

**TELECOMMUNICATION SYSTEMS
(ECEN 3234)**

Time Allotted : 3 hrs

Full Marks : 70

Figures out of the right margin indicate full marks.

*Candidates are required to answer Group A and
any 5 (five) from Group B to E, taking at least one from each group.*

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

**Group - A
(Multiple Choice Type Questions)**

1. Choose the correct alternative for the following: **10 × 1 = 10**
 - (i) In a rotary dial telephone, number of pulses generated per second is
(a) 12 (b) 10 (c) 15 (d) 20.
 - (ii) A fully connected network has 8 nodes. So numbers of physical link required
(a) 28 (b) 18 (c) 16 (d) 56.
 - (iii) CCI for Crossbar switches is
(a) 0.2 (b) 0.3 (c) 0.4 (d) 0.5.
 - (iv) What is the full form of POTS?
(a) Plain Old Telephone System (b) Public Old telephone System
(c) Public Ordinary Telephone System (d) None of these.
 - (v) Common control subsystem in a switching network is also called
(a) direct control (b) stored program control
(c) register control (d) distributed control.
 - (vi) STD stands for
(a) State Trunk Dialling (b) Subscriber Trunk Destination
(c) Subscriber Terminal Dialling (d) Subscriber Trunk Dialling.
 - (vii) ADSL in a telephone network uses a
(a) Splitter (b) Magic Tee (c) DSL filter (d) (b) or (c).
 - (viii) MUM stands for
(a) Maximum Unit Message (b) Maximum Under Message
(c) Multi Unit Message (d) Multi Unit Member.
 - (ix) In a pulse dialing the ratio of making and breaking time is
(a) 1 : 3 (b) 1 : 2 (c) 1 : 4 (d) 2 : 3.

- (x) A server is said to have 1 Erlang of traffic if there are
 - (a) 100 calls generated per hour
 - (b) 100 calls generated per day
 - (c) the server is busy for entire 1 hour period
 - (d) busy hour traffic is 100.

Group - B

2. (a) Draw and explain the working of a two motion selector switch.
(b) What were the disadvantage of a manual exchange employing telephone operator?

7 + 5 = 12

3. (a) What is the significance of side tone in a telephone conversation? Explain with necessary diagram.
(b) An exchange uses 50V battery, a resistance of 500 ohm is placed in series with the battery. If the telephone set resistance is 50 ohm, calculate the loop resistance limit for the minimum current requirement of 23mA for a carbon microphone.
(c) Explain with necessary diagram the time division space switching.

(2 + 3) + 3 + 4 = 12

Group - C

4. (a) What are the advantages of fibre optic cables over copper cables?
(b) With a diagram, explain the principle of operation of a Hybrid circuit.
5. (a) What are the differences between step index fibres and graded index fibres? What is the fundamental difference between light source LEDs and ILDs?
(b) Explain with necessary diagram the American and European PCM carrier channel. What is tandem exchange?

5 + 7 = 12

(2 + 2) + (6 + 2) = 12

Group - D

6. (a) With a diagram,, explain the principle of operation of cordless Phone..
(b) Calculate the no of trunks that can be supported in a time multiplexed space switch, given that (i) 32 channels are multiplexed in each stream

(ii) control memory access time, Bus switch, and transfer times are 100ns each.

$$6 + (4 + 2) = 12$$

7. (a) What do you mean by 2B + D in telecommunication? Describe the ISDN architecture.
- (b) A dual processor system configured with three modes – discuss each mode briefly. Given that MTBF = 1000 hours and MTTR = 8 hours, calculate the unavailability for single and dual processor systems.

$$(3 + 3) + (3 + 3) = 12$$

Group – E

8. (a) What is a blocking network? Prove that GoS = Blocking probability.
- (b) A subscriber makes three phone calls in 3 minutes, 4 minutes and 2 minutes duration in a 1 hour period. Calculate the subscriber traffic in Erlang, CCs and CM.

$$(1 + 6) + 5 = 12$$

9. (a) What is the purpose of traffic engineering in telecommunication? State about different models of Loss System. What is GOS in traffic engineering?
- (b) If a group of 20 trunk carries 10 erlangs and the average call duration is 3 minutes, calculate (i) average number of calls in progress (ii) total number of calls originating per hour.

$$(2 + 3 + 3) + 4 = 12$$