CS/B.TECH (EE)/SEM-8/EE-801B/09

1. ..... *Signature of Invigilator*

2. ..... *Signature of the Officer-in-Charge*

Reg. No. | | | | | | | | | | | | | | |

Roll No. of the Candidate | | | | | | | | | | | | | | |

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CS/B.TECH (EE)/SEM-8/EE-801B/09

ENGINEERING & MANAGEMENT EXAMINATIONS, APRIL – 2009

OPTIMIZATION TECHNIQUES (SEMESTER - 8)

Time : 3 Hours] [Full Marks : 70

INSTRUCTIONS TO THE CANDIDATES :

1. This Booklet is a Question-cum-Answer Booklet. The Booklet consists of **32 pages**. The questions of this concerned subject commence from Page No. 3.
2. a) In **Group – A**, Questions are of Multiple Choice type. You have to write the correct choice in the box provided **against each question**.
   b) For **Groups – B** & **C** you have to answer the questions in the space provided marked 'Answer Sheet'. Questions of **Group – B** are Short answer type. Questions of **Group – C** are Long answer type. Write on both sides of the paper.
3. **Fill in your Roll No. in the box** provided as in your Admit Card before answering the questions.
4. Read the instructions given inside carefully before answering.
5. You should not forget to write the corresponding question numbers while answering.
6. Do not write your name or put any special mark in the booklet that may disclose your identity, which will render you liable to disqualification. Any candidate found copying will be subject to Disciplinary Action under the relevant rules.
7. **Use of Mobile Phone and Programmable Calculator is totally prohibited in the examination hall.**
8. You should return the booklet to the invigilator at the end of the examination and should not take any page of this booklet with you outside the examination hall, **which will lead to disqualification**.
9. Rough work, if necessary is to be done in this booklet only and cross it through.

No additional sheets are to be used and no loose paper will be provided

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Marks Obtained

	Group – A										Group – B			Group – C			***Total Marks***	***Examiner's Signature***
Question Number																		
Marks Obtained																		

.....

Head-Examiner/Co-Ordinator/Scrutineer

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ENGINEERING & MANAGEMENT EXAMINATIONS, APRIL – 2009

OPTIMIZATION TECHNIQUES

SEMESTER - 8

Time : 3 Hours] [Full Marks : 70

Graph Sheet is provided on Page No. 31.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : 10 × 1 = 10

i) Branch and bound method is a part of

a) linear programming

b) integer programming

c) dynamic programming

d) none of these. ☐

ii) Saddle point gives us a solution which is

a) relative maxima b) relative minima

c) indifinite d) none of these. ☐

iii) Graphical method comes under

a) integer programming b) dynamic programming

c) linear programming d) all of these

e) none of these. ☐

iv) Beginning and end points of an activity are called events.

a) True b) False

c) May be true or false d) none of these. ☐

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v) CPM and PERT are methods of

a) Scheduling b) Planning

c) Controlling d) all of these

e) none of these.

vi) Dicision variables are

a) controllable b) uncontrollable

c) parameters d) none of these

e) all of these.

vii) For a maximization problem, the objective function coefficient for an artificial variable is

a) $+ M$ b) $- M$

c) zero d) none of these.

viii) Inventory cost includes

a) item cost and ordering on set-up cost

b) holding cost and stock-out cost

c) all of these

d) none of these.

ix) Common error in a network construction is

a) looping and dangling

b) dangling and redundancy

c) all of these

d) none of these.

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x) CPM is

a) Critical Path Method b) Critical Part Method

c) Creative Part Method d) none of these.

xi) A model is

a) an approximation b) an essence of reality

c) an idealisation d) all of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. Prove that dual of a dual is the primal solution.

3. Solve the following Linear Programming Problem (LPP) by Graphical method :

Maximize $Z = 5X_1 + 7X_2$

Subject to the constraints

$$X_1 + X_2 \leq 4$$

$$3X_1 + 8X_2 \leq 24$$

$$10X_1 + 7X_2 \leq 35$$

$X_1 , X_2 \geq 0.$

4. Determine the maximum and minimum values of the function

$f(x) = 12X^5 - 45X^4 + 40X^3 + 5.$

5. Discuss the advantages and limitations of Linear Programming Problem.

6. Derive the equation of multivariable optimization with Lagrange multiplier method.

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GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following questions. 3 × 15 = 45

7. a) A small-scale industry manufactures electrical regulators, the assembly of which is being accomplished by a small group of skilled workers, both men and women. Due to the limitations of space and finance, the number of workers employed cannot exceed 11 and their salary bill not more than Rs. 60,000 per month. The male members of skilled workers are paid Rs. 6,000 per month, while the female worker doing the same work as the male member gets Rs. 5,000 per month. Data collected on the performance of these workers indicate that a male member contributes Rs. 10,000 per month to total return of the industry, while the female worker contributes Rs. 8,500 per month. Formulate this problem as an LP model in order to maximize the monthly total return. 7

b) A D.C. generator has an internal resistance of r Ω and develops an open circuit voltage of V volt. Find the value of the load resistance R for which the power delivered by the generator, will be maximum. 8

dia

8. a) Use the dynamic programming to solve the following problem : 8

Minimize $Z = Y_1^2 + Y_2^2 + Y_3^2$

Subject to $Y_1 + Y_2 + Y_3 = 10$

$Y_1 , Y_2 , Y_3 \geq 0.$

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b) Find the initial basic feasible solution of the following Transportation problem by Vogel's approximation method (VAM). 7

To From	D_1	D_2	D_3	D_4	*Supply*
S_1	19	30	50	10	7
S_2	70	30	40	60	9
S_3	40	8	70	20	18
Demand	5	8	7	14	34

9. With the help of a suitable examples, explain Branch and Bound method. 15

10. a) In a restaurant, the time to wash and cook batches of produce depends on their condition, type, quality and in tended end product. The time in hours to process six batches J1 – J6, through the washer and cooker is shown below :

Batches	**J1**	**J2**	**J3**	**J4**	**J5**
Washer (M1)	4	7	3	12	11
Cooker (M2)	11	7	10	8	10

Find the sequence of the job that minimizes the total elapsed time. Also calculate the total elapsed time. 8

b) Solve the following LPP by simplex method : 7

Maximize $Z = 3X_1 + 5X_2 + 4X_3$

Subject to $2X_1 + 3X_2 \leq 8$

$2X_2 + 5X_3 \leq 10$

$3X_1 + 2X_2 + 4X_3 \leq 15$

$X_1, X_2, X_3 \geq 0.$

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11. Write short notes on any *two* of the following : $2 \times 7\frac{1}{2}$

a) ECQ models with and without shortages

b) Time-cost optimization algorithm

c) Dynamic programming and Integer programming

d) CPM and PERT.

END

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