

3 hours

80 Marks

**Instructions:**

1. **Question Number 1 is Compulsory**
2. Attempt **ANY THREE** Questions out of remaining **FIVE**
3. Use illustrative diagrams wherever required

- Q1)** Attempt any FOUR questions
- a) Define new product. What is the need for developing new products? **05**
  - b) What is product life cycle? Draw the four phases of product life cycle. **05**
  - c) Draw the flow chart of Concept Development Process in the product design. **05**
  - d) Why it is necessary to integrate the basic forms and elements of a product like balance, rhythm and proportion? **05**
  - e) What are the principles of Design for Manufacturing and Assembly (DFMA)? **05**
  - f) List ANY FIVE Prototyping techniques used in manufacturing a product. **05**
- Q2)**
- a) Explain SIX steps/phases of the Generic product development process with flow chart. **10**
  - b) Define market research. List and explain the methods of market research required in the product design and development. **10**
- Q3)**
- a) What do you mean by concept selection? Explain concept screening and concept scoring methodology giving example. **10**
  - b) What is Product Architecture? Explain the Steps in developing product architecture. **10**
- Q4)**
- a) Explain the process of identifying customer needs in concept development process. **10**
  - b) What is Quality Function Deployment (QFD)? Explain the phases of QFD. **10**
- Q5)**
- a) Draw House of Quality (HoQ) and highlight the customer matrix part in (HoQ)? Explain Voice of the Customer as an input to QFD. **10**
  - b) Define creative thinking. List any FIVE Creativity and problem-solving methods. Explain the Brainstorming Technique used in product development. **10**
- Q6)**
- a) What is golden ratio of proportion? Explain any THREE applications of Golden Ratio? **10**
  - b) Write short notes on Design for Environment and Design for Serviceability. **10**
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(3Hours)

[Total Marks: 80]

- N.B.:** (1) All questions carry equal marks.  
(2) Question No. 1 is compulsory. Attempt any three questions from remaining.  
(3) Figures to the right indicate full marks.  
(4) Illustrative answers with neat sketches wherever required.

- Q1.a) Write short note on Light weighting of vehicles with emphasis on material selection. **05**  
b) Enlist various Airbag materials and their property requirement. **05**  
c) With the help of neat sketch explain Hand lay-up process. **05**  
d) Explain relevance of smart material in the automobile industry. **05**
- Q2.a) Describe need to shift new materials and risk in adopting new materials **10**  
b) Describe evolution of casting technology **10**
- Q3.a) Briefly describe material used in flooring. **10**  
b) With the help of neat sketch explain Resin transfer moulding. **10**
- Q4.a) Explain various use of magnetorheological (MR) fluid in automobiles. **10**  
b) Explain various approaches in tempering of glass for improved toughness. **10**
- Q5.a) Explain application and current trends of paint technology. **10**  
b) Explain Ashby charts for making a good selection of materials in automobiles. **10**
- Q 6. Write short notes. (Any Four) **20**  
a) Aluminum and Magnesium alloys for car bodies  
b) Seat belt requirements  
c) Biocomposites in Automobiles  
d) Trends in windshield glass  
e) Fuel injector materials

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[Time: 3 Hours]

[ Marks:80]

- N.B:
1. Questions No. 1 is Compulsory.
  2. Attempt any three out of remaining Questions.
  3. Figures to the right Indicate full marks.

- Q.1** Attempt any Four write short notes on **20**
- a) Significance of Environment
  - b) Global Warming
  - c) Scope of Environment Management
  - d) EMS certification
  - e) Forest Act
  - f) Eco-system and its types
- Q.2**
- a) Discuss on environmental issues related to Indian context. **10**
  - b) Discuss on Air [ P & CP] Act **10**
- Q.3**
- a) Explain limiting factor and food chain as related to ecosystem. **10**
  - b) Write a note on each. Ozone layer depletion & Acid rain. **10**
- Q.4**
- a) Discuss on corporate environment responsibility. **10**
  - b) What is sustainable development? What are the parameter effecting it? **10**
- Q.5**
- a) What is ISO-14000? How does adoption of ISO-14000 practices benefits industries as well Environment. **10**
  - b) Discuss the functions of government as planning and regulatory agency. **10**
- Q.6**
- a) Discuss the Atomic and Biomedical hazards as related to Global environmental concern. **10**
  - b) Discuss on Total Quality environmental management. **10**

Time: 3Hrs

Marks: 80

1. Question no 1 is compulsory.
2. Attempt any three out of remaining five questions.
3. Figures to the right indicate full marks
4. Assume suitable data if necessary
5. Illustrate your answers with sketches wherever necessary

Q.1 Answer the following questions:

- a. Write short note on Need of BMS in electric vehicles. 05
- b. Explain fundamental operating principle of Fuel cells. 05
- c. Write brief note on Ultra capacitors and flywheels from EV perspective. 05
- d. What is full form of FAME? Explain briefly about FAME-I and FAME-II scheme by Govt. of India. 05

Q.2 a. Explain different resistance forces acting on the vehicle with neat labeled diagram. How do you calculate tractive effort from resistance forces? 10

- b. How many different types of Hybrid vehicles configuration do you know? Explain power flow control in atleast 2 of them with neat sketches. 10

Q.3 a. Compute forces due to drag, rolling and gradient resistance for the following vehicle assuming  $\rho = 1.2 \left(\frac{kg}{m^3}\right)$  and  $\theta = 8^\circ$  at  $V_1$  and  $V_2$ . 10

Vehicle	GVW (kg)	$C_D$	Area(m <sup>2</sup> )	$\mu$	$V_1$	$V_2$	Tire radius
4 wheeler	1500	0.3	2.5	0.015	30	80	0.3

