Printed Page:- **Subject Code**:- **AOE0867**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

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

Subject: Industry 4.0

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 purpose of a filter regulator lubricator (FRL) unit? (CO1, K1) 1

(a) To condition the compressed air for use in the pneumatic system

(b) To generate compressed air

(c) To control air direction and flow

(d) To cool down the compressed air

1-b. How is a solenoid actuated directional control valve operated? (CO1, K1) 1

(a) By electrical energy

(b) By hydraulic pressure

(c) By pneumatic pressure

(d) By manual operation

1-c. What is a robot? (CO2, K1) 1

(a) A programmable, self-controlled device consisting of electronic, electrical, or mechanical units.

(b) A mechanical apparatus designed to do the work of a man.

(c) An automatic apparatus.

(d) Something guided by automatic controls.

1-d. What advantage do robots have over humans in terms of work capacity? (CO2, K1) 1

(a) Can work 24/7 without getting tired

(b) Require regular salary and food
(c) Need frequent breaks
(d) Easily distracted and bored

1-e. Which cloud deployment model is operated solely for an organization? (CO3, K1) 1
(a) Public Cloud
(b) Private Cloud
(c) Community Cloud
(d) Hybrid Cloud

1-f. What does PaaS provide to the consumer in cloud computing? (CO3, K1) 1
(a) Deployment onto cloud infrastructure
(b) Control over underlying infrastructure
(c) Ready-to-use applications
(d) System monitoring tools

1-g. What is a common mistake in simulation related to level of detail? (CO4, K1) 1
(a) Too much detail leads to more bugs and higher CPU usage
(b) Less detail results in inaccurate simulations
(c) More detail ensures faster simulations
(d) General-purpose languages are more efficient for simulations

1-h. What is the purpose of state variables in simulation models? (CO4, K1) 1
(a) To define the current state of the system
(b) To generate random numbers
(c) To schedule events
(d) To manage the system's event-driven routines

1-i. Which material is commonly used in LDM technology for clay extrusion? (CO5, K1) 1
(a) Clay
(b) PLA
(c) ABS
(d) Nylon

1-j. How does additive manufacturing contribute to sustainability? (CO5, K1) 1
(a) Increases material waste
(b) Promotes mass production
(c) Reduces energy efficiency
(d) Enables on-demand production

2. Attempt all parts:-

2.a. Differentiate between single-acting and double-acting hydraulic cylinders. (CO1, K2) 2

2.b. What are the types of sensors mentioned in the chat for robot perception? (CO2, 2

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	K1)	
2.c.	Explain the concept of load balancing and its importance in cloud computing. (CO3, K2)	2
2.d.	Why is adequate time estimation important in simulation projects? (CO4, K2)	2
2.e.	Describe the importance of design optimization in additive manufacturing. Provide two optimization techniques. (CO5, K2)	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	Describe the operation and purpose of various types of positive displacement pumps in hydraulic systems. (CO1, K2)	6
3-b.	Compare the noise production of pneumatic and hydraulic systems and its impact on workplace environments. (CO1, K3)	6
3-c.	Analyze the challenges and considerations of integrating robots into medical applications, focusing on surgical robotics and patient safety. (CO2, K3)	6
3-d.	Discuss the implications of robot workspace and work envelope in determining the range of motion and tasks a robot can perform. (CO2, K2)	6
3.e.	Explain the concept of Big Data and the challenges associated with processing large and complex datasets. How does the trend towards larger datasets impact data analysis? (CO3, K2)	6
3.f.	Discuss the importance of adequate time estimation in simulation projects. What factors should be considered when estimating the time required for a simulation project? (CO4, K2)	6
3.g.	Explain the operational mechanism of Laser Direct Manufacturing (LDM) technology for clay extrusion. How does LDM technology innovate traditional clay modeling processes? (CO5, K2)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Compare and contrast reciprocating and rotary compressors used in pneumatic systems. Discuss their working principles, applications, and advantages in various industrial settings. (CO1, K3)	10
4-b.	Describe the importance of preventive maintenance for pneumatic and hydraulic systems. Outline a maintenance schedule and checklist for ensuring optimal system performance and reliability. (CO1, K2)	10

5. Answer any one of the following:-

5-a.	Design a robust control strategy for a robotic system utilizing closed-loop feedback mechanisms to achieve precise and repeatable motion in complex manufacturing tasks. (CO2, K3)	10
5-b.	Discuss the challenges and strategies associated with coordinating multiple robotic arms in a collaborative workspace, emphasizing synchronization and task allocation methods. (CO2, K2)	10

6. Answer any <u>one</u> of the following:-

6-a.	Explain the importance of structured data in relational databases. How does structured data facilitate efficient data storage, retrieval, and analysis in database management systems? (CO3, K2)	10
6-b.	Describe the process of structuring Big Data for analysis. Why is data structuring important, and what techniques are used to organize and manage large datasets effectively? (CO3, K2)	10

7. Answer any <u>one</u> of the following:-

7-a.	Compare and contrast continuous time models and discrete time models in simulation. Provide examples of real-world systems or processes that would be best suited for each type of model. (CO4, K3)	10
7-b.	Explain the concept of event-driven simulations in discrete event modeling. Describe the key components of a discrete event simulation model and their roles in simulating dynamic systems. Provide examples of event scheduling and system state variables in simulation. (CO4, K2)	10

8. Answer any <u>one</u> of the following:-

8-a.	Analyze the career opportunities and skill sets required for professionals in the additive manufacturing industry. How has the demand for specialized skills evolved with advancements in AM technologies? (CO5, K3)	10
8-b.	Explore the role of additive manufacturing in personalized healthcare. Discuss the applications of AM technologies in medical device customization, prosthetics, and patient-specific implants. (CO5, K3)	10

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