BITS, PILANI – DUBAI CAMPUS
DUBAI INTERNATIONAL ACADEMIC CITY
II SEMESTER 2012-13

COMPREHENSIVE EXAMINATION (CB)

Course: Probability & Statistics **Course No. MATH F113**

Total Marks: 120 **Weightage: 40%** **Date: 03-6-2013** **Time: 12:30pm to 3:30pm**

Instruction:

1. *Write answers of **Part A, Part B** and **Part C** in **separate** answer books.*
2. *Necessary table values are given, so statistical table is not required.*
3. *Non-programmable calculator is allowed.*
4. *Attempt all the questions.*

Table Values (in standard notation): $Z_{0.01} = 2.33$, $Z_{0.025} = 1.96$, $t_{24,0.025} = 2.064$,

$P(Z \leq -1.91) = 0.0281, P(Z \leq -2.39) = 0.0084, P(Z \leq -0.82) = 0.2061, P(Z \leq -1.64) = 0.0505.$

PART – A

1. One factory has four production lines to produce bicycles. Of the total production, line 1 produces 10%, line 2 produces 20%, line 3 produces 30% and line 4 produces 40%. The rates for defective products for these four production lines are 5%, 4%, 3%, and 2% respectively. If a bicycle is found defective, what is the probability that it comes from production line 4? Calculate the probability that a randomly selected bicycle is produced by production line 2 and is defective. [7]

2. An engineer wishes to investigate the recovery of heat normally lost to the environment in the form of exhaust gases from furnaces. The study yielded the following data:

x	1.2	1.5	2.3	2.5	3.4	3.5	4.2	4.5
y	0.740	0.745	0.718	0.678	0.652	0.627	0.607	0.507

Estimate the linear regression $y = b_0 + b_1 x$. [10]

3. The U.S. Department of Agriculture reports that the mean cost of raising a child from birth to age 2 in a rural area is \$8390. It is claimed that the report is incorrect. To test this

claim, a sample of 25 children of age 2 showed the mean as \$8275 and standard deviation \$1540. Test the suitable hypothesis at $\alpha = 0.05$ level. [8]

4. The probability that a shooter can hit a target is same for each attempt. The average number of attempts require to hit the target first time is 1.25. What is the probability that the shooter can hit the target first time in 4th attempt? [5]

5. The joint density function of X and Y are given as follows:

X \ Y	0	1	2	3
0	0.08	0.12	0	0.05
1	0.09	0.05	0.15	0.2
2	0.01	0.07	0.05	0.02
3	0.03	0.02	0.04	0.02

(a) Find $P(1 \leq X + Y < 8)$. [3]

(b) Find $Cov(X,Y)$. [7]

PART – B

6. Following are the data for air velocity (x) and the evaporation coefficient (y) of burning fuel droplets in an impulse engine. Calculate the correlation coefficient (r) between x and y: [10]

x (cm/sec)	20	60	100	140	180	220	260	300	340	380
y (mm^2/sec)	0.182	0.375	0.358	0.786	0.568	0.754	1.182	1.365	1.172	1.656

7. Twenty firms are under suspicion for violation of pollution norms, but all cannot be inspected. Only 5 firms will be inspected. Suppose that 3 of these 20 firms are in violation.
   a) Find the probability that inspection will find no violation.
   b) Find the probability that inspection will find at least two violations.
   c) Find the variance of the number of violations in the inspected firms. [8]

8. A process of manufacturing an electronic component produces 1% defective items. A quality control plan is to select 150 items from the process and if none is defective, the process will continue. Use **normal approximation** to find the probability that the process will continue
   a) for the sample plan as described;
   b) even if the process has gone bad to produce 3% defective items. [8]

9. According to Thomson Financial, through January 25, 2006, the majority of companies reporting profits had beaten the estimate (*Business Week, Feb 6 2006).* A sample of 162 companies showed 104 beat estimates, 29 match estimates and 29 fell short.
   a) Find a point estimate of the proportion of companies that fell short of estimates.
   b) Find a 95% confidence interval of the proportion of companies that beat estimates.
   c) Suppose you want to find a 95% confidence interval on the proportion of companies that match estimates to within 0.05 unit. What should be the minimum sample size?

[10]

10. Two cards are randomly drawn from a well-shuffled pack of 52 playing cards. Cards are drawn one by one without replacement. What is the probability that the first is an 'ACE' and the second is a 'JACK'? [4]

PART – C

11. A corporation operates two foundries that are similar in size and that are engaged in the same production operations. An experimental safety program has been implemented at one location. Before expanding the program, the management wants to compare the proportion of workers injured during the trial period at the experimental site to that of its other plant. It is thought that the program is cost effective if these proportions differ by more than 0.05. When the trial period ends, it is found that 24 of 263 workers at the

control plant were injured, whereas only 5 of the 250 workers at the experimental site received injuries.

(a) Specify the null & alternative hypothesis.

(b) Calculate a suitable test statistic.

(c) Interpret the result at 1% level of significance. [10]

12. Consider the random variable X with the density.

$$f(x) = \left(\frac{1}{16}x\right), \qquad 2 \le x \le 6$$

a) Verify that $f(x)$ defines a probability density function.

b) Find the cumulative distribution function $F(x)$.

c) Find $P(1 < X < 2)$. [10]

13. As heat is added to a material its temperature rises. The heat capacity is a quantitative statement of the increase in temperature for a specified addition of heat. The data were obtained on X, the measured heat capacity of liquid ethylene glycol at constant pressure and 80^0C and its mean was observed as 0.643 for a sample of 25 observations. Past experience indicates that $\sigma = 0.01$. Find 95% confidence interval on μ. [10]

14. Assume that each time a metal detector at an airport signals, there is a 25% chance that the cause is change in the passenger's pocket. During a given hour, 15 passengers are stopped because of a signal from the metal detector.

a) Find the probability that at least 3 persons will have been stopped due to change in their pockets.

b) If 15 passengers are stopped by the detector, would it be unusual for none of these to have been stopped due to change in the pocket? Explain based on the probability of this occurring. [10]

BITS, PILANI - DUBAI CAMPUS

II Semester 12 - 13

COMPREHENSIVE EXAM

PROBABILITY & STATISTICS (MATH F113)

3.6.13

PART A: ANSWER KEY

1. $P(D) = 0.1 \times 0.05 + 0.2 \times 0.04 + 0.3 \times 0.03 + 0.4 \times 0.02$

$= 0.03$

$P(L4 \mid D) = \dfrac{P(L4 \cap D)}{P(D)} = \dfrac{0.4 \times 0.02}{0.03} = 0.2667$ — (5)

$P(L2 \cap D) = 0.2 \times 0.04 = 0.008$ — (2)

2. $\Sigma X = 23.1, \quad \Sigma Y = 5.274, \quad \Sigma XY = 14.5941, \Sigma X^2 = 76.93$

$n = 8.$ — (5)

