	3	3	10 M
5	Unit-IV				
	a	i) State and explain the Law of Quadratic Reciprocity.	2	4	5M
		ii) What are pseudo primes? Explain with an example based on Fermat's Little Theorem.	2	4	5M
	OR				
	b	If p and 2p+1 are both odd primes, then show the integer $(-1)^{\left(\frac{p-1}{2}\right)}$ is a prime root of 2p+1.	3	4	10M
6	Unit-V				
	a	i) Illustrate $3^{135} \bmod 7$.	4	5	5M
		ii) Explain public key cryptography, write the advantages and disadvantages.	2	5	5M
	OR				
	b	Distinguish between stream ciphers and block ciphers.	5	5	10M

KL: Blooms Taxonomy Knowledge Level
Marks

CO: Course Outcome

M:

II B.Tech II Semester Regular & Supple. Examinations, April-2026

R23

Sub Code: R23DS2201 STATISTICAL METHODS FOR DATA SCIENCE

Time: 3 hours

(DS)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define Exploratory Data Analysis (EDA).	K1	1	2M
	b	Name two types of probability distributions and give one example for each.	K1	1	2M
	c	What is a parametric confidence interval?	K1	2	2M
	d	Name the test used for comparing the means of two related groups.	K1	2	2M
	e	What is the difference between linear and curvilinear regression?	K2	3	2M
	f	Mention two types of regression models used for non-linear relationships.	K1	3	2M
	g	What are the main components of a time series?	K1	4	2M
	h	Name any two methods used to identify a secular trend in time series analysis.	K1	4	2M
	i	What type of problem is logistic regression typically used to solve?	K1	5	2M
	j	What is the key difference between linear regression and logistic regression?	K2	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Explain the differences between discrete and continuous probability distributions. Give one example of each.	K2	1	5M
		ii) Describe three types of charts used in data visualization and state one use case for each.	K2	1	5M
	OR				
	b	i) What is a scatter plot, and how can it help in understanding data relationships? Illustrate with an example.	K2	1	5M
		ii) Explain the characteristics of a normal distribution and why it is important in statistics.	K3	1	5M
3	Unit-II				
	a	i) Explain the main steps involved in hypothesis testing.	K2	2	5M
		ii) Describe the concept of a T-test and when it is used in hypothesis testing.	K3	2	5M
	OR				
	b	i) What is meant by 'choosing a statistic' in the context of hypothesis testing? Give an example.	K1	2	5M
		ii) Explain the importance of pairwise comparisons and provide a scenario where they would be applied.	K2	2	5M

4	Unit-III																																		
	a	i) Explain the concept of multiple linear regression and how it differs from simple linear regression.						K3	3	5M																									
		ii) Describe the role of categorical explanatory variables in multiple regression and how they are incorporated in the model.						K3	3	5M																									
	OR																																		
	b	i) Fit a parabola to the following data						K2	3	5M																									
		X	0	1	2	3	4																												
		Y	1	1.8	1.3	2.5	6.3																												
		ii) Fit a curve of the form $y = a \cdot e^{bx}$						K2	3	5M																									
		X	1	5	7	9	12																												
		Y	10	15	12	15	21																												
Unit-IV																																			
a	i) Explain the significance of time series analysis in business and economics.						K2	4	5M																										
	ii) Describe the method of moving averages and how it is used to identify trends.						K3	4	5M																										
5	OR																																		
	b	i) Assuming that the trend is absent, find the seasonal indices for the following data:						K2	4	5M																									
		<table><tr><td>Year</td><td>I</td><td>II</td><td>III</td><td>IV</td></tr><tr><td>2002</td><td>3.7</td><td>4.1</td><td>3.3</td><td>3.5</td></tr><tr><td>2003</td><td>3.7</td><td>3.9</td><td>3.6</td><td>3.6</td></tr><tr><td>2004</td><td>4.0</td><td>4.1</td><td>3.3</td><td>3.1</td></tr><tr><td>2005</td><td>3.3</td><td>4.4</td><td>4.0</td><td>4.0</td></tr></table>					Year				I	II	III	IV	2002	3.7	4.1	3.3	3.5	2003	3.7	3.9	3.6	3.6	2004	4.0	4.1	3.3	3.1	2005	3.3	4.4	4.0	4.0	
		Year	I	II	III	IV																													
		2002	3.7	4.1	3.3	3.5																													
		2003	3.7	3.9	3.6	3.6																													
		2004	4.0	4.1	3.3	3.1																													
		2005	3.3	4.4	4.0	4.0																													
		ii) Calculate the 5 yearly moving averages for the following data						K2	4	5M																									
		<table><tr><td>Year</td><td>1950</td><td>1951</td><td>1952</td><td>1953</td><td>1954</td><td>1955</td><td>1956</td></tr><tr><td>Values</td><td>105</td><td>115</td><td>100</td><td>90</td><td>80</td><td>95</td><td>85</td></tr></table>									Year	1950	1951	1952	1953	1954	1955	1956	Values	105	115	100	90	80	95	85									
Year		1950	1951	1952	1953	1954	1955				1956																								
Values	105	115	100	90	80	95	85																												
Unit-V																																			
6	a	i) Explain the basic setup of logistic regression and how it models classification problems.						K3	5	5M																									
		ii) How do you interpret the coefficients and results in a logistic regression model? Provide an example.						K4	5	5M																									
	OR																																		
b	i) Discuss how logistic regression models can be compared and evaluated.						K3	5	5M																										

		Mention any two evaluation metrics.			
		ii) Describe how logistic regression can be used for classification tasks. Include an example scenario.	K3	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

* * *

II B.Tech II Semester Regular & Supple. Examinations, April-2026

Sub Code: R23EC2202

LINEAR CONTROL SYSTEMS

Time: 3 hours

(ECE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

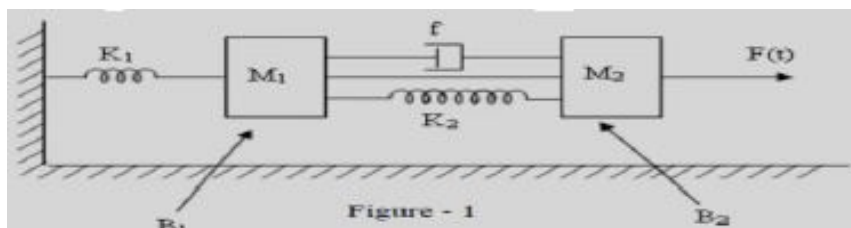
Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Describe the concept of an open-loop control system and provide an example	K2	1	2M
	b	State the transfer function of a rotational mechanical system and discuss its key parameters	K2	1	2M
	c	What is the time response and steady-state error in control systems?	K1	2	2M
	d	Write the mathematical expression for a parabolic signal	K2	2	2M
	e	What are the necessary conditions for stability in a control system?	K1	3	2M
	f	Discuss the concept of asymptotes in the root locus plot	K1	3	2M
	g	Define the terms of bode plots and polar plots	K1	4	2M
	h	What are the merits of frequency domain analysis	K1	4	2M
	i	Define the term Controllability	K2	5	2M
	j	What is phase variable form	K1	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	i) State and explain the Mason's gain formula	K2	1	5M
		ii) Derive the transfer function and develop the block diagram of controlled DC servo motor.	K3	1	5M
		OR			
	b	i) Explain the construction and operating principle of synchronous transmitter with neat diagrams	K3	1	5M
		ii) Design the force voltage analogy & force-current analogy circuit and develop the transfer function of the mechanical system shown in below figure	K3	1	5M



3	Unit-II				
	a	i) Derive expressions for time domain specifications of a second-order system	K2	2	5M
		ii) Demonstrate the relationship between steady-state error and error constants.	K2	2	5M
	OR				
	b	i) Obtain the time response of a first order system for a unit step input and plot its response.	K2	2	5M
ii) Explain the importance of characteristic equation		K3	2	5M	
4	Unit-III				
	a	i) Differentiate Qualitative Stability & Conditional Stability	K2	3	5M
		ii) Draw the root locus. Find the range of values of K for which the system is stable. Find all the closed loop poles corresponding to a damping ratio of 0.7	K2	3	5M
	OR				
	b	i) Explain the construction rules for root locus technique	K3	3	5M
ii) Determine the stability of the closed loop system with $G(s)H(s)=\frac{K(s+1)}{(s^2+4s+8)}$ using Root locus plot. Hence, determine the value of K such that the damping factor is 0.866.		K3	3	5M	
5	Unit-IV				
	a	i) Sketch the Bode plot and determine the Gain margin and phase margin For the transfer function is given $G(s)=\frac{10}{s(1+0.4s)(1+0.1s)}$	K3	4	5M
		ii) State and explain the Nyquist stability criterion	K2	4	5M
	OR				
	b	i) Derive the relation between phase margin and damping ratio	K2	4	5M
ii) Explain about correlation between time & frequency response		K3	4	5M	
6	Unit-V				
	a	i) State and prove the properties of State Transition matrix.	K2	5	5M
		ii) Explain the procedure to obtain state model from transfer function	K3	5	5M
	OR				
	b	i) Explain about similarity transformation and diagonalization	K3	5	5M
ii) Determine the state model of the system characterized by the differential equation $(s^4+2s^2+8s^3+4s+3)Y(s)=10U(s)$		K2	5	5M	

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Regular & Supple. Examinations, April-2026

Sub Code: R23EE2202

ANALOG CIRCUITS

Time: 3 hours

(EEE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	What are the classifications of amplifiers?	K2	CO1	2M
	b	What is power amplifiers?	K1	CO1	2M
	c	Draw the circuit of low pass RC circuit?	K1	CO2	2M
	d	What is meant by clipping circuit?	K1	CO2	2M
	e	What is meant by inverting amplifier?	K1	CO3	2M
	f	What is an instrumentation amplifier?	K1	CO3	2M
	g	Draw the functional diagram of 555 timer?	K2	CO4	2M
	h	What is Mono stable multi vibrators?	K2	CO4	2M
	i	What is the merits of active filters?	K1	CO5	2M
	j	What are the different types of ADC's?	K1	CO5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Write the basic principle of Feedback amplifiers?	K4	CO1	5M
		ii) Explain the voltage amplifier?	K5	CO1	5M
	OR				
	b	i) Explain the characteristics of negative feedback amplifiers?	K3	CO1	5M
		ii) Develop the expressions for input and output resistances of current shunt feedback amplifier?	K5	CO1	5M
3	Unit-II				
	a	Explain the RC network as a differentiator and an integrator?	K4	CO2	10M
	OR				
	b	Discuss the i) Emitter coupled clipper ii) High –pass RC circuits	K4	CO2	10M
4	Unit-III				
	a	i) Explain the Characteristics of Op-Amps?	K2	CO3	5M
		ii) Discuss the Ideal and practical Op-Amps?	K2	CO3	5M

	OR				
	b	i) Explain the V to I and I to V converters?	K2	CO3	5M
		ii) Explain the log and Anti log amplifiers?	K2	CO3	5M
5	Unit-IV				
	a	Briefly explain the Bi stable and astable multi vibrators using Op-Amp?	K3	CO4	10M
	OR				
	b	Explain about Mono stable Multi vibrator using 555 timer in detail?	K2	CO4	10M
6	Unit-V				
	a	i) Discuss the LPF, HPF filters?	K2	CO5	5M
		ii) Explain the R-2R ladder DAC?	K2	CO5	5M
	OR				
	b	i) Discuss the Successive approximation ADC?	K4	CO5	5M
		ii) Explain the parallel Comparator type ADC?	K2	CO5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Regular & Supple. Examinations, April-2026

R23

Sub Code: R23ME2202 COMPLEX VARIABLES, PROBABILITY & STATISTICS

Time: 3 hours

(ME)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define entire function and given an example of an entire function.	K1	1	2M
	b	Write the Cauchy's integral formula.	K1	1	2M
	c	What is the difference between zeros and singularities?	K2	2	2M
	d	Define the radius of convergence.	K1	2	2M
	e	Define probability.	K1	3	2M
	f	Describe Discrete and continuous random variables through examples.	K2	3	2M
	g	Define population and sample.	K1	4	2M
	h	Briefly explain the concept of sampling distribution of means.	K2	4	2M
	i	What do you mean by null and alternative hypothesis.	K1	5	2M
	j	When we prefer to use the one tailed test and when we use the two tailed test.	K2	5	2M

PART-B: Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	$ f'(z) ^2 = \begin{vmatrix} \frac{\partial u}{\partial x} & \frac{\partial u}{\partial y} \\ \frac{\partial v}{\partial x} & \frac{\partial v}{\partial y} \end{vmatrix}$ i) If $f(z) = u + iv$ is analytic, then show that	K3	1	5M
		ii) Evaluate $\int_c (z^2 + 3z) dz$ along the straight lines from (2, 0) to (2, 2) and then from (2, 2) to (0, 2). Is the integral independent of path? Justify your answer.	K3	1	5M
	OR				
	b	i) Find the analytic function $f(z) = u + iv$ by Milne-Thomson method, given $v = 2xy + x$	K3	1	5M
		ii) Evaluate $\oint_c z ^2 dz$ around the square with vertices at (0, 0), (1, 0), (1, 1), (0, 1).	K3	1	5M
3	Unit-II				
	a	i) Determine the poles of the following function and the residue at each pole $\frac{z^2 + 1}{z^2 - 2z}$	K3	2	5M
		ii) Find the Taylor's series expansion of $f(z) = \frac{1}{z^2 - z - 6}$, about $z = 1$.	K3	2	5M

	OR										
	b	$f(z) = \frac{z+1}{(z^2-16)(z+2)}$							K3	2	5M
		i) Determine the residues at the poles of the function									
		ii) Find the Laurent series of $f(z) = z^2 e^{1/z}$ about the point $z_0 = 0$.							K3	2	5M
4	Unit-III										
		i) If the probability density function $f(x) = k(x+3)$ in $(2, 8)$, determine (a) $P(3 < x < 5)$; (b) $P(x \geq 4)$.							K3	3	5M
	a	ii) The probability of a man hitting a target is $1/3$. (a) if he fires 5 times, what is the probability of his hitting the target at least twice? (b) How many times must he fire so that the probability of his hitting the target at least once is more than 90%?							K3	3	5M
	OR										
		i) A player tosses 3 fair coins. He wins Rs.500 if 3 heads occur, Rs.300 if 2 heads occur, Rs.100 if one head occurs. On the other hand, he loses Rs.1500 if 3 tails occur. Find the value of the game to the player. Is it favourable?							K3	3	5M
	b	ii) A distributor of bean seeds determines from extensive tests that 5% of large batch of seeds will not germinate. He sells the seeds in packets of 200 and guarantees 90% germination. Determine the probability that a particular packet will violate the guarantee.							K3	3	5M
5	Unit-IV										
	a	A sample of size two are taken from the population 3,6,9,15,27 without replacement. Find a)Mean of the population b) Variance of the population c) Mean of sampling distribution of means d) Variance of sampling distribution of means							K3	4	10 M
	OR										
		i) construct a 99% confidence interval for the true mean weight loss if 16 persons on diet control after one month had a mean weight loss of 3.42 kgs with s.d of 0.68 kgs							K3	4	5M
	b	ii) Using the mean of a random sample of size 150 to estimate the mean mechanical aptitude of mechanics of a large work shop and assuming $\sigma = 6.2$, what can we assert with 0.99 probability about the maximum size of the error.							K3	4	5M
6	Unit-V										
		i) Past experience shows that 40% of Indian youth favored 'cricket'. If in a random sample of 15 Indian youth, 8 favoured cricket, is there reason to believe that the proportion of Indian youth favoring cricket today has increased. Use 0.05 L.O.S.							K3	5	5M
	a	ii) Producer of 'gutkha' claims that the nicotine content in 'gutkha' on the average is 1.83 mg. Can this claim be accepted if a random sample of 8 'gutkhas' of this type have the nicotine contents of 2.0, 1.7, 2.1, 1.9, 2.2, 2.1, 2.0, 1.6 mg?							K3	5	5M
	OR										
	b	Use 0.05 level of significance to test that the following data may be treated as a random sample from a normal population							K3	5	10 M
		Class	5.0-8.9	9.0-12.9	13.0-16.9	17.0-20.9	21.0-24.9	25.0-28.9	29.0-32.9	Total	
		Frequency	3	10	14	25	17	9	2	80	

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Regular & Supple. Examinations, April-2026

R23

Sub Code: R23CC2204

DATABASE MANAGEMENT SYSTEMS

Time: 3 hours

(CSE, IT, CYS, CSE(AIML), AI, DS, AIML)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	List any two drawbacks of file systems.	2	1	2M
	b	What is the difference between entity and entity set?	2	1	2M
	c	Differentiate between relational calculus and relational algebra.	2	2	2M
	d	What is the difference between candidate key and super key?	2	2	2M
	e	Show the syntax on select statement in SQL.	1	3	2M
	f	List the aggregate operations in SQL.	1	3	2M
	g	What is a functional dependency?	1	4	2M
	h	List the properties of decomposition?	1	4	2M
	i	What is a schedule?	1	5	2M
	j	What is a Log file?	1	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) What is data independence? Why is it needed? Explain the types of data independence?	2	1	5M
		ii) Explain the concept of aggregation, generalization and specialization with an example.	3	1	5M
	OR				
	b	i) Write the advantages of using a DBMS and the capabilities that a good DBMS should possess.	2	1	5M
		ii) Explain the purpose of the ER Diagrams and describe how the Entities, Attributes and Relations are represented with an example.	3	1	5M
3	Unit-II				
	a	i) How do we convert ER to Relational Model? Explain with an example?	3	2	5M
		ii) Consider the following schema: - Suppliers (sid : integer, sname : string, address : string) - Parts (pid : integer, pname : string, color : string) - Catalog (sid : integer, pid : integer, cost : real) Write the following queries in Relational Algebra. - Find the name of suppliers who supply some red parts - Find the sids of suppliers who supply some red or green parts - Find the sids of suppliers who supply some red part or are at 221 packer Ave	3	2	5M

