GOVERNMENT OF KARNATAKA

KARNATAKA STATE PRE-UNIVERSITY EDUCATION EXAMINATION BOARD

II YEAR PUC EXAMINATION – 2017

SCHEME OF VALUATION

Subject Code : 75 Subject : BASICMATHS. (NS)

Qn. No.	part A.	Marks
1	$R_2 \to R_2 - R_1$ $\begin{vmatrix} 3200 & 3201 \\ 2 & 2 \end{vmatrix} \Rightarrow 2\begin{vmatrix} 3200 & 3201 \\ 1 & 1 \end{vmatrix} = -2$	1
2.	$(10-1)! = 9!$	1
3.	x is an integer or 5 is an odd number	1
4	$3^3 : 5^3 \Rightarrow 27 : 125$	1
5	Date of drawing = LDD − (0-3-0) − (3-0-0) = 18-8-2012 − (0-3-0) − (3-0-0) = 15-5-2012	1
6.	$\cos 3(20^\circ) = \cos 60^\circ = \frac{1}{2}$	1
7.	$4K = 8 \Rightarrow K = 2$	1
8	$\frac{3^2-3}{3-2} = \frac{9-3}{1} = 6$	1

Qn. No.		Marks
9.	Let $y = 5e^{x} - \log_e x - 3\sqrt{x}$	
	$\frac{dy}{dx} = 5e^{x} - \frac{1}{x} - \frac{3}{2\sqrt{x}}$	1
10.	$\int \sec^2(x-5)\,dx = \tan(x-5) + C$	1
	Part B	
11.	$AB = \begin{bmatrix} 2 & 8 & 4 \\ -1 & -4 & -2 \\ 3 & 12 & 6 \end{bmatrix}$	1
	$BA = [4]$	1
12.	One hand shaking needs 2 members	1
	Required number of hand shakings $= 25C_2$	
	$= \frac{25!}{(25-2)!\,2!} = 300$	1
13	Total beads = 6 white + 4 Red = 10 = n	
	Any one of the 6 white bead can be selected i.e m = 6	1
	p(getting a white bead) $= \frac{\cancel{6}}{\cancel{10}} = \frac{3}{5}$	1
14.	$\begin{array}{c\|c\|c\|c\|c} p & q & r & q\to r & p\to(q\to r) \\ F & T & F & F & T \end{array}$	2
15.	$\frac{a}{b} = \frac{4}{5} \Rightarrow a=4 \quad b=5$	1
	$\frac{3a+2b}{3a-2b} = \frac{11}{1}$	1

Qn. No.		Marks
16.	$t = 6m = \frac{1}{2}yr \quad r = 0.04 \quad BG = ₹24.$ $BG = TD.t.r = ₹\,1200$	1.
	$BD = BG + TD = ₹1224$	1
17.	$LHS = \dfrac{3\sin A - 4\sin^3 A}{1 + 2(1 - 2\sin^2 A)}$	1
	$= \dfrac{\sin A\,\cancel{(3 - 4\sin^2 A)}}{\cancel{3 - 4\sin^2 A}} = \sin A = RHS$	1
18.	$\tan(A+B) = \dfrac{\tan A + \tan B}{1 - \tan A \tan B} = \dfrac{\frac{5}{6} + \frac{1}{11}}{1 - \frac{5}{6} \times \frac{1}{11}}$	1
	$\tan(A+B) = 1.$ $A + B = \frac{\pi}{4}$	1
19.	$CO = r \Rightarrow r = \sqrt{(4-0)^2 + (-2-0)^2}$ $r = \sqrt{16+4} = \sqrt{20}.$	1
	Equation is $(x-4)^2 + (y+2)^2 = 20$ $x^2 + y^2 - 8x + 4y = 0$	1
20.	$LHL = \lim_{x \to 0^-} \left\{ (1+3x)^{\frac{1}{3x}} \right\}^3 = e^3$ $RHL = \lim_{x \to 0^+} \left\{ (1+3x)^{\frac{1}{3x}} \right\}^3 = e^3$	1
	$f(3) = e^3$ $f(x)$ is continuous at $x = 0$	1

