University of Mumbai
Examination 2020
Examinations Commencing from 1st June 2021

Program: Civil Engineering
Curriculum Scheme: Rev2019
Examination: Second year/ Semester IV
Course Code: CEC401 and Course Name: Engineering Mathematics-IV

Time: 2-hour Max. Marks: 80

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For the students: - All the Questions are compulsory and carry equal marks.

Q1.	Consider a dice with the property that that probability of a face with n dots showing up is proportional to n. The probability of face showing 4 dots is?
Option A:	1/7
Option B:	5/42
Option C:	1/21
Option D:	4/21
Q2.	X is a variate between 0 and 3. The value of E(X2) is
Option A:	8
Option B:	7
Option C:	9
Option D:	27
Q3.	A T-test sample has 7 pairs of samples. The distribution should contain
Option A:	5
Option B:	9
Option C:	6
Option D:	0
Q4.	Find the population proportion p for an IPL team having total 30 players with 10 overseas players.
Option A:	½
Option B:	1/3
Option C:	2/3
Option D:	1/4
Q5.	If 40% of boys opted for math's and 60% of girls opted for maths, then what is the probability that math's is chosen if half of the class's population is girls?
Option A:	0.5
Option B:	0.6
Option C:	0.7
Option D:	0.4
Q6.	If E(x) = 2 and E(z) = 4, then E (z – x) =?
Option A:	2
Option B:	6
Option C:	0
Option D:	-2

Q7.	For a Poisson Distribution, if mean(m) = 1, then P(1) is?
Option A:	e
Option B:	1/e
Option C:	e/2
Option D:	0
Q8.	A sample size is considered large in which of the following cases?
Option A:	n > or = 30
Option B:	n > or = 50
Option C:	n < or = 30
Option D:	n < or = 50
Q9.	Rank correlation coefficient was discovered by
Option A:	Fisher
Option B:	Spearman
Option C:	Karl Pearson
Option D:	Bowley
Q10.	A random variable X may have no moments although its M.G.F is
Option A:	Not exist
Option B:	Exist
Option C:	1
Option D:	0
Q11	A bag contains 80 chocolates. This bag has 4 different colors of chocolates in it. If all four colors of chocolates were equally likely to be put in the bag, what would be the expected number of chocolates of each color?
Option A:	12
Option B:	11
Option C:	20
Option D:	19
Q12.	In a Binomial Distribution, if 'n' is the number of trials and 'p' is the probability of success, then the mean value is given by
Option A:	np(1-p)
Option B:	np
Option C:	n
Option D:	p
Q13	A vector field which has a vanishing divergence is called as
Option A:	Solenoidal field
Option B:	Rotational field
Option C:	Hemispheroidal field
Option D:	Irrotational field
Q14.	Divergence and Curl of a vector field are
Option A:	Scalar & Scalar

Option B:	Scalar & Vector
Option C:	Vector & Vector
Option D:	Vector & Scalar
Q15	If the probability of hitting the target is 0.4, find mean and variance.
Option A:	0.4, 0.24
Option B:	0.6, 0.24
Option C:	0.4, 0.16
Option D:	0.6, 0.16
Q16.	In testing the hypotheses Ho: $\mu = 50$ vs Ha: $\mu \neq 50$, the following information is knows: $n = 64$, $\bar{x}$=53.5 and $\sigma = 10$. The standardized test statistic is:
Option A:	$t = 2.8$
Option B:	$t = -2.8$
Option C:	$z = 2.8$
Option D:	$z = -2.8$
Q17	If the coefficient of determination is equal to 1, then the correlation coefficient
Option A:	must also be equal to 1
Option B:	can be either -1 or +1
Option C:	can be any value between -1 to +1
Option D:	must be -1
Q18	Which of the following distributions is used to compare two variances?
Option A:	T – Distribution
Option B:	F – Distribution
Option C:	Normal Distribution
Option D:	Poisson Distribution
Q19	Normal Distribution is symmetric is about
Option A:	Variance
Option B:	Mean
Option C:	Standard deviation
Option D:	Covariance
Q20	In a Poisson Distribution, if 'n' is the number of trials and 'p' is the probability of success, then the mean value is given by?
Option A:	m = np
Option B:	m = (np)2
Option C:	m = np(1-p)
Option D:	m = p