	OR				
	b	i) Explain about Integrity Constraints and Enforcing Integrity Constraints.	2	2	5M
		ii) The following is the Pubs Database Schema: - author(author id, first name, last name) - author pub(author id, pub id, author position) - book(book id, book title, month, year, editor) - pub(pub id, title, book id) Write the following queries in Relational Calculus. - List all the books - Which authors authored a pub that was published in July? - How many authors are not book editors?	3	2	5M
4	Unit-III				
	a	i) Using the following schema: - PROJECT (Projectnum, Project Name, Project Type, Project Manager) - EMPLOYEE (Empnum, Empname) - ASSIGNED_TO (Projectnum, Empnum) Represent the following queries in SQL - Find Employee details working on a project name starts with 'L' - List all the employee details who are working under project manager "Clevee" - List the employees who are still not assigned with any project. iv. List the employees who are working in more than one project.	3	3 3	10 M
	OR				
	b	i) What is a View? How is it different from a Table? Explain different types of Views.	4	3	5M
		ii) Explain types of joins in SQL? Explain with an example.	3	3	5M
5	Unit-IV				
	a	i) Discuss insertion, deletion, and modification anomalies. Why are they considered bad? Illustrate with examples.	3	4	5M
		ii) What is Fourth normal form? When is it violated? When is it typically applicable?	4	4	5M
	OR				
	b	i) Discuss 1NF and 2NF with examples	3	4	5M
ii) Define Fifth normal form and explain why it is called project-join normal form?		3	4	5M	
6	Unit-V				
	a	i) Explain different types of locks that can be applied in brief.	2	5	5M
		ii) Explain how serializability is used for concurrency control with suitable example.	4	5	5M
	OR				
	b	i) What are the desirable ACID properties of transaction? Explain	2	5	4M
ii) Create a B+ tree to insert the following key elements (order of the tree is 4) 5, 3, 4, 9, 7, 15, 14, 21, 22, 23		3	5	6M	

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Regular & Supple. Examinations, April-2026

R23

Sub Code: R23CE2204

STRUCTURAL ANALYSIS

Time: 3 hours

(CE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

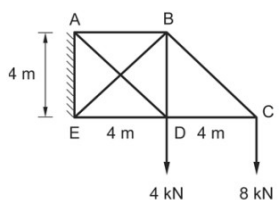
PART-A

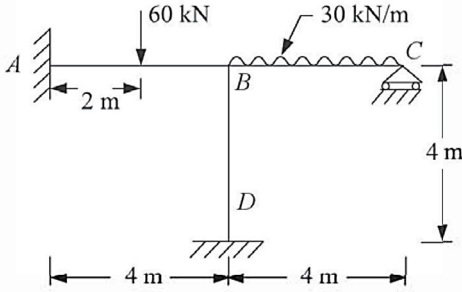
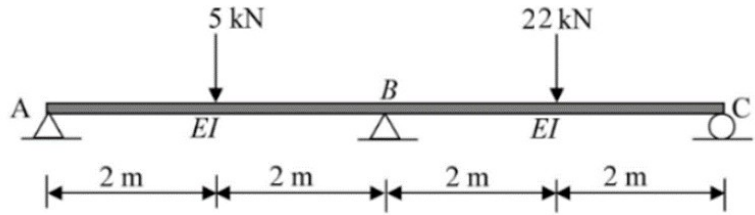
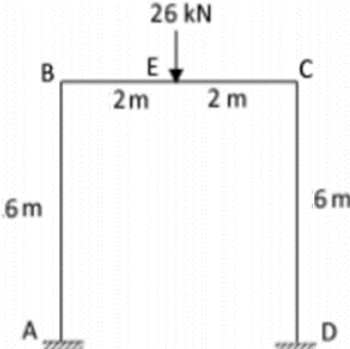
Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define strain energy and explain the unit of strain energy	K2	1	2M
	b	State Castigliano's First Theorem.	K2	1	2M
	c	What is static indeterminacy?	K2	2	2M
	d	Define internal and external indeterminacy.	K2	2	2M
	e	What is the effect of sinking of a support in fixed beams?	K2	3	2M
	f	Draw the SFD for a fixed beam with UDL over the entire span.	K2	3	2M
	g	Write the slope-deflection equation for a beam AB with constant EI.	K2	4	2M
	h	State the assumptions in slope-deflection method.	K2	4	2M
	i	Define distribution factor?	K2	5	2M
	j	Briefly discuss stiffness factor in MDM?	K2	5	2M

PART-B: Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	i) Derive the expression for strain energy stored in a beam due to bending.	K2	1	5M
		ii) Using Castigliano's First Theorem, determine the deflection at the free end of a cantilever beam of length L carrying a point load P at the free end.	K3	1	5M
		OR			
	b	i) Derive the expression for strain energy stored in a prismatic bar subjected to axial load.	K2	1	5M
		ii) A simply supported beam is loaded with a UDL. Determine the central deflection using strain energy method.	K3	1	5M
3		Unit-II			
	a	i) Explain the method of calculating strain energy for a statically indeterminate truss.	K2	2	10M
		OR			
	b	i) Determine the redundant force in a truss using strain energy method.	K2	2	5M
		ii) Find the forces in the members of the truss shown in Figure.2. The axial rigidities are the same for all the members.	K3	2	5M



4	Unit-III				
	a	i) Explain the effect of the sinking of support in a two-span fixed beam with an example.	K2	3	5M
		ii) A continuous beam ABC is supported at A, B and C. $AB = 4\text{m}$, $BC = 4\text{m}$. A UDL of 10 kN/m is applied over AB. Analyze using the three-moment equation.	K3	3	5M
	OR				
	b	i) Draw SFD and BMD for a fixed beam subjected to two-point loads.	K2	3	5M
		ii) A fixed beam of span 6 m carries a uniformly distributed load of 10 kN/m over the whole span. Calculate the fixing moments.	K3	3	5M
5	Unit-IV				
	a	i) Derive slope-deflection equations for a beam with one fixed end and another settled by δ .	K2	4	5M
		ii) Analyze a beam with supports A and B, $AB = 4\text{ m}$, and UDL of 5 kN/m , using the slope-deflection method.	K3	4	5M
	OR				
	b	Using the slope-deflection method, analyze a frame as shown in figure 3 	K3	4	10M
6	Unit-V				
	a	i) Analyze a beam with one end fixed and other simply supported under a point load using MDM.	K3	5	5M
		ii) Calculate the moment at B for the two-span continuous beam ABC, shown in Figure. 4. EI is constant. (Moment distribution method).  Figure. 4	K3	5	5M
	OR				
	b	Analyse the following frame shown in Figure 5 by using the moment distribution method and draw BMD. Assume EI is constant. 	K3	5	10M

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II B.Tech II Semester Regular & Supple. Examinations, April-2026

R23

Sub Code: R23EC2204

ELECTRONIC CIRCUIT ANALYSIS

Time: 3 hours

(ECE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Describe the effect of transistor internal capacitances on amplifier frequency response.	K2	1	2M
	b	Compare common source and common drain FET amplifiers.	K2	1	2M
	c	Sketch the circuit of Darlington pair amplifier.	K3	2	2M
	d	Interpret the advantages of using a cascode amplifier in multistage configurations?	K2	2	2M
	e	Draw the block diagram of voltage-series feedback amplifier.	K3	3	2M
	f	Discuss the impact of feedback on the input resistance of an amplifier.	K2	3	2M
	g	Compare Hartley and Colpitt's oscillator configurations	K2	4	2M
	h	Discuss the role of positive feedback in an oscillator.	K2	4	2M
	i	Interpret the advantages of Class B push-pull amplifier.	K2	5	2M
	j	Discuss the role of heat sinks in power amplifiers	K2	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Analyze the effect of short circuit current gain with frequency in a CE amplifier.	K4	1	5M
		ii) Analyze the frequency response of a CE amplifier using the hybrid- π model.	K4	1	5M
	OR				
	b	i) Explain the operation of a common source FET amplifier at high frequencies	K2	1	5M
		ii) Analyze the effect of the Miller capacitance on the frequency response in a CE amplifier.	K4	1	5M
3	Unit-II				
	a	i) Analyze a two-stage RC coupled amplifier and derive the expression for its overall voltage gain.	K4	2	5M
		ii) Analyze the input impedance effect on boot-strap emitter follower circuit	K4	2	5M
	OR				
	b	i) Analyse the effect of cascading on amplifier bandwidth	K4	2	5M
		ii) Design a Darlington pair amplifier such that the overall current gain is approximately 10,000, given that each transistor has $\beta = 100$. Also find the input resistance of the pair	K3	2	5M

4	Unit-III					
	a	i)Discuss the stability criteria in feedback amplifiers.	K2	3	5M	
		ii) Analyze the effect of noise in feedback amplifiers.	K4	3	5M	
	OR					
	b	i) Develop the expression for sensitivity in feedback amplifiers.	K3	3	5M	
ii) A voltage-series feedback amplifier has open loop gain $A=1000$ and feedback factor $\beta=0.01$. (a) Calculate the closed loop gain. (b) If the open loop gain changes by 20%, estimate the percentage change in the closed loop gain.		K3	3	5M		
5	Unit-IV					
	a	i) Explain the operation of a Colpitt's oscillator and derive its frequency of oscillation.	K3	4	5M	
		ii) Design a Wien bridge oscillator with a frequency of 10 kHz. (a) Given that all resistors R and capacitors C are equal, find the relationship between R and C. (b) What is the minimum amplifier gain needed for oscillations?	K3	4	5M	
		OR				
	b	i) Explain the operation of RC phase shift oscillator and derive its frequency of oscillation.	K3	4	5M	
ii)Analyze the criteria for getting oscillations. Also Derive its expression.		K3	4	5M		
6	Unit-V					
	a	i) Analyze the operation of a Class A power amplifier and derive the expression for its efficiency.	K4	5	5M	
		ii) A Class-A power amplifier is biased with $V_{CC} = 12\text{ V}$ $I_{CQ} = 50\text{mA}$. (a) Calculate the maximum theoretical collector efficiency. (b) Calculate the maximum peak output voltage swing across a load $R_L=5\text{k}\Omega$.	K3	5	5M	
		OR				
		b	i) Analyze the small signal response of a single tuned amplifier circuit.	K4	5	5M
ii) Describe staggered tuned amplifiers and explain how they improve bandwidth.	K3		5	5M		

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Regular & Supple. Examinations, April-2026

Sub Code: R23EE2204 INDUCTION & SYNCHRONOUS MACHINES

Time: 3 hours

(EEE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	What is slip in an induction motor?	K1	1	2M
	b	List any two differences between cage rotor and slip ring rotor.	K1	1	2M
	c	Write the condition for maximum torque in an induction motor.	K1	2	2M
	d	What is crawling in an induction motor?	K1	2	2M
	e	Why is a single-phase induction motor not self-starting?	K1	3	2M
	f	State any two applications of shaded pole motors.	K1	3	2M
	g	List any two differences between salient and non-salient pole rotors.	K2	4	2M
	h	Define Pitch factor of a synchronous machine.	K1	4	2M
	i	What is a synchronous condenser?	K1	5	2M
	j	Write the expression for power developed in a synchronous motor.	K1	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Explain the construction and working of a squirrel cage induction motor.	K2	1	5M
		ii) Derive the expression for rotor frequency in terms of slip.	K3	1	5M
	OR				
	b	i) Describe how a rotating magnetic field is produced in a 3-phase stator.	K3	1	5M
		ii) A 20 kW, 6 pole, 400 V, 50 Hz, 3 Phase induction motor has a full load slip of 0.02. If the torque lost in mechanical losses is 20 Nm, find the rotor ohmic losses, motor input and efficiency. Stator losses are 900 watts.	K3	1	5M
3	Unit-II				
	a	i) Derive the torque-slip characteristic of an induction motor and explain the nature of the curve.	K2	2	5M
		ii) Explain the construction of the circle diagram and how it is used to predict motor performance.	K2	2	5M
	OR				
	b	i) Explain how speed control is achieved using V/f control method. Mention its advantages.	K2	2	5M
		ii) A 415 V, 29.8 kW, 50 Hz, delta connected motor gave the following test data: No-load: 415 V, 21 A, 1250 W Locked-rotor test: 100 V, 45 A, 2730 W. Construct the circle diagram and determine i) The line current and power factor for rated output ii) The maximum torque iii) Slip iv) Efficiency. Assume stator and rotor cu losses equal at standstill.	K3	2	5M

4	Unit-III				
	a	i) Explain the construction and operation of AC series motor? What are the differences between AC series motor and DC series motor?	K2	3	5M
		ii) Draw the equivalent circuit of a single-phase induction motor and explain each component.	K3	3	5M
	OR				
	b	i) With the help of a diagram, explain the working of a capacitor start-capacitor run motor.	K2	3	5M
		ii) Describe the construction and working of shaded pole motor with the help of a neat diagram.	K3	3	5M
5	Unit-IV				
	a	i) Derive the EMF equation of an alternator.	K3	4	5M
		ii) Explain the differences between distributed winding and concentrated winding.	K2	4	5M
	OR				
	b	i) A 500 kVA, 1,100 V, 50 Hz star connected 3-phase alternator has armature resistance per phase of 0.1Ω and synchronous reactance per phase of 1.5Ω . Find its voltage for (i) 0.9 pf lag and (ii) 0.8 pf lead. Also find the voltage regulation in each case.	K3	4	5M
		ii) Describe the synchronous impedance method for voltage regulation.	K3	4	5M
6	Unit-V				
	a	i) Explain the working principle of a synchronous motor with a neat sketch.	K2	5	5M
		ii) What are the differences between synchronous motor and induction motor?	K2	5	5M
	OR				
	b	i) Explain hunting in a synchronous motor. What are its effects and how is it suppressed?	K2	5	5M
		ii) Write short notes on (a) Synchronous speed (b) Power factor control using synchronous motor	K2	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Regular & Supple. Examinations, April-2026

R23

Sub Code: R23ME2204 FLUID MECHANICS & HYDRAULIC MACHINES

Time: 3 hours

(ME)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Differentiate compressible and incompressible fluids. Give suitable examples	K1	1	2M
	b	Define centre of pressure and total pressure force	K2	1	2M
	c	What are the assumptions of the Bernoulli's equations?	K3	2	2M
	d	Define stream function and streak line?	K2	2	2M
	e	What is boundary layer and boundary layer theory?	K2	3	2M
	f	State the advantages of Dimensional and model analysis.	K1	3	2M
	g	Discuss the need of draft tube for turbine.	K2	4	2M
	h	Define speed ratio and jet ratio	K2	4	2M
	i	Define unit speed of a turbine.	K1	5	2M
	j	When does negative slip occur?	K1	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) The space between two square flat parallel plates is filled with oil. Each side of the plate is 60 cm. The thickness of the oil film is 12.5 mm. The upper plate, which moves at 2.5 m/s requires a force of 98.1 N to maintain the speed. Determine (a) dynamic viscosity of the oil in poise. (b) kinematic viscosity of the oil in stokes if the specific gravity of the oil is 0.95.	K2	1	5M
		ii) Determine the total pressure force on a circular plane of 1.5 diameter which is placed vertically in water in such way that the centre of plane is 3m below the free water surface. Find the position of centre of pressure also.	K3	1	5M
	OR				
	b	i). Calculate the capillary rise in a glass tube of 2.5mm diameter when immersed vertically in water and mercury. Take the surface tension 0.07N/m for water and 0.52N/m for mercury in contact with air, the specific gravity for mercury is 13.6 and angle of contact is 130°	K3	1	5M
		ii) Derive an expression for total pressure force and centre of pressure when a body is immersed vertically in to containing water in the container	K4	1	5M
3	Unit-II				
	a	The water is flowing through a pipe having a diameter 20cm and 10cm at the section 1 and 2 respectively. The weight of flow through the pipe is 35m/sec the section 1 is above the datum and 4m above the datum above at section 2.	K3	2	10M

		if the pressure at section 1 is 39.24N/m ² find the intensity of pressure at section 2.			
	OR				
	b	i) The main pipe is divides into two parallel pipes which again forms as one pipe the length and diameters for first parallel pipe are 2000m and 1m respectively. While the length and diameter of 2nd parallel pipe are 2000m and 0.8m. Find the rate of flow in each parallel pipe if rate of flow in the main is 3 m ³ /sec but coefficient of friction of each parallel pipe is same as 0.005 ii) A pipe of 300mm dia conveying 0.3m ³ /sec of water as a right-angled bent in a horizontal plane find the resultant force exerted on the bent. If the pressure at inlet and outlet are 24.525N/cm ² and 23.544 N/cm ² .	K2	2	5M
4		Unit-III			
	a	i). The velocity distribution in the boundary layer is given by $u = 2 \left(\frac{y}{\delta} \right) - \left(\frac{y}{\delta} \right)^2$, δ being boundary layer thickness. Calculate the following: a) Displacement thickness, and b) Momentum thickness, ii) List the criteria for selecting repeating variable in this dimensional analysis?	K4	3	5M
		OR			
	b	i) Check whether the following equation is dimensionally homogeneous. $T = 2\pi\sqrt{L/g}$ ii) Explain in detail about characteristics of a boundary layer along with thin plate and factors affecting boundary layer thickness.	K3	3	5M
		Unit-IV			
5	a	i) Derive the expression for force exerted by the jet on (a) Stationary vertical plate (b) Stationary inclined plate ii) A Pelton wheel has a mean bucket speed of 10 m/s with a jet of water flowing at the rate of 700 lps under a head of 30 m. The buckets deflect the jet through an angle of 160°. Identify the power given by the water to the runner and the hydraulic efficiency of the turbine. Assume coefficient of velocity as 0.98	K2	4	5M
		OR			
	b	A Kaplan turbine runner is to be designed to develop 7357 KW shaft power. The net available head is 5.50m. Assume that the speed ratio is 2.09 and flow ratio is 0.68 and the overall efficiency is 60%. The diameter of the boss is 1/3rd of the diameter of the runner. Find the diameter of the runner, its speed and its specific speed	K3	4	10M
		Unit-V			
6	a	The cylinder bore diameter of a single acting reciprocating pump is 150mm and its stroke is 300mm. The pump runs at 50r.p.m and lifts water through a height of 25m. The delivery pipe is 22 m long and 100mm in diameter. Find the theoretical discharge and the theoretical power required to run the pump. if the actual discharge is 4.2 liters/sec, find the percentage slip. Also determine the acceleration head at the beginning and middle of the delivery stroke.	K3	5	10M
		OR			
	b	i) How can you classify centrifugal pumps ii) Explain the working principle of hydraulic ram with neat sketch.	K2	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Regular & Supple. Examinations, April-2026

