

Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit

All Questions Carry Equal Marks

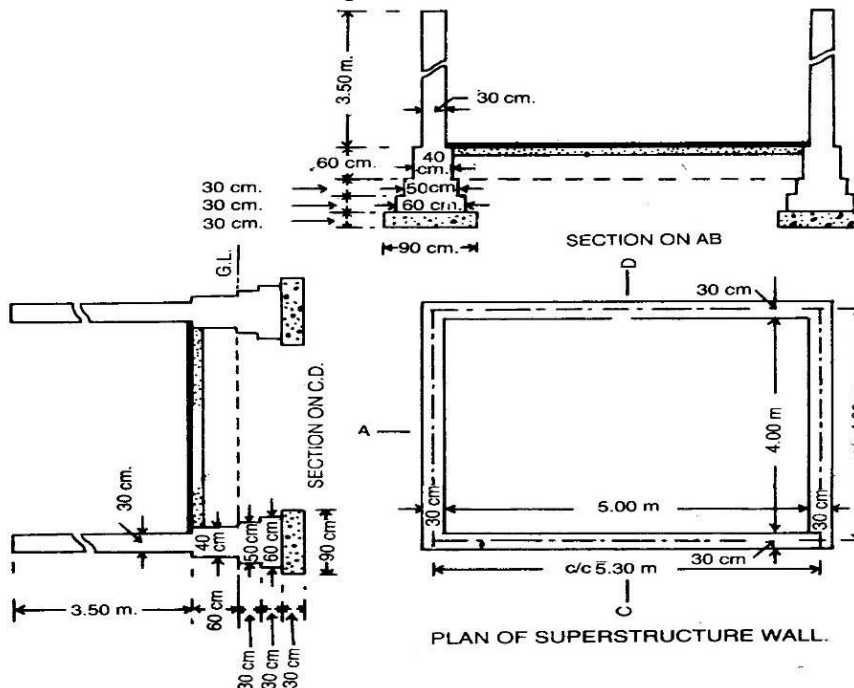
All parts of the Question must be answered at one place

UNIT-I

- | | | Marks | CO | Blooms Level |
|----|--|-------|----|--------------|
| 1. | a) Explain the main items of work in building. | 5 M | 1 | Remember |
| | b) What are the methods of building estimate? Explain any one method with example. | 5 M | 1 | Remember |

(OR)

- | | | | | |
|----|---|------|---|----------|
| 2. | Estimate the following items of work from the plan of super structure wall of a single room building of 5 m X 4 m and sections represents the cross-section of the walls with foundation estimate the quantities of | 10 M | 1 | Remember |
| | i) Earth work in excavation in foundation | | | |
| | ii) concrete in foundation | | | |
| | iii) Brick work in foundation and plinth | | | |
| | iv) Brick work in super structure | | | |

**UNIT-II**

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|----|--|------|---|----------|
| 3. | Estimate the quantity of earth work by Mid-sectional area; Mean sectional area and Prismoidal formula methods for 200 m length for a portion of a road in a uniform ground the heights of banks at the two ends being 1.0 m and 1.6 m. The formation width is 10 m and side slopes 2:1. Assume there is no transverse slope. | 10 M | 2 | Remember |
|----|--|------|---|----------|

(OR)

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|----|--|------|---|----------|
| 4. | Explain the different cases and methods for estimation of earthwork in canals. | 10 M | 2 | Remember |
|----|--|------|---|----------|

UNIT-III

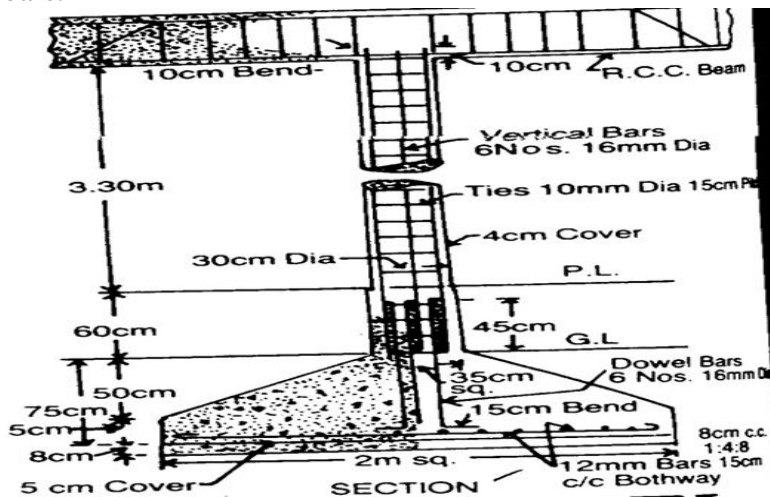
- | | | | | |
|----|---|------|---|----------|
| 5. | Discuss the standard specifications for different items of building construction, | 10 M | 2 | Remember |
|----|---|------|---|----------|

(OR)

