LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)

L.B. Reddy Nagar :: Mylavaram-521 230 :: NTR Dist. :: A.P
Approved by AICTE, New Delhi. Affiliated to JNTUK, Kakinada

B.Tech. (VI Semester) (R20) Semester End Examinations (Supplementary) December 2025

TIME TABLE

R20

Time : 02.00 PM to 05.00 PM **A.Y. : 2025-26**

Branch	24-12-2025 (Wednesday)	26-12-2025 (Friday)	27-12-2025 (Saturday)	29-12-2025 (Monday)	30-12-2025 (Tuesday)
				Open Elective-II	Program Elective-II
AI & DS	20CS20-Pattern Recognition	20AD07-Deep Learning	20CS19-Big Data Analytics	20ME83-Operations Research Techniques 20CE82-Disaster Management	20IT01-Software Engineering
ASE	20AE14-Elements of Heat Transfer	20AE15-Flight Dynamics	20AE16-Air Breathing Propulsion	20EC82-Elements of Communication Systems	20AE17-Introduction to Computational Fluid Dynamics 20AE19 - Airport Design
CE	20CE18-Highway Engineering	20CE19-Design of Steel Structures	20CE20-Estimation and Quantity Surveying	20IT84 - Cyber Security and Digital Forensics 20ME81-Renewable Energy Sources	20CE22-Construction Management
CSE	20CS17-Information Security	20CS18-Compiler Design	20CS19-Big Data Analytics	20CE82-Disaster Management 20ME81-Renewable Energy Sources	20CS21-Information Retrieval Systems
CSE (AI & ML)	20CS20-Pattern Recognition	20AD07-Deep Learning	20CS19-Big Data Analytics	20CE82-Disaster Management	20CS25- Software Project Management
ECE	20EC15-Microprocessors and Microcontrollers	20EC16-VLSI Design	20EC17-Microwave Engineering	20ME83-Operations Research Techniques	20EC18 - Image Processing 20EC19-Satellite Communications
EEE	20EE18-Power Systems-III	20EE19-Solid State Drives	20EE20-Basic Micro Processors and Micro Controllers	20AD83 - Introduction to Machine Learning 20IT84 - Cyber Security and Digital Forensics 20AD82-Introduction to Data Science	20EE21 - Intelligent Control Systems 20EE22-Classical and Meta heuristic Optimization Techniques
IT	20CS17-Information Security	20CS18-Compiler Design	20CS19-Big Data Analytics	20CE82-Disaster Management	20IT03 - Digital Image Processing 20IT04-Data Science
ME	20ME17-Heat Transfer	20ME18-CAD / CAM	20ME19-Design of Machine Elements-II	20AD81 - Introduction to Artificial Intelligence 20IT84 - Cyber Security and Digital Forensics 20EE84 - Electric Vehicles	20ME21-Modern Machining Processes

Note: Any omissions or clashes in the time table may please be informed to the Controller of Examinations immediately.

Date: 05-12-2025

CONTROLLER OF EXAMINATIONS

PRINCIPAL

Copy to: 1. Vice-Principal, Deans & HoDs 2. T&P cell, Transport in-charge & Librarian
3. Canteen, PD, Security & Hostels 4. Coordinator-Disciplinary 5. Notice Boards

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LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
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B.Tech. (VI Semester) Supplementary Examinations

20CS20-PATTERN RECOGNITION

(AI&DS and CSE(AI&ML))

Time : 3 hours | Max. Marks: 70

Answer one question from each unit

All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	How can overfitting be prevented in a pattern recognition system?	7M	CO1	L1
(b)	What is the difference between parametric and non-parametric classification methods?	7M	CO1	L1
	(OR)			
2(a)	Consider an e-mail SPAM classification for every incoming e-mail is either a normal e-mail (W1) and junk mail (W2) we have to actions α1 to keep the mail or α2 keep junk mail in dev/null. Select loss function $\lambda(\alpha1 \mid W1) = 0$, $\lambda(\alpha2 \mid W1) = 1$, $\lambda(\alpha1 \mid W2) = 3$ and $\lambda(\alpha2 \mid W2) = 0$. In addition, we have $P(W1) = 0.4$ and $P(W1) = 0.6$. Now vector we have computed $p(x \mid W1) = 0.35$, $p(x \mid W1) = 0.65$. Find the posterior probabilities of $P(W1 \mid x)$, $P(W2 \mid x)$ and conditional-risk or minimum risk classifier $R(\alpha1 \mid x)$ and $R(\alpha2 \mid x)$.	7M	CO1	L3
(b)	In Bayesian Decision Theory, how do prior probabilities and likelihood functions influence classification decisions.	7M	CO1	L3
3(a)	What is the role of the covariance matrix in a multivariate normal distribution?	7M	CO2	L1
(b)	Compare the discriminant functions for the three main cases: identical spherical, identical general, and different covariance matrices.	7M	CO2	L5
	(OR)			
4(a)	What is Bayes decision theory, and how does it apply to classification problems?	7M	CO2	L1
(b)	Define discriminant function, and how is it used in classification.	7M	CO2	L1
5(a)	Why is parameter estimation important in pattern recognition and machine learning?	7M	CO3	L2
(b)	Explain the steps to derive the MLE for the mean of a univariate Gaussian distribution.	7M	CO3	L2
	(OR)			
6(a)	Define the posterior distribution in the context of Bayesian estimation.	7M	CO3	L1
(b)	How do you estimate the parameters (mean and covariance) of a multivariate Gaussian distribution using MLE?	7M	CO3	L2
7(a)	What is a mixture density model, and how is it used in clustering?	7M	CO4	L1
(b)	List out the challenges associated with parameter estimation in mixture models.	7M	CO4	L1
	(OR)			
8(a)	What is the main objective of the K-means clustering algorithm?	7M	CO4	L1
(b)	Dataset: (1,2), (2,1), (4,5), (5,4) Initial centroids: (1,2), (5,4) Perform two full iterations (assignment and update). Show the cluster assignments and updated centroids at each step. State whether convergence is achieved.	7M	CO4	L3
9(a)	How does a Markov process differ from a general stochastic process?	7M	CO5	L2
(b)	What are the key components of a discrete HMM?	7M	CO5	L1
	(OR)			
10(a)	Describe the differences between ergodic and left-right HMMs.	7M	CO5	L2
(b)	Which type of HMM is typically used in speech recognition, and why.	7M	CO5	L2

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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations
20AE14-ELEMENTS OF HEAT TRANSFER
(ASE)

9. 2/2

Time : 3 hours Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Describe the modes of heat transfer.	7M	CO1	L2
(b)	Calculate the rate of heat transfer per unit area through a copper plate of 45 mm thick, whose one face is maintained at 350 ^{0}C and other face at 50 ^{0}C. Take k=370 W/m K.	7M	CO1	L3
	(OR)			
2(a)	State Fourier's law of heat conduction.	4M	CO1	L1
(b)	Formulate the general 3-dimensional heat conduction equation for Cartesian coordinate system.	10M	CO1	L3
3.	Derive the expression for heat flow through a long rectangular fin. Also state its assumptions while deriving the expression.	14 M	CO2	L3
	(OR)			
4(a)	Draw the various types of fin configurations.	7M	CO2	L1
(b)	Develop the expression for critical thickness of insulation for cylinder.	7M	CO2	L3
5(a)	Explain the characteristics of boundary layer formation over a flat plate.	7M	CO3	L2
(b)	A horizontal cylinder 25 mm diameter and 500 mm long is suspended in water at 20°C. Calculate the rate of heat transfer if the cylinder surface is at 60°C. Use the relation $N_u=0.53(GrPr)^{0.25}$. Take Pr=4.3, ρ= 992kg/m^3, μ=2.35kg/m hr, k=0.63 W/mk.	7M	CO3	L3
	(OR)			
6.	A 30 cm long glass plate is hung vertically in the air at 27°C while its temperature maintained at 77°C. Calculate the boundary layer thickness at the trailing edge of the plate. If a similar plate is placed in a wind tunnel and air is blown over it at a velocity of 4 m/s. Estimate the boundary layer thickness at its trailing edge.	14M	CO3	L4
7(a)	Differentiate between Stefan Boltzmann's law and Planck's distribution law.	7M	CO4	L2
(b)	Calculate the following for an industrial furnace in the form of a black body and emitting radiation at 2500 ^{0}C. (i) Monochromatic emissive power at 1.2μm length. (ii) The wavelength at which emission power is maximum. (iii) Maximum emissive power.	7M	CO4	L3
	(OR)			
8(a)	Define the terms 'Black body', 'Grey body' and 'View factor'.	7M	CO4	L1
(b)	Describe the purpose of providing radiation shields.	7M	CO4	L2
9(a)	Classify the exchangers with practical applications.	7M	CO5	L1
(b)	Obtain the expression for LMTD of a parallel flow heat exchanger.	7M	CO5	L3
	(OR)			
10(a)	Distinguish between liquid and immersion cooling methods.	7M	CO5	L2
(b)	The temperature of the case of a power transistor that is dissipating 3W is measured to be 50°C. If the junction-to-case resistance of this transistor is specified by the manufacturer to be 15°C/W, determine the temperature at the junction of the transistor.	7M	CO5	L3

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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

1. 22

20CE18-HIGHWAY ENGINEERING

(CE)

Time : 3 hours Max. Marks: 70

Answer one question from each unit

All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Outline the recommendations given by Jayakar committee for road development in India.	7M	CO1	L2
(b)	Explain the IRC classification of roads in India.	7M	CO1	L2
	(OR)			
2(a)	Compare the three "Twenty-year Road development plan" in India.	7M	CO1	L2
(b)	Write a brief note on: (i) Central Road Fund. (ii) Indian Road Congress (IRC).	7M	CO1	L2
3(a)	Summarize the objectives of highway geometric design. List the various geometric elements to be considered in highway design.	7M	CO2	L3
(b)	Describe ruling, maximum and exceptional gradients.	7M	CO2	L3
	(OR)			
4(a)	Derive an expression for determination of Stopping sight distance.	7M	CO2	L3
(b)	Calculate the safe Stopping sight distance (SSD) on a level road stretch for a design speed of 50 kmph for (i) Two-way traffic on a two-lane road and (ii) Two-way traffic on single lane road. (Assume coefficient of friction as 0.37 and reaction time as 2 sec)	7M	CO2	L3
5(a)	List out the various tests are conducted on subgrade soil to determine field density of soil.	4M	CO3	L1
(b)	Explain the sand replacement method test conducted on given soil sample to determine field density.	10M	CO3	L2
	(OR)			
6(a)	Explain the Penetration test that was conducted on bitumen.	7M	CO3	L2
(b)	Draw a typical cross section of a highway on embankment and show the various flexible pavement layers. List the functions of each.	7M	CO3	L2
7(a)	Discuss briefly the following terms: (i) Mud pumping (ii) Warping cracks.	7M	CO4	L2
(b)	Explain the CBR method of pavement design. How is this method useful to determine thickness of component layer?	7M	CO4	L2
	(OR)			
8.	The initial traffic after completion of construction of a four-lane divided highway is estimated to be 3500 cv per day. Design the flexible pavement for a life of 15 years using the data given below: Design CBR value = 8%, growth rate of traffic = 6.5% p a, Average vehicle damage factor = 4.0. **(Use CBR charts)**	14 M	CO4	L3
9(a)	Outline the consequences of disobeying the traffic rules.	7M	CO5	L2
(b)	Enumerate the different methods of carrying out traffic volume studies.	7M	CO5	L2
	(OR)			
10(a)	Classify various types of traffic signs with neat sketch.	7M	CO5	L2
(b)	Discuss in detail about Road markings.	7M	CO5	L2

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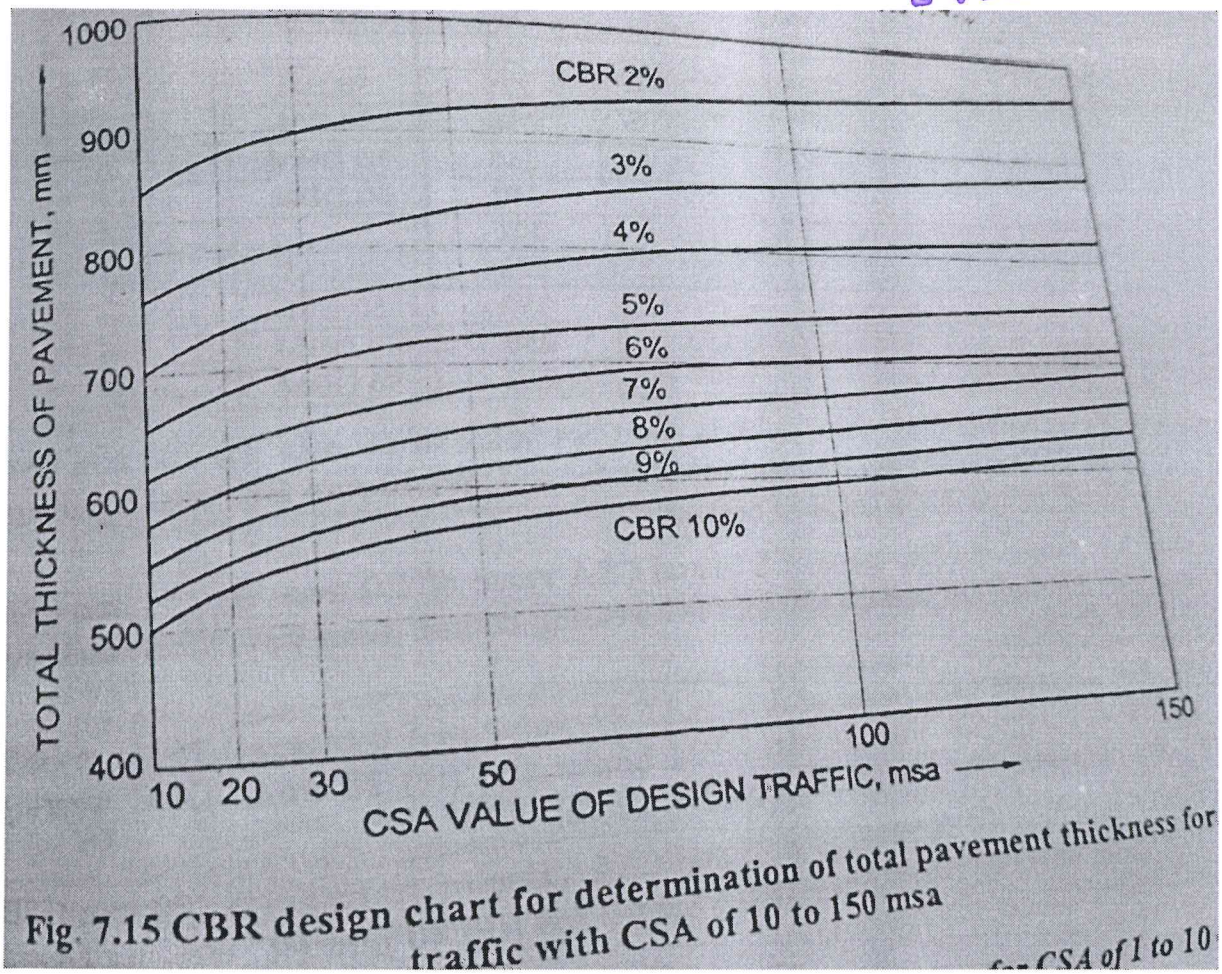