Qn. No.		Marks
21.	$x = \dfrac{\sin y}{\sin(a+y)}$	
	$\dfrac{dx}{dy} = \dfrac{\sin(a+y)\cos y - \sin y \cos(a+y)}{\sin^2(a+y)}$	1
	$\dfrac{dx}{dy} = \dfrac{\sin a}{\sin^2(a+y)} \Rightarrow \dfrac{dy}{dx} = \dfrac{\sin^2(a+y)}{\sin a}$	1
22.	$\dfrac{ds}{dt} = 3at^2 + b \quad \dfrac{d^2s}{dt^2} = 6at.$	1
	$\left\{\begin{array}{l} \text{At } t = 3 \quad a = \frac{7}{9}, \quad b = -21 \\ v = 0 \\ \text{Acceleration} = 14. \end{array}\right.$	1
23	put $3^x + 1 = t \Rightarrow 3^x \log 3\, dx = dt$	1
	$\left.\begin{array}{l} \int \frac{3^x \log 3\, dx}{3^x+1} = \int \frac{dt}{t} = \log t + c \\ = \log(3^x+1) + c \end{array}\right\}$	1
24.	$\int_1^2 \dfrac{dx}{2x+3}$ put $\left.\begin{array}{l} 2x+3 = t, \quad x = 1, \; t = 5 \\ dx = \frac{dt}{2} \quad x = 2, \; t = 7 \end{array}\right\}$	1
	$= \dfrac{1}{2}\displaystyle\int_5^7 \dfrac{dt}{t}$	1
	$= \dfrac{1}{2}\log\left(\dfrac{7}{5}\right)$	

Qn. No	Part C	Marks
25	$\left\{ 2A+B = \begin{bmatrix} 3 & -1 \\ -2 & 5 \end{bmatrix} \right\}$ multiply by 2	
	$4A+2B = \begin{bmatrix} 6 & -2 \\ -4 & 10 \end{bmatrix}$	
	$A-2B = \begin{bmatrix} 4 & 2 \\ -1 & 5 \end{bmatrix}$	2
	$5A = \begin{bmatrix} 10 & 0 \\ -5 & 15 \end{bmatrix} \Rightarrow A = \begin{bmatrix} 2 & 0 \\ -1 & 3 \end{bmatrix}$	
	$B = \begin{bmatrix} -1 & -1 \\ 0 & -1 \end{bmatrix}$	1
26.	$C_1' \to C_1 + C_2 + C_3$	
	$\begin{vmatrix} x+1 & 3 & -4 \\ x+1 & 3+x & -4 \\ x+1 & 3 & -4+x \end{vmatrix} = 0$	1
	$(x+1)\begin{vmatrix} 1 & 3 & -4 \\ 1 & 3+x & -4 \\ 1 & 3 & -4+x \end{vmatrix} = 0$	1
	$R_1' \to R_1 - R_2, \quad R_2' \to R_2 - R_3$	
	$(x+1)\begin{vmatrix} 0 & -x & 0 \\ 0 & x & -x \\ 1 & 3 & -4+x \end{vmatrix} = 0$	1
	$\boxed{x=-1}$ $\boxed{x=0}$	

Qn. No.		Marks
27.	Given $n=11$ of which 3 E's 3 N's 2 G's & 2 I's.	
	Total number of permutations $= \frac{11!}{3!\,3!\,2!\,2!}$	2
i)	Required no. of permutations $= \frac{9!}{3!\,2!\,2!}$	1
II	Required no. of permutations $= \frac{9!}{3!\,2!\,2!}$	1
28.	$S=\{1,2,3,4,5,6\}$, $E=\{3,6\}=2$	
	$F=\{2,4,6\}=3$	
	$E\cap F=\{6\}$	1
	$P(E)=\frac{2}{6}$, $P(F)=\frac{3}{6}$, $P(E)\cdot P(F)=\frac{1}{6}$	1
	$P(E\cap F)=\frac{1}{6}=P(E)\times P(F)$	1
	Hence E and F are independent	
(29)	Tap 1 can fill $\frac{1}{12}$th of the tank in 1 minute Tap 2 can fill $\frac{1}{15}$th of the tank in 1 min	1
	Drain pipe can drain $\frac{1}{20}$th of the tank in 1 minute In 1 minute 3 pipes can fill $\left(\frac{1}{12}+\frac{1}{15}-\frac{1}{20}\right)=\left(\frac{1}{10}\right)^{th}$ of the tank	1

