Q.P. 52446.

(1)

Q.		ATTEMPT ANY FOUR FROM THE FOLLOWING	MARKS
1	A)		05
	i)	$(5/x) + 6x$	
	ii)	$[(\log x-5)8x - (4x^2+3)/x]/(\log x-5)^2$	
	B)	R=pD, where $D=300p-p^2$ $R=p(300p-p^2)$ $R=300p^2-p^3$ when p=5 $T.R.=300(5^2)-5^3$ T.R.=300(25)-125 T.R.=Rs. 7375	05
	C)	$C=9+20x+x^2$ AC=C/x=9/x+20+x When x=3 then AC=26 MC=dc/dx=20+2x When x=3 then MC=26	05
	D)	Since $D=12+4p-p^2$ dD/dp=4-2P $\eta=(-p/D)(dD/dp)$ $=[-p/(12+4p-p^2)](4-2p)$ $=p(2p-4)/(12+4p-p^2)$ η at p=3 is given by $\eta=3(6-4)/(12+12-9)$ =6/15=2/5	05
	E)	Given $R=30x-x^2$ and C=20+4x Profit is given by p=R-C $P=(30x-x^2)-(20+4x)$ $P=-20+26x-x^2$ $dp/dx = 26-2x$ & $d^2p/dx^2=-2$ Now dp/dx =0,if 26-2x=0 i.e. if x=13 When x=13, $d^2p/dx^2=-2<0$ Thus for x=13, dp/dx =0 and $(d^2p/dx^2)<0$ P is maximum when x=13 Maximum profit when x=13 Max $p=-20+26*13-13^2$ =-20+13(26-13) =13*13-20=169-20=149	05
Q2			
	A)	Let rate will be x In first case, p=15000 and n=4years SI=Pni=15000*4*x=60000x In case second, p=16000,n=3years,i=0.1 SI=Pni=16000*3*0.1=4800 Therefor 60000x=4800 X=0.08 Therefor Rate of interest is 8%	05

B) (05)

Given p=Rs 30000, i=0.1,n=2years, m=2

$A=P(1+i/m)^{mn}$

$A=(30000)(1.05)^4$

A=(30000)(1.276)

A=Rs 38280

C) (05)

Given A=50000,n=3years,r=6%,i=0.06

$A=P(1+i)^n$

$50000=P(1.06)^3$

P=Rs 41980.9642

D) (05)

Given C=Rs 20000, i=0.1,n=4years

$A=C[(1+i)^n-1]/i$

$=20000[(1.1)^4-1]/0.1$

=20000(1.4641-1)

A=Rs 92820

E) (05)

Given P=Rs 80000,n=4 months

r=12/12 =1%p.m., hence i=0.01

Let the EMI be C Rs

$P=C[1-(1+i)^{-n}]/i$

$80000=C[1-(1.01)^{-4}]/0.01$

800=C[1-0.96098]

=C[0.03902]

C=Rs 20502.3065

Q3

A) (05)

Given,

$\bar{x}=\Sigma x/n=3$

$\bar{y}=\Sigma y/n=4$

$r= [(\Sigma xy/n)- \bar{x}\,\bar{y}]/[\sqrt{(\Sigma x^2/n)- \bar{x}^2}][\sqrt{(\Sigma y^2/n)-\bar{y}^2}]$

r= [(325/25)-12]/[√(250/25)-9][√(500/25-16)

r=0.5

B) (05)

Rank (X)	Rank (Y)	d	d^2
2	1	1	1
1	5	-4	16
3	6	-3	9
4	4	0	0
5	3	2	4
6	2	4	16
			$\Sigma d^2=46$

$R= 1-(6\Sigma d^2)/n^3-n$

$=1-(6*46)/6^3-6$

=1-1.314285

R=-0.314285

C) Let y=yield and x=Rainfall **05**

Given, r=0.8

$\bar{x}=27$, $\bar{y}=40$

$\sigma_x=3$, $\sigma_y=6$

$b_{yx}=r\ \sigma_y/\ \sigma_x$

$b_{yx}=1.6$

$y-\bar{y}=b_{yx}(x-\bar{x})$

$y-40=1.6(x-27)$

when x=30 then

$y-40=1.6(30-27)$

$=4.8$

$Y=44.8$

D) Let regression line of y on x is 2x+3y-66=0--------------(1) **05**

and regression line of x on y is 2x+y-38=0--------------(2)

we know that,

$y-\bar{y}=b_{yx}(x-\bar{x})$--------------(3)

and 3y=66-2x

y=22-(2/3)x---------------(4)

