SECTION I (50 Marks)

Answer all questions in this section

1. $Ducks\ \frac{48}{8}=6$

$Hens\ 5(48+6)=270$

$\frac{70}{100}\times 270$

$=189$

2. $\frac{Log\frac{1}{2}(32)}{Log\left(\frac{4}{16}\right)}=\frac{Log16}{Log\ 1/4}$

$=\frac{2Log4}{-Log4}$

$=-2$

3. Area of Δ PSR$=\frac{1}{2}\times 12\times 9$

$=54\text{cm}^2$

$PR=\sqrt{9^2+12^2}=\sqrt{225}=15cm$

$In\ \Delta\ PQR, S=\frac{1}{2}(15+17+18)=25$

$Area=\sqrt{25(25-15)(25-17)(25-18)}$

$=\sqrt{25(10)(8)(7)}$

$=\sqrt{14000}$

$118.32cm^2$

$Total\ area=54+118.32$

$=172.32cm^2$

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4. $y(x-a)=x+a$

$yx-ya=x+a$

$yx-x=a+ya$

$x(y-1)=ya+a$

$x \qquad =\frac{ya+a}{y-1}$

5.

$$\frac{11(3+2\sqrt{5})-5.5(3-2\sqrt{5})}{(3-2\sqrt{5})(3+2\sqrt{5})}$$

$$=\frac{33+22\sqrt{5}-16.5+11\sqrt{5}}{-11}$$

$$\frac{16.5+33\sqrt{5}}{-11}$$

$$=-1.5-3\sqrt{5}$$

$$a=-1.5$$

$$b=-3$$

$$c=5$$

6. $AQ:QB=5:-2$

$$OQ=\frac{-2}{5+(-2)}\underset{\sim}{a}+\frac{5}{5+(-2)}\underset{\sim}{b}$$

$$=-\frac{2}{3}\underset{\sim}{a}+\frac{5}{3}\underset{\sim}{b}$$

$$OQ=\frac{-2}{3}\begin{pmatrix}4\\1\\0\end{pmatrix}+\frac{5}{3}\begin{pmatrix}1\\-2\\3\end{pmatrix}$$

$$\begin{pmatrix}\frac{-8}{3}\\\frac{-2}{3}\\0\end{pmatrix}+\begin{pmatrix}\frac{5}{3}\\\frac{-10}{3}\\\frac{15}{3}\end{pmatrix}$$

$$=\begin{pmatrix}-1\\-4\\5\end{pmatrix}$$

$$Q(-1,-4,5)$$

7.

p: 6.5 - 7.5
q: 2.45 - 2.55
r: 1.245 – 1.255

$$Max.\frac{7.5-2.45}{2.45-1.255}=4.225941423$$

$$Min.\frac{6.5-2.55}{2.55-1.245}=3.026819923$$

$$Abs.error=\frac{1}{2}(4.225941423-3.02681992)^{3}{}_{7}$$

$$=0.5996\ \ (4s.f)$$

8.

$$(1.01)^5=(1+0.01)^5$$

1 5 10 10 5 1

$$(1.05)^5=1+5(0.01)+10(0.01)^2+$$

$$10(0.01)^3+5(0.01)^4+(0.01)^5$$

$$=1+0.05+0.001+0.00001+0.00000005+0.00000000001$$

$$=1.05101005$$

$$=1.05101$$

(5dp)

9.

$$\frac{\theta}{2\pi}.\pi(5.6)^2=6.93$$

$$\theta=\frac{6.93\times 2}{5.6\times 5.6}$$

$$=0.4419642857$$

$$=0.442^{c}\qquad(3dp)$$

10.

$$365000=580000\left(1-\frac{r}{100}\right)^5$$

$$0.62931=\left(1-\frac{r}{100}\right)^5$$

$$1-\frac{r}{100}=(0.62931)^{\frac{1}{5}}=0.9115$$

$$\frac{r}{100}=0.088465786$$

$$r=8.8465786$$

$$\approx 8.8\%\quad 1dp$$

11. $x^2+6xy+9y^2-(9y^2-6xy+x^2)$

$x^2+6xy+9y^2-9y^2+6x-x^2$

$=12xy$

12. $C=Kn+\frac{a}{n}$, *where* k & a *are cons* tan t

$135=2k+\frac{a}{2}$

$140=3k+\frac{a}{3}$

$270=4k+a$

$420=9k+a$

$150=5k$

$k=30$

$a=270-120=150$

$C=30n+\frac{150}{n}$

$=30(10)+\frac{150}{10}$

$=sh\,315$

13. $\begin{pmatrix}4&2\\-1&0\end{pmatrix}\begin{pmatrix}1&3\\8&6\end{pmatrix}=\begin{pmatrix}20&24\\-1&-3\end{pmatrix}$

