Engineering mathematics (2017)

Q1. Choose the correct options of the following :

(i) The value of $\log_{81} 3$ *is*

(a) 1 (b) $\frac{1}{3}$

(c) $\frac{1}{4}$ (d) None of these

Sol.(c)

(ii) The value of Determinant $\begin{vmatrix} 1 & a & b+c \\ 1 & b & c+a \\ 1 & c & a+b \end{vmatrix}$ *is*

(a) 0 (b) (a + b + c)

(c) 1 + a + b + c (d) None of these

Sol.(d)

(iii) A square matrix A is said to be non - singular if

(a) $|A| = 0$ (b) $|A| \neq 0$

(c) $|A| = 1$ (d) None of these

Sol.(b)

(iv) In the expansion of $(a + x)^n$, *total number of terms is*

(a) n (b) n+1 (c) n-1 (d) None of these

Sol.(b)

(v) The value of $\sin^6\theta + \cos^6\theta + 3\sin^2\theta \cdot \cos^2\theta$ *is equal to*

(a) 0 (b) 1 (c) 2 (d) 3

Sol.

(vi) The value of $\sin^2 75^\circ - \sin^2 15^\circ$ *is*

(a) $\frac{1}{2}$ (b) 1 (c) $\frac{\sqrt{3}}{2}$ (d) 0

Sol.(c)

(vii) If $\cos A = \frac{1}{2}$ *then the value of cos3A is equal to*

(a) 0 (b) -1 (c) 1 (d) None of these

Sol.(b)

(viii) $\sin^{-1}x + \cos^{-1}x =$

(a) $\frac{\pi}{2}$ (b) $\frac{3\pi}{2}$ (c) 1 (d) None of these

Sol.(a)

(ix) Two vectors $\vec{a}$ *and* $\vec{b}$ *are perpendicular to each other if*

(a) $\vec{a}.\vec{b} = 0$ (b) $\vec{a} \times \vec{b} = 0$

(c) $\vec{a}.\vec{b} = 1$ (d) None of these

Sol.(d) None of these

x) Two straight lines having slopes m_1 and m_2 are parallel if

(a) $m_1 \times m_2 = 0$ (b) $m_1 = m_2$

(c) $m_1.m_2 = -1$ (d) None of these

Sol.(b)

Group - B

Answer any five questions :

Q2(a) Show that $\dfrac{1}{\log_{ab} abc}+\dfrac{1}{\log_{bc} abc}+\dfrac{1}{\log_{ca} abc}=2$

Sol. L.H.S $= \dfrac{1}{\log_{ab} abc}+\dfrac{1}{\log_{bc} abc}+\dfrac{1}{\log_{ca} abc}$

$\log_{abc} ab + \log_{abc} bc + \log_{abc} ca$

$= \log_{abc}(ab \times bc \times ca)$

$= \log_{abc}(abc)^2$

$= 2\log_{abc} abc$

$= 2 \times 1 =$ R.H.S Proved.

Q2.(b) Resolve into partial fraction $\dfrac{x+4}{x(x+1)(x+2)}$

Sol. Let $\dfrac{x+4}{x(x+1)(x+2)} = \dfrac{A}{x}+\dfrac{B}{x-1}+\dfrac{c}{x+2}$

Multiplying both sides by x (x +1) (x +2) , we get

x+4 = A (x + 1) (x +2) + Bx (x +2) + cx (x +1)

Which is true for all values of x.

Putting x = -2 in above relation , we get

2 = -2 × C × -1

∴ C = 1

Putting x = -1

3 = Bx -1 ×1

∴ B = -3

Putting x = 0

4 = 2A

∴ A = 2

Thus, the required partial fractions are :

$$\frac{x+4}{x(x+1)(x+2)} = \frac{2}{x}-\frac{3}{x+1}+\frac{1}{x+2}$$ **Ans.**

Q3.(a) Show that $\begin{vmatrix} x & y & z \\ x^2 & y^2 & z^2 \\ y+z & z+x & x+y \end{vmatrix} = (x+y+z)(x-y)(y-z)(z-x)$

Sol. **L.H.S** $\begin{vmatrix} x & y & z \\ x^2 & y^2 & z^2 \\ y+z & z+x & x+y \end{vmatrix}$

