

**GEOMETRIC MODELLING AND INTEGRATED MANUFACTURING
SYSTEMS
(MECHANICAL ENGINEERING)****Time: 3 Hours****Max Marks: 70**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

- | | | Marks | CO | BTL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|----------|----|-----|---|---|---|---|---|---|--|---|--|---|--|--|--|---|--|--|---|--|---|--|--|---|---|---|--|---|--|--|---|----|---|----|
| <u>UNIT-I</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. | What is Design Process? Explain briefly the steps involved in design process.
(OR) | 14 | 1 | K2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2. | Briefly describe 3D transformations for scaling, translation & rotation
(OR) | 14 | 1 | K2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <u>UNIT-II</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3. | Give the similarities of a cubic Hermite spline in fourpoint form and two point and two tangent form.
(OR) | 14 | 2 | K2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4. | Explain the construction of 5x3 order B – Spline surface with neat sketch.
(OR) | 14 | 2 | K2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <u>UNIT-III</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5. | Define half spaces and their importance in the CAD solid modelling. List any two fifth generation CAD software's with CSG modelling
(OR) | 14 | 3 | K2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6. | Explain solid modifications features holes, fillets, chamfer and ribs and the necessary parameters for parametric modelling
(OR) | 14 | 3 | K2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <u>UNIT-IV</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7. a) | Define tool path generation in CNC machining. List three methods. | 6 | 4 | K2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| b) | Explain the challenges of tool path planning for milling operations for complex contours
(OR) | 8 | 4 | K2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8. a) | What types of machining operations are controlled by CNC? Give an examples. | 7 | 4 | K2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| b) | Explain how automatic tool changers to improve the machining efficiency. | 7 | 4 | K2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <u>UNIT-V</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Apply rank order clustering technique to the part-machine incidence matrix in the following table to identify logical part families and machine groups. Parts are identified by letters and machines are identified numerically. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9. | <table border="1" style="display: inline-table; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Machines</th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> <th>F</th> <th>G</th> </tr> </thead> <tbody> <tr> <td>1</td> <td></td> <td>1</td> <td></td> <td>1</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td></td> <td></td> <td>1</td> <td></td> <td>1</td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>1</td> <td>1</td> <td></td> <td>1</td> <td></td> <td></td> <td>1</td> </tr> </tbody> </table> | Machines | A | B | C | D | E | F | G | 1 | | 1 | | 1 | | | | 2 | | | 1 | | 1 | | | 3 | 1 | 1 | | 1 | | | 1 | 14 | 5 | K3 |
| Machines | A | B | C | D | E | F | G | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | 1 | | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | | | 1 | | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 1 | 1 | | 1 | | | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (OR) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10. a) | what is top-down assembly? Mention key features of modeling with integrated manufacturing environments. | 7 | 5 | K2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| b) | Explain how VR-based prototyping helps in collaboration to product development teams | 7 | 5 | K2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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<u>UNIT-I</u>		Marks	CO	BTL
1.	a) Explain briefly the advantages of Object Orientation.	7M	CO1	L2
	b) What do you mean by Structural modelling? Explain	7M	CO1	L1
(OR)				
2.	a) Discuss about any two Software Development Process Models in detail	7M	CO1	L2
	b) What do you mean by the term UML? Explain the various phases of USDP in OOAD.	7M	CO1	L1
<u>UNIT-II</u>				
3.	a) Define Domain modelling. How do you identify the various objects or elements for a Student course registration system? Explain	7M	CO2	L1
	b) Differentiate between Object oriented Analysis and Object-oriented Design	7M	CO2	L2
(OR)				
4.	a) What are the measurable objectives to be considered in Analysis and Design phases? Explain with a suitable example.	7M	CO2	L3
	b) Differentiate between Structural Modelling and Behavioural Modelling.	7M	CO2	L2
<u>UNIT-III</u>				
5.	a) With a suitable example explain how to design a class. Give all the possible representation in a class (name, attributes, visibility, methods and responsibilities)	7M	CO3	L3
	b) Write a short note on the following: (i) Generalization (ii) Aggregation (iii) Packages and Interfaces (iv) Patterns	7M	CO3	L1
(OR)				
6.	a) How Test Driven Development is different from traditional development model? Explain with an example	7M	CO3	L3
	b) Differentiate between white-box and black-box testing methods.	7M	CO3	L2
<u>UNIT-IV</u>				
7.	a) Why Software version control is important? Justify your answer	7M	CO4	L3
	b) Describe the basic concepts in software reliability and reliability measures.	7M	CO4	L2
(OR)				
8.	a) State the role and importance of CMM in software development.	7M	CO4	L2
	b) Analyze the benefits of refactoring techniques and Software version control.	7M	CO4	L4
<u>UNIT-V</u>				
9.	a) Explain the distinguishing characteristics of the Component-Based Software Engineering (CBSE)	7M	CO5	L2
	b) Describe Aspect-Oriented Programming (AOP) with a Bank ATM example	7M	CO5	L3
(OR)				
10.	a) Give an example of Model-Driven Engineering (MDE).	7M	CO5	L2
	b) How does SOA fundamentally differ from traditional monolithic application architectures? Explain	7M	CO5	L3

