



**PROGRAM** : B TECH  
*ELECTRICAL ENGINEERING*

**SUBJECT** : **Radio Engineering IV**

**CODE** : **EER411**

**DATE** : WINTER MAIN EXAMINATION  
22<sup>nd</sup> JULY 2015

**DURATION** : 11:30 - 14:30

**WEIGHT** : 40 : 60

**TOTAL MARKS** : 100

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**EXAMINER** : DR B. S. PAUL

**MODERATOR** : Mr. J. SEBASTIAN

**NUMBER OF PAGES** : 3 PAGES

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**INSTRUCTIONS TO CANDIDATES:**

1. ANSWER ALL THE QUESTIONS.
2. CALCULATORS MAY BE USED.
3. FIGURES MAY BE DRAWN WHEREVER NECESSARY TO SUPPORT THE ANSWERS.

**QUESTION 1**

- a) Sketch and explain the working of a Quadrature Amplitude Modulation (QAM) transmitter and receiver.
- b) Show that there will be interference between the two channels if there is a slight error in the phase of the carrier at the demodulator in QAM.

(6+4)

**QUESTION 2**

For a pulse train 11001101010 sketch the following

- a) On-off (RZ)
- b) Polar (RZ)
- c) Bipolar (RZ)
- d) On-off (NRZ)
- e) Polar (NRZ)

(2+2+2+2+2)

**QUESTION 3**

Determine the power and RMS value of the following signals.

- a)  $g(t) = C_1 \cos(\omega_1 t + \theta_1) + C_2 \cos(\omega_2 t + \theta_2)$   $\omega_1 \neq \omega_2$
- b)  $g(t) = D e^{j\omega_0 t}$

(6+4)

**QUESTION 4**

Sketch and explain the operation of a Direct Sequence Spread Spectrum (DSSS) system.

(10)

**QUESTION 5**

- a) Sketch the differential code for the bit stream 1101100011 in a Differential PSK (DPSK) transmitter.
- b) Explain the working of a differential PSK receiver.

(4+6)

**QUESTION 6**

Sketch and explain the working of a Pulse Amplitude Modulation (PAM) – natural and flat top sampling.

(10)

**QUESTION 7**

Discuss the operation of a weighted resistor type Digital-to-Analog (D/A) converter.

(8)

**QUESTION 8**

Antenna1 has a front lobe of 18 units and back lobe of 5 units, whereas Antenna2 has a front lobe of 20 units and a back lobe of 3 units. Calculate the Front to Back Ratio (FBR) for both the antennas.

Which antenna would you consider to be better in terms of the FBR.

(6+2)

**QUESTION 9**

- a) With the help of a suitable block diagram explain the working of a Phase Lock Loop (PLL)
- b) Comment on the different ranges of a PLL

(6+4)

**QUESTION 10**

What are the special features of a direct sequence spread spectrum system and how does it realize them.

(10)

**QUESTION 11**

For the bit stream 11010100 sketch the ASK and PSK signal.

(4)

[Total Marks: 100]