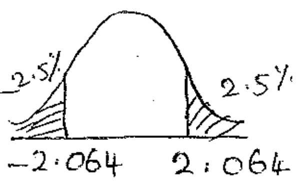
$b_1 = \dfrac{n \Sigma XY - \Sigma X \cdot \Sigma Y}{n \Sigma X^2 - (\Sigma X)^2} = -0.0620$ — (2)

$b_0 = \dfrac{\Sigma Y}{n} - b_1 \dfrac{\Sigma X}{n} = 0.4802$ — (2)

$\hat{y} = 0.4802 - 0.0620\, x.$ — (1)

3. $H_0 : \mu = 8390$
$H_1 : \mu \neq 8390$ (Two-tailed)] (2 M)

$n = 25, \quad \bar{X} = 8275, \quad S = 1540$

(2M) 

$t = \dfrac{\bar{X} - \mu}{S/\sqrt{n}} = -0.3734$ — (3m)

Accept Ho at 5% l.o.s — (1M)

4. $E(X) = 1.25 = \frac{1}{p} \Rightarrow p = 0.8, \; q = 0.2$ — (1M)

$P(X=4) = q^3 \times p = 0.2^3 \times 0.8 = 0.0064$ — (4M)

5. a) $P(1 \leq X+Y < 8) = 0.92$ — (3M)

b) $\text{cov}(X,Y) = E(XY) - E(X) \cdot E(Y)$

$E(XY) = 1.89$ (2M)

$E(X) = 1.12$ (2M)

$E(Y) = 1.61$ (2M)

$\therefore \text{cov}(X,Y) = 0.0868$ (1M)

PART-B

6

$$\left.\begin{aligned} n &= 10 \\ \Sigma x &= 2000 \\ \Sigma y &= 8.398 \\ \Sigma x^2 &= 532000 \\ \Sigma y^2 &= 9.1871 \\ \Sigma xy &= 2184.68 \end{aligned}\right\} \text{—— [6]}$$

$$\therefore \ r = \frac{n\Sigma xy - \Sigma x . \Sigma y}{\sqrt{\{n\Sigma x^2 - (\Sigma x)^2\}\{n\Sigma y^2 - (\Sigma y)^2\}}} \quad \text{—— [2]}$$

$$= 0.9515 \quad \text{—— [2]}$$

7

Let X be the number of firms under violation in the inspected 5. Then X has hypergeometric distribution with $N = 20, n = 5, r = 3$.

$\therefore$ Density of X is

$$f(x) = \frac{\binom{3}{x}\binom{17}{5-x}}{\binom{20}{5}}, \quad x = 0, 1, 2, 3.$$

$\therefore$ P(process will continue for this sample plan)

$= P(X=0)$

$\simeq P(-0.5 < Y < 0.5)$

$= P(Z \leq -0.82) - P(Z \leq -1.64)$ — [2]

$= 0.2061 - 0.0505$

$= 0.1556.$ — [1]

(b) Here $p = 0.03$

$\therefore \mu = np = 4.5$

and $\sigma = \sqrt{np(1-p)} = 2.0893$

$\therefore$ P(process will continue)

$= P(X=0)$

$\simeq P(-0.5 < Y < 0.5)$

$= P(Z \leq -1.91) - P(Z \leq -2.39)$ — [2]

$= 0.0281 - 0.0084$

$= 0.0197.$ — [1]

9. Let p_1 be the proportion of companies that beat the estimates, p_2 be proportion that match and p_3 be proportion that fell short.

a) A point estimate of p_3 is

$$\hat{p}_3 = \frac{29}{162} = 0.179. \qquad \text{—— [2]}$$

b) To find 95% CI on p_1.

$1-\alpha = 0.95 \Rightarrow \alpha/2 = 0.025. \quad \hat{p}_1 = 0.642.$ —— [2]

∴ 95% CI on p_1 is

$$\left[\hat{p}_1 - Z_{0.025}\sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n}},\ \hat{p}_1 + Z_{0.025}\sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n}}\right]$$

$$= [0.0568, 0.716] \qquad \text{—— [2]}$$

c) We need to find minimum sample size required to get 95% CI on p_2 to within 0.05 units

Here $d = 0.05$, $Z_{0.025} = 1.96$, $\hat{p}_3 = \frac{29}{162} = 0.179$ —— [2]

$$\therefore\ n \geq \frac{Z_{0.025}^2\,\hat{p}_2(1-\hat{p}_2)}{d^2} = 225.8 \approx 226$$

∴ Minimum sample size is 226. —— [2]

10 $P(A) = \frac{4}{52}$

$P(J/A) = \frac{4}{51}$

$\therefore P(A \cap J) = P(A)\,P(J/A)$

$= \frac{4}{52} \times \frac{4}{51} = \frac{16}{2652}$

$= 0.006$

P.T.O.

8 9

12 $f(x) = \frac{1}{16}x \; ; \quad 2 \le x \le 6$

a) $\int_2^6 \frac{1}{16} x \, dx = \frac{1}{16}\left[\frac{x^2}{2}\right]_2^6$

$= \frac{1}{16}\left[\frac{32}{2}\right] = 1.$

$\Rightarrow f$ is a pdf.

b) $F(x) = \frac{1}{16}\int_0^x t \, dt.$

$= \frac{1}{16}\left(\frac{t^2}{2}\right)_0^x \Rightarrow \frac{x^2}{32}$

$\therefore F(x) = \begin{cases} 0 & , \quad x < 2 \\ \frac{x^2}{32} & , \quad 2 \le x \le 6 \\ 1 & , \quad x > 6. \end{cases}$

c) $P(\cancel{2}\ 1 < x < 2) = 0.$

[10]

BITS, PILANI – DUBAI CAMPUS

I YEAR – II SEMESTER 2012-2013

TEST – II (OB)

COURSE: Probability and Statistics **COURSE NO.:** MATH F113

Max. Marks: 60 Weightage: 20% Date: 02-5-2013 Duration: 8:25 am to 9:15 am

Attempt all the questions.

1. In a studio, the developing time of each photo may be looked upon as a random variable having normal distribution with mean 16.28 seconds and variance 0.12 second.
   a) Find the probability that the developing time for a given photo will be anywhere from 16.25 seconds to 16.80 seconds.
   b) What time has the property that 69.5% of the photos will exceed this time?
   c) What percentage of photos will take at most 16.25 seconds for developing? [10]

2. The density function of a gamma distribution is:

$$f(x)=\begin{cases} \dfrac{x\, e^{-x/\beta}}{9}, & x>0 \\ 0, & otherwise \end{cases}$$

   a) Find the value of β.
   b) Find the mean and variance of this distribution.
   c) Find $P(|X|\le 9)$. [10]

3. Suppose the future lifetimes (in months) of two components of a machine have joint density function

$$f(x,y)=\begin{cases} c\,(x+y-5), & 1\le x<y\le 5 \\ 0, & otherwise \end{cases}$$

   a) Find the value of c that makes this a density.
   b) Find $f_{X/Y=3}$. [20]

4. A process for producing vinyl floor covering has been stabilized for a long period of time and the surface hardness measurement has a normal distribution with mean 4.5 and standard deviation 1.5. A second shift has been hired and trained and their production needs to be monitored. A random sample of hardness measurements is made of 25 vinyl specimens produced by the second shift which gave the mean as 3.9. Consider testing the hypothesis

   H_0: $\mu = 4.5$ versus H_1: $\mu \neq 4.5$.

