Top 50 Maths Questions for NDA II 2019 exam

1. Ans. B.

to find the relation between roots, we have b^2-4ac

Here a = a9b-c), b= b(c-a), c=c(a-b)

Assume it has equal roots

Then $[b(c-a)]^2-4*a(b-c)*c(a-b) = 0$

$b^2c^2+ b^2a^2+4a^2c^2+2acb^2-4a^2bc-4abc^2 = 0$

This is similar to $a^2+b^2+c^2+2ab+2bc+2ca=(a+b+c)^2$

So, $(bc+ba-2ac)^2=0$

bc+ba-2ac=0

bc+ba=2ac

b=2ab/(a+b)

a, b, care in H.P

Hence the assumption is correct, and the equation has equal roots.

2. Ans. C.

the given terms 2, 5, 8, …. are in A.P

Common difference d= 3; first term a= 2

Then 200^{th} term is given by a_{200}= a+(n-1) *d

a_{200}= 2+(200-1) *3

a_{200}=599.

3. Ans. A.

If the teacher has x questions then the number of ways, she can arrange is x!

The least value of x that satisfies the question is 5.

5! = 120>27.

4. Ans. B.

given log $(1+3x+2x^2)$

On factorization of quadratic equation, log $((1+x)(1+2x))$

= log $(1+x)$ + log $(1+2x)$ ------- (1)

We know x^n in $\log(1+x)$ expansion is $(-1)^{n+1}x^n/n$ ------- (2)

From (1) & (2), coefficient of x^n is

$= (-1)^{n+1}x^n/n + (-1)^{n+1}(2x)^n/n$

$= (-1)^{n+1}(1+2^n)x^n/n$

= so the coefficient of x^n is $(-1)^{n+1}(1+2^n)/n$

5. Ans. A.

Recall, Mean = Sum of all items/ (total number of items)

Lowering both numerator and denominator will decrease the mean.

Median being the middle number will not be affected

If the values you removed from the end happens to be the values that repeated the most, then modes can can be affected as well.

6. Ans. B.

the series follows as $0 = 1^3-1$

$5 = 2^3-3$

$22 = 3^3-5$

$57 = 4^3-7$

$116 = 5^3 - 9$

$205 = 6^3 - 11$

7. Ans. D.

Given that $A^5 = 0$ and an ≠ I for 1 <= n <= 4

Let $B = I + A + A^2 + A^3 + A^4$

[Given that an is not equal to I for n greater than or equal to 1 and less than equal to 4]

Now $(I - A) *B = (I - A) *(I + A + A^2 + A^3 + A^4)$

=> $(I - A) *B = I + A + A^2 + A^3 + A^4 - A – A^2 – A^3 – A^4 – A^5$

=> $(I - A) *B = I – A^5$

=> (I - A) *B = I (since A5 = 0)

Now left multiply (I - A)-1 on both sides, we get

(I - A)-1 *(I - A) *B = (I - A)-1 * I

=> B = (I - A)-1

=> (I - A)-1 = B

=> $(I - A)-1 = I + A + A^2 + A^3+ A^4$

8. Ans. B.

2 tests will be needed to find the faulty machines if we can find one faulty machine in each test

Probality that we will test a faulty machine in first test is 2/4=1/2 (there are 4 machines and 2 of them faulty)

Now that one faulty machine has been identified we are left with 3 machines with one of them being faulty.Probaility that we will test the other faulty machine in second test is 1/3.so probability that we will require 2 tests to find the faulty machines is 1/2*1/3=1/6

9. Ans. A.

Recall, Mean = Sum of all items/ (total number of items)

Lowering both numerator and denominator will decrease the mean.

Median being the middle number will not be affected

If the values you removed from the end happens to be the values that repeated the most, then modes can can be affected as well.

