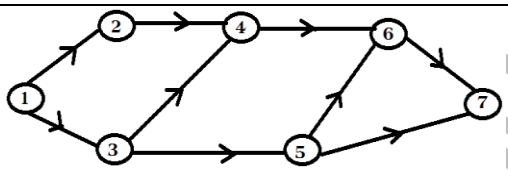
SHRI KRISHNA ACADEMY

NEET,JEE AND BOARD EXAM COACHING CENTRE
SBM SCHOOL CAMPUS,TRICHY MAIN ROAD,NAMAKKAL
CELL:9965531727-9443231727

COMMON PUBLIC EXAMINATION –MARCH –2020

XI – BUSINESS MATHEMATICS AND STATISTICS **TENTATIVE ANSWER KEY**

Q.No	PART – I	MARKS
1.	(c) $-\Delta$	1
2.	Question Wrong	1
3.	(d) $9\times 9!$	1
4.	(c) latus rectum	1
5.	(b) 3	1
6.	(d) 0	1
7.	(c) $\frac{1}{f(x)}$	1
8.	(d) $4e^{2x}$	1
9.	(d) $-x^2$	1
10.	(b) $2xe^{x^2}$	1
11.	(a) $\frac{\partial^2 u}{\partial x \partial y}$	1
12.	(d) Rs 91	1
13.	(c) Percentage	1
14.	(b) 11.25	1
15.	(c) 1	1
16.	(d) $\frac{2}{25}$	1
17.	(b) positive	1
18.	(b) Co-efficient of correlation lies between -1 and +1	1
19.	(d) Critical path	1
20.	(b) $E_j - E_i = L_j - L_i = t_{ij}$	1
	PART – II	
21.	$\begin{vmatrix} x & y & z \\ 2x+2a & 2y+2b & 2z+2c \\ a & b & c \end{vmatrix} = \begin{vmatrix} x & y & z \\ 2x & 2y & 2z \\ a & b & c \end{vmatrix} + \begin{vmatrix} x & y & z \\ 2a & 2b & 2c \\ a & b & c \end{vmatrix} = 0$	2
22.	Let $\frac{1}{x^2-1} = \frac{A}{x-1} + \frac{B}{x+1}$ $4 = A(x+1) + B(x-1)$ Simplifying we get, $A=2; B=-2$ $\therefore \frac{4}{x^2-1} = \frac{2}{x-1} - \frac{2}{x+1}$	1 1

23.	point $(x_1,y_1) = (2,3)$ Length of tangent $= \sqrt{2^2+3^2+8(2)+4(3)+8} = 7$units	2
24.	$\frac{\sin 2\theta}{1+\cos 2\theta} = \frac{2\sin\theta\cos\theta}{2\cos^2\theta} = \tan\theta$	2
25.	$\lim_{x\to\infty} x\tan\left(\frac{1}{x}\right) = \lim_{x\to\infty} \frac{\tan\left(\frac{1}{x}\right)}{\frac{1}{x}} = 1$	2
26.	$\eta_s = \frac{p}{x}\frac{dx}{dp} = \frac{p}{2p^2+5}(4p)$ when p=3 $\Rightarrow \eta_s = \frac{36}{23}$	1 1
27.	Harmonic mean $= \frac{n}{\sum\left(\frac{1}{x}\right)} = \frac{5}{1.4615} = 3.4211$	2
28.	$b_{xy} = \frac{N\sum xy - \sum x\sum y}{N\sum y^2 - \left(\sum y\right)^2} = \frac{5}{9} = 0.56$ Regression line of X on Y is $x-\bar{x} = b_{xy}\left(y-\bar{y}\right) \Rightarrow x-5 = 0.56\ (y-4) \Rightarrow x = 0.56y+2.76$	1 1
29.		2
30.	$\lim_{x\to 0} \frac{\sqrt{2\ x}\ \sqrt{2\ x}}{2x}$ $\lim_{x\to 0} \frac{\sqrt{2\ x}\ \sqrt{2\ x}}{2x} \frac{\sqrt{2\ x}\ \sqrt{2\ x}}{\sqrt{2+x}+\sqrt{2-x}}$ $= \lim_{x\to 0} \frac{1}{\sqrt{2+x}+\sqrt{2-x}} = \frac{1}{2\sqrt{2}}$	1 1
	PART – III	
31.	$AB = \frac{1}{5}\begin{bmatrix}5&0&0\\0&5&0\\0&0&5\end{bmatrix} = I$ .....(1) $\quad BA = \frac{1}{5}\begin{bmatrix}5&0&0\\0&5&0\\0&0&5\end{bmatrix} = I$.....(2) from (1) and (2) A and B are inverses to each other	2 1
32.	$\lvert A\rvert = 1$, adj $A = \begin{bmatrix}4&7\\3&5\end{bmatrix} = A^{-1}$; $\quad \lvert A^{-1}\rvert = 1$, adj $A^{-1} = \begin{bmatrix}5&7\\3&4\end{bmatrix}$ $\left(A^{-1}\right)^{-1} = \frac{1}{\lvert A^{-1}\rvert}$ adj $A^{-1} = \begin{bmatrix}5&-7\\3&-4\end{bmatrix} = A$	2 1
33.	$(n+2)C_n = 45 \Rightarrow (n+2)C_2 = 45$ $\Rightarrow n^2+3n-88 = 0 \Rightarrow n = 8$	1 2
34.	$\begin{vmatrix}3&4&-13\\2&-7&1\\a&1&-14\end{vmatrix} = 0$ $435-87a = 0 \Rightarrow a = 5$	1 2