Fig. 7.15 CBR design chart for determination of total pavement thickness for traffic with CSA of 10 to 150 msa

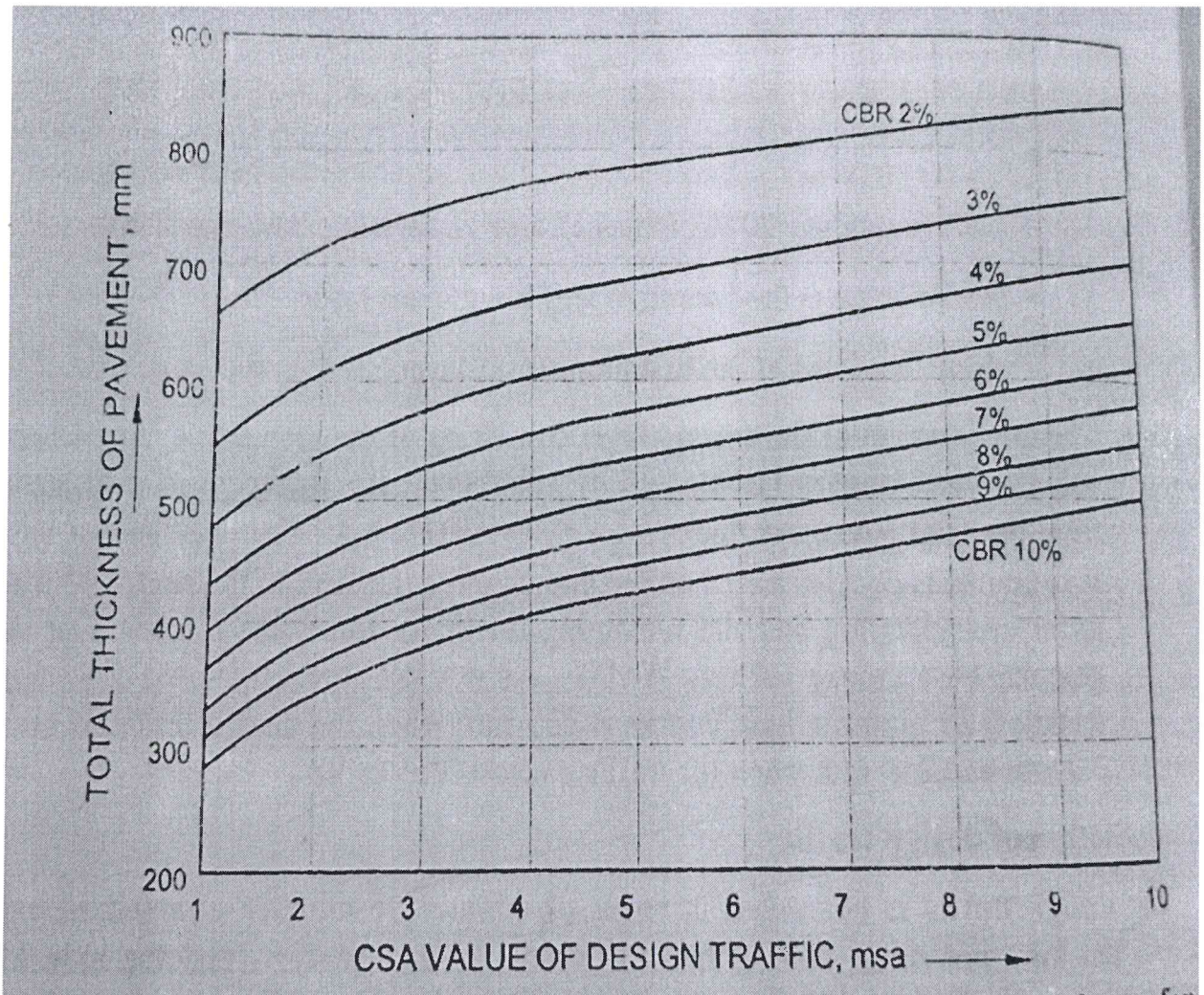

Fig. 7.14 CBR design chart for determination of total pavement thickness for traffic with CSA of 1.0 to 10 msa

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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

20CS17-INFORMATION SECURITY
(CSE & IT)

9, 2 V

Time : 3 hours Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Explain the basic working principle of a block cipher with an example.	7M	CO1	L2
(b)	Differentiate the characteristics of block and stream ciphers.	7M	CO1	L2
	(OR)			
2(a)	Interpret the flow of data through a symmetric cipher using a block diagram.	7M	CO1	L2
(b)	Define cryptanalysis and describe various cryptanalytic attacks.	7M	CO1	L2
3(a)	Outline the X.509 directory authentication service.	7M	CO2	L2
(b)	Identify the key fields in a sample digital certificate and explain their purposes.	7M	CO2	L3
	(OR)			
4(a)	Describe about digital signature algorithm.	7M	CO2	L2
(b)	Summarize the steps involved in HMAC algorithm.	7M	CO2	L2
5(a)	List the services provided by Pretty Good Privacy.	7M	CO3	L3
(b)	Demonstrate how the advantages of Tunnel Mode and Transport Mode address different security requirements in network deployments.	7M	CO3	L2
	(OR)			
6(a)	Discuss S/MIME protocol in detail.	7M	CO3	L2
(b)	Describe key management processes in IP Security.	7M	CO3	L2
7(a)	What is Dual Signature concept in Secure Electronic Transactions (SET)?	7M	CO4	L2
(b)	Illustrate Transport Layer Security (TLS).	7M	CO4	L3
	(OR)			
8(a)	Explain about PIMD, OIMD, POMD in dual signature.	7M	CO4	L2
(b)	List the key differences between TLS and its predecessor, SSL.	7M	CO4	L2
9(a)	Give a real-world example of a trusted system and explain how it maintains user trust.	7M	CO5	L3
(b)	Discuss about statistical anomaly detection and rule-based detection.	7M	CO5	L2
	(OR)			
10(a)	Write about intrusion detection system.	7M	CO5	L2
(b)	Elaborate the working of Distributed Denial of Service (DDoS) attacks.	7M	CO5	L2

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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations
20EC15-MICROPROCESSORS AND MICROCONTROLLERS
(ECE)

9, 22

Time : 3 hours Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Outline the register organization of 8086 microprocessor and mention the special functions of general purpose registers.	7M	CO1	L2
(b)	Draw the block diagram of maximum mode of 8086 operation and describe various functional blocks present in it.	7M	CO1	L3
	(OR)			
2(a)	Write an 8086 Assembler Language Program for comparison of two strings.	7M	CO2	L3
(b)	Illustrate various addressing modes used by the instructions of 8086 with suitable examples.	7M	CO1	L4
3(a)	Explain the interrupts of 8051 microcontroller in detail.	7M	CO1	L2
(b)	List the differences between microprocessor and microcontroller.	7M	CO1	L1
	(OR)			
4(a)	Explain the register structure of 8051 microcontroller.	7M	CO1	L2
(b)	Develop an 8051 Assembler Language Program to perform addition and subtraction on two 32-bit numbers.	7M	CO2	L3
5(a)	What are the main features of ARM architecture?	7M	CO1	L1
(b)	Explain the three stage pipelining implemented in ARM processor.	7M	CO1	L2
	(OR)			
6(a)	List the interrupts and Interrupt Vector Table of ARM7 in detail.	7M	CO3	L1
(b)	Differentiate About ARM processor families.	7M	CO1	L2
7(a)	Develope a program to subtract two 64-bit numbers using ARM instuctions.	7M	CO2	L3
(b)	Develope an assembler program to convert packed bcd number to unpacked BCD no. using ARM instructions.	7M	CO2	L3
	(OR)			
8(a)	Develop an assembler program to divide a 32-bit no. by 16-bit no. and store the quotient and remainder using ARM instructions.	7M	CO2	L3
(b)	Develop a program to multiply two 16-bit numbers using ARM instructions.	7M	CO2	L3
9(a)	Construct a ciruit using LPC2148 to interace 16-leds and develop an Embedded C program to glow LEDs continuosly.	7M	CO4	L3
(b)	Develop an Embedded C program to display "DEPT OF ECE " by interfacing of 16x2 LCD module with LPC2148 ARM microcontroller.	7M	CO4	L3
	(OR)			
10(a)	Consrtuct a circuit to interface a relay to ARM controller-(LPC 2148) and develope a program to operate the relay with constant delay is created between relay switches ON and OFF.	7M	CO4	L3
(b)	Consrtuct an interfacing circuit of a stepper motor with Arm micontroller-LPC 2148 and develop an Embedded C Program to rotate clock wise continuosly.	7M	CO4	L3

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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

20EE18-POWER SYSTEMS-III
(EEE)

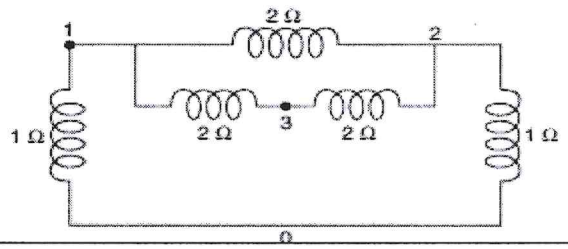
Time : 3 hours | Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Illustrate the procedure for forming admittance bus matrix using Direct Inspection method.	7M	CO1	L2
(b)	Form Ybus Matrix by direct inspection method for the line data of power system network given in table below.	7M	CO1	L3

Line (bus to bus)	Impedance (p.u)
1-2	0.06+j0.18
1-3	0.02+j0.06
2-3	0.04+j0.12

(OR)

2(a)	Discuss the properties of Impedance bus matrix.	4M	CO1	L2
(b)	Develop Z_{bus} matrix for the network shown in Fig. 	10M	CO1	L3
3(a)	Discuss the assumptions made in deriving Fast Decoupled Load flow solution.	4M	CO1	L2
(b)	Illustrate the procedure for solving load flow equations using Fast Decoupled method.	10M	CO1	L2

(OR)

4.	The schedule of active and reactive powers of a 4-bus system is shown in following table.	14M	CO1	L3

Bus	P(p.u)	Q(p.u)	V(p.u)	Bus specification
1	-	-	1.06	slack
2	0.5	-0.2	Not specified	PQ
3	-1.0	0.5	Not specified	PQ

The admittance matrix is

$$Y_{bus} = \begin{bmatrix} 3-j9 & -2+j6 & -1+j3 \\ -2+j6 & 3.666-j11 & -0.666+j2 \\ -1+j3 & -0.666+j2 & 3.666-j11 \end{bmatrix}$$

Assume a flat voltage start; find the voltages and bus angles at the buses at the end of first iteration using G-S method.

5(a)	Derive an expression for transmission loss in terms of loss coefficients (B –coefficients).	7M	CO2	L3

(b)	The incremental fuel costs of two plants are given by $\frac{dF_1}{dP_1} = 22 + 0.1\,P_1$ $\frac{dF_2}{dP_2} = 16 + 0.12\,P_2$ Where F is in Rs/hr and P is in MW. If both units operate at all times and maximum and minimum loads on each unit are 100 MW and 20MW respectively. Determine the economic operating schedule of the plants for a load of 60 MW.	7M	CO2	L3
	(OR)			
6(a)	What is Unit commitment? Distinguish between Unit commitment and Economic dispatch problem.	7M	CO2	L2
(b)	The fuel inputs per hour of plants 1 and 2 are given as $F_1 = 120 + 40P_1 + 0.2P_1^2 Rs/h$ $F_2 = 150 + 30P_2 + 0.25P_2^2 Rs/h$ Determine the economic operating schedule and the corresponding cost of generation if the maximum and minimum loading on each unit is 100 MW and 25 MW, the demand is 180 MW, and transmission losses are neglected. If the load is equally shared by both the units, determine the saving obtained by loading the units as per equal incremental production cost.	7M	CO2	L3
7(a)	Discuss the objectives of load frequency control.	7M	CO3	L2
(b)	Illustrate the steady state analysis of single area power system.	7M	CO3	L2
	(OR)			
8(a)	Derive the mathematical model of generator load system.	7M	CO3	L3
(b)	A 100 MVA 50 Hz turbo alternator operates at no load at 3000 r.p.m. A load of 25 MW is suddenly applied to the machine and the steam valves to the turbine commence to open after 0.6 sec due to the time-lag in the governor system. Assuming inertia constant H of 4.5 MW-sec per MVA of generator capacity, calculate the frequency to which the generated voltage drops before the steam flow commences to increase to meet the new load.	7M	CO3	L3
9(a)	Describe the equal area criterion for transient stability analysis of a system.	7M	CO4	L2
(b)	Define swing curve. Discuss the significance of swing curve.	7M	CO4	L2
	(OR)			
10(a)	Derive the swing equation of a synchronous machine swinging against an infinite bus. Clearly state the assumptions in deducing the swing equation.	7M	CO4	L3
(b)	What is meant by steady state stability limit? Discuss the methods to improve steady state stability limit.	7M	CO4	L2

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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

20AD07-DEEP LEARNING

(AI&DS and CSE(AI&ML))