Applying $R_2 \to R_1 + R_3$, we get

$$= \begin{vmatrix} x+y+z & x+y+z & x+y+z \\ x^2 & y^2 & z^2 \\ y+z & z+x & x+y \end{vmatrix}$$

$$= (x+y+z)\begin{vmatrix} 1 & 1 & 1 \\ x^2 & y^2 & z^2 \\ y+z & z+x & x+y \end{vmatrix}$$

Applying $C_2 \to C_2 - C_1,\ C_3 \to C_3 - C_1,$ we get,

$$\Delta = (x+y+z)\begin{vmatrix} 1 & 0 & 0 \\ x^2 & y^2-x^2 & z^2-x^2 \\ y+z & x-y & x-z \end{vmatrix}$$

$$\Delta = (x+y+z)\begin{vmatrix} y^2-x^2 & z^2-x^2 \\ x-y & x-z \end{vmatrix}$$

$$= (x+y+z)\ (x-y)\ (z-x)\begin{vmatrix} y-x & z+x \\ 1 & -1 \end{vmatrix}$$

$$= (x+y+z)\ (x-y)\ (z-x)\ (x-y-z-x)$$

$$= (x+y+z)\ (x-y)\ (z-x)\ (y-z) - R.H.S$$

Q3.(b) If $f(x)=x^2-5x+7$ ***and*** $A=\begin{vmatrix} 3 & 1 \\ -1 & 2 \end{vmatrix}$ ***;Find f(A).***

Sol. $f(x) = x^2-5x+7$

$$f(A) = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}\begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix} - 5\begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix} + 7\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} 9-1 & 3+2 \\ -3-2 & -1+4 \end{bmatrix} + \begin{bmatrix} -15 & 15 \\ 5 & -10 \end{bmatrix} + \begin{bmatrix} 7 & 0 \\ 0 & 7 \end{bmatrix}$$

$$= \begin{bmatrix} 8 & 5 \\ -5 & 3 \end{bmatrix} + \begin{bmatrix} -15 & -5 \\ 5 & -10 \end{bmatrix} + \begin{bmatrix} 7 & 0 \\ 0 & 7 \end{bmatrix}$$

$$= \begin{bmatrix} 8-15+7 & 5-5+0 \\ -5+5+0 & 3-10+7 \end{bmatrix}$$

$$= \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix} = 0$$

∴ $f(A) = 0$

Q4. Solve the following system of equations by using matrix inversion method

$2x+y-z=1,\ x-y+z=2,\ 3x+y-2z=-1.$

Sol. Set of equation are .

2x + y - z = 1

x - y + z = 2

$$\overline{3x + y - 2z = -1}$$

writeing them in matrix form , we get .

where Let

$$A = \begin{bmatrix} 2 & 1 & -1 \\ 1 & -1 & 1 \\ 3 & 1 & -2 \end{bmatrix} = \text{Matrix of coefficients.}$$

$$|A| = 2\,(2-1) - 1\,(-2-3) - 1\,(1+3)$$
$$= 2 + 5 - 4$$
$$= 3 \neq 0$$

$\therefore$ A^{-1} exists.

$$X = \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \text{Matrix of unknowns}$$

$$B = \begin{bmatrix} -3 \\ 10 \\ -3 \end{bmatrix} = \text{Matrix of constants.}$$

To Find A^{-1}:

$$\text{Let } |A| = \begin{vmatrix} 2 & 1 & -1 \\ 1 & -1 & 1 \\ 3 & 1 & -2 \end{vmatrix} = \begin{vmatrix} a^1 & b^1 & c^1 \\ a^2 & b^2 & c^2 \\ a^3 & b^3 & c^3 \end{vmatrix} = say$$

If $A_1, B_1 C_1$ .... are cofactors of elements a_1, b_1, c_1 ..... then we have.