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|---|--|------|---|------------|
| 6 | Prepare rate analysis for the following items of work. Assume suitable rates of material and labour. | 10 M | 3 | Understand |
| | i) I class brick work in superstructure with 20 X 10 X 10 cm brick with 1:6 cement sand mortar | | | |
| | ii) R.C.C work in beams 1:2:4 | | | |

UNIT-IV

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|----|--|------|---|---------|
| 7. | Prepare a detailed estimate of a R.C.C column with foundation size 2 X 2 m footing from the given section. Prepare schedule of bars. | 10 M | 4 | Analyse |
|----|--|------|---|---------|



(OR)

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|---|---|------|---|---------|
| 8 | Estimate the quantities of concrete and reinforcement for the R.C.C lintel. The lintel is used for a clear span of 1.50 m and has bearing of 300 mm on the walls on either side. The size of lintel 450 X 150 mm. The lintel has the following reinforcement. And prepare bar bending schedule. | 10 M | 4 | Analyse |
| | i) 12 mm ϕ main bars 2 Nos. straight and 2 Nos. crank 45° at 1/5 th of clear span on either side from ends. | | | |
| | ii) 10 mm ϕ anchor bars 2 Nos. at top. | | | |
| | iii) 6 mm ϕ stirrups at 15 Nos. c/c through out the length of lintel. | | | |

UNIT-V

- | | | | | |
|----|---|------|---|----------|
| 9. | Prepare a tender notice for a metal road on behalf of R & B department? | 10 M | 6 | Remember |
|----|---|------|---|----------|

(OR)

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|-----|---|-----|---|----------|
| 10. | a) Write short note on BIM. | 5 M | 5 | Remember |
| | b) What do you mean by contract system? And also explain its types? | 5 M | 6 | Remember |

UNIT-VI

- | | | | | |
|-----|--|------|---|----------|
| 11. | What is valuation? Explain the methods of valuation. | 10 M | 6 | Remember |
| | (OR) | | | |
| 12. | A colonizer intends to purchase a land of 100,000 sq.m area located in the suburb of a big city to develop it into plots of 700 sq.m each after providing necessary roads and parks and other amenities. The current sale price of small plots in the neighborhood is Rs.30.00 per sq.m. The colonizer wants a net profit of 20%. Work out the maximum price of the land at which the colonizer may purchase the land. | 10 M | 6 | Remember |

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) Define the terms with examples Mean, Median, Mode, Standard Deviation, Harmonic Mean, Line plot	5	CO-1	K1
	b) Explain briefly about Decimal Scaling Normalization with an Example?	5	CO-1	K2
(OR)				
2.	a) Explain about different Statistical functions with a small program?	5	CO-1	K2
	b) What is Decimal Scaling, Min-Max scaling, Z-score explain with example	5	CO-1	K2
<u>UNIT-II</u>				
3.	a) Differentiate Feature Selection, Feature Projection	5	CO-2	K1
	b) Explain Chi-square coefficient of co-relation with a data set?	5	CO-2	K2
(OR)				
4.	a) How dimensionality reduction methods helps for feature analysis	5	CO-2	K3
	b) Explain about PCA Algorithm in detail?	5	CO-2	K2
<u>UNIT-III</u>				
5.	a) Differentiate Boosting and Bagging Methods?	5	CO-3	K2
	b) Explain about ensemble learning method	5	CO-3	K1
(OR)				
6.	a) Differentiate between types of Machine Learning?	4	CO-3	K2
	b) Construct XG-Boost Algorithm with a dataset?	6	CO-3	K3
<u>UNIT-IV</u>				
7.	a) What are the challenges of the decision tree induction methods? Discuss	5	CO-4	K2
	b) Explain about K-Nearest Neighbour in detail with example?	5	CO-4	K2
(OR)				
8.	a) Define classification? Discuss about Naïve Bayes Classification	6	CO-4	K2
	b) Explain about Rule based classification method.	4	CO-4	K1
<u>UNIT-V</u>				
9.	a) Construct and explain a simple Linear Regression with a Dataset?	5	CO-5	K3
	b) What are the performance metrics for the regression methods ? discuss any three	5	CO-5	K2
(OR)				
10.	a) Construct multiple linear regression with a dataset?	5	CO-5	K3
	b) How Random Forest regression works? Explain	5	CO-5	K3
<u>UNIT-VI</u>				
11.	a) Explain about multi-layer feed forward network?	5	CO-6	K2
	b) What is Feed-forward Neural Network? Discuss it	5	CO-6	K2
(OR)				
12.	a) Explain delta learning rule for multi-perceptron layer?	5	CO-6	K2
	b) Discuss Multi-layer Feed forward Networks and its advantages	5	CO-6	K1

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

Answer ONE Question from each Unit

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All parts of the Question must be answered at one place

