MANAV RACHNA
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MANAV RACHNA UNIVERSITY

(FORMERLY MANAV RACHNA COLLEGE OF ENGINEERING
NAAC ACCREDITED 'A' GRADE INSTITUTION)

Declared as State Private University under section 2f of the UGC act, 1956

DEPARTMENT OF MATHEMATICS

"T3 Examination, Dec 2018-19"

Semester: III
Subject: STATISTICAL & NUMERICAL TECHNIQUES
Branch: CSE
Course Type: Core
Time: 3HRS.
Max.Marks: 100

Date of Exam: 01/12/2018
Subject Code: MAH208-T
Session: II
Course Nature: Hard
Program: B.Tech.
Signature: HOD/Associate HOD:

Note: All questions are compulsory in Part A & Part B. Each question carry 10 marks.
Attempt any two questions from each Part C and Part D and each question carry 20 marks

PART -A

Q1 (a) Find the root of the equation cos x = x e^x using the bisection method correct to four decimal places. (8)

(b) Write a Newton's Rephson formula to find the value of $(N)^{1/2}$. $x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$ (2)

Simpson $\frac{1}{3}$

PART –B

Q2(a) The velocity v(km/min) of a moped which starts from rest,is given at fixed intervals of time t(min) as follows:

t	2	4	6	8	10	12	14	16	18	20
V	10	18	25	29	32	20	11	5	2	0

Estimate approximately the distance covered in 20minnutes. (8)

(b) Write the formula of forward differences ,for find the value of f'(a). (2)

PART -C

Q 3 (a) A student while calculating the mean and standard deviation on 25 observations obtained the values : mean=56 cms, standard deviation=2 cms,
It was later discovered at the time of checking that he has wrongly copied down an observation as 64 what are the mean and standard deviation if the correct value is omitted. (10)

(b) Find the mean, standard deviation and skewness of the distributions: (10)

Variable	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40
Frequency	2	5	7	13	21	16	8	3

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$\sqrt{\frac{\sum x_i^2}{N} - \bar{x}^2}$

mean - mode

3(mean - median)

Q 4 (a) In a certain distribution first four moments about the point 4 are -1.5,17,-13 and 108
Calculate β_1 and β_2 and state the nature of the distribution as regards to skewness and Kurtosis. (10)

(b) The following table enumerates the marks obtained by the class of students in static I and II papers.

Marks in the first paper,x	80	45	55	56	58	60	65	68	70	75	85
Marks in the second paper,y	82	56	50	48	60	62	64	65	70	74	90

Find b_{yx} and b_{xy} (10)

Q(5) (a) An experiment gave the following values:

V(f/min)	350	400	500	600
T (min)	61	26	7	2.6

It is known that V and t and connected by the relation $v=at^b$. Find the best possible values of a and b. (10)

(b) Calculate the coefficient of correlation from the following data: (10)

x	81	78	73	73	69	68	62	58
y	10	12	18	18	18	22	20	24

PART -D

Q6 (a) An urn contains 5 balls , 2 balls are drawn and are found to be white, what is the probability of all the balls being white (10).

(b) Assuming that half of the population are consumers of rice so that the chance of an individual being a customer consumer is ½. And assuming that 100 investigators each take 10 individuals to see whether they are consumers. How many investigators do you expect to report that 3 people or less are consumers.? (7)

(c) Bring out the fallacy in the statement: 1246.9375
The mean of the binomial distribution is 5 and SD is 3. (3)

Q7 (a) In a certain factory turning out razor blade to be defective. The blades are supplied in packets of 10. Use the Poisson distribution to calculate the approximate number of packets containing, no defective, 1 defective and 2 defective blades respectively in a consignment of 10000 packets given that $e^{-.02}=0.9802$. (10)

(b) A factory turns out an article by mass production method. From past experiences, it appears that 20 articles on an average are rejected out of every batch of 100. Find the variance in the number of rejects in a batch. What is the probability that the number of rejects in a batch exceeds 30? (10)

$P(X=x) = \frac{e^{-\lambda} \cdot \lambda^x}{x!}$

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OR (a) A random sample of 200 villages was taken from Gorakhpur district and the average population per village was found to be 485 with a standard deviation of 50. Another random sample of 200 villages from the district gave an average population of 510 per village with a standard deviation of 40. Is the difference between the average of 2 samples of statistically significant? Give reasons. (10)

(b) Five die were thrown 96 times and the number of times 4, 5 or 6 was thrown were:

No of die showing 4,5,or 6	5	4	3	2	1	0
Frequency of	8	18	35	24	10	1

Find the probability of getting this result by chance. (10)

