INSTITUTE OF AERONAUTICAL ENGINEERING
Dundigal, Hyderabad - 500 043

CIVIL ENGINEERING

QUESTION BANK

Course Name	:	**Probability and Statistics**
Course Code	:	A40008
Class	:	II-II B. Tech
Branch	:	CIVIL Engineering
Year	:	2016 - 2017
Course Faculty	:	Ms. B PRAVEENA

OBJECTIVES

To meet the challenge of ensuring excellence in engineering education, the issue of quality needs to be addressed, debated and taken forward in a systematic manner. Accreditation is the principal means of quality assurance in higher education. The major emphasis of accreditation process is to measure the outcomes of the program that is being accredited.
In line with this, Faculty of Institute of Aeronautical Engineering, Hyderabad has taken a lead in incorporating philosophy of outcome based education in the process of problem solving and career development. So, all students of the institute should understand the depth and approach of course to be taught through this question bank, which will enhance learner's learning process.

1. Group - A (Short Answer Questions)

S. No	Question	Blooms Taxonomy Level	Course Outcome
	UNIT-I **SINGLE RANDOM VARIABLES AND PROBABILITY DISTRIBUTIONS**		
1	If X & Y is a random variable then Prove E[X+K]= E[X]+K ,where 'K' constant	Understand	b
2	Prove that $\sigma^2 = E(X^2) - \mu^2$	Understand	b
3	Explain probability distribution for discrete and continuous	Analyze	c
4	If X is Discrete Random variable then Prove that Var (a X +b) = a^2 var(X)	Understand	c
5	Write the properties of the Normal Distribution	Analyze	e
6	Write the importance and applications of Normal Distribution	Apply	e
7	Define different types of random variables with example	Remember	c
8	Derive variance of binomial distribution	Evaluate	d
9	Derive mean of Poisson distribution	Evaluate	d
10	Explain about Moment generating function	Analyze	e
	UNIT-II		

S. No	Question	Blooms Taxonomy Level	Course Outcome
	MULTIPLE RANDOM VARIABLES, CORRELATION &REGRESSION		
1	State the properties of joint distribution function of two random variable	Analyze	e
2	Explain about random vector concepts	Analyze	f
3	If a random variable W=X+Y where X and Y are two independent random variables what is the density function of W	Analyze	f
4	Explain types of correlations	Remember	g
5	Write the properties of rank correlation coefficient	Analyze	g
6	Write the properties of regression lines	Analyze	g
7	Write the difference between correlation and regression	Remember	g
8	The rank correlation coefficient between the marks in two subjects is 0.8.the sum of the squares of the difference between the ranks is 33.find the number of students	Evaluate	g
9	Find the angle between the regression lines if S.D of Y is twice the S.D of X and r=0.25	Evaluate	g
10	Derive the angle between the two regression lines	Evaluate	
	UNIT-III **SAMPLING DISTRIBUTIONS AND TESTING OF HYPOTHESIS**		
1	Explain different Types and Classification of sampling	Analyze	h
2	Write about Point Estimation, Interval Estimation	understand	i
3	Write a short note on Hypothesis, Null and Alternative with suitable examples	understand	i
4	Write a short Note on Type I & Type II error in sampling theory	understand	i
5	Prove that Sample Variance is not an Unbiased Estimation of Population Variance	understand	i
6	Write Properties of t-distribution	Analyze	j
7	Explain about Chi-Square	Analyze	j
8	Write a short note on Distinguish between t,F, Chi square test	understand	j
9	Explain about Bayesian estimation	Analyze	i
10	Compare Large Samples and Small sample tests	Create	j
	UNIT-IV **QUEUING THEORY**		

S. No	Question	Blooms Taxonomy Level	Course Outcome
1	Explain queue discipline	Analyze	k
2	Explain pure birth process	Analyze	k
3	Explain pure death process	Analyze	k
4	Derive expected number of customers	Evaluate	k
5	Derive average waiting time in queue	Evaluate	l
6	Evaluate P(n>1)	Evaluate	l
7	Define transient state and steady sate	Remember	l
8	Explain M/M/1 model	Analyze	l
9	Explain M/M/1 with infinite population	Analyze	l
10	Derive probability of having n customers P_n in a queue M/M/1, having poisson arrival	Evaluate	l
UNIT-V STOCHASTIC PROCESSES			
1	Define stochastic process	Remember	m
2	Explain different types of stochastic process	Analyze	m
3	Give examples of stochastic process	Create	m
4	Find the expected duration of the game for double stakes	Evaluate	m
5	Define Markov's chain	Understand	m
6	Explain Markov's property	Understand	m
7	Explain transition probabilities	Understand	m
8	Explain stationary distribution	Understand	m
9	Explain limiting distribution	Understand	m
10	Explain irreducible and reducible	Understand	m