35.	$\tan 2\alpha = \frac{2\tan\alpha}{1-\tan^2\alpha} = \frac{3}{4}$ $\tan(2\alpha+\beta) = \frac{\tan 2\alpha + \tan\beta}{1-\tan 2\alpha\tan\beta} = \frac{\frac{3}{4}+\frac{1}{7}}{1-\left(\frac{3}{4}\times\frac{1}{7}\right)} = 1$ $2\alpha+\beta = \frac{\pi}{4}$	1 1 1
36.	Let $y = \frac{x^2+x+1}{x^2-x+1} \Rightarrow \frac{dy}{dx} = \frac{(x^2-x+1)(2x+1)-(x^2+x+1)(2x-1)}{(x^2-x+1)^2}$ $\frac{dy}{dx} = \frac{-2x^2+2}{(x^2-x+1)^2}$	2 1
37.	$\frac{f}{} \quad 3x^2y \quad 2xyz^3 \; ; \; \frac{f}{} \quad x^3 \quad 4zy^3 \quad z^3x^2$ $\frac{^2f}{} \quad 6xy \quad 2yz^3 \; ; \; \frac{^2f}{^2} \quad 12zy^2$	1 2
38.	$A = \frac{a}{i}\left[(1+i)^n - 1\right] = \frac{3200}{0.1}\left[(1+0.1)^{12} - 1\right] = \text{Rs. } 68428.8$	3
39.	$r \quad \frac{N\sum xy - \sum x\sum y}{\sqrt{N\sum x^2 - (\sum x)^2}\sqrt{N\sum y^2 - (\sum y)^2}} \quad \frac{9(597) \quad 45(108)}{\sqrt{9(285) \quad (285)^2}\sqrt{9(1356) \quad (108)^2}}$ $r = +0.95$	2 1
40.	$a=2, b=3, h=\frac{7}{2}, g=\frac{5}{2}, f=\frac{5}{2}, c=2$ $abc+2fgh - af^2 - bg^2 - ch^2 = 0$ $\therefore$ The given equation represents a pair of straight lines. $\theta = \tan^{-1}\left\lvert\frac{2\sqrt{h^2-ab}}{a+b}\right\rvert = \tan^{-1}(1) = \frac{\pi}{4}$	1 2
	PART – IV	
41.(a)	$\begin{vmatrix}1 & a & a^2\\ 1 & b & b^2\\ 1 & c & c^2\end{vmatrix} = \begin{vmatrix}0 & a-b & a^2-b^2\\ 0 & b-c & b^2-c^2\\ 1 & c & c^2\end{vmatrix} \begin{matrix}R_1 \to R_1 - R_2\\ R_2 \to R_2 - R_3\end{matrix}$ $= (a-b)(b-c)\begin{vmatrix}0 & 1 & a+b\\ 0 & 1 & b+c\\ 1 & c & c^2\end{vmatrix}$ $= (a-b)(b-c)(c-a)$	2 1 2
41.(b)	Let $p(n) = 2^{3n} - 1$ is divisible by 7. Put n = 1 $\therefore p(1)$ is true Assume that $2^{3k} - 1$ is divisible by 7 is true $\Rightarrow 2^{3k} - 1 = 7m$ $p(k+1) = 2^{3(k+1)} - 1 = 2^{3k}8 - 1 = 7(2^{3k} + m)$ is divisible by 7. $\therefore p(k+1)$ is true By mathematical induction P(n) is true for $n \in N$.	1 1 2 1

