

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular/Backlog), November 2017

B. Tech in ECE Engineering, Semester VII

Roll No.....

COURSE CODE: ECE 727

Time: 3 hours

Max. Marks: 100

COURSE TITLE: Radar and Satellite Communication

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

Q.1A	Objective type multiple choice questions (5 questions @ 2 mark)	10
i.	The false alarm time for radar receiver having $(V_T^2/2\Psi_O)=15$ and 1 MHz bandwidth and average false alarm time of 10 min is (a) 1.1 min (b) 2.2 min (c) 3.3 min(d) 4.4 min.	
ii.	The error in Doppler frequency measurement due to target acceleration of 20 m/sec ² for a radar operating at 8 GHz is (a) 32 Hz (b)322 Hz (c) 3.2 k Hz (d)3.2 M Hz.	
iii.	If satellite velocity at apogee is v_a and at perigee is v_g , then the following relationship is true (A) $v_a = v_g$ (B) $v_a > v_g$ (C) $v_a < v_g$ (D) no definite relation	
iv.	The velocity of a satellite in parking orbit at 1000 Km is (given $\mu= 398600$ km ³ /m ²) (A) 3.28 km/s (B) 32.8 km/s (C) 328 km/s (D) 3280 km/s.	
v.	Thrusters are used for (A) Telemetry (B) Tele-command (C) AOCS (D) Tracking.	
Q.2	Short answer type questions (2 questions @ 5 marks)	10
(A)	Tabulate the various frequency bands for Radar and Satellite communication as specified by IEEE	
(B)	Explain using the expression for incremental velocity, why is mass of launch vehicle reduced as satellite moves to higher orbit?	
Q.3A	Draw the envelope of detected signal versus time and explain the term mean time between false alarms T_{fa} ?	05
Q.3B	Explain blind speed in context of MTI radar?	05
Q.4A	What is phased array radar and state its advantage over other tracking radars..	05
Q.4B	Compare sequential lobing with Conical Scan.	05
Q.5A	Explain working of Reaction wheel.	05
Q.5B	Explain the power supply used for satellite systems.	05

Q.6A	Define Noise Figure and Noise Temperature of a satellite receiver.	05
Q.6B	Determine overall Noise Figure of a receiver with two amplifiers with Gains G_1 & G_2 and individual noise figures F_1 and F_2 .	05
OR		
Q.6B	Draw equivalent model for a source producing thermal noise. What happens to noise power when the bandwidth of receiver tends to become infinite?	05
Q.7A	Explain with diagram the various orbits through which the satellite passes during launch.	05
Q.7B	Explain Attitude and Orbit Control system (AOCS) with diagram, marking the various axis used for AOCS.	10
OR		
Q.7B	Explain the various command execution methods for satellite control.	10
Q.8A	Derive the Carrier to Noise ratio of satellite link in terms of EIRP, path loss and Bandwidth of receiver.	10
Q.9A	What are the various losses in satellite systems? Explain with help of link budget.	5
Q.9B	Show that in highly unbalanced link, the total carrier to noise ratio $(C/N_o)_T$ will be equal to the lowest $(C/N_o)_{\min}$	10
OR		
Q.9B	Derive the total C/N_o in terms of uplink and downlink carrier to noise ratio.	10