1. Group - B (Long Answer Questions)

S. No	Question	Blooms Taxonomy Level	Course Outcome
UNIT-I SINGLE RANDOM VARIABLES AND PROBABILITY DISTRIBUTIONS			
1	A random variable x has the following probability function:	Evaluate	c

S. No	Question	Blooms Taxonomy Level	Course Outcome
	x 0 1 3 4 5 6 7 P(x) 0 k 2k 2k 3k k^2 $7k^2$+k Find the value of k (ii) evaluate p(x<6), p(x>6)		
2	Let X denotes the minimum of the two numbers that appear when a pair of fair dice is thrown once. Determine the (i) Discrete probability distribution (ii) Expectation (iii) Variance	Understand & Evaluate	c
3	A random variable X has the following probability function: X: -2, -1, 0, 1, 2, 3 P(x): 0.1, K, 0.2, 2K, 0.3, K Then find (i) k (ii) mean (iii) variance (iv) P(0 < x < 3)	Evaluate	c
4	A continuous random variable has the probability density function $f(x)=\begin{cases} kxe^{-\lambda x}, for\ x\geq 0, \lambda>0 \\ 0, otherwise \end{cases}$ Determine (i) k (ii) Mean (iii) Variance	Evaluate	c
5	If the PDF of Random variable f(x) = $k(1-x^2), 0<x<1$ then find (i) k (ii) p[0.1<x<0.2] (iii) P[x>0.5]	Evaluate	c
6	If the masses of 300 students are normally distributed with mean 68 kg and standard deviation3 kg how many students have masses: greater than 72 kg (ii) less than or equal to 64 kg (iii) between 65 and 71 kg inclusive	Analyze	e
7	Out of 800 families with 5 children each, how many would you expect to have (i)3 boys (ii)5 girls (iii)either 2 or 3 boys ? Assume equal probabilities for boys and girls.	Understand & Evaluate	d
8	If a Poisson distribution is such that $P(X=1).\frac{3}{2}P(X=3)$, find (i) $P(X\geq 1)$ (ii) $P(X\leq 3)$ (iii) $P(2\leq X\leq 5)$.	Evaluate	d
9	Average number of accidents on any day on a national highway is 1.8. Determine the probability that the number of accidents is (i) at least one (ii) at most one	Analyze & Evaluate	d
10	In a Normal distribution, 7% of the item are under 35 and 89%	Evaluate	e