   (a) Calculate the value of suitable test statistic.

   (b) Specify the critical region. Can H_0 be rejected at 5% level of significance? [10]

5. A random sample from a company's very extensive files shows that orders for a certain piece of machinery were filled in 10, 12, 19, 14, 15, 18, 11 and 13 days. Construct a 99% confidence interval for the variance of the amount of time it takes the company to fill an order for a piece of the given kind of machinery. [10]

BITS, PILANI - DUBAI CAMPUS

TEST-2 (OB)

PROB. & STAT

MARKING SCHEME

Max. Marks: 60 Wt: 20% Date: 02/5/13

(1) X : Developing time of a randomly selected photo (in sec).

$X \to N(16.28, 0.12)$

$\therefore \mu = 16.28, \quad \sigma = \sqrt{0.12} = 0.34641$

a) Reqd. Prob. $= P(16.25 \leq X \leq 16.80)$

$= F(1.50) - F(-0.09)$

$= 0.9332 - 0.4641$

$= 0.4691.$ —— [3]

b) Let this time be 'a' sec.

$\therefore \quad P(X > a) = 0.695$

$\Rightarrow \quad 1 - P(X \leq a) = 0.695$

$\Rightarrow \quad P(X \leq a) = 1 - 0.695$
$= 0.305$ —— [1]

$\Rightarrow F\left(\frac{a - 16.28}{0.34641}\right) = F(-0.51)$

$\Rightarrow \quad \frac{a - 16.28}{0.34641} = -0.51$

$\Rightarrow \quad a = 16.103$ sec. —— [3]

1(c) $P(X \le 16.25)$

$= F\left(\frac{16.25-16.28}{\sqrt{0.12}}\right)$

$= F(-0.09)$

$= 0.4641.$

$\therefore$ Reqd. % is 46.41%. —— [3]

2) Pdf of gamma distribution is

$$f(x) = \begin{cases} \frac{1}{\Gamma\alpha\, \beta^{\alpha}} x^{\alpha-1} e^{-x/\beta}, & x > 0 \\ 0, & \text{otherwise} \end{cases}$$

where $\alpha > 0, \beta > 0.$

a) Comparing the powers of x,

$\alpha - 1 = 1 \Rightarrow \alpha = 2$

$\therefore \frac{1}{\Gamma 2\, \beta^2} = \frac{1}{9}$

$\Rightarrow \beta^2 = 9$

$\Rightarrow \beta = 3.$ —— [3]

b) Mean $= \alpha\beta = 6.$ —— [2]

Variance $= \alpha\beta^2 = 18.$ —— [2]

2(c) $P(|X| \leq 9)$

$= P(-9 \leq X \leq 9)$

$= 0 + P(0 \leq X \leq 9)$

$= \frac{1}{9}\int_0^9 x\, e^{-x/3}\, dx$ —— [1]

$= 1 - 4e^{-3}$ —— [2]

$= 0.80085.$

contd

3. a) $$c\int_{y=1}^{5}\int_{x=1}^{y}(x+y-5)\,dx\,dy = 1$$

$$c\int_{1}^{5}\left(\frac{x^2}{2}+xy-5x\right)_{1}^{y} dy = 1$$

$$c\int_{1}^{5}\left(\frac{3}{2}y^2-6y+\frac{9}{2}\right) dy = 1$$

$$c\left(\frac{y^3}{2}-3y^2+\frac{9y}{2}\right)_{1}^{5} = 1$$

$$c = 1/8.$$ —— [10]

b) $$f_{X|y=3} = \frac{f_{xy}}{f_y(3)}$$

$$f_Y = \int_{x=1}^{y}\frac{1}{8}(x+y-5)\,dx$$

$$= \frac{1}{8}\left(\frac{x^2}{2}+xy-5\right)_{1}^{y}$$

$$= \frac{y}{2}-1, \quad 1 \le y \le 5$$ —— [6]

$$f_y(3) = \frac{1}{2}$$

$$\therefore f_{X|y=3} = \frac{x-2}{4}, \quad 1 \le x \le 3$$ [4]

(4) $H_0: \mu = 4.5$

$H_1: \mu \neq 4.5$

$\sigma = 1.5, \quad n = 25, \quad \bar{x} = 3.9.$

a) $$Z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}}$$

$$= \frac{3.9 - 4.5}{1.5/5} = -2. \quad \text{— [4]}$$

b) $\alpha = 0.05$

Critical Region : $\{ |Z| \geq Z_{\alpha/2} \}$

$\{ 2 \geq 1.96 \}$ — [4]

Reject H_0. — [2]

(5) $$\bar{x} = \frac{112}{8} = 14 \quad \text{— [2]}$$

$$s^2 = \frac{1}{(n-1)} \left[\sum_i x_i^2 - \frac{(\sum x_i)^2}{n} \right]$$

$$= \frac{1}{7} \left[1640 - 1568 \right]$$

$$= 10.2857 \quad \text{— [2]}$$

$s = 3.2071$

$$\frac{(n-1)s^2}{\chi^2_{n-1;\,\alpha/2}} \le \sigma^2 \le \frac{(n-1)s^2}{\chi^2_{n-1;\,1-\alpha/2}}$$ (6)

$\alpha = 0.01$

$\alpha/2 = 0.005$

$$\frac{7(10.2857)}{20.3} \le \sigma^2 \le \frac{7(10.2857)}{0.989}$$

$$3.5468 \le \sigma^2 \le 72.8007$$ [6]

BITS, PILANI – DUBAI CAMPUS

I YEAR – II SEMESTER

2012-2013

TEST– I(CB)

COURSE: Probability & Statistics **COURSE NO.:** MATH F113

Max. Marks: 75 Weightage: 25% Date: 14-3-2013 Time: 8:25 am to 9:15 am

Attempt all the questions.

