

R20

II BTECH II SEM

END EXAMINATION QUESTION PAPERS

SUPPLEMENTARY

SEPT.. 2025

II B.Tech II Semester Supple. Examinations, September-2025

Sub Code: R20CE2202

ENGINEERING GEOLOGY

Time: 3 hours

(CE)

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No	Questions	KL	CO	Marks
1	i) Explain the role of importance of geology in civil engineering.	K2	1	[6M]
	ii) Define weathering? Explain frost action and thermal effects in weathering.	K2	1	[8M]
	OR			
	i) What are the Branches of Geology? Explain.	K2	1	[7M]
2	ii) Explain the process of Weathering in Granite.	K2	1	[7M]
	i) What is meant by rock cycle and how does it represents the sequence of formation.	K2	2	[7M]
	ii) What are the types of joints in igneous rocks, sedimentary rocks and metamorphic rocks? Explain.	K2	2	[7M]
	OR			
3	i) Write the physical properties of QUARTZ group of minerals.	K2	2	[6M]
	ii) How sedimentary rocks are formed? Mention the important properties of sedimentary.	K2	2	[8M]
	i) Explain the advantages to study the branch of structural geology? Write and explain various faults with the help of neat sketches.	K2	3	[8M]
	ii) What are the parts of Folds? Give their types with sketches.	K2	3	[6M]
4	OR			
	i) Classify and describe different types of joints in rock with neat sketches.	K2	3	[6M]
	ii) Enumerate the unconformity its types, mechanism and their importance in civil engineering.	K2	3	[8M]
	i) Define focus and epicenter of earthquake? Explain the classification and causes of earthquakes.	K2	4	[7M]
5	ii) Write the importance of seismic refraction methods in civil engineering.	K2	4	[7M]
	OR			
	What is the importance of geophysical methods? Explain the study of magnetic method in civil engineering prospecting?	K2	4	[14M]
	i) Enumerate the objects of dams and various types of dams suitable for achieving different objects.	K2	5	[8M]
5	ii) Explain the influence of geological structures for Tunneling.	K2	5	[6M]
	OR			
	i) What is tunnel? Explain its types, what are their advantages.	K2	5	[7M]
	ii) Discuss geological considerations for a successful reservoir site.	K2	5	[7M]

II B.Tech II Semester Supple. Examinations, September-2025

Sub Code: R20CE2203

STRUCTURAL ANALYSIS

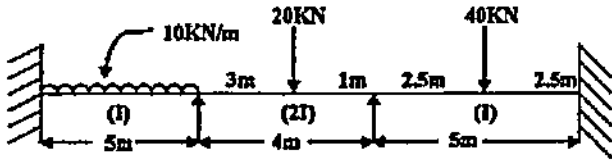
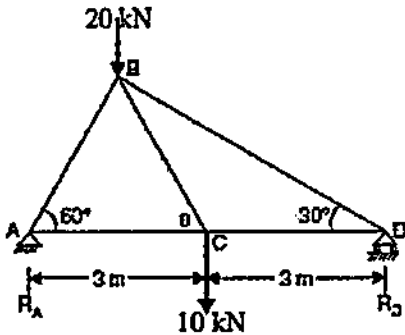
Time: 3 hours

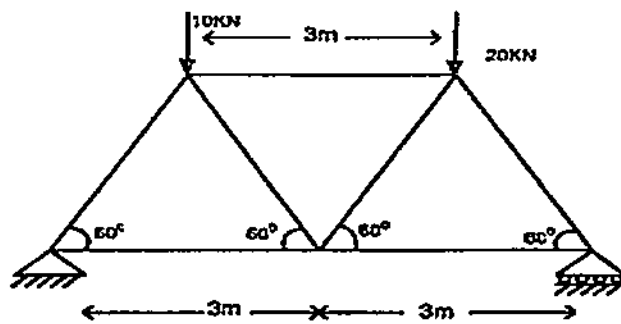
(CE)

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No	Questions	KL	CO	Marks
1	a A propped cantilever of span 9.2m is fixed at one end and propped at the other end and carries a UDL of 12.7kN/m on its whole span. Calculate the prop reaction and draw the shear force and bending moment diagrams.	3	1	14
	OR			
2	b A cantilever of length 5m carries a uniformly distributed load of 1kN/m length over the whole length. The free end of the cantilever is supported on a prop. If $E = 2 \times 10^5 \text{ N/mm}^2$ and $I = 10^8 \text{ mm}^4$, then (i) find the prop reaction (ii) deflection at the centre of cantilever (iii) Magnitude and position of maximum deflection	3	1	14
	OR			
3	a A two span continuous beam ABC is fixed at A and simply supported at C. It is continuous over support B. the span AB=4.8m and span BC=6.1m. The span AB carries a UDL of 9 kN/m and span BC carries a central point load of 11kN. EI is constant for the whole beam. Find the support moment at B and draw the shear force and bending moment diagrams using slope-deflection method	3	2	14
	OR			
3	b Analyse the continuous beam shown in figure. By moment distribution method and sketch shear force and bending moment diagrams.	3	2	14
				
3	a Determine the forces in all the members of the truss shown in Fig	3	3	14
				
3	b Find the forces in all the members of the simply supported truss loaded as shown in fig	3	3	14



4	a	Two point loads of 100 kN and 200 kN spaced 3m apart cross a girder of span 15m from left to right with the 100 kN load leading. Draw the influence line for shear force and bending moment and find the value of maximum shear force and bending moment at a section, 6m from the left hand support. Also, find the absolute maximum moment due to the given load system.	3	4	14
	b	A single rolling load of 100 kN moves on a girder of span 20m. (a) Construct the influence lines for (i) shear force and (ii) bending moment for a section 5m from the left support. (b) Construct the influence lines for points at which the maximum shears and maximum bending moment develop. Determine these values.	3	4	14
5	a	Analyze a continuous beam as shown in figure by flexibility matrix method. Take EI constant throughout.	3	5	14
5	b	Analysis of portal frames by flexibility and stiffness methods. Drawing of bending moment diagram	3	5	14

II B.Tech II Semester Supple. Examinations, September 2025

Sub Code: R20CE2204

STRENGTH OF MATERIALS-II

Time: 3 hours

(CE)

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No	Questions	KL	CO	M
1	Unit-I			
	a i) A rectangular bar is subjected to tensile stress of 200 MPa along the x-direction and compressive stress of 100 MPa along the y-direction. Determine the normal and tangential stresses on an inclined plane making an angle of 30° with the x-axis.	K2	C01	7M
	ii) Explain Maximum Strain Energy and Maximum Shear Strain Energy Theories of Failure with practical applications.	K2	C01	7M
	OR			
	b i) A machine component is subjected to two perpendicular normal stresses of 150 MPa and 80 MPa (both tensile) along with a shear stress of 50 MPa. Determine the principal stresses and their orientation analytically.	K2	C01	7M
2	ii) A steel bar is subjected to a biaxial state of stress: $\sigma_x = 120$ MPa, $\sigma_y = 50$ MPa, $\tau_{xy} = 40$ MPa. Determine the principal stresses and the maximum shear stress using Mohr's circle.	K2	C01	7M
	Unit-II			
	a Derive the torsion equation $T/J = q/r = N\phi/L$ and explain its assumptions. Also, determine the power transmitted by a shaft of diameter 50 mm rotating at 600 rpm if the maximum shear stress is limited to 60 MPa.	K2	C02	14M
	OR			
3	b i) A shaft is subjected to a torque of 15 kN.m and a bending moment of 10 kN.m. Determine the equivalent twisting moment and equivalent bending moment.	K2	C02	7M
	ii) Explain the behavior of closely coiled helical springs under axial loading.	K2	C02	7M
	Unit-III			
3	a Derive Euler's formula for the critical load of a long column with both ends hinged. A steel column of length 3 m and diameter 150 mm is hinged at both ends. Determine the critical load, assuming $E = 200$ GPa.	K3	C03	14M
	OR			
	b i) Derive the Secant formula for eccentrically loaded columns.	K3	C03	7M
	ii) Explain the Rankine-Gordon formula for columns and its practical applications.	K3	C03	7M
4	Unit-IV			
	a A masonry retaining wall of trapezoidal cross-section is subjected to a horizontal earth pressure. Determine the stresses developed at the base due to direct and bending stresses.	K3	C04	14M
	OR			
4	b i) A circular chimney of diameter 2.5 m and height 40 m is subjected to a	K3	C04	7M

