GOVERNMENT OF KARNATAKA

KARNATAKA STATE PRE-UNIVERSITY EDUCATION EXAMINATION BOARD

II YEAR PUC EXAMINATION - 2017

SCHEME OF VALUATION (05)

Subject Code : 75 Subject : Basic Mathy

Qn. No.		Marks
1	T	1
2	$(12-1)!$ or $11!$	1
3	$\text{adj } A = \begin{bmatrix} -3 & -8 \\ +2 & 5 \end{bmatrix}$	1
4	10 : 3	1
5	64 : 121	1
6.	learning index $b = \frac{\log(\text{learning ratio})}{\log 2}$	1
7.	Eqn of LR is $y = 2$	1
8	e^5	
9	$\frac{dy}{dx} = y$	1
10	$ax^2 - b\log x + cx + k$	1
11	Inverse: If two integers are not equal then their squares are not equal	1
	Contrapositive: If squares of 2 integers are equal then they are equal.	1

Qn. No.		Marks
12	$nC_r = \frac{n!}{(n-r)!\,r!}$	(1)
	$nC_{n-r} = \frac{n!}{(n-(n-r))!\,(n-r)!}$	(1)
	$= \frac{n!}{r!\,(n-r)!}$	
13	$P = \frac{m}{n}$	(1)
	$= \frac{{}^6C_1 \times {}^6C_2}{{}^{12}C_2}$	(1)
14	$x = 2$	1
	$y = -3$	1
15	One man can do $\frac{1}{10\times30}$ of the job/day One woman can do $\frac{1}{15\times30}$ of the job/day	1
	15 men + 5 women can do $\frac{15}{10\times30} + \frac{5}{15\times30}$ /day	
	$\frac{11}{180}$ day	
	They can complete in $\frac{180}{11}$ days	(1)
16	$35 - 3x = 26$	(1)
	$x = 3$	1

Qn. No.		Marks
17	$(-g,-f) = (-4,-4)$	(1)
	Eqn. $x^2+y^2+8x+8y+16=0$	
18	$\lim_{x\to 0} f(x) = f(0)$	(1)
	$\lim_{x\to 0} \frac{a^x-b^x}{x} = k$	
	$\lim_{x\to 0} \frac{a^x-1}{x} - \frac{b^x+1}{x} = k$	
	$\log \frac{a}{b} = k$	(1)
19	$7^{(x^2+3x)} \log 7 . (2x+3)$	2
20	$S = kv^2$	
	$\frac{ds}{dt} = k2v\frac{dv}{dt}$	(1)
	$v = 2kva$	
	$a = \frac{1}{2k}$ which is const	(1)
21	put $t = x+5$	(1)
	$\int (t-5)\sqrt{t}\, dt$	
	$\int t^{3/2} - 5t^{1/2} dt$	
	$\frac{t^{5/2}}{5/2} - \frac{5t^{3/2}}{3/2} + c$	(1)

Qn. No.		Marks
22.	$x e^x - \int e^x dx$	(1)
	$x e^x - e^x \Big]_0^{1/2}$	(1)
	$\frac{1}{2} e^{1/2} - e^{1/2} - [0 - e^0]$	
	$-\frac{1}{2}\sqrt{e} + 1$ //	(1)
23	A declarative sentence which is true or false but not both	(1)

p	q	r	$p \wedge q$	$\sim r$	$q \vee \sim r$	$p \wedge q \leftrightarrow q \vee \sim r$
T	T	T	T	F	T	T
T	T	F	T	T	T	T
T	F	T	F	F	F	T
T	F	F	F	T	T	F
F	T	T	F	F	T	F
F	T	F	F	T	T	F
F	F	T	F	F	F	T
F	F	F	F	T	T	T

(1) (1) (1) (1) (1)

24	no. of permutation $\frac{11!}{4!4!2!}$	(1)
1)	$\frac{10!}{4!3!2!}$	(1)
2)	$\frac{9!}{4!3!}$	(1)