10. Ans. A.

Let f(x) = ax^2-bx+c=0

f(2)= 4a-2b+c<0

f(0)=c>0

so we can see that the sign of f(x) changes, when x changes from 0 to 2. So it haws root in the interval (0,2)

11. Ans. D.

z-1/z+1 = x+iy-1/x+iy+1

z-1/z+1=x^2+y^2-1+2iy/x^2+y^2+2x+1

Re(z-1/z+1) = x^2+y^2-1/x^2+y^2+2x+1=0

$X^2+y^2=1$

Also zz′ = $x^2+y^2=1$

zz′ =$|z|^2$

$|z|^2=1$

|z|=1

12. Ans. A.

z= ($\sqrt{3}$/2+i/2)^{107}+($\sqrt{3}$/2+-i/2)^{107}

cosп/6 = $\sqrt{3}$/2 , sinп/6 = ½

z=(cosп/6 +isinп/6)+(cosп/6 -isinп/6)

(cosθ+isinθ)^n = cosnθ+isinnθ

Z = cos (107п/6)+isin(107$\pi/6$)+cos (107п/6)-isin(107$\pi/6$)

z=2cos (107п/6)

im(z) =0

13. Ans. D.

f(θ) *f(Φ)=

*

cos θ	-sin θ	0
sin θ	cos θ	0
0	0	1

cos Φ	-sin Φ	0
sin Φ	cos Φ	0
0	0	1

cos θ.cos Φ -sin θ sin Φ	-cos θ.sin Φ -sin θ.cos Φ	0
sin θ. cos Φ+ cos θ.sin Φ	Sinθ.cos Φ +cos θcos Φ	0
0	0	1

cos (θ+ Φ)	-sin(θ + Φ)	0
sin (θ+ Φ)	Cos(θ +Φ)	0
0	0	1

f(θ) *f(Φ)=f(θ+Φ)

det[f(θ) *f(Φ)] = $1[\cos^2(\theta+\Phi)+\sin^2(\theta+\Phi)]$ =1

det(f(x)) = $\cos^2x-(-\sin^2x) = \cos^2x+\sin^2x = 1$

for x=-x, det f(-x) = $\cos^2(-x)-(-\sin^2(-x))=\cos^2x+\sin^2x = 1$

detf(-x) = detf(x)

f(x) is even function.

14. Ans. A.

=

1	1	1
1	-1	2
3	-1	5

x
y
z

8
6
k

|A|=1(-5+2)-1(5-6)+1(-1+3)=0

Adj(A)=

3	-6	3
1	2	-1
2	4	-2

-24-36+15
8+12-15
16+24-30

-45
5
10

For k=15, (adjA)B =

= $\neq$0

System is inconsistent and has no solution

For k=20, (adjA)B=

-24-36+60
8+12-20
16+24-40

0
0
0

= =0

System has infinitely many solutions

15. Ans. D.

a-x	c	b
c	b-x	a
b	a	c-x

=0

$R_1 \rightarrow R_1+R_2+R_3$

a+b+c-x	a+b+c-x	a+b+c-x
c	b-x	a
b	a	c-x

=0

1	1	1
c	b-x	a
b	a	c-x

(a+b+c+x)=0

(a+b+c-x)(1(b-x)(c-x)-1(c(c-x))+1(ac(b(b-x))=0

$(-x)(bc-bx-xc+x^2-a^2-c^2+xc+ab+ac-b^2+bx)=0$

$(x)(ab+bc+ac-a^2-b^2-c^2)=0$

$x(x^2+a^2+b^2+c^2-ab-bc-ca)=0$

$x(x^2-(a-b)^2-(b-c)^2-(c-a)^2)=0$

$x=0$

16. Ans. B.

B = adjA, I = identity matrix, |A|=k

AB = A(adj A) = |A|I = kI

17. Ans. B.

Matrix product is commutative if both are diagonal matrices of same order

$A^2-B^2 = (A+B)(A-B)$ is not true

Next, (A+1)(A-1) = 0

$A^2+AI-IA-I^2=0$ (AI=IA)

$A^2 = I$ is correct

18. Ans. A.

$$\begin{bmatrix} x & -3i & 1 \\ y & 1 & i \\ 0 & 2i & -i \end{bmatrix} = 6+11i,$$

$x(-i-2i^2) + 3i(-iy)+2iy=6+11i$

$-ix + 2x +3y +2iy =6 + 11i$

$(-x+2y)i + 2x+3y =6+11i$

$-x+2y =11$

$-x+8=11$

$-x=3$

$x=-3$

$2x+3y=6$

Subsitiute x=-3 in above equation

Then,we get y=4

19. Ans. A.

A and B are (3×3) matrices and det A=4 and det B=3

We know $|KA|=K^n|A|$

det (2AB)= $2^3 \times 4 \times 3$

=96.