$$A_1 = +\begin{vmatrix} -1 & 2 \\ 1 & -2 \end{vmatrix} = (2-1) = 1$$

$$B_1 = -\begin{vmatrix} 1 & 1 \\ 1 & -2 \end{vmatrix} = -(-2-3) = 5$$

$$C_1 = +\begin{vmatrix} 1 & -1 \\ 3 & 1 \end{vmatrix} = 1+3 = 4$$

$$A_2 = -\begin{vmatrix} 1 & -1 \\ 1 & -1 \end{vmatrix} = -(-2+1) = 1$$

$$B_2 = +\begin{vmatrix} 2 & -1 \\ 3 & -1 \end{vmatrix} = (-4+3) = -1$$

$$C_2 = -\begin{vmatrix} 2 & 1 \\ 3 & 1 \end{vmatrix} = -(2-3) = 1$$

$$A_3 = +\begin{vmatrix} 1 & -1 \\ -1 & 1 \end{vmatrix} = (1-1) = 0$$

$$B_3 = -\begin{vmatrix} 2 & -1 \\ 1 & 1 \end{vmatrix} = -(2+1) = -3$$

$$C_3 = +\begin{vmatrix} 2 & 1 \\ 1 & -1 \end{vmatrix} = -2-1 = -3$$

The matrix of cofactor

$$= \begin{bmatrix} A_1 & B_1 & C_1 \\ A_2 & B_2 & C_2 \\ A_3 & B_3 & C_3 \end{bmatrix} = \begin{bmatrix} 1 & 5 & 4 \\ 1 & -1 & 1 \\ 0 & -3 & -3 \end{bmatrix}$$

$\therefore$ ad , A = transpose of matrix of cofactors .

$$= \begin{bmatrix} 1 & 5 & 4 \\ 5 & -1 & -3 \\ 4 & 1 & -3 \end{bmatrix}$$

$$\therefore A^{-1} = \frac{1}{|A|} \text{. ad , A}$$

$$= \frac{1}{3}\begin{bmatrix} 1 & 5 & 4 \\ 5 & -1 & -3 \\ 4 & 1 & -3 \end{bmatrix}$$

Next $X = A^{-1}, B$ gives.

$$= \frac{1}{3}\begin{bmatrix} -3+10 \\ -15-10+10 \\ -12+10+9 \end{bmatrix}$$

$$= \frac{1}{3}\begin{bmatrix} 7 \\ -16 \\ 7 \end{bmatrix}$$

$$\therefore \quad X = \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 7/3 \\ -16/3 \\ 7/3 \end{bmatrix}$$

By eqvality of matrix , $x = 7/3$, $y = -16/3$, $z = 7/3$
This is the required solution.

Q5.(a) Prove that $^nC_r + {}^nC_{r-1} = {}^{n+1}C_r$

Sol. Same as 2015 Q.1 (i) .

Q5.(b) Find the Coeffcient of x^5 in the expansion $(1+2x)^6(1-x)^7$.

Sol. The given expression is $(1+2x)^6(1-x)^7$

$$= [1 + {}^6C_1 1^5(2x) + {}^6C_2 1^4(2x)^2 + {}^6C_3 1^3(2x)^3 + {}^6C_4\, 1^2(2x)^4$$

$$+ {}^6C_5 1(2x)^5 + {}^6C_6(2x)^6(1 + {}^7C_1 1^6(-x)\ {}^7C_2 1^5(-x)^2$$
$$+ {}^7C_3 1^4(-x)^3 + {}^7C_4 1^3(-x)^4 + {}^7C_5 1^2(-x)^5$$

$+ {}^7C_6(1)(-x)^6 - {}^7C_7(-x)^7$

$= [(1 + {}^6C_1(2x) + 4 \times {}^6C_2x^2 + 8\,{}^6C_3x^3 + 16\,{}^6C_4x^4 + 32\,{}^6C_5x^5$
$+ 64\,{}^6C_6x^6)(1 - {}^7C_1x + {}^7C_2x^2 - {}^7C_3x^3 + {}^7C_4x^4$
$- {}^7C_5x^5 + {}^7C_6x^6 - {}^7C_7x^7)]$