Sub Code: R23CC2201 MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS

Time: 3 hours

(CE, CSE, ECE, EEE, CYS)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define law of demand. Write Its determinants.	K1	1	2M
	b	Write about the significance of managerial economics.	K3	1	2M
	c	Distinguish between Isoquants and Isocosts.	K4	2	2M
	d	Write about cost behavior.	K3	2	2M
	e	Define monopolistic competition. List the features of monopolistic competition.	K1	3	2M
	f	Classify pricing methods.	K4	3	2M
	g	Define working capital. List the sources of short-term and long-term working capital.	K1	4	2M
	h	An investor made an investment of \$500 and got \$570 next year. Calculate the internal rate of return on the investment.	K5	4	2M
	i	Define capital structure. List the key components of capital structure.	K1	5	2M
	j	Explain about double entry book keeping.	K3	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Describe the scope and nature of managerial economics.	K2	1	5M
		ii) Explain the types of elasticity.	K3	1	5M
	OR				
	b	i) Analyze the relationship between managerial economics, financial management and management.	K4	1	5M
		ii) List the methods of demand forecasting. Write about qualitative methods of demand forecasting.	K1	1	5M
3	Unit-II				
	a	i) Explain about cost concepts.	K3	2	5M
		ii) Define break even analysis. List the benefits of break-even analysis.	K1	2	5M
	OR				
	b	i) You are requested to report to top management of ABC Co. the point of sales in terms of ₹ volume to break even. For the purpose, you are provided: i) Fixed overhead remain constant at ₹ 12000 ii) Variable cost will rise from zero to ₹12000 iii) Selling Price is ₹ 600 per ton. iv) The tonnage produced and sold 30 ton.	K5	2	5M
		ii) Explain three factor Cobb-Douglas production function?	K3	2	5M

4	Unit-III																			
	a	i) Explain various forms of business organizations.	K3	3	5M															
		ii) Explain about types of markets.	K3	3	5M															
	OR																			
	b	i) Identify pricing techniques. Examine the effectiveness of dynamic pricing technique in automobile sector.	K4	3	5M															
ii) Illustrate price output determination in oligopoly market.		K4	3	5M																
5	Unit-IV																			
	a	i) Explain capital budgeting techniques.	K3	4	5M															
		ii) List the components of working capital. Estimate working capital requirements.	K3	4	5M															
	OR																			
	b	i) XYZ project requires an initial investment of \$ 2000 and it is expected to generate a cash flow of \$ 100 for 3 years plus \$ 12500 in the third year. The target rate of return of the project is 10% per annum. Calculate the net present value of the project.	K5	4	5M															
		ii) XYZ Company is considering investing in a project that requires an initial investment of \$100,000 for some machinery. There will be net inflows of \$20,000 for the first two years, \$10,000 in years three and four, and \$30,000 in year five. Finally, the machine has a salvage value of \$25,000. Calculate ARR.	K5	4	5M															
6	Unit-V																			
	a	i) Briefly explain types of liquidity ratios with uses.	K3	5	5M															
		ii) Define trial balance. List the errors that affect trial balance? Write about solving trial balance problems.	K1	5	5M															
	OR																			
	b	i) Describe the importance financial accounting conventions. Write the key differences between accounting concepts and conventions.	K3	5	5M															
		ii) From the following particulars calculate the liquidity ratios (a) current ratio, (b) Quick Ratio or Acid-test Ratio And (c) net working capital ratio.			5	5M														
		<table><tr><th>Particulars</th><th>Amount</th></tr><tr><td>Inventory</td><td>140000</td></tr><tr><td>Sundry Debtors</td><td>280000</td></tr><tr><td>Cash</td><td>50000</td></tr><tr><td>Bills receivable</td><td>20000</td></tr><tr><td>Creditors</td><td>300000</td></tr><tr><td>Bank Overdraft</td><td>50000</td></tr></table>		Particulars	Amount		Inventory	140000	Sundry Debtors	280000	Cash	50000	Bills receivable	20000	Creditors	300000	Bank Overdraft	50000		
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II B.Tech II Semester Regular & Supple. Examinations, April-2026

R23

Sub Code: R23CC2208

OPTIMIZATION TECHNIQUES

Time: 3 hours

(IT, CSE (AIML), AI, DS, AIML)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q. No		Questions	KL	CO	M
1	a	Define optimization problem.	K1	CO1	2M
	b	Distinguish between constrained and unconstrained optimization problems.	K2	CO1	2M
	c	What is a feasible solution in Linear Programming?	K1	CO2	2M
	d	State any two advantages of the Simplex method.	K2	CO2	2M
	e	Explain the concept of a balanced transportation problem.	K2	CO3	2M
	f	List the methods used to obtain initial feasible solution in transportation problems.	K1	CO3	2M
	g	Define nonlinear programming problem.	K1	CO4	2M
	h	Explain the idea of steepest descent method.?	K2	CO4	2M
	i	State Bellman's principle of optimality.	K1	CO5	2M
	j	Explain multistage decision process in dynamic programming.	K2	CO5	2M

PART-B: Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q. No		Questions	KL	CO	M
2		Unit-I			
	a	Determine the stationary points and identify whether they correspond to maximum or minimum values for the function $f(x) = 2x^3 - 9x^2 + 12x + 1$	K3	CO1	10M
		OR			
3	b	Apply the Kuhn-Tucker conditions to determine the optimal solution of Minimize $f(x_1, x_2) = x_1^2 + x_2^2$ subject to $x_1 + x_2 \geq 4, x_1, x_2 \geq 0$	K4	K4	10M
		Unit-II			
	a	Solve the following Linear Programming Problem using the Graphical Method. Maximize $Z = 4x_1 + 3x_2$ Subject to the constraints $x_1 + x_2 \leq 5, 2x_1 + x_2 \leq 8, x_1 + 3x_2 \leq 9, x_1, x_2 \geq 0$ a) Convert the problem into standard form. b) Draw the feasible region. c) Determine the optimal solution and maximum value of Z.	K3	CO2	10M
		OR			
	b	Solve the following Linear Programming Problem using the Simplex Method. Maximize $Z = 5x_1 + 4x_2$ Subject to $2x_1 + x_2 \leq 8, x_1 + 2x_2 \leq 10, x_1 + x_2 \leq 6, x_1, x_2 \geq 0$ a) Convert the LPP into standard form.	K3	CO2	10M

		b) Construct the initial simplex table. c) Perform pivot operations and determine the optimal solution.																																	
4	Unit-III																																		
	a	The transportation cost per unit from three warehouses to four retail stores is given below. <table><tr><td>Warehouse</td><td>D1</td><td>D2</td><td>D3</td><td>D4</td><td>Supply</td></tr><tr><td>W1</td><td>8</td><td>6</td><td>10</td><td>9</td><td>20</td></tr><tr><td>W2</td><td>9</td><td>12</td><td>13</td><td>7</td><td>30</td></tr><tr><td>W3</td><td>14</td><td>9</td><td>16</td><td>5</td><td>25</td></tr><tr><td>Demand</td><td>10</td><td>25</td><td>20</td><td>20</td><td></td></tr></table> a) Find the Initial Basic Feasible Solution using the North-West Corner Rule. b) Obtain another Initial Basic Feasible Solution using Vogel's Approximation Method (VAM). c) Compare the transportation cost obtained from both methods.	Warehouse	D1	D2	D3	D4	Supply	W1	8	6	10	9	20	W2	9	12	13	7	30	W3	14	9	16	5	25	Demand	10	25	20	20		K3	CO3	10M
	Warehouse	D1	D2	D3	D4	Supply																													
	W1	8	6	10	9	20																													
W2	9	12	13	7	30																														
W3	14	9	16	5	25																														
Demand	10	25	20	20																															
OR																																			
b	A company must transport goods from three factories to three distribution centres. The transportation cost per unit is given below. <table><tr><td>Factory</td><td>D1</td><td>D2</td><td>D3</td><td>Supply</td></tr><tr><td>F1</td><td>6</td><td>4</td><td>1</td><td>50</td></tr><tr><td>F2</td><td>3</td><td>8</td><td>7</td><td>40</td></tr><tr><td>F3</td><td>4</td><td>6</td><td>5</td><td>60</td></tr><tr><td>Demand</td><td>30</td><td>70</td><td>50</td><td></td></tr></table> a) Obtain an Initial Basic Feasible Solution using the Least Cost Method. b) Test the obtained solution for optimality using the MODI (u-v) method. c) Determine the optimal transportation schedule and minimum transportation cost.	Factory	D1	D2	D3	Supply	F1	6	4	1	50	F2	3	8	7	40	F3	4	6	5	60	Demand	30	70	50		K4	CO3	10M						
Factory	D1	D2	D3	Supply																															
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F2	3	8	7	40																															
F3	4	6	5	60																															
Demand	30	70	50																																
5	Unit-IV																																		
	a	Using the Fibonacci Search Method, determine the minimum value of $f(x)=x^2-6x+10$ in the interval (0,5),n=5 and take k=2 Perform the required Fibonacci iterations and determine the approximate value of x at which the function attains its minimum.	K3	CO4	10M																														
	OR																																		
	b	Minimize the function $f(x_1,x_2)=x_1^2+x_2^2-4x_1-6x_2+13$ using the Steepest Descent Method starting from the initial point $(x_1,x_2)=(0,0)$ Find the search direction, step size, and next approximation point.	K3	CO4	10M																														
6	Unit-V																																		
	a	Use Dynamic Programming (Tabular Method) to solve the following problem. Maximize $Z=3x_1+5x_2$ subject to $x_1+2x_2\leq 6$, $x_2\leq 3$, $x_1,x_2\geq 0$. Formulate the problem as a multistage decision process, construct the stage tables, and determine the optimal values of x_1 and x_2 and the maximum value of Z.	K3	CO5	10M																														
	OR																																		
	b	A company has 10 units of resources to allocate between two activities. The return from allocating x units of resources to each activity is given by: $f_1(x)=x^2$ $f_2(x)=3x$ Using Dynamic Programming (Calculus Method): a) Formulate the problem as a two-stage decision process. b) Apply the principle of optimality to determine the optimal allocation of resources. c) Find the maximum total return.	K3	CO5	10M																														

II B.Tech II Semester Regular & Supple. Examinations, April-2026

R23

Sub Code: R23ME2201

INDUSTRIAL MANAGEMENT

Time: 3 hours

(ME)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Mention two characteristics of Theory X.	K1	1	2M
	b	Name two quantitative tools used in industrial engineering.	K1	1	2M
	c	What are the main differences between batch production and mass production?	K2	2	2M
	d	What is MTM, and how does it help in standardizing work processes?	K2	2	2M
	e	When would you use an X and R chart over an X and S chart?	K2	3	2M
	f	What is ISO 9001, and why is it important for quality management systems?	K2	3	2M
	g	How is the Internal Rate of Return (IRR) calculated, and what does it indicate?	K2	4	2M
	h	What is the Net Present Value (NPV) method, and why is it considered reliable?	K2	4	2M
	i	What are the main types of job evaluation methods?	K1	5	2M
	j	What are the main steps involved in the implementation of value engineering?	K2	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Differentiate between production management and industrial engineering.	K3	1	5M
		ii) Define management. Discuss the core functions of management, including planning, organizing, staffing, leading, and controlling, with suitable examples.	K2	1	5M
	OR				
	b	i) Explain about Taylor's scientific management	K3	1	5M
		ii) Compare process layout and product layout. Discuss their advantages, disadvantages	K3	1	5M
3	Unit-II				
	a	i) Explain the different types of production systems: batch production, mass production, and job production. Discuss their key characteristics, advantages, disadvantages, and applications with examples.	K3	2	10M
	OR				

	b	i) What is work study? Discuss the role of method study and time study in improving productivity and efficiency in manufacturing.	K2	2	5M
		ii) Explain Therbligs as a work measurement tool. How are they used to analyze manual work and improve efficiency?	K2	2	5M
4	Unit-III				
	a	i) What is quality control and explain X chart with example	K2	3	10M
	OR				
	b	i) What are quality circles? Discuss their importance in employee involvement and continuous improvement.	K3	3	5M
		ii) What is Six Sigma? Discuss its definition, basic concepts, and importance in reducing defects and improving process capability.	K2	3	5M
5	Unit-IV				
	a	i) Compare and contrast fixed capital and working capital. Discuss their importance in ensuring smooth business operations.	K4	4	5M
		ii) What is financial management? Discuss its scope, nature, and importance in business decision-making.	K3	4	5M
	OR				
	b	i) What is capital budgeting? Discuss its significance in long-term investment decisions and financial planning	K3	4	5M
		ii) Explain NPV as investment evaluation methods.	K4	4	5M
6	Unit-V				
	a	Explain the HRM key functions in industrial Management and summarize its importance.	K3	5	10M
	OR				
	b	What is Enterprise Resource Planning (ERP)? Discuss its goals, components, and importance in modern business management.	K2	5	10M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Regular & Supple. Examinations, April-2026

Sub Code: R23CC2201 MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS

Time: 3 hours

(CE, CSE, ECE, EEE, CYS)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define law of demand. Write Its determinants.	K1	1	2M
	b	Write about the significance of managerial economics.	K3	1	2M
	c	Distinguish between Isoquants and Isocosts.	K4	2	2M
	d	Write about cost behavior.	K3	2	2M
	e	Define monopolistic competition. List the features of monopolistic competition.	K1	3	2M
	f	Classify pricing methods.	K4	3	2M
	g	Define working capital. List the sources of short-term and long-term working capital.	K1	4	2M
	h	An investor made an investment of \$500 and got \$570 next year. Calculate the internal rate of return on the investment.	K5	4	2M
	i	Define capital structure. List the key components of capital structure.	K1	5	2M
	j	Explain about double entry book keeping.	K3	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Describe the scope and nature of managerial economics.	K2	1	5M
		ii) Explain the types of elasticity.	K3	1	5M
	OR				
	b	i) Analyze the relationship between managerial economics, financial management and management.	K4	1	5M
		ii) List the methods of demand forecasting. Write about qualitative methods of demand forecasting.	K1	1	5M
3	Unit-II				
	a	i) Explain about cost concepts.	K3	2	5M
		ii) Define break even analysis. List the benefits of break-even analysis.	K1	2	5M
	OR				
	b	i) You are requested to report to top management of ABC Co. the point of sales in terms of ₹ volume to break even. For the purpose, you are provided: i) Fixed overhead remain constant at ₹ 12000 ii) Variable cost will rise from zero to ₹12000 iii) Selling Price is ₹ 600 per ton. iv) The tonnage produced and sold 30 ton.	K5	2	5M
		ii) Explain three factor Cobb-Douglas production function?	K3	2	5M

4	Unit-III																			
	a	i) Explain various forms of business organizations.	K3	3	5M															
		ii) Explain about types of markets.	K3	3	5M															
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	b	i) Identify pricing techniques. Examine the effectiveness of dynamic pricing technique in automobile sector.	K4	3	5M															
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5	Unit-IV																			
	a	i) Explain capital budgeting techniques.	K3	4	5M															
		ii) List the components of working capital. Estimate working capital requirements.	K3	4	5M															
	OR																			
	b	i) XYZ project requires an initial investment of \$ 2000 and it is expected to generate a cash flow of \$ 100 for 3 years plus \$ 12500 in the third year. The target rate of return of the project is 10% per annum. Calculate the net present value of the project.	K5	4	5M															
		ii) XYZ Company is considering investing in a project that requires an initial investment of \$100,000 for some machinery. There will be net inflows of \$20,000 for the first two years, \$10,000 in years three and four, and \$30,000 in year five. Finally, the machine has a salvage value of \$25,000. Calculate ARR.	K5	4	5M															
6	Unit-V																			
	a	i) Briefly explain types of liquidity ratios with uses.	K3	5	5M															
		ii) Define trial balance. List the errors that affect trial balance? Write about solving trial balance problems.	K1	5	5M															
	OR																			
	b	i) Describe the importance financial accounting conventions. Write the key differences between accounting concepts and conventions.	K3	5	5M															
		ii) From the following particulars calculate the liquidity ratios (a) current ratio, (b) Quick Ratio or Acid-test Ratio And (c) net working capital ratio.			5	5M														
		<table><tr><th>Particulars</th><th>Amount</th></tr><tr><td>Inventory</td><td>140000</td></tr><tr><td>Sundry Debtors</td><td>280000</td></tr><tr><td>Cash</td><td>50000</td></tr><tr><td>Bills receivable</td><td>20000</td></tr><tr><td>Creditors</td><td>300000</td></tr><tr><td>Bank Overdraft</td><td>50000</td></tr></table>		Particulars	Amount		Inventory	140000	Sundry Debtors	280000	Cash	50000	Bills receivable	20000	Creditors	300000	Bank Overdraft	50000		
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II B.Tech II Semester Regular & Supple. Examinations, April-2026