20. Ans. A.

For $(3 + x)^6$,

a = 3, b = x and n = 6

As n is even, $\left(\frac{n+2}{2}\right)^{th}$ is the middle term

Therefore, the middle term = $\left(\frac{6+2}{2}\right)^{th}$ = $\left(\frac{8}{2}\right)^{th}$ = $(4)^{th}$

General term t_{r+1} is given by

$t_{r+1} = \binom{n}{r} a^{n-r} b^r$

therefore, for 4^{th} , r = 3

therefore the middle term is

$t_4 = t_{3+1}$

$= \binom{6}{3} (3)^{6-3}(x)^3$

$= \frac{6\times5\times4}{3\times2\times1} . (3)^3 (x)^3$

$= (20). (27) x^3$

$= 540 x^3$

21. Ans. B.

To find the 9th term in the expansion of $\left(\frac{a}{b} - \frac{b}{2a^2}\right)^{12}$

Formula used: (i) $^nC_r = \frac{n!}{(n-r)!(r)!}$

(ii) $T_{r+1} = {}^nC_r\, a^{n-r}\, b^r$

For 9th term, r+1 = 9

⇒ r = 8

In, $\left(\frac{a}{b} - \frac{b}{2a^2}\right)^{12}$

9th term = T_{8+1}

⇒ $^{12}C_8 \left(\frac{a}{b}\right)^{12-8} \left(\frac{-b}{2a^2}\right)^8$

⇒ $\frac{12!}{8!(12-8)!} \left(\frac{a}{b}\right)^4 \left(\frac{-b}{2a^2}\right)^8$

⇒ $495 \left(\frac{a^4}{b^4}\right)\left(\frac{b^8}{256a^{16}}\right)$

⇒ $\left(\frac{495b^4}{256a^{12}}\right)$

⇒ $ANS: \left(\frac{495b^4}{256a^{12}}\right)$

22. Ans. C.

We have been given that 2nd, 3rd and 6th terms of an AP are the three consecutive terms of a GP.

Let the three consecutive terms of the G.P. be a,ar,ar^2

Where a is the first consecutive term and r is the common ratio.

2nd, 3rd terms of the A.P. are a and ar respectively as per the question.

∴ The common difference of the A.P. = ar - a

And the sixth term of the A.P. = ar^2

Since the second term is a and the sixth term is ar^2 (In A.P.)

We use the formula:t = a + (n - 1)d

∴ $ar^2 = a + 4(ar - a)$...(the difference between 2nd and 6th term is 4(ar - a))

⇒ $ar^2 = a + 4ar - 4a$

⇒ ar2 + 3a - 4ar = 0

⇒ $a(r^2 - 4r + 3) = 0$

⇒ a(r - 1)(r - 3) = 0

Here, we have 3 possible options:

1)a = 0 which is not expected because all the terms of A.P. and G.P. will be 0.

2)r = 1,which is also not expected because all th terms would be equal to first term.

3)r = 3,which is the required answer.

Ans: Common ratio = 3

23. Ans. A.

To Find: what amount will he pay in the 30th instalment.

Given: first instalment =10000 and it increases the instalment by 500 every month.

∴ So it form an AP with first term is 10000, common difference 500 and number of instalment is 30

Formula Used: Tn = a + (n - 1)d

(Where a is first term, Tn is nth term and d is common difference of given AP)

∴ Tn = a + (n - 1)d ⇒ Tn = 10000 + (30 - 1)500 ⇒ Tn = 10000 + 29 × 500

Tn = 10000 + 14500 ⇒ Tn = 24,500

So, he will pay 24,500 in the 30th instalment.

