SHRI VIDHYABHARATHI MATRIC HR.SEC.SCHOOL
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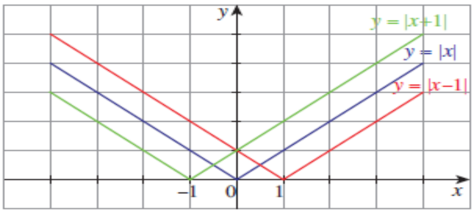
COMMON QUARTERLY EXAMINATION 2018

STD: XI **19.09.2018**

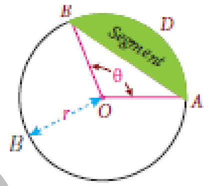
SUBJECT: MATHEMATICS **ANSWER KEY** **MARKS : 90**

SECTION – I		
Q.No	ANSWER KEY	MARKS
1.	d) $(-\infty,1]$	1
2.	** (Question wrong)	1
3.	d) f is neither one - one nor onto	1
4.	c) x	1
5.	a) $\frac{-1}{2}$	1
6.	b) $[2,\infty)$	1
7.	a) 2	1
8.	b) $(-\infty,-3]\cup[7,\infty)$	1
9.	a) 0	1
10.	c) $\frac{-a}{b}$	1
11.	c) $\frac{44}{117}$	1
12.	b) $2x, \frac{1}{x}$	1
13.	b) 3^4	1
14.	b) $\left(\frac{1}{2}\right)^n \times 2nc_n \times np_n$	1
15.	a) 2520	1
16.	a) $\frac{9!}{(2!)^3}$	1
17.	d) $10c_6 2^{10}$	1
18.	d) 20	1
19.	d) 309	1
20.	a) 3	1
SECTION – II		
21.	$n(A\Delta B)=n(A\cup B)-n(A\cap B)$ $n(A\Delta B)=10-3=7$ $n\left(p\left(A\Delta B\right)\right)=2^7=128$	 1 1
22.	Reflexive: If m-m = 0 $\Rightarrow$ mRm	

	R is reflexive Symmetric: Let mRn $\Rightarrow$ m-n =12 k, k is integer n-m = 12(-k) nRm R is symmetric. Transitive: Let mRn $\Rightarrow$ m-n =12 k Let nRp $\Rightarrow$ n-p =12l m-p =12 k +n-n +12l = 12(k+l) mRp R is transitive. R is equivalence relation.	1 1
23.	Domain = R - {5} Range = {-1}	1 1
24.	$\sqrt{6-4x-x^2}=x+4,\ x+4\geq 0$ $x^2+6x+5=0$ $x=-5(notpossible)[\because x\geq -4]$ $x=-1$	1 1
25.	$\cos 105°=\cos(60°+45°)$ $=\cos 60°\cos 45°-\sin 60° sin 45°$ $=\frac{1-\sqrt{3}}{2\sqrt{2}}$	1 1
26.	$\tan 2x=-\cot\left(x+\frac{\pi}{3}\right)$ $=\tan\left(\frac{\pi}{2}+x+\frac{\pi}{3}\right)$ $=\tan\left(\frac{5\pi}{6}+x\right)$ $x=n\pi+\frac{5\pi}{6},n\in Z$	1 1
27.	$\sin 100°+\cos 100°=\sin 100°+\cos(90°+10°)$ $=\sin 100°-\sin 10°$ $=2\cos 55°\sin 45°$ $=\sqrt{2}\cos 55°$	1 1
28.	$\frac{10!}{(10-r+1)!}=2\times\frac{6!}{(6-r)!}$ $(11-r)(10-r)(9-r)(8-r)(7-r)=7\times 6\times 5\times 4\times 3$ r =4	1 1
29.	Number of selection = $4C_3\times 48C_2$ $=4\times 1128=4512$	1 1
30.	9^7 = $(10-1)^7$	1

	$=7C_0(10)^7-7C_1(10)^6+7C_2(10)^5-7C_3(10)^4$ $+7C_4(10)^3-7C_5(10)^2+7C_6(10)^1-7C_7(10)^0$ $=4782969$	1
	SECTION – III	
31.		3
32.	$f(x)=f(y)$ $\frac{x}{x^2-1}=\frac{y}{y^2-1}$ $xy^2-x-yx^2+y=0$ $(y-x)(xy+1)=0$ $x=y,xy=-1$ $f(x)=f(y)\Rightarrow(2,-\frac{1}{2}),(7,-\frac{1}{2}),(-2,\frac{1}{2})$............ $f(2)=f(-\frac{1}{2})=\frac{2}{3}$ Hence not a 1 – 1 function	1 1 1
33.	Let $\frac{\log x}{y-z}=\frac{\log y}{z-x}=\frac{\log z}{x-y}=k$ $x=e^{k(y-z)},y=e^{k(z-x)},z=e^{k(x-y)}$ $xyz=e^0=1$	1 1 1
34.	$\|x\|=y$ $\frac{y-1}{y-3}\geq 0\quad,y\geq 1,y>1$ crictical points are -3,-1 ,1,3 Intervals $(-\infty,-3),(-3,-1),(-1,1),(1,3),(3,\infty)$ The solution set is $(-\infty,-3],[-1,1][3,\infty)$	1 2
35.	$A+B=45°$ $\tan(A+B)=\tan 45°$ $\tan A+\tan B=1-\tan A\tan B$ $LHS=(1+\tan A)(1+\tan B)$ $=1+\tan A+\tan B+\tan A\tan B$ $=2$	1 1 1
36.	$\cos B=\frac{a^2+c^2-b^2}{2ac}=\frac{44}{64}$ $\cos C=\frac{a^2+b^2-c^2}{2ab}=\frac{-1}{4}$ $LHS=4\left(\frac{44}{64}\right)+3\left(\frac{-1}{4}\right)=2$	1 1 1
37.	Number of ways = $1\times 8\times 7\times 2$ $=112$	2 1