$= -{}^7C_5 + 2 \times {}^6C_1 \times {}^7C_4 - 4 \times {}^6C_2 \times {}^7C_3 + 8 \times {}^6C_3 \times {}^7C_2$
$- 16 \times {}^6C_4 \times {}^7C_1 + 32\,{}^6C_5$

$$= -\frac{7!}{5! \times 2!} + 2 \times \frac{6!}{1! \times 5!} \times \frac{7!}{4! \times 3!} - 4 \times \frac{6!}{2! \times 4!} \times \frac{7!}{3! \times 4!} + \frac{8 \times 6!}{3! \times 3!} \times \frac{7!}{2! \times 5!}$$

$$-16 \times \frac{6!}{4! \times 2!} \times \frac{7!}{1! \times 6!} + 32 \times \frac{6!}{5! \times 1!}$$

$$= -\frac{7 \times 6}{2} + \frac{2 \times 6 \times 7 \times 6 \times 5}{6} - \frac{4 \times 6 \times 5 \times 7 \times 6 \times 5}{2 \times 6}$$

$$+ \frac{8 \times 6 \times 5 \times 4}{3 \times 2} \times \frac{7 \times 6}{2} - 16 \times \frac{6 \times 5}{2} \times \frac{7}{1} + 32 \times 6$$

$= -21 + 420 - 2100 + 3360 - 1680 + 192$
$= 3972 - 3801$
$= 171$

Hence the coefficient of x^5 is 171 Ans

Q6.(a) Prove that Sin 10°. sin 30°. sin 50°. sin 70° = $\frac{1}{16}$

Sol.LHS = Sin 10°. sin 30°. sin 50°. sin 70° = sin 30° (sin 10° sin 50°. sin 70°)

$$= \frac{1}{2}(\sin 10^0 \sin 50^0)\sin 70^0 = \frac{1}{2}\left(\frac{1}{2} 2\sin 10^0.\sin 50^0\right)\sin 70^0$$

$$= \frac{1}{4}\{\cos(10^0 - 50^0) - \cos(10^0 + 50^0)\}\sin 70^0$$

$$= \frac{1}{4}(\cos 40^0 - \cos 60^0)\sin 70^0 = \frac{1}{4}\left(\cos 40^0 - \frac{1}{2}\right)\sin 70^0$$

$$= \frac{1}{4}\left[\frac{1}{2}(\sin 110^0 + \sin 30^0) - \frac{1}{2}\sin 70^0\right]$$

$$= \frac{1}{8}\left[\sin 110^0 + \frac{1}{2} - \sin 70^0\right]$$

$$= \frac{1}{8}\left[\sin(180^0 - 70^0) + \frac{1}{2} - \sin 70^0\right]$$

$$= \frac{1}{8}\left[\sin 70^0 + \frac{1}{2} - \sin 70^0\right]$$

$$= \frac{1}{8} \times \frac{1}{2} = \frac{1}{16} = R.H.S$$

Q6.(b) Show that Sin 18° = $\left(\frac{\sqrt{5}-1}{4}\right)$

Sol.

Let $\theta = 18^0$

Now, $2\theta + 3\theta = 5\theta$

$\therefore\ 2\theta = 90^0 - 3\theta$

Taking sine ratio of both sides, we get,

$\sin 2\theta = \sin(90^0 - 3\theta)$

$\therefore\ \sin 2\theta = \cos 3\theta$

$\therefore\ 2\sin\theta.\cos\theta = 4\cos^3\theta - 3\cos\theta$

$\therefore\ = 2\sin\theta.\cos\theta = \cos\theta(4\cos^2\theta - 3)$

As $\theta = 18^0$ $\therefore \cos\theta \neq 0$, dividing throughout by $\cos\theta$, we get

$2\sin\theta = 4\cos^2\theta - 3$

$2\sin\theta = 4(1 - \sin^2\theta) - 3$

$2\sin\theta = 4 - 4\sin^2\theta - 3$

$4\sin 2\theta + 2\sin\theta - 1$ ... quadratic sin θ wehere a = 4, b = 2, c = -1

Using quadratic formula,

$$\sin\theta = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-2 \pm \sqrt{4 - 4(4)(-)}}{2 \times 4}$$

$$= \frac{-2 \pm 2\sqrt{5}}{2 \times 4}$$

$$= \frac{2(-1 \pm \sqrt{5})}{2 \times 4}$$

$$= \frac{-1 \pm \sqrt{5}}{4}$$

$\therefore\ \sin\theta = \frac{-1+\sqrt{5}}{4}\ OR\ \frac{-1-\sqrt{5}}{4}$

But $\theta = 18^0 < 90^0$ $\therefore$ $\sin\theta$ lies in first quadrant

$\therefore\ \sin\theta = +$ ve

$\therefore\ \sin\theta = \frac{-1+\sqrt{5}}{4}$ is correct

Thus, $\sin 18^0 = \frac{\sqrt{5}-1}{4}$ ....(i)