$\begin{pmatrix}20&24\\-1&-3\end{pmatrix}\begin{pmatrix}0&1\\-4&3\end{pmatrix}$

$=\begin{pmatrix}-96&92\\-12&-10\end{pmatrix}$

14. $\frac{(2^8)^{3/8}\times(3^6)^{-1/3}}{3^0\times(3^4)^{-1}}$

$=\frac{2^3\times3^{-2}}{3^0\times3^{-4}}$

$=2^3\times3^2$

$=72$

15.

$$Area\ \Delta AOB = \frac{1}{2} \times 20 \times AB = 360$$

$$But\ OB^2 = OA^2 + AB^2$$
$$= 20^2 + 36^2$$
$$= 400 + 1296$$
$$OB = \sqrt{1696}$$
$$= 41.18255056$$
$$CB = 41.18252 - 20$$
$$= 21.18252cm$$

16. In 1hr P fills 1/3 of the tank

Q " $\frac{1}{6}$ " " "

R *empties* $\frac{1}{8}$ " " "

Work done in 1*hr by* P & Q

$$= \frac{1}{3} + \frac{1}{6} = \frac{1}{2}$$

Work done in hr by P, Q & R

$$= \frac{1}{3} + \frac{1}{6} - \frac{1}{8} = \frac{3}{8}$$

Time taken to fill $\frac{1}{2}$ *of the* tan k *by* P, Q

$$= \frac{1}{2} \times \frac{8}{3} = 1\frac{1}{3} Hrs$$

$$Total\ time = \left(1 + 1\frac{1}{3}\right) hrs$$

$$= 2\frac{1}{3} hrs$$

SECTION II (50 Marks)

Answer only five questions

17. a) 28500+11980= ksh 40480

$b)\ 1^{st}\ 10165 \times \frac{10}{100} = Ksh\ 1016\ .5$

$2^{nd}\ 9574 \times \frac{15}{100} = Ksh\ 1436\ .10$

$3^{rd}\ 9575 \times \frac{20}{100} = Ksh\ 1915\ .00$

$4^{th}\ 9575 \times \frac{25}{100} = Ksh\ 2393\ .75$

$5^{th}\ 1588 \times \frac{30}{100} = Ksh\ 476\ .40$

$Total\ :\ 1016\ .5 + 1436\ .10 + 1915 + 2393\ .75 + 476\ .40$

$= Ksh\ 7237\ .75$

$c)\ 40480 \times \frac{150}{100} = Ksh\ 60720$

$5^{th}\ slab = \frac{30}{100}(60720 - 38392)$

$= \frac{30}{100} \times 21831$

$= 6549\ .3$

$New\ tax = 7237\ .75 - 476\ .40 + 6549\ .3$

$= 13310\ .65$

$Difference\ 13310\ .65 - 7237\ .75$

$= 6072\ .9$

$\%\ increase = \frac{6072\ .9}{7237\ .75} \times 100$

$= 83\ .9\%$

18.

$a)\ MB = \frac{\pi}{4} \times 12$

$= 9cm$

$b)\ i)\ \sin 67^0 = \frac{h_1}{9}\ in\ \Delta ABM$

$h_1 = 8.2845$

$Sin\ 67^0 = \frac{h_2}{3}\ in\ \Delta CDM$

$h_2 = 2.76151456$

$Total = 8.28454 + 2.761514$

$= 11.04605$

$= 11.05cm$

$ii)\ Sin\ 38^0 = \frac{h_2}{MD} = \frac{2.7615}{MD}$

$MD = \frac{2.7615}{Sin\ 38}$

$= 4.485419521$

$= 4.485cm$

$c)\ CD^2 = 3^2 + 4.85^2 - 2 \times 3 \times 4.485$

$Cos\ 75^0$

$= 9 + 20.115225 - 6.96482$

$= 22.150404$

$CD = 4.706421$

$= 4.7cm$

$d)\ Area = \frac{1}{2} \times 3 \times 4.485\ Sin\ 75^0$

$= 6.4982659$

$= 6.5cm^2$

19.