42.(a)

$\sin 600^0 \cos 390^0 + \cos 480^0 \sin 150^0 = \left(\frac{-\sqrt{3}}{2}\right)\left(\frac{\sqrt{3}}{2}\right) + \left(\frac{-1}{2}\right)\left(\frac{1}{2}\right)$ — 4

$= -1$ — 1

42.(b)

Diagram and The feasible region is ABCD and its coordinates are A(12,0) D(0,10) — 2

verification of B and C:

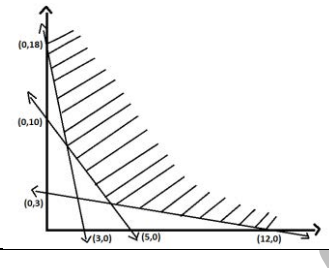
For B:

Solve 1&2 $\Rightarrow$ B(4,2) — 1

For C:

Solve 1&3 $\Rightarrow$ C(2,6)

$\therefore$ *The* solution is $x_1 = 4, x_2 = 2$ and $Z_{min} = 160$ — 2



43.(a)

P = Total revenue – (Total cost + tax)

$P = (2350 - 5x)x - \frac{x^3}{} - 5x^2 + 28x + 10 + 2x = -\frac{x^3}{} + 2500x - 10$ — 1

$\frac{dP}{dx} = -x^2 + 2500$; $\frac{d^2P}{dx^2} = -2x$ — 1

$\frac{dP}{dx} = 0 \Rightarrow x = 50$ — 1

when $x = 50 \Rightarrow \frac{d^2P}{dx^2} 0$ $\therefore$ P is maximum — 1

P = Rs 2280 — 1

43.(b)

$x^m y^n = (x+y)^{m+n}$

$m \log x + n \log y = (m+n) \log (x+y)$ — 1

Differentiation with respect to x

$\frac{m}{x} + \frac{n}{y}\frac{dy}{dx} = \frac{m+n}{x+y}\left(1 + \frac{dy}{dx}\right)$ — 2

$\frac{dy}{dx} = \frac{y}{x}$ — 2

44.(a)

$a = 36000, n = 7, i = 0.16$ — 1

$P \quad (1 \quad i)\frac{a}{i}\left|1 \quad \frac{1}{(1 \quad i)^n}\right| \quad (1 \quad 0.16)\frac{36000}{0.16}\left|1 \quad \frac{1}{(1 \quad 0.16)^7}\right|$ — 2

$\therefore$ P = Rs 1,68,709 — 2

44.(b) — 3

X	$x = X - 18$	x^2	Y	$y = Y - 18$	y^2	xy
6	-12	144	10	-9	81	108
8	-10	100	12	-7	49	70
12	-6	36	15	-4	16	24
15	-3	9	15	-4	16	12
18	0	0	18	-1	1	0
20	2	4	25	6	36	12
24	6	36	22	3	9	18
28	10	100	26	7	49	70
31	13	169	28	9	81	117
$\sum X = 162$	$\sum x = 0$	$\sum x^2 = 598$	$\sum Y = 171$	$\sum y = 0$	$\sum y^2 = 338$	$\sum xy = 431$

N= 9 , $\overline{X}=18, \overline{Y}=19$

$$r=\frac{\sum xy}{\sqrt{\sum x^2 \sum y^2}}=+0.959$$ 2

45.(a)

$$T_{n+1}=2nC_n(x)^n=\frac{2n!}{(2n-n)!n!}(x)^n$$ 2

$$=\frac{\{(2n)(2n-1)(2n-2).....5.4.3.2.1\}}{n!n!}(x)^n$$

$$=\frac{\{(2n)(2n-2)(2n-4)....4.2\}\{(2n-1)(2n-3)....5.3.1\}}{n!n!}(x)^n$$ 1

$$=\frac{\{1.3.5....(2n-1)\}}{n!}(x)^n$$ 2

45.(b)

x	f	Cumulative frequency	Mid x	$\lvert D\rvert=\lvert x-45.14\rvert$	$f\lvert D\rvert$
0-10	8	8	5	40.14	321.12
10-20	12	20	15	30.14	361.68
20-30	16	36	25	20.14	322.24
30-40	20	56	35	10.14	202.8
40-50	37	93	45	0.14	5.18
50-60	25	118	55	9.86	246.50
60-70	19	137	65	19.86	377.34
70-80	13	N = 150	75	29.86	388.18
	150				2225.04

