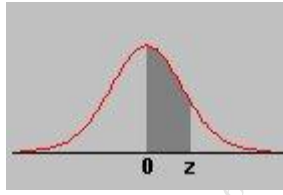


[Time:2.30 Hrs]		[ Marks:75]
Please check whether you have got the right question paper.		
N.B:	<ol style="list-style-type: none"> <li>1. All question are compulsory.</li> <li>2. Figures to the right indicate full marks.</li> <li>3. Students answering in the regional language should refer in case of doubt to the main text of the paper in English.</li> </ol>	

Q.1	<p>Attempt <b><u>any three</u></b> of the following:</p> <ol style="list-style-type: none"> <li>a) Use zero through third order taylor series expansion to predict value of <math>f(2)</math> using base point as <math>x = 1</math> for <math>f(x) = 7x^3 - 3x^2 + 5x - 2</math>.</li> <li>b) If approximate value of <math>\sqrt{2} = 1.414</math> and true value is 1.41421356. Find the absolute error and relative error.</li> <li>c) Suppose the current population is 200,000,000 and the birth rate and death rates are 0.04 and 0.02 respectively. What will be the population in 5 years?</li> <li>d) Find the value of <math>e^{0.5}</math> using the first five terms of Maclaurin series.</li> <li>e) Round off the number 764350 to four significant figures and compute the percentage error.</li> <li>f) Given a value of <math>\bar{x} = 2.5</math> with an error of <math>\Delta\bar{x} = 0.01</math>, estimate the resulting error in the function, <math>f(x) = x^4</math></li> </ol>	15
Q.2	<p>Attempt <b><u>any three</u></b> of the following:</p> <ol style="list-style-type: none"> <li>a) Perform 3 iterations of Regula falsi method to find root of <math>f(x) = 4x^3 + x + 7</math>.</li> <li>b) Find value of <math>\sqrt{11}</math> using Newton Raphson method.(perform 3 iterations).</li> <li>c) i) Derive an expression for <math>\Delta\left(\frac{f(x)}{g(x)}\right)</math> ii) If <math>f(x) = 3x^7 + 3x^6 - 2x^4 + x + 7</math>, find <math>\Delta^7 f(x)</math>.</li> <li>d) Construct the forward difference table and find value of function when <math>x = 5</math> Given <math>x_0 = 0, h = 1, x_5 = 4, y_0 = 1, y_1 = 5, y_2 = 12, y_3 = 31, y_4 = 31, y_5 = 68</math>.</li> <li>e) Find positive root of <math>f(x) = x^3 - x - 1</math> using bisection method. Perform 3 iterations.</li> </ol>	15

	f) Find the polynomial passing through the points (0,1) , (2,7), (3,13) using Lagrange's formula.																									
Q.3	<p>Attempt <b>any three</b> of the following:</p> <p>a) Solve using Gauss Jordan method <math>2x + 3y - z = 5, 4x + 4y - 3z = 3, 2x - 3y + 2z = 2</math></p> <p>b) Find <math>y(1.6)</math> for <math>\frac{dy}{dx} = y^2 - x^2, y(1) = 2, h = 0.3</math> Using Euler's method.</p> <p>c) For the following table obtain <math>\frac{dy}{dx}</math> &amp; <math>\frac{d^2y}{dx^2}</math> at <math>x = 10</math></p> <table><tr><td>X</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td></tr><tr><td>Y</td><td>8</td><td>4</td><td>7</td><td>6</td><td>15</td><td>2</td></tr></table> <p>d) Perform 3 iterations of Gauss Siedel method <math>10x - 5y - 2z = 3, 4x - 10y + 3z = -3, x + 6y + 10z = -3</math></p> <p>e) Evaluate <math>\int_0^1 \frac{dx}{3 + 2x}</math> by dividing [0, 1] into 5 equal parts by all possible methods.</p> <p>f) Find <math>y(0.1)</math> using taylor series method correct upto 4 decimal places for <math>y' = x - y^2, y(0) = 1</math></p>	X	10	11	12	13	14	15	Y	8	4	7	6	15	2	15										
X	10	11	12	13	14	15																				
Y	8	4	7	6	15	2																				
Q.4	<p>Attempt <b>any three</b> of the following:</p> <p>a) Find the coefficient of correlation between the heights of males and females</p> <table><tr><td>height of males</td><td>65</td><td>66</td><td>67</td><td>68</td><td>69</td><td>70</td><td>71</td></tr><tr><td>height of females</td><td>67</td><td>68</td><td>66</td><td>69</td><td>72</td><td>72</td><td>69</td></tr></table> <p>b) <math>r = 0.8, \sum(x - \bar{x})(y - \bar{y}) = 60, \sigma_y = 2.5, \sum(x - \bar{x})^2 = 90</math>. Find n.</p> <p>c) If <math>\sum x = 37, \sum y = 71, \sum xy = 563, \sum x^2 = 297, \sum y^2 = 1079, n = 5</math>. Find the two regression lines.</p> <p>d) Fit a parabola of the form <math>y = a + bx + cx^2</math> using least square method</p> <table><tr><td>x</td><td>0</td><td>1</td><td>2</td></tr><tr><td>y</td><td>1</td><td>6</td><td>17</td></tr></table>	height of males	65	66	67	68	69	70	71	height of females	67	68	66	69	72	72	69	x	0	1	2	y	1	6	17	15
height of males	65	66	67	68	69	70	71																			
height of females	67	68	66	69	72	72	69																			
x	0	1	2																							
y	1	6	17																							

