ROLL NO. _____

Code: DE62 Subject: TELECOMMUNICATION SWITCHING SYSTEMS

DipIETE – ET

Time: 3 Hours **DECEMBER 2014** **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. Which transmission mode is used for data communication along telephone lines?

(A) Parallel **(B)** Serial
(C) Synchronous **(D)** Asynchronous

b. In a time multiplexed space switching system, one speech sample appears every

(A) 125 micro sec **(B)** 20 msec
(C) 125 msec **(D)** 1 sec

c. Common channel signalling in SS7 is

(A) out band control channel
(B) in band control channel
(C) speech control channel
(D) none of the above

d. Network with point-to-point link is known as

(A) Fully Connected Network **(B)** Half Connected Network
(C) Duplex Connected Network **(D)** Matched Connected Network

e. Telephone Traffic is measured in

(A) Seconds **(B)** Hours
(C) Erlang **(D)** Pulses per minute

f. Which topology requires a central controller or hub

(A) Mesh **(B)** Star
(C) Bus **(D)** Ring

g. Trunks are the lines that run between

(A) Subscribers and exchange **(B)** Switching system and power plant
(C) Local area network **(D)** Switching stations

h. The number of point to point links required in a fully connected network for 50 entities is

(A) 1250 **(B)** 1225
(C) 2500 **(D)** 50

i. Traffic Capacity is given by

(A) Switching capacity × Theoretical maximum load
(B) Switching capacity / Theoretical maximum load
(C) Theoretical maximum load / switching capacity
(D) None of these

j. Time synchronization is necessary in

(A) FDM **(B)** TDM
(C) WDM **(D)** QAM

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

Q.2 a. With neat diagrams explain the configuration of a step-by-step switching system. **(8)**

b. List the basic functions of a switching system. **(8)**

Q.3 a. Define calling rate and holding time. **(6)**

b. On average, during the busy how, a company makes 120 outgoing calls of average duration 2 minutes. It receives 200 incoming calls of average duration 3 min. To obtain a grade of service of 0.01 for both incoming and outgoing calls, how many exchange lines are required if: **(10)**
(i) Incoming and Outgoing calls are handled on separate group of lines
(ii) A common group of lines are used for both incoming and outgoing calls.
[refer Table 1]

Q.4 a. A three stage switching structure is to accommodate N = 128 input and 128 output terminals. For 16 first stage and 16 last stage, determine the number of cross points for non blocking. If the number of cross points in the example is to be reduced by the factor of 3 with non blocking what is the probability that a call will be blocked? Assume the utilization probability p = 15%. **(8)**

b. Compare single stage and multi stage networks. **(6)**

c. Define grading in telecommunication switching networks. **(2)**

Q.5 a. What is time multiplexed space switching? With a neat diagram explain its operation. **(10)**

b. Calculate the maximum access time that can be permitted for the data and control memories in a TSI switch with a single input and single output trunk multiplexing 2500 channels. Also, estimate the cost of the switch and compare it with that of a single stage space division switch. **(6)**

Q.6 a. What is stored program control (SPC)? Give the different configurations of centralized SPC. Discuss the advantages of SPC automation in telephone switching**.** **(8)**

b. Draw the signal exchange diagram for a local call used to represent the sequence of events between the subscriber and exchanges. **(8)**

Q.7 a. Explain Channel Associated mode, Channel Non-Associated mode and Quasi-associated mode of common channel signalling networks. **(6)**

b. Enlist the advantages and disadvantages of in band and out band voice signaling. **(10)**

Q.8 a. What is 'ALOHA' protocol? How is slotted ALOHA different from pure ALOHA? Discuss both in detail. **(8)**