Time : 3 hours | Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Explain the concept of linear dependence and span with an example.	7M	CO1	L2
(b)	Discuss the properties and types of norms used in vector spaces.	7M	CO1	L2
	(OR)			
2(a)	Identify the trace of a matrix? State and prove any two properties.	4M	CO1	L1
(b)	Describe eigenvalue decomposition and its importance in dimensionality reduction.	10M	CO1	L3
3(a)	Illustrate the structure and function of different layers in a neural network.	7M	CO2	L2
(b)	Discuss the different types of Optimizers.	7M	CO2	L2
	(OR)			
4(a)	Discuss variants of gradient descent algorithm.	7M	CO2	L2
(b)	Describe vanishing gradient and exploding gradient problems.	7M	CO2	L2
5(a)	Discuss the motivation behind using Convolutional Neural Networks over fully connected networks.	7M	CO3	L2
(b)	Describe the convolution operation with an example of how it works on an image.	7M	CO3	L3
	(OR)			
6(a)	How does stride and padding affect the output of a convolution layer?	7M	CO3	L3
(b)	Compare max pooling vs average pooling with diagrams and examples.	7M	CO3	L3
7(a)	Explain the architecture of a traditional Recurrent Neural Network (RNN) with a neat diagram.	7M	CO4	L2
(b)	Demonstrate the applications of deep learning in NLP.	7M	CO4	L3
	(OR)			
8(a)	Discuss the concept of Word Embedding and its importance in NLP.	7M	CO4	L2
(b)	What are the different types of gates that can be used in the LSTM framework? Discuss the functionality of these gates.	7M	CO4	L3
9(a)	Explain the concept of sequence-to-sequence modeling in the context of RNNs.	7M	CO5	L2
(b)	Compare the roles of Autoencoders vs PCA in dimensionality reduction.	7M	CO5	L4
	(OR)			
10(a)	Define Dropout in deep learning? Explain its working with a simple example.	7M	CO5	L3
(b)	Write about Autoencoder with a neat sketch.	7M	CO5	L2

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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

20AE15-FLIGHT DYNAMICS

(ASE)

Time : 3 hours | Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	An aeroplane has a wing loading of 2400 N/m², and its drag equation is $C_D = 0.016 + 0.055\ C_L^2$, calculate its maximum lift to drag ratio.	4M	CO1	L2
(b)	A jet engine airplane has a weight of 30, 000 N and Wing plan form area 30m². Thrust available at sea-level is 4000 N. Maximum lift coefficient is 1.4. Drag polar $C_D = 0.015 + 0.024\ C_L^2$. Assume air density at sea-level is 1.22 kg/m³. Calculate the stall speed, maximum speed and minimum speed in steady level flight.	10M	CO1	L3
	(OR)			
2(a)	Derive the expression for velocity corresponding to minimum power required for steady level flight.	7M	CO1	L3
(b)	Prove that flight velocity for minimum power required is 0.76 times the flight velocity for minimum thrust required in the case of steady level flight.	7M	CO1	L3
3(a)	Define Rate of climb, Range and Endurance of an airplane.	4M	CO2	L2
(b)	A glider is launched from 500 m high hilltop. Following data is available for the glider. Zero drag coefficient is 0.02, Aspect ratio AR = 10 and Oswald efficiency factor e = 0.95. Determine the maximum range of the glider.	10M	CO2	L3
	(OR)			
4(a)	Derive the expressions for radius of turn and turn rate.	7M	CO2	L3
(b)	Explain with Absolute and service ceiling in aircraft performance.	7M	CO2	L2
5(a)	Describe with neat sketches the effect of deflection of each control on roll, pitch and yaw of an aircraft.	7M	CO3	L2
(b)	Derive the expression for Neutral point.	7M	CO3	L3
	(OR)			
6(a)	Derive the Equations of Longitudinal Static Stability.	7M	CO3	L3
(b)	Derive the expression for elevator angle to trim the airplane.	7M	CO3	L3
7(a)	Illustrate various reasons for adverse yaw generation.	7M	CO3	L2
(b)	Explain the contribution of various parts of an airplane to the yawing moment.	7M	CO3	L2
	(OR)			
8(a)	Derive the expression for rolling moment due to aileron using strip theory. Assume the necessary conditions.	7M	CO3	L3
(b)	Illustrate contribution of various parts of an airplane to the rolling moment.	7M	CO3	L3
9(a)	The roots of the longitudinal stability quartic are: -2.57±i 2.63; +0.02 and-0.26. Discuss the types of motion indicated in each mode. What would be the final motion of the airplane.	4M	CO4	L3
(b)	The longitudinal motion of an airplane is described by the following characteristics equation $\lambda^4 - 4.19\lambda^3 + 12.5\lambda^2 + 0.63\lambda + 0.51 = 0$. Determine whether the motion is dynamically stable or unstable.	10M	CO4	L3
	(OR)			
10.	Consider the motion referred to an orthogonal axis set (*oxyz*) with the origin '*o*' coincident with the center of gravity of the aircraft. The components of velocity and force along the axes *ox*, *oy* and *oz* are denoted (*U*, *V*, *W*) and (*X*, *Y*, *Z*) respectively. The components of angular velocity and moment about the same axes are denoted (*p*, *q*, *r*) and (L', M, N) respectively. Derive the expression for The X-force equation of an aircraft.	14M	CO4	L3

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H.T.No										

26 DEC 2025

R20

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)

L.B.Reddy Nagar :: Mylavaram – 521 230 :: NTR Dist.:: A.P.

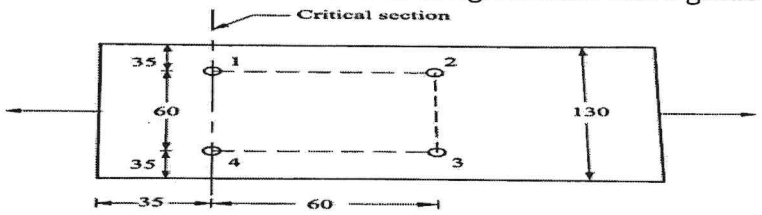
B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

20CE19-DESIGN OF STEEL STRUCTURES

(CE)

Time : 3 hours | Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	List out the types of bolted connections and explain along with neat sketches.	7M	CO1	L2
(b)	Design a lap joint between the two plates each of width 120mm, if the thickness of one plate is 16mm and other is 14mm. The joint has to transfer a design load of 160kN. The plates are of Fe410 grade.	7M	CO2	L4
	(OR)			
2(a)	A 22mm thick plate is joined to a 20mm plate by 220mm long butt weld. Determine the strength of joint if double U butt joint weld is used.	7M	CO1	L3
(b)	Discuss the advantages and disadvantages of bolted connections.	7M	CO1	L2
3.	Design a suitable angle section to carry a factored tensile force of 250Kn. Use 20mm diameter bolts and a gusset plate of 8mm thick.	14M	CO2	L4
	(OR)			
4(a)	Determine the design tensile strength of the plate 120mm x 12mm with holes for 16mm diameter bolts as shown in fig. Assume E250 grade steel. 	7M	CO2	L3
(b)	Calculate compressive resistance for a compound column of a length 5m consisting of ISHB 300@58.8Kg/m. Assume that both ends are restrained in rotation and translation is free.	7M	CO2	L3
5.	Design a laterally unsupported beam for the following data. Effective span 4m, maximum bending moment 550kN.m, maximum shear force 200kN.	14M	CO3	L4
	(OR)			
6.	Design a simply supported beam of span 6m is laterally unsupported. The beam carries a UDL is made up of 20kN/m imposed load and 20kN/m dead load. Assume Fe 410 grade steel.	14M	CO3	L4
7.	A column ISHB 350@666.2 N/m carries an axial compressive factored load of 1700kN. Design a suitable gusset base. The base rests on M15 grade concrete pedestal. Use 24mm dia bolts.	14M	CO3	L4
	(OR)			
8.	Design a built up column consisting of two channels placed toe to toe. The column carries an axial factored load 1150kN. The effective height of column is 5m. Design the lacing also.	14M	CO3	L4
9(a)	Discuss about different types of loads along with standard IS codes.	7M	CO4	L3
(b)	A power plant structure having max dimension more than 70m is proposed to built on downhill side near Zone-3 area. The height of the hill is 500m with a slope of 1 in 3. if the location is 350m from the crest at the hill on downward slope, and its eave board is at height of 10m. Determine design wind pressure.	7M	CO4	L3
	(OR)			
10(a)	Explain the following and write the IS standards (i) Pitch of trusses (ii) Spacing of trusses.	7M	CO4	L3
(b)	A roof truss shed is to be built in a Zone-3 area for an industry. The size of the shed is 24m x 40m. The height of the building is 12m at the eaves. Determine the basic wind pressure.	7M	CO4	L3

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LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
L.B.Reddy Nagar :: Mylavaram – 521 230 :: NTR Dist.:: A.P.

B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

20CS18-COMPILER DESIGN
(CSE & IT)

9.12.25

Time : 3 hours Max. Marks: 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Explain the phases of a compiler with an example of a=b+c*60.	7M	CO1	L2
(b)	What are the cousins of compiler? Explain their role in language processing.	7M	CO1	L1
	(OR)			
2(a)	Explain the role of lexical analyzer phase in the compilation process.	4M	CO1	L2
(b)	Describe the error recovery process strategies with an example.	10M	CO1	L2
3.	Construct a predictive parsing table for the following grammar S→a | b | (T) T→ T,S | S Is the parser LL(1). Show the actions of the parser for the input String (a, b).	14M	CO2	L4
	(OR)			
4(a)	What is recursive decent parsing? Explain with an example.	7M	CO2	L3
(b)	Construct the FIRST and FOLLOW sets for the variables in the following grammar. S→ L = R | R, L→ * R | id, R→ L	7M	CO2	L3
5(a)	Explain various actions performed by shift-reduce parsers with an example.	7M	CO3	L3
(b)	Explain operator precedence parsing with an example.	7M	CO3	L2
	(OR)			
6.	For the following grammar { A^1→ A A→ (A) A→ a (i) Generate LR(1) items (ii) Is the grammar LR(1)? If not why.	14M	CO3	L4
7(a)	Illustrate the syntax Directed Translation (SDT) scheme to construct syntax trees.	7M	CO4	L3
(b)	Explain about S-Attribute & L-Attribute in detail with an example.	7M	CO4	L2
	(OR)			
8(a)	Explain in detail about static allocation storage strategy.	7M	CO4	L2
(b)	Explain in detail about the loop optimization technique with an example.	7M	CO4	L2
9(a)	Explain in detail about peephole optimization technique.	7M	CO5	L2
(b)	Write an algorithm to construct flow graph for finding Sum of N natural numbers.	7M	CO5	L3
	(OR)			
10(a)	Explain in detail about register allocation with an example.	7M	CO5	L2
(b)	What is code optimization? explain the advantages of code optimization.	7M	CO5	L2

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LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)

L.B.Reddy Nagar :: Mylavaram – 521 230 :: NTR Dist.:: A.P.

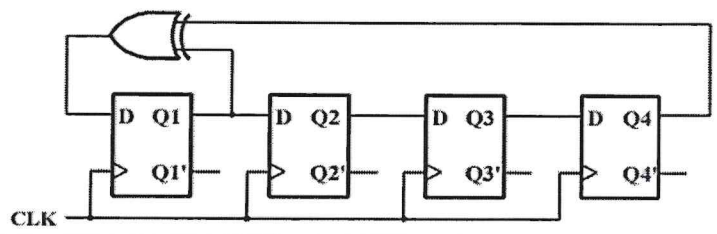
B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

20EC16-VLSI DESIGN

(ECE)

Time : 3 hours | Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	List the advantages of MOS transistor over Bipolar transistors.	7M	CO1	L1
(b)	With a neat diagram explain in detail about the transfer characteristics of CMOS inverter.	7M	CO1	L2
	(OR)			
2(a)	An nMOS transistor is operating in saturation region with V_{GS} =5V, V_{tn} =1.2V, W/L =110, $\mu_n C_{ox}$ =110 μA/V. Calculate transconductance and output resistance.	7M	CO1	L3
(b)	List fabrication steps of nMOS transistor.	7M	CO1	L1
3(a)	Calculate the area capacitance of Metal1, polysilicon, to substrate with the dimensions of L=20λ & W=2λ, given the Relative C value as 0.075 and 0.1, respectively.	7M	CO2	L3
(b)	Estimate the rise time and fall time for CMOS Inverter Delay.	7M	CO2	L3
	(OR)			
4(a)	Explain about CMOS lambda based design rules for wires and transistors.	7M	CO2	L2
(b)	Develop the Layout for CMOS Inverter.	7M	CO2	L3
5(a)	Build 2 * 1 mux using transmission gates.	7M	CO3	L3
(b)	Model the static complementary gate that computes Y=[A+BC]'.	7M	CO3	L4
	(OR)			
6(a)	Draw schematic and explain the operation of 4 bit ALU.	7M	CO3	L2
(b)	Design D Flip-flop using switch logic.	7M	CO3	L3
7(a)	Summarize one stage op-amp topologies.	7M	CO3	L2
(b)	Illustrate conventional band-gap reference circuit.	7M	CO3	L4
	(OR)			
8.	Determine the sensitivity factors for the circuits with necessary diagrams: MOS equivalent PN junction voltage reference and Breakdown diode voltage reference.	14M	CO3	L3
9(a)	Illustrate Stuck-at fault model with an example.	7M	CO4	L4
(b)	Generate the random input test vectors for the given LFSR below with the initial value 0001. 	7M	CO4	L3
	(OR)			
10(a)	Interpret Controllability and Observability in DFT.	7M	CO4	L2
(b)	Explain Signature analysis in BIST with an example.	7M	CO4	L2

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LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)

L.B.Reddy Nagar :: Mylavaram – 521 230 :: NTR Dist.:: A.P.