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	<u>UNIT-I</u>	Marks	CO	Blooms Level
1.	a) Define and explain ideal op-amp and list its characteristics	7	CO1	Analysis
	b) Compare the ideal and practical characteristics of an Op-Amp	7	CO1	Understanding
	(OR)			
2.	a) Draw the basic Block diagram of a general Op-Amp and explain the operation	7	CO1	Understanding
	b) Explain the following terms: (i) Slew Rate. (ii) CMRR.	7	CO1	Analysis
	<u>UNIT-II</u>			
3.	a) How an op-amp is used as a differentiator? Explain.	7	CO2	Understanding
	b) Explain the working of Non-Inverting amplifier and derive the equation of its Gain.	7	CO2	Analysis
	(OR)			
4.	a) How op-amp is used for comparator? Explain its working.	7	CO2	Understanding
	b) Draw the circuit diagram of a two input non-inverting type summing amplifier and derive the expression for the output voltage.	7	CO2	Analysis
	<u>UNIT-III</u>			
5.	a) Explain the working of a Schmitt trigger with neat circuit diagram.	7	CO3	Understanding
	b) Explain the functional diagram of IC 555 timer and explain the basic operation	7		Understanding
	(OR)			
6.	a) Explain the operation of monostable 555 timer and derive the expression for the period of pulse generated by the timer.	8	CO3	Understanding
	b) Find the free running frequency if control voltage $V_c=10.9V$, $V_{cc}=12V$, $R_1=4.6K$ and $C=1.1nF$.	6	CO3	Analysis
	<u>UNIT-IV</u>			
7.	a) Draw and explain the working of two input TTL NAND gate	7	CO4	Analysis
	b) Explain the construction and operation of ECL gates using emitter-coupled amplifiers.	7	CO4	Analysis
	(OR)			
8.	a) Draw and explain CMOS NOR gate and derive its truth table.	7	CO4	Understanding
	b) Compare CMOS, TTL and ECL with reference to logic levels, DC noise margin, and propagation delay and fan-out.	7	CO4	Understanding
	<u>UNIT-V</u>			
9.	a) Design a 3 to 8 decoder using two 74X138 IC's.	7	CO5	Application
	b) Design a 4-bit synchronous counter using IC74X163.	7	CO5	Analysis
	(OR)			
10.	a) Design a multiplexer using IC74×151.	7	CO5	Application
	b) Explain the operation of universal shift register using IC74LS194.	7	CO5	Analysis

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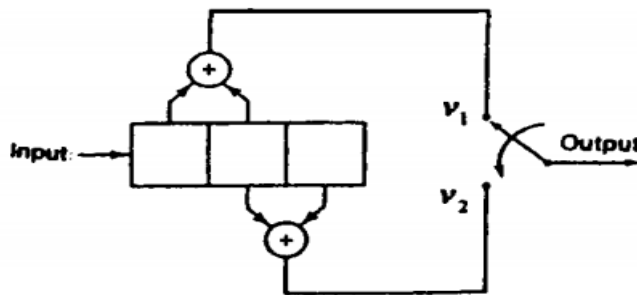
<u>UNIT-I</u>		Marks	CO	Blooms Level
1.	a) Derive an expression for entropy function and also the relationship between joint and conditional entropies.	7	CO1	Remembering
	b) Prove the Entropy relation $H(X, Y) = H(Y/X) + H(X)$ and $H(X, Y) = H(X/Y) + H(Y)$.	7	CO1	Understanding
(OR)				
2.	a) Explain the terms (i) Self information (ii) Entropy (iii) Information rate	7	CO1	Remembering
	b) In a Discrete Memoryless Source X has four symbols x_1, x_2, x_3, x_4 with probabilities $P(x_1)=0.4, P(x_2)=0.3, P(x_3)=0.2, P(x_4)=0.1$. (i) calculate $H(x)$ (ii) find the amount of information contained in the messages $x_1 x_2 x_1 x_3$ and $x_4 x_3 x_3 x_2$	7	CO1	Understanding
<u>UNIT-II</u>				
3.	a) State and prove Shannon–Hartley Theorem	7	CO2	Understanding
	b) A channel has the following channel matrix	7	CO2	Applying
$P(Y X) = \begin{bmatrix} 1-p & p & 0 \\ 0 & p & 1-p \end{bmatrix}$				
(i) Draw the channel diagram (ii) if the source has equally likely outputs, compute the probabilities associated with the channel outputs for $p=0.2$				
(OR)				
4.	a) Discuss the channel matrices for lossless channel, Deterministic channel and Noiseless channel	7	CO2	Understanding
	b) Construct Huffman coding for the DMS having seven symbols with probabilities 0.05, 0.15, 0.2, 0.05, 0.15, 0.3 and 0.1. Find Coding efficiency	7	CO2	Applying
<u>UNIT-III</u>				
5.	a) Define Linear block codes and explain generator matrix and parity check matrix.	7	CO3	Understanding
	b) Illustrate how the errors are correct using hamming coding with an example.	7	CO3	Applying
(OR)				
6.	a) For a systematic linear block code, the three parity check bits, c_4, c_5 , and c_6 are given $c_4 = m_1 \oplus m_2 \oplus m_3$, $c_5 = m_1 \oplus m_2$, $c_6 = m_1 \oplus m_3$ (i) Construct generator matrix (ii) Determine error correcting capability	7	CO3	Applying
	b) Explain clearly syndrome decoding method in linear block codes	7	CO3	Understanding