R23

Sub Code: R23CC2208

OPTIMIZATION TECHNIQUES

Time: 3 hours

(IT, CSE (AIML), AI, DS, AIML)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q. No		Questions	KL	CO	M
1	a	Define optimization problem.	K1	CO1	2M
	b	Distinguish between constrained and unconstrained optimization problems.	K2	CO1	2M
	c	What is a feasible solution in Linear Programming?	K1	CO2	2M
	d	State any two advantages of the Simplex method.	K2	CO2	2M
	e	Explain the concept of a balanced transportation problem.	K2	CO3	2M
	f	List the methods used to obtain initial feasible solution in transportation problems.	K1	CO3	2M
	g	Define nonlinear programming problem.	K1	CO4	2M
	h	Explain the idea of steepest descent method.?	K2	CO4	2M
	i	State Bellman's principle of optimality.	K1	CO5	2M
	j	Explain multistage decision process in dynamic programming.	K2	CO5	2M

PART-B: Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q. No		Questions	KL	CO	M
2		Unit-I			
	a	Determine the stationary points and identify whether they correspond to maximum or minimum values for the function $f(x) = 2x^3 - 9x^2 + 12x + 1$	K3	CO1	10M
		OR			
3	b	Apply the Kuhn-Tucker conditions to determine the optimal solution of Minimize $f(x_1, x_2) = x_1^2 + x_2^2$ subject to $x_1 + x_2 \geq 4, x_1, x_2 \geq 0$	K4	K4	10M
		Unit-II			
	a	Solve the following Linear Programming Problem using the Graphical Method. Maximize $Z = 4x_1 + 3x_2$ Subject to the constraints $x_1 + x_2 \leq 5, 2x_1 + x_2 \leq 8, x_1 + 3x_2 \leq 9, x_1, x_2 \geq 0$ a) Convert the problem into standard form. b) Draw the feasible region. c) Determine the optimal solution and maximum value of Z.	K3	CO2	10M
		OR			
	b	Solve the following Linear Programming Problem using the Simplex Method. Maximize $Z = 5x_1 + 4x_2$ Subject to $2x_1 + x_2 \leq 8, x_1 + 2x_2 \leq 10, x_1 + x_2 \leq 6, x_1, x_2 \geq 0$ a) Convert the LPP into standard form.	K3	CO2	10M

		b) Construct the initial simplex table. c) Perform pivot operations and determine the optimal solution.																																	
4	Unit-III																																		
	a	The transportation cost per unit from three warehouses to four retail stores is given below. <table><tr><td>Warehouse</td><td>D1</td><td>D2</td><td>D3</td><td>D4</td><td>Supply</td></tr><tr><td>W1</td><td>8</td><td>6</td><td>10</td><td>9</td><td>20</td></tr><tr><td>W2</td><td>9</td><td>12</td><td>13</td><td>7</td><td>30</td></tr><tr><td>W3</td><td>14</td><td>9</td><td>16</td><td>5</td><td>25</td></tr><tr><td>Demand</td><td>10</td><td>25</td><td>20</td><td>20</td><td></td></tr></table> a) Find the Initial Basic Feasible Solution using the North-West Corner Rule. b) Obtain another Initial Basic Feasible Solution using Vogel's Approximation Method (VAM). c) Compare the transportation cost obtained from both methods.	Warehouse	D1	D2	D3	D4	Supply	W1	8	6	10	9	20	W2	9	12	13	7	30	W3	14	9	16	5	25	Demand	10	25	20	20		K3	CO3	10M
	Warehouse	D1	D2	D3	D4	Supply																													
	W1	8	6	10	9	20																													
W2	9	12	13	7	30																														
W3	14	9	16	5	25																														
Demand	10	25	20	20																															
OR																																			
b	A company must transport goods from three factories to three distribution centres. The transportation cost per unit is given below. <table><tr><td>Factory</td><td>D1</td><td>D2</td><td>D3</td><td>Supply</td></tr><tr><td>F1</td><td>6</td><td>4</td><td>1</td><td>50</td></tr><tr><td>F2</td><td>3</td><td>8</td><td>7</td><td>40</td></tr><tr><td>F3</td><td>4</td><td>6</td><td>5</td><td>60</td></tr><tr><td>Demand</td><td>30</td><td>70</td><td>50</td><td></td></tr></table> a) Obtain an Initial Basic Feasible Solution using the Least Cost Method. b) Test the obtained solution for optimality using the MODI (u-v) method. c) Determine the optimal transportation schedule and minimum transportation cost.	Factory	D1	D2	D3	Supply	F1	6	4	1	50	F2	3	8	7	40	F3	4	6	5	60	Demand	30	70	50		K4	CO3	10M						
Factory	D1	D2	D3	Supply																															
F1	6	4	1	50																															
F2	3	8	7	40																															
F3	4	6	5	60																															
Demand	30	70	50																																
5	Unit-IV																																		
	a	Using the Fibonacci Search Method, determine the minimum value of $f(x)=x^2-6x+10$ in the interval (0,5), $n=5$ and take $k=2$ Perform the required Fibonacci iterations and determine the approximate value of x at which the function attains its minimum.	K3	CO4	10M																														
	OR																																		
	b	Minimize the function $f(x_1,x_2)=x_1^2+x_2^2-4x_1-6x_2+13$ using the Steepest Descent Method starting from the initial point $(x_1,x_2)=(0,0)$ Find the search direction, step size, and next approximation point.	K3	CO4	10M																														
6	Unit-V																																		
	a	Use Dynamic Programming (Tabular Method) to solve the following problem. Maximize $Z=3x_1+5x_2$ subject to $x_1+2x_2\leq 6$, $x_2\leq 3$, $x_1,x_2\geq 0$. Formulate the problem as a multistage decision process, construct the stage tables, and determine the optimal values of x_1 and x_2 and the maximum value of Z .	K3	CO5	10M																														
	OR																																		
	b	A company has 10 units of resources to allocate between two activities. The return from allocating x units of resources to each activity is given by: $f_1(x)=x^2$ $f_2(x)=3x$ Using Dynamic Programming (Calculus Method): a) Formulate the problem as a two-stage decision process. b) Apply the principle of optimality to determine the optimal allocation of resources. c) Find the maximum total return.	K3	CO5	10M																														

II B.Tech II Semester Regular & Supple. Examinations, April-2026

R23

Sub Code: R23ME2201

INDUSTRIAL MANAGEMENT

Time: 3 hours

(ME)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Mention two characteristics of Theory X.	K1	1	2M
	b	Name two quantitative tools used in industrial engineering.	K1	1	2M
	c	What are the main differences between batch production and mass production?	K2	2	2M
	d	What is MTM, and how does it help in standardizing work processes?	K2	2	2M
	e	When would you use an X and R chart over an X and S chart?	K2	3	2M
	f	What is ISO 9001, and why is it important for quality management systems?	K2	3	2M
	g	How is the Internal Rate of Return (IRR) calculated, and what does it indicate?	K2	4	2M
	h	What is the Net Present Value (NPV) method, and why is it considered reliable?	K2	4	2M
	i	What are the main types of job evaluation methods?	K1	5	2M
	j	What are the main steps involved in the implementation of value engineering?	K2	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Differentiate between production management and industrial engineering.	K3	1	5M
		ii) Define management. Discuss the core functions of management, including planning, organizing, staffing, leading, and controlling, with suitable examples.	K2	1	5M
	OR				
	b	i) Explain about Taylor's scientific management	K3	1	5M
		ii) Compare process layout and product layout. Discuss their advantages, disadvantages	K3	1	5M
3	Unit-II				
	a	i) Explain the different types of production systems: batch production, mass production, and job production. Discuss their key characteristics, advantages, disadvantages, and applications with examples.	K3	2	10M
	OR				

	b	i) What is work study? Discuss the role of method study and time study in improving productivity and efficiency in manufacturing.	K2	2	5M
		ii) Explain Therbligs as a work measurement tool. How are they used to analyze manual work and improve efficiency?	K2	2	5M
4	Unit-III				
	a	i) What is quality control and explain X chart with example	K2	3	10M
	OR				
	b	i) What are quality circles? Discuss their importance in employee involvement and continuous improvement.	K3	3	5M
		ii) What is Six Sigma? Discuss its definition, basic concepts, and importance in reducing defects and improving process capability.	K2	3	5M
5	Unit-IV				
	a	i) Compare and contrast fixed capital and working capital. Discuss their importance in ensuring smooth business operations.	K4	4	5M
		ii) What is financial management? Discuss its scope, nature, and importance in business decision-making.	K3	4	5M
	OR				
	b	i) What is capital budgeting? Discuss its significance in long-term investment decisions and financial planning	K3	4	5M
		ii) Explain NPV as investment evaluation methods.	K4	4	5M
6	Unit-V				
	a	Explain the HRM key functions in industrial Management and summarize its importance.	K3	5	10M
	OR				
	b	What is Enterprise Resource Planning (ERP)? Discuss its goals, components, and importance in modern business management.	K2	5	10M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Regular & Supple. Examinations, April-2026

R23

Sub Code: R23CC2205

SOFTWARE ENGINEERING

Time: 3 hours

(CSE, IT)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define the term Software Engineering and state the reason for its emergence.	K1	1	2M
	b	List the major notable changes in software development practices over time.	K2	1	2M
	c	List the key responsibilities of a software project manager in a software development project.	K2	2	2M
	d	Differentiate between Axiomatic specification and Algebraic specification in formal system specification	K4	2	2M
	e	Explain the concepts of cohesion and coupling in software design.	K2	3	2M
	f	Define software design and state two characteristics of a good software design.	K1	3	2M
	g	List the main objectives of code review in software development.	K2	4	2M
	h	Identify the purpose of smoke testing in the software testing process.	K2	4	2M
	i	Define Computer-Aided Software Engineering (CASE) and state its scope in software development.	K1	5	2M
	j	Define software maintenance and state two of its key characteristics.	K1	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Explain the evolution of software development and discuss how it led to the emergence of Software Engineering.	K2	1	5M
		ii) Describe the concept of Software Development Projects and illustrate their key characteristics.	K2	1	5M
	OR				
	b	i) Compare and contrast the Waterfall Model and Agile Development Model in software development.	K4	1	5M
		ii) Analyze the Spiral Model and describe how risk management is handled in this model.	K4	1	5M
3	Unit-II				
	a	i) Explain the complexities involved in software project management and describe the role of a software project manager in handling them.	K2	2	5M
		ii) Analyze the COCOMO model and explain how it is used for software cost estimation.	K4	2	5M
	OR				

	b	i) Explain different project estimation techniques and compare empirical estimation techniques with other methods.	K2	2	5M
		ii) Describe the process of requirements gathering and analysis and explain the importance of the Software Requirements Specification (SRS)	K2	2	5M
4	Unit-III				
	a	i) Discuss the concept of Agility in software development and explain the relationship between agility and the cost of change.	K3	3	5M
		ii) Describe the Structured Analysis and Structured Design (SA/SD) methodology and illustrate the steps involved in developing a DFD model of a system.	K2	3	5M
	OR				
	b	i) Analyze the characteristics of a good user interface and explain the basic concepts used in user interface design.	K4	3	5M
		ii) Explain the fundamentals of component-based GUI development and evaluate its advantages in modern user interface design.	K2	3	5M
5	Unit-IV				
	a	i) Discuss the concepts of black-box testing and white-box testing, and compare their advantages in software testing.	K3	4	5M
		ii) Explain the integration testing process and illustrate how debugging helps in identifying and fixing software errors.	K2	4	5M
	OR				
	b	i) Explain the concept of software quality management systems and describe the role of ISO 9000 standards in maintaining software quality.	K2	4	5M
		ii) Analyze the SEI Capability Maturity Model (CMM) and evaluate its importance in improving software development processes.	K4	4	5M
6	Unit-V				
	a	i) Discuss the CASE environment and analyze how it improves productivity in software development.	K3	5	5M
		ii) Explain the characteristics of software maintenance and illustrate their impact on software evolution.	K2	5	5M
	OR				
	b	i) Describe the process of software reverse engineering and analyze its importance in maintaining legacy systems.	K2	5	5M
		ii) Evaluate the role of CASE tools and maintenance strategies in improving long-term software quality and maintainability.	K4	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Regular & Supple. Examinations, April-2026

R23

Sub Code: R23CC2207

DIGITAL LOGIC & COMPUTER ORGANIZATION

Time: 3 hours

(CSE(AIML), CSE(AI), AIML)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Convert the decimal number 25 to binary and octal.	2	1	2M
	b	Define a universal gate. Which gates are considered universal?	1	1	2M
	c	Mention any two differences between synchronous and asynchronous counters.	2	2	2M
	d	List the main functional units of a computer.	1	2	2M
	e	State the difference between restoring and non-restoring division.	2	3	2M
	f	What is the difference between decoding and encoding in instruction execution?		3	2M
	g	List two differences between SRAM and DRAM.	2	4	2M
	h	Compare associative and set-associative mapping in one sentence.	2	4	2M
	i	write two methods of accessing I/O devices.	1	5	2M
	j	What is the purpose of enabling and disabling interrupts?	1	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Apply the 1's complement and 2's complement methods to perform the binary subtraction of $(1011)_2 - (111)_2$.	3	1	5M
		ii) Simplify the Boolean function in sum of product $F(A,B,C,D) = \sum m(0,1,2,5,8,9,10)$	4	1	5M
	OR				
	b	i) Design and implement the Boolean function $F(A, B, C) = \sum m(1, 3, 5, 6)$ using an 8:1 multiplexer	3	1	5M
		ii) Differentiate between sequential and combinational circuits.	2	1	5M
3	Unit-II				
	a	i) Draw the basic block diagram of a computer system and explain each unit briefly.	2	2	5M
		ii) Design a logic circuit to convert a D flip-flop into an SR flip-flop.	3	2	5M
	OR				
	b	i) What is a shift register? Explain the different types of shift registers.	2	2	5M
		ii) Differentiate between multiprocessor and multicomputer systems	2	2	5M
4	Unit-III				
	a	Explain booth's multiplication algorithm with example	2	3	10M

	OR				
	b	i) Compare and contrast Hardwired and Micro-programmed Control Unit	3	3	5M
		ii) Define instruction cycle. Describe the steps involved in the execution of a complete instruction.	2	3	5M
5	Unit-IV				
	a	i) Draw a neat block diagram of memory hierarchy in a computer system. Compare the parameters size, speed and cost per bit in the hierarchy.	3	4	5M
		ii) Interpret the block diagrams of ROM and RAM and explain their operational differences.	2	4	5M
	OR				
	b	Explain cache memory mapping techniques in detail	2	4	10M
6	Unit-V				
	a	i) What is Direct Memory Access (DMA)? Explain its purpose and describe the block diagram of a DMA controller.	2	5	5M
		ii) Compare and contrast synchronous and asynchronous buses.	3	5	5M
	OR				
	b	i) What is an interrupt? Describe the role of interrupt hardware in a computer system.	2	5	5M
		ii) Differentiate between hardware and software interrupts with examples.	2	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Regular & Supple. Examinations, April-2026

R23

Sub Code: R23CE2205

HYDRAULICS & HYDRAULIC MACHINERY

Time: 3 hours

(CE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	State and explain Stoke's law.	Un	1	2M
	b	Define the term boundary layer.	Re	1	2M
	c	Give the classification of open channel flow.	Re	2	2M
	d	What do you mean by hydraulically efficient channel sections?	Un	2	2M
	e	What are the main characteristics of a hydraulic jump?	Un	3	2M
	f	Define critical depth and minimum specific energy.	Re	3	2M
	g	State the basic principle involved in calculating the force on vanes due to the impact of jets.	Un	4	2M
	h	What is cavitation? How does it affect the turbine?	Un	4	2M
	i	What is the need for priming in the pump?	Un	5	2M
	j	Differentiate between a pump and a turbine.	Re	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) What do you understand by hydrodynamically smooth and rough pipes?	Ap	1	5M
		ii) Water flows in a circular pipe. At one section, the diameter is 0.3m, the static pressure is 260kPa gauge, the velocity is 3m/s, and the elevation is 10m above ground level. The elevation at a section downstream is 0m, and the pipe diameter is 0.15m. Find the gauge pressure at the downstream section. The frictional effect may be neglected. Assume the density of water to be 999kg/m ³ .	An	1	5M
	OR				
	b	i) Show that for laminar flow in circular pipes, the friction factor is inversely proportional to the Reynolds number.	Ap	1	5M
		ii) A 30 cm diameter pipe conveying water branches into two pipes of diameters 20cm and 15cm, respectively. If the average velocity in the 30 cm pipe is 2.5m/s, find the discharge in this pipe. Also, determine the velocity in 15cm pipe if the average velocity in 20cm pipe is 2m/s.	An	1	5M
3	Unit-II				
	a	i) In a rectangular channel 3.5m wide laid at a slope of 0.0036, uniform flow occurs at a depth of 2m. Find how high can the hump be raised without causing afflux? If the upstream depth of flow is to be raised to 2.5m. What should be the height of hump? Take n=0.015 in Manning's formula.	An	2	10M