b. Explain the Asynchronous Transfer Mode (ATM) in detail. **(8)**

Q.9 Explain any TWO in detail: **(8+8)**

(i) Cellular radio networks
(ii) Intelligent networks
(iii) Private networks

Table 1 Traffic-capacity table for full-availability groups

Number of trunks	1 lost call in 50 (0.02)	100 (0.01)	200 (0.005)	1000 (0.001)	Number of trunks	1 lost call in 50 (0.02)	100 (0.01)	200 (0.005)	1000 (0.001)
	E	*E*	*E*	*E*		*E*	*E*	*E*	*E*
1	0.020	0.010	0.005	0.001	51	41.2	38.8	36.8	33.4
2	0.22	0.15	0.105	0.046	52	42.1	39.7	37.6	34.2
3	0.60	0.45	0.35	0.19	53	43.1	40.6	38.5	35.0
4	1.1	0.9	0.7	0.44	54	44.0	41.5	39.4	35.8
5	1.7	1.4	1.1	0.8	55	45.0	42.4	40.3	36.7
6	2.3	1.9	1.6	1.1	56	45.9	43.3	41.2	37.5
7	2.9	2.5	2.2	1.6	57	46.9	44.2	42.1	38.3
8	3.6	3.2	2.7	2.1	58	47.8	45.1	43.0	39.1
9	4.3	3.8	3.3	2.6	59	48.7	46.0	43.9	40.0
10	5.1	4.5	4.0	3.1	60	49.7	46.9	44.7	40.8
11	5.8	5.2	4.6	3.6	61	50.6	47.9	45.6	41.6
12	6.6	5.9	5.3	4.2	62	51.6	48.8	46.5	42.5
13	7.4	6.6	6.0	4.8	63	52.5	49.7	47.4	43.4
14	8.2	7.4	6.6	5.4	64	53.4	50.6	48.3	44.1
15	9.0	8.1	7.4	6.1	65	54.4	51.5	49.2	45.0
16	9.8	8.9	8.1	6.7	66	55.3	52.4	50.1	45.8
17	10.7	9.6	8.8	7.4	67	56.3	53.3	51.0	46.6
18	11.5	10.4	9.6	8.0	68	57.2	54.2	51.9	47.5
19	12.3	11.2	10.3	8.7	69	58.2	55.1	52.8	48.3
20	13.2	12.0	11.1	9.4	70	59.1	56.0	53.7	49.2
21	14.0	12.8	11.9	10.1	71	60.1	57.0	54.6	50.1
22	14.9	13.7	12.6	10.8	72	61.0	58.0	55.5	50.9
23	15.7	14.5	13.4	11.5	73	62.0	58.9	56.4	51.8
24	16.6	15.3	14.2	12.2	74	62.9	59.8	57.3	52.6
25	17.5	16.1	15.0	13.0	75	63.9	60.7	58.2	53.5
26	18.4	16.9	15.8	13.7	76	64.8	61.7	59.1	54.3
27	19.3	17.7	16.6	14.4	77	65.8	62.6	60.0	55.2
28	20.2	18.6	17.4	15.2	78	66.7	63.6	60.9	56.1
29	21.1	19.5	18.2	15.9	79	67.7	64.5	61.8	56.9
30	22.0	20.4	19.0	16.7	80	68.6	65.4	62.7	58.7
31	22.9	21.2	19.8	17.4	81	69.6	66.3	63.6	58.7
32	23.8	22.1	20.6	18.2	82	70.5	67.2	64.5	59.5
33	24.7	23.0	21.4	18.9	83	71.5	68.1	65.4	60.4
34	25.6	23.8	22.3	19.7	84	72.4	69.1	66.3	61.3
35	26.5	24.6	23.1	20.5	85	73.4	70.1	67.2	62.1
36	27.4	25.5	23.9	21.3	86	74.4	71.0	68.1	63.0
37	28.3	26.4	24.8	22.1	87	75.4	71.9	69.0	63.9
38	29.3	27.3	25.6	22.9	88	76.3	72.8	69.9	64.8
39	30.1	28.2	26.5	23.7	89	77.2	73.7	70.8	65.6
40	31.0	29.0	27.3	24.5	90	78.2	74.7	71.8	66.6
41	32.0	29.9	28.2	25.3	91	79.2	75.6	72.7	67.4
42	32.9	30.8	29.0	26.1	92	80.1	76.6	73.6	68.3
43	33.8	31.7	29.9	26.9	93	81.0	77.5	74.3	69.1
44	34.7	32.6	30.8	27.7	94	81.9	78.4	75.4	70.0
45	35.6	33.4	31.6	28.5	95	82.9	79.3	76.3	70.9
46	36.6	34.3	32.5	29.3	96	83.8	80.3	77.2	71.8
47	37.5	35.2	33.3	30.1	97	84.8	81.2	78.2	72.6
48	38.4	36.1	34.2	30.9	98	85.7	82.2	79.1	73.5
49	39.4	37.0	35.1	31.7	99	86.7	83.2	80.0	74.4
50	40.3	37.9	35.9	32.5	100	87.6	84.0	80.9	75.3