VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE

[Central Technological Institute, Maharashtra State]

Matunga, Mumbai-400 019

SEMESTER EXAMINATION	*MAY- 2013*	DATE OF EXAM	
SEMESTER & PROGRAM	*SYBTECH*(CIVIL,MECH,PROD,TEXT)	TIME	
TIME ALLOWED	*3 HRS.*	MARKS	*100*
COURSE (Course Code)	*APPLIED MATHS-IV(MA0204)*		

Instructions
1. All questions carry equal marks.
2. Figures to the right indicate full marks.
3.

Q.1 a. In the play of two dice, a person loses if the sum obtained is 2 or 4 or 12. He wins if the sum is 5 or 11.Find the ratio of his probability of losing to the probability of winning in the first throw. 5

b. Find the mean and standard deviation of a normal distribution of the students in an engineering examination ,a student is considered to have failed secured second class,first class and distinction according as he scores less than 45%,between 45% and 60%,between 60%and 75% and above 75% respectively .In a particular year 10% of the students failed in the examination and 5% of the students get distinction. 5

c. Find the constants a,b,c if the directional derivative of $\Phi = ax^2y + by^2z + cz^2x$ at(1,1,1) has maximum magnitude 15 in the direction parallel to $\frac{x-1}{2} = \frac{y-3}{-2} = \frac{z}{1}$ 5

d Using Greens theorem evaluate $\int_c \overline{F}\, dr$ where $\overline{F} = -xy(xi - yj)$ and C is $r = a(1 + cos\theta)$. 5

Q.2 a. There are three similar coins, one of which is ideal and other two are biased. The chances of head are respectively $\frac{1}{3}$ and $\frac{2}{3}$ .A coin is selected at random and tossed twice. If head occurs both times. Find the probability that the ideal coin was selected. 6

b. A fluid motion is given by $\overline{v} = (ysinz - sinx)i + (xsinz + 2yz)j + (xycosz + y^2)k$ is the motion irrotational? If so find the velocity potential. 6

c (i). The following data represent the marks obtained by 12 students in 2tests one held before coaching and the other after coaching. 5

Test-1	55	60	65	75	49	25	18	30	35	51	61	72
Test-2	63	70	70	81	54	29	21	38	32	50	70	80

Do the data indicate that the coaching was effective in improving the performance of the students? 3

(ii) Define the term

(a)Degree of freedom

(b)Type-1 and Type-II error

(c)Null and Alternative hypothesis

Q.3 a. A car hire firm has two cars which it hires out day by day. The number of demands for a car on each day is distributed as Poisson variate with mean 1.5. calculate the proportion of days on which(i)neither car is used (i)some demand is refused 6

b. The equation of two regression lines are $6y = 5x + 90$ *and* $15x = 8y + 130$ .Find (i)mean of x and y(ii) correlation coefficient r (iii)σ_y^2 if$\sigma_x^2 = 16$ 6

c (i)The mean of two samples of sizes 1000 and 2000 respectively are 67.5 and 68 inches. Can the samples be regarded as drawn from the same population of standard deviation 2.5 inches at 0.27% level of significance? 5

(ii) Let X be a continuous random variable with p. d. f $f(x) = kx(1-x)$, $0 \leq x \leq 1$. Find k and determine a number b such that $P(x \leq b) = P(x \geq b)$ 3

OR

From the following data calculate Karlpearson's coefficient of correlation and Spearman's rank correlation coefficient. 8

x	36	56	20	42	33	44	50	15	60
y	50	35	70	58	75	60	45	80	38

Q4 a Find the mean, variance and moment generating function of Poisson distribution. 6

b The specification for a certain quality characteristic are 15 ± 6 (in coded values) 15 samples of size 4 reading each gave the following values for Mean and Range 6

Sample no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Mean	16.1	15.2	14.2	13.9	15.4	15.7	15.2	15	16.5	14.9	15.3	17.8	15.9	14.6	15.2
range	3	2.1	5.6	2.4	4.1	2.7	2.3	3.8	5	2.9	13.8	14.2	4.8	5	2.2

Compute the control limits for mean and range charts using the above data for the sample and comment on the state of control.

c Verify Divergence theorem $for\ \overline{F} = 2xi + xyj + zk$ over the region bounded by the cylinder $x^2 + y^2 = 4, z = 0, z = 6$. 8

OR

Fit a parabola to the following data by least square method

X	1	2	3	4	5	6	7	8	9
Y	2	6	7	8	10	11	11	10	9

Q5 a 1000 students at college level were graded according to their I.Q and the economic condition of their homes.. Use $X^2 - test$ to find out whether there is any association between economics condition at home and I.Q (given for v=1 $X^2 table\ value\ at\ 5\%\ los\ is\ 3.84$) 6

Economic conditions	High	Low	Total
Rich	460	140	600
Poor	240	160	400
Total	700	300	1000

b Apply stokes theorem to evaluate $\int_c (3ydx + 4zdy + 6ydz)$ where c is the curve of intersection of the sphere $x^2+y^2 + z^2 = 8z$ and $z = x + 4$ 6

c A standardized mathematics test was given to second year engineering students in five engineering college of Thane Districts. The mean score for each college and district follows 8

District1	District2	District3
59	58	55
68	63	79
77	72	52
70	55	77
79	**80**	**66**