UNIT-IV

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|-------------|----|--|---|-----|---------------|
| 7. | a) | With suitable example, explain about the Binary Cyclic Codes. | 7 | CO4 | Understanding |
| | b) | Discuss syndrome of cyclic code. Draw syndrome decoder for a (15,9) cyclic code with generator polynomial $g(X) = 1 + X^3 + X^4 + X^5 + X^6$ | 7 | CO4 | Applying |
| (OR) | | | | | |
| 8. | a) | Using the generator polynomial $g(X) = 1 + X^2 + X^3$ generate non-systematic cyclic code words for the message vector 1011 and 1100 | 7 | CO4 | Applying |
| | b) | Design a syndrome calculator for a (7, 4) cyclic code generated by the polynomial $g(p) = p^3 + p^2 + 1$. Identify the syndrome for the received code $Y = 0110101$. | 7 | CO4 | Understanding |

UNIT-V

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|-------------|----|---|---|-----|---------------|
| 9. | a) | Explain the Viterbi decoding algorithm of a convolution encoder with an example | 7 | CO5 | Understanding |
| | b) | A rate 2/3 convolution code is described by $g_1 = [1011]$ $g_2 = [1101]$ $g_3 = [1010]$. Draw the encoder, code tree. | 7 | CO5 | Applying |
| (OR) | | | | | |
| 10. | a) | Explain the advantages and disadvantages of convolutional codes. | 7 | CO5 | Understanding |
| | b) | Consider the convolutional encoder shown in Fig. | 7 | CO5 | Applying |



Analyze its state diagram and trellis diagram

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	<u>UNIT-I</u>	Marks	CO	Blooms Level
1. a)	What are the performance factors to calculate the system performance? Explain each in detail	7M	CO1	2
b)	Define computer architecture and computer organization. Differentiate between them.	7M	CO1	2
	(OR)			
2. a)	Discuss the role of system buses in computer organization.	7M	CO1	2
b)	Write notes on multi-processor and multi computer systems.	7M	CO1	2
	<u>UNIT-II</u>			
3. a)	Define Register Transfer Language (RTL). Give examples.	7M	CO2	2
b)	Explain addition and subtraction using micro-operations.	7M	CO2	2
	(OR)			
4. a)	Compare arithmetic vs logic micro-operations.	7M	CO2	2
b)	Discuss the Arithmetic Logic Shift Unit (ALSU) with a block diagram.	7M	CO2	2
	<u>UNIT-III</u>			
5. a)	What is a microprogrammed control unit? Explain with diagram.	7M	CO3	2
b)	Explain Booth's multiplication algorithm with steps.	7M	CO3	2
	(OR)			
6. a)	Explain the concept of overflow in arithmetic operations and underflow in floating-point arithmetic.	7M	CO3	2
b)	Explain restoring division algorithm with example.	7M	CO3	2
	<u>UNIT-IV</u>			
7. a)	Explain memory hierarchy with neat block diagram.	7M	CO4	2
b)	Explain write-through and write-back policies in cache.	7M	CO4	2
	(OR)			
8. a)	Explain and compare the RAID levels	7M	CO4	2
b)	Explain different types of memory and its applications.	7M	CO4	2
	<u>UNIT-V</u>			
9. a)	Discuss the role of DMA controller.	7M	CO5	2
b)	Differentiate between I/O bus and memory bus.	7M	CO5	2
	(OR)			
10. a)	Explain about Asynchronous data transfer modes.	7M	CO5	2
b)	Explain Input-Output Processor (IOP) organization.	7M	CO5	2