	OR				
	b	i) A concrete lined circular channel of diameter 3m has a bed slope of 1 in 500. Find out the velocity and flow rate for conditions of a) Max. Velocity b) Max. Discharge. Assume Chezy's constant $C=50$.	Ev	2	10M
4	Unit-III				
	a	i) State and discuss the assumptions made in the derivation of the dynamic equation of gradually varied flow.	Ap	3	5M
		ii) A horizontal rectangular channel 4m wide carries a discharge of $16\text{m}^3/\text{sec}$. Determine whether a jump may occur at a depth of 0.5m or not. If a jump occurs, determine the sequent depth to this initial depth. Also, determine the energy loss in the jump.	An	3	5M
	OR				
	b	i) What are the different types of hydraulic jumps? Explain them with neat sketches.	Un	3	5M
		ii) Find the rate of change of depth of water in a rectangular channel of 10m wide and 1.5m deep, when the water is flowing with a velocity of 1m/s. The flow of water through the channel of bed slope 1 in 4000 is regulated in such a way that the energy line has a slope of 0.00004.	An	3	5M
5	Unit-IV				
	a	i) How will you classify the turbines?	Un	4	5M
		ii) A 2.5 cm diameter jet of water strikes a symmetrical vane tangentially at one end and leaves at the other end. After impingement, the jet gets deflected through 160° by the vane. Calculate the thrust exerted by the jet on the vane if the discharge is $0.0736\text{ m}^3/\text{sec}$. Assume the vane to be smooth.	Ap	4	5M
	OR				
	b	i) Derive the expression for the force exerted by the jet strikes at the centre on the moving curved plate.	Ap	4	5M
		ii) What is a draft tube? With a neat sketch, list the different types of draft tubes.	Un	4	5M
6	Unit-V				
	a	i) What is the difference between single-stage and multistage pumps? Describe a multistage pump with: (i) Impellers in parallel. (ii) Impellers in series.	Ap	5	5M
		ii) A centrifugal pump runs at 1000 rpm and delivers water against a head of 15m. The impeller diameter and width at the outlet are 0.3m and 0.05m, respectively. The vanes are curved back at an angle of 30° with the periphery at the outlet $\phi_{\text{man}} = 0.92$. Find discharge.	An	5	5M
	OR				
	b	i) Explain various types of impellers used in centrifugal pumps.	Ap	5	5M
		ii) Derive the expression for the minimum starting speed for a centrifugal pump.	Ap	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Regular & Supple. Examinations, April-2026

Sub Code: R23CY2205

COMPUTER NETWORKS

Time: 3 hours

(CYBER SECURITY)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Write the types of Computer networks	K2	1	2M
	b	Define PAN and WAN	K2	1	2M
	c	Write difference between HTTP and HTTPS	K2	2	2M
	d	Define Content Delivery	K2	2	2M
	e	Write the importance of Transport layer	K3	3	2M
	f	What do you mean by Socket Programming	K3	3	2M
	g	Write the classes available in IPV4 protocol	K2	4	2M
	h	Define Broadcast routing	K2	4	2M
	i	Name any two Data Link Layer Design Issues	K2	5	2M
	j	Define Multiple Access Protocol	K2	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Explain the importance of Network Protocols along with its Protocol Layering, Service primitives	K2	1	5M
		ii) Explain about OSI model in detail	K2	1	5M
	OR				
	b	i) Explain about TCP/IP Reference Model	K2	1	5M
		ii) Explain About Broadband Access Networks and Content Provider Networks	K2	1	5M
3	Unit-II				
	a	i) Explain the architecture of Electronic mail and its services	K2	2	5M
		ii) Explain about Web privacy and dynamic Web pages	K2	2	5M
	OR				
	b	i) Write short notes on a) Message Transfer b) Message Formats	K2	2	5M
		ii) Explain about World Wide Web importance along with its architecture	K2	2	5M
4	Unit-III				
	a	i) Write in detail about Error Control And Flow Control	K3	3	5M
		ii) Explain about Remote Procedure Call	K3	3	5M

	OR				
	b	i) Explain about Multiplexing, Crash Recovery, Congestion Control	K3	3	5M
		ii) Write short notes on TCP Connection Establishment and TCP Connection Release.	K3	3	5M
5	Unit-IV				
	a	i) Compare Virtual-Circuit And Datagram Networks in detail	K2	4	5M
		ii) Explain about Border Gateway Protocol(BGP) in detail	K2	4	5M
	OR				
	b	i) Write about Link State Routing protocol in detail	K2	4	5M
		ii) Explain about Open Shortest Path First(OSPF) in detail	K2	4	5M
6	Unit-V				
	a	i) Write short notes on a) Flow Control, b) Error-Correcting Codes and Error Detecting Codes	K2	5	5M
		ii) Write the difference between Static Channel Allocation and Dynamic Channel Allocation	K2	5	5M
	OR				
	b	i) Write about Carrier Sense Multiple Access Protocol	K2	5	5M
		ii) Explain about a) Ethernet Performance, b) Switched Ethernet, c) Fast Ethernet	K2	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Regular & Supple. Examinations, April-2026

Sub Code: R23DS2203 COMPUTER ORGANIZATION & ARCHITECTURE

Time: 3 hours

(DS)

Max. Marks: 70

R23

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Write a short note on Hamming Code for Error Correction.	K3	1	2M
	b	Why are NAND and NOR gates called universal gates?	K3	1	2M
	c	What is the difference between multiplexer and de-multiplexer.	K2	2	2M
	d	How is a sequential circuit different from a combinational circuit?	K2	2	2M
	e	What is the function of the control memory in a microprogrammed control unit?	K3	3	2M
	f	What is Register Transfer Language (RTL)?	K3	3	2M
	g	What is the difference between direct and indirect addressing?	K3	4	2M
	h	What is an instruction format?	K3	4	2M
	i	What is the difference between SRAM and DRAM?	K3	5	2M
	j	What is the purpose of handshaking in asynchronous transfer?	K3	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i)Discuss different types of Error Detecting Codes.	K3	1	5M
		ii)Explain the role of logic gates in designing arithmetic circuits like adders and subtractors.	K3	1	5M
	OR				
	b	i)Explain how Hamming Code can be applied to detect and correct errors in computer memory systems.	K2	1	5M
		ii)Explain Self-Complementing Codes with examples. Discuss their advantages and applications.	K3	1	5M
3	Unit-II				
	a	i)Explain how digital logic circuits are implemented using universal gates.	K3	2	5M
		ii)What are Shift Registers and Ring Counters? Explain their working and applications.	K3	2	5M

	OR				
	b	i)What are Flip-Flops? Explain the types of Flip-Flops and their applications.	K3	2	5M
		ii)Design a 4-to-1 multiplexer circuit to select one of four input data lines and explain its working.	K3	2	5M
4	Unit-III				
	a	Explain Booth's Multiplication Algorithm with an example.	K3	3	10M
	OR				
	b	i)What are Microinstructions? How do they relate to RTL?	K3	3	5M
		ii)What is an Instruction Cycle? Explain its stages.	K3	3	5M
5	Unit-IV				
	a	i)What are Conditional Flags? Explain their role in Branching and how branching is performed based on these flags.	K3	4	5M
		ii)Why are addressing modes important in instruction execution? Give examples.	K3	4	5M
	OR				
	b	i)Discuss the design of a Control Unit using microprogramming. What are its main components?	K3	4	5M
		ii)What are Addressing Modes? Explain different types of addressing modes with examples.	K3	4	5M
6	Unit-V				
	a	i)Explain the concept of memory hierarchy in computer systems. Discuss why memory hierarchy is necessary and how it improves system performance.	K3	5	5M
		ii)What is Asynchronous Data Transfer? Explain its working, methods, and advantages with suitable diagrams.	K3	5	5M
	OR				
	b	i)What is associative memory? How does it differ from conventional memory? Discuss its applications.	K3	5	5M
		ii)Explain Direct Memory Access (DMA). Discuss its working, advantages, and types of DMA transfer modes.	K3	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Regular & Supple. Examinations, April-2026

Sub Code: R23EC2205

ANALOG COMMUNICATIONS

Time: 3 hours

(ECE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define modulation index in AM. What is its range?	K2	1	2M
	b	List any two methods of generating AM.	K1	1	2M
	c	What is the need for coherent detection in DSBSC systems?	K1	2	2M
	d	What is the primary function of a COSTAS Loop?	K1	2	2M
	e	Define modulation index for FM.	K2	3	2M
	f	List two methods of generating FM waves.	K1	3	2M
	g	What is meant by frequency stability in FM transmitters?	K1	4	2M
	h	Define tracking in the context of radio receivers.	K2	4	2M
	i	Write the expression for signal-to-noise ratio (SNR).	K2	5	2M
	j	Compare TDM and FDM.	K2	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Describe the working of a square-law modulator with a neat diagram.	K3	1	5M
		ii) A 10V carrier is amplitude modulated by a sinusoidal signal such that the maximum and minimum amplitudes of the AM wave are 12V and 8V respectively. Calculate the modulation index	K3	1	5M
	OR				
	b	i) Explain the working of an envelope detector used in AM demodulation.	K2	1	5M
		ii) An AM transmitter radiates a total power of 120W, out of which 100W is carrier power. Find the modulation index and power of each sideband.	K3	1	5M
3	Unit-II				
	a	i) Describe the time-domain and frequency-domain representation of DSBSC signals.	K3	2	5M
		ii) Explain the working of a balanced modulator with a neat block diagram.	K2	2	5M
	OR				
	b	i) Describe envelope detection of a VSB wave using a pulse carrier.	K2	2	5M

		ii) In a SSB system, the message signal is limited to 3 kHz and the carrier is 100 kHz. (i) What is the bandwidth of the SSB signal? (ii) Sketch the spectrum for LSB and USB cases.	K2	2	5M
4	Unit-III				
	a	i) Derive the expression for a single-tone frequency-modulated signal.	K3	3	5M
		ii) Derive the expression for the transmission bandwidth of an FM signal using Carson's Rule.	K3	3	5M
	OR				
	b	i) Describe the Armstrong indirect method of generating FM with a neat block diagram.	K3	3	5M
		ii) A 100 MHz FM transmitter has a deviation of 60 kHz and modulating signal frequency of 10 kHz. Calculate: (a) Frequency deviation ratio (b) Bandwidth of the FM wave	K3	3	5M
5	Unit-IV				
	a	i) With a block diagram, explain the working of an AM transmitter.	K2	4	5M
		ii) Explain the concept of frequency stability in FM transmitters and how it is achieved.	K2 3	4	5M
	OR				
	b	i) Explain the function of AGC and how it improves receiver performance.	K2	4	5M
		ii) Describe the RF section and its characteristics in a superheterodyne receiver.	K3	4	5M
6	Unit-V				
	a	i) Explain different types of noise and their sources.	K2	5	5M
		ii) With diagrams, explain the generation and detection of PWM.	K3	5	5M
	OR				
	b	i) Draw waveforms to represent PAM, PWM, and PPM for a given analog signal.	K2	5	5M
		ii) A receiver has an input SNR of 30 dB and an output SNR of 20 dB. Calculate the noise figure of the system.	K3	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Regular & Supple. Examinations, April-2026

R23

Sub Code: R23EE2205

CONTROL SYSTEMS

Time: 3 hours

(EEE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

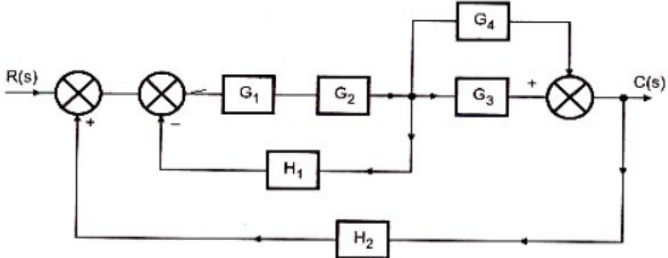
PART-A

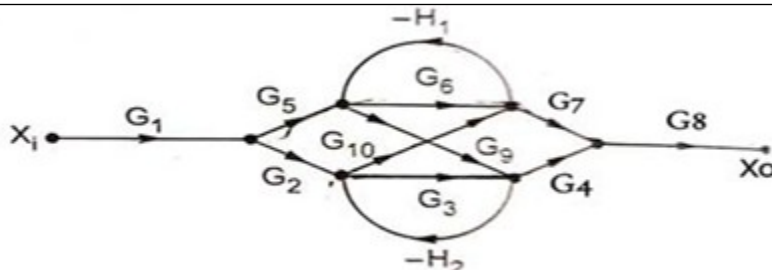
Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	What is a transfer function?	K1	1	2M
	b	Give two differences between open-loop and closed-loop systems.	K1	1	2M
	c	Define steady state error.	K1	2	2M
	d	What is a root locus?	K1	2	2M
	e	Define gain margin in frequency response analysis.	K1	3	2M
	f	Define Bode plot	K1	3	2M
	g	What is the purpose of a compensator in control systems?	K1	4	2M
	h	Explain Lag compensation.	K2	4	2M
	i	What is the state transition matrix	K1	5	2M
	j	What is a state model of a system?	K1	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	i) Obtain the transfer function of an armature-controlled DC servo motor.	K2	1	5M
		ii) Determine the transfer function $C(s)/R(s)$ by using Block diagram Reduction Techniques for the figure given below:	K3	1	5M
					
		OR			
	b	i) Find X_o/X_i for the signal flow graph shown in the figure using Mason's gain formula.	K3	1	5M

					
		ii)What is open-loop control system? State the advantages of closed-loop control systems.	K2	1	5M
3	Unit-II				
	a	i) Compare the effects of P, PI, and PD controllers on system performance.	K2	2	5M
		ii) Derive the expression for rise time for under damped system.	K2	2	5M
	OR				
	b	i) Explain the limitations of Routh's Stability Criterion.	K2	2	4M
ii) A unity feedback control system has the open loop transfer function given by $G(s) = 10/S(S+4)$. Determine damping ratio, natural un-damped resonance frequency, percentage peak overshoot and an expression for error response for a unit step input function.		K3	2	6M	
4	Unit-III				
	a	Plot the Bode diagram for the following transfer function and obtain the gain and phase cross over frequencies. $G(s) = \frac{10}{s(1+0.4s)(1+0.1s)}$	K3	3	10M
	OR				
	b	i) Discuss the calculation of gain crossover frequency and phase crossover frequency with respect to the polar plots.	K2	3	5M
ii) State Nyquist stability criteria and examine the stability of linear control system using the Nyquist stability criteria.		K3	3	5M	
5	Unit-IV				
	a	Compare Lead, Lag and Lead-Lag compensators with suitable examples	K2	4	10M
	OR				
	b	i) Derive the transfer function of Lead Compensator	K3	4	5M
ii) List out various effects of Lead Compensation.		K2	4	5M	
6	Unit-V				
	a	i) Given the system $\dot{X}(t) = A x(t) + B u(t)$, Where $A = \begin{bmatrix} 1 & 1 \\ 0 & -1 \end{bmatrix}$, $B = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$	K3	5	5M
		Find the controllability of the system.	K2	5	5M
	OR				
	b	i) Determine the state model of the system characterized by the differential equation $(s^4 + 2s^2 + 8s^3 + 4s + 3) Y(s) = 10 U(s)$.	K3	5	5M
ii) Describe the concepts of controllability and observability and their importance in system design.		K2	5	5M	

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Regular & Supple. Examinations, April-2026

R23

Sub Code: R23ME2205

THEORY OF MACHINES

Time: 3 hours

(ME)

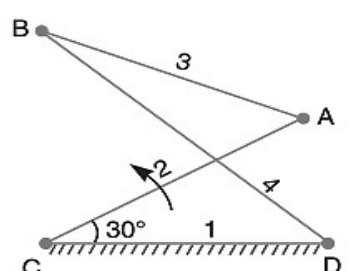
Max. Marks: 70

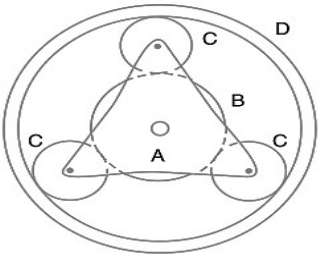
Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A: Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Explain Grubler's criterion for determining degree of freedom for mechanisms	K2	1	2M
	b	Define the terms: Kinematic chain and Inversion	K2	1	2M
	c	State and prove the 'Aronhold Kennedy's Theorem' of three instantaneous centres.	K2	2	2M
	d	Define normal and tangential components of acceleration.	K2	2	2M
	e	What do you understand by gyroscopic couple?	K2	3	2M
	f	What do you mean by static and dynamic balance of machinery?	K2	3	2M
	g	What is a cam? What is its use?	K2	4	2M
	h	Compare involute and cycloidal tooth profiles.	K2	4	2M
	i	Define free vibrations, forced vibrations and damped vibrations.	K2	5	2M
	j	Explain the terms fluctuation of energy and fluctuation of speed as applied to flywheels.	K2	5	2M