Qn. No.		Marks
	The whole tank will be filled in 10 minutes	1
30.	For a shirt $MP = ₹x$ (say) $SP = MP + ST\%$ on MP $336 = x + 12\%$ of x $\boxed{x = ₹300}$ For a necktie $MP = ₹y$ (say) $110 = y + 10\%$ of y $\boxed{y = ₹100}$	2
	Total amount $= x + y = 300 + 100$ (printed amount) $= ₹400$	1
31.	$F = ₹5000$ $DV = ₹4520$, $t = 146$ days $t = \frac{146}{365}$ yrs.	1
	$BD = F - DV = ₹480$	1
	$BD = Ftr \Rightarrow r = 20.24\%$	1
32.	cost of 10 shares at the rate of ₹2020/share $= 10 \times 2020 = ₹20,200$	1
	Brokerage for ₹20,200 is $= \frac{20200 \times 5}{1000} = ₹101$	1
	Total amount required to buy the 10 shares $= 20,200 - 101 = ₹20,099$	1

Qn. No.		Marks
33.	F(4,0), since x coordinate of the focus is given, so the required parabola lies on x-axis. Its equation is $y^2=4ax$	1
	a = 4, which is positive. So it is a Right handed parabola.	1
	Its equation is $y^2 = 4\times 4x = 16x$	1
	Equation of the tangent at V is $x=0$	1
34.	$\frac{dx}{d\theta} = -4a\cos^3\theta\sin\theta$.	1
	$\frac{dy}{d\theta} = 4a\sin^3\theta\cos\theta$	1
	$\frac{dy}{dx} = \frac{dy/d\theta}{dx/d\theta} = \frac{4a\sin^3\theta\cos\theta}{-4a\cos^3\theta\sin\theta} = -\tan^2\theta$	1
35.	$x = 200\,cm$, $\frac{dx}{dt} = \sqrt{3}\ cm/sec$	
	Area of the equilateral Δle $= \frac{\sqrt{3}}{4}x^2$	1
	$\frac{dA}{dt} = \frac{\sqrt{3}}{4}\,2x\frac{dx}{dt} = 300\ cm^2/sec$	2
36	Let the 2 nos be x & $14-x$ & p be their square sum	
	$p = x^2+(14-x)^2 = 2x^2-28x+196$	1

Qn. No.		Marks
	$\frac{dp}{dx} = 4x - 28 \Rightarrow \frac{d^2p}{dx^2} = 4 > 0$ Minimum	1
	$\frac{dp}{dx} = 0 \Rightarrow x = 7$	
	2 numbers are $x = 7$ and $(14-7) = 7$	1
	$\therefore$ 7, 7 are the required 2 numbers	
37.	$\int \frac{1+\cos 2x}{1-\cos 2x}\,dx = \int \frac{2\cos^2 x}{2\sin^2 x}\,dx$	1
	$= \int \cot^2 x\,dx$ $= \int (\operatorname{cosec}^2 x - 1)\,dx$	1
	$= -\cot x - x + C$	1
38.	$\int_0^1 (6x+1)\sqrt{3x^2+x+5}\,dx$	
	put $3x^2+x+5 = t$ $(6x+1)\,dx = dt$ $x = 0$, $t = 5$ $x = 1$, $t = 9$	1
	$= \int_5^9 \sqrt{t}\,dt = \frac{2}{3}\left(t^{\frac{3}{2}}\right)_5^9$	1
	$= \frac{2}{3}\left(27 - 5\sqrt{5}\right)$	1

Qn. No.	part D.	Marks
39.	$(\sqrt{2}+1)^6 = 8+24\sqrt{2}+60+40\sqrt{2}+30+6\sqrt{2}+1$ — (1)	3
	similarly	
	$(\sqrt{2}-1)^6 = 8-24\sqrt{2}+60-40\sqrt{2}+30-6\sqrt{2}+1$	1
	— (2)	
	Equations (1) − (2) gives	
	$(\sqrt{2}+1)^6-(\sqrt{2}-1)^6 = 140\sqrt{2}$	1
40.	$\dfrac{2x^2-4x+1}{(x-2)(x-3)^2} = \dfrac{A}{x-2}+\dfrac{B}{x-3}+\dfrac{C}{(x-3)^2}$ — (1)	
	Taking L.C.M on bothsides	1
	$2x^2-4x+1 = A(x-3)^2+B(x-2)(x-3)+C(x-2)$	
	— (2)	1
	To find $A=1$ $C=7$	1
	To find $B=1$	1
	Substituting A, B, C values in (1) we get	
	$\dfrac{2x^2-4x+1}{(x-2)(x-3)^2} = \dfrac{1}{x-2}+\dfrac{1}{x-3}+\dfrac{7}{(x-3)^2}$	1