2

L= 40, $\frac{N}{2}$=75, f=37, pcf=56, c=10

Median = $L+\left(\frac{\frac{N}{2}-pcf}{f}\right)\times c = 45.14$ 1

Mean deviation about median = $\frac{\sum f\lvert D\rvert}{N}=\frac{2225.04}{150}=14.83$ 2

46.(a)

$$\frac{\partial q}{\partial p_1}=-2p_1-p_2; \qquad \frac{\partial q}{\partial p_2}=3-p_1$$ 1

(i) $$\frac{Eq}{Ep_1}=-\frac{p_1}{q}\frac{\partial q}{\partial p_1}=\frac{-p_1}{250-p_1^{\,2}+3p_2-p_1p_2}(-2p_1-p_2)$$

when $p_1=2, p_2=1 \quad \Rightarrow \frac{Eq}{Ep_1}=\frac{10}{247}$ 2

(ii) $$\frac{Eq}{Ep_2}=-\frac{p_2}{q}\frac{\partial q}{\partial p_2}=\frac{-p_2}{250-p_1^{\,2}+3p_2-p_1p_2}(3-p_1)$$

when $p_1=2, p_2=1 \quad \Rightarrow \frac{Eq}{Ep_2}=\frac{-1}{247}$ 2

46.(b)

$y^2-8y-8x+24=0 \Rightarrow (y-4)^2=8(x-1)$ — 1

$Y^2=8X$

$a=2$ — 1

Vertex $(1,4)$; *Focus* $(3,4)$; *Axis* y=0

Equation of directrix x=-1

Length of Latus rectum (4a)=8. — 3

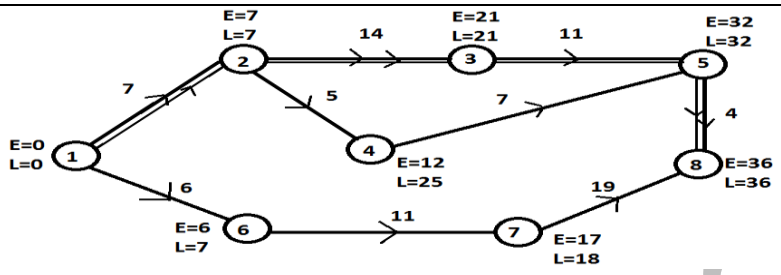
47.(a)

$p(A)=\frac{1}{2}, p(\bar{A})=\frac{1}{2}, p(B)=\frac{1}{3}, p(\bar{B})=\frac{2}{3}, p(C)=\frac{2}{5}, p(\bar{C})=\frac{3}{5}$ — 2

$p(A\cup B\cup C)=1-\overline{p(A\cup B\cup C)}=1-p(\bar{A}\cap\bar{B}\cap\bar{C})$ — 1

$=1-\frac{1}{5}=\frac{4}{5}$ — 2

47.(b)



2

Activity	Duration	EST	EFT = EST+t_{ij}	LST = LFT- t_{ij}	LFT
1-2	7	0	7	0	7
1-6	6	0	6	1	7
2-3	14	7	21	7	21
2-4	5	7	12	20	25
3-5	11	21	32	21	32
4-5	7	12	19	7	14
6-7	11	6	17	7	18
5-8	4	32	36	32	36
7-8	19	17	36	17	36

2

∴ The critical path is 1-2-3-5-8 and the duration of of time taken is 36 days — 1

MARK ANALYSIS (WITHOUT CHOICE)

PART	Questions	Total Questions	Book Back Questions	Interior/Creative Questions	Total Marks
I	1 Mark	20	13	7	20
II	2 Marks	10	7	3	20
III	3 Marks	10	8	2	30
IV	5 Marks	14	12	2	70
Total Marks			111	29	140
Percentage			79%	21%	100%