B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

20EE19-SOLID STATE DRIVES

(EEE)

Time : 3 hours Max. Marks : 70

Answer one question from each unit

All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Analyze the chopper control drive for motoring operation in two quadrant chopper drive with a neat sketch.	7M	CO1	L3
(b)	A 220 volts, 1500 rpm, 10 Amps separately excited DC motor has an armature resistance of 10 Ω. It is fed from a single phase fully controlled bridge rectifier with an ac source voltage of 230 volts, at 50 Hz. Assuming continuous load current, calculate the developed torque at the firing angle of 45⁰ and speed of 1000 rpm.	7M	CO1	L3
	(OR)			
2(a)	Illustrate the speed torque characteristics of single phase fully controlled rectifier fed drive.	7M	CO1	L3
(b)	Analyze regenerative braking and plugging of separately excited DC motor.	7M	CO1	L3
3.	A Three Phase Squirrel cage induction motor drives a fan load. No load rotational losses are negligible. (i) Prove that the rotor current is maximum when the slip is 1/3. (ii) If the motor speed is 1350 rpm and synchronous speed is 1500 rpm, determine the maximum current in terms of its rated current.	14M	CO2	L3
	(OR)			
4(a)	Describe the operation of stator Voltage Control of Induction Motor Drive.	7M	CO2	L2
(b)	Illustrate the operation of Voltage source inverter fed Induction Motor drive.	7M	CO2	L2
5(a)	Mention the advantages and limitations of DC link static Scherbius drive.	4M	CO3	L2
(b)	A 600V, 50Hz, 30KW, 3Φ IM is used as the drive motor in an SER (slip energy recovery) system. It is required to deliver constant (rated) motor torque over the full range from 100 rpm to the rated speed of 1000 rpm. The motor equivalent circuit parameters are R1=0.05Ω, R21=0.07Ω, R0=53Ω, X0=23Ω, X1+X21=0.153Ω. Stator to rotor turns ratio 1.3. Calculate the motor currents, efficiency and power factor at 300 rpm.	10M	CO3	L3
	(OR)			
6(a)	Analyze the improved modified Kramer system in slip power recovery scheme.	7M	CO3	L3
(b)	Illustrate the Static rotor resistance control with a neat sketch.	7M	CO3	L3
7(a)	Illustrate variable frequency control of synchronous motor drive.	7M	CO2	L2
(b)	Distinguish between Self-control and Separate Control methods of synchronous motor drive.	7M	CO2	L2
	(OR)			
8(a)	Explain the self-control mode of synchronous motor drive.	7M	CO2	L2
(b)	Discuss the self-controlled synchronous motor drive by CSI(Current Source Inverter) with a neat diagram.	7M	CO2	L2
9(a)	Analyze the operation of Sinusoidal BLDC Motor Drive.	7M	CO4	L3
(b)	Illustrate the principle of operation of Brushless DC motor drive.	7M	CO4	L3
	(OR)			
10(a)	Distinguish between Brushless DC motor and Brushed DC motor.	7M	CO4	L2
(b)	Analyze the trapezoidal operation of Brushless DC motor drive.	7M	CO4	L3

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LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
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L.B.Reddy Nagar :: Mylavaram – 521 230 :: NTR Dist.:: A.P.

B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

20CS19-BIG DATA ANALYTICS
(AI&DS,CSE,CSE(AI&ML) and IT)

Time : 3 hours Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Explain classification of digital data.	7M	CO1	L2
(b)	Describe characteristics of Big data.	7M	CO1	L2
	(OR)			
2(a)	Illustrate evolution of Big data.	7M	CO1	L2
(b)	Describe the following tools of Hadoop Eco System. (i) HBase (ii) Map Reduce (iii) YARN (iv) Mahout.	7M	CO1	L2
3(a)	Explain Compression techniques in Hadoop.	7M	CO2	L2
(b)	Make use of the HDFS commands to copy data from local file system to HDFS and vice versa, then display file content in HDFS.	7M	CO2	L3
	(OR)			
4(a)	Explain design of HDFS with neat sketch.	7M	CO2	L2
(b)	Discuss data ingestion with Hadoop archives.	7M	CO2	L2
5.	Apply Map Reduce approach to count the frequency of words in large text file.	14M	CO3	L3
	(OR)			
6(a)	Describe data types of Map Reduce.	7M	CO3	L2
(b)	Explain Anatomy of a Map Reduce with neat sketch.	7M	CO3	L2
7(a)	Explain advantages of Sqoop.	4M	CO4	L2
(b)	Create following table in Hive, load data into it from a local file system using HiveQL commands, and then display all records where the state is 'Punjab'.	10M	CO4	L3

CropName	Area	State
Wheat	1250	Punjab
Rice	1800	West Bengal
Maize	950	Karnataka

	(OR)			
8(a)	Explain architecture of Hive with neat sketch.	7M	CO4	L2
(b)	Explain data transfer between relational databases to HDFS using Sqoop with an example.	7M	CO4	L2
9(a)	Describe execution modes of Pig with suitable exmples.	7M	CO5	L2
(b)	Explain Clients of HBase.	7M	CO5	L2
	(OR)			
10(a)	Compare HBase and RDBMS.	7M	CO5	L2
(b)	Make use of the following Piglatin tools to perform analysis on any real-time data (i) Load (ii) ForEach (iii) Group By (iv) Filter.	7M	CO5	L3

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LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
L. B. Reddy Nagar :: Mylavaram – 521 230 :: NTR Dist.:: A.P.

B.Tech. (VI Semester) ~~Regular~~ / Supplementary Examinations

20AE16-AIR BREATHING PROPULSION
(ASE)

Time : 3 hours Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Explain the basic working principle of a gas turbine engine. Using a neat sketch describe the major components of a gas turbine engine and their functions.	7M	CO1	L2
(b)	Explain how a turboprop engine generates thrust and why it is more efficient at lower speeds.	7M	CO1	L2
	(OR)			
2(a)	Describe the working principle of a ramjet engine with a neat sketch and T-S diagram and its operational limitations.	7M	CO1	L2
(b)	Explain the working principle of a SCRAMJET engine with a neat sketch and mention as to how a scramjet differ from a ramjet in terms of airflow and flight speed capability?	7M	CO1	L2
3.	For a flow in a subsonic diffuser, derive the area ratio relation necessary to avoid boundary layer separation.	14M	CO2	L3
	(OR)			
4(a)	Describe the different flow patterns for a subsonic inlet with appropriate sketch and T-S diagrams.	7M	CO2	L2
(b)	Discuss about the type of diffusers used in the Concorde supersonic aircrafts.	7M	CO2	L2
5(a)	Explain the principle of operation of a centrifugal compressor with the help of a schematic diagram.	7M	CO3	L2
(b)	A centrifugal compressor has inlet eye diameter of 16centimeter. It runs at 21,000 rpm and takes air at 117meter per second axial speed. Inlet stagnation conditions are 298 Kelvin and 1.05 bar. Find the blade angle at the inlet and Mach number at the tip of the impeller eye.	7M	CO3	L3
	(OR)			
6(a)	An axial flow compressor has a tip diameter of 0.95 m and a hub diameter of 0.85 m. The absolute velocity of air makes an angle of 288 measured from the axial direction and relative velocity angle is 568. The absolute velocity outlet angle is 568 and the relative velocity outlet angle is 288. The rotor rotates at 5000 rpm and the density of air is 1.2 kg/m3. Determine: (i) The axial velocity (ii) 2. The mass flow rate (iii) The power required (iv) The flow angles at the tip (v) The degree of reaction at the tip.	10M	CO3	L3
(b)	Analyze the typical performance map of an axial flow compressor, highlighting regions of stable and unstable operation.	4M	CO3	L2

<table>
<tr><td>7(a)</td><td>Classify the different types of combustion chambers used in gas turbine engines and compare their advantages and disadvantages.</td><td>4M</td><td>CO4</td><td>L2</td></tr>
<tr><td>(b)</td><td>A liquid hydrocarbon fuel, approximated as $C_{10}H_{22}$, is being burned in a land-based gas turbine combustor with dry air. How many moles of dry air are required for the stoichiometric combustion of the surrogate fuel with dry air at atmospheric temperature and pressure? Determine the stoichiometric Fuel-to-Air ratio “f ”. If the gas turbine is being operated with 200% excess air, determine its equivalence ratio.</td><td>10M</td><td>CO4</td><td>L3</td></tr>
<tr><td colspan="5">(OR)</td></tr>
<tr><td>8(a)</td><td>Describe the methods used for cooling the flame tube in a combustion chamber and explain their importance for material protection.</td><td>7M</td><td>CO4</td><td>L2</td></tr>
<tr><td>(b)</td><td>Write the balanced equation of the combustion of Methane with oxygen and determine its stoichiometric Fuel-to-oxidizer ratio.
If the same methane is to be burned with air, what will be its stoichiometric f. Compare them and mention your observations.</td><td>7M</td><td>CO4</td><td>L3</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>9(a)</td><td>Draw the velocity triangles for an axial turbine stage and explain how they are used to calculate work output by deriving an expression.</td><td>7M</td><td>CO5</td><td>L3</td></tr>
<tr><td>(b)</td><td>Solve for an Axial turbine
A mean diameter design of a turbine stage having equal inlet and outlet velocities leads to the following data:
<table>
<tr><td>Mass flow m</td><td>20 kg/s</td></tr>
<tr><td>Inlet temperature T_{01}</td><td>1000 K</td></tr>
<tr><td>Inlet pressure p_{01}</td><td>4.0 bar</td></tr>
<tr><td>Axial velocity (constant through stage) C_a</td><td>260 m/s</td></tr>
<tr><td>Blade speed U</td><td>360 m/s</td></tr>
<tr><td>Nozzle efflux angle α_2</td><td>65°</td></tr>
<tr><td>Stage exit swirl α_3</td><td>10°</td></tr>
</table>
Determine the rotor blade gas angles, degree of reaction, temperature drop coefficient ($2c_p\Delta T_0 s/U^2$) and power output.</td><td>7M</td><td>CO5</td><td>L3</td></tr>
<tr><td colspan="5">(OR)</td></tr>
<tr><td>10(a)</td><td>Derive the expression for the polytropic efficiency of a turbine using the concept of infinitesimal temperature change.</td><td>7M</td><td>CO5</td><td>L3</td></tr>
<tr><td>(b)</td><td>Explain the working principle of a radial flow turbine and compare it with an axial flow turbine in terms of design, performance, and applications.</td><td>7M</td><td>CO5</td><td>L2</td></tr>
</table>

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LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)

L.B.Reddy Nagar :: Mylavaram – 521 230 :: NTR Dist.:: A.P.

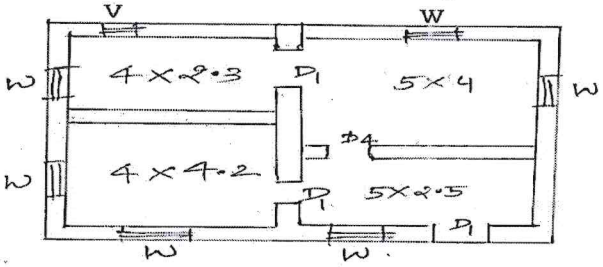
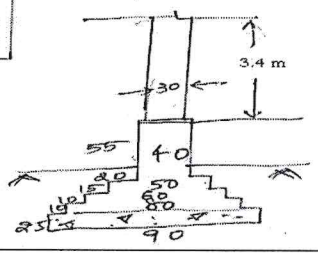
B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

20CE20-ESTIMATION AND QUANTITY SURVEYING

(CE)

Time : 3 hours | Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Determine the quantity of brickwork in a flat arch over a door of 1.20 m width. The thickness of arch is 30 cm and the breadth of wall is 30 cm.	7M	CO1	L3
(b)	Describe about the earthwork in filling in building construction.	7M	CO1	L2
	(OR)			
2.	Estimate the following quantites of the following items of a residential building from the given plan and section shown below (i) Earthwork in excavation in foundation (ii) Lime concrete in foundation (iii) 1st classs brickwork in cement mortar 1:6 in foundation and plinth.  D = 1.7 m X 2.3 m W = 1.0 m X 1.2 m V = 0.5 m X 0.5 m 	14M	CO1	L3
3.	Details of a simply supported R.C.C. Slab are as below. (i) Size. 4.05 x 5.0 metres x 12 cms deep (ii) Reinforcement 12mm dia. rods are placed in the direction of 4.05 m @15 cm c/c of the total number of rods, 16 No.s have been cranked at 45⁰ at appropriate places and hooked at ends. Other rods are straight and hooked at ends. The 12 mm dia. rod weighs 0.89kg/m. To hold the cranked portions 4no.s 10 mm dia. straight and hooded rods have been used. 10 mm dia. rods are placed in the direction of 5.0 m @ 20 cm c/c and all are straight and hooded at ends. The 10 mm dia. rod weighs 0.62kg/m (iii) Cover. 1.5 cm at the bottom and 2.5 cm on all sides (iv) Assume any other dimensions not given. (A) Draw sketches (plan and section) showing details of reinforcement of the slab. (B) Estimate the total weight of steel required in reinforcements for the slab.	14M	CO2	L3
	(OR)			

4	Determine the quantities of cutting and filling for a portion of road from chainage 14 to chainage 22 from the following data. Formation width of the road is 12 m. Side slopes are 2:1 in banking and 1.5:1 in cutting. Length of chain is 30 m. The road formation is proposed at uniform falling gradient in 1 in 200 passing through G.L. at chainage 14.	14M	CO2	L3

Chainage	R.L. of
14	105.00
15	105.60
16	105.44
17	105.90
18	105.42
19	104.30
20	105.00
21	104.10
22	104.62

5(a)	Discuss the general specifications of a second-class building.	7M	CO3	L2
(b)	Summarize about the detailed specifications of laying cement concrete in R.C.C. work.	7M	CO3	L1
	(OR)			
6(a)	Explain the detailed specifications of R.R. masonry in building constructions.	7M	CO3	L2
(b)	Describe the detailed specifications of materials in cement concrete.	7M	CO3	L2
7(a)	Determine the materials required for 10 cu m of concrete for 1:2:4 proportion.	7M	CO4	L3
(b)	Discuss about the purpose and importance of measurement book in P.W.D. works.	7M	CO4	L2
	(OR)			
8(a)	Define and describe about Earnest money and Security money.	7M	CO4	L1
(b)	Analyze the rate of plastering per sq m with 12 mm thick cement mortar 1:6 mix ratio.	7M	CO4	L3
9(a)	Define and describe about depreciation in valuation.	7M	CO5	L1
(b)	Define the following terms: (i) Outgoings (ii) Gross income (iii) Net income	7M	CO5	L1
	(OR)			
10(a)	The present value of a machine is Rs. 20,000/-. Determine the depreciation cost at the end of 5 years, if the salvage value is Rs. 2,000/-. Assume life of machine be 16 years. Use constant percentage method.	7M	CO5	L3
(b)	Calculate the value of year's purchase for an old building if its future life is 15 years and the rate of interest is 7% on capital and 4% for sinking fund.	7M	CO5	L3

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LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
L.B.Reddy Nagar :: Mylavaram – 521 230 :: NTR Dist.:: A.P.