<table>
<tr><td>Q2 (20 Marks)</td><td>Solve any Four out of Six 5 marks each</td></tr>
<tr><td>A</td><td>Evaluate $\int_C (z - z^2)\, dz$ where C is the lower half of the circle $|z| = 1$</td></tr>
<tr><td>B</td><td>Verify Green's theorem for $\overline{F} = \boldsymbol{x^2 i} - \boldsymbol{xyj}$ where C is the triangle having vertices A (0,3), B (3,0), C (6,3).</td></tr>
<tr><td>C</td><td>A bag contains green and yellow balls. Two balls are drawn without replacement. The probability of selecting a green ball and then a yellow ball is 0.28. The probability of selecting a green ball on the first draw is 0.5. Find the probability of selecting a yellow ball on the second draw, given that the first ball drawn was green.</td></tr>
<tr><td>D</td><td>Fit a second-degree parabolic curve to the following data:
<table>
<tr><td>x</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr>
<tr><td>y</td><td>2</td><td>6</td><td>7</td><td>8</td><td>10</td><td>11</td><td>11</td><td>10</td></tr>
</table></td></tr>
<tr><td>E</td><td>If the height of 500 students is normally distributed with mean 68 inches and standard deviation 4 inches. Find the expected number of students having heights between 65 and 71 inches. (Table value of area under 0.75 = 0.2734)</td></tr>
<tr><td>F</td><td>The following data is collected on two characters. Based on this, can you say that there is no relation between smoking and literacy? Use Chi square test at 5 % level of significance?
<table>
<tr><td></td><td>Smokers</td><td>Non-Smokers</td></tr>
<tr><td>Literates</td><td>83</td><td>57</td></tr>
<tr><td>illiterates</td><td>45</td><td>68</td></tr>
</table></td></tr>
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<table>
<tr><td>Q3
(20 Marks)</td><td>Solve any Four out of Six 5 marks each</td></tr>
<tr><td>A</td><td>Find the residues of f(z) = $\frac{sin\pi z}{(z-1)^2(z-2)}$ $at\ its\ poles$</td></tr>
<tr><td>B</td><td>Use Stokes's Theorem to evaluate where $\overline{F}$ = x^2i + xy j and C is the boundary of the circle x = 0 , y = 0 , x = a , y = b</td></tr>
<tr><td>C</td><td>If X is a random variable with probability density function
$f(x) = \{xk\ ; 0 \leq x \leq 2\ 2k; 2 \leq x \leq 4\ 6k; 4 \leq x \leq 6$
Find k , E(X)and P $(1 \leq x \leq 3)$</td></tr>
<tr><td>D</td><td>Compute Pearsons coefficient of correlation between advertisement cost and sales as per the data given below:
<table>
<tr><td>Advertisement Cost in 1000's</td><td>39</td><td>65</td><td>62</td><td>90</td><td>82</td><td>75</td><td>25</td><td>98</td><td>36</td></tr>
<tr><td>Sales in lakhs</td><td>47</td><td>53</td><td>58</td><td>86</td><td>62</td><td>68</td><td>60</td><td>91</td><td>51</td></tr>
</table></td></tr>
<tr><td>E</td><td>The means of two random samples of size 9 and 7 are 196.42 and 198.82 respectively. The sum of the squares of the deviation from the means are 26.94 and 18.73 respectively. Can the samples be considered to have been drawn from the same population?</td></tr>
<tr><td>F</td><td>Conduct an F-Test on the following samples:

Sample-1 having variance = 109.63, sample size = 41.

Sample-2 having Variance = 65.99, sample size = 21</td></tr>
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