24. Ans. D.

Ln(dy/dx) = ax+by

dy/dx = e^{ax+by}

dy/dx = $e^{ax}e^{by}$

dy.e^{-by} = e^{ax}dx

e^{-by}/-b +C_1=e^{ax}/a+C_2

e^{ax}/a +e^{-by}/b = C_2-C_1=C

25. Ans. A.

$\frac{d}{dx}$(sec^2 (tan^{-1}x))

→2sec(tan^{-1}x)(sec(tan^{-1}x)tan(tan^{-1}x)).1/1+x^2

[$\frac{d}{dx}$(sec^{2}x)=2secx(secxtanx)]

tan^{-1}x=t

→2 sec(t)(sect)x.1/1+x^2

→2sec^{2}t.x/1+x^2

→2(1+tan^2(tan^{-1}x)).x/1+x^2

→2(1+x^2).x/1+x^2=2x

26. Ans. C.

$y = \sin(\ln x)$--------(1)

$\frac{dy}{dx} = \cos(\ln x).\frac{1}{x}$----------(2)

$=\frac{d^2y}{dx^2} = (x(-\sin(\ln x))(\frac{1}{x}) - \cos(\ln x)\,(1))/x^2$

$= x^2\left(\frac{d^2y}{dx^2}\right) = -y - x\frac{dy}{dx}$

$= x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = 0$

27. Ans. B.

Given dy/dx = $-x^2-1/x^3$

On integrating

y = $-x^3/3 + 1/2x^2 + C$

the curve passes throughu (-1,-2), substitute in above equation

-2 = 1/3+1/2+C

C=-17/6

So, y = $-x^3/3+1/2x^2-17/6$

On rearranging, $6x^2 y + 17x^2 + 2x^5 - 3 = 0$

28. Ans. C.

$= \mathbf{y = mx + c}$

$= \mathbf{mx - y + c = 0 \text{ is at unit distance from the origin}}$

$= \mathbf{\frac{|m(0)-(0)+c|}{\sqrt{m^2+(-1)^2}} = 1}$

$= \mathbf{c = \sqrt{1 + m^2}}$

$= \mathbf{\left[y - x\frac{dy}{dx}\right]^2 = c^2 = 1 + m^2 = 1 + \left[\frac{dy}{dx}\right]^2}$

29. Ans. B.

y=csinx

Area=$\int_0^{\pi} csinxdx$

=c$[-\cos x]^{\pi}_{0}$

=-c(-1-1)=2c

30. Ans. C.

Put $\cos^2x=t$

2cosx(-sinx)=dt/dx

Sin2xdx=-dt

$$I = -\int e^t dt$$

$$I = -e^t + c$$

$$I = -e^{\cos^2 x} + c$$

31. Ans. B.

$X^2 = 6y$ is a upward parabola with vertex (0,0)and $x^2 + y^2 = 16$ is a circle with centre(0,0)and radius is 4

by solving both the equation we got $(-2\sqrt{3}, 2)$and $(2\sqrt{3}, 2$

required area = 2x area of OBCO

= 2(area of ODBCO − area ODBO)

$$= 2\{\int_0^{2\sqrt{3}} \sqrt{16 - x^2}dx - \int_0^{2\sqrt{3}} \frac{x^2}{6}dx\}$$

$$= 2\left[\{\frac{x}{2}\sqrt{16 - x^2} + \frac{16}{2}\sin^{-1}\frac{x}{4}\}_0^{2\sqrt{3}} - \frac{1}{6}\left(\frac{x^3}{3}\right)_0^{2\sqrt{3}}\right]$$

$$= 2[(\frac{2\sqrt{3}}{2}\sqrt{16 - 2\sqrt{3}^2} + \frac{16}{2}\sin^{-1}\frac{2\sqrt{3}}{4}) - \left(\frac{0}{2}\sqrt{16 - 0^2} + \frac{16}{2}\sin^{-1}\frac{0}{4}\right) - \frac{1}{6}\left\{\frac{2\sqrt{3}^3}{3} - 0\right\}]$$

$= \frac{16\pi + 4\sqrt{3}}{3}$ square units

32. Ans. A.

Given equation 2y=5x+7

y= $\frac{5x+7}{2}$

-5x+2y=7

$$\sqrt{\frac{x}{-\frac{7}{5}}+\frac{y}{\frac{7}{2}}=1}$$

Required area=

$$\int ydx=\int_2^8 \frac{5x+7}{2}dx=\frac{1}{2}\int_2^8 5x+7dx=\frac{1}{2}\left[\frac{5x^2}{2}+7\right]_2^8=96 \text{ square units}$$

33. Ans. B.

$$\int_{2000}^{P} dP=\int_0^{25} 100-12\sqrt{x}dx$$

(P-2000)=25×1000- $\frac{12\times2}{3}25^{\frac{3}{2}}$ =3500

34. Ans. A.

By solving two parabolas equation we got (0,0) and (4,4)

