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Subject Code:- BME0201

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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: II - THEORY EXAMINATION (20..... - 20.....)

Subject: Emerging Trends In Mechanical Engineering

Time: 3 Hours

Max. Marks: 100

General Instructions:

IMP: Verify that you have received the question paper with the correct course, code, branch etc.

1. This Question paper comprises of **three Sections -A, B, & C**. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.
2. Maximum marks for each question are indicated on right -hand side of each question.
3. Illustrate your answers with neat sketches wherever necessary.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.
6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION-A

20

1. Attempt all parts:-

- 1-a. What is the primary role of a mechanical engineer? (CO1,K2) 1
- (a) To design electrical systems
 - (b) To analyze and improve mechanical systems
 - (c) To manage business operations
 - (d) To monitor environmental systems
- 1-b. Which of the following is an example of an emerging manufacturing technology? (CO1,K1) 1
- (a) Traditional casting
 - (b) Additive manufacturing (3D printing)
 - (c) Manual lathes
 - (d) Conventional welding
- 1-c. What improves accuracy in mechanical AI systems? (CO2,K2) 1
- (a) Less data
 - (b) Heuristics only
 - (c) Large datasets
 - (d) Random guessing
- 1-d. CAD evolution enables better: (CO2,K2) 1
- (a) Manual drawing
 - (b) Welding control

- (c) Simulation and optimization
- (d) Voice control
- 1-e. Which method is fastest for physical concept modeling? (CO3,K2) 1
- (a) Welding
- (b) Casting
- (c) 3D Printing
- (d) Drilling
- 1-f. A key benefit of CNC prototyping is: (CO3,K2) 1
- (a) Slow process
- (b) Human error
- (c) High precision
- (d) Software dependence
- 1-g. Which of these is a design tradeoff? (CO4,K1) 1
- (a) Functionality vs cost
- (b) Color vs size
- (c) Font vs background
- (d) Button shape vs brand
- 1-h. A responsible designer must consider: (CO4,K2) 1
- (a) Stakeholder ethics
- (b) Only color preference
- (c) Avoiding market needs
- (d) Removing traceability
- 1-i. The role of humans in Industry 5.0 is to: (CO5,K1) 1
- (a) Be excluded
- (b) Collaborate with machines
- (c) Control all manually
- (d) Avoid learning
- 1-j. Cloud computing enables: (CO5,K1) 1
- (a) Faster manual typing
- (b) Centralized data access & processing
- (c) More paperwork
- (d) Less collaboration
2. Attempt all parts:-
- 2.a. What opportunities exist in emerging mechanical engineering fields? (CO1,K2) 2
- 2.b. What is the difference between AI and IoT? (CO2,K2) 2
- 2.c. Why is prototype validation important in product design? (CO3,K2) 2
- 2.d. Why must engineers consider sustainability in product design? (CO4,K2) 2

2.e. What was the Industrial Revolution? (CO5,K2) 2

SECTION-B 30

3. Answer any five of the following:-

3-a. What are the main differences between traditional and emerging mechanical engineering sectors? (CO1,K2) 6

3-b. Discuss the role of mechanical engineers in modern industries and their impact on society. (CO1,K2) 6

3-c. Compare the differences between AI and IoT in mechanical applications. (CO2,K2) 6

3-d. Explain the key benefits of 3D printing in the automotive industry. (CO2,K2) 6

3.e. Compare evolutionary prototyping and incremental prototyping. (CO3,K1) 6

3.f. Why is Design for X (DfX) an important approach in modern engineering? (CO4,K2) 6

3.g. What are the biggest opportunities for engineers in Industry 5.0? (CO5,K2) 6

SECTION-C 50

4. Answer any one of the following:-

4-a. What are the emerging trends in mechanical engineering, and how can engineers prepare for them? (CO1,K2) 10

4-b. What are the future challenges and opportunities for mechanical engineers in various industries? (CO1,K2) 10

5. Answer any one of the following:-

5-a. Discuss the use of 3D printing in rapid prototyping and mass production. (CO2,K2) 10

5-b. What are the future trends in CAD and how will they impact mechanical product development? (CO2,K2) 10

6. Answer any one of the following:-

6-a. What are the benefits and risks of using extreme prototyping in product development? (CO3,K2) 10

6-b. What role does user testing play in prototype validation? (CO3,K2) 10

7. Answer any one of the following:-

7-a. Discuss the future of sustainable design and its impact on mechanical engineering. (CO4,K2) 10

7-b. What role does digital twin technology play in optimizing design tradeoffs? (CO4,K2) 10

8. Answer any one of the following:-

8-a. How does mass customization improve production efficiency in Industry 4.0? (CO5,K2) 10

8-b. Discuss the importance of hyper customization and smart products in Industry 5.0.(CO5,K2) 10