

B.TECH/AEIE/7<sup>TH</sup> SEM/AEIE 4101/2017  
**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 maximum power efficiency of an AM modulator is  
(a) 25% (b) 50% (c) 33% (d) 100%.
- (ii) A PWM signal can be generated by  
(a) a monostable multivibrator  
(b) an astable multivibrator  
(c) integrating the PPM signal  
(d) differentiating the PPM signal.
- (iii) Guard band is  
(a) the small unused bandwidth between the frequency channels to avoid interference  
(b) the bandwidth allotted to the signal  
(c) the channel spectrum  
(d) the spectrum acquired by the noise between the signal
- (iv) In delta modulation, the slope overload distortion can be reduced by  
(a) decreasing the step size (b) decreasing the granular noise  
(c) decreasing the sampling noise (d) increasing the step size.
- (v) In Differential Pulse Code Modulation techniques, decoding is performed by  
(a) Quantizer (b) Accumulator  
(c) Sampler (d) PLL.
- (vi) In digital transmission, modulation technique that requires minimum bandwidth is  
(a) PCM (b) DPCM  
(c) Delta modulation (d) PAM.

- (vii) QPSK system uses a phase shift of  
(a)  $\Pi$  (b)  $\Pi/2$  (c)  $\Pi/4$  (d)  $2\Pi$ .
- (viii) The interference caused by the adjacent pulses in digital transmission is called  
(a) inter symbol interference  
(b) white noise  
(c) transit time noise  
(d) image frequency interference.
- (ix) The satellite subsystem that monitors and controls the satellite is the  
(a) propulsion subsystem  
(b) power subsystem  
(c) communications subsystem  
(d) telemetry, tracking, and command subsystem.
- (x) A geosynchronous satellite  
(a) has the same period of that of the Earth  
(b) has a circular orbit  
(c) rotates in the equatorial plane  
(d) has all of the above.

**Group - B**

2. (a) Explain briefly the device addressing in Bluetooth. What are the two types of links between a Bluetooth master and a Bluetooth slave? In multiple-slave communication, who uses the odd-numbered slots?  
(b) What is the difference between a port address, a logical address and a physical address? What is peer-to-peer process?  
**(5 + 2 + 1) + (2 + 2) = 12**
3. (a) Why was the WiMAX system introduced? What RF Frequencies does WiMAX Technology work in? What is the Range of WiMAX Technology? What is a WiMAX gateway?  
(b) Write short note on:  
(i) Zigbee  
(ii) TCP/IP protocols.  
**(3 + 1 + 1 + 1) + (3 + 3) = 12**

**Group - C**

4. (a) Compare the various types of digital modulation techniques. Draw the block diagram of QPSK modulator and explain its operation.

- (b) For an 8 PSK system, operating at an information bit rate of 36 kbps, find the baud, minimum bandwidth and bandwidth efficiency.

$$(3 + 6) + 3 = 12$$

5. (a) Write short note on quadrature amplitude modulation. Briefly explain spread spectrum modulation techniques.

- (b) Distinguish between delta modulation and adaptive delta modulation.

$$(5 + 5) + 2 = 12$$

#### Group - D

6. (a) Explain in brief Rayleigh scattering mechanism.

- (b) The average optical power launched into a 10 km length of fiber is 100  $\mu$ W and the average output power is 2.5  $\mu$ W. Calculate (i) the signal attenuation in decibels through the fiber (It is assumed that there are no connectors or splices) (ii) the signal attenuation per km of the fiber (iii) overall signal attenuation for the 11 km optical link using the same fiber with 3 splices each having an attenuation of 0.8 db and (iv) numerical value of the ratio between input and output power.

$$7 + (2 + 1 + 1 + 1) = 12$$

7. (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 the three important mechanisms that are responsible for absorption losses in signal through an optical fiber? Explain in brief.

$$(3 + 1 + 2) + 6 = 12$$

#### Group - E

8. (a) Discuss telemetry system in process industries.

- (b) Write short note on:

- (i) Telemedicine  
(ii) Remote Control.

$$6 + (2 \times 3) = 12$$

9. (a) What is IoT? Explain the basic architecture of IoT network. What are the main internal components of an IoT device?

- (b) Write short note on:

- (i) Wireless sensor-network and  
(ii) Power system telemetry

$$(2 + 4 + 2) + (2 \times 2) = 12$$