Jharkhand University of Technology, Ranchi

Diploma 5th Semester Examination, 2025

Subject : Heating, Ventilation & Air Conditioning (Professional Elective)　　Subject Code : MECPE 501

Time Allowed : 3 Hours　　　　　　　　　　　　　　　　　　　　　　Full Marks : 70

Answer in your own words.

Answer any five *questions in which* Question No.1 *is compulsory.*
The figures in the margin indicate full marks.
All questions carry equal marks.

2×7=14

1. Choose the correct alternative:

   (a) Sensible heat is associated with change in

   　(i) temperature　　　　　　　　(ii) humidity

   　(iii) pressure　　　　　　　　　(iv) volume

   (b) DBT and WBT are measured using

   　(i) Hygrometer　　　　　　　　(ii) Barometer

   　(iii) Sling psychrometer　　　　(iv) Manometer

   (c) Unit of refrigeration is

   　(i) kW　　　　　　　　　　　　(ii) TR

   　(iii) kWh　　　　　　　　　　　(iv) HP

   (d) Which gas is commonly used in Split AC?

   　(i) R-11　　　　　　　　　　　(ii) R-12

   　(iii) R-22　　　　　　　　　　　(iv) R-410A

   (e) ASHRAE standards are related to

   　(i) structural design　　　　　　(ii) human comfort

   　(iii) electrical safety　　　　　　(iv) welding

   (f) AHU stands for

   　(i) Air Heating Unit　　　　　　(ii) Air Handling Unit

   　(iii) Automatic Heating Unit　　　(iv) Air Humidifying Unit

   (g) BIM is mainly used for

   　(i) drafting only　　　　　　　(ii) load calculation and system design

   　(iii) electrical wiring　　　　　(iv) cost estimation only

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2. (a) Explain sensible heat and latent heat with examples.

    (b) Explain laws of thermodynamics applicable to HVAC systems.   7+7

3. (a) Define psychrometry and explain any four psychrometric properties.

    (b) Explain human comfort parameters and Indoor Air Quality (IAQ).   7+7

4. (a) Explain heat gain through walls and roofs with sol-air temperature.

    (b) Explain heat gain through glass and effect of shading devices.   7+7

5. (a) Explain HVAC load calculation for a residential building.

    (b) Explain infiltration and ventilation heat loads.   7+7

6. (a) Explain working of Split Air Conditioning system with diagram.

    (b) Explain VRF/VRV air conditioning system and its advantages.   7+7

7. Write short notes on *any four*:   3.5×4

    (i) Psychrometric chart

    (ii) Chiller

    (iii) Cooling tower

    (iv) Duct pressure losses

    (v) ASHRAE standards

Jharkhand University of Technology, Ranchi

Diploma 5th Semester Examination, 2025

Subject : Product Design & Development   Subject Code : MECC501

Time Allowed : 3 Hours   Full Marks : 70

Answer in your own words.
Answer any five questions in which Question No.1 is compulsory.
The figures in the margin indicate full marks.
All questions carry equal marks.

2×7=14

1. Choose the most suitable answer from the following options:

   (i) Product design mainly focuses on
   - (a) manufacturing only
   - (b) customer needs and functionality
   - (c) marketing only
   - (d) cost estimation only

   (ii) Design by innovation means
   - (a) copying existing product
   - (c) completely new concept
   - (b) minor modification
   - (d) reverse engineering

   (iii) QFD stands for
   - (a) Quality Function Development
   - (c) Quantitative Function Diagram
   - (b) Quality Factor Design
   - (d) Quick Functional Design

   (iv) Ergonomics is related to
   - (a) strength of material
   - (b) human comfort and safety
   - (c) manufacturing cost
   - (d) aesthetics only

   (v) Modular product architecture means
   - (a) single component product
   - (b) interchangeable components
   - (c) no standard parts
   - (d) fixed assembly

   (vi) DFM mainly aims to
   - (a) increase complexity
   - (c) reduce cost and improve quality
   - (b) reduce manufacturability
   - (d) improve packaging

   (vii) FDM is a type of
   - (a) Casting
   - (c) Rapid prototyping
   - (b) Machining
   - (d) Welding

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1. b
2. c
3. a
4. b

2. (i) Explain product development process with neat flow chart.