B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

27/12/25

20EC17-MICROWAVE ENGINEERING
(ECE)

Time : 3 hours Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	A rectangular waveguide has a=4cm, b=3cm as its sectional dimensions. Find all the modes which will propagate at 500MHz.	7M	CO1	L2
(b)	Discuss about the advantages and applications of microwaves.	7M	CO1	L2
	(OR)			
2(a)	Interpret the modes of wave propagation in rectangular and circular waveguides	7M	CO1	L2
(b)	A standard air-filled waveguide with dimensions a=8.636cm, b=4.318cm is fed by a 4GHz carrier from a coaxial cable. Justify whether a TE_{10} mode will be propagated. If so, calculate the phase velocity and group velocity.	7M	CO3	L3
3(a)	Derive the field expressions for TM_{mnp} mode in a circular cavity resonator.	7M	CO1	L2
(b)	Illustrate the structure and operation of two cavity klystron with Applicate diagram.	7M	CO1	L2
	(OR)			
4(a)	Describe the principle of working of Reflex Klystron using Applegate diagram.	7M	CO1	L2
(b)	Discuss about O- type, M-type microwave tubes.	7M	CO1	L2
5(a)	Illustrate Mode jumping in 8-cavity magnetron.	7M	CO1	L2
(b)	Describe Hull cut-off Magnetic field of a Magnetron.	7M	CO1	L2
	(OR)			
6(a)	Discuss about the characteristics of helix slow wave structure.	7M	CO2	L2
(b)	Discuss the amplification process of TWT.	7M	CO1	L2
7(a)	Interpret TWO Valley model theory used in Gunn diode.	7M	CO4	L3
(b)	Classify microwave solid-state devices.	7M	CO4	L2
	(OR)			
8(a)	Illustrate IMPATT diode characteristics.	7M	CO4	L3
(b)	Compare microwave transistors and transferred electron devices (TEDs).	7M	CO4	L3
9(a)	Develop the S-matrix for a Directional coupler by using the properties of S-parameters.	7M	CO2	L3
(b)	Develop a Isolator using Faraday rotation.	7M	CO2	L3
	(OR)			
10(a)	Demonstrate impedance measurement using block diagram of a microwave bench setup.	7M	CO1	L2
(b)	Differentiate E-plane and H-plane tees using S-matrix.	7M	CO3	L3

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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

20EE20-BASIC MICRO PROCESSORS AND MICRO CONTROLLERS
(EEE)

Time : 3 hours Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Write about the general-purpose registers of 8086.	7M	CO1	L2
(b)	Find the procedure for calculating physical address in 8086.	7M	C01	L3
	(OR)			
2(a)	Develop a logic operation to complete the AND operation on two inputs.	4M	CO2	L3
(b)	Sketch out the detailed architecture circuit of 8086 microprocessor and discuss its operation.	10M	CO1	L3
3(a)	Using the appropriate timing diagram, describe the operation of 8086 memory read operation in minimum mode.	7M	C03	L2
(b)	How may interrupts are used in 8086 processor? Analyze about ISR function in 8086.	7M	CO1	L3
	(OR)			
4.	Design a 8086 processor using 64 kB EPPROM and 128 kB RAM interfacing.	14M	CO4	L3
5(a)	Build up A/D 800 converter interfacing circuit with 8086 and describe the operation.	7M	CO4	L3
(b)	Design a circuit for USART 8251 used for 8086 processor.	7M	CO3	L3
	(OR)			
6(a)	How the key press identify in 8255 interfacing with 8086? Derive the control word for each key word identification keyboard.	7M	CO3	L3
(b)	Determine control word register for 8255 I/O mode operation. Choose port A, port B and port C upper as input ports and remaining ports are output port.	7M	CO3	L3
7(a)	Why the 8051 serial port operation is required? Mention the importance of TxD and RxD commands.	7M	CO3	L2
(b)	Sketch the 8051 pin diagram and synthesize the function of each pin. Provide the detailed 8-bit connections of ports P0, P1, P2 and P3.	7M	CO1	L2
	(OR)			
8(a)	Detailed architecture of 8051 microcontroller has ALU, ROM, RAM and I/O ports. Justify your answer with all about the architecture circuit operation and give the importance of 8-bit and 16-bit registers.	10M	CO1	L3
(b)	Mention the importance and advantages of 8051 microcontroller.	4M	C01	L2
9(a)	Develop 8051 interfacing circuit for seven segment LED display.	7M	CO4	L3
(b)	Sketch out the neat diagram for stepper motor interfacing with 8051 and discuss its operation.	7M	CO4	L3
	(OR)			
10.	Design a detailed circuit for 8051 timer counter operation. Also analyze the procedure for Mode 0 operation.	14M	CO3	L3

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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

27/12/25

20ME19-DESIGN OF MACHINE ELEMENTS-II

(ME)

Time : 3 hours | Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	A journal bearing 60 mm is diameter and 90 mm long runs at 450r.p.m. The oil used for hydrodynamic lubrication has absolute viscosity of 0.06 kg / m-s. If the diametral clearance is 0.1 mm, find the safe load on the bearing.	7M	CO1	L3
(b)	The load on the journal bearing is 150 kN due to turbine shaft of 300 mm diameter running at 1800 r.p.m. Determine the following: (i) Length of the bearing if the allowable bearing pressure is 1.6N/mm², and (ii) Amount of heat to be removed by the lubricant per minute if the bearing temperature is 60°C and viscosity of the oil at 60°C is 0.02 kg/m-s and the bearing clearance is 0.25 mm.	7M	CO1	L3
	(OR)			
2(a)	Write short note on antifriction bearings and classify them.	7M	CO1	L2
(b)	A single row angular contact ball bearing number 310 is used for an axial flow compressor. The bearing is to carry a radial load of 2500 N and an axial or thrust load of 1500 N. Assuming light shock load, determine the rating life of the bearings.	7M	CO1	L3
3.	Design a piston for a four-stroke diesel engine consuming 0.3 kg of fuel per kW of power per hour and produces a brake mean effective pressure of the 0.7 N/mm². The maximum gas pressure inside the cylinder is 5 N/mm² at a speed of 3500 r.p.m. The cylinder diameter is required to be 300 mm with stroke 1.5 times the diameter. The piston may have 4 compression rings and an oil ring. The following data can be used for design: Higher calorific value of fuel = 46 × 10^3 kJ/kg; Temperature at the piston center = 700 K; Temperature at the piston edge = 475 K; Heat conductivity factor=46.6 W/m/K; Heat conducted through top = 5% of heat produced; Permissible tensile strength for the material of piston=27N/mm²; Pressure between rings and piston = 0.04 N/mm²; Permissible tensile stress in rings = 80 N/mm²; Permissible Pressure on piston barrel = 0.4 N/mm²; Permissible pressure on piston pin=15 N/mm²; Permissible stress in piston pin = 85 N/mm². Any other data required for the design may be assumed.	14M	CO2	L4
	(OR)			
4.	A connecting rod is required to be designed for a high speed, four stroke I.C. engine. The following data are available. Diameter of piston = 88 mm; Mass of reciprocating parts = 1.6 kg; Length of connecting rod (center to center) = 300 mm; Stroke = 125 mm; R.P.M. = 2200 (when developing 50 kW); Possible over speed =3000r.p.m.; Compression ratio = 6.8:1; Probable maximum explosion pressure (assumed shortly after dead centre, say at about3°) = 3.5N/mm². Draw fully dimensioned drawings of the connecting rod showing the provision for the lubrication.	14M	CO2	L4
5(a)	Discuss the procedure used in designing a cast iron pulley.	4M	CO3	L3

(b)	A belt 100 mm wide and 10 mm thick is transmitting power at 1000 metres/min. The net driving tension is 1.8 times the tension on the slack side. If the safe permissible stress on the belt section in 1.6 MPa, calculate the maximum power, that can be transmitted at this speed. Assume density of the leather as 1000 kg/m^3. Calculate the absolute maximum power that can be transmitted by this belt and the speed at which this can be transmitted.	10M	CO3	L3
	(OR)			
6.	A V-belt is driven on a flat pulley and a V-pulley. The drive transmits 20 kW from a 250 mm diameter V-pulley operating at 1800 r.p.m. to a 900 mm diameter flat pulley. The centre distance is 1 m, the angle of groove 40° and μ = 0.2. If density of belting is 1110 kg/m^3 and allowable stress is 2.1 MPa for belt material, what will be the number of belts required if C-size V-belts having 230 mm^2 cross-sectional area are used.	14M	CO3	L3
7(a)	Discuss and derive the expression for stiffness and deflection of helical springs subjected to loading.	7M	CO4	L3
(b)	Design a leaf spring for the following specifications: Total load=140kN; Number of springs supporting the load = 4; Maximum number of leaves = 10; Span of the spring = 1000 mm; Permissible deflection=80 mm. Take Young's modulus, E = 200 kN/mm^2 and allowable stress in spring material as 600 MPa.	7M	CO4	L4
	(OR)			
8(a)	Design a close coiled helical compression spring for a service load ranging from 2250 N to 2750 N. The axial deflection of the spring for the load range is 6 mm. Assume a spring index of 5. The permissible shear stress intensity is 420 MPa and modulus of rigidity, G=84kN/mm^2. Neglect the effect of stress concentration. Draw a fully dimensioned sketch of the spring, show ing details of the finish of the end coils.	10M	CO4	L4
(b)	Discuss about the surge in springs. And mention the methods that can be used to eliminate surging effect in springs.	4M	CO4	L2
9(a)	A pair of straight teeth spur gears is to transmit 20 kW when the pinion rotates at 300 r.p.m. The velocity ratio is 1:3. The allowable static stresses for the pinion and gear materials are 120 MPa and 100 MPa respectively. The pinion has 15 teeth and its face width is 14 times the module. Determine: i. module; ii. face width; and iii. pitch circle diameters of both the pinion and the gear from the standpoint of strength only, taking into consideration the effect of the dynamic loading. The tooth form factor y can be taken as $y=0.154-\frac{0.912}{No.of\ teeth}$ and the velocity factor C_v as $C_v=\frac{3}{3+v}$, where v is expressed in m/s.	10M	CO5	L4
(b)	Mention four important types of gears and discuss their applications.	4M	CO5	L2
	(OR)			
10.	A helical cast steel gear with 30° helix angle has to transmit 35 kW at 1500 r.p.m. If the gear has 24 teeth, determine the necessary module, pitch diameter and face width for 20° full depth teeth. The static stress for cast steel may be taken as 56 MPa. The width of face may be taken as 3 times the normal pitch. What would be the end thrust on the gear? The tooth factor for 20° full depth involute gear may be taken as $0.154-\frac{0.912}{T_E}$, where T_E represents the equivalent number of teeth.	14M	CO5	L4

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VICE

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L.B.Reddy Nagar :: Mylavaram – 521 230 :: NTR Dist.:: A.P.

B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

20ME83-OPERATIONS RESEARCH TECHNIQUES
(AI&DS and ECE)

Time : 3 hours | Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Describe the characteristics or features of operations research.	7M	CO1	L2
(b)	Use graphical method to solve maximize $Z = 6x_1+8x_2$ subjected to $5x_1+10x_2 \le 60$, $4x_1+4x_2 \le 40$, & $x_1, x_2 \ge 0$.	7M	CO1	L3
	(OR)			
2(a)	Define following terms in LPP. (i) Slack variable (ii) Surplus variable	4M	CO1	L1
(b)	Use simplex method to minimize $Z = 12x_1+16x_2$ subjected to $10x_1+20x_2 \le 120$, $8x_1+8x_2 \le 80$, and $x_1, x_2 \ge 0$.	10M	CO1	L3
3(a)	Define following terms (i) Degeneracy (ii) Non-degeneracy (iii) Unbalanced transportation problem.	4M	CO2	L1
(b)	A company has 3 plants P1, P2 & P3 and ware houses W1, W2, W3, W4 and W5 respectively. Determine a transportation schedule so that cost is minimized.	10M	CO2	L3

	W1	W2	W3	W4	W5	Supply
P1	20	28	32	55	70	50
P2	48	36	40	44	25	100
P3	35	55	22	45	48	150
Demand	100	70	50	40	40	

	(OR)				
4(a)	A solicitors firm employs typists A, B, C, D, E for jobs P, Q, R, S, and T. According to an assignment technique only one job was given to one typist. Find least cost assignment for the following data.	7M	CO2	L3

	P	Q	R	S	T
A	85	75	65	125	75
B	90	78	66	132	78
C	75	66	57	114	69
D	80	72	60	120	72
E	76	64	56	112	68

(b)	A travelling salesman has to visit 5 cities. He wishes to start from a particular city visit each city once and then return to his starting point. The travelling cost for each city from a particular city is given below.	7M	CO2	L3

		To City				
		A	B	C	D	E
From City	A	∞	4	7	3	4
	B	4	∞	6	3	4
	C	7	6	∞	7	5
	D	3	3	7	∞	7
	E	4	4	5	7	∞

5(a)	Reduce the following game by dominance principle and find the value of game.	7M	CO3	L3

		Player B			
		I	II	III	IV
Player A	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

(b) Solve the following 2x5 game by graphical method. — 7M | CO3 | L3

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

(OR)

6(a) Discuss the assumptions in sequencing problems. — 4M | CO3 | L2

(b) There are seven jobs, each of which has to go through machines A and B in the order AB. Processing time in hours are given below. Arrange the job sequence and find the elapsed times for machines A and B. — 10M | CO3 | L3

Job	1	2	3	4	5	6	7
Machine A	3	12	15	6	10	11	9
Machine B	8	10	10	6	12	1	3

7. A taxi owner estimates from his past records that the costs per year for operating a taxi whose purchase price when new is Rs 58,000 are as given below. After 5 years, the operating cost is Rs 6,000 k, where k= 6,7,8,9,10 (k denoting age in year). If the resale value decreases by 10% of purchase price each year, what is the best replacement policy? Cost of money is zero. — 14M | CO4 | L3

Age	1	2	3	4	5
Operating Cost (Rs)	10,000	12,000	15,000	18,000	20,000

(OR)

8(a) Define the following terms.
(i) Waiting time in system (ii) Waiting time in queue
(iii) Length of queue (iv) Utilization Factor — 7M | CO4 | L1

(b) A self-service store employs one cashier at its counter. An average of ten customers arrives every 6 minutes while the cashier can serve 12 customers in 6 minutes. Assuming Poisson distribution for arrival rate and exponential distribution for service rate, find
(i) Average number of customers in the system.
(ii) Average number of customers in the queue.
(iii) Average time a customer spends in the system. — 7M | CO4 | L3

9(a) Outline the applications of dynamic programming. — 4M | CO5 | L2

(b) Annual demand for an item is 6000 units. Ordering cost is Rs. 600 per order. Inventory carrying cost is 18 % of the purchase price per unit per year. The price break up is as shown below. Find the optimal order size. — 10M | CO5 | L3

Quantity	Price
$0 \le q_1 \le 2000$	20
$2000 \le q_2 \le 4000$	15
$4000 \le q_3$	9

(OR)