1. In a certain city, the proportion of highway sections requiring major repairs in a given year is a random variable X whose probability density function is defined by

$$f(x) = \begin{cases} kx^2(1-x) & for\ 0 < x < 1 \\ 0 & otherwise \end{cases}$$

   a) Find the value of k.
   b) Find $E(X)$ and Var(X).
   c) Find $P(0.2 \le X \le 0.6)$ and $P(0.5 \le X \le 1.2)$.
   d) Find cumulative distribution function $F(x)$. [25]

2. It has been found that 80% of all printers used on home computers operate correctly at the time of installation. The rest require some adjustment. A particular dealer sells 10 units during a given month.
   a) Find the probability that at least 9 of the printers operate correctly upon installation.
   b) Consider 3 months in which 10 units are sold per month. What is the probability that at least 9 units operate correctly in each of the 3 months? [15]

3. A carton of 14 rechargeable batteries contains 3 that are defective. In how many ways can an inspector choose 3 of the batteries such that
   a) none of them is defective;
   b) at most one is defective. [10]

4. Three different machines are used to produce a particular manufactured item. The machines A, B and C produce 20%, 30% and 50% of the items respectively. The machines A, B and C produce defective items at a rate of 1%, 2% and 3% respectively. Suppose that we pick an item from the final batch at random. What is the probability that

the item is found to be defective? What is the probability that this defective item was produced by machine B? [15]

5. (a) Let us split a class of 20 children into 3 groups, such that the first group has 6 members, the second group has 12 members and the third group has 2 members. In how many ways can this be done? [5]

(b) A car rental agency has 20 compact cars and 15 intermediate size cars. If five of the cars are randomly selected for a safety check, what is the probability of getting three of compact cars? [5]

BITS PILANI – DUBAI CAMPUS

Marking Scheme

COURSE: PROB&STAT Test-1 (CB) DATE: 14-3-13

Max Marks: 75 Weightage: 25%

---

(1) $f(x) = \begin{cases} Kx^2(1-x) & \text{for } 0<x<1 \\ 0 & \text{otherwise} \end{cases}$

a) $f(x) \geq 0 \Rightarrow K \geq 0$ in $0<x<1$

$$\int_0^1 f(x)\,dx = 1$$

$$\Rightarrow K\int_0^1 (x^2-x^3)\,dx = 1$$

$$\Rightarrow K\left[\frac{x^3}{3}-\frac{x^4}{4}\right]_0^1 = 1$$

$$\Rightarrow K = 12.$$ —— [4]

b) $E(X) = \int_0^1 x f(x)\,dx$

$$= 12\int_0^1 (x^3-x^4)\,dx$$

$$= 12\left[\frac{x^4}{4}-\frac{x^5}{5}\right]_0^1$$

$$= 0.6.$$ —— [4]

contd.

$$\mathrm{Var}(X) = E(X^2) - \{E(X)\}^2$$

$$= 12\int_0^1 x^2 f(x)\,dx - 0.6^2$$

$$= 12\int_0^1 (x^4 - x^5)\,dx - 0.36$$

$$= 12\left[\frac{x^5}{5} - \frac{x^6}{6}\right]_0^1 - 0.36$$

$$= \underline{\underline{0.04}}. \qquad \text{———— [4]}$$

e) $P(0.2 \le X \le 0.6)$

$$= \int_{0.2}^{0.6} f(x)\,dx$$

$$= 12\int_{0.2}^{0.6} (x^2 - x^3)\,dx$$

$$= 12\left[\frac{x^3}{3} - \frac{x^4}{4}\right]_{0.2}^{0.6}$$

$$= \underline{\underline{0.448}}. \qquad \text{———— [4]}$$

$P(0.5 \le X \le 1.2)$

$$= \int_{0.5}^{1} f(x)\,dx$$

$$= 12\int_{0.5}^{1} (x^2 - x^3)\,dx$$

$$= \underline{\underline{0.6875}}. \qquad \text{———— [4]}$$

d) $$F(x) = \begin{cases} 0, & x \leq 0 \\ 12\int_0^x (x^2 - x^3)\,dx, & 0 < x < 1 \\ 1, & x \geq 1 \end{cases}$$

$$= \begin{cases} 0, & x \leq 0 & \text{——— [1]} \\ 4x^3 - 3x^4, & 0 < x < 1 & \text{——— [3]} \\ 1, & x \geq 1 & \text{——— [1]} \end{cases}$$

Contd. on next page

4

(2) $p = 0.8$, $n = 10$.

a) $P(x \geq 9) = P(x=9) + P(x=10)$

$= {}^{10}C_9 (0.8)^9 (0.2)^1 + {}^{10}C_{10} (0.8)^{10}$

$= 0.3758$

[15]

b) $(0.3758)^3 = 0.5170$

(3) $N = 14$ ———— $n = 3$

$r = 3$ $\quad (N-r) = 11$ $\quad\quad x \quad 3-x$

a) $P(x=0) = \dfrac{{}^{3}C_0 \, {}^{11}C_3}{{}^{14}C_3} = \dfrac{165}{364} = 0.4533$

b) $P(x \leq 1) = P(x=0) + P(x=1)$

$= 0.4533 + 0.4533$

$= 0.9066$. [10]

5

Q4: $P(D) = P(D|A) \times P(A) + P(D|B) \times P(B) + P(D|C) \times P(C)$

$= 0.2 \times 0.01 + 0.3 \times 0.02 + 0.5 \times 0.03$

$= 0.023$ —— (7)

$$P(B|D) = \frac{P(B) \times P(D|B)}{P(D)}$$

$$= \frac{0.3 \times 0.02}{0.023} = 0.2609$$ —— (8)

Q5 a) $\frac{20!}{6!\,12!\,2!} = 3527160$ —— (5)

b) $\frac{20C_3 \times 15C_2}{35C_5} = 0.3687$ —— (5)

B

BITS, PILANI – DUBAI CAMPUS

II SEMESTER, 2012-13

QUIZ – II(CB)

COURSE: Probability & Statistics **COURSE NO.:** MATH F113

Max. Marks: 21 Weightage: 7% Date: 17- 4 -2013 Duration: 3:00 pm to 3:20 pm

NAME: **ID. NO.:** **SEC:**

Attempt all the questions. No marks will be awarded for overwriting and multiple answers. Do not use pencil. Each question carries 3 marks. No extra sheet will be given for rough works. Non-programmable Calculator is permitted.

Fill in the blanks with correct answers:

1. If the joint density of X and Y is $f(x,y) = c\left(\frac{1}{2x} + \frac{1}{2y}\right)$ where $1 \leq x \leq e,\ 1 \leq y \leq e,$ then the value of $c =$ ________________ .

2. Following table defines the joint distribution of X and Y :

X \ Y	1	3	5
2	0.2	0.1	0.3
6	0.05	0.15	0.2

For this distribution, $E(XY) =$ __________, $cov(X,Y) =$ __________ .

3. If X has exponential distribution with mean 6.5, $P(X \geq 3) =$ _________ .

4. If the random variable X has uniform distribution defined on the interval $[-6,14]$, then $E(X) =$ ________ and standard deviation of $X =$ ___________ .

5. For a standard normal variate Z, if $P(|Z| > a) = 0.242,$ then $P(0 \leq Z \leq a) =$ _________ .

6. If the random number 0.65 is used, then the simulated value of an exponential distribution with parameter $\beta = 4$ is ___________ .

