Total No. of printed pages = 7

Et-605/MCS/6th Sem/2018/M

MODERN COMMUNICATION SYSTEM

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer Q.1 and any other *five* questions.

1. Answer *all* the questions :

(a) India's first Geo-synchronous satellite is ——— and it was launched in the year ———. 2

(b) Which of the frequency band is not used for satellite communication ? 1

(i) HF band (30-300 MHz)

(ii) L band (1-2 GHz)

(iii) Ku band (12-18 GHz)

(iv) Ka band (26-40 GHz).

[Turn over

(c) Transponder is a combination of ——— and ———. 2

(d) The satellite orbit which maintains a fixed orientation with respect to Earth-Sun direction is known as

(i) Geo-synchronous orbit

(ii) Molniya orbit

(iii) Sun-synchronous orbit

(iv) Low-earth orbit 1

(e) Mean and variance of the Gaussian noise with the following distribution are ——— and ———. 2

$$f_x(x) = \frac{1}{\sqrt{8\pi}} e^{\frac{(x-2)^2}{32}}$$

(f) Which of the following is not related to the channel capacity ? 1

(i) Presence of the additive noise in the channel.

(ii) Source coding efficiency.

(iii) Probability of error.

(iv) Mutual information between the source and destination.

(g) The average amount of information in a message is known as 1

(i) Probability

(ii) Possibility

(iii) Mutual information

(iv) Entropy.

(h) Information is a measure of ———. 1

(a) Uncertainty

(b) Certainty

(c) Number of beat or byte present in the data

(d) None of the above

(i) Full form of MODEM is ——— and ———. 2

(j) Which is not a standard of MODEM ? 1

(i) V.22 (ii) V.34

(iii) V.42 (iv) V.89

(k) Number of keys in symmetric key encryption is ———. 1

(i) One

(ii) Two

(iii) Three

(iv) No key is required

(l) The encrypted information is known as ———. 1

(m) RSA is the (public-key/private key) cryptography technique. 1

(n) Rotate 001101 two bits in the right ———. 1

(o) Ordinary telephone is a 1

(i) Circuit switch network

(ii) Packet switch network

(iii) Message switch network

(iv) Multiplexing and demultiplexing

(p) The term 'DATAGRAM' is related with

(i) Circuit switch network

(ii) Ordinary telephone

(iii) ISDN telephone

(iv) Packet switched network 1

(q) Full form of ISDN is ———. 1

(r) ISDN is ——— (Analog/Digital) communication standard. 1

(s) ISDN B channel has a data rate of 1

(i) 16 Kbps

(ii) 64 Kbps

(iii) Either of the two

(iv) None of the above

(t) The first generation cellular system is 1

(i) AMPS (ii) GSM

(iii) IS-95 (iv) CDMA 2000

2. Define following terms (any *three*) : 3×3=9

(a) Angle of elevation

(b) Inclination angle

(c) Station Keeping

(d) Attitude Control

(e) Molniya Orbit.

3. (a) Define entropy. A source emits five different symbols with the probabilities. 2+4=6

$p_1 = .2$, $p_2 = .3$, $p_3 = .1$, $p_4 = .1$, $p_5 = .3$

Find out the entropy of the source.

(b) Define Hartley Shanon's law. 3

4. (a) What is the difference between symmetric key and asymmetric key cryptography ? 3

(b) With neat sketch describe the operation of Data Encryption Standard (DES). 6

5. (a) Why switching is required in a network ?

(b) Name the different types of switching techniques.

(c) What is Datagram ? Describe packet routing mechanism, Efficiency and Delay of a Datagram network. 2+2+5=9

6. Draw the block diagram of the ISDN network with all types of interfaces and explain briefly the functionalities of different blocks. 9

7. Why do we prefer representation of a cell with an Hexagonal shape. Define co-channel cell and interference. Find out the expression of the co-channel interference in a Hexagonal cellular system with cluster size = 7. 2+2+5=9

8. Draw neat sketch of a GSM architecture and describe the functions of the following sub-systems 4+2+2+1=9

   (a) HLR

   (b) VLR

   (c) EIR

9. Define the following terms (any *three*) : 3×3=9

   (a) Geo-synchronous orbit

   (b) Channel capacity

   (c) Encryption

   (d) Signal to noise ratio

   (e) Probability of error.