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		Marks	CO	Blooms Level
<u>UNIT-I</u>				
1.	a) Discuss about static characteristics of measuring instrument.	7M	CO1	L1
	b) Describe the range extension DC voltmeter.	7M	CO1	L2
(OR)				
2.	a) Discuss about dynamic characteristics	7M	CO1	L1
	b) Describe the operation of shunt type ohm meter with a diagram	7M	CO1	L2
<u>UNIT-II</u>				
3.	a) Describe the operation of standard signal generator	7M	CO2	L1
	b) Write short notes on spectrum analyzers	7M	CO2	L2
(OR)				
4.	a) Discuss the operation of AF sine and square wave generators	7M	CO2	L1
	b) Describe the operation of heterodyne wave analyzer	7M	CO2	L2
<u>UNIT-III</u>				
5.	a) Discuss the function of trigger circuit	7M	CO3	L1
	b) Discuss in detail, the construction and working of a sampling oscilloscope.	7M	CO3	L2
(OR)				
6.	a) Discuss the operation of vertical amplifier	7M	CO3	L1
	b) Briefly discuss about digital storage oscilloscope.	7M	CO3	L2
<u>UNIT-IV</u>				
7.	a) Describe how a Maxwell bridge can be used for measuring an unknown inductance	10M	CO4	L1
	b) What are the applications of Wheatstone bridge. And list out its limitations	4M	CO4	L2
(OR)				
8.	a) Discuss how a Maxwell bridge can be used for measuring an unknown inductance	7M	CO4	L1
	b) Derive the expression for current when the bridge is balanced.	7M	CO4	L2
<u>UNIT-V</u>				
9.	a) With a neat sketch, explain the operation of piezo-electric transducers in detail.	10M	CO5	L1
	b) What are the functions of transducers?	4M	CO5	L2
(OR)				
10.	a) Define a transducer. List the applications.	4M	CO5	L1
	b) Discuss about Inductive transducers.	10M	CO5	L2

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	<u>UNIT-I</u>	Marks	CO	Blooms Level
1. a)	Explain the UNIX environment and command structure with an example.	7	1	K2
b)	Differentiate between absolute and relative pathnames with examples.	7	1	K3
	(OR)			
2. a)	Demonstrate directory commands (pwd, cd, mkdir, rmdir) with examples.	7	1	K3
b)	Write short notes on internal and external commands in UNIX.	7	1	K2
	<u>UNIT-II</u>			
3. a)	Explain file permissions and directory permissions in UNIX.	7	2	K2
b)	Write the syntax and examples for wc, comm, and tr commands.	7	2	K3
	(OR)			
4. a)	What are wildcards in UNIX? Explain their usage with examples.	7	2	K2
b)	Explain the working of awk command with examples.	7	2	K3
	<u>UNIT-III</u>			
5. a)	Explain the role of control statements (if, while, case) in shell programming.	14	3	K3
	(OR)			
6. a)	Differentiate between system calls and library functions.	7	3	K2
b)	Write a shell program to check whether a given string is a palindrome.	7	3	K3
	<u>UNIT-IV</u>			
7. a)	Explain process termination using exit() and _exit() with examples.	7	4	K3
b)	Write short notes on process identifiers and process hierarchy.	7	4	K2
	(OR)			
8. a)	Explain the concept of signals and signal masks.	7	4	K2
b)	Illustrate the usage of kill() and sleep() functions with examples.	7	4	K3
	<u>UNIT-V</u>			
9. a)	Differentiate between pipes and message queues.	7	5	K3
b)	Explain shared memory operations with suitable examples.	7	5	K2
	(OR)			
10. a)	Discuss the use of semaphores in process synchronization.	7	5	K2
b)	Explain APIs for message queues (msgget, msgsnd, msgrcv, msgctl).	7	5	K2

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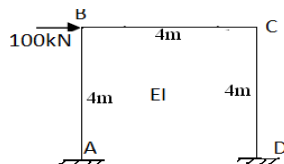
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UNIT-I