PART-B: Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	Sketch slider crank chain and its various inversions, stating actual machines in which these are used in practice.	K2	1	10M
	OR				
	b	Sketch and describe the working of two different types of quick return mechanisms. Give examples of their applications. Derive an expression for the ratio of times taken in forward and return stroke for one of these mechanisms.	K2	1	10M
3	Unit-II				
	a	Locate all the instantaneous centres for the crossed four bar mechanism as shown in Fig. The dimensions of various links are: CD = 65 mm; CA = 60 mm; DB = 80 mm; and AB = 55mm. Find the angular velocities of the links AB and DB, if the crank CA rotates at 100 r.p.m. in the anticlockwise direction. 	K3	2	10M
	OR				
	b	The crank of a slider crank mechanism rotates clockwise at a constant speed of 300 r.p.m. The crank is 150 mm and the connecting rod is 600 mm long. Determine:	K3	2	10M

		i. linear velocity and acceleration of the midpoint of the connecting rod ii. angular velocity and angular acceleration of the connecting rod, at a crank angle of 45° from inner dead centre position.			
4	Unit-III				
	a	A ship propelled by a turbine rotor which has a mass of 5 tonnes and a speed of 2100 r.p.m. The rotor has a radius of gyration of 0.5 m and rotates in a clockwise direction when viewed from the stern. Find the gyroscopic effects in the following conditions: i. The ship sails at a speed of 30 km/h and steers to the left in a curve having 60 m radius. ii. The ship pitches 6 degree above and 6 degrees below the horizontal position. The bow is descending with its maximum velocity. The motion due to pitching is simple harmonic and the periodic time is 20 seconds. iii. The ship rolls and at a certain instant it has an angular velocity of 0.03 rad/s clockwise when viewed from stern.	K3	3	10M
	OR				
	b	A shaft has three eccentrics of mass 1 kg each. The central plane of the eccentrics is 50 mm apart. The distances of the centers from the axis of rotation are 20, 30 and 20 mm and their angular positions are 120 apart. Find the amount of out-of-balance force and couple at 600 rpm. If the shaft is balanced by adding two masses at a radius of 70 mm and at a distance of 100 mm from the central plane of the middle eccentric, find the amount of the masses and their angular positions.	K3	3	10M
5	Unit-IV				
	a	A disc cam is to give SHM to a knife edge follower during out stroke of 50 mm. The angle of ascent is 120° , dwell 60° , and angle of descent 90° . The minimum radius of cam is 50 mm. Draw the profile of the cam when the axis of the follower passes through the axis of the camshaft.	K3	4	10M
	OR				
	b	In an epicyclic gear train of the 'sun and planet type' as shown in Fig., the pitch circle diameter of the internally toothed ring D is to be 216 mm and the module 4 mm. When the ring D is stationary, the spider A, which carries three planet wheels C of equal size, is to make one revolution in the same sense as the sun wheel B for every five revolutions of the driving spindle carrying the sun wheel B. Determine suitable number of teeth for all the wheels and the exact diameter of pitch circle of the ring. 	K3	4	10M
6	Unit-V				
	A	i) Derive the equation of motion of a spring-mass system using energy method.	K3	5	4M
		ii) The mass of a single degree damped vibrating system is 7.5 kg and makes 24 free oscillations in 14 seconds when disturbed from its equilibrium position. The amplitude of vibration reduces to 0.25 of its initial value after five oscillations. Determine:	K3	5	6M
		a. stiffness of the spring, b. logarithmic decrement, and c. damping factor			
	OR				
	b	Analyze about the turning moment diagrams with neat sketches	K3	5	10M

II B.Tech II Semester Regular & Supple. Examinations, April-2026

R23

Sub Code: R23CC2205

SOFTWARE ENGINEERING

Time: 3 hours

(CSE, IT)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define the term Software Engineering and state the reason for its emergence.	K1	1	2M
	b	List the major notable changes in software development practices over time.	K2	1	2M
	c	List the key responsibilities of a software project manager in a software development project.	K2	2	2M
	d	Differentiate between Axiomatic specification and Algebraic specification in formal system specification	K4	2	2M
	e	Explain the concepts of cohesion and coupling in software design.	K2	3	2M
	f	Define software design and state two characteristics of a good software design.	K1	3	2M
	g	List the main objectives of code review in software development.	K2	4	2M
	h	Identify the purpose of smoke testing in the software testing process.	K2	4	2M
	i	Define Computer-Aided Software Engineering (CASE) and state its scope in software development.	K1	5	2M
	j	Define software maintenance and state two of its key characteristics.	K1	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Explain the evolution of software development and discuss how it led to the emergence of Software Engineering.	K2	1	5M
		ii) Describe the concept of Software Development Projects and illustrate their key characteristics.	K2	1	5M
	OR				
	b	i) Compare and contrast the Waterfall Model and Agile Development Model in software development.	K4	1	5M
		ii) Analyze the Spiral Model and describe how risk management is handled in this model.	K4	1	5M
3	Unit-II				
	a	i) Explain the complexities involved in software project management and describe the role of a software project manager in handling them.	K2	2	5M
		ii) Analyze the COCOMO model and explain how it is used for software cost estimation.	K4	2	5M
	OR				

	b	i) Explain different project estimation techniques and compare empirical estimation techniques with other methods.	K2	2	5M
		ii) Describe the process of requirements gathering and analysis and explain the importance of the Software Requirements Specification (SRS)	K2	2	5M
4	Unit-III				
	a	i) Discuss the concept of Agility in software development and explain the relationship between agility and the cost of change.	K3	3	5M
		ii) Describe the Structured Analysis and Structured Design (SA/SD) methodology and illustrate the steps involved in developing a DFD model of a system.	K2	3	5M
	OR				
	b	i) Analyze the characteristics of a good user interface and explain the basic concepts used in user interface design.	K4	3	5M
		ii) Explain the fundamentals of component-based GUI development and evaluate its advantages in modern user interface design.	K2	3	5M
5	Unit-IV				
	a	i) Discuss the concepts of black-box testing and white-box testing, and compare their advantages in software testing.	K3	4	5M
		ii) Explain the integration testing process and illustrate how debugging helps in identifying and fixing software errors.	K2	4	5M
	OR				
	b	i) Explain the concept of software quality management systems and describe the role of ISO 9000 standards in maintaining software quality.	K2	4	5M
		ii) Analyze the SEI Capability Maturity Model (CMM) and evaluate its importance in improving software development processes.	K4	4	5M
6	Unit-V				
	a	i) Discuss the CASE environment and analyze how it improves productivity in software development.	K3	5	5M
		ii) Explain the characteristics of software maintenance and illustrate their impact on software evolution.	K2	5	5M
	OR				
	b	i) Describe the process of software reverse engineering and analyze its importance in maintaining legacy systems.	K2	5	5M
		ii) Evaluate the role of CASE tools and maintenance strategies in improving long-term software quality and maintainability.	K4	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Regular & Supple. Examinations, April-2026

R23

Sub Code: R23CC2207

DIGITAL LOGIC & COMPUTER ORGANIZATION

Time: 3 hours

(CSE(AIML), CSE(AI), AIML)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Convert the decimal number 25 to binary and octal.	2	1	2M
	b	Define a universal gate. Which gates are considered universal?	1	1	2M
	c	Mention any two differences between synchronous and asynchronous counters.	2	2	2M
	d	List the main functional units of a computer.	1	2	2M
	e	State the difference between restoring and non-restoring division.	2	3	2M
	f	What is the difference between decoding and encoding in instruction execution?		3	2M
	g	List two differences between SRAM and DRAM.	2	4	2M
	h	Compare associative and set-associative mapping in one sentence.	2	4	2M
	i	write two methods of accessing I/O devices.	1	5	2M
	j	What is the purpose of enabling and disabling interrupts?	1	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Apply the 1's complement and 2's complement methods to perform the binary subtraction of $(1011)_2 - (111)_2$.	3	1	5M
		ii) Simplify the Boolean function in sum of product $F(A,B,C,D) = \sum m(0,1,2,5,8,9,10)$	4	1	5M
	OR				
	b	i) Design and implement the Boolean function $F(A, B, C) = \sum m(1, 3, 5, 6)$ using an 8:1 multiplexer	3	1	5M
		ii) Differentiate between sequential and combinational circuits.	2	1	5M
3	Unit-II				
	a	i) Draw the basic block diagram of a computer system and explain each unit briefly.	2	2	5M
		ii) Design a logic circuit to convert a D flip-flop into an SR flip-flop.	3	2	5M
	OR				
	b	i) What is a shift register? Explain the different types of shift registers.	2	2	5M
		ii) Differentiate between multiprocessor and multicomputer systems	2	2	5M
4	Unit-III				
	a	Explain booth's multiplication algorithm with example	2	3	10M

	OR				
	b	i) Compare and contrast Hardwired and Micro-programmed Control Unit	3	3	5M
		ii) Define instruction cycle. Describe the steps involved in the execution of a complete instruction.	2	3	5M
5	Unit-IV				
	a	i) Draw a neat block diagram of memory hierarchy in a computer system. Compare the parameters size, speed and cost per bit in the hierarchy.	3	4	5M
		ii) Interpret the block diagrams of ROM and RAM and explain their operational differences.	2	4	5M
	OR				
	b	Explain cache memory mapping techniques in detail	2	4	10M
6	Unit-V				
	a	i) What is Direct Memory Access (DMA)? Explain its purpose and describe the block diagram of a DMA controller.	2	5	5M
		ii) Compare and contrast synchronous and asynchronous buses.	3	5	5M
	OR				
	b	i) What is an interrupt? Describe the role of interrupt hardware in a computer system.	2	5	5M
		ii) Differentiate between hardware and software interrupts with examples.	2	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Regular & Supple. Examinations, April-2026

R23

Sub Code: R23CE2205

HYDRAULICS & HYDRAULIC MACHINERY

Time: 3 hours

(CE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	State and explain Stoke's law.	Un	1	2M
	b	Define the term boundary layer.	Re	1	2M
	c	Give the classification of open channel flow.	Re	2	2M
	d	What do you mean by hydraulically efficient channel sections?	Un	2	2M
	e	What are the main characteristics of a hydraulic jump?	Un	3	2M
	f	Define critical depth and minimum specific energy.	Re	3	2M
	g	State the basic principle involved in calculating the force on vanes due to the impact of jets.	Un	4	2M
	h	What is cavitation? How does it affect the turbine?	Un	4	2M
	i	What is the need for priming in the pump?	Un	5	2M
	j	Differentiate between a pump and a turbine.	Re	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) What do you understand by hydrodynamically smooth and rough pipes?	Ap	1	5M
		ii) Water flows in a circular pipe. At one section, the diameter is 0.3m, the static pressure is 260kPa gauge, the velocity is 3m/s, and the elevation is 10m above ground level. The elevation at a section downstream is 0m, and the pipe diameter is 0.15m. Find the gauge pressure at the downstream section. The frictional effect may be neglected. Assume the density of water to be 999kg/m ³ .	An	1	5M
	OR				
	b	i) Show that for laminar flow in circular pipes, the friction factor is inversely proportional to the Reynolds number.	Ap	1	5M
		ii) A 30 cm diameter pipe conveying water branches into two pipes of diameters 20cm and 15cm, respectively. If the average velocity in the 30 cm pipe is 2.5m/s, find the discharge in this pipe. Also, determine the velocity in 15cm pipe if the average velocity in 20cm pipe is 2m/s.	An	1	5M
3	Unit-II				
	a	i) In a rectangular channel 3.5m wide laid at a slope of 0.0036, uniform flow occurs at a depth of 2m. Find how high can the hump be raised without causing afflux? If the upstream depth of flow is to be raised to 2.5m. What should be the height of hump? Take n=0.015 in Manning's formula.	An	2	10M

	OR				
	b	i) A concrete lined circular channel of diameter 3m has a bed slope of 1 in 500. Find out the velocity and flow rate for conditions of a) Max. Velocity b) Max. Discharge. Assume Chezy's constant $C=50$.	Ev	2	10M
4	Unit-III				
	a	i) State and discuss the assumptions made in the derivation of the dynamic equation of gradually varied flow.	Ap	3	5M
		ii) A horizontal rectangular channel 4m wide carries a discharge of $16\text{m}^3/\text{sec}$. Determine whether a jump may occur at a depth of 0.5m or not. If a jump occurs, determine the sequent depth to this initial depth. Also, determine the energy loss in the jump.	An	3	5M
	OR				
	b	i) What are the different types of hydraulic jumps? Explain them with neat sketches.	Un	3	5M
		ii) Find the rate of change of depth of water in a rectangular channel of 10m wide and 1.5m deep, when the water is flowing with a velocity of 1m/s. The flow of water through the channel of bed slope 1 in 4000 is regulated in such a way that the energy line has a slope of 0.00004.	An	3	5M
5	Unit-IV				
	a	i) How will you classify the turbines?	Un	4	5M
		ii) A 2.5 cm diameter jet of water strikes a symmetrical vane tangentially at one end and leaves at the other end. After impingement, the jet gets deflected through 160° by the vane. Calculate the thrust exerted by the jet on the vane if the discharge is $0.0736\text{ m}^3/\text{sec}$. Assume the vane to be smooth.	Ap	4	5M
	OR				
	b	i) Derive the expression for the force exerted by the jet strikes at the centre on the moving curved plate.	Ap	4	5M
		ii) What is a draft tube? With a neat sketch, list the different types of draft tubes.	Un	4	5M
6	Unit-V				
	a	i) What is the difference between single-stage and multistage pumps? Describe a multistage pump with: (i) Impellers in parallel. (ii) Impellers in series.	Ap	5	5M
		ii) A centrifugal pump runs at 1000 rpm and delivers water against a head of 15m. The impeller diameter and width at the outlet are 0.3m and 0.05m, respectively. The vanes are curved back at an angle of 30° with the periphery at the outlet $\phi_{\text{man}} = 0.92$. Find discharge.	An	5	5M
	OR				
	b	i) Explain various types of impellers used in centrifugal pumps.	Ap	5	5M
		ii) Derive the expression for the minimum starting speed for a centrifugal pump.	Ap	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Regular & Supple. Examinations, April-2026

Sub Code: R23CY2205

COMPUTER NETWORKS

Time: 3 hours

(CYBER SECURITY)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Write the types of Computer networks	K2	1	2M
	b	Define PAN and WAN	K2	1	2M
	c	Write difference between HTTP and HTTPS	K2	2	2M
	d	Define Content Delivery	K2	2	2M
	e	Write the importance of Transport layer	K3	3	2M
	f	What do you mean by Socket Programming	K3	3	2M
	g	Write the classes available in IPV4 protocol	K2	4	2M
	h	Define Broadcast routing	K2	4	2M
	i	Name any two Data Link Layer Design Issues	K2	5	2M
	j	Define Multiple Access Protocol	K2	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Explain the importance of Network Protocols along with its Protocol Layering, Service primitives	K2	1	5M
		ii) Explain about OSI model in detail	K2	1	5M
	OR				
	b	i) Explain about TCP/IP Reference Model	K2	1	5M
		ii) Explain About Broadband Access Networks and Content Provider Networks	K2	1	5M
3	Unit-II				
	a	i) Explain the architecture of Electronic mail and its services	K2	2	5M
		ii) Explain about Web privacy and dynamic Web pages	K2	2	5M
	OR				
	b	i) Write short notes on a) Message Transfer b) Message Formats	K2	2	5M
		ii) Explain about World Wide Web importance along with its architecture	K2	2	5M
4	Unit-III				
	a	i) Write in detail about Error Control And Flow Control	K3	3	5M
		ii) Explain about Remote Procedure Call	K3	3	5M

	OR				
	b	i) Explain about Multiplexing, Crash Recovery, Congestion Control	K3	3	5M
		ii) Write short notes on TCP Connection Establishment and TCP Connection Release.	K3	3	5M
5	Unit-IV				
	a	i) Compare Virtual-Circuit And Datagram Networks in detail	K2	4	5M
		ii) Explain about Border Gateway Protocol(BGP) in detail	K2	4	5M
	OR				
	b	i) Write about Link State Routing protocol in detail	K2	4	5M
		ii) Explain about Open Shortest Path First(OSPF) in detail	K2	4	5M
6	Unit-V				
	a	i) Write short notes on a) Flow Control, b) Error-Correcting Codes and Error Detecting Codes	K2	5	5M
		ii) Write the difference between Static Channel Allocation and Dynamic Channel Allocation	K2	5	5M
	OR				
	b	i) Write about Carrier Sense Multiple Access Protocol	K2	5	5M
		ii) Explain about a) Ethernet Performance, b) Switched Ethernet, c) Fast Ethernet	K2	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Regular & Supple. Examinations, April-2026

Sub Code: R23DS2203 COMPUTER ORGANIZATION & ARCHITECTURE

Time: 3 hours

(DS)

Max. Marks: 70

R23

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Write a short note on Hamming Code for Error Correction.	K3	1	2M
	b	Why are NAND and NOR gates called universal gates?	K3	1	2M
	c	What is the difference between multiplexer and de-multiplexer.	K2	2	2M
	d	How is a sequential circuit different from a combinational circuit?	K2	2	2M
	e	What is the function of the control memory in a microprogrammed control unit?	K3	3	2M
	f	What is Register Transfer Language (RTL)?	K3	3	2M
	g	What is the difference between direct and indirect addressing?	K3	4	2M
	h	What is an instruction format?	K3	4	2M
	i	What is the difference between SRAM and DRAM?	K3	5	2M
	j	What is the purpose of handshaking in asynchronous transfer?	K3	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Discuss different types of Error Detecting Codes.	K3	1	5M
		ii) Explain the role of logic gates in designing arithmetic circuits like adders and subtractors.	K3	1	5M
	OR				
	b	i) Explain how Hamming Code can be applied to detect and correct errors in computer memory systems.	K2	1	5M
		ii) Explain Self-Complementing Codes with examples. Discuss their advantages and applications.	K3	1	5M
3	Unit-II				
	a	i) Explain how digital logic circuits are implemented using universal gates.	K3	2	5M
		ii) What are Shift Registers and Ring Counters? Explain their working and applications.	K3	2	5M

