

AMIETE – ET (OLD SCHEME)

Time: 3 Hours

OCTOBER 2012

Max. Marks: 100

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

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.
- The answer sheet for the Q.1 will be collected by the invigilator after 45 minutes of the commencement of the examination.
- 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.

Q.1 Choose the correct or the best alternative in the following: (2×10)

- a. Satellite launch station should be nearer to _____
- (A) Arctic Circle (B) 1st parallel south
(C) Equator (D) 1st parallel north
- b. India ISRO's satellite launch station is located at _____
- (A) Ahmedabad (B) Rampuram, Kerala
(C) Delhi (D) Shriharikota
- c. Geostationary satellite is located about _____ kms above earth
- (A) 3600 (B) 36000
(C) 37000 (D) 40000
- d. _____ two bands are used for satellite communication
- (A) A band & B band (B) C band & Ku Band
(C) E band & Du band (D) Z band and Y band
- e. Block coding can help in _____ at receiver
- (A) Synchronization (B) Error detection
(C) Attenuation (D) Both (A) & (B)
- f. _____ launched India's first satellite
- (A) USA (B) Canada
(C) Russia (D) China
- g. _____ is the key person behind ISRO
- (A) Dr. APJ Abdul Kalam (B) Dr. Vikram Sarabhai
(C) Dr. Homibhabha (D) Dr. Chandraprakash bose

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h. _____ rays are used in satellites for night vision

- (A) X ray (B) Visible
(C) Audio (D) Infrared

i. _____ mission was beyond earth's orbit

- (A) Aryabhata (B) Chandrayan-1
(C) ISRO Earth (D) ISRO Planet

j. _____ is the first artificial satellite of earth

- (A) Moon (B) Aryabhata
(C) Sputnik1 (D) Kalpana1

**Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.**

Q.2 a. Why geostationary orbit is preferred for all high capacity communication satellite systems? Briefly explain Kepler's second law of planetary motion, with necessary illustrations. (8)

b. A low orbit satellite is in a circular polar orbit with an altitude, h , of 1000 km. A transmitter on the satellite has a frequency of 2.6GHz. Find
(i) The velocity of the satellite in orbit.
(ii) The component of velocity towards an observer at an earth station as the satellite appear over the horizon, for an observer who is the plane of the satellite orbit.
(iii) Hence find the Doppler's shift of the received signal at the earth station. Use the mean earth radius value, r_e , of 6378 Km the satellite also carries a K-band transmitter at 20.0 GHz.
(iv) Find the Doppler shift for this signal when received by the same observer. (8)

Q.3 a. A satellite system uplink was designed so that the transponder carrier-to-noise plus interference ratio is 22.5 dB. The link is cascaded with the downlink for which the receiver carrier-to-noise plus interference ratio is 16.25 dB. Estimate the overall carrier-to-noise ratio of the cascaded link. (8)

b. Define EIRP. Obtain the expression for uplink C/N ratio, downlink C/N ratio and combined C/N ratio. (8)

Q.4 a. Explain what is meant by rainrate and how this is related to specific attenuation. Explain effective path length in connection with rain attenuation. (8)

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- b. Explain the principle behind the following schemes: FDMA, CDMA, and TDMA. Is it perationally possible to have a combination of these schemes? Give examples. (8)
- Q.5** a. Explain the following: (8)
- (i) G/T ratio for each station.
 - (ii) Noise temperature.
- b. What do you mean by 'attitude' of a satellite? Distinguish between passive and active attitude control. (8)
- Q.6** a. What is SCPC technique and how is it different from FM-FDM as far as bandwidth is concerned? (8)
- b. Explain what is meant by preemphasis and deemphasis and why these are effective in improving signal-to-noise ratio in FM transmission. State typical improvement levels expected for both telephony and TV transmissions. (8)
- Q.7** a. Explain various network architecture in detail. (8)
- b. Describe the operation of a typical VSAT system. State briefly where VSAT systems find widest application. (8)
- Q.8** a. Write a short notes on linear block codes and cyclic codes. (8)
- b. What are convolution code? Explain $\frac{1}{2}$ rate convolution encoder. (8)
- Q.9** Write short note on any **TWO** of the following: (8+8)
- (i) Unique word
 - (ii) DAMA
 - (iii) Satellite stabilization
 - (iv) Wideband receiver