Q.P. Code: 00000673

[Time:2.30 Hrs]	**[Marks:75]**
Please check whether you have got the right question paper.	
N.B:	1. All question are compulsory. 2. Figures to the right indicate full marks. 3. Students answering in the regional language should refer in case of doubt to the main text of the paper in English.

Q.1		Attempt **any three** of the following:	15

a. To travel 500 kms if 50 litres of petrol is required. How much petrol is needed to go to a place which is 200 kms away?

b. 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?

c. Suppose that you have the task of measuring the lengths of a bridge and a rivet and come up with 9999 and 9 cm, respectively. If the true values are 10,000 and 10 cm, respectively, compute (a) the true error and (b) the true percent relative error for each case.

d. Round-off the numbers 865250 and 37.46235 to four significant figures and compute ea, er, ep in each case.

e. The Taylor series for e^x at point x= 0 is given by
$e^x = 1 + x + x^2/\mathbf{2!} + x^3/\mathbf{3!} + x^4/\mathbf{4!} + x^5/\mathbf{5!} + ...$
a) What is the truncation (true) error in the representation of e^1 if only four terms of the series are used?
b) Use the remainder theorem to find the bounds of the truncation error.

f. Derive the Maclaurin series of $\sin(x) = x - x^3/\mathbf{3!} + x^5/\mathbf{5!} - x^7/\mathbf{7!} + ...$

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Q.2 Attempt **any three** of the following: 15

a. Find the smallest positive root of $f(x) = x^3 - 5x + 1 = 0$ by performing three iterations of Bisection Method.

b. Perform four iterations of Regula Falsi method for $f(x) = x^3 - 5x + 1$ such that the root lies in the interval (0,1).

c. Using Secant Method, find the root of $f(x) = \cos x - xe^x = 0$ taking the initial approximations as 0 and 1.

d. Construct the divided difference table for the given data and hence find the interpolating polynomial.

x	0.5	1.5	3.0	5.0	6.5	8.0
f(x)	1.625	5.875	31.000	131.000	282.125	521.000

e. Obtain the Newton's forward and backward difference interpolating polynomial for the given data

x	*0.1*	*0.2*	*0.3*	*0.4*	*0.5*
f(x)	*1.40*	*1.56*	*1.76*	*2.00*	*2.28*

f. Find the unique polynomial P(x) such that P(3) = 1P(4)=2, and P(5) = 4 using Lagrange interpolation

Q.3 Attempt **any three** of the following: 15

a. Solve the system
$6x + y + z = 20$
$x + 4y - z = 6$
$x - y + 5z = 7$ using Gauss-Jordan Method.

b. Solve the equation:
$x + 4y - z = 6$
$6x + y + z = 20$
$x - y + 5z = 7$
by using Gauss-Seidel Method

c. Tabulate the following function: $y = x^3 - 10x + 6$ at $x0 = 0.5$, $x_1 = 1$ and $x_2 = 2$. Compute its 1st and 2nd derivatives at x = 1.00 using Lagrange's interpolation method.

d. A solid of revolution is formed by rotating about the x-axis, the area between the x-axis, the lines x = 0 and x = 1 and the curve through the points below:

x	0.00	0.25	0.50	0.75	1.00
x	1.000	0.9896	0.9589	0.9089	0.8415

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Estimate the volume of the solid formed.

e. Find the value of y when x = 0.1, given that y(0) = 1 and $y^0 = x^2 + y$ by using Euler's Method.

f. Using Range-Kutta Method of second order Given; $dy/dx = y - x$, where $y_0 = 2$, Find y(0.1) and y(0.2), correct upto 4 decimal places.

Q.4 Attempt **any three** of the following: 15

a. Explain Types of Correlation and Scatter Diagram

b. Find the Coefficient of correlation for the following data and comment on its value

x	6	13	9	10	6	4
y	2	15	17	13	7	6

c. From the following data fit a regression line where y is dependent variable and x
is independent variable (i.e. y on x)(using the method of least square, also estimate the value of y when x =7.8

x	2	4	6	8	10
y	15	14	8	7	2

d. Obtain a regression plane by using multiple regression to fit the following data

x	0	1	2	3	4
y	13	17	19	21	26
z	1	2	3	4	5

e. A manufacture produce Ball pen and Ink pen each of which must be processed through two machines A and B. Machine A has maximum 220 hours available and machine B has maximum of 280 hours available . Manufacturing a Ink pen requires 6 hours on machine A and 3 hours on machine B. Manufacturing a Ball pen requires 4 hours on machine A and 10 hours on machine B. If the profit are Rs. 55 for Ink pen and Rs. 75 for Ball pen. Formulate the LPP to have maximum profit.

f. Solve the following linear programming by graphical method.
Maximize Z= 5x + 6y
Subject to 2x + 4y <= 16
3x + y <= 12
3x + 3y =24 x >= 0 y>=0

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Q.5		Attempt **any three** of the following:	15

a. A random variable is number of tails when a coin is flipped thrice. Find probability distribution of the random variable.
b. A random variable is a number of tails when a coin is tossed three times. Find p.m.f. and c.d.f of the random variable.
c. Calculate the variance of X, if X denote the number obtained on the face of fair die.
d. 20 wrist watches in a box of 100 are defective. If 10 watches are selected at random, find the probability that (i) 10 are defective (ii) 10 are good (iii) at least one watch is defective (iv)at most 3 are defective.
e. In a company previous record show that on an average 3 workers are absent without leave per shift. Find the probability that in a shift i) Exactly 2 workers are absent ii) More than 4 workers will be absent iii) At most 3 workers will be absent.
f. Students of a class were given an aptitude test. Their marks were found to be normally distributed with mean 60 and standard deviation 5. What percentage of students scored. i) More than 60 marks (ii) Less than 56 marks (iii) Between 45 and 65 marks

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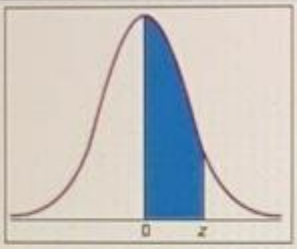

TABLE A Areas of a Standard Normal Distribution (Alternate Version of Appendix I Table 4)

The table entries represent the area under the standard normal curve from 0 to the specified value of z.

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	.0753
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	.3729	.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	.4265	.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	.4960	.4961	.4962	.4963	.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	.4989	.4989	.4990	.4990
3.1	.4990	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993
3.2	.4993	.4993	.4994	.4994	.4994	.4994	.4994	.4995	.4995	.4995
3.3	.4995	.4995	.4995	.4996	.4996	.4996	.4996	.4996	.4996	.4997
3.4	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4998
3.5	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998
3.6	.4998	.4998	.4998	.4999	.4999	.4999	.4999	.4999	.4999	.4999

For values of z greater than or equal to 3.70, use 0.4999 to approximate the shaded area under the standard normal curve.