Qn. No.		Marks

41

p	q	$p \vee q$	$\sim p$	$\sim q$	$\sim p \wedge \sim q$	$(p \vee q) \wedge (\sim p \wedge \sim q)$
T	T	T	F	F	F	F
T	F	T	F	T	F	F
F	T	T	T	F	F	F
F	F	F	T	T	T	F

	Marks
<u>To write</u> : p & q	1
$p \vee q$	1
$\sim p$ and $\sim q$	1
$\sim p \wedge \sim q$	1
Last column and conclusion	1

42. Let the 3 parts be x, y, z

$\frac{3}{7}x = \frac{2}{3}y = \frac{4}{5}z$ → 1

$\frac{x}{y} = \frac{2}{3} \times \frac{7}{3} = \frac{14}{9}$ ① | $\frac{y}{z} = \frac{4}{5} \times \frac{3}{2} = \frac{6}{5}$ ② 1

multiply on RHS of ① ~~& ②~~ by 2
and ② by 3

$x : y = 28 : 18$ $y : z = 18 : 15$

$x : y : z = 28 : 18 : 15$ 2

$\Rightarrow x = 27,$

x Receives $= 28 \times 27 = ₹756$

y — " — $= 18 \times 27 = ₹486$ 1

z — " — $= 15 \times 27 = ₹405$

Qn. No.		Marks

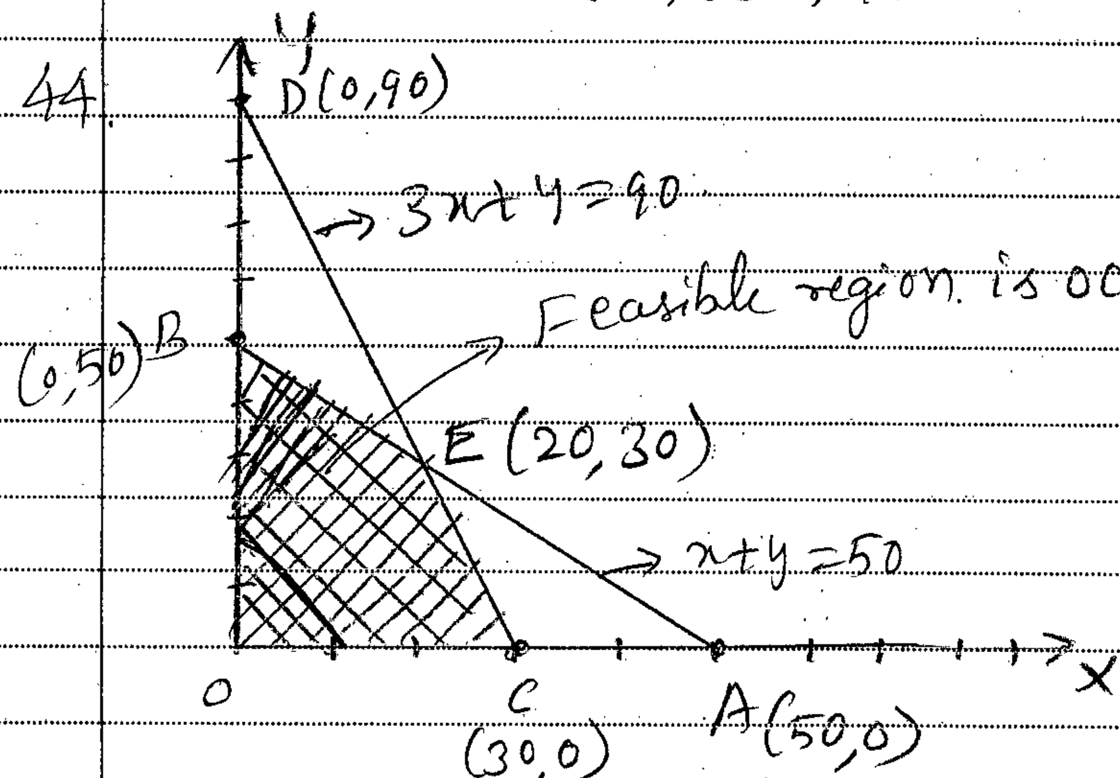
43. Assume 10 units = 1 lot
160 units = 16 lots — 1

units produced	Total output in units	cumulative Average time / lot (in hours)	Total Time in hours
1	1	100.	100
1	2	80% of 100 = 80	160
2	4	80% of 80 = 64	256
4	8	80% of 64 = 51.2	409.6
8	16	80% of 51.2 = 40.96	655.36

Marks: 3

Total time taken for 160 units = 655.36 hrs
Total cost = ₹ 9830,40 — 1

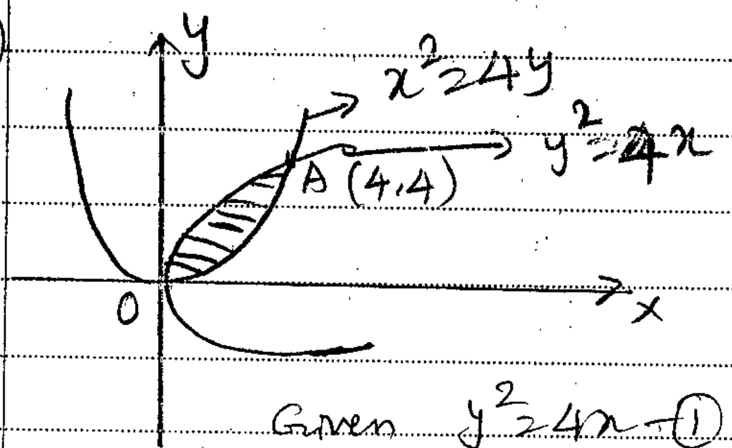
44.



Marks: 3

At O(0,0) ⇒ Z = 0, At C(30,0) Z = 1800
At E(20,30), Z = 1650, At B(0,50)
Z = 750 — 1

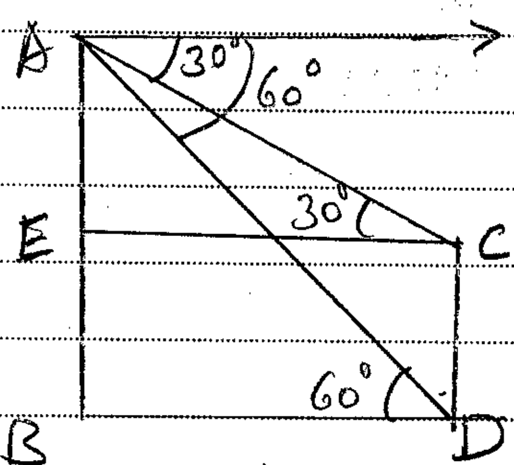
Qn. No.		Marks
	Z is maximum at C $Z_{max} = 1800$	1
	at which $x = 30$ $y = 0$.	
45	$LHS = \sin 20^\circ \sin 40^\circ \sin 60^\circ \sin 80^\circ$	
	$= \sin 40^\circ \sin 20^\circ \frac{\sqrt{3}}{2} \sin 80^\circ$	1
	$= \frac{\sqrt{3}}{2}\left[-\frac{1}{2}(\cos 60^\circ - \cos 20^\circ)\right] \sin 80^\circ$	
	$= -\frac{\sqrt{3}}{4}\left[\frac{1}{2}\sin 80^\circ - \sin 80^\circ \cos 20^\circ\right]$	
	$= -\frac{\sqrt{3}}{4}\left[\frac{1}{2}\sin 80^\circ - \frac{1}{2}(\sin 100^\circ + \sin 60^\circ)\right]$	
	$= -\frac{\sqrt{3}}{8}\left[\sin 80^\circ - \sin 100^\circ - \frac{\sqrt{3}}{2}\right]$	
	$= -\frac{\sqrt{3}}{8}\left[\sin 80^\circ - \{\sin(100 - 80^\circ)\} - \frac{\sqrt{3}}{2}\right]$	4
	$= -\frac{\sqrt{3}}{8}\left[\cancel{\sin 80^\circ} - \cancel{\sin 80^\circ} = \frac{\sqrt{3}}{2}\right]$	
	$= \frac{\sqrt{3}}{16} = RHS$	
46.	Let the required equation of the cle	
	be $x^2 + y^2 + 2gx + 2fy + c = 0$ — (1)	
	$10g + 2f + c = -26$ — (2)	1
	$6g + 8f + c = -25$ — (3)	1
	Centre lies on x-axis $\Rightarrow f = 0$	
	(2) $\Rightarrow$ $10g + c = -26$ — (4)	1
	(3) $\Rightarrow$ $6g + c = -25$ — (5)	
	Solving (4) & (5) $\underbrace{g = -\frac{1}{4}, f = 0, c = -15}$ $\rightarrow$ 1	1