	OR				
	b	i)What are Flip-Flops? Explain the types of Flip-Flops and their applications.	K3	2	5M
		ii)Design a 4-to-1 multiplexer circuit to select one of four input data lines and explain its working.	K3	2	5M
4	Unit-III				
	a	Explain Booth's Multiplication Algorithm with an example.	K3	3	10M
	OR				
	b	i)What are Microinstructions? How do they relate to RTL?	K3	3	5M
		ii)What is an Instruction Cycle? Explain its stages.	K3	3	5M
5	Unit-IV				
	a	i)What are Conditional Flags? Explain their role in Branching and how branching is performed based on these flags.	K3	4	5M
		ii)Why are addressing modes important in instruction execution? Give examples.	K3	4	5M
	OR				
	b	i)Discuss the design of a Control Unit using microprogramming. What are its main components?	K3	4	5M
		ii)What are Addressing Modes? Explain different types of addressing modes with examples.	K3	4	5M
6	Unit-V				
	a	i)Explain the concept of memory hierarchy in computer systems. Discuss why memory hierarchy is necessary and how it improves system performance.	K3	5	5M
		ii)What is Asynchronous Data Transfer? Explain its working, methods, and advantages with suitable diagrams.	K3	5	5M
	OR				
	b	i)What is associative memory? How does it differ from conventional memory? Discuss its applications.	K3	5	5M
		ii)Explain Direct Memory Access (DMA). Discuss its working, advantages, and types of DMA transfer modes.	K3	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Regular & Supple. Examinations, April-2026

Sub Code: R23EC2205

ANALOG COMMUNICATIONS

Time: 3 hours

(ECE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define modulation index in AM. What is its range?	K2	1	2M
	b	List any two methods of generating AM.	K1	1	2M
	c	What is the need for coherent detection in DSBSC systems?	K1	2	2M
	d	What is the primary function of a COSTAS Loop?	K1	2	2M
	e	Define modulation index for FM.	K2	3	2M
	f	List two methods of generating FM waves.	K1	3	2M
	g	What is meant by frequency stability in FM transmitters?	K1	4	2M
	h	Define tracking in the context of radio receivers.	K2	4	2M
	i	Write the expression for signal-to-noise ratio (SNR).	K2	5	2M
	j	Compare TDM and FDM.	K2	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Describe the working of a square-law modulator with a neat diagram.	K3	1	5M
		ii) A 10V carrier is amplitude modulated by a sinusoidal signal such that the maximum and minimum amplitudes of the AM wave are 12V and 8V respectively. Calculate the modulation index	K3	1	5M
	OR				
	b	i) Explain the working of an envelope detector used in AM demodulation.	K2	1	5M
		ii) An AM transmitter radiates a total power of 120W, out of which 100W is carrier power. Find the modulation index and power of each sideband.	K3	1	5M
3	Unit-II				
	a	i) Describe the time-domain and frequency-domain representation of DSBSC signals.	K3	2	5M
		ii) Explain the working of a balanced modulator with a neat block diagram.	K2	2	5M
	OR				
	b	i) Describe envelope detection of a VSB wave using a pulse carrier.	K2	2	5M

		ii) In a SSB system, the message signal is limited to 3 kHz and the carrier is 100 kHz. (i) What is the bandwidth of the SSB signal? (ii) Sketch the spectrum for LSB and USB cases.	K2	2	5M
4	Unit-III				
	a	i) Derive the expression for a single-tone frequency-modulated signal.	K3	3	5M
		ii) Derive the expression for the transmission bandwidth of an FM signal using Carson's Rule.	K3	3	5M
	OR				
	b	i) Describe the Armstrong indirect method of generating FM with a neat block diagram.	K3	3	5M
		ii) A 100 MHz FM transmitter has a deviation of 60 kHz and modulating signal frequency of 10 kHz. Calculate: (a) Frequency deviation ratio (b) Bandwidth of the FM wave	K3	3	5M
5	Unit-IV				
	a	i) With a block diagram, explain the working of an AM transmitter.	K2	4	5M
		ii) Explain the concept of frequency stability in FM transmitters and how it is achieved.	K2 3	4	5M
	OR				
	b	i) Explain the function of AGC and how it improves receiver performance.	K2	4	5M
		ii) Describe the RF section and its characteristics in a superheterodyne receiver.	K3	4	5M
6	Unit-V				
	a	i) Explain different types of noise and their sources.	K2	5	5M
		ii) With diagrams, explain the generation and detection of PWM.	K3	5	5M
	OR				
	b	i) Draw waveforms to represent PAM, PWM, and PPM for a given analog signal.	K2	5	5M
		ii) A receiver has an input SNR of 30 dB and an output SNR of 20 dB. Calculate the noise figure of the system.	K3	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Regular & Supple. Examinations, April-2026

R23

Sub Code: R23EE2205

CONTROL SYSTEMS

Time: 3 hours

(EEE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

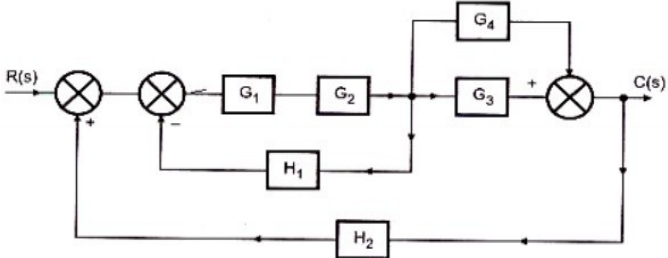
PART-A

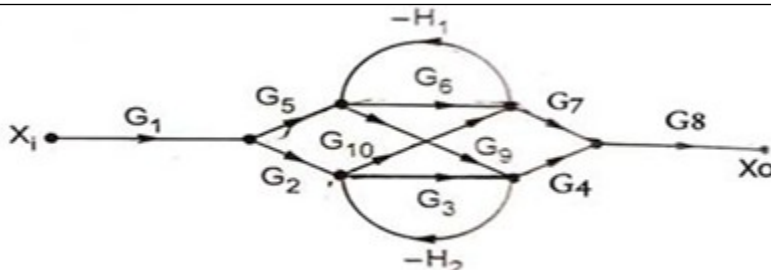
Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	What is a transfer function?	K1	1	2M
	b	Give two differences between open-loop and closed-loop systems.	K1	1	2M
	c	Define steady state error.	K1	2	2M
	d	What is a root locus?	K1	2	2M
	e	Define gain margin in frequency response analysis.	K1	3	2M
	f	Define Bode plot	K1	3	2M
	g	What is the purpose of a compensator in control systems?	K1	4	2M
	h	Explain Lag compensation.	K2	4	2M
	i	What is the state transition matrix	K1	5	2M
	j	What is a state model of a system?	K1	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	i) Obtain the transfer function of an armature-controlled DC servo motor.	K2	1	5M
		ii) Determine the transfer function $C(s)/R(s)$ by using Block diagram Reduction Techniques for the figure given below:	K3	1	5M
					
		OR			
	b	i) Find X_o/X_i for the signal flow graph shown in the figure using Mason's gain formula.	K3	1	5M

					
		ii)What is open-loop control system? State the advantages of closed-loop control systems.	K2	1	5M
3	Unit-II				
	a	i) Compare the effects of P, PI, and PD controllers on system performance.	K2	2	5M
		ii) Derive the expression for rise time for under damped system.	K2	2	5M
	OR				
	b	i) Explain the limitations of Routh's Stability Criterion.	K2	2	4M
		ii) A unity feedback control system has the open loop transfer function given by $G(s) = 10/S(S+4)$. Determine damping ratio, natural un-damped resonance frequency, percentage peak overshoot and an expression for error response for a unit step input function.	K3	2	6M
4	Unit-III				
	a	Plot the Bode diagram for the following transfer function and obtain the gain and phase cross over frequencies. $G(s) = \frac{10}{s(1+0.4s)(1+0.1s)}$	K3	3	10M
	OR				
	b	i) Discuss the calculation of gain crossover frequency and phase crossover frequency with respect to the polar plots.	K2	3	5M
		ii) State Nyquist stability criteria and examine the stability of linear control system using the Nyquist stability criteria.	K3	3	5M
5	Unit-IV				
	a	Compare Lead, Lag and Lead-Lag compensators with suitable examples	K2	4	10M
	OR				
	b	i) Derive the transfer function of Lead Compensator	K3	4	5M
ii) List out various effects of Lead Compensation.		K2	4	5M	
6	Unit-V				
	a	i) Given the system $\dot{X}(t) = A x(t) + B u(t)$, Where $A = \begin{bmatrix} 1 & 1 \\ 0 & -1 \end{bmatrix}$, $B = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$	K3	5	5M
		Find the controllability of the system.	K2	5	5M
	OR				
	b	i) Determine the state model of the system characterized by the differential equation $(s^4 + 2s^2 + 8s^3 + 4s + 3) Y(s) = 10 U(s)$.	K3	5	5M
		ii) Describe the concepts of controllability and observability and their importance in system design.	K2	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Regular & Supple. Examinations, April-2026

R23

Sub Code: R23ME2205

THEORY OF MACHINES

Time: 3 hours

(ME)

Max. Marks: 70

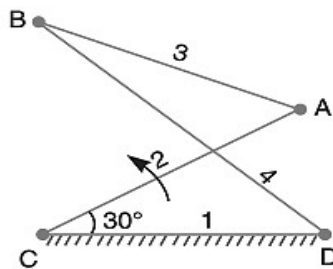
Note: Question Paper consists of Two parts (Part-A and Part-B)

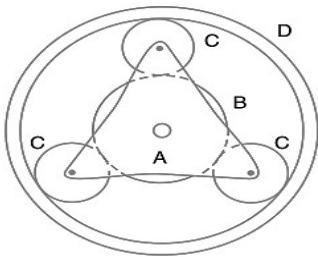
PART-A: Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Explain Grubler's criterion for determining degree of freedom for mechanisms	K2	1	2M
	b	Define the terms: Kinematic chain and Inversion	K2	1	2M
	c	State and prove the 'Aronhold Kennedy's Theorem' of three instantaneous centres.	K2	2	2M
	d	Define normal and tangential components of acceleration.	K2	2	2M
	e	What do you understand by gyroscopic couple?	K2	3	2M
	f	What do you mean by static and dynamic balance of machinery?	K2	3	2M
	g	What is a cam? What is its use?	K2	4	2M
	h	Compare involute and cycloidal tooth profiles.	K2	4	2M
	i	Define free vibrations, forced vibrations and damped vibrations.	K2	5	2M
	j	Explain the terms fluctuation of energy and fluctuation of speed as applied to flywheels.	K2	5	2M

PART-B: Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	Sketch slider crank chain and its various inversions, stating actual machines in which these are used in practice.	K2	1	10M
	OR				
	b	Sketch and describe the working of two different types of quick return mechanisms. Give examples of their applications. Derive an expression for the ratio of times taken in forward and return stroke for one of these mechanisms.	K2	1	10M
3	Unit-II				
	a	Locate all the instantaneous centres for the crossed four bar mechanism as shown in Fig. The dimensions of various links are: CD = 65 mm; CA = 60 mm; DB = 80 mm; and AB = 55mm. Find the angular velocities of the links AB and DB, if the crank CA rotates at 100 r.p.m. in the anticlockwise direction.	K3	2	10M
	OR				
	b	The crank of a slider crank mechanism rotates clockwise at a constant speed of 300 r.p.m. The crank is 150 mm and the connecting rod is 600 mm long. Determine:	K3	2	10M



		i. linear velocity and acceleration of the midpoint of the connecting rod ii. angular velocity and angular acceleration of the connecting rod, at a crank angle of 45° from inner dead centre position.			
4	Unit-III				
	a	A ship propelled by a turbine rotor which has a mass of 5 tonnes and a speed of 2100 r.p.m. The rotor has a radius of gyration of 0.5 m and rotates in a clockwise direction when viewed from the stern. Find the gyroscopic effects in the following conditions: i. The ship sails at a speed of 30 km/h and steers to the left in a curve having 60 m radius. ii. The ship pitches 6 degree above and 6 degrees below the horizontal position. The bow is descending with its maximum velocity. The motion due to pitching is simple harmonic and the periodic time is 20 seconds. iii. The ship rolls and at a certain instant it has an angular velocity of 0.03 rad/s clockwise when viewed from stern.	K3	3	10M
	OR				
	b	A shaft has three eccentrics of mass 1 kg each. The central plane of the eccentrics is 50 mm apart. The distances of the centers from the axis of rotation are 20, 30 and 20 mm and their angular positions are 120 apart. Find the amount of out-of-balance force and couple at 600 rpm. If the shaft is balanced by adding two masses at a radius of 70 mm and at a distance of 100 mm from the central plane of the middle eccentric, find the amount of the masses and their angular positions.	K3	3	10M
5	Unit-IV				
	a	A disc cam is to give SHM to a knife edge follower during out stroke of 50 mm. The angle of ascent is 120°, dwell 60°, and angle of descent 90°. The minimum radius of cam is 50 mm. Draw the profile of the cam when the axis of the follower passes through the axis of the camshaft.	K3	4	10M
	OR				
	b	In an epicyclic gear train of the ‘sun and planet type’ as shown in Fig., the pitch circle diameter of the internally toothed ring D is to be 216 mm and the module 4 mm. When the ring D is stationary, the spider A , which carries three planet wheels C of equal size, is to make one revolution in the same sense as the sun wheel B for every five revolutions of the driving spindle carrying the sun wheel B. Determine suitable number of teeth for all the wheels and the exact diameter of pitch circle of the ring. 	K3	4	10M
6	Unit-V				
	A	i) Derive the equation of motion of a spring-mass system using energy method.	K3	5	4M
		ii) The mass of a single degree damped vibrating system is 7.5 kg and makes 24 free oscillations in 14 seconds when disturbed from its equilibrium position. The amplitude of vibration reduces to 0.25 of its initial value after five oscillations. Determine:	K3	5	6M
		a. stiffness of the spring, b. logarithmic decrement, and c. damping factor			
	OR				
b	Analyze about the turning moment diagrams with neat sketches	K3	5	10M	

II B.Tech II Semester Regular & Supple. Examinations, April-2026

Sub Code: R23CC2203

OPERATING SYSTEMS

Time: 3 hours

(CSE, IT, CYS)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	What are the advantages of Multiprogramming?	1	1	2M
	b	Write different operating system services.	1	1	2M
	c	Write the difference between user level thread and kernel level thread?	1	2	2M
	d	What are the 3 different types of scheduling queues?	1	2	2M
	e	What are the necessary condition for a deadlock?	1	3	2M
	f	Define busy waiting and spinlock.	1	3	2M
	g	What is meant by Global Replacement and Local Replacement?	1	4	2M
	h	What is meant by Demand Paging?	1	4	2M
	i	Which are the typical information elements of a file directory? Why?	1	5	2M
	j	What are the objectives and minimal set of requirement for the file management system?	1	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) What is kernel? Explain types of kernel.	2	1	5M
		ii) What are the characteristics of Operating System? Explain the various types of Operating Systems?	2	1	5M
	OR				
	b	i) What is Operating System? Give the view of OS as Resource Manager.	2	1	5M
		ii) Explain the different types of system calls	2	1	5M
3	Unit-II				
	a	i) Explain process creation and process termination with example functions.	2	2	5M
		ii) Explain the different issues of Threads.	2	2	5M
	OR				
	b	i) What is scheduler? Explain queuing diagram representation of process scheduler with figure.	2	2	5M
		ii) Assume arrival order is: P1, P2, P3, P4, P5 at time 0,1,2,3,4 and their priorities are 2,9,6,5 and 7 respectively and a smaller priority number implies a higher priority. Draw the Gantt charts for preemptive and non-preemptive priority scheduling. Calculate Average Turnaround Time and Average Waiting Time.	3	2	5M

4	Unit-III				
	a	i) There is a unisex salon where both males and females can get the salon service. However, there is a condition that males and females cannot come to the salon at the same time. The second condition is that there cannot be more than three persons in the salon at a time. Give a synchronization solution using semaphores.	3	3	5M
		ii) What is advantage of using Monitor? Give the implementation of Bounded Buffer Producer Consumer Problem using “Monitor”.	2	3	5M
	OR				
	b	i) What is deadlock? Explain deadlock detection with multiple resources of each type.	2	3	5M
		ii) Explain deadlock prevention in detail.	2	3	5M
5	Unit-IV				
	a	i) What is paging? What is Page Table? Explain the conversion of Virtual Address to Physical Address in Paging with example.	2	4	5M
		ii) Given memory partition of 100K, 500K, 200K, 300K, and 600K in order, how would each of the First-fit, Best-fit and Worst-fit algorithms place the processes of 212K, 417K, 112K and 426K in order? Which algorithm makes the most efficient use of memory? Show the diagram of memory status in each case.	3	4	5M
	OR				
	b	i) Explain swapping in memory management.	2	4	5M
		ii) Discuss the procedure for page fault in demand paging.	2	4	5M
6	Unit-V				
	a	Suppose that a disk drive has 1000 cylinders, numbered 0 to 999. Assume last request received was at track 345 and the head is moving towards track 0. The queue of pending requests, in FIFO order, is 123,874,692,475,105,367. Perform following scheduling algorithm: SCAN,LOOK,C-SCAN & C-LOOK.	3	5	10M
	OR				
	b	i) What are points to be consider in file system design? Explain linked list allocation and index allocation in detail.	2	5	5M
		ii) Explain file system consistency in detail.	2	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Regular & Supple. Examinations, April-2026

Sub Code: R23CC2206

MACHINE LEARNING

Time: 3 hours

(CSE(AIML), AI, AIML)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	What is Feature Engineering? Write its Purpose.	1	1	2M
	b	Compare Learning by Rote, and Learning by Induction.	1	1	2M
	c	Relate entropy and information gain.	1	2	2M
	d	Compare classification and regression models.	1	2	2M
	e	Define Bayes theorem	1	3	2M
	f	Outline the significance of the Random Forest Algorithm.	1	3	2M
	g	Compare the difference between local and distributed representation.	1	4	2M
	h	Sketch block diagram of perceptron	1	4	2M
	i	Write some real world applications of clustering.	1	5	2M
	j	Compare K-Means Clustering, and Agglomerative Clustering.	1	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Explain the Data Representation mechanisms. Use a suitable example for explaining your answer.	2	1	5M
		ii) Describe the steps in Model Selection using any standard models of your choice.	2	1	5M
	OR				
	b	i) Describe the Learning Process. Explain Supervised Learning and Unsupervised Learning in detail, and Give Necessary examples.	2	1	10M
3	Unit-II				
	a	i) Describe the different Classification Algorithms Based on the Distance Measures.	2	2	5M
		ii) Explain the steps in working of Radius Distance Nearest Neighbor Algorithm.	2	2	5M
	OR				
	b	i) Describe how to assess the Performance of Regression Algorithms.	2	2	5M
		ii) Explain weighted K-nearest Neighbor algorithm.	2	2	5M
4	Unit-III				
	a	i) Describe Random Forest Algorithm with an example.	2	3	5M
		ii) Explain about Naïve Bayes algorithm for continuous attributes with examples.	2	3	5M

