1/7/12 Code: A-20

Diplete - ET (OLD SCHEME)

Code: DE17 Subject: ELEMENTS OF SATELLITE COMMUNICATION Time: 3 Hours Max. Marks: 100

JUNE 2010

NOTE: There are 9 Questions in all.

- Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.
- Out of the remaining EIGHT Questions, answer any FIVE Questions. Each question carries 16 marks.
- Any required data not explicitly given, may be suitably assumed and stated.

0.1	Choose the	correct or the	best alternative	in the	following
V.1	Choose the	COLLECT OF THE	Dest ancinative	III UIC	10110 11111

 (2×10)

- a. Satellite transponders
 - (A) use a single frequency for reception and retransmission of
- information to and from earth
- (B) use a lower frequency for reception and a higher frequency for
- retransmission
- (C) use a higher frequency for reception and a lower frequency for retransmission
- (D) use S band for reception and X band frequency for transmission
- b. The orbital velocity of the satellite
 - (A) is directly proportional to its distance from earth's surface
 - **(B)** is inversely proportional to square root of its distance from earth's center.
 - (C) depends upon the thrust with which it is launched
 - **(D)** is continuously changing as the satellite moves
- c. The angular velocity (v) of a satellite at a height (H) from the surface of the earth with a mean radius of R is given by

(A)
$$v = R\sqrt{g/(R+H)}$$
 (B) $v = \sqrt{G.g/(R+H)}$ (C) $v = Rg/\sqrt{(R+H)}$ (D) $v = \sqrt{GMm/(R+H)}$

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(C)
$$v = Rg / \sqrt{(R+H)}$$

(D)
$$v = \sqrt{GMm/(R+H)}$$

- d. Satellite S1 and S2 are orbiting in two different equatorial circular orbits. The radius of S1 orbit is four times the radius of S2 orbit. The orbital period of S1 orbit will therefore be
 - (A) Four times the orbital period of S2
 - **(B)** Eight times the orbital period of S2
 - (C) Two times the orbital period of S2
 - (D) Same as the orbital period of S2
- e. The satellite tracking stations are placed in remote areas in order to minimize the effect of
 - (A) Solar noise

- (B) Man made noise
- (C) Cosmic noise
- (D) Thermal noise
- The range of Ku Band is
 - (A) 24 36 GHz
- **(B)** 12 18 GHz
- (C) 16 24 GHz
- **(D)** 24 40 GHz
- g. In broadcast satellites, the high power transmitters are based on

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		(A) TWT (C) MASERS	(B) LASERS (D) MOSFETS			
	h.	SCPC essentially is a				
		 (A) Non-multiplexed low capacity TI (B) Non-multiplexed low capacity FI (C) Multiplexed low capacity TDMA (D) Multiplexed low capacity FDMA 	OMA			
	i.	Digital DBS-TV transmission uses a transmitted symbol rate of				
		(A) 10 Mbits/sec using QPSK(C) 10 Mbits/sec using PSK	(B) 20 Mbits/sec using QPSK(D) 20 Mbits/sec using PSK			
	j. Each INSAT – I satellites has					
	(A) Three TV broadcast transponders operating in S-band uplink and C-band					
	 (B) Three TV broadcast transponders operating in C-band uplink and S-band downlink (C) Two TV broadcast transponders operating in S-band uplink and C-band downlink (D) Two TV broadcast transponders operating in C-band uplink and S-band downlink 					
		Answer	any FIVE Questions out of EIGHT Qu Each question carries 16 marks.	uestions.		
Q.2	a.	Derive the expressions for C/N and G	/T ratios and explain their significance.	. (8)		
	ŀ	*	2	4150 MHz, has diameter of 30 m and an overall at the satellite at an elevation angle of 28°. Find		
Q.3	a.	Explain analog base band signal & exp	olain SCPC system.	(8)		
	b.	Explain Quadrature Phase Shift Keyin	g system.	(8)		
Q.4	a.	Explain simple Direct Sequence Spreasequences.	d Spectrum Modulation and PN	(10)		
	b.	Explain Demand Assignment Control.		(6)		
Q.5	a.	Discuss the Satellite location with resp	ect to earth.	(8)		
	b.	Explain the terms (i) Look angles and (ii) Station Keeping		(8)		
Q.6	a.	Explain, with a block diagram the open	ration of Repeater/Transponder.	(8)		
	b.	Explain how altitude and orbital control	ol is carried in a satellite system.	(8)		
Q.7	a.	Explain, with neat block diagrams the (i) Transmitter and	satellite earth station's			

(10)

(ii) Receiver

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b. Determine the orbital velocity of a satellite moving in a circular orbit at a height of 150 km above the surface of earth given that gravitation constant, $G = 6.67 \times 10^{11} \text{ N-m}^2/\text{kg}^2$, mass of earth $M = 5.98 \times 10^{24} \text{ kg}$, and radius of earth R = 6370 km

Q.8 a. Explain basic DBS-TV system and mention the features and specifications of a Typical DBS-TV satellite system. (9)

b. Explain Network Architecture of a Cable TV system

(7)

Q.9 Explain the following;

(2 × 8)

(i) Weather Forecasting with Satellite.

(ii) INSAT-I Satellite Series