<table>
<tr><th>S. No</th><th>Question</th><th>Blooms Taxonomy Level</th><th>Course Outcome</th></tr>
<tr><td></td><td>are under 63. Find the mean and standard deviation of the distribution.</td><td></td><td></td></tr>
<tr><td colspan="4">UNIT-II
MULTIPLE RANDOM VARIABLES, CORRELATION &REGRESSION</td></tr>
<tr><td>1</td><td>Consider the joint probability density function f(x, y) = xy, 0 < x < 1, 0 < y < 2. Find marginal density function</td><td>Evaluate</td><td>f</td></tr>
<tr><td>2</td><td>Two independent variable X and Y have means 5 and 10 and variances 4 and 9 respectively. Find the coefficient of correlation between U and V where U=3x+4y, V=3x-y</td><td>Understand & Evaluate</td><td>g</td></tr>
<tr><td>3</td><td>The probability density function of a random variable x is $f(x)=\frac{1}{2}\exp\left[-\frac{x}{2}\right], \quad x>0$. Find the probability of 1 < x < 2.</td><td>Evaluate</td><td>f</td></tr>
<tr><td>4</td><td>Let X and Y random variables have the joint density function f(x, y)=2,0<x<y<1then find marginal density function</td><td>Evaluate</td><td>f</td></tr>
<tr><td>5</td><td>Find the rank correlation coefficient for the following ranks of 16 students (1,1),(2,10),(3,3),(4,4),(5,5),(6,7),(7,2),(8,6),(9,8),(10,11),(11,15),(12,9),(13,14),(14,12),(15,16) (16,13)</td><td>Analyze & Evaluate</td><td>g</td></tr>
<tr><td>6</td><td>Calculate the coefficient of correlation between age of cars and annual maintain cost and comment:
<table>
<tr><td>Years</td><td>2</td><td>4</td><td>6</td><td>7</td><td>8</td><td>10</td><td>12</td></tr>
<tr><td>Rupees</td><td>1600</td><td>1500</td><td>1800</td><td>1900</td><td>1700</td><td>2100</td><td>2000</td></tr>
</table></td><td>Evaluate</td><td>g</td></tr>
<tr><td>7</td><td>If $\sigma_x=\sigma_y=\sigma$ and the angle between the regression lines is $Tan^{-1}(4/3)$. Find r.</td><td>Remember & Evaluate</td><td>g</td></tr>
<tr><td>8</td><td>For 20 army personal the regression of weight of kidneys (Y) on weight of heart (X) is Y=3.99X+6.394 and the regression of weight of heart on weight of kidneys is X=1.212Y+2.461. Find the correlation coefficient between the two variable and also their means</td><td>Understand & Evaluate</td><td>g</td></tr>
<tr><td>9</td><td>From 10 observations on price X and supply Y the following data was obtained $\sum X = 130, \sum Y = 220, \sum X^2 = 2288, \sum Y^2 = 5506, \sum XY = 3467$ Find coefficient of correlation, line of regression of Yon X and X on Y</td><td>Evaluate</td><td>g</td></tr>
<tr><td>10</td><td>If the variance of X is 9.The two regression equations are 8X-10Y+66=0 and 40X-18Y-214=0.Find correlation coefficient between X and Y and standard deviation of Y</td><td>Remember & Evaluate</td><td>g</td></tr>
<tr><td colspan="4">UNIT-III
SAMPLING DISTRIBUTIONS AND TESTING OF HYPOTHESIS</td></tr>
<tr><td>1</td><td>The mean of a random sample is an unbiased estimate of the mean of the population 3,6, 9,15,27. (i) List of all possible samples of size 3 that can be taken without replacement from the</td><td>Apply</td><td>h</td></tr>
</table>

S. No	Question	Blooms Taxonomy Level	Course Outcome
	finite population. (ii) Calculate the mean of the each of the samples listed in (iii) And assigning each sample a probability of 1/10.		
2	An ambulance service claims that it takes on the average 8.9 minutes to reach its destination In emergency calls. To check on this claim the agency which issues license to Ambulance service has then timed on fifty emergency calls getting a mean of 9.2 minutes with 1.6 minutes. What can they conclude at 5% level of significance?	Apply	i
3	A sample of 400 items is taken from a population whose standard deviation is 10.The mean of sample is 40.Test whether the sample has come from a population with mean 38 also calculate 95% confidence interval for the population	Apply	i
4	The means of two large samples of sizes 1000 and 2000 members are 67.5 inches and 68.0 inches respectively. Can the samples be regarded as drawn from the same population of S.D 2.5 inches	Apply	i
5	Experience had shown that 20% of a manufactured product is of the top quality. In one day's production of 400 articles only 50 are of top quality .Test the hypothesis at 0.05 level.	Analyze & Evaluate	i
6	A sample of 26 bulbs gives a mean life of 990 hrs. With S.D. of 20 hours. The manufacture claims that the mean life bulb is 1000 hrs. is the sample not up to the standard	Apply	j
7	In a one sample of 10 observations the sum of squares of deviations from mean was 90 and other sample of 12 observations it was 108 .test whether the difference is significant at 5% level of significance.	Apply	j
8	The no. of automobile accidents per week in a certain area as follows: 12,8,20,2,14,10,15,6,9,4 . are these frequencies in agreement with the belief that accidents were same in the during last 10 weeks.	Apply	j