38.	$\frac{(n+2)C_7}{(n-1)P_4}=\frac{13}{24}$ $\frac{(n+2)(n+1)n(n-1)!}{(n-1)!7!}=\frac{13}{24}$ $(n+2)(n+1)n=15\times14\times13$ $n=13$	1 1 1
39.	Rank $=\frac{5}{2!}\times5!+\frac{0}{2!}\times4!+\frac{0}{2!}\times3!+\frac{1}{0!}\times2!+\frac{1}{0!}\times1!+\frac{0}{0!}\times1!+1$ $=303$	2 1
40.	$3^{600}=(3^2)^{300}=9^{300}=(10-1)^{300}$ $=300C_0(10)^{300}-300C_1(10)^{299}+300C_2(10)^{298}-........$ $-300C_{299}(10)^1+300C_{300}(10)^0$ $=(10)^{300}-300(10)^{299}+........-3000+1$ The last two digit is 01	1 1 1
SECTION – IV		
41.	(a) $n(A\times A)=16$ $=n(A)\times n(A)=16,=n(A)=4$ $S=\{(a,b)\in A\times A:a<b\}$ Given $S=\{(-1,2),(0,1)\}$ Remaining of $S=\{(-1,0),(-1,1),(0,2),(1,2)\}$	2 3
	(b) $\frac{7+x}{(x^2+1)(x+1)}=\frac{A}{x+1}+\frac{Bx+c}{x^2+1}$ $x+7=A(x^2+1)+(Bx+c)(x+1)$ put , $x=-1\Rightarrow A=3$ $x=0\Rightarrow C=4$ $x=1\Rightarrow B=-3$ $\frac{7+x}{(x^2+1)(x+1)}=\frac{3}{x+1}+\frac{-3x+4}{x^2+1}$	1 3 1
42.	(a) Let y=3x-5 $x=\frac{y+5}{3}$ $g(y)=\frac{y+5}{3}$ $f\circ g(y)=f(g(y))=y$ $g\circ f(x)=g(f(x))=\frac{3x}{3}=x$ $f\circ g=I_Y$ and $g\circ f=I_x$ f and g are bijection and inverse to each other.f is bijective. $f^{-1}(y)=\frac{y+5}{3}$ $f^{-1}(x)=\frac{x+5}{3}$	1 1 1 1 1
	(b) $x^2+y^2=25$ $y=\pm\sqrt{25-x^2}$	

	$x=0 \Rightarrow y=\pm 5$ $y=0 \Rightarrow x=\pm 5$ $(0,5),(0,-5)\in R$ $x=3 \Rightarrow y=\pm 4$ $x=-3 \Rightarrow y=\pm 4$ Domain of $R=\{0,3,-3,-4,4,-5,5\}$ Domain of $R^{-1}=\{0,3,-3,-4,4,-5,5\}$	1 1 1 1 1
43.	(a) Given, one of the root is x=1 Using synthetic division we get, (x-1)(x-2)(x-3)=o other roots 2,3 x = 1,2,3.	1 2 2
	(b) Area of the segment =area of the sector –area of ΔOAB $=\frac{1}{2}r^2\theta-\frac{1}{2}r^2\sin\theta$ $=8[\theta-\sin\theta]$..........1 $\{\cos\theta=\frac{1}{2}\},\theta=\frac{\pi}{3}$ $=\frac{4}{3}\left[2\pi-3\sqrt{3}\right]m^2$ 	2 1 1 1
44.	(a) LHS= $a\sin\left(\frac{A}{2}+B\right)$ $=2R\sin A\sin\left(\frac{A}{2}+B\right)$ $=4R\sin\frac{A}{2}\cos\frac{A}{2}\sin\left(\frac{A}{2}+B\right)$ $=2R\sin\frac{A}{2}[\sin(A+B)+\sin B]$ $=2R\sin\frac{A}{2}\left[\frac{C}{2R}+\frac{B}{2R}\right]$ $=\sin\frac{A}{2}[b+c]$ =RHS	2 2 1
	(b) LHS= $\cos^2 x+\cos^2\left(x+\frac{\pi}{3}\right)+\cos^2\left(x-\frac{\pi}{3}\right)$ $=\frac{1+\cos 2x}{2}+\frac{1+\cos\left(2x+\frac{2\pi}{3}\right)}{2}+\frac{1+\cos\left(2x-\frac{2\pi}{3}\right)}{2}$ $=\frac{1}{2}\left[3+\cos 2x+\cos\left(2x+\frac{2\pi}{3}\right)+\cos\left(2x-\frac{2\pi}{3}\right)\right]$ (using cos C+cos D) $=\frac{1}{2}\left[3+\cos 2x+2\cos 2x\cos\left(\pi-\frac{\pi}{3}\right)\right]$	2 1 1