		wind pressure of 2 kN/m^2 . Determine the maximum and minimum stresses at the base due to direct load and bending moment.			
		ii) Explain a section's core concept and its significance in designing retaining walls.	K3	C04	7M
5	Unit-V				
	a	i) Explain the importance of centroidal principal axes in unsymmetrical bending.	K2	C05	7M
		ii) Explain the concept of shear center and determine the shear center for an unequal angle section.	K3	C05	7M
	OR				
	b	i) Derive expressions for deflection in beams subjected to unsymmetrical bending and explain their applications.	K3	C05	7M
		ii) Determine the shear center for an L-section.	K2	C05	7M

II B.Tech II Semester Supple. Examinations, September-2025

Sub Code: R20EE2203

CONTROL SYSTEMS

Time: 3 hours

(EEE)

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No	Questions	KL	CO	Marks
1	a Explain the difference between open loop, closed loop system and write the advantages and features of transfer function.	2	CO1	6M
	Using block diagram reduction technique find closed loop transfer function of the system whose block diagram is shown in fig.	3	CO1	8M
	OR			
	Explain the following terms w.r.t closed loop control systems i. Plant ii. Reference input iii. Error detector iv. Feedback path elements v. Controller.	2	CO1	6M
2	b Obtain the Transfer Function of the SFG shown below, using Mason's gain formula.	3	CO1	8M
2	a Obtain the response of unity feedback system whose open loop transfer function $G(s) = \frac{4}{s(s+5)}$ and when the input is unit step	3	CO2	7M
	Derive expressions for the steady state errors of type - 0, type - 1 and type - 2 systems excited by a unit - parabolic input	2	CO2	7M
2	OR			
	b Derive the time domain specifications of a second order system with unit step input.	3	CO2	7M

		A unity feedback system has an open loop transfer function $G(s) = \frac{10}{s(s+2)}$. Find the rise time, Percentage overshoot, Peak time and settling time for a step input of 12 units	3	CO2	7M
3		Explain the Routh's criteria with an example.	2	CO3	7M
	a	A system $G(s)H(s) = \frac{K}{s(s+2)(s+4)(s+8)}$ has Where K is positive. Determine the range of K for stability.	3	CO3	7M
	OR				
	b	Explain the construction rules for root locus technique	2	CO3	7M
4		Test the stability of the system with the following characteristic equation by Routh's test $s^6 + 2s^5 + 8s^4 + 20s^3 + 16s^2 + 16s + 16 = 0$	3	CO3	7M
	a	Sketch the Bode plot for the following transfer function and determine the system gain K for the gain crossover frequency to be 5 rad/s $G(s) = \frac{Ks^2}{(1+0.2s)(1+0.02s)}$	3	CO4	14M
	OR				
	b	A unity feedback control system has an open loop transfer function given by $G(s)H(s) = \frac{100}{s(s+2)(s+5)}$. Draw Nyquist diagram and determine stability.	3	CO4	14M
5		Define the term state variable. What are the advantages of state space representation?	2	CO5	6M
	a	Obtain a state model for the system described by $T(s) = \frac{Y(s)}{U(s)} = \frac{2s^3 + 7s^2 + 12s + 8}{s^3 + 6s^2 + 11s + 9}$	3	CO5	8M
	OR				
	b	Given the system $\dot{x}(t) = Ax(t) + Bu(t)$ $Y(t) = Cx(t)$ Where $A = \begin{bmatrix} -1 & 1 & 0 \\ 0 & -1 & 1 \\ 0 & 0 & -1 \end{bmatrix}$ $B = \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix}$ $C = [1 \ 0 \ 1]$ Determine the state controllability, output controllability and observability of the system	3	CO5	8M
		Discuss the concept of controllability and observability with an example.	2	CO5	6M

II B.Tech II Semester Supple. Examinations, September-2025

Sub Code: R20EE2204

ELECTRICAL MACHINES-II

Time: 3 hours

(EEE)

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No	Questions	KL	CO	Marks
1	Derive and explain rotating magnetic field in a three-phase induction motor with suitable diagrams.	2	CO1	7M
	a In a 6 pole, 3-phase 50 Hz induction motor with star connected rotor, the rotor resistance per phase is 0.3Ω , the reactance at standstill is 1.5Ω per phase and an e.m.f. between the slip rings on open circuit is 175V. Calculate: i) Slip at a speed of 960 rpm ii) Rotor e.m.f. per phase	3	CO1	7M
	OR			
	b A cage induction motor has a short circuit current of 5 times the full load value and has a full load slip of 3%. Calculate a suitable auto transformer ratio for starting this motor when the supply current is not to exceed 2.5 times the full load current. Also, find the starting torque in terms of the full load torque.	3	CO1	7M
	Explain the phenomenon of crawling on 3-phase induction motor.	2	CO1	7M
2	a i) A three-phase squirrel cage induction motor has a short-circuit current of 5 times the full-load current. Its full-load slip is 5%. Estimate the starting torque as a percentage of full-load torque if the motor is started by i) DOL starter ii) Star Delta Starter.	3	CO2	7M
	Explain pole changing method of Speed control of induction motor.	2	CO2	7M
	OR			
	b Analyse two and three lead connections of ac dynamic braking of three phase induction motor	3	CO2	7M
	Justify the firing angle of inverter improves the torque and efficiency of a slip ring induction motor using Slip power recovery scheme	3	CO2	7M
3	a Explain the equivalent circuit of a single phase induction motor with neat sketch.	2	CO3	7M
	Explain why single-phase induction motor is not self-starting and enlist types of single-phase motors.	2	CO3	7M
	OR			
	b Explain various methods of starting methods of single phase induction motor.	2	CO3	7M
	Analyze the operation of single-phase induction motor by double-field revolving theory.	3	CO3	7M
4	a Derive the expression for emf induced per phase in a three phase alternator	2	CO4	7M
	Estimate direct and quadrature-axis reactances of a salient-pole synchronous machine using slip test	2	CO4	7M
	OR			
	b Analyze the armature reaction of an alternator at different power factors.	3	CO4	7M
	A 9 kVA, 208 V, 1200 rpm three phase, 60 Hz star-connected generator has a field winding resistance of 4.5Ω . The armature impedance is $(0.3 + j0.5) \Omega$ per phase. When the generator operates at full load and 0.8 pf lagging, the field winding current is 5 A. Its rotational losses is 500W. Determine i) voltage regulation ii) efficiency of alternator	3	CO4	7M

5	a	What is Synchronous Condenser and explain its purpose in detail.	2	CO5	7M
		A three phase, 400V, 50 Hz 37.3 kW, star connected synchronous motor has a full-load efficiency of 88%. The synchronous impedance of motor is $(0.2+j1.6) \Omega/\text{phase}$. If the excitation of the motor is adjusted to give a leading power factor of 0.9, calculate i) the induced emf ii) total mechanical power developed.	3	CO5	7M
	OR				
	b	Discuss in detail about starting of synchronous motors with the help of external prime mover.	2	CO5	7M
		Explain about variation of current and power factor with excitation of a synchronous motor.	2	CO5	7M

