MATHS PAPER-4 ASSIGNMENT-2

FDN/4/BMS/2008/T-2

1@ Let total no. of workers = x

∴ no. of officers = 12

∴ no. of rest workers = x-12

Salaries of all workers = Rs 60x (Av. salary of all = 60)

" " officers = 12 × 400 = 4800 (" " of offices = 400)

" " rest workers = (x-12)56 (" " of rest = 56)

According to question

$60x = 4800 + 56(x-12)$

$60x = 4800 + 56x - 672$

$4x = 4800 - 672$

$x = \frac{4128}{4}$

$= 1032$

total no. of workers = 1032

1⑥

Men	days	Area (Hec)
5	9	10
25	x	30

Let no. of men = A

no. of days = B

it is clear $A \propto \frac{1}{B}$

$A = K \cdot \frac{1}{B}$

$5 = K \cdot \frac{1}{9}$

$K = 45$

Now 25 men take how many days for same area (10 hec)

$A = \frac{K}{B}$

$25 = \frac{45}{B}$

$B = \frac{9}{5}$ days

but area is 30 hec it thrice of above (10 hec)

so, the total days to plough 30 hec $= 3 \times \frac{9}{5}$

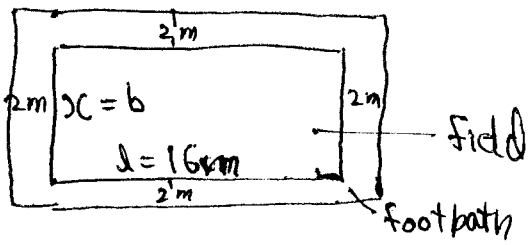
$= \frac{27}{5} = 5\frac{2}{5}$ days.

soln

2@

Let breadth of field $= x$

length of field $= 16$ cm



Area of field $= l \times b = 16x$

Area of field with footpath

when $l = 16 + 2 + 2 = 20$ m

$b = x + 2 + 2 = x + 4$

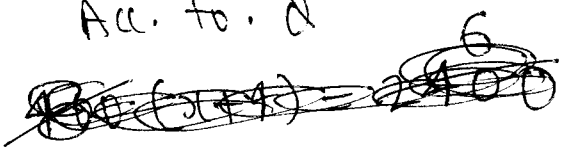
Area $= 20(x+4)$

Area of footpath $= 20(x+4) - 16x$

cost of paving path $= 20 \times [20(x+4) - 16x]$ [cost per m^2 = ₹20 (given)]

$= 400(x+4) - 320x$

Acc. to. Q



$80x + 1600 = 2400$

$80x = 800$

$x = 10$ m

breadth of field $= 10$ m

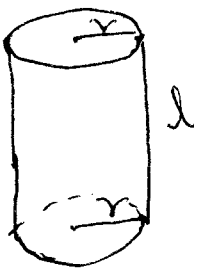
2©

Let length of cylinder $= l$

& radius of " $= r$

lateral area $= 2\pi r l$

volume $= \pi r^2 l$



Acc. to. Q

$2\pi r l = \pi r^2 l$

$r = 2$ unit

3(a) eqn of line $7x+9y-11=0$

3(a) slope of this line $= -\frac{\text{coff. of } x}{\text{coff. of } y} = -\frac{7}{9}$

this slope is equal to required, because both are parallel

eqn of required line

$(y-y_1) = m(x-x_1)$ — (x_1, y_1) are passing point which is $(5,-3)$

$(y+3) = -\frac{7}{9}(x-5)$

$\Rightarrow \quad 9y+27 = -7x+35$

$\Rightarrow \quad 7x+9y = 8$ eqn of required line.