Q7. (a) *Prove that* $\tan^{-1}\frac{1}{3}+\tan^{-1}\frac{1}{5}+\tan^{-1}\frac{1}{7}+\tan^{-1}\frac{1}{8}$

Sol .L.H.S $\tan^{-1}\frac{1}{3}+\tan^{-1}\frac{1}{5}+\tan^{-1}\frac{1}{7}+\tan^{-1}\frac{1}{8}$

$$=\tan^{-1}\left[\frac{\frac{1}{3}+\frac{1}{5}}{1-(1/3)(1/5)}\right]+\tan^{-1}\left[\frac{\frac{1}{7}+\frac{1}{8}}{1-\left(\frac{1}{7}\right)\left(\frac{1}{8}\right)}\right]$$

$$\left(\because \tan^{-1}x+\tan^{-1}y=\tan^{-1}\left[\frac{x+y}{1-xy}\right]\right)$$

$$=\tan^{-1}\left[\frac{\frac{8}{15}}{\frac{14}{15}}\right]+\tan^{-1}\left[\frac{\frac{15}{56}}{\frac{55}{56}}\right]$$

$$=\tan^{-1}\left[\frac{8}{14}\right]+\tan^{-1}\left[\frac{15}{55}\right]$$

$$=\tan^{-1}\left[\frac{4}{7}\right]+\tan^{-1}\left[\frac{3}{11}\right]$$

$$=\tan^{-1}\left[\frac{\frac{4}{7}+\frac{3}{11}}{1-\frac{4}{7}\times\frac{3}{11}}\right]=\tan^{-1}\left[\frac{\frac{44+21}{77}}{\frac{65}{77}}\right]=\tan^{-1}[1]$$

$=\frac{\pi}{4}$ R.H.S Proved.

Q7.(b) ***Show that Points A (a,0), B (0,b) and C (3a,-2b) are Collinear, Also find the equation containing them.***

Sol. The given there points are collinear it and only if

$$D=\begin{vmatrix}x_1 & y_1 & 1\\ x_2 & y_2 & 1\\ x_3 & y_3 & 1\end{vmatrix}=0$$

Let $$D=\begin{vmatrix}x_1 & y_1 & 1\\ x_2 & y_2 & 1\\ x_3 & y_3 & 1\end{vmatrix}=\begin{vmatrix}a & 0 & 1\\ 0 & b & 1\\ 3a & -2b & 1\end{vmatrix}$$

Now exponding the determinant first row wise, we get

D = a (b + 2b) - 0 + 1 (0 - 3ab)

D = 3ab - 3ab

the condition for collinear points is satisfied.

$\therefore$ The points A,B,C are collinerar.

Q8.(a) ***Find the equation of the line passing through the point of intersetion of the lines $4x + 7y - 3 = 0$ and $2x - 3y + 1 = 0$ which has equal intercepts on the axes.***

Sol. We have

$4x + 7y - 3 = 0$ ..... (i)

$2x - 3y + 1 = 0$ .... (ii)

For point of intersection of (i) and (ii)

$4x + 7y = 3$ ....(i) × 1

$2x - 3y = -1$ ... (ii) × 2

$$\begin{aligned}4x+7y&=3\\ 4x-6y&=-2\\ -\quad+\quad&+\\ \hline 13y&=5\\ y&=\frac{5}{13}\end{aligned}$$

Putting the value of y in eq^n (ii)

$$2x-\frac{3\times5}{13}=-1$$

$$2x-\frac{15}{13}=-1$$

$$2x=\frac{15}{13}-1$$

$$2x=\frac{15-13}{13}=\frac{2}{13}$$

$$x=\frac{1}{13}$$

Now

Let the equation of the line in the intercept form

be $\frac{x}{a}+\frac{y}{b}=1$

It is given that $a = b$

Hence the equation of the line becomes

$$\frac{x}{a}+\frac{y}{a}=1$$

$$x+y=a\text{.....(i)}$$

Since the line passes through the point $\left(\frac{1}{13}+\frac{5}{13}\right)$

We have $\frac{1}{13}+\frac{5}{13}=a \Rightarrow a=\frac{6}{13}$

Hence putting $a=\frac{6}{13}$ in (i),

The required equation of the line is .

$$x + y = \frac{6}{13}$$

Q8.(b) If p_1 and p_2 are lengths of perpendiculars from the origin to the lines $xSec\theta + yCo\sec\theta = a$ and $xCos\theta - ySin\theta = aCos2\theta$ respectively, then prove that $4p^2{}_1 + p^2{}_2 = a^2$.