II B.Tech II Semester Supple. Examinations, September-2025

Sub Code: R20ME2203

MANUFACTURING TECHNOLOGY

Time: 3 hours

(ME)

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No	Questions	KL	CO	Marks
1	a i) Explain different types of patterns used in foundry and list their applications.	K2	CO1	7M
	ii) Discuss the various casting defects and suggest suitable remedies.	K4	CO1	7M
	OR			
	b Explain the steps involved in manufacturing of plastic components using blow moulding and injection moulding processes with neat sketches.	K3	CO1	14M
2	a Explain in detail the principle, equipment, and procedure of Arc Welding.	K3	CO2	14M
	OR			
	i) Describe different types of welds and welding joints with neat sketches.	K2	CO2	7M
	ii) What are the common welding defects? Discuss their causes and remedies.	K4	CO2	7M
3	a i) Explain the principle and applications of spot welding and seam welding with neat diagrams.	K3	CO3	7M
	ii) Differentiate between TIG and MIG welding processes.	K4	CO3	7M
	OR			
	i) Write short notes on Plasma Arc Welding.	K3	CO3	7M
4	a ii) Write short notes on Thermit Welding.	K2	CO3	7M
	i) Explain the process of open-die forging and closed-die forging with neat sketches.	K4	CO4	7M
	ii) What are rolling mill arrangements? Explain briefly with sketches.	K3	CO4	7M
	OR			
5	b i) Explain recovery, recrystallization, and grain growth in metal forming.	K4	CO4	7M
	ii) Differentiate between hot working and cold working processes.	K4	CO4	7M
	a i) Describe forward extrusion and backward extrusion processes with neat sketches.	K3	CO5	7M
	ii) Explain the tube drawing process with neat sketches.	K3	CO5	7M
5	OR			
	b i) Explain the principle, process, and advantages of hydrostatic extrusion.	K4	CO5	7M
	ii) Write a note on wire drawing process.	K2	CO5	7M

II B.Tech II Semester Supple. Examinations, September-2025

Sub Code: R20ME2204

APPLIED THERMODYNAMICS

Time: 3 hours

(ME)

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No	Questions	KL	CO	Marks
Unit 1				
1	a Differentiate between an air standard cycle and an actual cycle of an internal combustion engine.	K2	CO1	7M
	b Explain the concepts of valve timing and port timing in internal combustion engines. Draw and label a simple valve timing diagram for a four-stroke engine.	K2	CO1	7M
	Or			
	b Explain the working principle of a carburetor. Describe its role in mixing air and fuel for a spark-ignition engine.	K2	CO1	7M
	b Differentiate between a supercharger and a turbocharger in IC engines. Discuss their power source, efficiency, and applications.	K2	CO1	7M
Unit 2				
2	a Explain the four stages of combustion in a compression-ignition engine and the significance of the delay period.	K2	CO2	7M
	a Define abnormal combustion in S.I. engines. Explain pre-ignition and knocking.	K2	CO2	7M
	Or			
	b Explain the four stages of combustion in a compression-ignition engine and the significance of the delay period.	K2	CO2	7M
	b Describe the types of combustion chambers in C.I. engines?	K2	CO2	7M
Unit 3				
3	a Explain the parameters of performance of an internal combustion engine and describe the methods of measuring cylinder pressure, fuel consumption, and air intake.	K2	CO3	14M
	Or			
	b A four stroke gas engine has a cylinder diameter of 25 cm and stroke 45 cm. The effective diameter of the brake is 1.6 m. The observations made in a test of the engine were as follows. Duration of test = 40 min; Total number of revolutions = 8080 ; Total number of explosions = 3230; Net load on the brake = 80 kg ; mean effective pressure = 5.8 bar; Volume of gas used = 7.5 m ³ ; Pressure of gas indicated in meter = 136 mm of water (gauge); Atmospheric temperature = 17 C; Calorific value of gas = 19 MJ/ m ³ at NTP; Temperature rise of cooling water = 45 C; Cooling water supplied = 180 kg. Draw up a heat balance sheet and find the indicated thermal efficiency and brake thermal efficiency. Assume atmospheric pressure to be 760 mm of mercury.	K3	CO3	14M
Unit 4				
4	a Classify compressors and explain the main difference between positive displacement and dynamic (rotodynamic) compressors with examples.	K2	CO4	7M
	a Explain the construction and working principle of a Roots blower (rotary positive displacement compressor).	K2	CO4	7M
	Or			
	b Describe the construction and working principle of a vane-type rotary compressor.	K2	CO4	7M

		Explain the working principle of a Lysholm screw compressor and comment on its efficiency considerations.	K2	CO4	7M
		Unit 5			
5	a	Differentiate between a rotary (radial/centrifugal) compressor and an axial flow compressor.	K2	CO5	7M
		List and explain any four losses that occur in a centrifugal compressor	K2	CO5	7M
		Or			
	b	Briefly describe the working principle and construction of an axial flow compressor.	K2	CO5	7M
		Draw and neatly label the velocity triangle (velocity diagram) of an axial flow compressor stage.	K3	CO5	7M

II B.Tech II Semester Supple. Examinations, September-2025

Sub Code: R20EC2202

INTERNET OF THINGS

Time: 3 hours

(ECE)

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No	Questions	KL	CO	Marks
1	a i) Explain the characteristics of IOT and applications of IOT.	K4	1	7
	ii) Explain communication models of IOT with a block diagram.	K4	1	7
	OR			
	b i) Analyze the IOT level 6.	K2	1	7
	ii) Explain in detail about IOT enabling technologies (wireless sensor network, communication protocol, embedded systems)	K4	1	7
2	a i) Summarize the steps involved in designing of an IOT system or application.	K2	2	7
	ii) Choose an example of smart city automation, explain the devices considered and component integration.	K3	2	7
	OR			
	b i) Choose an example of home automation, derive purpose and requirement specification.	K3	2	7
	ii) Explain service specification and IOT level specification.	K4	2	7
3	a i) Determine what is M2M, explain in detail.	K3	3	7
	ii) Interpret software defined networking (SDN) in detail.	K2	3	7
	OR			
	i) Explain Network function virtualization (NFV) and key elements of NFV.	K4	3	7
	ii) Distinguish between M2M and IOT.	K4	3	7
4	a i) Compare and contrast the functionality, power consumption, application areas of microcontrollers and SOC's.	K2	4	7
	ii) Interpret the role of sensors and actuators in embedded systems.	K2	4	7
	OR			
	b i) Distinguish between raspberry pi and beagle bone black.	K4	4	7
	ii) Explain the development environment that you would setup for raspberry pi.	K4	4	7
5	a i) Determine and explain sensors that can be used in home automation.	K3	5	7
	ii) Experiment on an intelligent parking management system. Explain what types of sensors, communication protocols to be considered.	K3	5	7
	OR			
	b Choose an agricultural application of IOT, explain it in detail.	K3	5	14

II B.Tech II Semester Supple. Examinations, September-2025

Sub Code: R20EC2203 ANALOG AND DIGITAL COMMUNICATIONS

Time: 3 hours

(ECE)

