3 Hours   **Total Marks: 80**

N.B. (1) Question No.**1** is **compulsory**.

    (**2**) Out of remaining **five** questions, attempt any **three** questions.

    (**3**) Assume suitable data, if required but justify the same.

    (**4**) Figures to the right indicate full marks.

    (**5**) Use of **Statistical Table** is allowed.

1	a)	Discuss Properties a pseudo random numbers generator should fulfill. (5)
	b)	Explain One channel and two channel Queuing model with an example. (5)
	c)	Show that exponential distribution is memory less. (5)
	d)	Explain process of model building. (5)

2   a)   Explain how to select family of distribution when historical data is available.   (10)

    b)   Conduct chi-sq test for the given set of pseudo random numbers. Clearly state your conclusion.

0.40	0.74	0.32	0.63	0.94	0.51	0.62	0.41	0.17	0.66
0.98	0.44	0.20	0.87	0.62	0.27	0.25	0.78	0.93	0.39
0.42	0.60	0.25	0.43	0.11	0.44	0.59	0.73	0.97	0.88
1.00	0.59	0.56	0.89	0.57	0.87	0.30	0.52	0.09	0.42
0.43	0.35	0.44	0.28	0.57	0.23	0.53	0.75	0.15	0.07
0.97	0.65	0.35	0.41	0.11	0.08	0.97	0.55	0.93	0.33
0.82	0.63	0.52	0.21	0.71	0.60	0.39	0.14	0.57	0.06
0.82	0.48	0.66	0.34	0.81	0.73	0.90	0.26	0.38	0.58
0.50	0.61	0.80	0.56	0.08	0.80	0.37	0.56	0.02	0.46
0.13	0.36	0.17	0.67	0.93	0.25	0.18	0.25	0.86	0.83

(10)

Assume Critical Value to be $\lambda^2_{(0.05,9)}$ = 16.9.

3   a)   Explain any one method of generating pseudo random numbers. Explain the term "period" in the context of random number generators.   (10)

    b)   Conduct KS test on the following random numbers and give your conclusion

0.44	0.76	0.21	0.45	0.16

(10)

    Assume critical value D_c = 0.565.

4   a)   Generate random variate for exponential and Uniform distribution   (10)

    b)   Conduct run above and below mean test for the given random numbers

0.76	0.57	0.52	0.05	0.92	0.86	0.95	0.36	0.46	0.65
0.63	0.81	0.98	0.85	0.42	0.82	0.55	0.90	0.13	0.93
0.85	0.46	0.36	0.63	0.70	0.41	0.12	0.61	0.24	0.12
0.85	0.01	0.43	0.27	0.94	0.61	0.62	0.45	0.71	0.19
0.96	0.89	0.18	0.45	0.17	0.35	0.46	0.70	0.43	0.73

(10)

Assume critical value Z_c = 1.96.

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5 a) Explain widely used steps for calibration and validation of models (10)
  b) Given single channel queuing model has following characteristics. Find efficiency, average wait time and probability of wait. (10)

Probability	Time b/w Arrival		Probability	Service time
0.20	1		0.20	1
0.10	3		0.15	2
0.25	4		0.25	3
0.30	2		0.30	4
0.15	6		0.1	5

6 a) Explain the concept of point estimator and interval estimator with respect to terminating simulation. (10)
  b) Discuss areas of application of simulation and modeling. (10)

Random Number Table

0.51	0.20	0.08	0.04	0.19	0.21	0.48	0.80	0.86	0.65
0.65	0.50	0.91	0.77	0.47	0.68	0.75	0.34	0.70	0.80
0.52	0.62	0.92	0.26	0.59	0.35	0.07	0.58	0.33	0.66
0.40	0.26	0.80	0.56	0.10	0.41	0.51	0.14	0.05	0.29
0.64	0.31	0.43	0.95	0.71	0.31	0.38	0.48	0.25	0.37
0.64	0.94	0.97	0.62	0.97	0.09	0.03	0.77	0.80	0.29
0.09	0.23	0.70	0.78	0.73	0.78	0.29	0.44	0.24	0.43
0.80	0.07	0.41	0.46	0.70	0.50	0.60	0.59	0.98	0.28
0.12	0.76	0.59	0.94	0.76	0.24	0.12	0.87	0.25	0.02
0.99	0.73	0.37	0.06	0.63	0.23	0.87	0.51	0.05	0.89
0.69	0.31	0.45	0.28	0.37	0.86	0.01	0.47	0.81	0.18
0.78	0.72	0.81	0.56	0.71	0.35	0.44	0.63	0.77	0.32
0.80	0.83	0.47	0.20	0.58	0.21	1.00	0.34	0.36	0.42
0.81	0.05	0.10	0.74	0.88	0.90	0.04	0.17	0.00	0.16
0.96	0.26	0.88	0.51	0.60	0.72	0.75	0.91	0.43	0.17
0.05	0.56	0.31	0.35	0.65	0.62	0.25	0.24	0.41	0.89
0.14	0.57	0.05	0.48	0.43	0.69	0.01	0.53	0.55	0.11
0.41	0.18	0.72	0.18	0.00	0.13	0.62	0.49	0.77	0.42
0.61	0.03	0.61	0.97	0.39	0.89	0.29	0.27	0.20	0.93
0.56	0.24	0.33	0.01	0.62	0.39	0.59	0.63	0.06	0.98