MA [sem- I] NEP Jan- 2025

Duration: 02 hours **Total marks: [50 marks]**

Note:

1. **Attempt any Five questions out of SEVEN.**
2. **Each question is for 10 marks.**
3. **This is a NEP Paper.**
4. **Diagram, graph, and other illustrations must be done using pen; pencil work will not be evaluated.**

सूचना:

1. **सातपैकी कोणतेही पाच प्रश्न सोडवा.**
2. **प्रत्येक प्रश्न हा 10 गुणासाठी आहे.**
3. **हा NEP पेपर आहे**
4. **आकृती, आलेख, आणि इतर बाबी पेनने कराव्यात. पेन्सिलचे काम तपासले जाणार नाही.**
5. **मूळ इंग्लिश प्रश्नपत्रिका पाहावी.**

Q 1. Explain any three multiple comparisons in details. (10)
कोणत्याही तीन बहुविध तुलना स्पष्ट करा.

Q 2. Discuss measures of central tendency and variability with relative merits and demerits. (10)
केंद्रीय प्रवृत्तीच्या आणि विचलनाच्या विविध मापनांचे फायदे आणि तोटे सहित वर्णन करा.

Q 3. Discuss any two issues that ramify interpretation of correlation coefficient. (10)
सहसंबंध अर्थ लावताना कोणत्याही दोन अडचणी स्पष्ट करा.

Q 4. How to carry out CFA? Discuss steps. (10)
CFA कसे करावे? त्याच्या पायऱ्यांचे वर्णन करा.

Q 5. Compute appropriate statistics on given data and interpret. (10)
The regression equation is
Product preference = 3 + (.6 X Positive affect) + (.4 X Advertisement) + (.5 X packaging) + e
The SE for each predictors are .2, .1, and .5 respectively. The sample is of 90 individuals. SS total is 100 and SS residual is 50.
दिलेल्या डेटावर योग्य संख्याशास्त्राची गणना करा आणि त्याचा अर्थ लावा.
प्रतिगमन समीकरण:
प्रोडक्ट प्रेफरन्स = 3 + (.6 X धनात्मक भावना) + (.4 X जाहिरात) + (.5 X पॅकेज) + e
प्रत्येक प्रेडिक्टरसाठी SE अनुक्रमे .२, .१ आणि .५ आहेत. नमुना ९० व्यक्तींचा आहे. SS एकूण १०० आहे आणि SS अवशिष्ट ५० आहे.

Q 6. Explain independent samples t-test and its applications. (10)
स्वतंत्र नमुना टी चाचणी आणि त्याच्या उपयोजनाचे वर्णन करा.

Q 7. Write notes on any two. कोणत्याही दोनवर टीप लिहा.

A. Poisson random variable / पॉयझॉन यादृच्छिक परिवर्तक (05)
B. Discuss application of R for data analysis / प्रदत्त विश्लेषणासाठी R चा उपयोग (05)
C. Axioms of probability / संभाव्यतेचे स्वयंसिद्ध तत्वे (05)
D. Type of errors in inference / संख्याशास्त्रातील अनुमानातील प्रमादांचे प्रकार (05)

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Formula Sheet

$$\bar{X} = \frac{\sum_{i=1}^{n} X_i}{n}$$

$$S_X^2 = \frac{\sum (X - \bar{X})^2}{n}$$

$$S_X = \sqrt{\frac{\sum (X - \bar{X})^2}{n}}$$

$$S_{\bar{X}} = \frac{S_X}{\sqrt{n}}$$

$$Mdn = \left[\frac{(n+1)}{2}\right]^{th} score$$

$$Cov_{XY} = \frac{\sum (X - \bar{X})(Y - \bar{Y})}{n}$$

$$r = \frac{\frac{\sum (X - \bar{X})(Y - \bar{Y})}{n}}{S_X S_Y} \quad t = \frac{r\sqrt{N-2}}{\sqrt{\sqrt{1-r^2}}}$$

$$r_{adj} = \sqrt{1 - \frac{(1-r^2)(n-1)}{n-2}}$$

$$\sum (X - \bar{X})(Y - \bar{Y}) = \sum XY - \frac{(\sum X)(\sum Y)}{n}$$

$$\tilde{\tau} = \frac{n_C - n_D}{\left[\frac{n(n-1)}{2}\right]} \quad \tilde{\tau} = 1 - \frac{2(n_s)}{\frac{n(n-1)}{2}} \quad z = \frac{\tilde{\tau}}{\sqrt{\frac{2(2n+5)}{9n(n-1)}}}$$

$$r_{Rho} = 1 - \frac{6\sum D^2}{n(n^2-1)} \quad t = \frac{r_{Rho}\sqrt{n-2}}{\sqrt{1-r_{Rho}^2}}$$

