12 JAN.2026 MCA (NEP 2020) (SEM-I) MFCS QP CODE:10094630

(Time: 2 Hours) **(Total Marks: 50)**

N.B. : 1) Question No.1 is **Compulsory.**
2) Attempt any **Two** from the remaining **Four** questions.
3) Figures to the right indicate full marks.
4) Scientific Calculator is allowed.

<table>
<tr><th></th><th></th><th></th><th>Marks</th><th>CO</th><th>BL</th></tr>
<tr><td>Q1.</td><td>(a)</td><td>Apply Spearman's rank correlation coefficient formula for the following data and find rank correlation coefficient.
<table>
<tr><td>Marks in WT</td><td>64</td><td>50</td><td>44</td><td>42</td><td>56</td><td>65</td><td>59</td></tr>
<tr><td>Marks in DS</td><td>80</td><td>60</td><td>37</td><td>51</td><td>30</td><td>75</td><td>44</td></tr>
</table></td><td>[5]</td><td>2</td><td>3</td></tr>
<tr><td></td><td>(b)</td><td>For a moderately skewed frequency distribution of retail prices for men's shoes it is found that the mean price is Rs. 20 and median price is Rs. 17. If the Coefficient of variation is 20%, Solve the Pearsonian coefficient of skewness of the distribution.</td><td>[5]</td><td>1</td><td>5</td></tr>
<tr><td></td><td>(c)</td><td>A card is drawn from a well shuffled pack of playing card. Solve the probability that it is either a diamond or a king.</td><td>[5]</td><td>3</td><td>3</td></tr>
<tr><td></td><td>(d)</td><td>A die is rolled 100 times with the following distribution:
<table>
<tr><td>Number</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr>
<tr><td>Observed frequency</td><td>17</td><td>14</td><td>20</td><td>17</td><td>17</td><td>15</td></tr>
</table>
At the 0.01 level of significance, determine whether die is true (or uniform) . 5% level of significance, the table value of Chi^2 is 15.086)</td><td>[5]</td><td>6</td><td>3</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Q2.</td><td>(a)</td><td>Ten unbiased coins are tossed simultaneously. What is the probability of obtaining i)Exactly 6 heads (ii)At least 8 heads (iii) no head (iv) at least one head (v) not more than three heads (vi) At least 4 heads</td><td>[7]</td><td>4</td><td>2</td></tr>
<tr><td></td><td>(b)</td><td>Following data gives the number of car accidents in the city .How would you solve Bowley's coefficient skewness for the following distribution.
<table>
<tr><td>Class</td><td>5-10</td><td>10-15</td><td>15-20</td><td>20-25</td><td>25-30</td><td>30-35</td><td>35-40</td></tr>
<tr><td>Freq.</td><td>7</td><td>9</td><td>16</td><td>22</td><td>14</td><td>12</td><td>3</td></tr>
</table></td><td>[8]</td><td>1</td><td>3</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