7. If the mean and standard deviation of a random variable X are 0 and 2 respectively, then by Chebyshev's inequality the upper bound of $P\left(|X| \geq 8\right)$ is ___________ .

B

BITS, PILANI – DUBAI CAMPUS

II SEMESTER, 2012-13

QUIZ – II(CB)

COURSE: Probability & Statistics **COURSE NO.:** MATH F113

Max. Marks: 21 Weightage: 7% Date: 17- 4 -2013 Duration: 3:00 pm to 3:20 pm

NAME: **ID. NO.:** **SEC:**

Attempt all the questions. No marks will be awarded for overwriting and multiple answers. Do not use pencil. Each question carries 3 marks. No extra sheet will be given for rough works. Non-programmable Calculator is permitted.

Fill in the blanks with correct answers:

1. If the joint density of X and Y is $f(x,y) = c\left(\frac{2}{x}+\frac{2}{y}\right)$ where $1 \le x \le e,\ 1 \le y \le e$, then the value of $c =$ ________________ .

2. Following table defines the joint distribution of X and Y :

X \ Y	1	2	4
2	0.2	0.1	0.3
6	0.05	0.15	0.2

For this distribution, $E(XY) =$ __________, $cov(X,Y) =$ __________ .

3. If X has exponential distribution with mean 4.5, $P(X \ge 3) =$ __________ .

4. If the random variable X has uniform distribution defined on the interval $[-2,14]$, then $E(X) =$ ________ and standard deviation of $X =$ ___________ .

5. For a standard normal variate Z, if $P(|Z| > a) = 0.842$, then $P(0 \le Z \le a) =$ __________ .

6. If the random number 0.45 is used, then the simulated value of an exponential distribution with parameter $\beta = 4$ is ___________ .

7. If the mean and standard deviation of a random variable X are 0 and 2 respectively, then by Chebyshev's inequality the upper bound of $P\left(|X| \ge 6\right)$ is ___________ .

A

BITS, PILANI – DUBAI CAMPUS

II SEMESTER, 2012-13

QUIZ – II(CB)

COURSE: Probability & Statistics **COURSE NO.:** MATH F113

Max. Marks: 21 Weightage: 7% Date: 17- 4 -2013 Duration: 3:00 pm to 3:20 pm

NAME: **ID. NO.:** **SEC:**

Attempt all the questions. No marks will be awarded for overwriting and multiple answers. Do not use pencil. Each question carries 3 marks. No extra sheet will be given for rough works. Non-programmable Calculator is permitted.

Fill in the blanks with correct answers:

1. If the joint density of X and Y is $f(x,y) = c\left(\frac{1}{3x} + \frac{1}{3y}\right)$ where $1 \le x \le e,\ 1 \le y \le e$, then the value of $c =$ ________________ .

2. Following table defines the joint distribution of X and Y :

X \ Y	2	3	5
2	0.2	0.1	0.3
3	0.05	0.15	0.2

For this distribution, $E(XY) =$ __________, $cov(X,Y) =$ __________ .

3. If X has exponential distribution with mean 8.5, $P(X \ge 3) =$ _________ .

4. If the random variable X has uniform distribution defined on the interval $[-8,14]$, then $E(X) =$ ________ and standard deviation of $X =$ ___________ .

5. For a standard normal variate Z, if $P(|Z| > a) = 0.555$, then $P(0 \le Z \le a) =$ _________ .

6. If the random number 0.86 is used, then the simulated value of an exponential distribution with parameter $\beta = 4$ is ___________ .

7. If the mean and standard deviation of a random variable X are 0 and 2 respectively, then by Chebyshev's inequality the upper bound of $P\left(|X| \ge 10\right)$ is ___________ .

A

BITS, PILANI – DUBAI CAMPUS

II SEMESTER, 2012-13

QUIZ – II(CB)

COURSE: Probability & Statistics **COURSE NO.:** MATH F113

Max. Marks: 21 Weightage: 7% Date: 17- 4 -2013 Duration: 3:00 pm to 3:20 pm

NAME: **ID. NO.:** **SEC:**

Attempt all the questions. No marks will be awarded for overwriting and multiple answers. Do not use pencil. Each question carries 3 marks. No extra sheet will be given for rough works. Non-programmable Calculator is permitted.

Fill in the blanks with correct answers:

1. If the joint density of X and Y is $f(x,y) = c\left(\frac{1}{x}+\frac{1}{y}\right)$ where $1 \le x \le e,\ 1 \le y \le e$, then the value of $c =$ ________________ .

2. Following table defines the joint distribution of X and Y:

X \ Y	1	2	4
2	0.2	0.1	0.3
3	0.05	0.15	0.2

For this distribution, $E(XY) =$ __________, $cov(X,Y) =$ __________ .

3. If X has exponential distribution with mean 2.5, $P(X \ge 3) =$ __________ .

4. If the random variable X has uniform distribution defined on the interval $[-2,10]$, then $E(X) =$ ________ and standard deviation of $X =$ ___________ .

5. For a standard normal variate Z, if $P(|Z| > a) = 0.542$, then $P(0 \le Z \le a) =$ __________ .

6. If the random number 0.45 is used, then the simulated value of an exponential distribution with parameter $\beta = 2$ is ____________ .

7. If the mean and standard deviation of a random variable X are 0 and 2 respectively, then by Chebyshev's inequality the upper bound of $P(|X| \ge 4)$ is ____________ .

A

BITS, PILANI – DUBAI CAMPUS

II SEMESTER, 2012-13

KEY

QUIZ – II(CB)

COURSE: Probability & Statistics **COURSE NO.:** MATH F113

Max. Marks: 21 Weightage: 7% Date: 17- 4 -2013 Duration: 3:00 pm to 3:20 pm

NAME: ______ **ID. NO.:** ______ **SEC:** ______

Attempt all the questions. No marks will be awarded for overwriting and multiple answers. Do not use pencil. Each question carries 3 marks. No extra sheet will be given for rough works. Non-programmable Calculator is permitted.

Fill in the blanks with correct answers:

1. If the joint density of X and Y is $f(x,y) = c\left(\frac{1}{3x} + \frac{1}{3y}\right)$ where $1 \le x \le e,\ 1 \le y \le e$, then the value of c = $\frac{3}{2(e-1)}$.
2. Following table defines the joint distribution of X and Y:

X \ Y	2	3	5
2	0.2	0.1	0.3
3	0.05	0.15	0.2

For this distribution, $E(XY) =$ 9.05, $cov(X,Y) =$ 0.05.

