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B. Tech. 8th Semester
(Mechanical Engineering)
Examination – May, 2023

OPERATION RESEARCH

Paper : OEC-ME-402-G

Time : Three Hours]　　　　　　　[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. *Compulsory* question 6 parts :　　　　2.5 × 6 = 15

   (a) What are the various application of Simulation ?

   (b) Define a simulation models ?

   (c) What are the Purpose of transportation and Assignment Problem ?

   (d) Define Optimal basis feasible solution.

   (e) Difference between PERT and CPM.

   (f) Define Queuing theory.

P. T. O.

UNIT – I

2. Maximize $Z = 8X_1 + X_2$ Subjected to : 15

$$8X_1 + X_2 \leq 8$$
$$2X_1 + X_2 \leq 6$$
$$3X_1 + X_2 \leq 6$$
$$X_1 + 6X_2 \leq 8$$
$$X_1, X_2 \geq 0$$

Find optimal solution using simplex

3. Maximize $Z = 2X_1 + X_2$ Subjected to : 15

$$X_1 + 2X_2 \leq 10$$
$$X_1 + X_2 \leq 6$$
$$X_1 - X_2 \leq 6$$
$$X_1 - 2X_2 \leq 1$$
$$X_1, X_2 \geq 0$$

Find optimal solution using Graphical Method.

UNIT – II

4. Find the optimal solution of transportation problem by VAM and check the optimality of solution using MODI Method. 15

	Ware House			Supply
	10	8	9	15
Factories	5	2	3	20
	6	7	4	30
	7	6	8	35
Demand	25	26	49	

5. (a) Find the dual of the following L. P. Problem :
Min $Z = 8X1 + 4X_2$ Subjected to 7.5 × 2

$$10X_1 + 2X_2 \leq 15$$
$$2X_1 + X_2 \geq 10$$
$$3X_1 + 2X_2 \leq 6$$
$$2X_1 + 4X_2 = 8$$
$$X_1, X_2 \geq 0$$

(b) Indicate the various areas of application of LPP with brief examples.

UNIT – III

6. Draw a Network diagram. Determine its critical path, total float, free float and independent float. 15

Activity	Duration (Days)
1 – 2	4
1 – 3	12
1 – 4	10
2 – 4	8
2 – 5	6
3 – 6	8
4 – 6	10
5 – 7	10
6 – 7	0
6 – 8	8
7 – 8	10
8 – 9	6

P. T. O.

7. Train arrives at the yard every 15 minute and the service time is 33 minute. If the line capacity of the yard is limited to 5 train. Find the probability that yard is empty and the average number of train in the system. 15

UNIT – IV

8. (a) What is Meant Monte Carlo simulation and the various steps involved in it ? 7.5

   (b) What are the advantages and limitations of using simulation ? 7.5

9. (a) What are the basic steps of a decision making process ? 7.5

   (b) Write short note on SIMON model. 7.5

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B. Tech. 8th Semester (Mechanical Engg.) Examination – May, 2023

INDUSTRIAL AUTOMATION

Paper : PCC-ME-402-G

Time : Three Hours]　　　　　　[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. Write a short notes on :　　　　　　$2.5 \times 6 = 15$

   (a) Principles of automation

   (b) Simulation

   (c) Vibratory feeder

   (d) Group Technology

   (e) Sensors V s actuator

   (f) Artificial intelligence

UNIT – I

2. (a) Discuss production system on the basis of facilities & support systems availability. 10

   (b) Discuss the levels and types of automations. 5

3. (a) Discuss principal of material handling system and equipment used for it. 7.5

   (b) Discuss the design considerations of material handling system. 7.5

UNIT – II

4. (a) Discuss requirement of storage system. 7.5

   (b) Why automatic data capturing is required in storage system ? 7.5

5. (a) Discuss group technology and its application. 7.5

   (b) Discuss components, applications and benefits of flexible manufacturing systems. 7.5

UNIT – III

6. (a) What do you mean by evaluation of automatic production ? Explain. 10

   (b) What is Sensors, Actuators & Transducer ? 5

7. (a) Discuss the desirable features for selecting measuring devices used in automated system. 7.5