Qn. No.		Marks
(3)	I's together $\frac{8!}{4!2!}$	(1)
	All I's not together $\frac{11!}{4!4!2!} - \frac{8!}{4!2!}$	(1)
25	$\frac{2x^2+3x+1}{(2x-1)(x+1)(x-1)}$	(1)
	$= \frac{A}{2x-1} + \frac{B}{x+1} + \frac{C}{x-1}$	(1)
	$A = -4$	1
	$B = 0$	(1)
	$C = 3$	1
26	$\Delta = \begin{vmatrix} 1 & 1 & 2 \\ 3 & 2 & 1 \\ 1 & 2 & 3 \end{vmatrix} = 4$	(3)
	$\Delta_1 = \begin{vmatrix} 9 & 1 & 2 \\ 10 & 2 & 1 \\ 14 & 2 & 3 \end{vmatrix} = 8$	(1)
	$\Delta_2 = \begin{vmatrix} 1 & 9 & 2 \\ 3 & 10 & 1 \\ 1 & 14 & 3 \end{vmatrix} = 8$	(1)
	$\Delta_3 = \begin{vmatrix} 1 & 1 & 9 \\ 3 & 2 & 10 \\ 1 & 2 & 14 \end{vmatrix} = 12$	(3)

Qn. No.		Marks
	$x = \frac{\Delta_1}{\Delta} = 1 \quad y = \frac{\Delta_2}{\Delta} = 2 \quad z = \frac{\Delta_3}{\Delta} = 3$	(3)
27	Avg cost $= \frac{P_1x_1 + P_2x_2}{\text{total no of mangoes}}$ (2)	(2)
	$5.5 = \frac{8 \times 240 + 4 \times (x_2 - 20)}{240 + x_2 + 5 + 20}$	(1)
	$x_2 = 255$	(2)
	total $255 + 20 = 275$	
28	gross interest in 100 net income is 90 ? 350	
	gross interest $= \frac{350 \times 10}{90} = 388.88$	(1)
	yield $= \frac{\text{Nominal Int}}{\text{price paid}} = \frac{\text{nominal or gross interest}}{\text{Amount invested}}$	(1)
	$\frac{14.5}{80 + 0.125} = \frac{388.88}{x}$	
	$x = 2148.946$	(2)
	NV MV 100 80.125 ? y 2148.946	
	$y = \frac{2148.946 \times 100}{80.125} = 2681.99$	(1)

Qn. No.		Marks

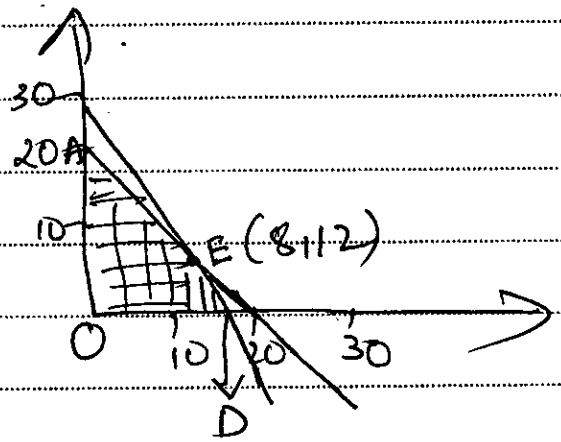
29)

units of product	total output	Cumulative avg time/unit	Total hr
1	1	180	180
1	2	80%/180 162	162
2	4	145.8	
4	8	131.22	3
8	16	118.0	1,889,5

Total labour cost is Total hr x Rs60

113,374,08 (2)

30.



(2)

At O(0,0) = P = 0

At A(0,20) = p = 360

At E(8,12) p = 392 (2)

At D(16,0) p = 352.

Maximum fo at E (1)

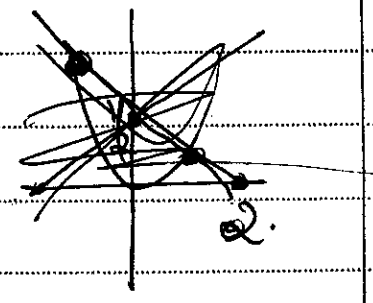
Qn. No.		Marks
31	$x+4y-6=0$	
	$x^2+y^2+4x+6y-12=0$	
	$(6-4y)^2+y^2+4(6-4y)+6y-12=0$	
	$17y^2-58y+48=0$	
	$b^2-4ac>0$ ∴ point of intersection is real and distinct so it cuts the circle	2
	length of ⊥ from $C(-2,3)$ to the line = radius.	
	$P=\frac{20}{\sqrt{17}}$	(1)
	length of chord $=2\sqrt{r^2-p^2}$	
	$=\frac{10}{\sqrt{17}}$	(2)
32.	x & $12-x$	1
	$f(x)=x^3+(12-x)^3$	
	$f'(x)=3x^2+3(12-x)^2(-1)$	1
	$f'(x)=0$ for minimum	1
	$3x^2+3[x^2+144-24x]=0$	
	$x^2-x^2+24x-144=0$	
	$x=6$	
	$f''(x)=6x+6(12-x)^2(+1)$	
	$f''(6)=$ >0	1
	∴ it is minimum at $x=6$	1
	numbers are 6 and 6	