<u>UNIT-I</u>		Marks	CO	Blooms Level
1.	a) Explicit the nMOS enhancement mode fabrication process for different conditions of V_{ds} .	5M	CO1	3
	b) Expound the steps in twin-tub process of CMOS fabrication with suitable sketch.	5M	CO1	2
(OR)				
2.	a) With a neat sketch explain BICMOS fabrication in an n-well process in detail.	5M	CO1	2
	b) Explicate the structures of n MOS depletion mode and p-MOS enhancement mode transistors.	5M	CO1	3
<u>UNIT-II</u>				
3.	a) Compare the relative merits of three different forms of pull-up for an inverter circuit. What is the best choice for realization in nMOS and CMOS technology?	5M	CO2	2
	b) Present threshold voltage of a MOS device and explain its significance.	5M	CO2	2
(OR)				
4.	a) Sketch the circuit diagram of CMOS inverter and explain its operation.	5M	CO2	3
	b) Categorize the relationship between drain to source current I_{ds} versus drain to source voltage V_{ds} in a saturated region.	5M	CO2	2
<u>UNIT-III</u>				
5.	a) Interpret about stick diagram? Draw the stick diagram and layout for an nMOS inverter.	5M	CO3	2
	b) Draw the layout for a two input CMOS NAND gate.	5M	CO3	1
(OR)				
6.	a) Outline λ -based design rules? Give them for each layer.	5M	CO3	3
	b) Design a stick diagram for two input nMOS NAND and NOR gates?	5M	CO3	2
<u>UNIT-IV</u>				
7.	a) Explain about dynamic CMOS logic with example.	5M	CO4	2
	b) Explain the detail about pseudo-nMOS gates with neat circuit diagram.	5M	CO4	1
(OR)				
8.	a) Exemplify Transmission gates with neat sketches.	5M	CO4	3
	b) List out various ways to minimize the static and dynamic power dissipation.	5M	CO4	2
<u>UNIT-V</u>				
9.	a) Calculate the sheet resistance of an CMOS inverter from V_{DD} to GND.	5M	CO5	2
	b) Depict the expressions for rise time and fall time in the case of CMOS inverter.	5M	CO5	3

(OR)

- | | | | | | |
|-----|----|---|----|-----|---|
| 10. | a) | Summarize about inverter delay? How delay is calculated for multiple stages? Explain. | 5M | CO5 | 3 |
| | b) | Paraphrase standard unit capacitance? Explain. | 5M | CO5 | 2 |

UNIT-VI

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|-----|----|--|----|-----|---|
| 11. | a) | How do design-verification tools contribute to ensuring the reliability and functionality of electronic systems? | 5M | CO6 | 2 |
| | b) | Contrast the approaches in design for testability? Briefly discuss about each method with suitable diagrams. | 5M | CO6 | 3 |

(OR)

- | | | | | | |
|-----|----|--|----|-----|---|
| 12. | a) | How do design-capture tools facilitate the process of schematic design and component placement in electronic circuits? | 5M | CO6 | 2 |
| | b) | How does the evolution of CMOS technology impact manufacturing test principles and methodologies? | 5M | CO6 | 2 |

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) Explain about various starting characteristics of DC motors and Induction motors.	5M	CO 1	K2
	b) Describe particular applications of electric drives	5M	CO 1	K2
(OR)				
2.	a) List various advantages and disadvantages of Electric Drives over Mechanical Drives.	5M	CO 1	K2
	b) Classify various types of loads; give examples of loads which are a function of speed?	5M	CO 1	K2
<u>UNIT-II</u>				
3.	Explain in brief how heating is done in the following cases: i) Resistance heating, ii) Induction heating	10M	CO 2	K2
(OR)				
4.	What is dielectric heating? Derive the mathematical expression of power consumed in such process. List the important applications of dielectric heating.	10M	CO 2	K2
<u>UNIT-III</u>				
5.	a) Compare AC welding and DC welding.	5M	CO 3	K2
	b) Explain the merits and demerits of electric welding processes?	5M	CO 3	K2
(OR)				
6.	a) Explain the submerged arc welding method with neat sketch.	5M	CO 3	K2
	b) List out different types of resistance welding. Explain them in detail?	5M	CO 3	K2
<u>UNIT-IV</u>				
7.	a) Explain the basic principles of light control?	5M	CO 4	K2
	b) Explain the working principle of fluorescent lamp. Demonstrate the construction and operation of the fluorescent lamp with neat diagram.	5M	CO 4	K2
(OR)				
8.	a) Explain the following terms w.r.t illumination Engineering: i)Reduction factor ii)Utilization factor iii)Maintenance factor iv)Absorption factor	5M	CO 4	K2
	b) State and explain different laws of illumination.	5M	CO 4	K2
<u>UNIT-V</u>				
9.	a) Explain the need for 25kV single phase AC traction in India	5M	CO 5	K2
	b) Derive the expression of maximum speed of quadrilateral speed time curve.	5M	CO 5	K2
(OR)				
10.	a) Explain the following terms: i)Crest speed ii) coasting iii)Schedule speed iv)Average speed	5M	CO 5	K2
	b) An electric train scheduled at a speed of 55 kmph (including a station stop of 40 sec) has a maximum speed of 80 kmph. If the train accelerates at 2.0 kmph/sec, determine the value of retardation when the distance between stops is 5 km	5M	CO 5	K3