10. An oil company has 8 units of money available for exploration of three sites. If the oil is present at a site the probability of finding it depending upon the amount of allocated for exploiting the site as given below, find the optimal allocation of money. — 14M | CO5 | L3

	Units of money allocated								
	0	1	2	3	4	5	6	7	8
Site 1	0	0	4	8	12	20	28	36	40
Site 2	0	3	6	9	12	18	21	24	30
Site 3	0	2	2	4	6	10	16	18	20

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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

20CE82-DISASTER MANAGEMENT
((AI&DS),CSE,CSE(AI&ML) and IT)

Time : 3 hours Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Distinguish between hazard and a disaster.	4M	CO1	L2
(b)	Discuss in brief the Disaster Management Act 2005.	10M	CO1	L2
	(OR)			
2(a)	Describe technological, industrial and security related disasters with examples.	7M	CO1	L2
(b)	Describe various phases of disaster management cycle.	7M	CO1	L2
3.	Write a case study related to Natural disaster which includes loss of life, habitation, agriculture, and environmental losses. Also suggest measures for their control.	14M	CO1	L2
	(OR)			
4(a)	Write a short note on impact of contamination of water during a disaster.	7M	CO1	L2
(b)	Explain how will you assess the loss and damage to human life in disasters?	7M	CO1	L2
5(a)	Explain the functions of multimedia technology in disaster management.	7M	CO2	L2
(b)	Explain in detail about GIS applications in disaster Risk reduction.	7M	CO2	L2
	(OR)			
6(a)	What are the different types of droughts? Suggest relief and rehabilitation measures for drought.	7M	CO2	L2
(b)	Explain the importance of indigenous knowledge. How is it helpful in disaster management?	7M	CO1	L2
7(a)	Explain the effect of various human activities causing soil erosion process.	7M	CO3	L2
(b)	Suggest risk reduction measures that can be taken up to prevent severe damage in earthquake.	7M	CO3	L2
	(OR)			
8(a)	Illustrate how the following facilities - Water, Food, Sanitation, Shelter, Health, Waste Management could be arranged after a disaster.	10M	CO3	L2
(b)	Discuss briefly the early warning system of India with respect to cyclone.	4M	CO3	L2
9(a)	Explain the necessity of community participation in disaster.	7M	CO4	L2
(b)	Discuss the need for disaster risk reduction in schools.	7M	CO4	L2
	(OR)			
10.	Discuss the causes and consequences of earth quakes in India with suitable case study.	14M	CO4	L2

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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

20EC82-ELEMENTS OF COMMUNICATION SYSTEMS

(ASE)

Time : 3 hours | Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Discuss the properties of stable and unstable systems with examples.	7M	CO1	L2
(b)	Verify the Linearity and causality of the following (i) $y(t)=e^{x(t)}u(t)$; (ii) $y(t) = (t+5)\,u(t)$	7M	CO1	L3
	(OR)			
2(a)	Verify Time Invariance and Causality of the following system. $y(t) = t\cos(\omega t)u(t)$	7M	CO1	L3
(b)	Paraphrase the following terms : (i) Signal bandwidth (ii) System bandwidth	7M	CO1	L2
3(a)	Elucidate the significance of the transfer function and the impulse response of a system.	7M	CO3	L2
(b)	Consider a stable LTI system characterized by the differential equation $\frac{dy(t)}{dt} + 6y(t) = 4x(t)$. Find its impulse response.	7M	CO3	L3
	(OR)			
4(a)	Analyze how amplitude and phase distortion affect the transmission of signals through a system. What changes would you recommend to achieve distortion less transmission?	7M	CO3	L4
(b)	Design a simple diagram showing how a radio broadcast system incorporates all communication elements.	7M	CO3	L4
5	Categorize noise based on its sources and enumerate each source in detail.	14M	CO1	L2
	(OR)			
6(a)	Interpret narrowband noise and represent it in mathematical terms.	7M	CO1	L2
(b)	Paraphrase the following terms: (i) Noise figure (ii) Noise temperature	7M	CO1	L2
7(a)	Analyze the function of various blocks present in FM Transmitter.	7M	CO4	L3
(b)	Summarize Performance Characteristics of radio receiver.	7M	CO4	L2
	(OR)			
8(a)	Describe the Functional block Diagram of Superheterodyne AM receiver.	7M	CO4	L2
(b)	A superheterodyne receiver with an intermediate frequency of 455 KHz is tuned to a station operating at 1200 KHz. Find the corresponding image frequency.	7M	CO4	L3
9(a)	Mention different characteristics of an antenna.	7M	CO2	L2
(b)	A lossless transmission line has an inductance of 250 nH/m and a capacitance of 100 pF/m. Determine the characteristic impedance of the line and finds its value.	7M	CO2	L4
	(OR)			
10(a)	Describe the principle of operation of a folded dipole antenna.	7M	CO2	L2
(b)	Define the following terms: (i) Characteristic impedance (ii) Standing wave ratio.	7M	CO2	L2

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B.Tech. (VI Semester) ~~Regular~~/ Supplementary Examinations

25/12/25

20IT84-CYBER SECURITY AND DIGITAL FORENSICS

(CE & EEE)

Time : 3 hours Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1.	Discuss the classifications of cybercrime that assist law enforcement and cybersecurity experts in combating criminal activities in the online sphere.	14M	CO1	L2
	(OR)			
2(a)	Illustrate the botnets in the context of cybercrime.	7M	CO1	L2
(b)	Discuss the ethical considerations associated with cyberstalking and suggest preventive measures individuals can employ for self-protection.	7M	CO1	L2
3(a)	Discuss the best practices that individuals and organizations can implement to establish and uphold strong, secure passwords.	7M	CO2	L2
(b)	Differentiate between viruses and worms concerning cyber threats, and interpret methods for safeguarding against both viruses and worms.	7M	CO2	L2
	(OR)			
4(a)	Explain the effects of DoS (Denial of Service) and DDoS (Distributed Denial of Service) attacks on online services, infrastructure, and outline the key distinctions between these two forms of attacks.	7M	CO2	L2
(b)	Explain the significance of user inputs in SQL Injection attacks and elaborate on how attackers exploit vulnerabilities in input handling mechanisms.	7M	CO2	L2
5(a)	Describe how database forensics contributes to cyber investigations.	7M	CO3	L2
(b)	Discuss the concept of cyber forensics and provide a detailed overview of its scope and methodologies.	7M	CO3	L2
	(OR)			
6(a)	Explain wireless forensics in cyber investigations and its limitations.	7M	CO3	L2
(b)	Describe the process of collecting and preserving email evidence during a digital forensic investigation.	7M	CO3	L2
7(a)	Explain the procedure for gathering digital evidence in criminal investigations and Discuss the obstacles involved in its preservation.	7M	CO4	L2
(b)	Explain how Windows Registry would be used to identify recently accessed files, installed applications, and network connections that could be relevant to the investigation.	7M	CO4	L2
	(OR)			
8(a)	Analyze the significance of Windows artifacts in digital forensic investigations.	7M	CO4	L4
(b)	Describe the methods used to authenticate and validate digital evidence obtained from social media platforms during forensic investigations.	7M	CO4	L2
9.	Analyze the present status and future prospects of cyber forensics, emphasizing advancements in forensic tools.	14M	CO5	L4
	(OR)			
10(a)	Analyze the role of forensic tools in the analysis of emails during cyber forensic investigations.	7M	CO5	L4
(b)	Analyze how forensic tools used for encryption and decryption provide support to cyber forensic analysts.	7M	CO5	L4

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LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
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29/12/25

B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

20AD83-INTRODUCTION TO MACHINE LEARNING
(EEE)

Time : 3 hours Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Define Machine Learning. Why it is important?	7M	CO1	L1
(b)	Differentiate Supervised and Unsupervised Learning.	7M	CO1	L2
	(OR)			
2(a)	Explain Data Pre Processing Technique in Machine Learning.	7M	CO1	L2
(b)	Discuss the main challenges in Machine Learning in detail.	7M	CO1	L2
3(a)	What is the necessity of feature transformation in learning?	7M	CO2	L1
(b)	Discuss about Real-world Applications of LDA.	7M	CO2	L2
	(OR)			
4(a)	Explain about singular value decomposition.	7M	CO2	L2
(b)	Why do you use PCA? Discuss some advantages and disadvantages of PCA.	7M	CO2	L2
5(a)	What do you mean by linear regression? Which applications are best modelled by linear Regression?	7M	CO3	L1
(b)	Can Logistic regression be used for classification or regression? Justify.	7M	CO3	L2
	(OR)			
6(a)	What are the Assumptions in Regression Analysis?	7M	CO3	L1
(b)	What is regression? Explain types of regression.	7M	CO3	L2
7(a)	What is Classification? What are the Learning steps in Classification?	7M	CO4	L2
(b)	Define Overfitting. Explain about SVM algorithm to overcome it.	7M	CO4	L2
	(OR)			
8(a)	How does the random forest model work?	7M	CO4	L1
(b)	Explain KNN algorithm with an example.	7M	CO4	L3
9(a)	Define Boosting. Explain about Gradient Boosting technique.	7M	CO5	L2
(b)	What is Reinforcement Learning and how does it works?	7M	CO5	L2
	(OR)			
10(a)	Illustrate the stacking mechanism in ensemble techniques.	7M	CO5	L3
(b)	What is Bias and Variance in a Machine Learning Model?	7M	CO5	L1

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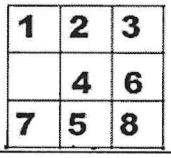
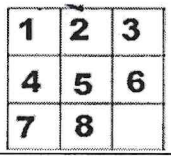
B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

20AD81-INTRODUCTION TO ARTIFICIAL INTELLIGENCE
(ME)

Time : 3 hours Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Discuss history and state of the art of Artificial Intelligence.	7M	CO1	L2
(b)	Explain The Foundations of Artificial Intelligence.	7M	CO1	L2
	(OR)			
2(a)	Define Environment. Describe the features of environment.	7M	CO1	L2
(b)	Explain about PEAS with an example.	7M	CO1	L2
3(a)	How do uninformed search algorithms differ from informed search algorithms?	4M	CO2	L3
(b)	Implement A* algorithm using 8-puzzle problem with an example. **Start state**  **Goal state** 	10M	CO2	L4
	(OR)			
4(a)	Demonstrate the AO* algorithm, using a suitable example.	7M	CO2	L3
(b)	Discuss the properties of search algorithms.	7M	CO2	L2
5(a)	Illustrate Depth first Search algorithm to find solution to the problem with an example.	7M	CO3	L3
(b)	Implement Breadth first Search with an example.	7M	CO3	L3
	(OR)			
6(a)	Implement Uniform Cost Search with an example.	7M	CO3	L3
(b)	Implement Iterative deepening DFS technique.	7M	CO3	L3
7(a)	Define Adversarial Search? Pick a two-player game and show how adversarial search would work in it.	7M	CO4	L3
(b)	Discuss various levels and operations of Knowledge based agent.	7M	CO4	L2
	(OR)			
8(a)	Illustrate Min Max procedure with example.	7M	CO4	L3
(b)	Differentiate forward chaining and backward chaining.	7M	CO4	L2
9(a)	Explain the Ontological engineering with example.	7M	CO5	L2
(b)	Differentiate proposition logic and predicate logic.	7M	CO5	L2
	(OR)			
10(a)	Define Reasoning? Explain types of Reasoning.	7M	CO5	L2
(b)	Explain the concept of The Internet Shopping World.	7M	CO5	L2

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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

20IT01-SOFTWARE ENGINEERING

(AI&DS)

Time : 3 hours | Max. Marks : 70

Answer one question from each unit

All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Discuss the challenge associated with Legacy Software systems including issues related to maintenance, compatibility and security.	7M	CO1	L2
(b)	Discuss the evolving role of Software in Modern Society.	7M	CO1	L2
	(OR)			
2(a)	Describe the concept of Software Process and its significance in Software Development.	7M	CO1	L1
(b)	Evaluate the importance of Software Engineering in the development process of software systems.	7M	CO1	L3
3.	Explain fundamental design concepts in Software Engineering such as abstraction, modularity and encapsulation. Discuss how these concepts contribute to the development of scalable, maintainable and reusable software systems.	14M	CO2	L2
	(OR)			
4(a)	Compare and contrast Functional and Non-functional requirements in Software Development.	7M	CO2	L4
(b)	Discuss the importance of Requirements Gathering and Analysis in the Software Development process.	7M	CO2	L2
5(a)	Explain how different stakeholders including developers, designers and project managers utilize UML diagrams throughout the software development lifecyle.	7M	CO3	L2
(b)	Discuss common mechanisms provided by UML for modeling software systems such as inheritance, polymorphism and encapsulation.	7M	CO3	L2
	(OR)			
6(a)	Explain how UML defines things such as Classes, Objects, interfaces and relationships between them.	7M	CO3	L2
(b)	Define Object Diagrams in UML and their role in modeling instances of classes at a specific point in time. Discuss the relationship between Class Diagrams and Object Diagrams in UML modeling.	7M	CO3	L1
7(a)	Define events and signals in the context of Behavioral Modeling and explain their significance in representing Asynchronous Communication between Objects.	7M	CO4	L1
(b)	Describe the purpose of Deployment Diagrams and how they visualize the physical deployment of software components on hardware nodes.	7M	CO4	L2
	(OR)			
8(a)	Discuss how Use-case Diagrams visualize the relationships between Actors and Use-cases and how they help stakeholders understand system functionality.	7M	CO4	L2
(b)	Discuss the elements of a State Chart Diagram including States, Transitions and Events.	7M	CO4	L2
9(a)	Discuss the principles and techniques used in White Box testing. Discuss the benefits and limitations of White Box Testing compared to Black Box Testing.	7M	CO5	L2
(b)	Define System Testing and explain its role in evaluating the behavior of a complete software system against its specified requirements.	7M	CO5	L2
	(OR)			
10(a)	Define Software Testing and its importance in the Software Development Life Cycle.	7M	CO5	L1
(b)	Explain different approaches to integration testing such as top-down, bottom-up and incremental integration testing.	7M	CO5	L2

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30/12/25

B.Tech. (VI Semester) Regular/Supplementary Examinations

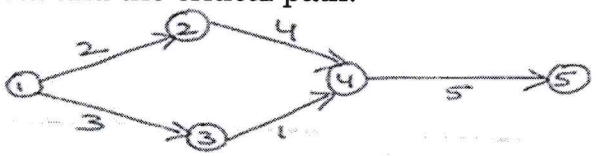
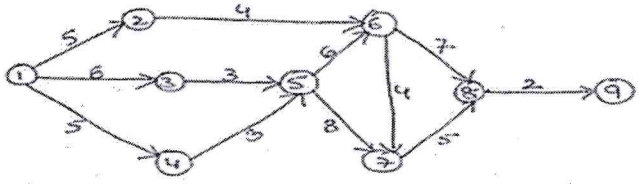
20CE22–CONSTRUCTION MANAGEMENT