Qn. No.		Marks
33	$\frac{dx}{dt} = e^t\left(\frac{1}{t}\right) + e^t \log t$	1
		1
(a)	$\frac{dy}{dt} = e^t\left(\frac{1}{t}\right) - e^t \log t$	
	$\frac{dy}{dx} = \frac{\frac{dy}{dt}}{\frac{dx}{dt}}$	(1)
(b)	$y = x^y$	
	$\log y = y \log x$	1
	$\frac{1}{y}\frac{dy}{dx} = y \cdot \frac{1}{x} + \log x \frac{dy}{dx}$.	
	$\left(\frac{1}{y} - \log x\right)\frac{dy}{dx} = \frac{y}{x}$.	(1)
	$\frac{dy}{dx} = \frac{\frac{y}{x}}{\frac{1}{y} - \log x}$ //	(1)
34. a)	Divide Nr & Dr by e^x. $\int \frac{e^x + e^{-x}}{e^x - e^{-x}}\, dx$.	
	$= \log(e^x - e^{-x}) + c$.	(2)
b)	$\int \frac{1}{\sqrt{x}(\sqrt{x}-1)}\, dx$.	
	Let $t = \sqrt{x} - 1$	
	$dt = \frac{1}{2\sqrt{x}}\, dx$.	
	$\int \frac{2dt}{t} = 2\log t = 2\log(\sqrt{x}-1)$	

Qn. No.		Marks
35	$T_4 = T_{3+1} = {}^7C_3 (\sqrt{x})^{7-3} \left(\frac{-1}{\sqrt{x}}\right)^3$	(2)
(a)	Simplification	(1)
	$T_5 = T_{4+1} = {}^7C_4 (\sqrt{x})^3 \left(\frac{-1}{\sqrt{x}}\right)^4$	(1)
	Simplification	(1)
(b)	$\lim_{x\to 3} \frac{1}{x-3}\left(1 - \frac{3}{x(x-2)}\right)$	
(1)	$\lim_{x\to 3} \frac{1}{x-3} \frac{x^2-2x-3}{x(x-2)}$	(1)
	$\lim_{x\to 3} \frac{(x-3)(x+1)}{(x-3)x(x-2)}$	(1)
	$\lim \frac{3+1}{3(1)} = \frac{4}{3}$	(1)
(2)	$\lim_{n\to\infty} \frac{n\left(\sqrt{1+\frac{2}{n}+\frac{5}{n^2}} + 1\right)}{n\left(\sqrt{9+\frac{9}{n}-8} + 1\right)}$	1
	$\frac{1+1}{3+1} = \frac{2}{4} = \frac{1}{2}$	1
36	$MR = 400 - 4x$ $\quad MC = 4x + 40$	2
(a)	$AR = 400 - 2x$ $\quad AV \quad 2x + 40 + \frac{400}{x}$	2
	Max pf $\quad MR = M.C$	
	$400 - 4x = 4x + 40$	(1)
	$360 = 8x$	
	$x = 40$ //	

Qn. No.		Marks
(b) (1)	$\frac{26C_2}{52C_2}$	(1)
(2)	$\frac{4C_1 \times 4C_1}{52C_2}$	(2)
(3)	$\frac{4C_2}{52C_2}$	(1)
37 a	$R_2 \to R_2 - R_1 \quad R_3 - R_1$ $\begin{vmatrix} 1 & b+c & b^2+c^2 \\ 0 & a-b & a^2-b^2 \\ 0 & a-c & a^2-c^2 \end{vmatrix}$	2
	$(a-b)(a-c)\begin{vmatrix} 1 & b+c & b^2+c^2 \\ 0 & 1 & a+b \\ 0 & 1 & a+c \end{vmatrix}$	(1)
	$R_3 \to R_3 - R_1$ $= (a-b)(a-c)\begin{vmatrix} 1 & b+c & b^2+c^2 \\ 0 & 1 & a+b \\ 0 & 0 & c-b \end{vmatrix}$	(1)
	$= (a-b)(a-a)(b-c)$	(1)
(b)	LDD 1.05.2012 + 3 years 4.08.2012	(1)
	$\therefore$ BD = Pt r	(1)
	$44.80 = 2920 \times t \times 0.16$	