<table>
<tr><td>Q3.</td><td>(a)</td><td>Consider discrete random variables X and Y with the joint PMF as below.
<table>
<tr><td>Y / X</td><td>-1</td><td>0</td><td>1</td></tr>
<tr><td>-2</td><td>1/16</td><td>1/16</td><td>1/16</td></tr>
<tr><td>-1</td><td>1/8</td><td>1/16</td><td>1/8</td></tr>
<tr><td>1</td><td>1/8</td><td>1/16</td><td>1/8</td></tr>
<tr><td>2</td><td>1/16</td><td>1/16</td><td>1/16</td></tr>
</table>
What can you say about X and Y independent? Are they uncorrelated?</td><td>[7]</td><td>4</td><td>2</td></tr>
<tr><td></td><td>(b)</td><td>What is the regression of production on year. How could you determine the asset for the year 2001. Also find Karl Pearson's Coefficient of correlation.
<table>
<tr><td>Year</td><td>1994</td><td>1995</td><td>1996</td><td>1997</td><td>1998</td><td>1999</td><td>2000</td></tr>
<tr><td>Production</td><td>25</td><td>35</td><td>40</td><td>35</td><td>50</td><td>60</td><td>42</td></tr>
</table></td><td>[8]</td><td>2</td><td>5</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Q4.</td><td>(a)</td><td>The joint PDF of a two dimensional random variable (x, y) is given by
f(x,y) = 8/9 xy, 0<=x<=y<=2
= 0 otherwise
(i) What are the marginal density functions of X and Y
(ii) What are the conditional density function of Y|X and X|Y</td><td>[7]</td><td>4</td><td>4</td></tr>
<tr><td></td><td>(b)</td><td>In a class of 75 students, 15 were considered to be very intelligent, 45 as medium and the rest below average. The probability that a very intelligent students fails in a viva –voce examination is 0.005; the medium student failing has a probability 0.05 and the corresponding probability for a below average student is 0.15. If a student is known to have passed the viva-voce examination. What is the probability that he is below average?</td><td>[8]</td><td>3</td><td>4</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Q5.</td><td>(a)</td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>It is claimed that a random sample of 100 tyres with a mean life of 15269 kms is drawn from a population of tyres which has a mean life 15200 kms and a standard deviation of 1248 kms. Write Null and Alternate Hypothesis. Test the validity of the claim at (I) 5%level of significance is 1.96 and (ii) 1 % level of significance is 2.58 of significance.</td><td>[7]</td><td>6</td><td>4</td></tr>
<tr><td></td><td>(b)</td><td>There are 12 balls in a bag, 8 red and 4 green, Three balls are drawn successively without replacement. What is the probability that they are alternately of the same color?</td><td>[8]</td><td>3</td><td>2</td></tr>
</table>

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(Time: 2 Hours) **(Total Marks: 50)**

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<table>
<tr><th></th><th></th><th></th><th>Marks</th><th>CO</th><th>BL</th></tr>
<tr><td>Q1.</td><td>(a)</td><td>खालील डेटासाठी स्पीयरमॅनचा रँक सहसंबंध गुणांक शोधा.
<table>
<tr><td>Marks in WT</td><td>64</td><td>50</td><td>44</td><td>42</td><td>56</td><td>65</td><td>59</td></tr>
<tr><td>Marks in DS</td><td>80</td><td>60</td><td>37</td><td>51</td><td>30</td><td>75</td><td>44</td></tr>
</table></td><td>[5]</td><td>2</td><td>3</td></tr>
<tr><td></td><td>(b)</td><td>पुरुषांच्या शूजच्या किरकोळ किमतींच्या माफक प्रमाणात विस्कळीत वारंवारता वितरणासाठी असे आढळून आले आहे की सरासरी किंमत रुपये आहे. 20 आणि सरासरी किंमत रु. 17. भिन्नतेचा गुणांक 20% असल्यास, वितरणाच्या स्क्युनेसचा पियर्सो नियन गुणांक शोधा.</td><td>[5]</td><td>1</td><td>5</td></tr>
<tr><td></td><td>(c)</td><td>प्लेइंगकार्डच्या चांगल्या फेरबदल केलेल्या पॅकमधून एक कार्ड काढले जाते. तो एक तरहिरा किंवा राजा असल्याची संभाव्यता शोधा.</td><td>[5]</td><td>3</td><td>3</td></tr>
<tr><td></td><td>(d)</td><td>खालील वितरणासह डाय 100 वेळा गुंडाळले जाते: महत्त्वाच्या 0.01 पातळीवर, डाय खरे आहे की नाही हे ठरवा (किंवा एकसमान). 5% महत्त्व पातळी, CHI2 चे सारणी मूल्य 15.086 आहे)
<table>
<tr><td>Number</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr>
<tr><td>Observed frequency</td><td>17</td><td>14</td><td>20</td><td>17</td><td>17</td><td>15</td></tr>
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<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Q2.</td><td>(a)</td><td>दहा निष्पक्षनाणी एकाच वेळी फेकली जातात. मिळण्याची शक्यता शोधा i) _अगदी 6 हेड (ii) किमान 8 हेड (iii) नाहीहेड (iv) किमानएकडोके (v) तीनपेक्षाजास्तनाही (vi) किमान 4 हेड</td><td>[7]</td><td>4</td><td>2</td></tr>
<tr><td></td><td>(b)</td><td>खालील डेटा शहरातील कार अपघातांची संख्या देतो .खालील वितरणासाठी Bowley च्या गुणांक skewness ची गणना करा.
<table>
<tr><td>Class</td><td>5-10</td><td>10-15</td><td>15-20</td><td>20-25</td><td>25-30</td><td>30-35</td><td>35-40</td></tr>
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<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