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No	Questions	KL	CO	Marks
Unit- I				
1	Explain how switching modulator is used to generate AM wave.	2	1	[8]
	Using the message signal $m(t)$, determine and sketch the modulated wave for amplitude modulation whose percentage modulation equals the following values: (a) 50 percent (b) 100 percent (c) 125 percent Where $m(t)$ is $m(t) = \frac{t}{1 + t^2}$	3	1	[6]
	OR			
	Derive the figure of merit for an AM system with envelope detection and compare it with that of an FM system.	2	1	[10]
	When the modulation percentage is 50, an AM transmitter produces 5KW. Calculate the carrier power. What would be the percentage power saving if the carrier and one of the side bands were suppressed?	2	1	[4]
Unit- II				
2	Derive the expression for FM signal from fundamentals and differentiate narrow band FM and wide band FM.	2	2	[7]
	Why is the TRF (Tuned Radio Frequency) receiver not suitable for high-frequency applications? Discuss its limitations in terms of selectivity and sensitivity.	2	2	[7]
	OR			
	Compare the operation of FM Receiver with AM Receiver.	2	2	[7]
3	With neat diagram explain the two methods of producing an FM wave.	2	2	[7]
	Unit- III			
	Describe the generation and demodulation of PPM with the help of block diagram and hence discuss its spectral characteristics.	2	3	[7]
	Explain how CRC (Cyclic Redundancy Check) detects burst errors more effectively than parity checks. Provide an example polynomial division for CRC-8.	2	3	[7]
4	OR			
	Explain, how a PPM signal can be generated from PWM signal. Compare PAM, PWM and PPM pulse modulation technique.	2	3	[6+8]
Unit- IV				
4	Compare the robustness of ASK, FSK, and PSK in a multipath fading environment. Which technique is most resistant to fading, and why?	3	4	[7]
	Explain the generation and reception of DPSK signals with a neat block diagram.	2	4	[7]

	OR				
	b	Sketch the constellation diagrams for QPSK and 8-PSK. How does increasing the number of phases impact bandwidth efficiency and error performance?	2	4	[14]
	Unit- V				
5	a	Explain the importance of hamming codes? Discuss the error correction and detection capability of hamming code.	2	5	[10]
		Consider five symbols given by the probabilities 1/2, 1/4, 1/8, 1/16, 1/16. Use Shannon-Fano algorithm to develop an efficient code and for that code, calculate the average number of bits/symbol.	3	5	[4]
	OR				
	b	Explain the working of CRC (Cyclic Redundancy Check) with an example.	2	5	[7]
Describe the role of parity check in error detection? Illustrate with examples.		2	5	[7]	

II B.Tech II Semester Supple. Examinations, September-2025

Sub Code: R20EC2204

ELECTRONIC CIRCUITS AND PULSE CIRCUITS

Time: 3 hours

(ECE)

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No.	Questions		KL	CO	Marks
1	a	i) Determine the Current gain, Voltage Gain, Input and Output impedance expressions of CE Hybrid Model?	K5	CO1	7M
		ii) Determine various expressions of Common Source FET Amplifier with neat sketches.	K5	CO1	7M
	OR				
	b	i) For a Darlington Pair transistor amplifier circuit, determine R_i , A_i , A_v and R_o . Where $h_{ie} = 1.1K$, $h_{fe} = 50$, $h_{re} = 2.5 \times 10^{-4}$, $h_{oe} = 25 \mu A/V$.	K5	CO1	7M
		ii) Analyze the various expressions of CE short circuit current gain?	K4	CO1	7M
2	a	Summarize the properties of negative feedback in amplifiers. How does it improve the performance of an amplifier?	K4	CO2	14M
	OR				
	b	Determine Expression of Frequency of Oscillations of RC Phase Shift Oscillator?	K5	CO2	14M
3	a	i) Summarize the working of Transformer coupled Class A amplifier with neat sketches.	K2	CO3	7M
		ii) Analyze the working of a Class B push-pull amplifier with neat sketches.	K4	CO3	7M
	OR				
	b	i) Analyze the working of Class AB amplifier used to reduce crossover distortion.	K4	CO3	7M
		ii) Summarize about Class C and Class D amplifiers.	K2	CO3	7M
4	a	i) Summarize the working of Low Pass RC circuit for Step input?	K2	CO4	7M
		ii) Summarize the working of High Pass RC circuit for sinusoidal input?	K2	CO4	7M
	OR				
	b	i) Explain about Diode Clippers (Any Two) with neat sketches.	K2	CO4	7M
		ii) Outline about the Clamping Circuit theorem.	K2	CO4	7M
5	a	i) Analyze the operation of a Bistable multivibrator with neat sketches.	K4	CO5	7M
		ii) Explain the operation of Schmitt trigger circuit.	K2	CO5	7M
	OR				
	b	i) Analyze the operation of Astable Multivibrator with neat sketches.	K4	CO5	7M
		ii) Explain about various Applications of Monostable Multivibrator?	K2	CO5	7M

II B.Tech II Semester Supple. Examinations, September-2025

Sub Code: R20CC2201 TECHNICAL AND COMMUNICATIVE ENGLISH-II

Time: 3 hours

(ECE)

Max. Marks: 70

Note: Answer All FIVE Questions. All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No	Questions	KL	CO	Marks
Unit-I				
1	a How did Nellie Bly succeed in getting approval for her world tour? Illustrate Bly's efforts and perseverance in achieving this goal.	3	1	14M
	OR			
	b I). Is business manager's response to Bly's proposal acceptable? Why/why not? II). Construct two sentences using each of the following structures. i. Sub+verb+adjective+object ii. Sub+verb+preposition+object iii. Sug+verb+adverb	3	1	8M
Unit-II				
2	a I). Compare and contrast the teaching methods maintained by Mary Smith and Mr. Ellis II). Fill in the blanks with appropriate articles/zero article: i) This painting is of.....Western Ghats.. ii) He believes in.....Bhagvat Gita. iii) I saw.....European at the temple. iv) I have-----white car. v)It's inspiring story. vi) man is mortal.	3	1	8M
	OR			
	b I). Describe the qualities of Mary Smith that inspired the author very much. II). Form six interrogative sentences using the question words, "What, who, why, when, where and which".	3	1	8M
Unit-III				
3	a What are the methods and tools used by a company with distributed workforce to connect its employees?	3	1	14M
	OR			
	b Summarize the changes that have been adopted by the employees in the modern workplace environment. Discuss the advantages and disadvantages of this changed workplace environment.	3	1	14M
Unit-IV				
4	a Name some of the predictions of H.G.Wells on advancement of technology? Did technological advancement really help mankind to lead their lives happily? Substantiate your answer.	3	2	14M
	OR			
	b I).What made H.G.Wells realize that there can be no static future Utopia? Elaborate this concept with reference to his novels. II). Write the antonyms for the following words. i) Success ii) Uniformity iii) exclusively iv) Obstacle v) Haste vi) Vanish	3	2	8M
		3	4	6M

	Unit-V				
5	a	I). What is cultural diversity? How do people maintain cultural sensitivity?	3	1	6M
		II). Compose an analytical essay in 200 words on "Advantages and Disadvantages of Social Media"	6	2	8M
	OR				
	b	What can you infer about the narrator's personality based on the reading on the text? How did her experiences impact her?	3	1	14M

II B.Tech II Semester Supple. Examinations, September-2025

Sub Code: R20CC2202

COMPLEX VARIABLES, PROBABILITY AND STATISTICS

Time: 3 hours

(EEE&ME)