   (ii) Explain characteristics of successful product development.   7+7

3. (i) Explain concept generation process and five-step method.

   (ii) Explain concept screening and concept scoring methods   7+7

4. (i) Explain product architecture. Differentiate between modular and integral architecture.

   (ii) Explain principles of ergonomics in product design.   7+7

5. (i) Explain Design for Manufacturability (DFM) and its impact on cost and quality.

   (ii) Explain product life cycle with suitable examples.   7+7

6. (i) Explain Quality Function Deployment (QFD) with House of Quality.

   (ii) Explain value engineering and value engineering job plan.   7+7

7. Write short notes on the following (*any four*):   3.5×4=14

   (i) Aesthetics in product design

   (ii) Component standardization

   (iii) Rapid prototyping

   (iv) 3D printing

   (v) Patent filing process

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501/502
ALL

Jharkhand University of Technology, Ranchi

Diploma 5th Semester Examination, 2025

Subject : Entrepreneurship Development and Start-ups Subject Code : COMC 501/DDGC 502

Time Allowed : 3 Hours   **Full Marks : 70**

Answer in your own words.

Answer any five *questions in which* Question No.1 *is compulsory.*
The figures in the margin indicate full marks.
All questions carry equal mark.

1. Choose the correct option: 2×7=14

   (i) What is the main objective of a Start-up?

       (a) Build a team

       (b) Sell your product

       (c) Search for a (Repeatable, Scalable, Profitable) Business Model

       (d) Get a building

   (ii) If your 1st step is 1 meter, how far will you go after completing 5 Exponential steps?

       (a) 5 Meters   (b) 8 Meters

       (c) 31 Meters   (d) 120 Meters

   (iii) If your 1st step is 1 meter, how far will you go after completing 5 Linear steps?

       (a) 5 Meters   (b) 10 Meters

       (c) 15 Meters   (d) 120 Meters

   (iv) What one of the following is not part of the 14 manifestos of an entrepreneur?

       (a) It is all about Passion   (b) No facts inside your building

       (c) Fast decision-making   (d) Quit if you fail

   (v) What does 'MVP' stand for in entrepreneurship?

       (a) Most Valuable Player   (b) Most Valuable Person

       (c) Minimum Viable Product   (d) Most Valuable Product

   (vi) How should an entrepreneur view "Failure"?

       (a) Should never try again   (b) A learning opportunity

       (c) Happens to bad engineers   (d) Blame others

   (vii) What is the first thing a start-up must do?

       (a) Develop a product   (b) Talk to a bank

       (c) Find an unmet need   (d) Hire a lawyer

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2. (i) Describe two factors that are enabling exponential growth in your own words. 7

   (ii) Identify any 4 of 6D's, and describe in a few sentences what they represent. 7

3. (i) Draw the Business Model Canvas (BMC) and identify all nine blocks. 7

   (ii) Of the nine blocks of MBC, which two are most important and why? 7

4. (i) Describe the critical skill an entrepreneur must acquire in your own words. 7

   (ii) In your views, how did the Chadryan team use those skills to be successful? 7

5. (i) In the product manufacturing, what important inputs are required for scalability? 7

   (ii) Why the quality, cost and on-time delivery important factors for profitability? 7

6. (i) Describe two factors that are enabling exponential growth in your own words. 7

   (ii) In your own words, explain any 4D's of 6D's, describing what they represent. 7

7. Write short notes on *any four* of the following: 3.5×4=14

   (i) What is technology convergence, and list any of the four technologies converged in a Drone?

   (ii) Which unmet need would you like to work on?

   (iii) What is the difference between an Intrapreneur and an Entrepreneur?

   (iv) What are the two requirements for a business to qualify as a startup?

   (v) What action did Aditya Kumar take to pivot from 'Service' to a 'Service and Product' company?

