8. Write short notes on any *three* of the following :

(i) Pulse-Doppler radar

(ii) Delay live cancellors

(iii) Duplexes

(iv) System losses

(v) Propagation effects. **20**

No. of Printed Pages : 04 **Roll No. .....**

832

B. Tech. EXAMINATION, Dec. 2017

(Eighth Semester)

(Old Scheme) (Re-appear Only)

(ECE)

ECE-414/EE-454-E

RADAR AND SONAR ENGINEERING

Time : 3 *Hours*] [*Maximum Marks :* 100

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt any *Five* questions. All questions carry equal marks.

1. (a) Write a short note describing the various stages to the development of a modern radar system. **8**

(b) With the help of a neat block diagram, explain the working of a radar system. **12**

2. (a) Prove that the maximum range of a radar operating at a given frequency is proportional to the linear dimensions of the antenna. **12**

(b) A radar transmitter has peak pulse power of 400 kW, PRF = 1500 pps, width = 0.8 μsec. Calculate : **8**

(i) Maximum unambiguous range of detection

(ii) Duty cycle

(iii) Average transmitted power

(iv) Suitable bandwidth of the receiver.

3. (a) What is the Doppler effect ? What are its radar applications ? **5**

(b) Draw the block diagram and explain the operation of a CW Doppler radar using an IF in the receiver. **15**

4. (a) What are the factors influencing the bandwidth of a radar receiver ? What are the advantages and disadvantages of a very large bandwidth ? **8**

(b) What is blind speed ? How is the effect of blind speed tackled in an MTI radar ? **12**

5. (a) Write a note on clutter. **5**

(b) With the aid of a sketch, describe the conical scanning method of tracking an acquired target. How is this an improvement over lobe switching ? **15**

6. (a) Write a note on radar receivers. **10**

(b) With the aid of a suitable sketch, explain the operation of SONAR system. **10**

7. (a) With the help of a sketch, explain fully the PPI radar indicator. **12**

(b) A CW radar operator at $\lambda = 3$ cm. What is the doppler frequency produced by :

(i) an aeroplane flying at a speed of 200 km/hr.

(ii) by a man crawling at a rate of 1 cm/sec. **8**