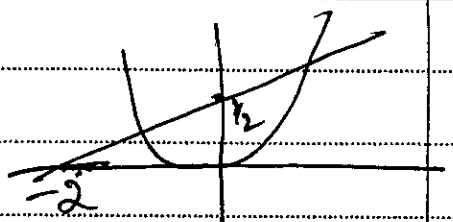
Qn. No.		Marks
	$t = 35$ days	2
	i.e. Aug 4	
	July 30	
	June 1	
	discounted day . June 29th	1
38(a)	$x^2+2x = 8y-25$	
	$x^2+2x+1 = 8y-24$	
	$(x+1)^2 = 8(y-3)$ $\quad 4a=8 \quad a=2$	(1)
	vertex $(h,k) = (-1,3)$	(1)
	Focus $(0+h, a+k) = (-1,5)$	
	Directrix $y = -a+k \quad y=3$	(1)
	Axis $x=h \quad x=-1$	(1)
	tangent at V $y=k \quad y=3$	
	Ends of LR $(2a+h, a+k) \quad (3,5)$	(1)
	$(-2a+h, a+k) \quad (-5,5)$	
(b)	$x^2=4y$	
	$(4y-2)^2 = 4y$	
	$16y^2+4-16y = 4y$	
	$16y^2-20y+4=0$	
	$4y^2-5y+1=0$	
	$(4y-1)(y-1)$	
	$y=1$ and $y=\frac{1}{4}$	



Qn. No.		Marks

$y = \frac{1}{4}x - 2$

$y = 1 \quad x = 2$



$$A_1 = \int_{-2}^{2} \frac{x+2}{4}\,dx = \frac{1}{4}\left[\frac{x^2}{2} + 2x\right]$$

$\frac{1}{4}\left[2 + 4 - \frac{1}{2} + 2\right]$ (2)

$$A_2 = \int_{-1}^{2} \frac{x^2}{2}\,dx = \frac{x^3}{6}\Big|_{-1}^{2}$$ (2)

$$\text{Area} = |A_1 - A_2| = \frac{9}{8}$$ (1)

39

(a) $(2+\sqrt{5})^4 = 2^4 + 4C_1 2^3\sqrt{5} + 4C_2 2^2(\sqrt{5})^2 + 4C_3 2(\sqrt{5})^3 + (\sqrt{5})^4$ (1)

$(2-\sqrt{5})^4 = 2^4 - 4C_1 2^3\sqrt{5} + 4C_2 2^2(\sqrt{5})^2 - 4C_3 2(\sqrt{5})^3 + (\sqrt{5})^4$ (1)

Add $= 2\left[2^4 + 4C_2 \times 4 \times 5 + 25\right]$

$= 0$ Ans (2)

(b) Maximize $Z = 30x + 60y$

subjected to constraints

$6x + 8y \leq 300$

$8x + 4y \leq 350$

$12x + 4y \leq 400$

$x \geq 0 \quad y \geq 0$

Qn. No.		Marks
C	$f(x) = x^3 - 6x^2 + 12x - 6$	
	$f'(x) = 3x^2 - 12x + 12$	
	for increasing fun	
	$f'(x) \geq 0$	
	$3(x^2 - 4x + 4) > 0$	
	$(x-2)^2 > 0$ for all $x (\neq 2)$	(2)
40(a)	Avg price $= \frac{30 \times 155 + 25 \times 175}{55}$	(1)
	$\frac{9025}{55} = 164.$	(1)
	Cost $= 164 + 164 \times \frac{10}{100}$	(1)
	$= 180.4$ Rs	(1)
(b)	$e^x + e^y = e^{x+y}$	
	$e^x + e^y \frac{dy}{dx} = e^{x+y}\left(1 + \frac{dy}{dx}\right)$	
	$e^x + e^y \frac{dy}{dx} = e^x + e^y + (e^x + e^y)\frac{dy}{dx}$	
	$-e^y = e^x \frac{dy}{dx}$	
	$\frac{dy}{dx} = -e^{-x+x}$	
(c)	BD $= 800$	
	TD $= 8$ BG	
	$= 8(BD - TD)$	
	$9TD = 8BD$ $\quad TD = \frac{800 \times 8}{9} = 711.11$	