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No	Questions	KL	CO	Marks
1	a I) Identify whether the function $f(z) = \sqrt{ xy }$ is analytic or not at the origin although Cauchy-Riemann equations are satisfied at that point.	3	1	7M
	II) Construct the analytic function whose real part is $u = \frac{x}{x^2 + y^2}$.	3	1	7M
	OR			
	b Show that $w = \log z$ is analytic everywhere except at origin and find $\frac{dw}{dz}$.	3	1	7M
2	a I) Evaluate $\int_C \frac{e^{2z}}{(z-1)(z-2)} dz$ Where C is the circle $C: z =3$ using Cauchy's Integral Formula.	5	2	7M
	II) Evaluate $\int_C \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)^2(z-2)} dz$ Where C is the circle $C: z =3$ using Residue Theorem.	5	2	7M
	OR			
	b I) Construct the Laurent's series expansion for the function $f(z) = \frac{1}{(z-1)(z-3)}$ in the region $0 < z-1 < 2$	3	2	7M
3	a II) Determine the Taylor's series, expansion of $f(z) = \frac{2z^3+1}{z^2+z}$ about the point i) $z=1$, ii) $z=i$.	5	2	7M
	I) A businessman goes to hotels X, Y, Z ; 20% , 50% , 30% of the time respectively. It is known that 5%, 4%, 8% of the rooms in X, Y, Z hotels have faulty plumbing. Determine the probability that businessman's room having faulty plumbing is assigned to hotel Z.	5	3	7M
	II) If the masses of 300 students are normally distributed with mean 68kgs and standard deviation 3kgs, using these how many students have masses i) Greater than 72 Kg ii) Less than or equal to 64 Kg iii) Between 65 and 71kg inclusive.	3	3	7M
	OR			
	b I) Out of 800 families with 5 children each, identify how many would you expect to have a) 3 boys b) 5 girls c) either 2 or 3 boys? Assume equal probabilities for boys and girls	3	3	7M

		II)A continuous random variable has the probability density function. $f(x)=\begin{cases} Kxe^{-x}; & \text{if } x \geq 0, >0 \\ 0; & \text{otherwise} \end{cases}$ Determine the constant K, find mean and variance	5	3	7M																											
4	a	I) Determine the size of the smallest sample required to estimate an unknown proportion to within a maximum error of 0.06 with at least 95% confidence.	5	4	7M																											
		II)The mean and standard deviation of a population are 11,795 and 14,054 respectively. What can you assert with 95% confidence about the maximum error if sample mean is 11,795 and n=50 and using these constructs 95% confidence interval for true mean.	3	4	7M																											
	OR																															
	b	I) Find 95% confidence limits for the mean of a normality distributed population from which the following sample was taken 15, 17, 10, 18, 16, 9, 7, 11, 13, 14.	3	4	7M																											
II) A random sample of size 81 was taken whose variance is 20.25 and mean is 32. Determine 98% confidence interval.		5	4	7M																												
5	a	I) In a sample of 1000 people in Karnataka, 540 are rice eaters and the rest are wheat eaters can we assume that both rice and wheat are equally popular in this state using at 1% of level of significance	3	5	7M																											
		II) Random samples of 400 men and 600 women were asked whether they would like to have a flyover near their residence. 200 men and 325 women were in favor of the proposal. Using test, the hypothesis that proportions of men and women in favor of the proposal are same, at 5% level.	3	5	7M																											
	OR																															
	b	I) In one sample of 8 observations the sum of squares of deviations of the sample values from the sample mean was 84.4 and other sample of 10 observations it was 102.6. Using test whether this difference is significant in variances at 5% level	3	5	7M																											
		II) From the following data Identify whether there is any significant taking in the habit of taking soft drink among the category's employees.	5	5	7M																											
		<table border="1"> <thead> <tr> <th rowspan="2"></th> <th colspan="3">Employee's</th> <th rowspan="2">Total</th> </tr> <tr> <th>Clerks</th> <th>Teachers</th> <th>officers</th> </tr> </thead> <tbody> <tr> <td>Pepsi</td> <td>10</td> <td>25</td> <td>65</td> <td>100</td> </tr> <tr> <td>Thums up</td> <td>15</td> <td>30</td> <td>65</td> <td>110</td> </tr> <tr> <td>Sprite</td> <td>50</td> <td>60</td> <td>30</td> <td>140</td> </tr> <tr> <td>Total</td> <td>75</td> <td>115</td> <td>160</td> <td>350</td> </tr> </tbody> </table>		Employee's			Total	Clerks	Teachers	officers	Pepsi	10	25	65	100	Thums up	15	30	65	110	Sprite	50	60	30	140	Total	75	115	160	350		
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Sprite	50	60	30	140																												
Total	75	115	160	350																												

II B.Tech II Semester Supple. Examinations, September-2025

Sub Code: R20CC2203

DATABASE MANAGEMENT SYSTEMS

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No	Questions	KL	CO	Marks
1	a Describe the structure of database systems and explain how they provide a shared repository of data for various applications.	2	1	14
	OR			
	b Discuss the different views of data in a database system. How do these views support data independence?	2	1	14
2	a What are the different types of database languages? Explain the role of each type in a database system	2	2	14
	OR			
	b Explain the concept of entities, attributes, and entity sets in ER diagrams. Provide examples to illustrate your answer	2	2	14
3	a i) Explain the concept of nested queries with example	2	3	7
	ii) How NULL values can be disallowed. Explain with example	2	3	7
	OR			
	b Describe the different types of relationships in the ER model (1:1, 1:N, M:N). Explain how these relationships are represented in an ER diagram	2	3	14
4	a Describe the concept of integrity constraints in the relational model. Explain the different types of integrity constraints (primary key, foreign key, unique) and provide examples.	2	4	14
	OR			
	b Define Normalization and explain 1NF, 2NF and 3NF with example	2	4	14
5	a Describe the basic operations of Relational Algebra, including selection, projection, union, intersection, and difference. Provide examples to illustrate each operation	3	5	14
	OR			
	b Explain the Indexed Sequential Access Methods (ISAM) in detail	2	5	14

II B.Tech II Semester Supple. Examinations, September-2025

Sub Code: R20CC2204

SOFTWARE ENGINEERING

Time: 3 hours

(CSE,IT & AI)

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No.	Questions		KL	CO	Marks
1	a	Explain about Incremental Process Model and Spiral model?	K2	CO1	7
		What is the role of feasibility study in requirement engineering process? How it is performed	K3	CO1	7
OR					
1	b)	Illustrate about Functional Requirements and Non-functional Requirements	K3	CO1	14
2	a	Describe the requirements elicitation engineering process	K2	CO2	7
	b	Illustrate class diagram with an example.	K3	CO2	7
OR					
2	a	Discuss about forward and reverse engineering	K2	CO2	7
	b	Explain modeling flow controls by organization	K2	CO2	7
3	Describe state chart diagram and Collaboration with an example		K2	CO3	14
	OR				
4	Discuss about the deployment with modeling client/server system.		K2	CO3	14
	a	Explain about task analysis and modeling	K2	CO4	7
4	b	Discuss about system design principles	K2	CO4	7
	OR				
5	List different architecture styles and explain them		K2	CO4	14
	What is meant by software testing discuss white box testing in detail with suitable example		K3	CO5	14
OR					
5	a	Discus in brief various cost estimation models	K3	CO5	7
	b	Explain Elements of a Configuration Management System	K2	CO5	7

Sub Code: R20CC2210

II B.Tech II Semester Supple. Examinations, September-2025

NUMERICAL METHODS & TRANSFORMATION

Time: 3 hours

(AI&ML,DS & CY)

Max. Marks: 70

Note: Answer All FIVE Questions. All Questions Carry Equal Marks (5X14 = 70M)