- b. A battery pack of 375V, 200Ah is to be made to power a luxury car. One battery pack is made with 3.65V, 4Ah, 21700 cylindrical cells and another pack uses 3.65V, 50 Ah prismatic cells. Calculate no of cell required in parallel and series required to make a battery pack. Also find total no of cells in both cases. 10

Q.4 a. Define and explain the following terms in relation to Li-ion batteries: State of charge (SoC), Depth of Discharge (DoD), State of Health (SoH), Specific Energy and Specific power. 10

- b. Enlist different types of traction motor which can be used for Electric vehicles. Sketch and explain working and construction of any two of them. 10

Q.5 a. List different types of fuels cells which you can recall. Explain construction and working of any two fuel cells with neat labeled diagram. 10

- b. Describe different charging techniques which can be used in EV's. Also explain different types of pins and connectors used for charging systems in EV's. 10

Q.6 Write short notes on **any four** of following: 05

- a. Regenerative braking in EV's 05
- b. History of HEV's and EV's 05
- c. Traction motor characteristics and Vehicle performance 05
- d. Vehicle to Grid (V2G) concept 05
- e. Control strategies for series drivetrain. 05

**Time: 3-hour**

**Marks: 80**

- N.B. :** (1) Question No 1 is Compulsory.  
 (2) Attempt any three questions out of the remaining five.  
 (3) All questions carry equal marks.  
 (4) Assume suitable data, if required and state it clearly.  
 (5) Notations carry usual meaning.

**Q1. Answer the following (Any FOUR.) [20M]**

- What are the contents of project charter? who prepares and authorizes the project charter?
- Compare the top-down budgeting and bottom-up budgeting.
- What is Goldratt's critical chain method?
- Explain the significance of IRR method in project selection.
- Briefly describe the purchasing cycle.
- Explain the risk breakdown structure.

- Q2.** (a) A consulting project has an actual cost of Rs. 35000, Scheduled cost Rs. 27000, and completed work is Rs. 31000. Find the Scheduled and Cost Variance. Also find SPI and CPI. [5M]
- (b) What is a contract? Explain different types of contracts in brief. [5M]
- (c) Consider a project having following cash flow stream. The cost of capital ( $r$ ) for the firm is 10% . Calculate NPV of project and decide whether to accept or reject the project. [10M]

Year	0	1	2	3	4	5
CASH Flow in Rs.	10,00,000	2,00,000	2,00,000	3,00,000	3,00,000	3,50,000

- Q3.** (a) What is project life cycle? how does cost of change, risk and influence of stakeholders are affected with Project time during the life cycle of project? [10M]
- Q3.** (b) Explain probability and impact matrix. What are the risk response strategies foe negative risks (threats) and positive risks(opportunities). [10M]

Q4. (a) A small project is composed of 8 activities, whose time estimates are listed below.

Activity	Predecessor	$t_o$	$t_m$	$t_p$
A	-	3	6	9
B	-	5	7	8
C	A	6	9	12
D	A	6	12	15
E	B	9	12	18
F	B	12	18	24
G	C, D, E	6	9	12
H	C	3	6	9

i) Draw the project network diagram. Find the critical path and expected project duration.

ii) If the due date is 30 days. What is the probability that the project will be completed within the due date?

iii) Find the probability of completing project between 26 to 31 days. [10M]

Q4. (b) What are the non-numeric models of project selection? Explain in brief. [5M]

Q4. (c) Explain importance of ethics in projects. [5M]

Q5. (a) How communication is planned and managed in project management? [10M]

Q5. (b) What is life cycle of a project audit? what are responsibilities of project auditor? What is essential for successful project audit? [10M]

Q6. (a) What are four stages of team development and growth? What are the barriers to team effectiveness? [10M]

Q6. (b) List and briefly describe the ways project may be terminated. What are some non-technical reasons for project termination? [10M]

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Time: 3hour

Max Marks: 80

- N.B.** (1) Question No. 1 is compulsory.  
 (2) Attempt any three questions out of remaining five questions.  
 (3) Assume suitable data if necessary.  
 (4) Figures to the right indicate full marks.

- Q1. Solve any Four out of Five.** 20
- Illustrate the Cause-and-effect diagram with suitable example.
  - List and describe the dimensions of product quality.
  - What is single sampling plan? Explain with neat sketch.
  - What is Quality Circle? What are the steps involved in quality circle process.
  - Specify the difference between ISO9000 and QS9000.

- Q2.**
- What is cost of quality? What are its categories explain in brief. 10
  - What are the reasons for benchmarking and explain the important steps in the process of benchmarking. 10

- Q3.** 10  
 Following are the inspection results of magnets for nineteen observations.

Week No.	No. of Magnet inspected	No. of defective magnets	Week No.	No. of Magnet inspected	No. of defective magnets
1	724	48	11	736	47
2	763	83	12	739	50
3	748	70	13	723	47
4	748	85	14	748	57
5	724	45	15	770	51
6	727	56	16	756	71
7	726	48	17	719	53
8	719	67	18	757	34
9	759	37	19	760	29
10	745	52			

Calculate the average fraction defective and 3 sigma control limits, construct the control chart and state whether the process is in statistical control.

- Explain the concept of Taguchi's quality function in detail. Give an example. 10

- Q4.**
- Discuss about the four important documents to be prepared for ISO9000 certification. 10
  - Elaborate on the concept of Win-win policy in the context of supplier relationship? 10

- Q5.**
- Describe Deming's philosophy for quality improvement. 10
  - Explain in brief Malcom Baldrige National Quality Award framework and criteria for performance excellence. 10

- Q6.**
- Explain how Six Sigma can be used to improve the quality of products and services in the manufacturing and service sectors. 10
  - Explain strategic approach to leadership in TQM. 10

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