(CE)

Time : 3 hours | Max. Marks : 70

Answer one question from each unit

All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Outline the various financial facilities that can be adopted for executing engineering projects.	7M	CO1	L1
(b)	Discuss the importance of coordination among the members of the construction team.	7M	CO1	L2
	(OR)			
2(a)	Explain the legal and financial aspects in construction project.	7M	CO1	L2
(b)	Discuss the roles and responsibilities of project manager.	7M	CO1	L1
3(a)	Describe the advantages and draw backs of the matrix organization.	7M	CO1	L2
(b)	State the importance of organization in construction activities.	7M	CO1	L1
	(OR)			
4(a)	What is planning and mention its importance in construction management.	7M	CO1	L1
(b)	Mention the objectives and principles of planning.	7M	CO1	L1
5(a)	Describe the role of construction equipment in construction projects.	10M	CO3	L2
(b)	Mention the uses of material management.	4M	CO3	L1
	(OR)			
6(a)	Describe the steps involved in classifying items using ABC analysis technique in inventory control.	7M	CO3	L2
(b)	Discuss the important aspects to be considered in materials procurement.	7M	CO4	L2
7.	The following figure shows the network in connection. Determine the total float, free float and the critical path. 	14M	CO2	L3
	(OR)			
8.	The network shown below has the estimated duration for each activity marked. Determine the total float, free float and independent float for each activity and establish the critical path. 	14M	CO2	L3
9(a)	Describe the importance of M book and state the procedure for making entries in it.	10M	CO4	L2
(b)	Discuss the different types of tenders in construction projects.	4M	CO4	L2
	(OR)			
10(a)	Define the term Contract and indicate the information provided in the contract agreement.	7M	CO4	L1
(b)	Describe the term specification and its importance in construction management.	7M	CO4	L2

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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

20CS21-INFORMATION RETRIEVAL SYSTEMS
(CSE)

Time : 3 hours | Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	How is the Information Retrieval System related to Database Management System?	7M	CO1	L2
(b)	Summarize the similarities and differences between use of Fuzzy Searches and Term Masking.	7M	CO1	L2
	(OR)			
2(a)	What are the four major functional processes that Information Storage and Retrieval System is composed? Explain in detail with neat diagram.	7M	CO1	L1
(b)	Discuss the Miscellaneous Capabilities of IRS.	7M	CO1	L2
3(a)	Discuss in detail about N-Gram Data Structure.	7M	CO2	L2
(b)	Discuss the usage of Cataloging and Indexing in Information Retrieval Systems.	7M	CO2	L2
	(OR)			
4(a)	Discuss the Inverted File Data Structure in IRS.	7M	CO2	L2
(b)	What is Automatic Indexing? Explain the various types of Automatic Indexing.	7M	CO2	L1
5(a)	Show the Data Flow in Information Processing System using Automatic Indexing.	7M	CO3	L3
(b)	Describe the concept of Clustering and the process of Clustering.	7M	CO3	L2
	(OR)			
6(a)	Define the Thesaurus Generation. Discuss the concept of Manual Clustering.	7M	CO3	L1
(b)	Describe the concept of Clustering Using Existing Clusters.	7M	CO3	L2
7(a)	Describe in detail about Weighted Searches of Boolean Systems.	7M	CO4	L1
(b)	Discuss in detail about Cognition and Perception.	7M	CO4	L2
	(OR)			
8(a)	What is Relevance Feedback? Is the use of positive feedback always better than using negative feedback to improve a query?	7M	CO4	L1
(b)	What is Ranking? Explain about Ranking Algorithms.	7M	CO4	L1
9(a)	Describe the Boyer-Moore Text Search algorithm with an example.	7M	CO5	L2
(b)	Differentiate hardware versus software text search algorithms.	7M	CO5	L2
	(OR)			
10(a)	Elaborate the structure of Hardware Text Search System.	7M	CO5	L2
(b)	Elaborate the features of Fast Data Finder architecture.	7M	CO5	L2

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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

20EC19-SATELLITE COMMUNICATIONS
(ECE)

Time : 3 hours Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Discuss the types of satellite launch vehicles.	7M	CO2	L2
(b)	Mention the advantages and disadvantages of Satellite Communications.	7M	CO1	L2
	(OR)			
2(a)	Discuss the frequency bands used in satellite communications.	7M	CO1	L2
(b)	Interpret the general structure of satellite communication system.	7M	CO1	L2
3(a)	State and explain Kepler's three laws of planetary motion with relevant equations.	7M	CO3	L3
(b)	Derive an expression for azimuth angle and elevation angle of earth station.	7M	CO3	L3
	(OR)			
4(a)	List out the various orbital elements of a satellite and discuss them with the help of a diagram.	7M	CO1	L2
(b)	Compare the geostationary and non geostationary orbits.	7M	CO2	L2
5(a)	Discuss the three axis stabilization approaches.	7M	CO2	L2
(b)	Discuss in detail about attitude control of a satellite systems.	7M	CO2	L2
	(OR)			
6(a)	Discuss the functions of single conversion bent-pipe transponder.	7M	CO2	L2
(b)	Illustrate the functions of TTC&M system with relevant diagram.	7M	CO2	L2
7(a)	Compare pre-assigned FDMA and demand assigned FDMA.	7M	CO4	L2
(b)	Explain the TDMA burst frame structure of satellite system with necessary diagrams.	7M	CO4	L2
	(OR)			
8(a)	Summarize the concepts of Spread Spectrum transmission and reception of CDMA with an example.	7M	CO4	L2
(b)	Draw the transmit-receive Earth station block diagram and discuss its functions.	7M	CO2	L2
9(a)	Elaborate the principles and application of GPS.	7M	CO2	L2
(b)	Describe the indoor and outdoor units of DBSTV system.	7M	CO1	L2
	(OR)			
10(a)	Illustrate the concepts of mobile satellite (MSAT) network configuration.	7M	CO2	L2
(b)	Discuss the functions of VSAT.	7M	CO2	L2

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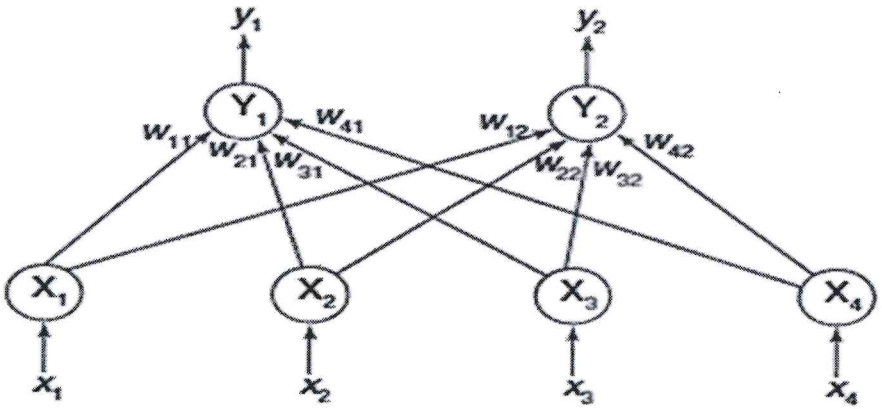
B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

20EE21-INTELLIGENT CONTROL SYSTEMS
(EEE)

Time : 3 hours Max. Marks : 70

Answer one question from each unit.
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Draw the structure of a simple biological neuron and explain the function of each part.	7M	CO1	L2
(b)	State and explain linear and non-linear activation functions which are used in single layer and multilayer networks to calculate the output.	7M	CO1	L2
	(OR)			
2(a)	Differentiate between single layer and multilayer neural networks.	7M	CO2	L4
(b)	What is supervised learning and how is it different from unsupervised learning?	7M	CO2	L2
3.	Construct a Kohonen self-organizing map to cluster the four given vectors, [0 0 1 1], [1 0 0 0], [0 1 1 0] and [0 0 0 1]. The number of clusters to be formed is two. Assume an initial learning rate of 0.5. 	14M	CO3	L3
	(OR)			
4(a)	With a neat architecture, explain the training algorithm of back-propagation network.	7M	CO3	L2
(b)	What are the factors that improve the convergence of learning in BPN network?	7M	CO3	L2
5(a)	State the outer products rule used for training pattern association networks.	7M	CO3	L2
(b)	Draw the architecture of a BAM network and discuss the training algorithm in detail.	7M	CO3	L2
	(OR)			

6.	Train a hetero-associative memory network using outer products rule to store input row vectors s= (s1, s2, s3, s4) to the output row vector t = (t1, t2). Use the vector pairs as given in Table below. **Input and targets** s_1 s_2 s_3 s_4 t_1 t_2 1st 1 0 1 0 1 0 2nd 1 0 0 1 1 0 3rd 1 1 0 0 0 1 4th 0 0 1 1 0 1	14M	CO3	L3
7(a)	Explain the key properties of crisp sets. Why do crisp sets enforce strict membership (either 0 or 1)?	7M	CO4	L2
(b)	Given two relations, find the relation T: R∘S, using Max-min composition. $R = \begin{matrix} \\ x_1 \\ x_2 \end{matrix}\begin{matrix} \begin{matrix} y_1 & y_2 & y_3 \end{matrix} \\ \begin{bmatrix} 0.1 & 0.2 & 0.3 \\ 0.4 & 0.5 & 0.6 \end{bmatrix} \end{matrix}$; $S = \begin{matrix} \\ y_1 \\ y_2 \\ y_3 \end{matrix}\begin{matrix} \begin{matrix} z_1 & z_2 \end{matrix} \\ \begin{bmatrix} 0.8 & 0.1 \\ 0.6 & 0.9 \\ 0.4 & 1.0 \end{bmatrix} \end{matrix}$	7M	CO4	L3
	(OR)			
8(a)	Explain the fundamental differences between crisp logic and fuzzy logic.	7M	CO4	L2
(b)	Using the linguistic variables as shown below, plot fuzzy membership functions for "weight of people". Very thin (VT) : $W \leq 25$ Thin (T) : $25 < W \leq 45$ Average (AV) : $45 < W \leq 60$ Stout (S) : $60 < W \leq 75$ Very stout (VS) : $W > 75$	7M	CO4	L3
9(a)	Explain the purpose of fuzzification in fuzzy logic systems.	7M	CO4	L2
(b)	Compare and contrast fuzzification and defuzzification in fuzzy logic systems.	7M	CO4	L4
	(OR)			
10(a)	Write the design steps for a fuzzy-logic controlled washing machine that adjusts wash time based on input variables (dirt level, fabric type). Give a sample rule base.	7M	CO5	L4
(b)	Describe the structure and function of a fuzzy rule-based system.	7M	CO5	L2

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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

20EE22-CLASSICAL AND META HEURISTIC OPTIMIZATION TECHNIQUES
(EEE)

Time : 3 hours Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Define optimization. What are the engineering applications of Optimization?	7M	CO1	L1
(b)	State the necessary and sufficient conditions for single variable optimization technique.	7M	CO1	L1
	(OR)			
2(a)	Find the maxima and minima, if any, for the objective function given below. $f(x) = 4x^3 - 18x^2 + 27x - 7$	7M	CO1	L3
(b)	Discuss the following (i) Constrain surface (ii) Objective function and (iii) Decision variable.	7M	CO1	L2
3.	Use the simplex algorithm to find two optimal solutions to the following LP: Max $z = 5X_1 + 3X_2 + X_3$ Subjected to constraints $x_1 + x_2 + 3x_3 \leq 6$ $5x_1 + 3x_2 + 6x_3 \leq 15$	14M	CO2	L3
	(OR)			
4(a)	Distinguish between a slack and a surplus variable.	4M	CO2	L1
(b)	Solve the given LPP Min $Z = X_1 + 2X_2 + 3X_3$ S.T $2X_1 - X_2 + X_3 \geq 4$ $X_1 + X_2 + 2X_3 \leq 8$ $X_2 - X_3 \geq 2$ Where x1, x_2 and x_3 are non-negative.	10M	CO4	L3
5(a)	Describe the step by step procedure to solve the optimization problem using Gradient decent method.	7M	CO2	L2
(b)	Minimize the function $f(X_1, X_2) = X_1 - X_2 + 2X_1X_2 + X_2^2$ Using steepest decent method starting point is (0, 0).	7M	CO2	L3
	(OR)			
6(a)	Discuss the method of Lagrange's multiplier to solve the problem of Maximization/ Minimization.	7M	CO2	L2
(b)	Minimize the function $f(X_1, X_2) = X_1 - X_2 + 2X_1X_2 + X_2^2$ starting point is (0, 0) using Newton's method,	7M	CO2	L3
7(a)	Minimize $f(x) = x_1^2 - 4x_1 + x_2^2 - 6x_2$ Subject to $x_1 + x_2 \leq 3$ $-2x_1 + x_2 \leq 2$ $x_1 \geq 0, x_2 \geq 0$ Use the method of KKT conditions	7M	CO2	L3

(b)	Maximize/ Minimize the given function $f = -4x_1 + x_1^2 - 2x_1x_2 + 2x_2^2$ Subject to $2x_1 + 2x_2 \leq 6$ $x_1 - 4x_2 \leq 0$ With the quadratic programming method.	7M	CO2	L3
	(OR)			
8(a)	Illustrate the process of dynamic programming problem.	7M	CO2	L2
(b)	Solve the problem Max $Z = x_1^2 + 2x_2^2 + 4x_3^2$ Subject to constraints $x_1 + 2x_2 + x_3 \leq 8$ $x_1 \geq 0, x_2 \geq 0, x_3 \geq 0$ Using the concept of dynamic programming.	7M	CO2	L3
9(a)	Discuss the terms related to genetic algorithm (i) Crossover (ii) mutation (iii) termination	7M	CO3	L2
(b)	Classify various heuristic search techniques.	7M	CO3	L1
	(OR)			
10(a)	Sketch the flow chart of particle swarm optimization algorithm.	7M	CO3	L2
(b)	Maximize the function $f(x) = x^2$ with x in the interval [0,31] using genetic algorithm.	7M	CO3	L3

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LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
L.B. Reddy Nagar :: Mylavaram – 521 230 :: NTR Dist.:: A.P.