	$= \frac{1}{2}\ \ 3+\cos 2x-2\cos 2x.\frac{1}{2}$ $=\frac{3}{2}$ =RHS	1
45.	(a) LHS $=\sin^2\frac{\pi}{18}+\cos^2\left(\frac{\pi}{2}-\frac{\pi}{9}\right)+\sin^2\frac{7\pi}{18}+\cos^2\left(\frac{\pi}{2}-\frac{\pi}{18}\right)$ $=\sin^2\frac{\pi}{18}+\cos^2\frac{7\pi}{18}+\sin^2\frac{7\pi}{18}+\cos^2\frac{\pi}{18}$ =1+1 =2 =RHS	2 2 1
	(b) $P(n)=\frac{1}{2.5}+\frac{1}{5.8}+\text{...........}+\frac{1}{(3n-1)(3n+2)}=\frac{n}{6n+4}$ P(1)= $\frac{1}{10}=\frac{1}{10}$, P(1) is true Assume that P(k) is true. P(k)= $\frac{1}{2.5}+\frac{1}{5.8}+\text{...........}+\frac{1}{(3k-1)(3k+2)}=\frac{k}{6k+4}$ To prove P(k+1) is true P(k+1)= $\frac{1}{2.5}+\frac{1}{5.8}+\text{...........}+\frac{1}{(3k-1)(3k+2)}+\frac{1}{(3k+2)(3k+5)}$ $=\frac{k}{(6k+4)}+\frac{1}{(3k+2)(3k+5)}$ $=\frac{(k+1)(3k+2)}{2(3k+2)(3k+15)}=\frac{k+1}{6k+10}$ P (k+1) is also true. By the principle of mathematical induction p(n) is true for all $n\in N$	1 1 2 1
46.	(a) $(n-1)P_{r-1}\times$(sum of digits)×111...........1(r times) , n=5, r=4 $=4P_3\times(1+2+4+6+8)\times 1111$ =4×3×2×21×1111 =559944	1 2 2
	(b) Let a^n= $\left[b+(a-b)\right]^n$ $a^n=b^n+nC_1b^{n-1}(a-b)+nC_2b^{n-2}(a-b)^2+.....+(a-b)^n$ $a^n\quad(a\quad b)\ b^n\quad nC_1b^{n-1}\quad nC_2b^{n-2}(a\quad b)^1\quad .....\quad (a\quad b)^{n-1}$ $a^n\quad b^n\quad (a\quad b)\ b^n\quad nC_1b^{n-1}\quad nC_2b^{n-2}(a\quad b)^1\quad .....\quad (a\quad b)^{n-1}\quad b^n$ (a-b) is a factor of a^n-b^n	1 1 1 1 1
47.	(a) LHS= $\frac{(2n)!}{n!}=\frac{1.2.3.4.......(2n-2)(2n-1)2n}{n!}$ $=\frac{(1.3.5.......(2n-1))(2.4.6.........(2n-2)2n)}{n!}$ [separate odd and even] $=\frac{(1.3.5.......(2n-1))\times 2^n\times n!}{n!}$ $=(1.3.5.......(2n-1))\times 2^n$	2 1 1 1

	(b) $T_2 = nC_1 x^{n-1} a = 240..........(1)$ $T_3 = nC_2 x^{n-2} a^2 = 720.......(2)$ $T_4 = nC_3 x^{n-3} a^3 = 1080.......(3)$	1
	Dividing (2)by (1) and (3) by(2) $\frac{a}{x} = \frac{6}{n-1}..............(4)$ $\frac{a}{x} = \frac{9}{2(n-2)}........(5)$	1
	From (4)and (5) $\frac{6}{n-1} = \frac{9}{2(n-2)}$	1
	n=5 sub in (1)& (4) and div (1)by (4) $\Rightarrow \frac{5x^4 a}{\frac{a}{x}} = \frac{240}{\frac{6}{4}}$ we get **x=2** $\Rightarrow$ sub in 4we get **a=3**	2

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