UNIT-VI

11. a) What is Specific energy consumption and list the factors that affect it 5M CO 6 K2
- b) A 40 tonne train starts a gradient 1 in 75 at the rate of 1.6 kmphs. The tractive resistance is 66.75 Newton per tonne and allowance for rotational inertia is 10%. Calculate:
- a) The energy in kWh usually employed in attaining a speed of 48 kmph from rest.
- b) The specific energy consumption Wh per tonne-km when running at a steady speed of 56 kmph up this gradient if the overall efficiency of equipment is 70%.
- (OR)**
12. a) Define coefficient of adhesion and derive the necessary expression with related illustrations. 5M CO 6 K2
- b) Find the necessary expression to calculate total tractive effort required to run a train on track 5M CO 6 K2

**Data Science with python
(INFORMATION TECHNOLOGY)****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) What is Data Science, and how does it differ from traditional data analysis?	5	CO1	1
	b) Discuss the stages of the Data Science life cycle	5	CO1	2
	(OR)			
2.	Discuss the challenges organizations might face when implementing Data Science projects.	10	CO1	3
	<u>UNIT-II</u>			
3.	a) Explore the attributes of a NumPy ndarray, such as shape, dtype, and ndim.	5	CO2	2
	b) Explain the concept of indexing and slicing in NumPy. How can you access specific elements or subsets of an ndarray using indexing and slicing?	5	CO2	2
	(OR)			
4.	Discuss how NumPy facilitates element-wise operations on arrays. Provide examples of basic arithmetic operations.	10	CO2	3
	<u>UNIT-III</u>			
5.	a) Explain the concept of dropping data in Pandas using the drop()	5	CO3	2
	b) Discuss the process of grouping data in Pandas.	5	CO3	3
	(OR)			
6.	Explain the significance of reading and writing data in text format in data analysis and manipulation.	10	CO3	3
	<u>UNIT-IV</u>			
7.	a) Describe the approaches for handling missing data in a DataFrame.	5	CO4	3
	b) Discuss the reasons for renaming axis indexes in a DataFrame.	5	CO4	3
	(OR)			
8.	a) What is discretization and binning in the context of data analysis? How can you perform discretization	5	CO4	2
	b) How can you use Pandas to perform string concatenation and splitting within text data?	5	CO4	3
	<u>UNIT-V</u>			
9.	a) Explain the importance of combining and merging datasets in data analysis.	5	CO5	2
	b) Explain the process of reshaping a DataFrame using the stack() and unstack() methods.	5	CO5	2
	(OR)			
10.	What are the advantages of using hierarchical indexing when working with multi-dimensional data in pandas?	10	CO5	3
	<u>UNIT-VI</u>			
11.	Explain the significance of Matplotlib in data visualization. What are the core components of the Matplotlib library	10	CO6	3
	(OR)			
12.	a) Describe the process of creating bar plots using pandas.	5	CO6	3
	b) Discuss the concept of histograms in data visualization.	5	CO6	3

**IV B.Tech I Semester Regular Examinations, October-2023
PROJECT MANAGEMENT AND OPERATIONS RESEARCH
(MECHANICAL ENGINEERING)****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-I

Marks

1. a) Explain the need for project management with suitable examples 6M
- b) Explain about project contracts 4M

(OR)

2. a) Discuss the principles of project management 6M
- b) What are the essentials of project management and discuss them 4M

UNIT-II

3. Discuss about capital cost and how it affects the project management 10M

(OR)

4. What are various sources of finance and explain them in detail 10M

UNIT-III

5.	Activity	1-2	2-3	2-4	2-5	3-5	4-5	5-6	6-7	6-8	7-8	8-9	10M
	Duration(Days)	15	10	10	10	5	5	18	9	15	10	12	

(i) Draw the project network; (ii) identify the critical path, (iii) Calculate all the Float values for all the activities.

(OR)

6. The data related to a small project consisting of different activities are given below 10M

Activity	Normal Duration	Normal cost	Crash Duration	Crash cost
(1,2)	3	300	2	400
(2,3)	3	30	3	30
(2,4)	7	420	5	580
(2,5)	9	720	7	810
(3,5)	5	250	4	300
(4,5)	0	0	0	0
(5,6)	6	320	4	410
(6,7)	4	400	3	470
(6,8)	13	780	10	900
(7,8)	10	1000	9	1200

Indirect cost = Rs.50 per day. For the above given data Draw the network and find the optimum duration and cost.

UNIT-IV

7. Use simplex method to solve Maximize $Z = x_1 + 2x_2 + 3x_3$; 10M
subject to $x_1 - x_2 + x_3 \geq 4$;
 $x_1 + x_2 + 2x_3 \leq 8$;
 $x_1 - x_3 \geq 2$,
 $x_1, x_2, x_3 \geq 0$

(OR)

8. We have five jobs, each of which has to go through the machines A and B in the order AB. 10M
Processing times are given in the table below.