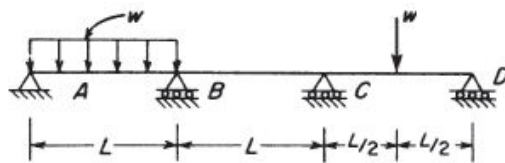
- | | | Marks | CO | BTL |
|----|---|-------|-----|-----|
| 1. | ABC is a continuous beam with constant EI throughout its length. The end supports A and C are fixed and beam is continuous over middle support B. Span BC is uniformly loaded with 10kN per meter length, while a concentrated vertical load of 100kN acts at the mid span AB. Use slope-deflection method. | 14M | CO1 | 3 |

(OR)

- | | | | | |
|----|--|-----|-----|---|
| 2. | Analyze the portal frame shown in figure by slope-deflection method. | 14M | CO1 | 4 |
|----|--|-----|-----|---|

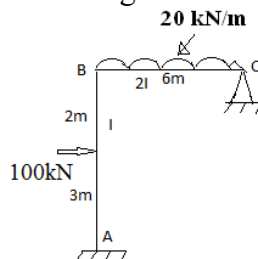
**UNIT-II**

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|----|---|-----|-----|---|
| 3. | Analyze the continuous beam shown in Figure using moment distribution method. The flexural rigidity of the beam is EI. Take $W = 20\text{kN/m}$ and $L = 4$. | 14M | CO2 | 3 |
|----|---|-----|-----|---|

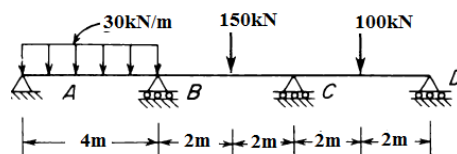


(OR)

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|----|---|-----|-----|---|
| 4. | Analyse the Frame shown in Figure. using moment distribution method and draw the Bending moment diagram | 14M | CO2 | 4 |
|----|---|-----|-----|---|

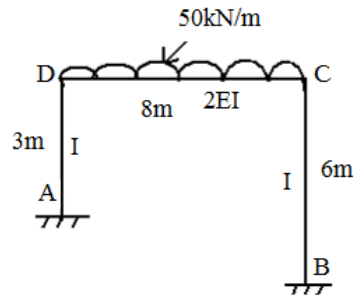
**UNIT-III**

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|----|---|-----|-----|---|
| 5. | Analyse the continuous beam shown in Figure using Kani's method | 14M | CO3 | 3 |
|----|---|-----|-----|---|



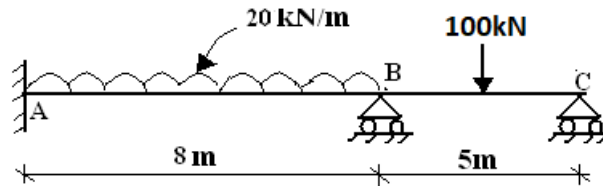
(OR)

6. Analyse the rigid frame as shown in Fig. draw the bending moment diagram By Kani's method. 14M CO3 4



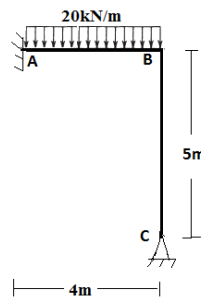
UNIT-IV

7. Analyse the beam shown in Figure using Stiffness method, EI is constant. 14M CO4 3



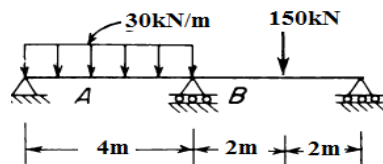
(OR)

8. Analyse the portal frame shown in figure using strain stiffness method and draw bending moment diagram. EI is constant. 14M CO4 4



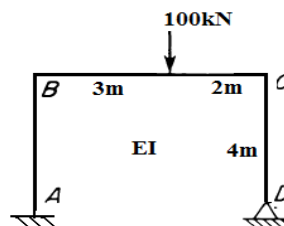
UNIT-V

9. Analyse the continuous beam shown in Figure using Flexibility method. 14M CO5 3



(OR)