		<p>e) A dietician wishes to mix two types of foods in such a way that vitamin contents of the mixture contain atleast 8 units of vitamin A and 10 units of vitamin C. Food 'I' contains 2 units/kg of vitamin A and 1 unit/kg of vitamin C. Food 'II' contains 1 unit/kg of vitamin A and 2 units/kg of vitamin C. It costs Rs 50 per kg to purchase Food 'I' and Rs 70 per kg to purchase Food 'II'. Formulate this problem as a linear programming problem to minimise the cost of such a mixture.</p> <p>f) Solve the following linear programming by graphical method.  Minimize <math>Z = 3x + 9y</math>  subject to <math>x + 2y \leq 8</math>, <math>3x + y \leq 12</math>, <math>x + y \leq 8</math>, <math>x \geq 0</math>, <math>y \geq 0</math></p>	
Q.5		<p>Attempt <b><u>any three</u></b> of the following:</p> <p>a) For a continuous random variable X, its probability density function is given by  <math>f(x) = kx^2(1 - x), 0 &lt; x &lt; 1</math>  <math>= 0, \text{otherwise}</math>  Find k, mean.</p> <p>b) X and Y are independent random variables with mean 7 and 4, variance 9 and 4 respectively. Find <math>E(X + Y)</math>, <math>E(3X + 2)</math>, <math>V(Y + 2)</math>, <math>E(3X - Y)</math>, <math>V(3X - 2Y)</math>.</p> <p>c) If 2% of electric bulbs manufactured by a certain company are defective. Find the probability that in a sample of 200 bulbs i) less than 2 bulbs ii) more than 3 bulbs are defective.</p> <p>d) X is normally distributed with mean 12 and S.D 4. Find the probability of  i) <math>X \geq 20</math> ii) <math>X \leq 20</math>. Find <math>x_1</math> when <math>P(X &gt; x_1) = 0.24</math>.</p> <p>e) X follows exponential distribution with mean 2. Find <math>P(X &gt; 5)</math>, <math>P(5 &lt; X &lt; 10)</math>.</p> <p>f) A biased coin for which head is twice as likely as tail is tossed five times. Find the probability of getting i) atleast one head ii) majority of heads.</p>	15



Standard Normal Variate

	0	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0	0	0.004	0.008	0.012	0.016	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	0.091	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	0.148	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.17	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.195	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.219	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	0.258	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.291	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	0.334	0.3365	0.3389
1	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	0.377	0.379	0.381	0.383
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.398	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	0.437	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	0.475	0.4756	0.4761	0.4767
2	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	0.483	0.4834	0.4838	0.4842	0.4846	0.485	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.489
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	0.492	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.494	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	0.496	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.497	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	0.498	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	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.499	0.499