<table>
<tr><th>S. No</th><th>Question</th><th>Blooms Taxonomy Level</th><th>Course Outcome</th></tr>
<tr><td>9</td><td>Two independent samples of 7 items respectively had the following values
<table>
<tr><td>Sample I</td><td>11</td><td>11</td><td>13</td><td>11</td><td>12</td><td>9</td><td>12</td><td>14</td></tr>
<tr><td>Sample II</td><td>9</td><td>11</td><td>10</td><td>13</td><td>9</td><td>8</td><td>10</td><td>-</td></tr>
</table></td><td>evaluate</td><td>j</td></tr>
<tr><td>10</td><td>A die is thrown 264 times with the following results .show that the die is unbiased
<table>
<tr><td>No appeared on die</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr>
<tr><td>Frequency</td><td>40</td><td>32</td><td>28</td><td>58</td><td>54</td><td>52</td></tr>
</table></td><td>Understand</td><td>j</td></tr>
<tr><td colspan="4">UNIT-IV
QUEUING THEORY</td></tr>
<tr><td>1</td><td>Consider a box office ticket window being managed by a single server. Customer arrive to purchase ticket according to Poisson input process with a mean rate of 30 per hour. The time required to serve a customer has an exponential distribution with a mean of 910 sec. Determine the following: a)Fraction of the time the server is busy b)The average number of customers queuing for service</td><td>Apply</td><td>k</td></tr>
<tr><td>2</td><td>Patients arrive at a clinic in a Poisson manner at an average rate of 6 per hour. The doctor on average can attend to 8 patients per hour. Assuming that the service time distribution is exponential, find Average number of patients waiting in the queue, Average time spent by a patient in the clinic</td><td>Evaluate</td><td>l</td></tr>
<tr><td>3</td><td>A bank plans to open a single server drive in banking facilities at a particular centre. It is estimated that 20 customers will arrive each hour on an average. If on an average, it required 2 minutes to process a customers transaction, determine 1.The proportion of time that the system will be idle 2.On the average how long a customer will have to wait before reaching the server? 3. Traffic intensity of Bank? 4.The fraction of customers who will have to wait</td><td>Analyze</td><td>l</td></tr>
<tr><td>4</td><td>A car park contains five cars .The arrival of cars in Poisson with a mean rate of 10 per/hour. The length of time each car spends in</td><td>Evaluate</td><td>l</td></tr>
</table>

S. No	Question	Blooms Taxonomy Level	Course Outcome
	the car park has negative exponential distribution with mean of two hours. how many cars are in the car park on average and what is the probability of newly arriving costumer finding the car park full and having to park his car else where		
5	Consider a self service store with one cashier. Assume Poisson arrivals and exponential service time. Suppose that 9 customers arrive on the average of every 5 minutes and the cashier can serve 19 in 5 minutes. Find (i) the average number of customers queuing for service. (ii)the probability of having more than 10 customers in the system. (iii) the probability that the customer has to queue for more than 2 minutes	Evaluate	1
6	A self service canteen employs one cashier at its counter. 8 customers arrive per every 10 minutes on an average. The cashier can serve on average one per minute. Assuming that the arrivals are Poisson and the service time distribution is exponential, determine: (i)the average number of customers in the system; (ii) the average queue length; (iii) average time a customer spends in the system; (iv) average waiting time of each customer	Evaluate	1
7	Customers arrive at a one window drive in bank according to a Poisson distribution with mean 10 per hour. Service time per customer is exponential with mean 5 minutes The car space in front of the window including that for the serviced can accommodate a maximum of 3 cars . other cars can wait outside the space. i) what is the probability that an arriving customer can drive directly to the space in front of the windom? Ii) what is the probability that an arriving customer will have to wait outside the indicated space? Iii) How long is an arriving customer expected to wait before starting service	Apply	1
8	A fast food restaurant has one drive window. Cars arrive according to a Poisson process. Cars arrive at the rate of 2 per 5 minutes. The service time per customer is 1.5 minutes. Determine i) The Expected number of customers waiting to be served. ii) The probability that the waiting line exceeds 10iii) Average waiting time until a customer reaches the window to place an order. iv) The probability that the facility is idle	Apply	1
9	At a railway station, only one train is handled at a time. The railway yard is sufficient only for two trains to wait while other is given signal to leave the station. Trains arrive at an average rate of 6 per hour and the railway station can handle them on an	Apply	1