	OR																					
	b	i) Describe the steps in Gibbs Algorithm.		3	5M																	
		ii) Consider a boy who has a volleyball tournament on the next day, but today he feels sick. It is unusual that there is only a 40% chance he would fall sick since he is a healthy boy. Now, Find the probability of the boy participating in the tournament. The boy is very much interested in volley ball, so there is a 90% probability that he would participate in tournaments and 20% that he will fall sick given that he participates in the tournament.	3	3	5M																	
5	Unit-IV																					
	a	i) Describe the Linear separability and Linear Regression.	2	4	5M																	
		ii) Explain how to train, test and validate the MLP.	2	4	5M																	
	OR																					
	b	i) Discuss in detail the working of Support Vector Machine, its implementation and examples.	2	4	5M																	
		ii) Explain how to learn Multilayer Networks using Backpropagation Algorithm.	2	4	5M																	
6	Unit-V																					
	a	i) Describe Expectation Maximization-Based Clustering with example.	2	5	5M																	
		ii) Explain Fuzzy C-Means Clustering with example.	2	5	5M																	
	OR																					
	b	i) Explain Rough Clustering with example.	2	5	5M																	
		ii) Cluster the following set of data using k-means algorithm with initial value of objects 2 and 5 with the coordinate values (4,6) and (12,4) as initial seeds.	3	5	5M																	
		<table><tr><td>Objec ts</td><td>X-coordinate</td><td>Y-coordinate</td></tr><tr><td>1</td><td>2</td><td>4</td></tr><tr><td>2</td><td>4</td><td>6</td></tr><tr><td>3</td><td>6</td><td>8</td></tr><tr><td>4</td><td>10</td><td>4</td></tr><tr><td>5</td><td>12</td><td>4</td></tr></table>	Objec ts	X-coordinate	Y-coordinate	1	2	4	2	4	6	3	6	8	4	10	4	5	12	4		
Objec ts		X-coordinate	Y-coordinate																			
1	2	4																				
2	4	6																				
3	6	8																				
4	10	4																				
5	12	4																				

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Regular & Supple. Examinations, April-2026

Sub Code: R23CE2203

CONCRETE TECHNOLOGY

Time: 3 hours

(CE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define hydration of cement.	K2	1	2M
	b	List out various tests on aggregates in detail	K1	1	2M
	c	Define workability of concrete	K1	2	2M
	d	What are the different types of concrete mixes?	K1	2	2M
	e	Write about Gel space Ratio	K2	3	2M
	f	What are the codal provisions of NDT?	K2	3	2M
	g	Explain about Creep of concrete?	K2	4	2M
	h	How to prevent plastic shrinkage in concrete?	K2	4	2M
	i	Define the deterioration of concrete	K1	5	2M
	j	What is the aspect ratio in fiber-reinforced concrete?	K1	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Explain about the different tests conducted on cement in the laboratory to check its suitability	K2	1	5M
		ii) How workability of concrete is affected by addition of chemical admixtures?	K2	1	5M
	OR				
	b	i) Explain the difference between plasticizer and super plasticizers?	K2	1	5M
		ii) What is the affect of size of aggregate on concrete?	K1	1	5M
3	Unit-II				
	a	i) Discuss the Slump Test for determining the workability of fresh concrete with a neat sketch.	K2	2	5M
		ii) Explain the factors affecting the workability of concrete	K2	2	5M
	OR				
	b	i) Write about alkali aggregate reaction.	K2	2	5M
		ii) What is segregation and bleeding of concrete why they occur, discuss how to prevent them	K2	2	5M
4	Unit-III				
	a	i) Describe the relationship between creep and time.	K2	3	5M
		ii) Describe the Rebound Hammer Test to determine the quality of concrete with a neat sketch.	K3	3	5M

	OR				
	b	i) What are the factors affecting the strength of concrete?	K1	3	5M
		ii) Discuss the Abrams water/cement ratio law and its significance. How strength of concrete is estimated by w/c ratio law.	K2	3	5M
5	Unit-IV				
	a	i) Define Poisson's ratio and explain its significance in concrete behavior.	K2	4	5M
		ii) What is creep? What are the factors influencing creep?	K1	4	5M
	OR				
	b	i) What is Shrinkage of concrete and types and discuss about the factors affecting the shrinkage of concrete.	K2	4	5M
		ii) Draw a typical stress-strain curve of concrete and identify the different types of static elastic moduli.	K3	4	5M
6	Unit-V				
	a	i) What is Fibre reinforced concrete? Discuss its applications.	K2	5	5M
		ii) Explain in detail the various steps involved in designing concrete mixes using I.S.I method.	K3	5	5M
	OR				
	b	i) What is ready-mixed concrete (RMC), and what are its advantages over site-mixed concrete	K1	5	5M
		ii) What is meant by quality control of concrete? How to control the quality of concrete?	K2	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Regular & Supple. Examinations, April-2026

R23

Sub Code: R23DS2202

DATA ENGINEERING

Time: 3 hours

(DS)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	List two major differences between Data Engineering and Data Science	2	1	2M
	b	Name two key skills required by a Data Engineer.	2	1	2M
	c	What is meant by "data ingestion"	2	2	2M
	d	State any two roles of security in the Data Engineering Life Cycle.	2	2	2M
	e	What does CRUD stand for in database operations?	2	3	2M
	f	What is the role of Enterprise Architecture in data management	2	3	2M
	g	Define a data warehouse.	2	4	2M
	h	State two differences between batch ingestion and stream ingestion.	2	4	2M
	i	Define streaming data in the context of query processing	2	5	2M
	j	What is meant by reverse ETL	2	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Describe the key skills and activities involved in Data Engineering.	3	1	5M
		ii) Explain the concept of Data Maturity and its impact on business decision-making.	3	1	5M
	OR				
	b	i) Describe the technical responsibilities of a Data Engineer and their significance in big data projects.	3	1	5M
		ii) How do Data Engineers collaborate with other technical roles like Data Scientists, Analysts, and DevOps Engineers?	4	1	5M
3	Unit-II				
	a	i) What is a datapost? Explain its relevance in managing and monitoring data pipelines.	3	2	5M
		ii) Discuss how software engineering principles are applied in the context of Data Engineering.	3	2	5M
	OR				
	b	i) Describe the five key phases of the Data Engineering Life Cycle: generation, storage, ingestion, transformation, and serving.	3	2	5M
		ii) Explain the role of source systems in the data generation phase with examples.	3	2	5M

4	Unit-III				
	a	i) Differentiate between OLTP and OLAP systems with suitable examples and use cases.	3	3	5M
		ii) Explain how APIs contribute to data generation and integration in distributed systems.	3	3	5M
	OR				
	b	i) Discuss the core principles of good data architecture with examples.	3	3	5M
		ii) Illustrate the role of metadata in managing and supporting robust data architecture.	3	3	5M
5	Unit-IV				
	a	i) What are the major components and challenges of message-based ingestion systems?	3	4	5M
		ii) Discuss the advantages and limitations of a Data Lakehouse architecture.	5	4	5M
	OR				
	b	i) Describe various data storage systems and discuss how they support scalable and fault-tolerant data pipelines.	5	4	5M
		ii) Explain various methods of data ingestion and how to choose the right method for a given scenario.	5	4	5M
6	Unit-V				
	a	i) What is data modeling, and why is it important?	4	5	5M
		ii) Explain different types of analytics (business, operational, and embedded) and how data is served to support them.	4	5	5M
	OR				
	b	i) What is reverse ETL? Discuss its architecture, use cases, and benefits in modern data platforms.	4	5	5M
		ii) Explain the role and components of a query optimizer	4	5	5M

II B.Tech II Semester Regular & Supple. Examinations, April-2026

R23

Sub Code: R23EC2203

ELECTROMAGNETIC WAVES & TRANSMISSION LINES

Time: 3 hours

(ECE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define electric flux density.	1	1	2M
	b	Explain Biot-Savart law.	2	1	2M
	c	Examine the physical significance of the continuity equation.	3	2	2M
	d	Analyze the significance of the curl operations in Maxwell's differential equations.	4	2	2M
	e	Distinguish between perfect dielectric and lossy medium.	4	3	2M
	f	Define critical angle.	1	3	2M
	g	List the different types of transmission lines.	1	4	2M
	h	Explain the significance of infinite line concept.	2	4	2M
	i	Write the relation between reflection coefficient and VSWR.	2	5	2M
	j	Examine the significance of $\lambda/4$ line?	3	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Develop Poisson's and Laplace's equations starting from Gauss's law.	3	1	5M
		ii) Two point charges $Q_1 = 5.0$ C and $Q_2 = 1.0$ nC are located at $(-1, 1, -3)$ m and $(3, 1, 0)$ m respectively. Calculate the electric field at Q_1 .	4	1	5M
	OR				
	b	i) State and explain Coulomb's law. Obtain an expression in vector form.	2	1	5M
		ii) Explain the concept of Magnetic vector potential.	2	1	5M
3	Unit-II				
	a	i) Write Maxwell's equations for time varying fields in differential and integral form.	2	2	5M
		ii) What is the inconsistency in Ampere's Law? How it is rectified by Maxwell.	2	2	5M
	OR				
	b	i) State and explain Faraday's laws of electromagnetic induction with its integral and point forms.	2	2	5M
		ii) In free space, the magnetic field of an EM wave is given by $\vec{H} = 0.4 \omega \epsilon_0 \cos(\omega t - 50x) \vec{a}_z$ A/m. Find the electric field and displacement current density.	3	2	5M

4	Unit-III				
	a	i) Explain the significances of Poynting theorem and Poynting vector.	2	3	5M
		ii) Analyze wave propagation in a lossy medium and derive the attenuation and phase constants.	4	3	5M
	OR				
	b	i) Develop wave equations for a conducting medium.	3	3	5M
		ii) Analyze the reflection and transmission coefficients for normal incidence on a dielectric boundary.	4	3	5M
5	Unit-IV				
	a	i) A lossy cable which has $R=2.25 \Omega /m$, $L=1.0 \mu H/m$, $C=1 pF/m$ and $G=0$ operates at $f = 0.5 GHz$. Find the attenuation constant of the line.	3	4	5M
		ii) With necessary conditions develop the transmission line equations.	3	4	5M
	OR				
	b	i) Find the Characteristic impedance, propagation constant and velocity of propagation at $f = 100 KHz$ for a lossless transmission line having $L= 33 \mu H/m$ and $C= 10 nF/m$.	3	4	5M
		ii) Develop the conditions for distortion less transmission line.	3	4	5M
6	Unit-V				
	a	i) Develop an expression for the input impedance of a transmission line of length, L .	3	5	5M
		ii) Explain the characteristics and derive the expression for UHF lines as circuit elements	2	5	5M
	OR				
	b	i) A low transmission line of 100Ω characteristic impedance is connected to a load of 300Ω . Calculate the reflection coefficient and standing wave ratio.	4	5	5M
		ii) Explain the significance and utility of $\lambda/8$, $\lambda/4$ and $\lambda/2$ lines.	2	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Regular & Supple. Examinations, April-2026

R23

Sub Code: R23EE2203

POWER SYSTEMS-I

Time: 3 hours

(EEE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	List the factors to be considered for selecting the site of a hydroelectric power plants.	K1	1	2M
	b	Discuss the advantages Electro-static precipitator over mechanical ash precipitator.	K2	1	2M
	c	What is the importance of reflector in nuclear reactor?	K2	2	2M
	d	List the advantages of Pressurized Water Reactor (PWR).	K1	2	2M
	e	What are the Advantages of Gas insulated substations.	K1	3	2M
	f	Give the comparison of outdoor and indoor substations.	K2	3	2M
	g	What is meant by capacitance grading?	K1	4	2M
	h	Give the comparison between DC and AC distribution systems.	K2	4	2M
	i	Define diversity factor and plant capacity factor.	K1	5	2M
	j	Describe different costs of generation.	K1	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	What are the functions of Air preheater and condenser in a thermal power plant? And also draw the layout of thermal power plant.	K2	1	10M
	OR				
	b	i) Explain different types of turbines used in thermal power plants. ii) Draw a pumped storage hydroelectric power plant and discuss the function of each component in it.	K2 K3	1 1	5M 5M
3	Unit-II				
	a	i) What is a Nuclear Reactor? Explain the basic components of Nuclear Reactor?	K2	2	5M
		ii) Write the advantages and disadvantages of a Fast breeder reactor.	K2	2	5M
	OR				
	b	i) What are the functions of moderator and control rods in a nuclear power plant?	K2	2	5M
4	a	ii) Distinguish between thermal and fast reactors and Classify each according to moderator, coolant and fuel utilized.	K3	2	5M
	Unit-III				
	a	i) With suitable diagrams explain the main and transfer bus arrangement.	K2	3	5M
		ii) Write the Comparison of Air insulated substations and Gas insulated substations.	K2	3	5M

	OR				
	b	i) Draw and explain the layout of 33KV/11KV substation.	K3	3	5M
		ii) Explain in detail about constructional aspects of gas insulated substation.	K2	3	5M
5	Unit-IV				
	a	i) A single core, 33kV cable has a conductor diameter of 3.3 cm and a sheath of inside diameter 6.3 cm. The cable has an inner layer of 1.4 cm thick of rubber of dielectric constant 4.9 and rest impregnated refer of dielectric constant 3.3. Find the maximum stresses in the rubber and in the paper.	K3	4	5M
		ii) Derive an expression for the voltage drop for a uniformly loaded distributor fed at one end.	K3	4	5M
	OR				
	b	i) Derive the expression for capacitance of a single core cable.	K3	4	5M
		ii) What is the importance of load power factor in AC distribution?	K2	4	5M
6	Unit-V				
	a	i) A generating station supplied the following loads: 175MW, 110MW, 90MW, 60MW and 7 MW. The station has a maximum demand of 255MW. The annual load factor of the station is 48%, Calculate the number of units supplied annually, the diversity factor and the demand factor.	K3	5	5M
		ii) Briefly explain the fixed cost, semi-fixed cost and running cost.	K2	5	5M
	OR				
	b	i) The annual load duration for of a certain power station cab be considered as a straight line from 22MW to 5MW to meet this load, three turbine-generator units, two rated at 11MW each and one rated at 6MW are installed. Determine the Installed capacity, plant factor, units generated per annum, load factor and utilization factor.	K3	5	5M
		ii) Explain in detail about Block rate tariff and maximum demand Tariff	K2	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Regular & Supple. Examinations, April-2026

R23

Sub Code: R23ME2203

MANUFACTURING PROCESSES

Time: 3 hours

(ME)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	What is shrinkage allowance?	K1	1	2M
	b	Name any two common casting defects.	K1	1	2M
	c	List the three types of flames used in gas welding	K1	2	2M
	d	What does TIG stand for? Mention one advantage of TIG welding.	K1	2	2M
	e	Define rolling operation?	K2	3	2M
	f	What is strain hardening?	K2	3	2M
	g	What is bending operation?	K1	4	2M
	h	What do you mean by spring back?	K1	4	2M
	i	Mention any two industrial applications of Additive Manufacturing.	K1	5	2M
	j	List any two types of materials used in Additive Manufacturing	K1	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Explain the steps involved in making a sand casting with a neat diagram.	K2	1	5M
		ii) What are the different types of patterns? Explain any four with neat sketches.	K2	1	5M
	OR				
	b	i) Describe different types of cores used in casting. Also mention their function.	K3	1	5M
		ii) Explain the function of a riser. Describe the different types of risers used in casting.	K3	1	5M
3	Unit-II				
	a	i) Describe the principle and process of gas welding. List its advantages and limitations.	K2	2	5M
		ii) Describe the principle and process of arc welding. List its advantages and limitations.	K2	2	5M

	OR				
	b	i) Compare TIG and MIG welding processes with respect to process, applications, and limitations.	K3	2	5M
		ii) Describe the Thermit Welding process. What are its major applications?	K3	2	5M
4	Unit-III				
	a	i) Explain the stages of plastic deformation: recovery, recrystallization, and grain growth.	K3	3	5M
		ii) What is strain hardening? How does it affect the properties of a metal?	K3	3	5M
	OR				
	b	i) List and explain any four common forging defects and suggest remedies.	K3	3	5M
		ii) Describe different types of rolling mills and the products obtained from each.	K3	3	5M
5	Unit-IV				
	a	i) What is blanking? How does it differ from piercing? Explain with neat sketches.	K3	4	5M
		ii) Describe the deep drawing process. What are its key applications and limitations?	K3	4	5M
	OR				
	b	i) Differentiate between compound die and progressive die with suitable examples.	K3	4	5M
		ii) What is coining? Describe the process, applications, and advantages.	K3	4	5M
6	Unit-V				
	a	Write the steps in AM and what are the advantages of Additive Manufacturing? List and briefly explain.	K2	5	10M
	OR				
	b	Describe the Stereo Lithography (SLA) process with its principle and applications with neat sketch	K2	5	10M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks
