GOVERNMENT OF KARNATAKA
KARNATAKA SCHOOL EXAMINATION AND ASSESSMENT BOARD

II PUC SUPPLEMENTARY EXAMINATION
MAY/JUNE 2023

SCHEME OF EVALUATION

Subject : Basic Mathematics ***Subject Code : 75***

Instructions:

a) Any answer by alternative method should be valued and suitably awarded.

Qn. No	***Part A***	***Marks***
1	b) $A' = \begin{bmatrix} 2 & 1 \\ 3 & -1 \\ -1 & 0 \end{bmatrix}$	1
2	a) $\frac{15}{4}$	1
3	c) 25	1
4	a) $\frac{1}{4}$	1
5	b)x is an integer and today is not a holiday	1
6	d) 5:2	1
7	a) $\frac{1}{2}$	1
8	d)10	1
9	a) $\frac{2x}{x^2-2}$	1
10	c) $-8\cos x + C$	1
11	360	1

12	1.2	1
13	2.4%	1
14	8%	1
15	-3	1
16	If x=2 then x(x-2) = 0	1
17	Rs.714.28	1
18	$y = ax^b$	1
19	$k = \frac{1}{2}$	1
20	5x+2	1
	PART - B	
21	$B + C = \begin{bmatrix} 5 & -3 \\ 0 & 5 \end{bmatrix}$	1
	$A(B + C) = \begin{bmatrix} 5 & 7 \\ 5 & 17 \end{bmatrix}$	1
22	$7! \times {}^8P_4$	2
23	i. $\frac{2}{36}$	1
	ii. $\frac{1}{36}$	1
24	$\sim (p \rightarrow q) V \sim (q \rightarrow p)$	1
	$(P \wedge \sim q) V (q \wedge \sim p)$	1
25	$\frac{3x-1000}{4x-1000} = \frac{1}{2}$	1
	x=500 .Hence incomes are 1500 and 2000	1
26	BD = Rs 110	1
	F = Rs 1100	1
27	Formula with substitution	1
	LHS = $\frac{1}{\sqrt{2}}\cos A + \frac{1}{\sqrt{2}}\sin A + \frac{1}{\sqrt{2}}\cos A - \frac{1}{\sqrt{2}}\sin A$ and simplification	1

28	LHS $= \dfrac{\sin 3\theta.\cos\theta - \cos 3\theta.\sin\theta}{\sin\theta.\cos\theta}$	1
	LHS $= \dfrac{\sin 2\theta}{\sin\theta.\cos\theta} = 2$	1
29	a = 2 , focus = (0,2)	1
	Directrix is y = -2	1
30	$\lim\limits_{x\to 1} 4x+3 = k+x$	1
	Finding k = 6	1
31	$y = \sqrt{x+y} \Rightarrow y^2 = x+y$	1
	$2y\dfrac{dy}{dx} = 1 + \dfrac{dy}{dx}$ rearranging and simplifying to get the answer.	1
32	$v = 80 - 32t$ Hence $v = 16\ ft/\sec$	1
	$acceleration = -32\ ft^2/\sec$	1
33	$\log x.\dfrac{x^2}{4} - \int \dfrac{x^4}{4}.\dfrac{1}{x}dx$	1
	$\dfrac{x^4 \log x}{4} - \dfrac{x^4}{16} + C$	1
34	Given integral = $-\cos x + \sin x\Big]_0^{\pi/2} = \left(-\cos\dfrac{\pi}{2} + \sin\dfrac{\pi}{2}\right) - (-\cos 0 + \sin 0)$	1
	1+1 = 2	1
	PART - C	
35	$\Delta = \begin{vmatrix} 2 & 1 \\ 1 & -3 \end{vmatrix} = -6 - 1 = -7$ $\Delta x = \begin{vmatrix} 1 & 1 \\ 4 & -3 \end{vmatrix} = -3 - 4 = -7$ $\Delta y = \begin{vmatrix} 2 & 1 \\ 1 & 4 \end{vmatrix} = 8 - 1 = 7$	1
	$x = 1$ $y = -1$	1+1