Job	A	B
1	5	2
2	1	6
3	9	7
4	3	8
5	10	4

Find the sequence and total make span?

UNIT-V

9. Solve the following transportation problem 10M

		to					
		D1	D2	D3	D4	D5	availability
from	A	5	8	6	6	3	800
	B	4	3	7	6	6	500
	C	8	4	6	6	4	900
requirements		400	400	500	400	800	

(OR)

10. Solve the following travelling salesman problem 10M

	A	B	C	D	E
A	∞	3	1	13	1
B	1	∞	13	20	5
C	0	14	∞	11	4
D	19	3	0	∞	5
E	12	8	1	6	∞

UNIT-VI

11. a) What is the problem of replacement and explain failure mechanism of items 4M
b) Machine A costs Rs 45,000 and the operating costs are estimated at Rs 1000 for the first year, increasing by Rs 10,000 per year in the second and subsequent years. Machine B costs Rs 50,000 and operating costs are Rs 2000 for the first year, increasing by Rs 4000 in the second and subsequent years. If you have a machine of type A, should we replace with B? If so when? Assume that both machines have no resale value and future costs are not discounted 6M

(OR)

12. a) Explain pure, mixed and optimal strategies in a game 4M
b) Using dominance principle to simplify the rectangular game with the following pay of matrix, and solve it. 6M

		Player B			
		I	II	III	IV
Player A	I	18	4	6	4
	II	6	2	13	7
	III	11	5	17	3
	IV	7	6	12	2

AR16(RA)

CODE: 16CE4026

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

**IV B.Tech I Semester Regular/Supplementary Examinations, October, 2023
Environmental Engineering-II
(CIVIL 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

UNIT-I

1. a) Explain about carbon and nitrogen cycle with neat sketches. 6 M
- b) Find the minimum velocity and gradient required to transport 8 M
coarse sand with particles of 1 mm diameter and specific
gravity 2.65 through a sewer of 0.9 m diameter. Assume $\beta =$
0.1 and $f = 0.03$. The sewer may be assumed to run half full.
Take $n = 0.013$ for half full condition.

(OR)

2. a) What are the methods used for estimation of quantity of storm 6 M
water?
- b) Differentiate between BOD and COD. Derive an expression 8 M
to compute BOD remaining and exerted from the first order
reaction rate principles.

UNIT-II

3. a) Write short notes on Activated sludge process. 6 M
- b) Design a rectangular grit chamber from the following data 8 M
Flow of sewage = 55×10^6 litres/day,
Specific gravity of the grit = 2.70
Size of the grit particle to be removed = 0.21 mm,
Viscosity of the water = 1.0×10^{-2} cm²/sec

(OR)

4. a) Describe the functioning of a standard rate trickling filter with 7 M
a neat sketch.
- b) Design a secondary sedimentation tank to treat effluent from 7 M
Activated Sludge plant with the following data:
Average sewage flow = 60MID;
mixed liquor suspended solids (MLSS) concentration of
influent = 3000mg/l; peak flow factor = 2.5

UNIT-III

5. a) Why is sludge digestion required? Discuss the different factors affecting the sludge digestion process. 7 M
b) Write short notes on Sewage sickness and its remedial measures. 7 M

(OR)

6. a) Explain in detail about sewage farming. 6 M
b) Design a septic tank for 50 users, assuming the rate of water supply as 60 litres/ head/ day. 8 M

UNIT-IV

7. a) Define air pollution. Describe the different sources of air pollution. 7 M
b) Describe impacts of air pollution on human health. 7 M

(OR)

8. a) How does air pollution affects the different zones of the atmosphere? 7 M
b) Write about classification of air pollutants. 7 M

UNIT-V

9. a) Discuss the impacts of noise pollution in detail. 7 M
b) Explain the control measures of noise pollution. 7 M

(OR)

10. a) Explain noise pollution and its measurement scale. 7 M
b) What are the permissible limits for noise pollution? 7 M

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) List the applications of Microwave frequencies 7M
b) Analyze the TM Mode of propagation in rectangular wave guide 7M
- (OR)**
2. a) Analyze the Dominant mode of propagation in rectangular wave guide 7M
b) Derive the Resonant frequency of the rectangular cavity resonator 7M

UNIT-II

3. a) How Directional coupler is different from remaining passive junctions and analyze its scattering matrix 7M
b) Discusses in brief about the operation of circulator 7M
- (OR)**
4. a) Analyze the [S] matrix of magic tee junction. 7M
b) List the Properties of scattering matrix 7M

UNIT-III

5. a) Discusses in brief about the limitations of the conventional devices at high frequency 7M
b) Analyze the velocity modulation process of two cavity Klystron 7M
- (OR)**
6. a) With Apple gate diagram explain mode analysis of Reflex klystron 7M
b) Discusses in brief about the bunching process of two cavity klystron 7M

