



বিদ্যাসাগর বিশ্ববিদ্যালয়  
**VIDYASAGAR UNIVERSITY**  
**Question Paper**

**B.Sc. Honours Examinations 2022**

(Under CBCS Pattern)

**Semester - VI**

**Subject : ELECTRONICS**

**Paper : DSE 3-T**

**Modern Communication Systems**

**Full Marks : 40**

**Time : 2 Hours**

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

1. Answer any *four* questions. Each question carries five marks : 5×4=20
- (i) Explain DM technique using proper block diagram. 5
- (ii) What is grade of service ? Write down the Erlang formula. 2½+2½
- (iii) Explain different line coding techniques using proper waveform. 5
- (iv) Explain FDM switching systems. 5
- (v) Write advantages of optical communication systems. 5
- (vi) Write short note on optical power budgeting. 5

2. Answer any *two* questions. Each question carries ten marks :

10×2=20

- (i) Draw block diagram of cellular mobile communication network and explain each of the block. 4+6
- (ii) What are the frequency bands used in cellular communication ? What is absolute RF channel ARFCN? Explain frequency reuse technique. Explain hand off technology. 2+2+3+3
- (iii) Write down the frequency bands of bluetooth, Wi-Fi and WiMAX allocated for India and write down their applications. 6+4
- (iv) Explain different satellite orbits. What are the advantages and disadvantages of geostationary satellites? 6+2+2
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**Or,**  
**Paper - DSE 3-T**  
**Digital Signal Processing**

Full Marks : 40

Time : 2 Hours

1. Answer any *four* questions. Each question carries five marks : 5×4=20

(i) Find the period of the following signals :

$$x(n) = \text{Cos} (0.125 \pi n), \quad x(n) = \text{Re} \left\{ e^{jn\pi/12} \right\} + \text{Im} \left\{ e^{jn\pi/18} \right\}. \quad 5$$

(ii) Express the following sequence as sum of scaled and shifted unit steps :

$$x(n) = \begin{cases} 2 & \text{for } n = 0 \\ 3 & \text{for } n = 1 \\ 0 & \text{else} \end{cases} \quad 5$$

(iii) Differentiate between power and energy signal. 5

(iv) Consider the following signal :

$$x(t) + \cos(15t)$$

(a) Find the value of the sampling interval  $T_s$  such that  $X[n] = X(nt_s)$  is periodic.

(b) Find the fundamental period of  $X[n] = X(nt_s)$  if  $T_s = 0.1\pi$  seconds. 2½+2½

(v) A system has input output relation as follows. Whether the system is time invariant?

$$y[n] = T\{x[n]\} = x[k_0n], \quad k_0 \text{ is positive integer.} \quad 5$$

(vi) Show that :

$$x(t) * \delta(t) = x(t) \quad 5$$

2. Answer any *two* questions. Each question carries ten marks : 10×2=20

(i) Find the Laplace transformation of the following systems :

$$x(t) = -e^{-at} u(-t) \text{ and } x(t) = e^{at} u(t) \quad 10$$

(ii) Find the DTFT of the two sided sequences :

10

$$x(n) = \left(\frac{1}{4}\right)^{|n|}$$

(iii) Consider the discrete time sequence :

$$x(n) = \cos\left(\frac{n\pi}{8}\right).$$

Find two different continuous time signals that would produce this sequence when sampled at the frequency of  $f_s = 10$  Hz. 10

(iv) Find the Z transform of the following signals :

(a)  $x(n) = 3^n u(n) + 3 (1/2)^n u(n)$

(b)  $x(n) = \text{Cos} (n\omega_0) u(n)$

5+5

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**Or,**  
**Paper - DSE 3-T**  
**Computer Networks**

Full Marks : 40

Time : 2 Hours

1. Answer any *four* questions. Each question carries five marks : 5×4=20

- (i) (a) Explain Go-Back-N ARQ.
- (b) What is Piggybacking? 3+2
- (ii) (a) Write a short note on IEEE 802.3 for Ethernet LAN.
- (b) Which layer allows end-to-end communication in OSI model? 4+1
- (iii) (a) Match the following two lists :

<b>List-I</b>	<b>List-II</b>
Application Layer	TCP
Transport Layer	HDLC
Network Layer	HTTP
Datalink Layer	BGP

- (b) Describe about SMTP. 2+3
- (iv) (a) What is the difference between IPv4 and IPv6?
- (b) In OSI model, which layer is responsible for encryption and data compression? 4+1
- (v) Explain cyclic redundancy check with example. 5
- (vi) (a) Distinguish between packet switching and circuit switching.
- (b) What is the length of an IP address? 4+1

2. Answer any *two* questions. Each question carries ten marks : 10×2=20

- (i) (a) An organization has an IP address 192.168.1.0/24, it should divide this address such that HQ-LAN1 has 50 hosts, HQ-LAN2 has 50 hosts,

Sales-LAN1 has 30 hosts, Sales-LaN2 has 30 hosts, IT-LAN1 has 12 hosts, and IT-LAN2 has 8 hosts.

Now calculate sub-netting and find the network address, subnet mask, valid IP range, broadcast address using VLSM.

- (b) Write down the differences between asynchronous transmission and synchronous transmission. 8+2
- (ii) (a) What are the basic functions of network layer and transport layer of OSI model?
- (b) Describe about ARP. (3+3)+4
- (iii) (a) Write short notes on the following (any *two*) :
- (i) DNS
  - (ii) Router
  - (iii) Repeater
- (b) Compare between TCP and UDP. (2×3)+4
- (iv) (a) What are the disadvantages of Tree Topology?
- (b) Why physical address is used in networking system?
- (c) What is attenuation?
- (d) Write a short note on ICMP. 2+2+2+4
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