3. If X has exponential distribution with mean 8.5, $P(X \ge 3) =$ $e^{-6/17}$ $(= 0.7026)$
4. If the random variable X has uniform distribution defined on the interval $[-8,14]$, then $E(X) =$ 3 and standard deviation of $X =$ 6.3508
5. For a standard normal variate Z, if $P(|Z| > a) = 0.555$, then $P(0 \le Z \le a) =$ 0.2225.
6. If the random number 0.86 is used, then the simulated value of an exponential distribution with parameter $\beta = 4$ is 7.8644. ('or' 0.60329)
7. If the mean and standard deviation of a random variable X are 0 and 2 respectively, then by Chebyshev's inequality the upper bound of $P\left(|X| \ge 10\right)$ is $1/25$ ~~(= 0.2)~~

A

BITS, PILANI – DUBAI CAMPUS

II SEMESTER, 2012-13

QUIZ – II(CB)

KEY

COURSE: Probability & Statistics **COURSE NO.:** MATH F113

Max. Marks: 21 Weightage: 7% Date: 17- 4 -2013 Duration: 3:00 pm to 3:20 pm

NAME: ______ **ID. NO.:** ______ **SEC:** ______

Attempt all the questions. No marks will be awarded for overwriting and multiple answers. Do not use pencil. Each question carries 3 marks. No extra sheet will be given for rough works. Non-programmable Calculator is permitted.

Fill in the blanks with correct answers:

1. If the joint density of X and Y is $f(x,y) = c\left(\frac{1}{x}+\frac{1}{y}\right)$ where $1 \le x \le e,\ 1 \le y \le e$, then the value of $c =$ $\frac{1}{2(e-1)}$.
2. Following table defines the joint distribution of X and Y:

$X \backslash Y$	1	2	4
2	0.2	0.1	0.3
3	0.05	0.15	0.2

For this distribution, $E(XY) =$ 6.65, $cov(X,Y) =$ 0.05.

3. If X has exponential distribution with mean 2.5, $P(X \ge 3) =$ $e^{-1.2}$ $(= e^{-6/5} = 0.3012)$
4. If the random variable X has uniform distribution defined on the interval $[-2,10]$, then $E(X) =$ 4 and standard deviation of $X =$ 3.4641
5. For a standard normal variate Z, if $P(|Z| > a) = 0.542$, then $P(0 \le Z \le a) =$ 0.229.
6. If the random number 0.45 is used, then the simulated value of an exponential distribution with parameter $\beta = 2$ is 1.1957. (or 1.5970)
7. If the mean and standard deviation of a random variable X are 0 and 2 respectively, then by Chebyshev's inequality the upper bound of $P(|X| \ge 4)$ is $\frac{1}{4}$ (= 0.25)

B

BITS, PILANI – DUBAI CAMPUS

II SEMESTER, 2012-13

QUIZ – II(CB)

KEY

COURSE: Probability & Statistics **COURSE NO.:** MATH F113

Max. Marks: 21 Weightage: 7% Date: 17- 4 -2013 Duration: 3:00 pm to 3:20 pm

NAME: ______ **ID. NO.:** ______ **SEC:** ___

Attempt all the questions. No marks will be awarded for overwriting and multiple answers. Do not use pencil. Each question carries 3 marks. No extra sheet will be given for rough works. Non-programmable Calculator is permitted.

Fill in the blanks with correct answers:

1. If the joint density of X and Y is $f(x,y) = c\left(\frac{1}{2x}+\frac{1}{2y}\right)$ where $1 \le x \le e,\ 1 \le y \le e,$ then the value of c = $1/(e-1)$.
2. Following table defines the joint distribution of X and Y:

X \ Y	1	3	5
2	0.2	0.1	0.3
6	0.05	0.15	0.2

For this distribution, $E(XY)$ = 13, $cov(X,Y)$ = 0.4.

3. If X has exponential distribution with mean 6.5, $P(X \ge 3)$ = $e^{-6/13}$ (= 0.6303)
4. If the random variable X has uniform distribution defined on the interval $[-6,14]$, then $E(X)$ = 4 and standard deviation of X = 5.7735
5. For a standard normal variate Z, if $P(|Z| > a) = 0.242$, then $P(0 \le Z \le a)$ = 0.379.
6. If the random number 0.65 is used, then the simulated value of an exponential distribution with parameter $\beta = 4$ is 4.1993 (or 1.72313)
7. If the mean and standard deviation of a random variable X are 0 and 2 respectively, then by Chebyshev's inequality the upper bound of $P(|X| \ge 8)$ is 1/16 (~~0.0625~~)

B

BITS, PILANI – DUBAI CAMPUS

II SEMESTER, 2012-13

QUIZ – II(CB)

KEY

COURSE: Probability & Statistics **COURSE NO.:** MATH F113

Max. Marks: 21 Weightage: 7% Date: 17- 4 -2013 Duration: 3:00 pm to 3:20 pm

NAME: ______ **ID. NO.:** ______ **SEC:** ______

Attempt all the questions. No marks will be awarded for overwriting and multiple answers. Do not use pencil. Each question carries 3 marks. No extra sheet will be given for rough works. Non-programmable Calculator is permitted.

Fill in the blanks with correct answers:

1. If the joint density of X and Y is $f(x,y) = c\left(\frac{2}{x}+\frac{2}{y}\right)$ where $1 \le x \le e,\ 1 \le y \le e$, then the value of $c = \frac{1}{4(e-1)}$.
2. Following table defines the joint distribution of X and Y:

X \ Y	1	2	4
2	0.2	0.1	0.3
6	0.05	0.15	0.2

For this distribution, $E(XY) =$ 10.1, $cov(X,Y) =$ 0.2.

3. If X has exponential distribution with mean 4.5, $P(X \ge 3) = e^{-2/3} (= 0.5134)$.
4. If the random variable X has uniform distribution defined on the interval $[-2,14]$, then $E(X) =$ 6 and standard deviation of $X =$ 4.6188
5. For a standard normal variate Z, if $P(|Z| > a) = 0.842$, then $P(0 \le Z \le a) =$ 0.079.
6. If the random number 0.45 is used, then the simulated value of an exponential distribution with parameter $\beta = 4$ is 2.3913. (or 3.1940)
7. If the mean and standard deviation of a random variable X are 0 and 2 respectively, then by Chebyshev's inequality the upper bound of $P(|X| \ge 6)$ is 1/9 (= 0.1111)

A

BITS, PILANI – DUBAI CAMPUS

I YEAR – II SEMESTER

2012-2013

QUIZ – I(CB)

COURSE: Probability and Statistics **COURSE NO.:** MATH F113

Max. Marks: 24 Weightage: 8% Date: 06-3-2013 Duration: 3:00 pm to 3:20 pm

NAME: **ID. NO.:** **SEC:**

Attempt all the questions. No marks will be awarded for overwriting and multiple answers. Do not use pencil. Each question carries 3 marks. No extra sheet will be given for rough works. Non-programmable Calculator is permitted.

