BHARATIYA VIDYA BHAVAN'S

SARDAR PATEL INSTITUTE OF TECHNOLOGY

MUNSHI NAGAR, ANDHERI (WEST), MUMBAI – 400 058, India
(Autonomous College Affiliated to University of Mumbai)

Mid Semester Examination Marh-2019

Synoptic

Class: FYMCA Subject: **Probability & Statistics** Semester: II

Course Code: MCA 25 Date: 15/ 03 /2019

Q. N.		Max Marks	CO
1.(a)		5	3

Sample Space S= total number of arrangements of the letters in the word 'AHMEDNAGAR'.

$\therefore$ S = Arrangement of 3 letters A, 1 letter H, 1 letter M, 1 letter E, 1 letter D, 1 letter N, 1 letter G, 1 letter R.

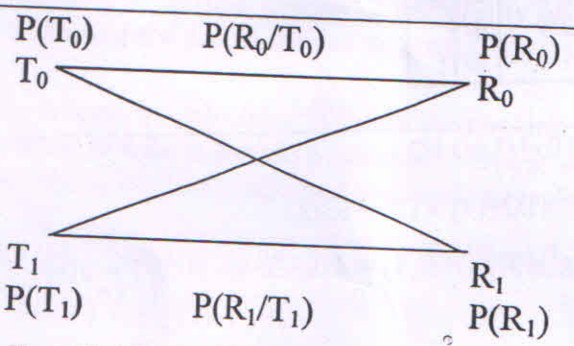
$$\therefore n(S)=\frac{10!}{3!\times 1!\times 1!\times 1!\times 1!\times 1!\times 1!\times 1!}=\frac{10!}{3!}$$

Event A= the vowels (A,A,A,E) come together.

$\therefore$ A=Arrangement of vowels (A,A,A,E) together and then arrangement of 1 letter H, 1 letter M, 1 letter D,1 letter N, 1 letter R, 1 group of vowels.

$$\therefore n(A)=\frac{7!}{1!\times 1!\times 1!\times 1!\times 1!\times 1!\times 1!}\times\frac{4!}{3!\times 1!}=7!\times 4 \qquad \therefore P(A)=\frac{n(A)}{n(S)}=7!\times 4\div\frac{10!}{3!}=\frac{1}{30}=0.033$$

Q. N.		Max Marks	CO
(b)		5	3



Define Events T_0 = 'A 0 is transmitted' T_1 = 'A 1 is transmitted'

R_0 = 'A 0 is received' R_1 = 'A 1 is received'

Then $T_1=\overline{T}_0$ and $R_1=\overline{R}_0$

Given $P(R_0/T_0)=0.94$, $P(R_1/T_1)=0.91$, $P(T_0)=0.45$

Now $P(R_1/T_0)=P(\overline{R}_0/T_0)=1-P(R_0/T_0)=1-0.94=0.06$

$P(R_0/T_1)=P(\overline{R}_1/T_1)=1-P(R_1/T_1)=1-0.91=0.09$

$P(T_1)=P(\overline{T}_0)=1-P(T_0)=0.55$

$P(\text{error})=P(R_1\cap T_0)+P(R_0\cap T_1)$

$= P(R_1/T_0)\times P(T_0)+P(R_0/T_1)\times P(T_1)=0.06\times 0.45+0.09\times 0.55=0.0765$

OR

Let event E_1 = the graduate person selected is a woman

E_2 =the graduate person selected is a man

A=the graduate person selected is a smoker

$P(E_1)=0.7$, $P(E_2)=0.3$,

$P(A/E_1)=20\%=0.20$, $P(A/E_2)=25\%=0.25$

$P(A)= P(E_1).P(A/E_1)+ P(E_2).P(A/E_2)=0.7\times0.20+0.3\times0.25=0.215$

2. a) 5 4

The joint probability function $f(x,y)=\dfrac{1}{27}(2x+y)$; x=0, 1,2, y=0,1,2

gives the following table of joint probability distribution of X and Y.

X \ Y	0	1	2	$f_X(x)$
0	0	1/27	2/27	3/27
1	2/27	3/27	4/27	9/27
2	4/27	5/27	6/27	15/27

The marginal probability distribution of X is given by $f_X(x)=\sum_y f(x,y)$

The conditional distribution of Y for X=x is given by $f_{Y|X}(Y=y\mid X=x)=\dfrac{f(x,y)}{f_X(x)}$

and is given in the following table.

X \ Y	0	1	2
0	0	1/3	2/3
1	2/9	3/9	4/9
2	4/15	5/15	6/15

(b) 5 5

$E(X)=\Sigma xP(x) = -3\times1/6+6\times1/2+9\times1/3 = 11/2$

$E(X^2)=\Sigma x^2P(x) = (-3)^2\times1/6+(6)^2\times1/2+(9)^2\times1/3 = 93/2$

$E(2X+1)^2=E(4x^2+4x+1) = 4E(x^2)+4E(x)+E(1) = 4\times93/2+4\times11/2+1 = 209$

OR

If X is Poisson variate with parameter λ, then

$P(X=x)=\dfrac{e^{-\lambda}\lambda^x}{x!}$, $x=0,1,2,\ldots;\ \lambda>0$

$\therefore$ The given equation gives $\dfrac{e^{-\lambda}\lambda^2}{2!}=e^{-\lambda}\left[9\dfrac{\lambda^4}{4!}+90\dfrac{\lambda^6}{6!}\right]$

$\therefore \lambda^4+3\lambda^2-4=0$ $\therefore(\lambda^2+4)(\lambda^2-1)=0$ Since $\lambda>0$, we get $\lambda^2=1$ $\Rightarrow\lambda=1$

Hence mean $\lambda=1$

---x---x---x---