

OPTIMIZATION TECHNIQUES**(Thermal Engineering)**

Time: 3 Hours

Max Marks: 60

Answer any FIVE questions
All questions carry EQUAL marks

1. The standard weight of a special purpose brick is 5 kg and it contains two basic ingredients B_1 and B_2 . B_1 costs Rs 5 per kg and B_2 costs Rs 8 per kg. Strength considerations dictate that the brick should contain not more than 4 kg of B_1 and a minimum of 2 kg of B_2 . Since the demand for the product is likely to be related to the price of the brick, graphically find out the minimum cost of the brick satisfying the above conditions. (solve Graphically) 12M
2. Solve the given through L.P.P 12M
Maximize $4x + 3y$ Subjected to
 $1x + 1y \leq 50$;
 $1x + 2y \geq 80$;
 $3x + 2y \geq 140$
And both x and $y \geq 0$
3. a) A company has three production facilities S_1 , S_2 and S_3 with production capacity of 7, 9 and 18 units (in 100s) per week of a product, respectively. These units are to be shipped to four warehouses D_1 , D_2 , D_3 and D_4 with requirement of 5, 6, 7 and 14 units (in 100s) per week, respectively. 6M

The transportation costs (in rupees) per unit between factories to warehouses are given in the table below: (Solve by North west Cornet method)

	D_1	D_2	D_3	D_4	Supply (Available)
S_1	19	30	50	10	7
S_2	70	30	40	60	9
S_3	40	8	70	20	18
Demand (Requirement)	5	8	7	14	34

b) Write the difference between transportation problem and Assignment problem 6M

4 A methods engineer wants to assign four new methods to three work centres. The assignment of the new methods will increase production. The methods are given below. 12M

		Increase in Production (unit)		
		Work Centres		
		A	B	C
Method	1	10	7	8
	2	8	9	7
	3	7	12	6
	4	10	10	8

If only one method can be assigned to a work centre, determine the optimum assignment.

5. Find the minimum value of $f(x) = x^2 + 2x$ with in using Fibonacci method. Obtain the optimal value with in the 5% of extract value. 12M
6. Solve the Non-linear programming process by Lagrange's multiplier method, optimize $z = 4x_1^2 + 2x_2^2 + x_3^2 - 4x_1x_2$ subjective to constraints $x_1 + x_2 + x_3 = 15$; $2x_1 - x_2 + 2x_3 = 20$ and $x_1, x_2, x_3 > 0$ 12M
7. Use golden selection search method to find out the value of x that minimizes $f(x) = x^4 - 14x^3 + 60x^2 - 70x$ in the range $[0, 2]$ locate this value of x to within range of 0.3. 12M
8. Minimize $f(x) = x_1 + x_2 + 1/x_1x_2$ for $x_1, x_2 > 0$ using the geometric programming method. 12M

AR19

CODE: 19MPE1015

SET-2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I M.Tech II Semester Regular & Supplementary Examinations, January,2022**

**NON-CONVENTIONAL ENERGY SOURCES AND APPLICATIONS
(PED)**

Time: 3 Hours

Max Marks:60

**Answer any FIVE questions
All questions carry EQUAL marks**

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|----|----|--|----|
| 1. | a) | List out any 5 solar energy applications. | 6M |
| | b) | Discuss principles of renewable energy systems. | 6M |
| 2. | a) | Mention the importance of solar PV array and PV modules. | 6M |
| | b) | Describe the main considerations in selecting a site for wind generators | 6M |
| 3. | a) | Explain horizontal axis wind turbine. | 6M |
| | b) | Discuss the advantages and disadvantages of wind energy. | 6M |
| 4. | a) | Discuss the closed cycle operation of OTEC plant | 6M |
| | b) | What are the main limitations of wave energy conversion | 6M |
| 5. | a) | Describe the status of India in geothermal energy sector | 6M |
| | b) | Explain the concept of geothermal power plants. | 6M |
| 6. | a) | Explain different types of Biogas plants in detail | 6M |
| | b) | List any four advantages of OTEC plants | 6M |
| 7. | a) | Explain the principle of MHD power generation | 6M |
| | b) | List the applications of fuel cells. | 6M |
| 8. | a) | Explain the necessity of hybrid systems. | 6M |
| | b) | Explain the wind-diesel hybrid system. | 6M |