Qn. No.		Marks
	Equation (1) $\Rightarrow 2x^2+2y^2-x-30=0$.	1
47.	$y = x+\sqrt{x^2-1}$	
	$y_1 = 1+\frac{(2x-0)}{2\sqrt{x^2-1}} = \frac{\sqrt{x^2-1}+x}{\sqrt{x^2-1}} = \frac{y}{\sqrt{x^2-1}}$	1
	$\sqrt{x^2-1}\ y_1 = y$ — (1)	1
	Differentiate w.r.t. x	
	$\sqrt{x^2-1}\ y_2 + y_1 \frac{x}{\sqrt{x^2-1}} = y_1$	1
	$\frac{(x^2-1)y_2 + xy_1}{\cancel{\sqrt{x^2-1}}} = \frac{y}{\cancel{\sqrt{x^2-1}}}$ (using (1))	1
	$\boxed{(x^2-1)\ y_2 + xy_1 - y = 0}$	1
48)		1
	Given $y^2=4x$ — (1) $x^2=4y$ — (2)	
	solving (1) & (2) & finding $x=0$ $x=4$	2
	Required Area bounded between the curves $= \int_0^4 y\,dx_{(1)} - \int_0^4 y\,dx_{(2)}$	1
	Answer $\boxed{A = \frac{16}{3} \text{ square units}}$	1

Qn. No.	part E	Marks
V 49	(a) Let x, y, z be the punctuality, good behaviour and hard working respectively	1
	$x+y+z=6000$ — (1)	
	$x+0y+3z=11000$ — (2)	
	$x+z=2y \Rightarrow x-2y+z=0$ — (3)	1
	$A=\begin{bmatrix}1&1&1\\1&0&3\\1&-2&1\end{bmatrix}$ $X=\begin{bmatrix}x\\y\\z\end{bmatrix}$ $B=\begin{bmatrix}6000\\11000\\0\end{bmatrix}$	
	$\lvert A\rvert=6\neq 0$. A^{-1} exists.	1
	$\text{Adj}A=\begin{bmatrix}6&-3&3\\2&0&-2\\-2&3&-1\end{bmatrix}$	1
	$A^{-1}=\frac{1}{6}\begin{bmatrix}6&-3&3\\2&0&-2\\-2&3&-1\end{bmatrix}$	1
	$X=A^{-1}B$ $x=₹500, y=₹2000,$ $z=₹3500$	1
b)	(i) $MR=\frac{d}{dx}(TR)=400-4x$	1
	$MC=\frac{d}{dx}(TC)=4x+40$	1
II	$AR=\frac{TR}{x}=400-2x$	1
	$AC=\frac{TC}{x}=2x+40+\frac{4000}{x}$	1

Qn. No.		Marks
50	(a) case (i) when n is a +ve integer.	2
	Case II when n is a −ve integer. Take $n = -m$ (m is a +ve integer)	2
	Case III when n is any fraction say $n = p/q$ $(q \neq 0)$	2

b)



	(figure) →	1
	Explanation. From the Right angled Δle ~~ABD~~. $BD = \frac{75}{\sqrt{3}}$	1
	From the Right angled Δle AEC $BD = \sqrt{3}(75 - CD)$	1
	To find $h = 50$ ft	1