Sol. Hence $$p1 = \frac{0\times Sec\theta + 0\times Co\sec\theta - a}{\sqrt{Sec^2\theta + Co\sec^2\theta}}$$

$$= \frac{-a}{\sqrt{\frac{1}{\cos^2\theta} + \frac{1}{\sin^2\theta}}}$$

$$= \frac{-aSin\theta.Cos\theta}{\sqrt{\sin^2\theta + Cos^2\theta}} = \frac{-a}{2}Sin2\theta$$

Again, $$p_2 = \frac{0\times Cos\theta - 0\times\sin\theta - aCos^2\theta}{\sqrt{Cos^2\theta + \sin^2\theta}}$$

$$= -aCos^2\theta$$

$$Sin^2\theta = \frac{-2p_1}{a} \text{ and } Cos^2\theta = \frac{-p^2}{a}$$

Squaring and adding , we get

$$= \frac{4p_1^{\ 2}}{a^2} + \frac{p_2^{\ 2}}{a^2}$$

$$\therefore 4p_1^{\ 2} + p_2^{\ 2} = a^2 \text{ Ans.}$$

Q9.(a) Find the equation of the circle passing through the points (5,7),(6,6) and (2,-2) Find its centre and radius.

Sol. Let the equation of the circle be

$$x^2 + y^2 + 2gx + 2fy + c = 0 \text{ ...... (i)}$$

Since the point (5,7) lince on the circle there fore.

$$5^2 + 7^2 + 2\times 5\times g + 2\times 7\times f + c = 0$$

$$25 + 49 + 10g + 14f + c - 0$$

$$74 + 10g + 14f + c = 0 \text{ .... (ii)}$$

Similarly, Since the point (6,6) lies on the circle

$$6^2 + 6^2 + 2\times 6\times g + 2\times 6\times f + c = 0$$

$$36 + 36 + 12g + 12f + c = 0$$

$$72 + 12g + 12f + c = 0 \text{ .... (iii)}$$

Again, since the point (2,-2) lies on the circle,

$$2^2 + (-2)^2 + 4g - 4f + c = 0$$

$$4 + 4 + 4g - 4f + c = 0$$

$$8 + 4g - 4f + c = 0 \text{ ..... (iv)}$$

Subtracting eq^n (iv) from (iii) and eq^n from

$$64 + 8g + 16f = 0$$

$$8g + 16f = -64 \text{ .... (iv)}$$

$$-2 + 2g - 2f = 0$$
$$2g - 2f = 2 \text{ .... (vi)}$$

Eqvating equation (v) and (vi)

$$8g + 16f = -16$$
$$8g - 8f = 8$$
$$24f = -72$$
$$f = -6$$

$$g = \frac{-64 + 16\times 6}{8}$$

$$g = \frac{32}{8}$$

Putting f = -6 , g = 4 in eq^n (iv)

$$8 + 4\times 4 - 4\times -6 + c = 0$$

$$8 + 16 + 24 + c = 0$$

$$c = -48$$

There fore , the required equation is

$$x^2 + y^2 + 8x - 12y - 48 = 0$$

Centre is the point (-4 , 6)
and whose radius is

$$= \sqrt{4^2 + 6^2 + 48}$$

$$= \sqrt{16 + 36 + 48}$$

$$= 10 \text{ Ans.}$$

Q9.(b) Find the equation of a circle, the end points of one of whose diameters are A (2,-3) and B (- 3,5).

Sol. $x_1 = 2$, $y_1 = -3$; $x_2 = -3$, $y_2 = 5$,

The required equation of the circle is.

$$(x - x_1)(x - x_2) + (y - y)(y - y_2) = 0$$
$$\Rightarrow (x-2)(x+3) + (y+3)(y-5) = 0$$
$$\Rightarrow (x^2 + 3x - 2x - 6) + (y^2 - 5y + 3y - 15) = 0$$
$$\Rightarrow (x^2 + x - 6) + (y^2 - 2y - 15) = 0$$