Fill in the blanks with correct answers:

1. A computer password of length 3 will be formed by using vowels and numerical digits. First entry must be a vowel. There is no restriction on the remaining entries. Total number of such possible password is ________________.
2. Let $P(A) = 0.525$ and $P(A \cap B) = 0.105$. If A and B are independent, then $P(A' \cap B) =$ ________ and $P(A \cup B) =$ ________.
3. If the moment generating function of a random variable is $M_X(t) = e^{2.5(e^t-1)}$, then the mean is ____________.
4. If $P(A/B) = 0.65, P(B) = 0.62$ then $P(A' \cup B') =$ __________.
5. Specify if the sample space is discrete or continuous:
   -Measurements are made to determine the uranium content of a certain ore.____________
6. If a test consists of 6 true-false questions, in how many different ways can a student mark the test paper with one answer to each question? ______________.
7. A certain product was found to have two types of minor defects. The probability that an item of the product has only type 1 defect is 0.4, the probability that it has type 2 error is 0.5, and the probability that it has both defects is 0.2. Then the probability that an item has at least one defect is _________.
8. If the distribution of a random variable X is:

X	-2	1	3
$f(x)$	1/3	1/2	1/6

then $E(2X + 5) =$ ________.

A

BITS, PILANI – DUBAI CAMPUS

I YEAR – II SEMESTER

2012-2013

QUIZ – I(CB)

COURSE: Probability and Statistics **COURSE NO.:** MATH F113

Max. Marks: 24 Weightage: 8% Date: 06-3-2013 Duration: 3:00 pm to 3:20 pm

NAME: **ID. NO.:** **SEC:**

Attempt all the questions. No marks will be awarded for overwriting and multiple answers. Do not use pencil. Each question carries 3 marks. No extra sheet will be given for rough works. Non-programmable Calculator is permitted.

Fill in the blanks with correct answers:

1. A computer password of length 5 will be formed by using vowels and numerical digits. First entry must be a vowel. There is no restriction on the remaining entries. Total number of such possible password is _______________.
2. Let $P(A) = 0.525$ and $P(A \cap B) = 0.1323$. If A and B are independent, then $P(A' \cap B) =$ ________ and $P(A \cup B) =$ ________.
3. If the moment generating function of a random variable is $M_X(t) = e^{4(e^t-1)}$, then the mean is ____________.
4. If $P(A/B) = 0.65, P(B) = 0.41$ then $P(A' \cup B') =$ __________.
5. Specify if the sample space is discrete or continuous:
   -Measurements are made to determine the uranium content of a certain ore.____________
6. If a test consists of 5 true-false questions, in how many different ways can a student mark the test paper with one answer to each question? ______________.
7. A certain product was found to have two types of minor defects. The probability that an item of the product has only type 1 defect is 0.2, the probability that it has type 2 error is 0.5, and the probability that it has both defects is 0.1. Then the probability that an item has atleast one defect is _________.
8. If the distribution of a random variable X is:

X	-2	1	3
$f(x)$	1/3	1/2	1/6

then $E(2X - 5) =$

B

BITS, PILANI – DUBAI CAMPUS

I YEAR – II SEMESTER

2012-2013

QUIZ – I(CB)

COURSE: Probability and Statistics **COURSE NO.:** MATH F113

Max. Marks: 24 Weightage: 8% Date: 06-3-2013 Duration: 3:00 pm to 3:20 pm

NAME: **ID. NO.:** **SEC:**

Attempt all the questions. No marks will be awarded for overwriting and multiple answers. Do not use pencil. Each question carries 3 marks. No extra sheet will be given for rough works. Non-programmable Calculator is permitted.

Fill in the blanks with correct answers:

1. A computer password of length 6 will be formed by using vowels and numerical digits. First entry must be a vowel. There is no restriction on the remaining entries. Total number of such possible password is ________________ .
2. Let $P(A) = 0.525$ and $P(A \cap B) = 0.23625$. If A and B are independent, then $P(A' \cap B) =$ ________ and $P(A \cup B) =$ _________ .
3. If the moment generating function of a random variable is $M_X(t) = e^{3(e^t-1)}$, then the mean is ____________ .
4. If $P(A/B) = 0.85, P(B) = 0.62$ then $P(A' \cup B') =$ __________ .
5. Specify if the sample space is discrete or continuous:
   -Measurements are made to determine the uranium content of a certain ore.____________
6. If a test consists of 7 true-false questions, in how many different ways can a student mark the test paper with one answer to each question? _____________ .
7. A certain product was found to have two types of minor defects. The probability that an item of the product has only type 1 defect is 0.3, the probability that it has type 2 error is 0.5, and the probability that it has both defects is 0.2. Then the probability that an item has at least one defect is _________.
8. If the distribution of a random variable X is:

X	-2	1	3
$f(x)$	1/3	1/2	1/6

then $E(3X + 5) =$ ________ .

B

BITS, PILANI – DUBAI CAMPUS

I YEAR – II SEMESTER

2012-2013

QUIZ – I(CB)

COURSE: Probability and Statistics **COURSE NO.:** MATH F113

Max. Marks: 24 Weightage: 8% Date: 06-3-2013 Duration: 3:00 pm to 3:20 pm

NAME: **ID. NO.:** **SEC:**

Attempt all the questions. No marks will be awarded for overwriting and multiple answers. Do not use pencil. Each question carries 3 marks. No extra sheet will be given for rough works. Non-programmable Calculator is permitted.

Fill in the blanks with correct answers:

1. A computer password of length 4 will be formed by using vowels and numerical digits. First entry must be a vowel. There is no restriction on the remaining entries. Total number of such possible password is ________________.
2. Let $P(A) = 0.825$ and $P(A \cap B) = 0.20625$. If A and B are independent, then $P(A' \cap B) =$ ________ and $P(A \cup B) =$ _________.
3. If the moment generating function of a random variable is $M_X(t) = e^{5(e^t-1)}$, then the mean is ______________.
4. If $P(A/B) = 0.85, P(B) = 0.42$ then $P(A' \cup B') =$ ___________.
5. Specify if the sample space is discrete or continuous:
   -Measurements are made to determine the uranium content of a certain ore.____________
6. If a test consists of 4true-false questions, in how many different ways can a student mark the test paper with one answer to each question? ______________.
7. A certain product was found to have two types of minor defects. The probability that an item of the product has only type 1 defect is 0.4, the probability that it has type 2 error is 0.5, and the probability that it has both defects is 0.4. Then the probability that an item has at least one defect is _________.
8. If the distribution of a random variable X is:

X	-2	1	3
$f(x)$	1/3	1/2	1/6

then $E(3X - 5) =$ _________.

A

KEY

BITS, PILANI – DUBAI CAMPUS

I YEAR – II SEMESTER

2012-2013

QUIZ – I(CB)

COURSE: Probability and Statistics **COURSE NO.:** MATH F113

Max. Marks: 24 Weightage: 8% Date: 06-3-2013 Duration: 3:00 pm to 3:20 pm

NAME: **ID. NO.:** **SEC:**

Attempt all the questions. No marks will be awarded for overwriting and multiple answers. Do not use pencil. Each question carries 3 marks. No extra sheet will be given for rough works. Non-programmable Calculator is permitted.