3(b) Normal eqn of parabola

$(y-k)^2 = 4a(x-h)$ — (I)

eqn of given parabola $y^2 = 4(x+y)$

$\rightarrow y^2 = 4x+4y$

$\rightarrow y^2-4y = 4x$

reduce it into general form

$y^2-4y+2^2-2^2 = 4x$

$(y-2)^2 = 4x+4$

$(y-2)^2 = 4(x+1)$ — (II)

Compare (I) & (II)

$k = 2$

$h = -1$

$a = 1$

vertex $(h,k) = (-1,2)$

focus $(a+h, k) = (1-1, 2) = (0,2)$

length of latus rectum $= 4a = 4 \times 1 = 4$ units.

4(a) $y = \sqrt{1+x^2}$

diff. w.r.t x

$$\frac{dy}{dx} = \frac{1}{2}(1+x^2)^{-1/2} \cdot \frac{d}{dx}(1+x^2)$$

$$= \frac{1}{2\sqrt{1+x^2}} \cdot 2x = \frac{x}{\sqrt{1+x^2}}$$

now $L.H.S = y \cdot \frac{dy}{dx}$

$$= \sqrt{1+x^2} \cdot \frac{x}{\sqrt{1+x^2}}$$

$$= x$$

$$= R.H.S$$

hence proved.

4(b) (i) $I = \int \log x \cdot dx$

$$= \int \log x \cdot 1 \, dx$$

$$= \log x \cdot \int dx - \int \left(\frac{d}{dx}\log x \int 1 \cdot dx\right) dx$$

$$= \log x \cdot x - \int \frac{1}{x} \cdot x \cdot dx$$

$$= x \log x - x + C$$ soln

(ii) (ii) Let $I = \int_0^2 x\sqrt{4-x^2}\,.\,dx$

Let $4-x^2 = t$

diff. w.r.t x

$-2x. = \frac{dt}{dx}$

$x.dx = -\frac{dt}{2}$

when $x=0$

$t = 4$

& $x = 2$

$t = 4-2^2 = 0$

$$I = \int_4^0 t^{1/2} \cdot \frac{dt}{-2}$$

$$= -\frac{1}{2}\left[\frac{t^{3/2}}{3/2}\right]_4^0$$

$$= -\frac{1}{3}\left[0^{3/2} - 4^{3/2}\right]$$

$$= -\frac{1}{3}x-8 = \frac{8}{3}$$

$4^{3/2} = \sqrt{4^3} = \sqrt{64} = 8$

5(a).

x	y	$x.y$
0	43	0
1	f_2	f_2
2	f_3	$2f_3$
3	25	75
4	10	40
5	5	25
Total	$83+f_2+f_3 = 500$	f_2+2f_3+140

$f_2 + f_3 = 417$ — (1)

$$A.M = \frac{\Sigma x.y}{\Sigma.y}$$

$$1.46 = \frac{f_2 + 2f_3 + 140}{500}$$

$$730 = f_2 + 2f_3 + 140$$

$$f_2 + 2f_3 = 590 \quad \text{---(II)}$$

on solving eq (I) & (II)

$$f_2 + 2f_3 = 590$$
$$\underline{-f_2 + -f_3 = -417}$$
$$f_3 = 173$$

$$f_2 = 417 - f_3 = 417 - 173$$
$$= 244$$

$f_2 = 244$ & $f_3 = 173$

soln

5(b)

Marks	No. of students
less than 5	6
" " 10	16
" " 15	36
" " 20	45
" " 25	50

Frequency distribution of data

Marks	students (f)	c.f
0-5	6	6
5-10	10 (=16-6)	16
10-15	20 (=36-16)	36
15-20	9 (=45-36)	45
20-25	5 (=50-45)	50

$N = 50$

median = Value of $\frac{N}{2}$ th term

= value of $\frac{50}{2}$ th term = 25 th term

median class (10-15)

$l_1 = 10$, $l_2 = 15$, $fm = 20$, $\frac{N}{2} = 25$, $c = 16$

$$\text{median} = l_1 + \frac{l_2 - l_1}{fm}\left(\frac{N}{2} - c\right)$$

$$= 10 + \frac{15-10}{20}(25-16)$$

$$= 10 + \frac{1}{4} \times 9$$

$$= \frac{49}{4} = 12.25$$