Comparing coefficients of x in equations 3 and 4 we get

$b_{yx}=-2/3$

similarly, 2x=38-y

x=19-(1/2)y---------------(5)

and $x-\bar{x}=b_{xy}(y-\bar{y})$--------------(6)

Comparing coefficients of x in equations 5 and 6 we get

$b_{xy}=-1/2$

we know that,

$r=\sqrt{(b_{yx}\ b_{xy})}$

$r=\sqrt{((-1/2)*(-2/3)}=\sqrt{0.333333}$

r=0.5773

Q4 A) **05**

commodity	P0	Q0	P1	Q1	P0Q0	P1Q1	P0Q1	P1Q0
A	9	5	15	5	45	75	45	75
B	8	10	12	11	80	132	88	110
C	4	6	5	6	24	30	24	36
D	1	4	2	8	4	16	8	32
Total					153	253	165	253

$P^L_{01}=(\Sigma P_1Q_0)/(\ \Sigma P_0Q_0)$

$=1.6535$

$P^L_{01}=(\Sigma P_1Q_1)/(\ \Sigma P_0Q_1)$

$=1.5333$

$P^F_{01}=SQRT[(P^L_{01})*(\ P^P_{01})]$

$=1.5923$

			05
	B)		

Year	Sales(Lakh)	Three yearly moving total	Three yearly moving average
2011	15	.....	
2012	17	54	18
2013	22	69	23
2014	30	77	25.66666667
2015	25	82	27.33333333
2016	27	87	29
2017	35	......	

C) 05

Commodity	P0	P1	W	I=(P1/P0)*100	I*W
Wheat	32	40	20	125	2500
Rice	25	30	10	120	1200
Dal	40	55	5	137.5	687.5
Salt	3	4	7	133.3333	933.3333
Vegetables	8	14	8	175	1400
Total			50		6720.833

Cost of living I.N.=ΣIW/ΣW=134.4167

D) 05

Year	sales(y)	x=(year-1994)	x^2	xy
1991	12	-3	9	-36
1992	30	-2	4	-60
1993	56	-1	1	-56
1994	15	0	0	0
1995	24	1	1	24
1996	34	2	4	68
1997	40	3	9	120
Total	211	0	28	60
	a=(Σy/n)=	30.14285714		
	b=Σxy/Σx^2=	2.142857143		

Therefor the trend line equation is
Y=30.1428+2.1428x

Q5 A) 05

Given, p=3/10, q=7/10, n=5

$P(x)={}^{n}C_{x}p^{x}q^{n-x}$

$P(x=3)={}^{5}C_{3}(3/10)^{3}(7/10)^{2}$

$=10*0.49*0.027$

$=0.1323$

	B)	$\lambda=2$ $P(x)=(e^{-\lambda}\lambda^{x})/x!$ i) $P(x=0)=(e^{-2}\lambda^{0})/0!=0.135$ ii) P(at most two successes)= P(0)+ P(1)+ P(2) =0.135+(0.135*2)+(0.135*2) =0.675	05
	C)	Given, p=4/5,q=1/5, n=5 $P(x)={}^{n}C_{x}p^{x}q^{n-x}$ i) $P(x=4)={}^{5}C_{4}(4/5)^{4}(1/5)^{1}$ =5*0.4096*0.2 =0.4096 ii)\` P(1 or less)=P(0)+P(1) $={}^{5}C_{0}(4/5)^{0}(1/5)^{5}+{}^{5}C_{1}(4/5)^{1}(1/5)^{4}$ =0.00672	05
	D)	Let X: weekly wages We know, standard normal variate Z $Z=(X-\mu)/\sigma$ Here, $\mu=770$, $\sigma=70$ Z=(X-770)/70 When X=770, Z=0 When X=700, Z=(700-770)/70=-1 Area to the left of Z=-1 =(Area to the left of Z=0)-(Area between Z=0 & Z=-1) =0.5-0.3413 =0.1587 $P(X<700)=P(Z<-1)=0.1587$ The number of workers earning less than Rs 700=N*P =8000*0.1587 =1269.6	05