UNIT-IV

7. a) Explain the concept of velocity modulation in TWT. 7M
b) Express Hull cut off voltage V_0 in the cylindrical magnetron. 7M
- (OR)**
8. a) Describe the mechanism of interaction between electrons and fields, and account for the energy delivery and build up of oscillations in a Cylindrical Magnetron, with neat sketches. 7M
b) Explain the importance of ω - β diagram in travelling wave tube 7M

UNIT-V

9. a) Explain how an IMPATT diode exhibits a differential negative resistance 7M
b) Explain clearly about the Microwave bench setup. 7M
- (OR)**
10. a) Analyze the negative resistance characteristics of Avalanche transit time diode 7M
b) Analyze the attenuation measurement at high frequency 7M

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)****IV B.Tech I Semester Supplementary Examinations, October, 2023****Environmental Engineering-II
(CIVIL ENGINEERING)****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-I

1. a) What are various sewerage systems? Describe merits and demerits of each system. 6 M
- b) Explain the factors affecting sanitary sewage? How do you calculate quantity of sanitary sewage? 6 M

(OR)

2. a) A combined sewer of a circular section is to be laid to serve a particular area. Determine the size of the sewer from the following data: 6 M

Area to be served	= 120 hectares
Population	= 1, 00,000
Maximum permissible flow velocity	= 3 m/sec
Time of entry for storm water	= 10 minutes
Time of flow in channel	= 20 minutes
Per capita water supply	= 250 lpcd
Coefficient of run-off	= 0.45
Hourly, maximum rainfall for the area	= 5 cm
- b) Derive an expression for first stage BOD. 6 M

UNIT-II

3. a) Draw a flow diagram for sewage treatment plant and Enumerate preliminary unit operations involved in Sewage treatment plant. 6 M
- b) Design a grit chamber for a maximum wastewater flow of 10 MLD, to remove particles up to 0.2 mm diameter having specific gravity 2.65. The kinematic viscosity of water is $1.141 \times 10^{-6} \text{ m}^2/\text{s}$ at 15°C . 6 M

(OR)

4. a) Design the high rate trickling filter for the following data: 6 M

i) Sewage flow = 5 MLD	ii) Recirculation ratio = 1.5
iii) BOD of raw sewage = 300 mg/l	iv) BOD removal in primary tank = 30%
v) Final effluent BOD desired = 30 mg/l	
- b) Compare & contrast between trickling filter and activated sludge process. 6 M

UNIT-III

5. a) Discuss the anaerobic sludge digestion process with neat sketch. 6 M
- b) Explain in detail about any one sewage disposal method. 6 M

(OR)

6. a) Design a septic tank for a hostel with users of 150. 6 M
- b) Explain the factors affecting the sludge digestion. 6 M

UNIT-IV

7. a) Explain the classification of air pollutants? 6 M
- b) Explain the effects of meteorological parameters on the dispersion of air pollutants into the atmosphere? 6 M

(OR)

8. a) What are the effects of Air pollution on plants? 6 M
- b) Explain the working principle of cyclone with a neat diagram. What are its advantages and disadvantages? 6 M

UNIT-V

9. a) Explain the causes and effects of noise pollution. 6 M
- b) Explain the noise rating system. 6 M

(OR)

10. Explain the sources and control measures of noise pollution. 12 M

AR18(RA)

CODE: 18CST417

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

IV B.Tech I Semester Regular(RA)/Supplementary Examinations, October, 2023

**UML & Design Patterns
(COMPUTER SCIENCE AND ENGINEERING)**

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-I

1. a) What is Object? Explain about Oriented Analysis and Design? 6 M
b) What are the salient features of object orientation? Explain briefly. 6 M
(OR)
2. a) Mention the goals of Good design 6 M
b) Explain the software development life cycle for UML? 6 M

UNIT-II

3. a) Explain in detailed about the dependency relationship in use case with suitable example 6 M
b) Explain the following with regard to interaction diagrams. 6 M
i. Object life line ii. «create» and «destroy» messages iii. Focus of control
iv. Nesting flow of control v. Semantic equivalence
- (OR)
4. a) Mention the Strength and Weakness of the Use case Diagram. 6 M
b) Explain Aggregation and Composition relationships in detail 6 M

UNIT-III

5. a) Define signal? What are the differences between thread and component? 6 M
b) What are the types of components in UML? Write the difference between component and deployment diagram 6 M
- (OR)
6. a) Discuss the need of Advanced Behavioural modelling with an example 6 M
b) What is Component? Mention different components present in behavioural modelling. 6 M

UNIT-IV

7. a) Define Design Pattern. State the use of design pattern. 6 M
b) Explain how to Select a Design Pattern 6 M
- (OR)
8. a) Describe the use of Smalltalk MVC in Design Patterns 6 M
b) Discuss which design pattern addresses the private Issues? 6 M

UNIT-V

9. a) Mention the list of structural patterns used during design phase of software development. 6 M
b) What are the advantages of Factory objects? 6 M
- (OR)
10. a) List out the benefits of Adapter patterns. 6 M
b) Mention the list of Behavioral patterns used during design phase of software development 6 M