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Jharkhand University of Technology, Ranchi
Diploma 5th Semester Examination, 2025

Subject : Internet of Things (IoT)

Subject Code : AUTOE503, CIVOE503, CSEPE503,AIMPE503,CCBPE503,CEIPE503, CSIPE503,ECEPE505,ECEOE503,EEEOE503, MECOE503,METOE503,IDEOE503,MINOE503

Time Allowed : 3 Hours

Full Marks : 70

Answer in your own words.
Answer any five questions in which Question No.1 is compulsory.
The figures in the margin indicate full marks.
All questions carry equal marks.

1. Answer the following questions: 2×7=14

   (i) Which of these is NOT a characteristic of IoT systems?
      (a) Dynamic and Self-Adapting
      (b) Self-configuring
      (c) Centralized Control
      (d) Interoperable Communication Protocols

   (ii) In IoT Level-1 architecture, where is data analysis performed?
      (a) Cloud only
      (b) Local analysis node
      (c) On the sensor/device itself
      (d) At the gateway level

   (iii) What is the primary difference between IoT and M2M communication?
      (a) IoT uses HTTP while M2M uses CoAP.
      (b) IoT relies on internet protocols while M2M uses point-to-point communication.
      (c) M2M supports more devices than IoT.
      (d) IoT devices are wireless while M2M devices are wired.

   (iv) Which protocol is specifically designed for constrained IoT devices?
      (a) HTTP
      (b) FTP
      (c) CoAP
      (d) SMTP

   (v) What does YANG provide in NETCONF-based IoT management?
      (a) Data encryption
      (b) Data modeling language
      (c) Wireless transmission
      (d) Power management

   (vi) Which component converts electrical signals into physical action in IoT systems?
      (a) Sensor
      (b) Actuator
      (c) Transducer
      (d) Microcontroller

Please Turn Over

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(vii) In IoT communication models, which model involves direct communication between devices?

    (a) Request-Response

    (b) Publish-Subscribe

    (c) Device-to-Device

    (d) Push-Pull

2. (i) Define Internet of Things (IoT). Explain the key characteristics that distinguish IoT systems from traditional networked systems. Discuss how these characteristics enable new application and services.

  (ii) Compare and contrast the physical design and logical design of IoT systems. Include in your answer the roles of things, protocols, functional blocks, and communication models in each design approach.   7+7

3. (i) Explain the six IoT levels and deployment templates (Level-1 to Level-6). For each level, describe the key characteristics, number of nodes, data storage location, and analysis with suitable application examples.

  (ii) Discuss three popular IoT platforms and their specific features. How do these platforms simplify IoT application development and deployment across different domains?   7+7

4. (i) Differentiate between IoT and M2M communication paradigms. Discuss their architectural differences, communication protocols, applications, and how SDN and NFV enhance IoT systems compared to traditional M2M approaches.

  (ii) Explain the need for IoT systems management. Compare SNMP with NETCONF-YANG approach, highlighting why NETCONF-YANG is better suited for modern IoT systems management requirement.   7+7

5. (i) Describe the hardware components of IoT systems with specific focus on Raspberry Pi and Arduino. Compare their architectures, capabilities, interfaces, and typical use cases in IoT applications.

  (ii) Explain the role of sensors and actuators in IoT systems. Discuss different types of sensors, their working principles, and how smart objects with RFID extend the capabilities of traditional IoT devices.   7+7

6. (i) Outline the IoT design methodology with its key steps. Explain how this methodology ensures systematic development of IoT applications from concept to deployment.

  (ii) Discuss programming Raspberry Pi with Python for IoT applications. Include interfaces, essential Python packages for IoT, and how data can be stored and managed on cloud or local servers.   7+7

7. Write short notes (*any four*):

3.5×4=14

(i) Industrial IoT (IIoT) Applications

(ii) Cloud Computing for IoT

(iii) Smart Objects and RFID

(iv) IoT Security Lifecycle

(v) Big Data Analytics in IoT