B.Tech. (VI Semester) Regular/Supplementary Examinations

20IT03-DIGITAL IMAGE PROCESSING
(IT)

Time : 3 hours Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Outline the image formation model.	7M	CO1	L2
(b)	Summarize various applications of image processing.	7M	CO1	L2
	(OR)			
2(a)	What is resolution? Explain the basic relationship between pixels.	7M	CO1	L2
(b)	Illustrate the components of digital image processing with its block diagram.	7M	CO1	L2
3(a)	Describe how various filter masks are generated to sharpen images in spatial domain.	7M	CO2	L2
(b)	Summarize the role of the Discrete Cosine Transform (DCT) in JPEG image compression.	7M	CO2	L2
	(OR)			
4(a)	Describe the Histogram Specification process.	7M	CO2	L2
(b)	Outline the basic gray level transformations with an example.	7M	CO2	L2
5(a)	Illustrate the HSI model and give equations in converting colors from HSI to RGB.	7M	CO3	L2
(b)	What are some common noise models used in image processing and how do they differ?	7M	CO3	L2
	(OR)			
6(a)	Describe the process of Image Degradation and Restoration model.	7M	CO3	L2
(b)	Discuss the Weiner filter and its application in image restoration.	7M	CO3	L2
7(a)	Illustrate the image compression model with neat diagram.	7M	CO4	L2
(b)	Explain the run-length coding (RLC) technique and its application in image compression.	7M	CO4	L2
	(OR)			
8(a)	How does Huffman coding assign variable-length codes to input symbols based on their frequencies and what is a step-by-step example of this process?	7M	CO4	L2
(b)	Compare and contrast JPEG and JPEG2000 image compression standards.	7M	CO4	L2
9(a)	Discuss any two region based segmentation techniques.	7M	CO5	L2
(b)	Describe the edge linking process and its role in image segmentation with an example.	7M	CO5	L3
	(OR)			
10(a)	Discuss the adaptive thresholding process in image segmentation by taking an example.	7M	CO5	L3
(b)	Differentiate between region split and region merge techniques.	7M	CO5	L2

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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

20IT04-DATA SCIENCE
(IT)

Time : 3 hours Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	List and exlain the steps involved in Discovery phase.	7M	CO1	L2
(b)	Write about Model Building in data analysis.	7M	CO1	L2
	(OR)			
2(a)	Write about Model Planning in data analysis.	7M	CO1	L2
(b)	What kind of tools would be used in model planning and building phase?	7M	CO1	L2
3(a)	Define confidence interval. How to estimate it with different measures?	7M	CO2	L2
(b)	What is IQR ? How it is helpful in identifying outliers in data?	7M	CO2	L2
	(OR)			
4.	Consider the data 35, 52, 45, 70, 43, 68, 77, 45, 28. Calculate the following measures. (i) Mode (ii) Median (iii) Mean (iv) Variance (v) Standard Deviation (vi) Z-score (vii) standard error.	14M	CO2	L3
5(a)	Discuss the following normalization techniques (i) Min-max tranformation (ii) Z-score transformation (iii) Standard Scaling Tranformation.	7M	CO3	L3
(b)	Discuss the role of Reciprocal, Exponential transformations to change the distribution of features.	7M	CO3	L2
	(OR)			
6(a)	Demonstrate One Hot Encoding technique to convert text into numbers.	7M	CO3	L3
(b)	Convert this following text into numeric using Bag of Words technique. d_1:="I am happy" d_2:="I am hungry ,I am sick" d_3:="Food is fine"	7M	CO3	L3
7(a)	Calculate the correlation coefficient for the following data. X = 4, 8 ,12, 16 and Y = 5, 10, 15, 20.	7M	CO4	L3

(b)	Suppose two basketball coaches rank 12 of their players from worst to best. The following table shows the rankings that each coach assigned to the players. use Kendall's Tau to calculate the correlation between the two coaches' rankings.	7M	CO4	L3

Player	Coach #1	Coach #2
AJ	1	1
Ben	2	2
Conner	3	3
Duane	4	5
Elliot	5	4
Frank	6	7
Greg	7	6
Hank	8	8
Isaiah	9	10
Jim	10	9
Kurt	11	11
Luke	12	12

	(OR)			
8(a)	What is clustering? How is it different from classification?	7M	CO4	L2
(b)	How to rank the splits using the sum of the squares of error (SSE) in decision trees?	7M	CO4	L2
9(a)	What is the coefficient of determination (R-squared) in simple linear regression? How is it interpreted?	7M	CO5	L2
(b)	How do you calculate the slope and y-intercept in a simple linear regression equation? Explain with an example.	7M	CO5	L2
	(OR)			
10(a)	State and prove Bayes theorem.	7M	CO5	L2
(b)	How sensitivity, and specificity can be used to assess the performance of the bnary classification model? Explain with an example.	7M	CO5	L3

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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

20ME21-MODERN MACHINING PROCESSES

(ME)

Time : 3 hours | Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Justify the need of modern machining processes in the today's industries.	7M	CO1	L3
(b)	Describe the basic principle of ultra-sonic machining (USM) process with a suitable sketch.	7M	CO1	L2
	(OR)			
2(a)	List the drawbacks of conventional machining methods.	7M	CO1	L1
(b)	Explain the working principle of water jet machining (WJM) process.	7M	CO1	L2
3(a)	With help of a neat sketch, confer the working of electrochemical machining (ECM) process.	7M	CO2	L2
(b)	Explicate the process of electrochemical grinding (ECG).	7M	CO2	L2
	(OR)			
4(a)	State the importance of chemical machining (CHM) process and identify important parameters on the MRR.	7M	CO2	L1
(b)	Describe the process of electrochemical honing (ECH).	7M	CO2	L2
5(a)	Find various process parameters influence in EDM process. Briefly.	7M	CO3	L3
(b)	With a neat sketch describe the Mechanism of metal removal in EDM process.	7M	CO3	L2
	(OR)			
6(a)	Identify the important properties of electrode materials and write the various types of electrode materials used for EDM process.	7M	CO3	L3
(b)	Differential between EDM process and Wire EDM process.	7M	CO3	L2
7(a)	Why select hot machining process for advanced materials, justify.	7M	CO4	L3
(b)	Enumerate the process characteristics of laser beam machining (LBM).	7M	CO4	L2
	(OR)			
8(a)	Distinguish between laser beam machining and electron beam mashing.	7M	CO4	L2
(b)	Illustrate the plasma arc machining with a neat sketch.	7M	CO4	L2
9(a)	Define Rapid Prototyping process and list out the merits and demerits.	7M	CO5	L1
(b)	With a neat sketch explain the processing steps in Stereo Lithography Apparatus (SLA).	7M	CO5	L2
	(OR)			
10(a)	In current scenario list out the applications of rapid prototyping process.	7M	CO5	L1
(b)	State the process of selective Laser Sintering (SLS).	7M	CO5	L1

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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

Proof 31/12/25

20ME17-HEAT TRANSFER
(ME)

Time : 3 hours Max. Marks : 70

Answer one question from each unit
All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	Formulate the general 3-dimensional heat conduction equation in cylindrical coordinate system.	7M	CO1	L2
(b)	A plane wall 10 cm thick generates heat at the rate of $4x10^4 W/m^3$ when an electric current is passed through it. The convective heat transfer coefficient between each face of the wall and the ambient air is 50 W/m^2 K. Determine: (i) The surface temperature (ii) The maximum temperature in the wall. Assume the ambient air temperature to be 20^0C and the thermal conductivity of the wall material to be 15 W/m K.	7M	CO1	L3
	(OR)			
2(a)	Estimate the loss of heat through a red brick wall of length 5m, height 4 m and thickness 0.25 m, if the temperatures of the wall surfaces are maintained at 110^0C and 40^0C respectively, k for red brick is equal to 0.70 W/m K.	7M	CO1	L2
(b)	Discuss the different modes by which heat can be transferred. Give suitable examples to illustrate your answer.	7M	CO1	L1
3(a)	Derive an equation for temperature distribution in a lumped heat system.	7M	CO2	L2
(b)	Determine the heat transfer rate from the rectangular fin of length 20 cm, width 40 cm and thickness 2 cm. The tip of the fin is not insulated and the fin has a thermal conductivity of 150 W/mk. The base temperature is 100^0C and the 20^0C. The heat transfer coefficient between the fin and the fluid is $300W/m^2K$.	7M	CO2	L3
	(OR)			
4(a)	Distinguish between fin effectiveness and fin efficiency.	7M	CO2	L1
(b)	An aluminum fin [k=200 W/m·°C] 3.0 mm thick and 7.5 cm long protrudes from a wall. The base is maintained at 300 ^0C, and the ambient temperature is 50 ^0C with $h=10\ W/m^2K$. Calculate the heat loss from the fin per unit depth of material.	7M	CO2	L2
5(a)	Differentiate between Natural and Forced convection.	7M	CO3	L2
(b)	State the Buckingham's π Theorem. Explain the various parameters used in forced convection. Using dimensional analysis obtain an expression for Nusselt number in terms of Reynolds and Prandtl numbers.	7M	CO3	L2
	(OR)			

6(a)	Explain the development of hydrodynamic and Thermal boundary layer along a vertical plate.	7M	CO3	L2
(b)	Determine the thickness of velocity boundary layer and local shear stress at x= 2m from the leading edge of the plate for the boundary layer flow of air at atmosphere temperature of 80^{0}C with a velocity of 2m/s.	7M	CO3	L3
7(a)	Explain briefly the various regimes in boiling heat transfer with neat diagram.	7M	CO4	L2
(b)	Water is boiled at a rate of 30kg/h in a copper pan, 30cm in diameter, at atmospheric pressure. What is the temperature of the bottom surface of the pan assuming nucleate boiling conditions?	7M	CO4	L3
	(OR)			
8(a)	What is the Stefan-Boltzmann Law? Explain the concept of total emissive power of the surface.	7M	CO4	L2
(b)	A furnace emits radiation at 2000K. Treating it as a black body radiation, Calculate the (i) monochromatic radiant flux density at 1μm wavelength. (ii) wavelength at which emission is maximum and the corresponding radiant flux density, (iii) total emissive power.	7M	CO4	L3
9(a)	Discuss the general arrangement of parallel flow, counter flow and cross flow heat exchangers.	7M	CO5	L2
(b)	In a Counter flow heat exchanger, water is heated from 25^{0}C to 65 ^{0}C by an oil with a specific heat of 1.45 KJ/Kg K and mass flow rate of 0.9 kg/s. The oil is cooled from 230 ^{0}C to 160 ^{0}C. If the Overall heat transfer coefficient is 420 W/m^{2}K, Calculate the following (i) The rate of heat transfer (ii) The mass flow rate of water and (iii) The surface area of the heat exchanger.	7M	CO5	L3
	(OR)			
10(a)	Hot oil with a capacity rate of 2500 W/K flows through a double pipe heat exchanger. It enters at 360 ^{0}C and leaves at 300 ^{0}C. Cold fluid enters at 30 ^{0}C and leaves at 200 ^{0}C. If the overall heat transfer coefficient is 800 W/m^{2}K, Determine the heat exchanger area required for (i) parallel flow and (ii) counter flow.	7M	CO5	L3
(b)	Derive an expression for the LMTD of counter flow heat exchanger.	7M	CO5	L2

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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

Bheem 21/1/26

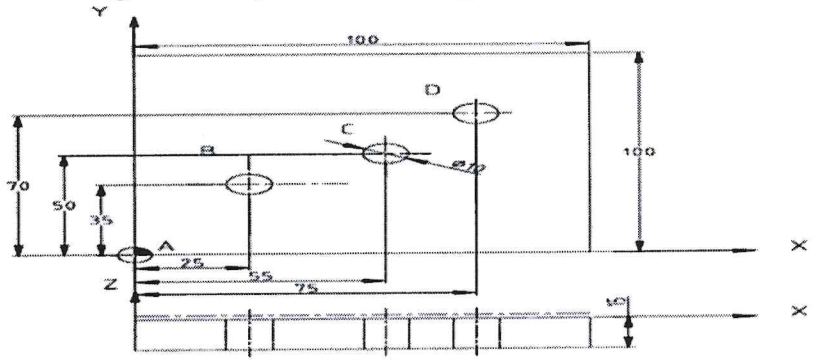
20ME18-CAD/CAM

(ME)

Time : 3 hours | Max. Marks : 70

Answer one question from each unit

All questions carry equal marks

Q.No	Questions	Marks	CO	BL
1(a)	With a neat sketch describe the product life cycle in a computerized manufacturing environment.	7M	CO1	L2
(b)	List out benefits of Computer Aided Design.	7M	CO1	L2
	(OR)			
2(a)	Explain the functions of interactive computer graphic design workstation.	7M	CO1	L2
(b)	A triangle is defined in a two dimensional coordinate system by its vertices (0, 2), (0, 3) and (1, 2). Construct transformations on this triangle Rotate the triangle by 45^0 about the origin.	7M	CO1	L3
3(a)	Represent Hermite cubic spline curve in parametric form and derive Hermite matrix.	7M	CO2	L3
(b)	List out different types of analytical and synthetic curves and their properties.	7M	CO2	L2
	(OR)			
4(a)	Classify different analytical surfaces and represent them in parametric way.	7M	CO2	L2
(b)	Illustrate CSG-Representation method in solid modelling with an example.	7M	CO2	L2
5(a)	What is numerical control? Illustrate various elements of NC with a neat diagram.	7M	CO3	L2
(b)	Write the block format of G01, G02 and G 81 preparatory functions used in NC programming.	7M	CO3	L2
	(OR)			
6.	What is meant by Canned Cycle? Illustrate its importance by writing NC part program using canned cycle for the component shown in Fig. below. 	14M	CO3	L3
7(a)	What do you understand by the term group technology? List out the benefits of GT.	7M	CO4	L2
(b)	Describe how the Opitz code captures both geometric and technological attributes of a part.	7M	CO4	L2
	(OR)			
8(a)	Describe the main components of an FMS and their functions.	7M	CO4	L2
(b)	Describe Computer-Aided Process Planning (CAPP) with its benefits.	7M	CO4	L2
9(a)	With a neat sketch explain about scanning laser system used for CAQC.	7M	CO5	L2
(b)	Illustrate the various CMM types with neat sketches.	7M	CO5	L2
	(OR)			
10(a)	Discuss how CIM facilitates coordination across various functions in a manufacturing environment.	7M	CO5	L2
(b)	Illustrate the Lean Manufacturing approach.	7M	CO5	L2

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