

**B.TECH/AEIE/7<sup>TH</sup> SEM/AEIE 4101/2020**  
**TELEMETRY & REMOTE CONTROL**  
**(AEIE 4101)**

**Time Allotted : 3 hrs**

**Full Marks : 70**

*Figures out of the right margin indicate full marks.*

*Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.*

*Candidates are required to give answer in their own words as far as practicable.*

**Group - A**  
**(Multiple Choice Type Questions)**

1. Choose the correct alternative for the following: **10 × 1 = 10**
- (i) The OSI model defines layers 1,2 and 3 as the \_\_\_\_\_ layers  
(a) physical support (b) network support  
(c) user support (d) transport
- (ii) An IP packet is called a \_\_\_\_\_  
(a) used datagram (b) segment  
(c) datagram (d) none of the above
- (iii) In an IPv4 packet, the value of HLEN is 1000 in binary. How many bytes of options are being carried by this packet?  
(a) 32 (b) 20  
(c) 12 (d) 8
- (iv) What is the total number of slaves supported in a Bluetooth piconet?  
(a) 1 (b) 2  
(c) 6 (d) 7
- (v) MQTT stands for \_\_\_\_\_  
(a) MQ Telemetry Things (b) MQ Transport Telemetry  
(c) MQ Transport Things (d) MQ Telemetry Transport
- (vi) The point where the orbit crosses the equatorial plane going from south to north is known as \_\_\_\_\_  
(a) Ascending node (b) Descending node  
(c) Inclination (d) None of the above

- (vii) How many WiMAX network topologies are defined by IEEE 802.16 standard?  
(a) 2 (b) 3  
(c) 4 (d) 6
- (viii) How many types of messages are there in CoAP?  
(a) 4 (b) 5  
(c) 6 (d) 3
- (ix) What are the key components of a M2M system?  
(a) Vortex DDS (b) Smart Homes  
(c) Sensors and Wi-Fi (d) Protocols
- (x) In telemedicine, the recommended file formats suitable for transmission of medical images (e.g., CT scan) from a remote end to the specialist end is  
(a) DICOM (b) JPEG  
(c) MPEG (d) TIFF

### **Group – B**

2. (a) Draw the basic block diagram of the transmitter side of a telemetry system. Briefly describe the functional blocks of the transmitter side.
- (b) Why was the WiMAX system introduced? What are the main key aspects of WiMAX security?
- (3+3) + (3+3) = 12**

3. (a) An IPv4 packet has arrived with the first 8 bits as shown: 01000010. The receiver discards the packet. Why?
- (b) What are the different levels of addresses used in an internet employing the TCP/IP protocol? What are the basic differences between them?
- (c) Briefly explain the difference between connection-oriented acknowledged service and connectionless acknowledged service. How do the protocols that provide these services differ?
- 2+ (2+2) + (3+3) = 12**

### **Group – C**

4. (a) What do you understand by quantization? State how the quantization error affects the quality of the reconstructed wave in the receiver end?
- (b) Explain the two types of TDM systems based on synchronization.
- (4 + 2) + 6 = 12**

5. (a) What do you understand by sampling?  
(b) Explain with a neat diagram how FSK (Frequency Shift Keying) works?  
(c) State how MPSK (Minimum Phase Shift Keying) systems work? What is the main reason of using MPSK over convention PSK modulation technique?

**3+3 + (3+3) = 12**

### **Group - D**

6. (a) What are the geostationary satellites? How many geostationary satellites would be required to cover the entire earth? Discuss the application of geostationary satellites.  
(b) What are Line of Apesides and Argument of Perigee?  
(c) What is meant by transponder?

**(3+1+2) + (2+2) + 2 =12**

7. (a) An LED operating at 850 nm has a spectral width of 45 nm. What is the pulse spreading in ns/km due to material dispersion? For LED source operating at 850 nm, material dispersion given by  $\left[ \lambda^2 \frac{d^2n}{d\lambda^2} \right] = 0.025$   
(b) What are the different types of mismatch may occur due to improper connection of splices?  
(c) What do you understand by cladding in an optical fiber? What do you mean by numerical aperture of an optical fiber?

**3 + 3 + (3+3) = 12**

### **Group - E**

8. (a) What do you understand by QoS (Quality of Service) in case of MQTT protocol for IoT systems? Explain the basic differences between the MQTT protocols from HTTP.  
(b) What is the different quality attributes used in Medical Video Conferencing system?  
(c) How is M2M different to IoT?

**(4+4) + 2 +2 = 12**

9. Write short note on (any three):  
(i) Telemedicine  
(ii) Power system telemetry  
(iii) Architecture of IoT system  
(iv) Telemetry system in process industries

**3 × 4 = 12**

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