Draw AD as perpendicular on OX

Required area=area of OCABO=area of OBADO-area OCADO

$$=\int_0^4 y1dx-\int_0^4 y2dx=\int_0^4 2\sqrt{x}dx-\int_0^4 \frac{x^2}{4}dx=[2\times\frac{2}{3}x^{\frac{3}{2}}]_0^4-\frac{1}{4}[\frac{x^3}{3}]_0^4=\left[\frac{32}{3}-\frac{16}{3}\right]=\frac{16}{3}\text{square units}$$

35. Ans. A.

$$=\mathbf{Given, xdy=ydx+y^2dy}$$

$$=\mathbf{1=\frac{4}{x}.\frac{dx}{dy}+\frac{y^2}{x}}$$

$$\frac{dx}{dy} + x = \frac{x}{y}$$

$$\frac{dx}{dy} - \frac{x}{y} = -y$$

$$P = -\frac{1}{y}, Q = -y$$

$$\text{Integrating factor} = e^{\int P dy} = e^{-\log y} = 1/y$$

$$\frac{1}{y}\frac{dx}{dy} - \frac{x}{y^2} = -1$$

Multiply the equation with Integrating factor

$$\frac{x}{y} = \int \frac{1}{y}(-y)dy + c$$

$$\frac{x}{y} = \int -1\, dy + C$$

$$\frac{x}{y} = -y + c$$

$$y(1) = 1$$

$$\frac{1}{1} = -1 + c; c = 2$$

$$\frac{x}{y} = -y + 2\ ; x = -y^2 + 2y$$

$$y(-3);\ -3 = -y^2 + 2y$$

$$y^2 - 2y - 3 = 0$$

$$y = \frac{+2 \pm \sqrt{4+12}}{2} = \frac{2 \pm 4}{2}$$

$$y = 3, -1$$

$$y = 3\ \text{, since}\ y > 0$$

36. Ans. C.

We have $x^2+6x-7<0$ à $(x-1)(x+7)<0$ à$x\in(-7,1)$

$x^2+9x+1>0$ à $(x+2)(x+7)>0$ à$x\in(-\propto,-7)\cup(-2,\propto)$

A∩B={xЄR;-2<x<a} à it is true.

A-B= {xЄR; -7<x<-2}à true

37. Ans. C.

Here the maximum number of students failed in all the four subjects = 15%

But minimum number of students failed in al four subjects varies from 0 to 15%.

So correct option is C

38. Ans. C.

On differentiating option C we can get the original differential equation

$=y-x+\ln(x+y)=c$

$.On\ differentiating\ the\ equation$

$=1-\frac{dx}{dy}+\left(\frac{1}{x+y}\right)\left(1+\frac{dx}{dy}\right)=0$

$=1-\frac{dx}{dy}+\frac{1}{x+y}+\frac{dx}{dy}\left(\frac{1}{x+y}\right)=0$

$=\frac{dx}{dy}\left(\frac{1}{x+y}-1\right)=-1-\frac{1}{x+y}$

$=\frac{dx}{dy}\left(\frac{1-x-y}{x+y}\right)=\left(\frac{-x-x-1}{x+y}\right)$

$=\frac{dx}{dy}=\frac{1+x+y}{x+y-1}$

39. Ans. D.

Let sin x = t

$= \lim_{x\to\pi/6} \frac{2x^2+x-1}{2x^2-3x+1}$

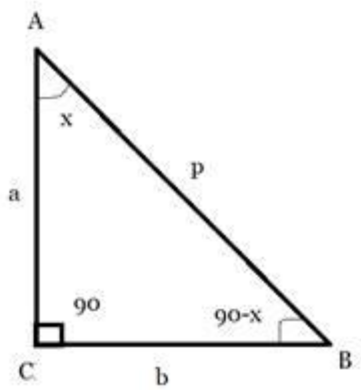
$= \lim_{x\to\frac{\pi}{6}} \frac{(x+1)(2x-1)}{(2x-1)(x-1)}$