10. Analyse the portal frame shown in Figure using Flexibility method 14M CO5 4



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UNIT-I				
1.	a) Define "big data" and under what conditions it is given that name. Identify the characteristics of Big Data. State the importance of Big Data Analytics.	7	CO1	L2
	b) List two industries that heavily rely on big data analytics? Explain about the computing resources of Big Data Storage	7	CO1	L2
(OR)				
2.	a) State the various raw data sources. How does unstructured data differ from structured data? List out the benefits of Big Data analysis.	7	CO1	L1
	b) What are the key trends that led to the emergence of big data? Recognize the various analytical tools used for big data	7	CO1	L2
UNIT-II				
3.	a) Discuss the key concepts of stream processing system. Explain the following terms: i. Counting oneness in a window ii. Decaying window.	7	CO2	L2
	b) What is a Real-Time Analytics Platform (RTAP)? Why is RTAP Important? What are Common Applications of RTAP?	7	CO2	L2
(OR)				
4.	a) What is Streaming data and Streaming data architecture? Explain various sampling techniques in big data stream.	7	CO2	L2
	b) Write notes on the term stream computing. And explain the models for data stream processing.	7	CO2	L2
UNIT-III				
5.	a) Identify the key advantages of Hadoop. Evaluate the HDFS concepts and Java interface.	7	CO3	L2
	b) Explain core architecture of Hadoop with suitable block diagram. Discuss role of each component in detail.	7	CO3	L2
(OR)				
6.	a) Compare RDBMS versus Hadoop. List down the tools related with Hadoop	7	CO3	L4
	b) Why Hadoop is called a Big Data technology? Explain how it supports Big Data. Enlist the key advantages of Hadoop	7	CO3	L3
UNIT-IV				
7.	a) Describe following with respect to Map Reduce: i. Mapper ii. Reducer iii. Combiner iv. Partitioner v. searching vi. Sorting vii. Compression.	7	CO4	L2
	b) Discuss on the different types and formats of MapReduce with an example for each one. Write the advantages and disadvantages of map reduce.	7	CO4	L2
(OR)				
8.	a) Write down and explain MapReduce workflow for the following system - Find the mean maximum recorded temperature for everyday of the year and every weather station	7	CO4	L2
	b) Explain any two multi-user schedulers in MapReduce. List out the failures in classic map reduce.	7	CO4	L2
UNIT-V				
9.	a) Explain file formats used in Hive What are the different ways to insert data into a table using Hive? Give a sample query for each kind.	7	CO5	L2
	b) Explain in detail about Hive query language statements and hive analytic functions with appropriate illustrations.	7	CO5	L2
(OR)				
10.	a) List out the data types in Hive. Explain the join operations using Hive.	7	CO5	L2
	b) What are the different ways of executing Pig program. How can you run the Pig script in Local and Distributed mode, explain with your own example.	7	CO5	L2

Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

		<u>UNIT-I</u>	Marks	CO	Blooms Level
1.	a)	Explain Naïve and Euclid's algorithm of GCD.	5	CO1	Understand
	b)	Write a program for extended Euclid's algorithm	5	CO1	Understand
		(OR)			
2.	a)	What is multiplicative inverse and modular multiplicative inverse?	5	CO1	Understand
	b)	Explain naïve and better approach of prime numbers.	5	CO1	Understand
		<u>UNIT-II</u>			
3.	a)	What is a circular linked-list? Explain with an example.	5	CO2	Analyze
	b)	Write code for deleting middle element from the singly linked list.	5	CO2	Apply
		(OR)			
4.	a)	Write an algorithm for insert a node in the middle of the DLL.	5	CO2	Analyze
	b)	How to search for an element in the single linked list? Explain.	5	CO2	Apply
		<u>UNIT-III</u>			
5.	a)	Write Algorithm for Linear Search. Illustrate search for 38 and 69 in the given list of elements: 13 9 25 11 38 64 42 20	5	CO3	Apply
	b)	Illustrate Quick sort for the following elements step by step and explain: 23,56,14,34,58,97,72,69,36.	5	CO3	Analyze
		(OR)			
6.	a)	Write Algorithm for Binary Search. Illustrate search 77 and 12 in the given list of elements:13 19 25 31 38 42 51 65 77 95	5	CO3	Apply
	b)	Explain about Recursive merge sort with suitable example.	5	CO3	Understading
		<u>UNIT-IV</u>			
7.	a)	Write an algorithm for implementing stacks using Arrays. Explain	5	CO4	Apply
	b)	Write an algorithm for implementing queues using linked list. Explain with an example.	5	CO4	Analyz
		(OR)			
8.	a)	Write an algorithm for implementing stack using linked list. Explain	5	CO4	Understand
	b)	Write an algorithm for implementing queues using Arrays. Explain	5	CO4	Understand
		<u>UNIT-V</u>			
9.	a)	Define binary search tree. Show how to insert and delete an element from binary search tree.	5	CO5	Analyze
	b)	What is a graph? Explain the properties of graphs.	5	CO5	Apply
		(OR)			
10.	a)	Write breadth first traversal algorithm. Explain with an example.	5	CO5	Analyze
	b)	Write algorithm to insert and delete an element from binary search tree.	5	CO5	Apply
		<u>UNIT-VI</u>			
11.	a)	How 0/1 knapsack problem can be solved by using dynamic programming approach?	5	CO6	Apply
	b)	Write an algorithm for implementing egg dropping problem.	5	CO6	Analyze
		(OR)			
12.	a)	Write an algorithm for implementing rod cutting problem.	5	CO6	Apply
	b)	Distinguish between bottom up and top down approach.	5	CO6	Analyze

Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-IMarks CO Blooms
Level

- | | | | | | |
|----|----|---|---|-----|----|
| 1. | a) | Implement function for reversing a singly linked list without using extra space? | 5 | CO1 | K1 |
| | b) | Given an array, print the next greater element for every element, elements which do not have any greater elements consider the next greater element as -1.
Input: arr[] = [13,7,6,12]
Output :13 -> -1
7-> 12
6 -> 12
12 -> -1 | 5 | CO1 | K3 |

(OR)

- | | | | | | |
|----|----|--|---|-----|----|
| 2. | a) | Define Queue and implement circular queue using array (enqueue and dequeue)? | 5 | CO1 | K1 |
| | b) | Give a efficient approach to identify the middle element of the singly linked list in order of length of the list? | 5 | CO1 | K2 |

UNIT-II

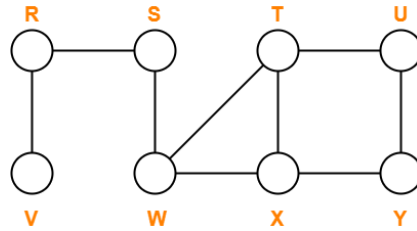
- | | | | | | |
|----|----|--|---|-----|----|
| 3. | a) | Explain about quick sort technique and discuss the time and space complexity of quick sort technique? | 5 | CO2 | K1 |
| | b) | Given an array of n elements such that elements may repeat. you can delete any number of elements from the array. The task is to find a minimum number of elements to be deleted from the array to make all elements are equal.
Input: arr[] = {4,3,4,4,4,2,4}
Output: 2
Explanation:
deleting 2 and 3 from array, array becomes arr[] = {4,4,4,4} | 5 | CO2 | K3 |

(OR)

- | | | | | | |
|----|----|---|---|-----|----|
| 4. | a) | what is collision in hashing and explain different collision resolution techniques with examples? | 5 | CO2 | K1 |
| | b) | Given an array of both positive and negative integers arr[] which are sorted. The task is to sort the square of the numbers of the array in order of N where N is the number of elements in the array.
Input: arr[] = {-6,-3,-1,2,4,5}
Output: 1,4,9,16,25,36 | 5 | CO2 | K2 |

UNIT-III

5. a) Construct the post order tree for the given pre order and in order traversal
inorder : 40,20,50,10,60,30
pre order: 10,20,40,50,30,60 5 CO3 K1
- b) Construct BFS for given below graph? Consider vertex S as the starting vertex? 5 CO3 K2



(OR)

6. a) Explain Binary search tree and implement function for searching in BST? 5 CO3 K1
- b) Explain the graph representations i) Adjacency matrix and ii) Adjacency list? 5 CO3 K1

UNIT-IV

7. a) Explain about the fractional knapsack problem? 5 CO4 K1
- b) Given a paper of size A x B. Task is to cut the paper into squares of any size. Find the minimum number of squares that can be cut from the paper. 5 CO4 K2

Input: 13 x 29

Output: 9

Explanation: 2 (squares of size 13 x 13) +
4 (Squares of size 3 x 3) +
3 (squares of size 1 x 1) = 9

(OR)

8. a) Explain about the job scheduling problem? 5 CO4 K1
- b) Given the arrival and departure times of all trains that reach a railway station, the task is to find the minimum number of platforms required for the railway station so that no train waits, you are given two arrays that represent the arrival and departure times of trains that stop. 5 CO4 K3

Input: arr[] = {9:00, 9:40, 9:50, 11:00, 15:00, 18:00},

Dep[] = {9:10, 12:00, 11:20, 11:30, 19:00, 20:00}

Output: 3

UNIT-V

9. a) Explain about KMP algorithm? 5 CO5 K1
- b) Given an array a, we have to find the minimum product possible with the subset of elements present in the array. The minimum product can be a single element also. 5 CO5 K2

Input : a[] = { -1, -1, -2, 4, 3 }

Output : -24

Explanation : Minimum product will be (-2 * -1 * -1 * 4 * 3) = -24

(OR)