AR19

CODE: 19MCS1014

SET-2

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

I M.Tech II Semester Regular & Supplementary Examinations, January, 2022

**HUMAN COMPUTER INTERACTION
(Computer Science Engineering)**

Time: 3 Hours

Max Marks: 60

Answer any FIVE questions
All questions carry EQUAL marks

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|----|----|---|-----|
| 1. | a) | Define user interface.What is the importance of the user interface design? | 6 M |
| | b) | Explain different characteristics of Graphical user interface | 6 M |
| 2. | a) | What are the benefits of the good design? What comprises good design? | 5 M |
| | b) | What are the major principles of user interfaces and characters? Describe them with suitable examples | 7 M |
| 3. | a) | Describe human characteristics and considerations in interface design | 8 M |
| | b) | How requirement analysis play role in the interface design process | 4 M |
| 4. | a) | Explain screen design interaction and prototyping | 6M |
| | b) | What is prototyping interface design and what is purpose of the prototyping | 6 M |
| 5. | a) | How socio organizational issues affects in cognitive model | 6 M |
| | b) | Describe communication and collaboration modules | 6 M |
| 6. | a) | Discuss windows characteristics and components of windows | 8 M |
| | b) | What are the functions of windows | 4 M |
| 7. | a) | What is icon? Explain characteristics of icon | 6 M |
| | b) | Give your observations that influences on icon usability | 6M |
| 8. | a) | Describe about contextual tools in designing web interface | 6M |
| | b) | List and discuss various web interface designing tools used in the web designing interface. | 6M |

AR19

CODE: 19MVL1016

SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

I M.Tech II Semester Regular & Supplementary Examinations, January, 2022

CPLD AND FPGA ARCHITECTURE AND APPLICATIONS

(VLSI System Design)

Time: 3 Hours

Max Marks: 60

Answer any FIVE questions
All questions carry EQUAL marks

1. a) Implement the following Boolean functions using PAL logic 6M
 $F_1(A, B, C) = \sum m(0,1,6,7)$ and $F_2(A, B, C) = \sum m(1,2,4,6)$.
b) Differentiate between CPLD and FPGA. 6M
2. a) Explain the structure of Advanced MAX700 CPLD with the help of neat block diagram. 6M
b) Explain about Cypress Flash device technology and also state the merits of the technology. 6M
3. a) Explain the architecture of ALTERA's FLEX and XC4000 FPGA device. 12M
4. a) Give the routing architecture and the logic blocks of FPGA. 6M
b) Explain about AT&T ORCA Programmable Functional Unit. 6M
5. a) Illustrate about state assignment in FPGAs. 6M
b) With an example, explain how state machine charts are realized using Microprogramming. 6M
6. a) Explain the basic structure of petri-nets with an example. 6M
b) What are the advantages of One hot design method? 6M
7. a) Explain about Synchronization in FSM's? 6M
b) Describe about Extended Petri-nets for parallel controllers. 6M
8. a) Explain about FPGA Advantage Tool that allows different design entries. 6M
b) Discuss in detail about EDA tools. 6M

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CODE: 19MSE1018

SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

I M.Tech II Semester Regular & Supplementary Examinations, January, 2022

ADVANCED DESIGN OF FOUNDATIONS (Structural Engineering)

Time: 3 Hours

Max Marks: 60

Answer any FIVE questions
All questions carry EQUAL marks

1. a) A vane, used to test a deposit of soft alluvial clay, required a torque 72 metre-newtons. The vane dimensions are $D = 100$ mm, and $H = 200$ mm. Determine a value for the undrained shear strength of the clay. 6 M
b) Compute the area ratio of a thin walled tube samples having an external diameter of 6 cm and a wall thickness of 2.25 mm. Do you recommend the sampler for obtaining undisturbed soil samples? Why? 6 M
2. A strip foundation is to be designed for a gross allowable total load of 250 kN. If the load is inclined at angle of 15° to the vertical determine the width of foundation. Take a factor of safety of 3.0 and use Meyerhof's equation. Take $\gamma = 19$ kN/m³, $\phi = 35^\circ$ and $C^1 = 5$ kN/m². The depth of foundation is 1 m. Given $N_C = 46.13$; $N_q = 33.29$; $N_\gamma = 40.69$ at $\phi = 35^\circ$; and $S_C = 1.72$; $S_q = 1.7$; $S_\gamma = 0.6$. 12 M
3. A concrete pile of 45 cm diameter was driven into sand of loose to medium density to a depth of 15m. The following properties are known: (a) Average unit weight of soil along the length of the pile, $\gamma = 17.5$ kN/m³, average $\theta = 30^\circ$, (b) average $K_s = 1.0$ and $\delta = 0.75\phi$. Calculate (a) Ultimate bearing capacity of the pile, and the allowable load with $F_s = 2.5$. Assume water table is at the ground surface and $\gamma_{sat} = 18.5$ kN/m³. 12 M
4. a) What are IRC recommendations in the calculation of steining thickness in well foundations 6 M
b) Write advantages and disadvantages of pneumatic caissons. 6 M
5. a) Explain the stages involved in sub-surface soil exploration. 6 M
b) Classify the piles based on i) Materials ii) Method of construction 6 M
6. a) Explain the Design considerations for the construction of Tunnels. 6 M
b) Explain the process of determining bearing capacity by Vesic's bearing capacity theory. 6 M
7. Explain different types of Cofferdams used in Practice. 12 M
8. Explain different types of Sheet piling and Bracing systems. 12 M