   (b) Discuss the definition, operations and theorems of Boolean algebra. 7.5

UNIT – IV

8. Discuss Fuzzy logics with application. 15

9. Discuss the modern techniques used in manufacturing automation for controlling purpose. 15

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B. Tech. 8th Semester (Mechanical Engg.) Examination – May, 2023

PLANT MAINTENANCE ENGINEERING

Paper : PEC-ME-404-G

Time : Three Hours] [Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. Explain the following :

   (a) Corrective Function   5

   (b) Productive Maintenance   5

   (c) Functions of Spare parts   5

UNIT – I

2. Define the term Maintenance or Plant engineering. What are the chief activities of this department in an organization ?   15

3. Distinguish between the decentralization and delegation, with suitable examples. Do you think that decentralization is helpful in increasing the efficiency of the plant engineering department ? Discuss your answer with supporting evidences or examples,   15

UNIT – II

4. (a) Distinguish between No Maintenance technique and Operate to Failure and Corrective maintenance   8

(b) Discuss different types of failures with suitable classification.   7

5. "Prevention is better than cure" – How do you support with reference to the plant engineering functions ?   15

UNIT – III

6. What are the principal factors affecting the location choice ? What are different types of facility location problem ?   15

7. What are the major criteria taken into consideration for placing a manufacturing firm making lighter items ?   15

UNIT – IV

8. (a) Explain V-E-D, C-I-N and V-E-I-N analyses, Discuss their relevance to the maintenance department. 8

   (b) Enumerate the factors leading to a high failure rate in non-standard items. 7

9. What is codification ? What is its significance in maintenance spare parts management ? What are the advantages of codification ? 15

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B. Tech. 8th Semester (Mechanical Engg.) Examination – May, 2023

POWER PLANT ENGINEERING

Paper : PEC-ME-412-G

Time : *Three Hours*]　　　　　[*Maximum Marks : 75*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit. Question No. **1** is *compulsory*. All questions carry equal marks.

1. Explain the following :

   (a) Explain surg tank.　　　　　　　　　　2.5

   (b) Explain electrostatic precipitator.　　　2.5

   (c) What is tariffs ?　　　　　　　　　　2.5

   (d) What is thermionic power generation ?　2.5

   (e) Explain various type of power plant.　　2.5

   (f) What is PWR ?　　　　　　　　　　　2.5

UNIT – I

2. Explain Economizer. Compare steam thermal power plant with hydroelectric power plant.

15

3. Discuss the construction and operation of hydroelectric power plant with neat sketch.

15

UNIT – II

4. What is pulverized fuel ? Discuss PFBC system with neat sketch.

15

5. Explain combined cycle gas turbine power plant. What are the parameters affecting thermodynamic efficiency of combined cycles ?

15

UNIT – III

6. Explain CANDU and give advantage and limitations of nuclear power plant.

15

7. Discuss waste disposal of nuclear power plant. Explain economics of load sharing and load curve.

15

UNIT – IV

8. Discuss OTEC and wind power plants with neat sketch. 15

9. What is thermoelectric power generation ? Explain working of fuel cell with neat sketch. 15

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B. Tech. 8th Semester (Mechanical Engg.) Examination – May, 2023

AUTOMOBILE ENGINEERING

Paper : PEC-ME-420-G

Time : Three Hours]   *[Maximum Marks : 75*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. Explain the following :   6 × 2.5 = 15

   (a) Wet Type & Dry Types clutch.

   (b) What is the necessity of a gear box ?

   (c) Universal Joint.

   (d) Classify different types of wheels.

   (e) What is camber in automobile ?

   (f) Sources of Atmospheric Pollution from the automobile.

UNIT – I

2. What is an Automobile ? How front engine rear drive is different from front engine front drive, explain in detail. 15

3. Explain the working of a single plate clutch with the help of a diagram. 15

UNIT – II

4. Describe the working of a synchromesh gearbox with the help of a sketch. 15

5. Explain the following :

   (a) Torque tube drive. 8

   (b) Radius rod. 7

UNIT – III

6. What is the purpose of independent suspension ? Explain various methods to achieve the same in front and rear axle of car. 15

7. What is wheel alignment ? Discuss various factors of wheel alignments. 15

UNIT – IV

8. State the various functions performed by an automobile tyre. Discuss the properties expected in the same. 15

9. Write short note on : 8

   (a) Evaporative Emission Control.

   (b) Exhaust Gas Recirculation (ECR) Systems. 7

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