S. No	Question	Blooms Taxonomy Level	Course Outcome
	average of 12 per hour. Assuming Poisson arrivals and exponential service distribution, find the steady state probabilities for the various number of trains in the system. Find also the average waiting time of a new train coming into the yard		
10	Consider a single server queuing system with Poisson input and exponential service time. Suppose the mean rate is 3 calling units per hour with the expected service time as 0.25 hours and the maximum permissible number of calling units in the system is two. Obtain the steady state probability distribution of the number of calling units in the system and then calculate the expected number in the system	Apply	l
UNIT-V STOCHASTIC PROCESSES			
1	The transition probability matrix is given by $P = \begin{bmatrix} 0.1 & 0.4 & 0.5 \\ 0.2 & 0.2 & 0.6 \\ 0.7 & 0.2 & 0.1 \end{bmatrix}$ and $P_0 = [0.4 \quad 0.4 \quad 0.2]$ (a) Find the distribution after three transitions. (b) Find the limiting probabilities.	Evaluate	m
2	If the transition probability matrix of market shares of three brands A,B, and C is $\begin{bmatrix} 0.4 & 0.3 & 0.3 \\ 0.8 & 0.1 & 0.1 \\ 0.35 & 0.25 & 0.4 \end{bmatrix}$ and the initial market shares are 50%,25% and 25%, Find (a) The market shares in second and third periods (b) The limiting probabilities.	Evaluate	m
3	Define the stochastic matrixes which of the following stochastic matrices are regular. (a) $\begin{bmatrix} 1/2 & 1/4 & 1/4 \\ 0 & 1 & 0 \\ 1/2 & 0 & 1/2 \end{bmatrix}$ (b) $\begin{bmatrix} 2 & 1/2 & 0 \\ 1/2 & 1/2 & 0 \\ 1/4 & 1/4 & 1/2 \end{bmatrix}$	Remember & Evaluate	m
4	Three boys A, B, C are throwing a ball to each other. A always throws the ball to B; B always throws the ball to C; but C is just as likely to throw the ball to B as to A. Show that the process is Markovian. Find the transition matrix and classify the states. Do all the states are ergodic	Understand & Apply	m
5	A gambler has Rs.2. He bets Rs.1 at a time and wins Rs.1 with probability 0.5. He stops Playing if he loses Rs.2 or wins Rs.4.i)What is the Transition probability matrix of the related markov chain? (b) What is the probability that he has lost his money at the end of 5 plays	Understand & Apply	n
6	Check whether the following markov chain is regular and	Apply	m

S. No	Question	Blooms Taxonomy Level	Course Outcome
	ergodic? $\begin{bmatrix} 1 & 1/2 & 1/2 & 0 \\ 1/2 & 0 & 0 & 1/2 \\ 1/2 & 0 & 0 & 1/2 \\ 0 & 1/2 & 1/2 & 1/2 \end{bmatrix}$		
7	The transition probability matrix of a marker chain is given by $\begin{bmatrix} 0.3 & 0.7 & 0 \\ 0.1 & 0.4 & 0.5 \\ 0 & 0.2 & 0.8 \end{bmatrix}$ irreducibleor not?	Evaluate	m
8	. Which of the following matrices are Stochastic i) $\begin{bmatrix} 1/2 & 0 \\ 0 & 1 \end{bmatrix}$ ii) $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ iii) $\begin{bmatrix} 1/2 & 1/4 & 1/4 \\ 1 & 1 & 0 \\ 1/2 & 1/2 & 0 \end{bmatrix}$	Apply	m
9	Which of the following Matrices are Regular i) $\begin{bmatrix} 1/2 & 1/2 \\ 0 & 1 \end{bmatrix}$ ii) $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ iii) $\begin{bmatrix} 1/2 & 1/4 & 1/4 \\ 0 & 1 & 0 \\ 1/2 & 1/2 & 0 \end{bmatrix}$	Apply	m
10	a) Is the Matrix $\begin{bmatrix} 0.4 & 0.6 & 0 & 0 \\ 0.3 & 0.7 & 0 & 0 \\ 0.2 & 0.4 & 0.1 & 0.3 \\ 0 & 0 & 0 & 1 \end{bmatrix}$ irreducible? (b) Is the Matrix p= $\begin{bmatrix} 0 & 1 & 0 \\ 1/2 & 1/6 & 1/3 \\ 1/3 & 2/3 & 0 \end{bmatrix}$ Stochastic?	Evaluate	m