36	$c_1' \to c_1 + c_2 + c_3$ $\begin{vmatrix} x+9 & 3 & 4 \\ x+9 & x+3 & 4 \\ x+9 & 3 & x+4 \end{vmatrix}$ $R_2' \to R_2 - R_1, R_3' \to R_3 - R_1$ $(x+9)\begin{vmatrix} 1 & 3 & 4 \\ 0 & x & 0 \\ 0 & 0 & x \end{vmatrix} = 0$	2
	x+9 = 0 or $x^2 = 0$ Therefore x = -9,0	1
37	${}^5C_4 \times {}^4C_2 \times {}^3C_2 = 90$	1
	${}^5C_3 \times {}^4C_3 \times {}^3C_2 + {}^5C_3 \times {}^4C_4 \times {}^3C_1 + {}^5C_4 \times {}^4C_3 \times {}^3C_1 = 210$	1
38	P(India loses) = $\frac{2}{3}$ i. $\frac{1}{27}$ ii. $\frac{8}{27}$ iii. $1 - \frac{8}{27} = \frac{19}{27}$	1 1 1
39	Total distance = x Distance covered by Aeroplane = $\frac{5}{9}x$ Distance covered by train = $\frac{1}{3}x$ Distance covered by car = 200 km	1
	Given x = $\frac{5}{9}x + \frac{1}{3}x + 200$	1
	Solving x = 1800 km	1
40	LDD = 30-6-2018	1
	Unexpired period t = 73 days = 0.2 y	1
	BD = Rs 49 , Discounted value = Rs 3451	1
41	Amount obtained by selling at 3% = $\frac{2100 \times 121}{100} = 2541$ Income = $\frac{2100 \times 3}{100} = 63$	1
	New Income = 63 + 14 = 77	1

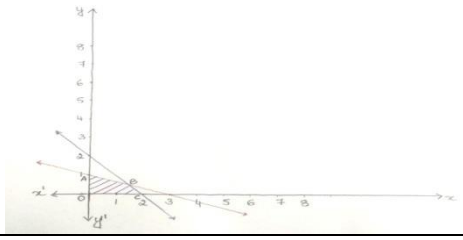
	Market price of 5% stock = $\frac{2541\times 5}{77}=165$	1
42	i. After 10% discount, SP = 24000 – 2400 = 21600	1
	Amount paid = 21600 + 10% = 23760	1
	ii. VAT = 10% (21600 – 16800) = 480	1
43	Writing $x^2=4ay$	1
	Substituting x = -1 , y = -3 and getting a = $\frac{-1}{12}$	1
	Ans $3x^2=-y$	1
44	$\frac{dx}{dt}=a\left(1+\frac{1}{t^2}\right)$	1
	$\frac{dy}{dt}=a\left(1-\frac{1}{t^2}\right)$	1
	$\frac{dy}{dx}=\frac{a\left(1-\frac{1}{t^2}\right)}{a\left(1+\frac{1}{t^2}\right)}=\frac{t^2-1}{t^2+1}$	1
45	$A=\pi r^2$ $\frac{dA}{dt}=\pi 2r\frac{dr}{dt}$	1
	$\frac{dr}{dt}=\frac{4}{3\pi}$	1
	$\frac{dC}{dt}=\frac{8}{3}$	1
46	$f'(x)=3x^2-3$ $f''(x)=6x$ $f'(x)=0\Rightarrow x=1,x=-1$	1
	$f''(1)=6>0\Rightarrow$ min at $x=1$ $f''(-1)=-6<0\Rightarrow$ max at $x=-1$	1
	$f_{\max}=2$ $f_{\min}=-2$	1
47	$3+\log(\sin x)=t$	1
	Given integral = $\int\frac{dt}{t}=\log t+C$	1
	= $\log\left(3+\log(\sin x)\right)+C$	1
48	$\frac{4x+5}{(x-1)(x+2)}=\frac{3}{x-1}+\frac{1}{x+2}$	2
	Ans = $3\log(x-1)+\log(x+2)+C$	1

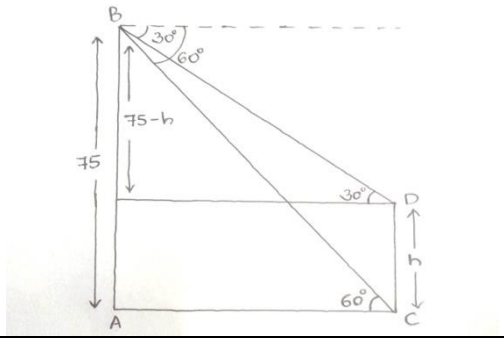
	PART - D	
49	$\begin{bmatrix}1 & 1 & -1\\ 3 & 1 & -2\\ 1 & -1 & -1\end{bmatrix}\begin{bmatrix}x\\ y\\ z\end{bmatrix}=\begin{bmatrix}1\\ 3\\ -1\end{bmatrix}$; AX = B	
	$\lvert A\rvert = 2$	1
	$adjA=\begin{bmatrix}-3 & 2 & -1\\ 1 & 0 & -1\\ -4 & 2 & -2\end{bmatrix}$	2
	$X=\frac{1}{2}\begin{bmatrix}-3 & 2 & -1\\ 1 & 0 & -1\\ -4 & 2 & -2\end{bmatrix}\begin{bmatrix}1\\ 3\\ -1\end{bmatrix}=\frac{1}{2}\begin{bmatrix}4\\ 2\\ 4\end{bmatrix}=\begin{bmatrix}2\\ 1\\ 2\end{bmatrix}$	1
	$x=2, y=1, z=2$	1
50	Formula with substitution	1
	$T_{r+1}={}^{9}C_{r}\left(\frac{2^{18-3r}}{3^{9-2r}}\right)x^{18-3r}$	2
	$18-3r=0\Rightarrow r=6$	1
	Final answer = ${}^{9}C_{3}\left(3^{3}\right)$	1
51	$\frac{3x+4}{(x+1)^{2}(x-1)}=\frac{A}{x-1}+\frac{B}{x+1}+\frac{C}{(x+1)^{2}}$	1
	$A=\frac{7}{4}, B=\frac{-7}{4}, C=\frac{-1}{2}$	3
	Conclusion	1
52		