$$\sum (Y - \bar{Y})^2 = \sum (\hat{Y} - \bar{Y})^2 + \sum (Y - \hat{Y})^2$$

$$\tilde{n} = \frac{k}{(1/n_A) + (1/n_B) + \ldots + (1/n_k)}$$

$$t = \frac{(\bar{X}_A - \bar{X}_B) - (\mu_A - \mu_B)_{hypo}}{\sqrt{\frac{S_A^2}{n_A} + \frac{S_B^2}{n_B}}}$$

$$s_p^2 = \frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2}$$

$$SS_b = \sum^{k} n_i (\bar{X}_i - \bar{\bar{X}})^2 \quad SS_T = \sum_{i=1}^{n} (X - \bar{\bar{X}})^2$$

$$SS_w = \sum^{\text{all scores}} (X - \bar{X})^2 \quad F = \frac{S_b^2}{S_w^2} \quad HSD = q\sqrt{\frac{s_w^2}{n}}$$

$$\chi^2 = \sum \left(\frac{(f_o - f_e)^2}{f_e} \right)$$

$$t = \frac{b_k}{SE_{b_k}} \text{ where } b_k \text{ is regression coefficient}$$

$$\Lambda = \frac{|S_{error}|}{|S_{effect} + S_{error}|} \quad \eta^2 = 1 - \Lambda$$

$$b = \frac{Cov_{xy}}{S_x^2} \quad a = \bar{Y} - b\bar{X}$$

$$s_{Y.X} = \sqrt{\frac{\sum (Y - \hat{Y})^2}{n-2}} = \sqrt{\frac{SS_{Residual}}{df}}$$

$$\text{PIP} = 1 - \sqrt{(1 - r^2)}$$

$$Eigenvalue = \sum_{i=1}^{k} (b_{ij})^2 \quad \text{f = component, } f \le k; k = \text{variable,}$$

$$j = 1, 2, \ldots f; \; i = 1, 2, .. k$$

$$h^2 = \sum_{j=1}^{f} (b_{ij})^2 \quad \text{f = component, } f \le k; k = \text{variable,}$$

$$j = 1, 2, \ldots f; \; i = 1, 2, .. k$$

$$t = \frac{(\bar{X}_A - \bar{X}_B) - (\mu_A - \mu_B)_{hypo}}{\sqrt{S_{\bar{A}}^2 + S_{\bar{B}}^2 - 2rS_{\bar{A}}S_{\bar{B}}}}$$

$$r_p = r_{AB.C} = \frac{r_{AB} - r_{AC}r_{BC}}{\sqrt{(1 - r_{AC}^2)(1 - r_{BC}^2)}} \quad t = \frac{r_P\sqrt{n-v}}{\sqrt{1 - r_P^2}}$$

Appendix: Statistical Tables.

Table: Area Under Normal Distribution.

For example, to determine the area under the curve between 0 and 0.45, start at the row for 0.4, and read along until 0.45 - there is the value 0.1736. Because the curve is symmetrical, the same table can be used for values going either direction, so a negative 0.45 also has an area of 0.1736.

For the Z score of .045, The area between mean and Z is .1736. the area beyond Z is .50 - .1736.

Z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990

The studentized range statistic (q)*

*The critical values for q corresponding to alpha = .05 (top) and alpha = .01 (bottom)

df for Error Term	3	4	5
5	4.60 6.98	5.22 7.80	5.67 8.42
6	4.34 6.33	4.90 7.03	5.30 7.56
7	4.16 5.92	4.68 6.54	5.06 7.01
8	4.04 5.64	4.53 6.20	4.89 6.62
9	3.95 5.43	4.41 5.96	4.76 6.35
10	3.88 5.27	4.33 5.77	4.65 6.14

Pearson's r significance table

Df	1	2	3	4	5	6	7	8	9	10
0.05	0.997	0.95	0.878	0.811	0.754	0.707	0.666	0.632	0.602	0.576
0.01	0.9999	0.99	0.959	0.917	0.874	0.834	0.798	0.765	0.735	0.708

Table various values of F in F distribution for probability of .05 and .01.

df1 (numerator)	df2 (denominator)	Probability	
		0.05	0.01
1	8	5.317655	11.25862
1	20	4.351243	8.095958
1	26	4.225201	7.721254
1	36	4.1132	7.395663
2	5	5.786135	13.27393
2	13	3.805565	6.700965
2	14	3.738892	6.514884
2	15	3.68232	6.358873
2	17	3.591531	6.112114
2	27	3.354131	5.488118
2	28	3.340386	5.452937
2	29	3.327654	5.420445
2	174	3.04	4.75
2	176	3.04	4.72

Chi-square Table			
df	Probability		
	0.05	**0.01**	**0.005**
1	3.841459	6.634897	7.879439
2	5.991465	9.21034	10.59663

$e^{-\lambda}$ values

λ	1	2	3	4	5	6	7	8
$e^{-\lambda}$	0.367879	0.135335	0.049787	0.018316	0.006738	0.002479	0.000912	0.000335

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