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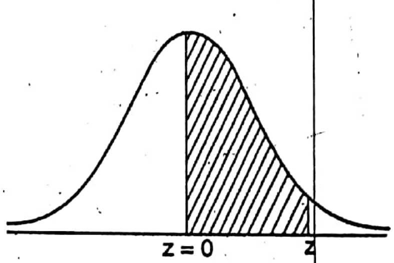
Table 2 : SIGNIFICANT VALUES $t_v(\alpha)$ OF t-DISTRIBUTION (TWO TAIL AREAS) $[|t| > t_v(\alpha)] = \alpha$

d.f. (v)	*Probability (Level of Significance)*					
	0.50	*0.10*	*0.05*	*0.02*	*0.01*	*0.001*
1	1.00	6.31	12.71	31.82	63.66	636.62
2	0.82	0.92	4.30	6.97	6.93	31.60
3	0.77	2.32	3.18	4.54	5.84	12.94
4	0.74	2.13	2.78	3.75	4.60	8.61
5	0.73	2.02	2.57	3.37	4.03	6.86
6	0.72	1.94	2.45	2.14	3.71	5.96
7	0.71	1.90	2.37	3.00	3.50	5.41
8	0.71	1.80	2.31	2.90	3.36	5.04
9	0.70	1.83	2.26	2.82	3.25	4.78
10	0.70	1.81	2.23	2.76	3.17	4.59
11	0.70	1.80	2.20	2.72	3.11	4.44
12	0.70	1.78	2.18	2.68	3.06	4.32
13	0.69	1.77	2.16	2.05	3.01	4.22
14	0.69	1.76	2.15	2.62	2.98	4.14
15	0.69	1.75	2.13	2.60	2.95	4.07
16	0.69	1.75	2.12	2.58	2.92	4.02
17	0.69	1.74	2.11	2.57	2.90	3.97
18	0.69	1.73	2.10	2.55	2.88	3.92
19	0.69	1.73	2.09	2.54	2.86	3.88
20	0.69	1.73	2.09	2.53	2.85	3.85
21	0.69	1.72	2.08	2.52	2.83	3.83
22	0.69	1.72	2.07	2.51	2.42	3.79
23	0.69	1.71	2.07	2.50	2.81	3.77
24	0.69	1.71	2.06	2.49	2.80	3.75
25	0.68	1.71	2.06	2.49	2.79	3.73
26	0.68	1.71	2.06	2.48	2.78	3.71
27	0.68	1.70	2.05	2.47	2.77	3.69
28	0.68	1.70	2.05	2.47	2.76	3.67
29	0.68	1.70	2.05	2.46	2.76	3.66
30	0.68	1.70	2.04	2.46	2.75	3.65
∞	0.67	1.65	1.96	2.33	2.58	3.29

APPENDIX—II

Table 1 : NORMAL TABLE
AREAS UNDER THE STANDARD NORMAL

$$\text{CURVE} = \frac{1}{\sqrt{2\pi}} \int_0^z e^{-\frac{z^2}{2}}\, dz$$



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0754
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
0.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.8729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4255	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4930	.4961	.4962	.4903	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4999	.4989	.4990	.4990
3.1	.4990	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993

Table 3: CHI-SQUARE (χ^2)

Significant Values χ^2 (α) of χ^2 Distribution Right Tail Areas for Given Probability α,

$P = P_r(\chi^2 > \chi^2(\alpha)) = \alpha$

And is Degrees of Freedom (d.f.)

Degree of freedom (v)	*Probability (Level of Significance)*						
	0 = .99	*0.95*	*0.50*	*0.10*	*0.05*	*0.02*	*0.01*
1	.000157	.00393	.455	2.706	3.841	5.214	6.635
2	.0201	.103	1.386	4.605	5.991	7.824	9.210
3	.115	.352	2.366	6.251	7.815	9.837	11.341
4	.297	.711	3.357	7.779	9.488	11.668	13.277
5	.554	1.145	4.351	9.236	11.070	13.388	15.086
6	.872	2.635	5.348	10.645	12.592	15.033	16.812
7	1.239	2.167	6.346	12.017	14.067	16.622	18.475
8	1.646	2.733	7.344	13.362	15.507	18.168	20.090
9	2.088	3.325	8.343	14.684	16.919	19.679	21.669
10	2.558	3.940	9.340	15.987	18.307	21.161	23.209
11	3.053	4.575	10.341	17.275	19.675	22.618	24.725
12	3.571	5.226	11.340	18.549	21.026	24.054	26.217
13	4.107	5.892	12.340	19.812	22.362	25.472	27.688
14	4.660	6.571	13.339	21.064	23.685	26.873	29.141
15	4.229	7.261	14.339	22.307	24.996	28.259	30.578
16	5.812	7.962	15.338	23.542	26.296	29.633	32,000
17	6.408	8.672	15.338	24.769	27.587	30.995	33.409
18	7.015	9.390	17.338	25.989	28.869	32.346	34.805
19	7.633	10.117	18.338	27.204	30.144	33.687	36.191
20	8.260	10.851	19.337	28.412	31.410	35.020	37.566
21	8.897	11.591	20.337	29.615	32.671	36.343	38.932
22	9.542	12.338	21.337	30.813	33.924	37.659	40.289
23	10.196	13.091	22.337	32.007	35.172	38.968	41.638
24	10.856	13.848	23.337	32.196	36.415	40.270	42.980
25	11.524	14.611	24.337	34.382	37.65	41.566	44.314
26	12.198	15.379	25.336	35.363	38.885	41.856	45.642
27	12.879	16.151	26.336	36.741	40.113	41.140	46.963
28	13.565	16.928	27.336	37.916	41.337	45.419	48.278
29	14.256	17.708	28.336	39.087	42.557	46.693	49.588
30	14.933	18,493	29.336	40.256	43.773	47.962	50.892

Note. For degrees of freedom (v) greater than 30, the quantity $\sqrt{2\chi^2} - \sqrt{2v-1}$ may be used as a normal variate with unit variance.