

(Set-1)

B.Tech - 8th

Communication System Engineering - II

Full Marks : 70

Time : 3 hours

Answer any six questions including Q. No. 1

The figures in the right-hand margin indicate marks

1. Answer all questions :

2 × 10

(a) Consider a Pulse Radar system that can detect signals with $S_{\min} = 10^{-11}$ mW. It uses one antenna for transmitting and receiving, with $G = 35$ dB. It broadcasts a signal with $\lambda = 3$ cm and with $P_T = 1$ MW. How far can it detect a small plane with $\sigma = 1$ m² ?

(b) A 10 GHz Pulsed Doppler radar processes the signal digitally. What is the p r f for a maximum unambiguous Doppler shift in detecting a moving aircraft with a radial velocity of 165 m/s ?

(Turn Over)

(2)

- (c) What type of CW radar can measure both range and velocity of a moving target ?
 - (d) Why is AGC is absolutely necessary in a conical scan radar receiver ?
 - (e) What is the time taken for a radar signal to travel a nautical mile and back ?
 - (f) What is the maximum number of alternate dark and white elementary lines that can be resolved by a viewer at a distance 8 times the height of the TV screen ?
 - (g) Explain colour circle diagram.
 - (h) Why the shape of the display unit of a TV set is rectangular ?
 - (i) Which type of TV camera tube has the ability to operate at different levels of sensitivity and how is it done ?
 - (j) What is a filterplexer in a high level TV transmitter ?
2. (a) Discuss the scanning process in Basic Television System. What is Interlace

(3)

- scanning ? Describe its advantages over simple scanning . 5
- (b) What is VSB Transmission ? Why is it used for Transmission of TV picture signal ? 5
3. (a) Draw the detailed Diagram of tri-nitron colour Picture Tube. Describe its Working. 5
- (b) Discuss in detail antenna requirement for television system. Describe various antennas used for transmission and reception. 5
4. (a) Give the Merits of Digital TV Technology and Draw the basic Diagram of fully Digital TV. 5
- (b) Explain the application and working of cable Television (CATV). 5
5. (a) Derive the radar range Equation and discuss the factors affecting the choice of frequency of operation of radar system ? 5
- (b) What is the Doppler's Effect ? Derive the formula for Doppler's shift and hence explain the working of FM-CW radar ? 5

6. (a) Prove that the maximum range of a radar operating at a given frequency is proportional to the linear dimension of the antenna. 5
- (b) The difference in distance from a radar to two particular targets is 400 feet. Each target has a radial width of 100 feet. What is the longest pulse that will resolve these targets ? (i. e. the longest pulse that will not give overlapping echoes). 5
7. (a) Explain about the minimum detectable signal in radar system. 5
- (b) Explain the working principle of monopulse radar. 5
8. Write short notes on any two : 5 × 2
- (i) G-Y Signal
- (ii) Colour Burst Signal
- (iii) Bi Static radar
- (iv) Synthetic aperture radar (SAR).
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