Fill in the blanks with correct answers:

1. A computer password of length 3 will be formed by using vowels and numerical digits. First entry must be a vowel. There is no restriction on the remaining entries. Total number of such possible password is $5 \times 15^2 = 1125$.
2. Let $P(A) = 0.525$ and $P(A \cap B) = 0.105$. If A and B are independent, then $P(A' \cap B) =$ 0.095 and $P(A \cup B) =$ 0.62 .
3. If the moment generating function of a random variable is $M_X(t) = e^{2.5(e^t - 1)}$, then the mean is 2.5 .
4. If $P(A/B) = 0.65, P(B) = 0.62$ then $P(A' \cup B') =$ 0.597 .
5. Specify if the sample space is discrete or continuous:
   -Measurements are made to determine the uranium content of a certain ore. Continuous
6. If a test consists of 6 true-false questions, in how many different ways can a student mark the test paper with one answer to each question? $2^6 = 64$.
7. A certain product was found to have two types of minor defects. The probability that an item of the product has only type 1 defect is 0.4, the probability that it has type 2 error is 0.5, and the probability that it has both defects is 0.2. Then the probability that an item has at least one defect is 0.9 .
8. If the distribution of a random variable X is:

X	-2	1	3
$f(x)$	1/3	1/2	1/6

then $E(2X + 5) =$ 5.67 $(= 17/3)$

A

KEY

BITS, PILANI – DUBAI CAMPUS

I YEAR – II SEMESTER

2012-2013

QUIZ – I(CB)

COURSE: Probability and Statistics **COURSE NO.:** MATH F113

Max. Marks: 24 Weightage: 8% Date: 06-3-2013 Duration: 3:00 pm to 3:20 pm

NAME: ____________ **ID. NO.:** ____________ **SEC:** ______

Attempt all the questions. No marks will be awarded for overwriting and multiple answers. Do not use pencil. Each question carries 3 marks. No extra sheet will be given for rough works. Non-programmable Calculator is permitted.

Fill in the blanks with correct answers:

1. A computer password of length 5 will be formed by using vowels and numerical digits. First entry must be a vowel. There is no restriction on the remaining entries. Total number of such possible password is 5×15^4.
2. Let $P(A) = 0.525$ and $P(A \cap B) = 0.1323$. If A and B are independent, then $P(A' \cap B) =$ 0.1197 and $P(A \cup B) =$ 0.6447
3. If the moment generating function of a random variable is $M_X(t) = e^{4(e^t-1)}$, then the mean is 4.
4. If $P(A/B) = 0.65, P(B) = 0.41$ then $P(A' \cup B') =$ 0.7335
5. Specify if the sample space is discrete or continuous:
   -Measurements are made to determine the uranium content of a certain ore. continuous
6. If a test consists of 5 true-false questions, in how many different ways can a student mark the test paper with one answer to each question? 2^5.
7. A certain product was found to have two types of minor defects. The probability that an item of the product has only type 1 defect is 0.2, the probability that it has type 2 error is 0.5, and the probability that it has both defects is 0.1. Then the probability that an item has atleast one defect is 0.7.
8. If the distribution of a random variable X is:

X	-2	1	3
$f(x)$	1/3	1/2	1/6

then $E(2X - 5) = -\frac{13}{3}$

B

KEY

BITS, PILANI – DUBAI CAMPUS

I YEAR – II SEMESTER

2012-2013

QUIZ – I(CB)

COURSE: Probability and Statistics **COURSE NO.:** MATH F113

Max. Marks: 24 Weightage: 8% Date: 06-3-2013 Duration: 3:00 pm to 3:20 pm

NAME: ______ **ID. NO.:** ______ **SEC:** ______

Attempt all the questions. No marks will be awarded for overwriting and multiple answers. Do not use pencil. Each question carries 3 marks. No extra sheet will be given for rough works. Non-programmable Calculator is permitted.

Fill in the blanks with correct answers:

1. A computer password of length 6 will be formed by using vowels and numerical digits. First entry must be a vowel. There is no restriction on the remaining entries. Total number of such possible password is 5×15^5.
2. Let $P(A) = 0.525$ and $P(A \cap B) = 0.23625$. If A and B are independent, then $P(A' \cap B) =$ 0.21375 and $P(A \cup B) =$ 0.73875.
3. If the moment generating function of a random variable is $M_X(t) = e^{3(e^t-1)}$, then the mean is 3.
4. If $P(A/B) = 0.85, P(B) = 0.62$ then $P(A' \cup B') =$ 0.473.
5. Specify if the sample space is discrete or continuous:
   -Measurements are made to determine the uranium content of a certain ore. Continuous
6. If a test consists of 7 true-false questions, in how many different ways can a student mark the test paper with one answer to each question? $2^7 = 128$.
7. A certain product was found to have two types of minor defects. The probability that an item of the product has only type 1 defect is 0.3, the probability that it has type 2 error is 0.5, and the probability that it has both defects is 0.2. Then the probability that an item has at least one defect is 0.8.
8. If the distribution of a random variable X is:

X	-2	1	3
$f(x)$	1/3	1/2	1/6

then $E(3X + 5) =$ 6.

B

BITS, PILANI – DUBAI CAMPUS

I YEAR – II SEMESTER

KEY

2012-2013

QUIZ – I(CB)

COURSE: Probability and Statistics **COURSE NO.:** MATH F113

Max. Marks: 24 Weightage: 8% Date: 06-3-2013 Duration: 3:00 pm to 3:20 pm

NAME: ________ **ID. NO.:** ________ **SEC:** ____

Attempt all the questions. No marks will be awarded for overwriting and multiple answers. Do not use pencil. Each question carries 3 marks. No extra sheet will be given for rough works. Non-programmable Calculator is permitted.

Fill in the blanks with correct answers:

1. A computer password of length 4 will be formed by using vowels and numerical digits. First entry must be a vowel. There is no restriction on the remaining entries. Total number of such possible password is 5×15^3.
2. Let $P(A) = 0.825$ and $P(A \cap B) = 0.20625$. If A and B are independent, then $P(A' \cap B) =$ 0.04375 and $P(A \cup B) =$ 0.86875
3. If the moment generating function of a random variable is $M_X(t) = e^{5(e^t-1)}$, then the mean is 5.
4. If $P(A/B) = 0.85, P(B) = 0.42$ then $P(A' \cup B') =$ 0.643.
5. Specify if the sample space is discrete or continuous:
   -Measurements are made to determine the uranium content of a certain ore. Continuous
6. If a test consists of 4true-false questions, in how many different ways can a student mark the test paper with one answer to each question? 2^4.
7. A certain product was found to have two types of minor defects. The probability that an item of the product has only type 1 defect is 0.4 the probability that it has type 2 error is 0.5, and the probability that it has both defects is 0.4. Then the probability that an item has at least one defect is 0.9.
8. If the distribution of a random variable X is:

X	-2	1	3
$f(x)$	1/3	1/2	1/6

then $E(3X - 5) =$ -4.