Q.No	Questions		KL	CO	M												
1	Unit-I																
	a	i) Find the positive root of the equation $x^3 - x - 11 = 0$ using Bisection method.	3	1	7M												
		ii) Using Newton's Method, identify the approximate root of the equation $x^3 - 3x + 1 = 0$.	3	1	7M												
	OR																
	b	i) Using Newton-Raphson Method, identify the approximate root of the equation $x^4 - x - 9 = 0$	3	1	7M												
		ii) Find the roots of the equation $2x^3 + x^2 - 20x + 12 = 0$. using Bisection method.	3	1	7M												
2	Unit-II																
	a	i) Draw the table of backward differences of the function $f(x) = x^3 - 3x^2 - 5x - 7$ for $x = -1, 0, 1, 2, 3, 4, 5$ and find $f(4.5)$	5	2	7M												
		ii) Find the second difference of the polynomial $x^4 - x^3 + 2x^2 - 30x + 9$ with interval of differencing $h = 2$.	5	2	7M												
	OR																
	b	i) Estimate from following table $f(3.8)$ to three significant figures <table><tr><td>x</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>F(x)</td><td>1</td><td>2</td><td>2.2</td><td>3.1</td><td>4.6</td></tr></table> using Newton backward interpolation formula	x	0	1	2	3	4	F(x)	1	2	2.2	3.1	4.6	5	2	7M
		x	0	1	2	3	4										
F(x)	1	2	2.2	3.1	4.6												
ii) Newton's interpolation formula and use it to calculate the value of $\exp(1.85)$ given the following table <table><tr><td>x</td><td>1.7</td><td>1.8</td><td>1.9</td><td>2.0</td><td>2.1</td><td>2.2</td></tr><tr><td>F(x)</td><td>5.474</td><td>6.050</td><td>6.686</td><td>7.389</td><td>8.166</td><td>9.025</td></tr></table>	x	1.7	1.8	1.9	2.0	2.1	2.2	F(x)	5.474	6.050	6.686	7.389	8.166	9.025	5	2	7M
x	1.7	1.8	1.9	2.0	2.1	2.2											
F(x)	5.474	6.050	6.686	7.389	8.166	9.025											
3	Unit-III																
	a	i) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using Simpson's 1/3 and 3/8 rule.	3	3	14M												
	OR																
	b	i) Use Simpson's 1/3 rule to find $\int_0^{0.6} e^{-x^2} dx$ by taking seven ordinates.	3	3	7M												
ii) Use the Trapezoidal rule to estimate the integral $\int_0^2 e^{x^2} dx$ taking 10 intervals.		3	3	7M													

4	Unit-IV				
	a	i) Express $f(x) = \begin{cases} 1 & \text{for } 0 \leq x \leq \pi \\ 0 & \text{for } x > \pi \end{cases}$ As a Fourier sin integral and hence evaluate $\int_0^{\infty} \frac{1 - \cos(\pi\lambda)}{\lambda} \sin(\pi\lambda) d\lambda$.	5	4	7M
		ii) Find the Fourier cosine transform of e^{-x} .	5	4	7M
	OR				
	b	i) Using finite Fourier transformation, solve $\frac{du}{dt} = \frac{d^2u}{dx^2}$ Given $u(0,t)=u(4,t)=0$ and $u(x,0)=2x$ where $0 < x < 4, t > 0$.	5	4	7M
		ii) Find the Fourier expansion of $f(x) = 2x, 0 < x < 4$.	5	4	7M
5	Unit-V				
	a	i) Find the Laplace transformation of $3 \cosh 5t - 4 \sinh 5t$	3	5	7M
		ii) By using Laplace transform method solve $(D^2+1)x = a \cosh t, x(0)=x'(0)=0$.	3	5	7M
	OR				
	b	A beam is simply supported at its end $x = 0$ and is clamped at the other end $x = l$. It carries a load w at $x = \frac{l}{4}$. Find the resulting deflection at any point.	3	5	14 M

KL: Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Supple. Examinations, September-2025
Sub Code: R20CC2211

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

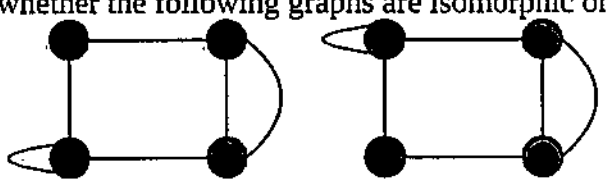
Time: 3 hours

(AI&ML)

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No	Questions	KL	CO	M
1	Unit-I			
	a i) Obtain the Principal disjunctive normal form of $(P \rightarrow Q) \wedge (Q \leftrightarrow R)$.	3	1	7M
	ii) Show that $(P \rightarrow Q) \wedge (R \rightarrow Q) \Leftrightarrow (P \vee R) \rightarrow Q$.	3	1	7M
	OR			
	b i) Construct the truth table for the following statement $(\sim P \leftrightarrow \sim Q) \leftrightarrow (Q \leftrightarrow R)$.	3	1	7M
2	ii) Define tautology. Show that $[(p \rightarrow q) \rightarrow r] \rightarrow [(p \rightarrow q) \rightarrow (p \rightarrow r)]$ is a tautology.	3	1	7M
	Unit-II			
	a i) Show that the following statements constitute a valid argument Every living thing is a plant or an animal. David's dog is alive and it is not a plant. All animals have hearts. Hence, David's dog has a heart.	3	2	7M
	ii) Show that $(\exists x) (P(x) \wedge Q(x)) \Rightarrow (\exists x) P(x) \wedge (\exists x) Q(x)$.	3	2	7M
	OR			
3	b i) Show that $p \rightarrow q, q \rightarrow r, s \rightarrow \neg r, p \wedge s$ are inconsistent.	3	2	7M
	ii) Using mathematical induction prove that, $1.2.3 + 2.3.4 + 3.4.5 + \dots + n(n+1)(n+2) = \{n(n+1)(n+2)(n+3)\} / 4$, for all $n \geq 1$	3	2	7M
	Unit-III			
	a i) Define Minimum Spanning tree. Describe in brief about Kruskal's algorithm with example.	3	3	7M
	ii) Define and give example for the following. (a) Hamiltonian paths (b) Hamiltonian circuits (c) Euler graphs	2	3	7M
4	OR			
	b i) Determine whether the following graphs are isomorphic or not.  G1 G2	3	3	7M
	ii) How many vertices will the graph contain 6 edges and all vertices of degree 3?	3	3	7M
4	Unit-IV			

	a	i) Solve Recurrence relation $a_{n+2} - 2a_{n+1} + a_n = 3n + 5$.	3	4	7M
		ii) Solve the following recurrence relation using characteristic roots. $a_n + 4a_{n-1} + 6a_{n-2} = 0$ and $a_0 = 2, a_1 = -7$	3	4	7M
	OR				
	b	i) Solve $a_n - 9a_{n-1} + 26a_{n-2} - 24a_{n-3} = 0$ for $n \geq 3$ by generating functions.	3	4	7M
		ii) Solve the recurrence relation of Fibonacci series.	3	4	7M
5	Unit-V				
	a	i) 15 males and 10 females are members are seated in a round table meeting. How many ways they can seated if all the females seated together?	3	5	7M
		ii) What is Boolean algebra? Discuss the Laws for Boolean Algebra.	3	5	7M
	OR				
	b	i) How many ways can the letters of the word ALGORITHM be arranged in a row if A and L must remain together as a unit.	3	5	7M
		ii) What is the pigeonhole principle? Discuss the applications of pigeonhole principle and Switching Circuits.	2	5	7M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome M: Marks

II B.Tech II Semester Supple. Examinations, September-2025

Sub Code: R20CS2202

FORMAL LANGUAGES AND AUTOMATA THEORY

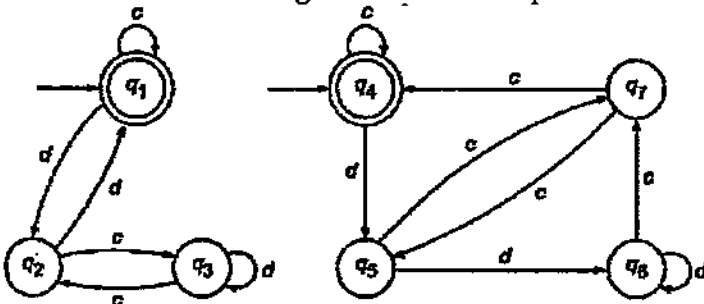
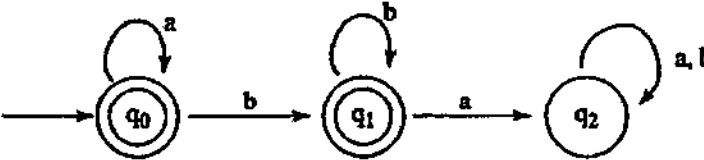
Time: 3 hours