$a)\ 2nd\ week = 50 \times \frac{110}{100}$

$= 55km$

$b)\ Common\ ratio = \frac{110}{100} = 1.1$

$Series: 50 + 50(1.1) + 50(1.1)^2 + 50(1.1)^3 + ...$

$= 50 + 55 + 60.5 + 66.55 + ...$

$c)\ a = 50$

$r = 1.1$

$n = 10$

$S_{10} = \frac{50(1.1^{10} - 1)}{1.1 - 1}$

$= \frac{50(1.1)^{10} - 50}{0.1}$

$= \frac{50 \times 2.59374246 -}{0.1}$

$= \frac{129.687123 - 50}{0.1}$

$= 796.87123$

$= 797km$

20.

$a)\ OB = 6\underset{\sim}{p} + \frac{3}{2}.4\underset{\sim}{r}$

$= 6\underset{\sim}{p} + 6\underset{\sim}{r}$

$AJ = 6\underset{\sim}{p} - \left(4\underset{\sim}{r} + \frac{1}{3}.6\underset{\sim}{p}\right)$

$= 4\underset{\sim}{p} - 4\underset{\sim}{r}$

$b)\ i)\ OX = m\left(6\underset{\sim}{p} + 6\underset{\sim}{r}\right)$

$ii)\ OX = 4\underset{\sim}{r} + 2\underset{\sim}{p} + n\left(4\underset{\sim}{p} - 4\underset{\sim}{r}\right)$

$= (2+4n)\underset{\sim}{p} + (4-4n)\underset{\sim}{r}$

$iii)\ 6m\underset{\sim}{P} + 6m\underset{\sim}{r} = (2+4n)\underset{\sim}{p} + (4-$

$6m = 2n + 4n$

$6m = 4 - 4n$

$8n = 2$

$n = \frac{1}{4}$

$m = \frac{4 - 4\left(\frac{1}{4}\right)}{6}$

$= \frac{1}{2}$

$AX : XJ$

$\frac{1}{4}AJ : \frac{3}{4}AJ$

21.

a) $(-3)^2+(-1)^2-2(-3)+8(-1)+h$

$9+1+6-8+h=0$

$h=-8$

b) $x^2+y^2-2x+8y-8=0$

$x^2-2x+(-1)^2+y^2+8y+(4)^2$

=8

Co-ordinates : (1, -4)

c) $r=\sqrt{8+(-1)^2+(4)}^2$

$=\sqrt{25}$

$=5units$

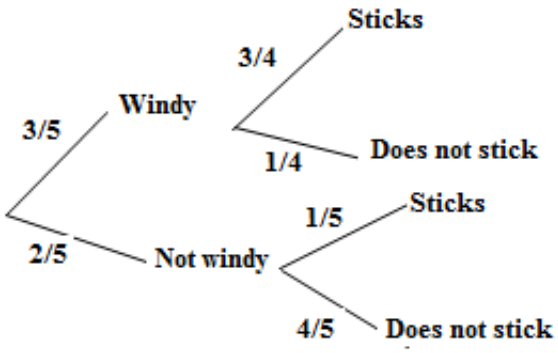
d) centre $(1,-4)$, *point* $(-3,-1)$

$\frac{x-3}{2}=1\Rightarrow x=5$

$\frac{y-1}{2}=-4\Rightarrow y=-7$

$co-ordinates:\ (5,-7)$

22.



b) i) $\frac{3}{5}\times\frac{1}{4}$

$=\frac{3}{20}$

ii) $\left(\frac{3}{5}\times\frac{1}{4}\right)+\left(\frac{2}{5}\times\frac{4}{5}\right)$

$=\frac{3}{20}+\frac{8}{25}$

$=\frac{47}{100}$

iii) $\left(\frac{3}{5}\times\frac{3}{4}\right)+\left(\frac{2}{5}\times\frac{1}{5}\right)$

$=\frac{9}{20}+\frac{2}{25}$

$=\frac{53}{100}$

23.