p	q	**p ^ q**	~ q	p →~q	**~(p →~q)**
T	T	**T**	F	F	**T**
T	F	**F**	T	T	**F**
F	T	**F**	F	T	**F**
F	F	**F**	T	T	**F**

1 1 1 1 1

53	6:12 5:8 9:6 } = 540 : x	3
	Solving and getting x = Rs 1152	2

<table>
<tr><td>54</td><td>
<table>
<tr><td>No of units</td><td>Total output</td><td>Cumulative average time per unit</td><td>Total Hrs</td></tr>
<tr><td>1</td><td>1</td><td>6000</td><td>6000</td></tr>
<tr><td>1</td><td>2</td><td>4800</td><td>9600</td></tr>
<tr><td>2</td><td>4</td><td>3840</td><td>15360</td></tr>
</table>
</td><td>4</td></tr>
<tr><td></td><td>Total labour cost = 15360 × 20 = Rs 307200</td><td>1</td></tr>
<tr><td>55</td><td>  </td><td>3</td></tr>
<tr><td></td><td>Corner points Z= 3x + 5y
O(0,0) Z = 0
A(0,1) Z = 5
B(3/2,1/2) Z = 7
C(2,0) Z = 6</td><td>1</td></tr>
<tr><td></td><td>Maximum Z = 7 at x = 3/2 y = 1/2</td><td>1</td></tr>
<tr><td>56</td><td>$LHS = \frac{(\sin 5A + \sin A) + (\sin 4A + \sin 2A)}{(\cos 5A + \cos A) + (\cos 4A + \cos 2A)}$</td><td>1</td></tr>
<tr><td></td><td>$\frac{2\sin 3A.\cos 2A + 2\sin 3A.\cos A}{2\cos 3A.\cos 2A + 2\cos 3A.\cos A}$</td><td>2</td></tr>
<tr><td></td><td>$\frac{2\sin 3A(\cos 2A + \cos A)}{2\cos 3A(\cos 2A + \cos A)} = \tan 3A$</td><td>2</td></tr>
<tr><td>57</td><td>$\frac{dy}{dx} = e^x \frac{1}{x} + e^x \log x$</td><td>1</td></tr>
<tr><td></td><td>$xy_1 = e^x + xy$
$xy_2 + y_1 = e^x + (xy_1 + y)$</td><td>2</td></tr>
<tr><td></td><td>$xy_2 + y_1 = xy_1 - xy + xy_1 + y$</td><td>1</td></tr>
<tr><td></td><td>Rearranging and getting the answer</td><td>1</td></tr>
<tr><td>58</td><td>Finding x = 0 and x = 5</td><td>1</td></tr>
<tr><td></td><td>Required Area = $\int_0^5 \left(\sqrt{5x} - x\right)dx = \sqrt{5}\left(\frac{x^{3/2}}{3/2} - \frac{x^2}{2}\right]_0^5\right)$</td><td>3</td></tr>
<tr><td></td><td>$\frac{25}{6}$</td><td>1</td></tr>
</table>

59	$x^2 + y^2 + 2gx + 2fy + c = 0$	1
	Writing c = 0 Circle passing through (3,-1) and (3,-3) : 6g – 2f = -10 6g – 6f = -18 Solving to get g = -1 , f = 2	1 2
	Writing $x^2 + y^2 - 2x + 4y = 0$	1
	Proving for concyclic points	1
	OR	
	Proving for n = + ve integer	2
	Proving for n = -ve integer	2
	Proving for n = rational number	2
60		1
	$\tan 60^\circ = \frac{75}{AC} \Rightarrow AC = \frac{75}{\sqrt{3}}$	1
	$\tan 30^\circ = \frac{75-h}{AC} \Rightarrow AC = \sqrt{3}(75-h)$	1
	Solving and getting h = 50	1
	OR	
	$(1.1)^5 = (1+0.1)^5$	1
	$= 1 + {}^5C_1(0.1) + {}^5C_2(0.1)^2 + {}^5C_3(0.1)^3 + {}^5C_4(0.1)^4 + (0.1)^5$	1
	$= 1 + 5(0.1) + 10(0.01) + 10(0.001) + 5(0.0001) + 0.00001$	1
	$= 1.61051 = 1.6105$	1
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