(CSE)

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No	Questions			
1	a	List and explain the components of finite state model with example.	K2	CO1 7M
		Discuss Advantages and Disadvantages of FSM?	K2	CO1 7M
	OR			
	b	Discuss about different Language Operations with Examples.	K2	CO1 7M
		Label the Components and Elements of Finite Automata. Explain in detail.	K2	CO1 7M
2	a	Design a ϵ -NFA for the regular expression $a^*b^*cb^*ac^*b$. Then convert it in to a DFA.	K2	CO2 7M
		Determine whether the two DFAs given below are equivalent or not?	K3	CO2 7M
				
	OR			
	b	Compare and contrast Melay and Moore machines. Give an example for each.	K2	CO2 7M
		Construct the moore machine to determine residue mod 3.	K3	CO2 7M
3	a	Define regular expression. Explain the operations and properties of regular expressions.	K2	CO1 7M
		Discover the regular expression for the below machine.	K4	CO1 7M
				
	OR			
	b	Consider the CFG with {S, A, B} as the non-terminal alphabet, {a, b} as the terminal alphabet, S as the start symbol and the following set of production rules $S \rightarrow ASA \mid aB \mid bA$, $A \rightarrow BB$, $B \rightarrow b \mid \epsilon$. Find a simplified(reduced) grammar equivalent to the above grammar.	K4	CO3 7M
		Plan to write the procedure for converting finite automata to regular grammar with an example.	K3	CO3 7M
		Design a PDA that accepts the language $L = \{WW^R \mid W \in (0+1)^*\}$ and verify the string acceptance by empty stack.	K5	CO2 7M
4	a	Let G be the grammar $S \rightarrow aB bA$, $A \rightarrow a aS bAA$, $B \rightarrow b bS aBB$. For the string 'aabbabab' find derivation tree, rightmost derivation and left most derivation.	K2	CO3 7M

	OR			
	b	Construct the Greibach Normal Form (GNF) for the Context Free Grammar (CFG), $G = (\{A_1, A_2, A_3\}, \{a, b\}, P, S)$ where P consist of : $A_1 \rightarrow A_2 A_3$ $A_2 \rightarrow A_3 A_1 b$ $A_3 \rightarrow A_1 A_2 a$	K3	CO3 7M
		Explain the elements of PDA. Construct PDA for $L = \{0^n 1^m\}$ Where $n, m \geq 1$	K3	CO2 7M
5	a	List the elements of TM's and give the block diagram of TM.	K2	CO2 7M
	a	Determine and construct a Turing machine to recognize the language $\{1^n 2^n 3^n \mid n \geq 1\}$.	K5	CO4 7M
	OR			
	b	Design TM which will recognize strings containing equal number of a's and b's over an alphabet $\{a, b\}$.	K5	CO4 7M
		What are the circumstances under $P = NP$ and $P \neq NP$?	K2	CO3 7M

II B.Tech II Semester Supple. Examinations, September-2025

Sub Code: R20AC2204

OPERATING SYSTEMS

Time: 3 hours

(AI&ML)

Max. Marks: 70

R20

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No	Questions	KL	CO	M
1	Unit-I			
	i) Describe the user view and system view of an operating system. How do they differ? Provide examples to illustrate your answer.	2	1	7M
	ii) Explain the following operating system functions: a • Process Management • Memory Management Provide examples of how these functions are implemented in a modern operating system.	2	1	7M
	OR			
	i) Compare and contrast the following operating system structures: • Simple Structure • Layered Approach Discuss the advantages and disadvantages of each approach.	2	1	7M
	ii) Explain the concept of caching in operating systems. How does caching improve system performance?	2	1	7M
2	Unit-II			
	i) Describe the different states of a process in a computer system. Explain the transitions between these states.	2	2	7M
	Explain PCB in detail	2	2	7M
	OR			
	b Explain the concept of Inter-Process Communication (IPC) mechanisms.	2	2	14M
3	Unit-III			
	i) Describe dining-philosopher problem? Write an algorithm to solve the problem using semaphores?	2	3	7M
	ii) What is Dead lock? Explain various methods to prevent and avoid dead lock	2	3	7M
	OR			
	i) Explain the Critical-Section Problem in process synchronization and explain Peterson's Solution?	2	3	7M
	ii) Explain the readers writers problem and it's solution using semaphores	2	3	7M
4	Unit-IV			
	i) Explain the concept of contiguous memory allocation, including memory allocation and fragmentation. Describe the first-fit, best-fit, and worst-fit algorithms for allocating memory	2	4	7M
	ii) A process requires 10 pages of memory, and the system has a page replacement policy of LRU. If the page reference string is 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, calculate the number of page faults.	3	4	7M
	OR			
	i) Explain the Banker's algorithm for deadlock detection and avoidance	2	4	7M
	ii) Write a detailed note on Virtual Memory		4	7M
5	Unit-V			
	i) Explain the concept of disk scheduling, including FCFS scheduling, SSTF scheduling.	2	5	7M

		ii) Explain the file system structure.	2	5	7M
	OR				
	b	i) What is File system and Explain various Allocation methods?	2	5	7M
		ii) Explain various File access methods.	2	5	7M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

II B.Tech II Semester Supple. Examinations, September-2025

Sub Code: R20DS2203 DATA WAREHOUSING & DATA MINING

Time: 3 hours

(DS)

Max. Marks: 70

R20

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No	Questions	KL	CO	M
Unit-I				
1	a i) What is data Mining? Explain the differences between Knowledge discovery and data mining.	K2	CO1	7M
	ii) Define data mining list applications of data mining?	K2	CO1	7M
	OR			
	b i) Explain data mining as a step-by-step process of knowledge discovery. Mention the functionalities of Data mining.	K2	CO1	7M
	ii) What is data cleaning? Describe the approaches to fill missing values	K2	CO1	7M
Unit-II				
2	a i) Explain in detail about data pre-processing techniques.	K4	CO2	7M
	ii) Given the following measurement for the variable age: 18, 22, 25, 42, 28, 43, 33, 35, 56, 28 Standardize the variables by the following: (i) Compute the mean absolute deviation for age. (ii) Compute the Z-score for the first four measurements.	K4	CO2	7M
	OR			
	b i) Briefly describe various forms of data pre-processing.	K2	CO2	7M
	ii) Summarize Similarity and Dissimilarity between Simple Attributes	K2	CO2	7M
Unit-III				
3	a i) Experiment Multidimensional Data Model with an example.	K3	CO3	7M
	ii) Compare and contrast ROLAP vs. MOLAP vs. HOLAP	K2	CO3	7M
	OR			
	b i) Discuss about star schema and snowflake scheme in detail.	K2	CO3	7M
	ii) Explain data warehouse modelling using data cube by giving 1-Cube, 2-Cube, 3-Cube and 4-Cube and cuboid.	K2	CO3	7M
Unit-IV				
4	a i) What is Classification? Explain the general approach to classification as a two-step process with an example	K2	CO4	7M
	ii) What is Bayesian belief network? Explain in detail?	K2	CO4	7M
	OR			
	b i) Explain decision tree with an example. How are decision trees used for classification?" Why are decision tree classifiers so popular?	K2	CO4	7M
	ii) What is replication and repletion, which decision trees suffer? Explain with suitable example.	K2	CO4	7M
Unit-V				
5	a i) What is frequent itemset generation? Explain	K2	CO5	7M
	ii) Explain basic K-means algorithm with suitable example.	K2	CO5	7M
	OR			
	b i) Discuss FP-Growth Algorithm by giving FP-tree representation.	K2	CO5	7M
	ii) Explain bisecting - K-means algorithm with suitable example.	K2	CO5	7M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Supple. Examinations, September-2025