AR18(RA)

CODE: 18ECT417

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

IV B.Tech I Semester Regular(RA)/Supplementary Examinations, October, 2023

MICROWAVE ENGINEERING

(ELECTRONICS AND COMMUNICATION ENGINEERING)

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-I

1. a) Draw the field patterns of the dominant mode in a rectangular waveguide 6M
- b) Derive the expressions for dominant and degenerate modes in a rectangular waveguides 6M

(OR)

2. a) Explain the advantages of microwave and List the applications of microwave. 8M
- b) Explain field components of TM mode propagation in rectangular wave guide 4M

UNIT-II

3. a) Write short notes on: 6M
- a) Coupling mechanisms. (b) Waveguide irises
- b) Draw the junction diagram of H-plane Tee and explain its characteristics. 6M

(OR)

4. a) What is a magic Tee junction. Derive the S matrix of a magic Tee 4M
- b) Explain S matrix for two port network and give S matrix properties 8M

UNIT-III

5. a) Show that theoretical efficiency of reflex klystron is 22.78%. 6M
- b) Derive the expression for bunching parameter of two cavity klystron amplifier. 6M

(OR)

6. a) Draw the structure and explain the velocity modulation process in two cavity klystron amplifiers. 8M
- b) Discuss the limitations of conventional tubes at microwave frequencies. 4M

UNIT-IV

7. a) What is slow wave structure and compare TWT and Klystron. 5M
- b) With a neat sketch, explain the structure and principle of operation of TWT Amplifier 7M

(OR)

8. a) Why pi-mode operation is preferred in cylindrical type magnetron? Give its working principle with neat sketches. 4M
- b) How is bunching achieved in a 8-cavity magnetron? Explain. 8M

UNIT-V

9. a) Explain the principle of operation and characteristics of IMPATT diode with neat sketches. 7M
- b) Explain the operation of GUNN diode along with its V-I characteristics 5M

(OR)

10. a) What is bolometer? How it is used for microwave measurements? 4M
- b) Draw a neat diagram of a microwave bench setup and explain in detail about all the components 8M

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) Draw the block diagram and explain the operation of four quadrant control using dual converter in dc motor drive. 6M
b) Explain dynamic and Regenerative braking briefly. 6M
- (OR)
2. a) What are the different types of braking in DC motors. Why plugging is not popular. 6M
b) Explain with one application of dual converter for speed control of DC motor. 6M

UNIT-II

3. a) Draw the armature voltage and armature current waveforms of 3 phase semiconverter-fed DC motor drive for $\alpha=60^\circ$. 6M
b) A 220 V, 1500 rpm, 50 A separately excited motor with armature resistance of 0.5Ω is fed from a three-phase fully controlled rectifier. Available ac source has a line voltage of 440 V, 50 Hz. A star-delta connected transformer is used to feed the armature so that motor terminal voltage equals rated voltage when the converter firing angle is zero. Determine the value of firing angle when: (a) motor is running at 1200 rpm and rated torque and (b) when motor is running at -800 rpm and twice the rated torque. 6M
- (OR)
4. a) Explain the operation of a DC series motor fed from a single phase fully controlled converter with relevant waveforms. 6M
b) Derive the speed-torque (ω -T) equation of a separately excited DC motor. Plot the ω -T characteristics of the motor. 6M

UNIT-III

5. a) Explain the principle of operation of the chopper for the first quadrant operations with all relevant diagrams. 6M
b) Explain closed loop control of one-quadrant chopper controlled separately excited DC motor drive for a step-command in speed reference in normalized form. 6M
- (OR)
6. a) Discuss regenerative braking control of DC separately excited motor using chopper. 6M
b) Describe four quadrant chopper controlled operation of DC motor drive with necessary diagram and wave forms. 6M

UNIT-IV

7. a) Discuss stator voltage control method for speed control of induction motor. 6M
b) Discuss principle of V/f control of induction motor in detail with necessary equation and diagram. 6M
- (OR)
8. a) Discuss effect of variation in rotor resistance on induction motor performance. 6M
b) Develop the speed-torque characteristics of induction motor in four quadrants. 6M

UNIT-V

9. a) What is slip power recovery. How it can be used for speed control of induction motor. 6M
b) Explain about Static Scherbius drive with neat diagram. 6M
- (OR)
10. a) When a synchronous motor is operating in true synchronous mode, frequency must be varied in steps. Why. 6M
b) Explain in detail about self-control mode of operation of synchronous motor. 6M

AR18(RA)

CODE: 18MET416

SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

IV B.Tech I Semester Regular(RA)/Supplementary Examinations, October,2023

FINITE ELEMENT METHODS (MECHANICAL ENGINEERING)

Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit

All Questions Carry Equal Marks

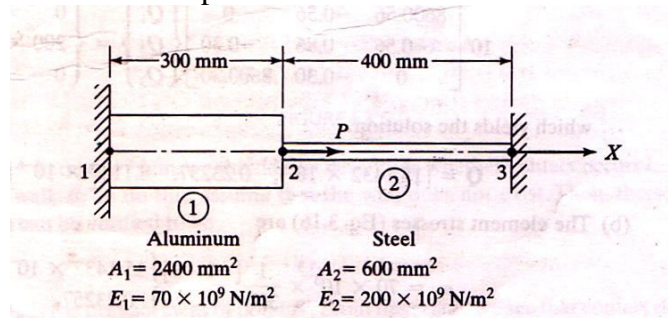
All parts of the Question must be answered at one place

UNIT-I

1. a) What is meant by discretization? 2M
b) Derive the stress strain relations for a 3D body 10M
(OR)
2. a) What are the steps involved in Rayleigh Ritz Method, 6M
b) In a plane strain problem we have, $\sigma_x = 20000 \text{ psi}$, $\sigma_y = -10000 \text{ psi}$, $E = 3 \times 10^7$ 6M
 psi , and $\nu = 0.3$. Determine the value of the stress σ_z .

UNIT-II

3. a) Explain the importance of (i) Node numbering (ii) Mesh generation 4M
b) Consider the bar shown in figure, an axial load $P = 200 \times 10^3 \text{ N}$ is applied as 8M
shown. Calculate the nodal displacements.



(OR)

4. An axial load $P=300\text{KN}$ is applied at 20°C to the rod as shown in Figure 3 below. 12M
The temperature is raised to 60°C . a) Assemble the K and F matrices.
b) Determine the nodal displacements and stresses.

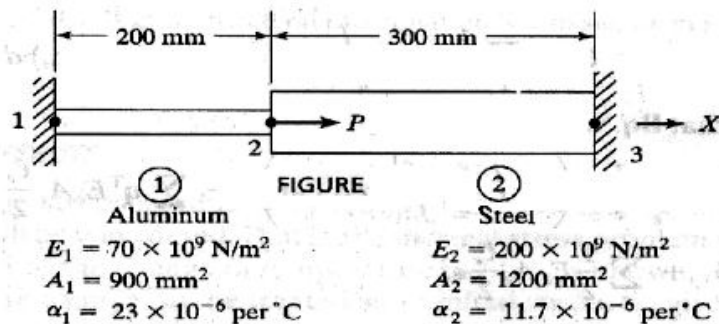


Figure.3

UNIT-III

5. a) For the truss structure shown in figure 4 is subjected to a horizontal load of 4 kN in positive x-direction at node 2. Calculate (a) stiffness matrix and (b) stresses. 8M

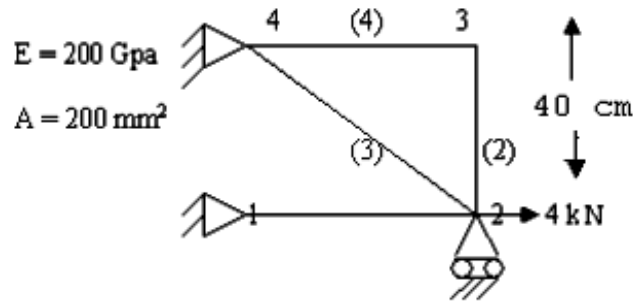


Figure.4

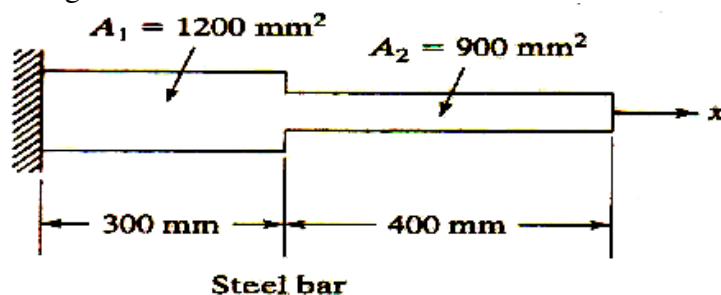
- b) What is the difference between global and local coordinate system? 4M
(OR)
6. Consider a truss element with the coordinates 1(10, 10) and 2(50, 40). If the displacement $q = [15 \ 10 \ 21 \ 43]^T$ mm, then determine 12M
(a) The vector q'
(b) Stress in the element and
(c) Stiffness matrix if $E=70$ GPa and $A=200$ mm²

UNIT-IV

7. Derive strain displacement **B** matrix for CST element. 12M
(OR)
8. a) Write the expressions Gaussian 1x1, 2x2 formula for Single Integral and Double Integrals. 6M
b) Describe how you would implement the boundary condition for the beam. 6M

UNIT-V

9. Consider axial vibration of the steel bar shown in Figure.5 below. By hand calculations, determine the eigen values and natural frequencies. $E=200$ GPa, Density = 7800 kg/m³ 12M



Steel bar

Figure.5

- (OR)
10. a) List down the properties of eigen values. 4M
b) Derive the consistent mass matrix for 1D bar element. 8M