- | | | | | | |
|-----|----|---|---|-----|----|
| 10. | a) | <p>Given an array of size n that has the following specifications:
 Each element in the array contains either a policeman or a thief.
 Each policeman can catch only one thief.
 A policeman cannot catch a thief who is more than K units away from the policeman.
 you need to find the maximum number of thieves that can be caught.
 Input : $arr[] = \{'P', 'T', 'T', 'P', 'T'\}$,
 $k = 1$.
 Output : 2.
 Here maximum 2 thieves can be caught, first policeman catches first thief and second police-man can catch either second or third thief.</p> | 5 | CO5 | K3 |
| | b) | <p>Given a binary string S, return the number of non-empty substrings that have the same number of 0's and 1's, and all the 0's and all the 1's in these substrings are grouped consecutively. Substrings that occur multiple times are counted the number of times they occur.
 Input: "00110011"
 Output: 6</p> | 5 | CO5 | K2 |

UNIT-VI

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|-----|----|--|---|-----|----|
| 11. | a) | <p>Given a "2 x n board and tiles of size "2 x 1". Count the number of ways to tile the given board using the 2 x 1 tiles. A tile can either be placed horizontally I.e, as a 1 x 2 tile or vertically i.e 2 x 1 tile.
 Input: $n = 4$
 Output: 5
 For a 2 x 4 board, there are 5 ways
 All 4 vertical (1 way)
 All 4 horizontal (1 way)
 2 vertical and 2 horizontals (3 ways)</p> | 5 | CO6 | K2 |
| | b) | <p>Given a gold mine of $n*m$ dimensions. Each filed in this mine contains a positive integer which is the amount of gold in tons. Initially the miner is at first column but can be at any row. He can move only (right->, right up/,right down\) that is from a given cell, the miner can move to the cell diagonally up towards the right or diagonally down towards the right. Find out maximum amount of gold he can collect.
 Input: $mat[][] = \{\{1,3,3\},\{2,1,4\},\{0,6,4\}\}$
 Output: 12</p> | 5 | CO6 | K2 |

- | | | | | | |
|-----|----|---|---|-----|----|
| 12. | a) | Given an input sequence array, Find the longest increasing subsequence of a given array such that all elements of the subsequence are in the increasing order.
Input : arr[] = {3,10,2,1,20}
Output: Length of LIS = 3
The longest increasing subsequence is 3,10,20 | 5 | CO6 | K3 |
| | b) | Given an array of size N. the task is to find the sum of the contiguous subarray within a arr[] with the largest sum.
Input: arr[] = {-2, -3, 4 -1, -2, 1, 5, -3}
Output: 7
Explanation: $4 + (-1) + (-2) + 1 + 5 = 7$ | 5 | CO6 | K2 |

Time: 3 Hours**Max Marks: 60**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

		Marks	CO	Blooms Level
<u>UNIT-I</u>				
1.	a) Classify the maps and explain the maps which are classified based on the scale criteria?	5	01	L2
	b) Summarize the salient points of Lambert's cylindrical equal-area projection?	5	01	L2
(OR)				
2.	a) Explain the concept of a grid system and its advantages	5	01	L2
	b) Compare the properties of small scale and large-scale maps?	5	01	L2
<u>UNIT-II</u>				
3.	a) Compare the Spatial and Non-Spatial data types with a neat sketch?	5	02	L2
	b) Define the term Geographical Information System and list the applications of GIS?	5	02	L2
(OR)				
4.	a) Illustrate the components of GIS with a sketch.	5	02	L2
	b) Explain with a neat sketch the linking of spatial data with non-spatial data?	5	02	L2
<u>UNIT-III</u>				
5.	a) Explain the following. a) Data display b) Data exploration	5	03	L2
	b) What do you mean by fundamental operations in GIS? Summarise their salient points.	5	03	L2
(OR)				
6.	a) Explain the following methods of spatial data input in GIS. a) Entry of coordinates using coordinate geometry b) Importing of Existing Digital Data	5	03	L2
	b) Explain the concept of Data Analysis in GIS	5	03	L2
<u>UNIT-IV</u>				
7.	a) Summarize the Network database models in GIS	5	04	L2
	b) Compare the simple file list and ordered sequential files in DBMS	5	04	L2
(OR)				
8.	Explain what are the functions of Database Management System?	10	04	L2
<u>UNIT-V</u>				
9.	Explain with a neat sketch the stages in GIS to construct the data models?	10	05	L2
(OR)				
10.	a) Show and explain the vector data representation in GIS?	5	05	L2
	b) What is meant by raster data model and illustrate its Entity model and Pixel Value with a neat sketch.	5	05	L2
<u>UNIT-VI</u>				
11.	Apply the GIS techniques in land use and landcover studies?	10	06	L3
(OR)				
12.	Apply the GIS techniques in geological studies?	10	06	L3