Sub Code: R20DS2212

SOFTWARE ENGINEERING

Time: 3 hours

(DS)

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No	Questions	KL	CO	M
1	Unit-I			
	a i) Explain the incremental process model along with its advantages and disadvantage.	K2	CO1	7M
	ii) Illustrate the challenges faced in Software engineering.	K2	CO1	7M
	OR			
	b i) Lucidly present the core principles of Software Engineering.	K2	CO1	7M
	ii) With the help of a neat diagram, explain the prototyping model for software development.	K2	CO1	7M
2	Unit-II			
	a i) Explain about Eliciting Requirements. Why is it mandatory?	K2	CO2	7M
	ii) Build different checks to be carried out during requirements validation process.	K3	CO2	7M
	OR			
	b i) Explain the ways and means for collecting the software requirements and how are they organized and represented?	K2	CO2	7M
	ii) Analyse the measures to validate the requirements of software system.	K4	CO2	7M
3	Unit-III			
	a i) Explain the design of class based components.	K2	CO3	7M
	ii) What are the outcomes of design process in software engineering? Give their formats.	K3	CO3	7M
	OR			
	b i) Explain about Designing Traditional Components in detail.	K2	CO3	7M
	ii) How to translate the analysis model into the design model? Explain with an example scenario.	K4	CO3	7M
4	Unit-IV			
	a i) Discuss about White box Testing in detail.	K2	CO4	7M
	ii) What strategies need to be followed for testing object oriented software? Explain them.	K2	CO4	7M
	OR			
	b i) Discuss about Black box Testing in detail.	K2	CO4	7M
	ii) Describe the strategies to be followed in testing WebApps.	K2	CO4	7M
5	Unit-V			
	a i) What is meant by SQA? Discuss in detail SQA activities.	K2	CO5	7M
	ii) Outline Software Metrics and Measurements.	K2	CO5	7M
	OR			
	b i) How does quality assurance differ from software testing? Explain with a suitable example.	K2	CO5	7M
	ii) Demonstrate COCOMO cost model for a Software Project.	K2	CO5	7M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Supple. Examinations, September-2025

Sub Code: R20AI2202

AUTOMATA AND COMPILER DESIGN

Time: 3 hours

(AI)

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No	Questions	KL	CO	Marks
Unit-I				
1	a i) Explain the Conversion of regular expression to NFA with example	K3	1	7
	ii) Compare compiler and an interpreter with the help of suitable examples.	K3	1	7
	OR			
	b i) Design a DFA that accepts the language over $\Sigma = \{a, b\}$ of all strings that contain the sub-string either aa or bb.	K4	1	7
	ii) Consider the Grammar: $G = (\{S, A\}, \{a, b\}, \{S \rightarrow aAa \mid bAb \mid A, A \rightarrow SS\}, S)$ Find the leftmost derivation, rightmost derivation, and parse tree for the string: <i>baabbb</i> .	K4	1	7
Unit-II				
2	a i) Explain the procedure for eliminating ambiguity and eliminating left recursion from a grammar: $E \rightarrow TE', E' \rightarrow +TE' / \epsilon, T \rightarrow FT', T' \rightarrow *FT' / \epsilon, F \rightarrow (E) \mid id$	K3	2	7
	ii) Construct the predictive parse table for the following grammar: $S \rightarrow A$ $A \rightarrow aB \mid Ad$ $B \rightarrow bBC \mid f$ $C \rightarrow g.$	K3	2	7
	OR			
	b i) Compute FIRST and FOLLOW for the grammar: $E \rightarrow TE', E' \rightarrow +TE' / \epsilon, T \rightarrow FT', T' \rightarrow *FT' / \epsilon, F \rightarrow (E) \mid id$	K4	2	7
	ii) What is LR parser? Compare and contrast the different types of LR parsers.	K4	2	7
Unit-III				
3	a i) Compare inherited attributes and synthesized attributes with an example.	K3	3	7
	ii) Explain quadruples, Triples, indirect triples for the expression $a = b * - c + b * - c$ with an example.	K3	3	7
	OR			
	b What are the principles associated with designing calling sequences and the layout of activation records?	K3	3	14
Unit-IV				
4	a i) Explain the following: Translation scheme for checking the type of statements	K3	4	7
	ii) What is Type System? Discuss static and dynamic Checking of types?	K3	4	7
	OR			
	b Write notes on the static storage allocation strategy with example and discuss its limitations?	K3	4	14

Unit-V					
5	a	Explain the following (a) Copy Propagation (b) Dead-Code Elimination (c) Code Motion (d) Reduction in Strength.	K3	5	14
	OR				
	b	Construct DAG for the following basic block: d: = b+c e: = a+b b: =b*c a: = e-d.	K3	5	14

II B.Tech II Semester Supple. Examinations, September-2025

Sub Code: R20IT2202

DESIGN AND ANALYSIS OF ALGORITHMS

Time: 3 hours

(IT)

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No	Questions	KL	CO	Marks
1	a Explain the properties of an algorithm with an example.	2	1	7M
	a Derive the time complexity of matrix multiplication using step count method	3	1	7M
	OR			
	b Explain the asymptotic notations in detail	2	1	14M
2	a Apply quick sort algorithm to sort the list. E, X, A, M, P, L, E in alphabetical order	3	2	7M
	a Write recursive binary search algorithm with an example and analyze time complexity.	3	2	7M
	OR			
	b Explain the strassen's matrix multiplication and derive the time complexity	3	2	14M
3	a What is the solution generated by function Job Sequencing algorithm when $n=6$ ($P_1...P_6$) = (3, 5, 20, 18, 1, 6), and ($d_1...d_6$) = (1, 3, 4, 3, 2, 1).	3	3	7M
	a Apply greedy algorithm to generate single-source shortest path with an example graph. Mention its time complexity.	3	3	7M
	OR			
	b Generate the actions of shortest paths for the given graph from vertex 1 to all remaining vertices. $1 \rightarrow 2=20$, $2 \rightarrow 1=2$, $1 \rightarrow 3=15$, $2 \rightarrow 5=10$, $2 \rightarrow 6=30$, $3 \rightarrow 6=10$, $3 \rightarrow 4=4$, $5 \rightarrow 4=15$, $6 \rightarrow 4=4$, $6 \rightarrow 5=10$.	3	3	14M
4	a Construct a system with multiple devices connected parallel in three stages. The costs of the devices are 25, 10 and 15 respectively. The cost of the system is to be no more than 100. The reliability of each device type is 0.8, 0.7 and 0.4 respectively.	3	4	14M
	OR			
	b Apply dynamic programming to obtain optimal binary search tree for the identifier set (a_1, a_2, a_3, a_4) = (cin, for, int, while) with (p_1, p_2, p_3, p_4) = (1, 4, 2, 1), (q_0, q_1, q_2, q_3, q_4) = (4, 2, 4, 1, 1)	3	4	14M
5	a Discuss the 4 – queen's problem. Draw the portion of the state space tree for $n=4$ queens using backtracking algorithm.	3	5	7M
	a Explain the Graph – coloring problem. And draw the state space tree for $m=3$ colors $n=4$ vertices graph. Discuss the time and space complexity.	3	5	7M
	OR			
	b Explain the FIFO BB 0/1 Knapsack problem procedure with the knapsack instance for $n=4, m=15, (p_1, p_2, p_3, p_4) = (10, 10, 12, 18)$ (w_1, w_2, w_3, w_4) = (2, 4, 6, 9). Draw the portion of the state space tree and find optimal solution	3	6	14M