3. Group - III (Analytical Questions)

S. No	Questions	Blooms Taxonomy Level	Program Outcome
UNIT-I SINGLE RANDOM VARIABLES AND PROBABILITY DISTRIBUTIONS			
1	When the classical definition of probability fails.	Analyze	b
2	The function $f(x)=Ax^2$ In 0<x0<1 is valid probability density function then find the value of A.	Evaluate	c
3	Define Normal distribution	Understand	e
4	Explain about Moments	Analyze	f
5	Derive mean deviation from the mean for Normal Distribution	Evaluate	e
6	What is the area under the whole normal curve?	Analyze	e
7	In which distribution the mean, mode and median are equal.	Analyze	e

S. No	Questions	Blooms Taxonomy Level	Program Outcome
8	The mean and variance of a binomial variable X with parameters n and p are 16 and Find $P(X \geq 1)$	Evaluate	d
9	Where the traits of normal distribution lies.	Analyze	e
10	Write the properties of continuous random variable	Understand	b
	UNIT-II **MULTIPLE RANDOM VARIABLES, CORRELATION &REGRESSION**		
1	Derive the angle between the two regression lines	Evaluate	g
2	If θ is the angle between two regression lines then show that sinθ ≤ $1-r^2$	Apply	g
3	What is the marginal distributions of X and Y.	Analyze	f
4	Write the normal equations of straight line	Analyze	g
5	Find mean value of the variables X and Y and coefficient of correlation from the following regression equations 2Y-X-50=0, 3Y-2X-10=0	Evaluate	g
6	Define regression and give its uses	Remember	g
7	What are normal equations for regression lines?	Analyze	g
8	When the Regression coefficient is independent	Analyze	g
9	Find correlation coefficient if b_{xy}=085y, b_{yx}=089x σ_x =3	Evaluate	g
10	When the coefficient of correlation is maximum	Analyze	g
	UNIT-III **SAMPLING DISTRIBUTIONS AND TESTING OF HYPOTHESIS**		
1	Which error is called producer’s risk?	Understand	i
2	Which error is called consumer’s risk.	Understand	i
3	When the single tailed test is used.	Analyze	i
4	What is test statistics for testing single mean?	Analyze	i
5	How to calculate limit for true mean.	Analyze	i
6	If p=0.15 q=0.85 n=10 find confidence limits	Evaluate	i
7	What must be sample size to apply t test.	Analyze	h
8	If $\overline{x}$ =47.5, $\mu = 42.1, s = 8.4, n = 24$ find t. What is shape of t	Evaluate	j
9	What is the range of F distribution?	Understand	j
10	Which distribution is used to test the equality of population means?	Analyze	j
	UNIT-IV **QUEUING THEORY**		
1	What is probability of arrivals during the service time of any	Analyze	k

S. No	Questions	Blooms Taxonomy Level	Program Outcome
	given customer?		
2	What is FIFO means?	Remember	k
3	Define Jack eying.	Understand	k
4	Define reneging.	Understand	k
5	Define m/m/1:FIFO	Understand	k
6	Model of queuing system.	Analyze	k
7	Define balking.	Understand	k
8	What is the pattern according to which customers are served?	Analyze	l
9	What is variance of queue length?	Analyze	l
10	How to calculate the idle time of the server according to queue theory	Evaluate	k
UNIT-V STOCHASTIC PROCESSES			
1	What do you call the random variable in stochastic process?	Analyze	m
2	When the state is said to be Ergodic.	Analyze	m
3	What is null persistent state?	Understand	m
4	What is Markov process?	Understand	m
5	Give an example of discrete parameter Markov chain.	Create	m
6	When a matrix is said to be regular.	Understand	m
7	What is the use of Markov process?	Understand	m
8	When the state is said to be commute with each other.	Understand	m
9	Let $p = \frac{1}{2}, q = \frac{1}{2}, z = 500, a = 1000$ then find the expected duration of the game	Evaluate	n
10	If the stakes are doubled while the initial capital remain unchanged the probability ruin decreases for the player whose probability of success is P<1/2 and increases for the adversary	Apply	n

Prepared By: Ms. B Praveena