Q3.	(a)	खालीलप्रमाणेसंयुक्त PMF सहस्वतंत्रयादृच्छिकचल X आणि Y चाविचारकरा. X आणि Y स्वतंत्र आहेत का? ते असंबंधित आहेत.	[7]	4	2
	(b)	वर्षातील उत्पादनाचे प्रतिगमन शोधा. वर्ष 2001 साठी मालमत्तेचा अंदाज लावा. तसेच कार्ल पियर्सनचा सहसंबंध गुणांक शोधा.	[8]	2	5
Q4.	(a)	द्विमितीय यादृच्छिक चल (x, y) ची संयुक्त PDF द्वारे दिली आहे $F_{xy}(x,y) = 8/9\ xy, \quad 0<=x<=y<=2$ $= 0, \quad$ अन्यथा (i) X आणि Y ची सीमांत घनता कार्ये शोधा (ii) Y|X आणि X|Y चे सशर्त घनता कार्य शोधा	[7]	4	4
	(b)	75 विद्यार्थ्यांच्या वर्गात, 15 अतिशय हुशार, 45 मध्यम आणि उर्वरित सरासरीपेक्षा कमी मानले जात होते. अत्यंत हुशार विद्यार्थी viva-voce परीक्षेत नापास होण्याची शक्यता 0.005 आहे; नापास होणाऱ्या मध्यम विद्यार्थ्याची संभाव्यता०.०५ आहे आणि सरासरीपेक्षा कमी असलेल्या विद्यार्थ्याची संबंधित संभाव्यता ०.१५आहे. जर एखाद्या विद्यार्थ्याने viva-voce परीक्षा उत्तीर्ण केल्याचे ज्ञात असेल. तो सरासरीपेक्षा कमी असण्याची शक्यता किती आहे ?	[8]	3	4
Q5.	(a)				
		असा दावा केला जात आहे की 15269 कि.मी.च्या सरासरी जीवनासह 100 टायर्सचे यादृच्छिक नमुना टायर्सच्या लोकसंख्येपासून काढले जाते ज्याचे आयुष्य 15200 कि.मी. आणि 1248 कि.मी.चे प्रमाणित विचलन आहे. शून्य आणि वैकल्पिक गृहीतक लिहा. (I) 5 % महत्त्व पातळीवरील दाव्याची वैधता चाचणी घ्या 1.96 आणि (ii) 1 % महत्त्व पातळी 2.58 महत्त्व आहे.	[7]	6	4
	(b)	एका पिशवीत 12 चेंडू आहेत, 8 लाल आणि 4 हिरवे, तीन चेंडू बदली न करता क्रमश: काढले जातात. ते वैकल्पिकरित्या एकाच रंगाचे असण्याची संभाव्यता किती आहे?	[8]	3	2

Y / X	-1	0	1
-2	1/16	1/16	1/16
-1	1/8	1/16	1/8
1	1/8	1/16	1/8
2	1/16	1/16	1/16

Year	1994	1995	1996	1997	1998	1999	2000
Production	25	35	40	35	50	60	42

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