$= \lim_{x\to\frac{\pi}{6}} \frac{\sin x+1}{\sin x-1}$

$= \frac{0.5+1}{0.5-1}$

=-3

40. Ans. B.



From projection formula

$= p = a\cos x + b\cos(90 - x)$

$= p = a\cos x + b\sin x \ldots\ldots..(1)$

$= \overrightarrow{AB}.\overrightarrow{AC} + \overrightarrow{BC}.\overrightarrow{BA} + \overrightarrow{CA}.\overrightarrow{CB}$

$= (AB.AC.\cos x) + (BC.BA.\cos(90 - x)) + (CA.CB.\cos 90)$

$= (p.a.\cos x) + (y.p.\sin x)$

$= p[a\cos x + y\sin x]$

From (1)

$= p * p = p^2$

41. Ans. C.

Point P is (1,-1,2)

Point Q is (2,-1,3)

$= \vec{r} = (1-2)\hat{i} + (-1+1)\hat{j} + (2-3)\hat{k}$

$= \vec{r} = -\hat{i} + 0\hat{j} - \hat{k}$ and $\vec{F} = 3\hat{i} + 2\hat{j} - 4\hat{k}$

Moment

$$= \vec{r} \times \vec{F} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ -1 & 0 & -1 \\ 3 & 2 & -4 \end{vmatrix} = \hat{i}(0+2) - \hat{j}(4+3) + \hat{k}(-2+0) = 2\hat{i} - 7\hat{j} - 2\hat{k}$$

42. Ans. C.

For simplicity lets take a, b, c as i,j,k

Now magnitude of A, B and C will be $\sqrt{3}$

43. Ans. A.

Only $\overline{AB} + \overline{BC} + \overline{CA} = \bar{0}$ is correct, rest all the equation are not present in cyclic order

The above expression tells that the movement is from A to B, then from B to C, and then From C to the starting point. This type of Expression is not present in other options.

44. Ans. D.

Given lines x-y-4=0 and 2x+3y+7=0

Point of intersection of $a_1x+b_1y+c_1=0$ and $a_2x+b_2y+c_2=0$ is

$(b_1c_2-b_2c_1/a_1b_2-a_2b_1 , c_1a_2-c_2a_1/a_1b_2-a_2b_1)$

(-1*7-3*(-4)/1*3-2*-1, (-4*2-7*1/1*3-2*-1)

(1,-3)

Radius = distance between (1,-3) and (2,4)

$((1-2)^2+(3+4)^2)^{1/2}$

$=\sqrt{50}=5\sqrt{2}$ units

45. Ans. A.

Substitute the line equation into ellipse equation:

$3x+4y=12$; $x=\frac{12-4y}{3}$

So, $9\left(\frac{12-4y}{3}\right)^2+16y^2=144$

On solving we get, $y=0,3$

For y=0; x=4

For y=3;x=0

Length of the chord=$\sqrt{(0-3)^2+(4-0)^2}=\sqrt{9+16}=5\text{units}$

46. Ans. D.

Let Q(x_1, y_1, z_1) be the image of the point P

The direction ratios of PQ are 3, -2, 2

Line equation will be $\frac{x+2}{3}=\frac{y-1}{-2}=\frac{z+5}{2}=r$

Let the point be Q (3r-2, -2r+1, 2r-5)

Co ordinates thus forms are x= 3r-2, y=-2r+1, z= 2r-5

PQ = (3r-2, -2r+1, 2r-5)

Midpoint of PQ is (3r/2 -2, 1-r, r-5)

It lies on the plane i.e., $3\left(\frac{3r}{2}-2\right)-2(1-r)+2(r-5)+1=0$

On simplifying, we get r=2

Q=4, -3, -1)

Mid point = (1, -1, -3)

So, PQ = $\sqrt{(-2-4)^2+(1+3)^2+(-5+1)^2}=\sqrt{68}$

PQ= $2\sqrt{17}>8$

47. Ans. C.

Let a,b,c be the direction ratios of the line then the equation thus formed will be

$$\frac{x-5}{a}=\frac{y+6}{b}=\frac{z-7}{c}$$

The above line is parallel to planes x+y+z=1,2x-y-2z=3

So, a(1)+b(1)+c(1)=0, a(2)+b(-1)+c(-2)=0

On solving we get

$$=\frac{a}{-1}=\frac{b}{4}=\frac{c}{-3}=\lambda$$

a=-λ, b=4λ, c=-3λ

Direction ratios are <-1, 4, -3>

SO the equation is

$$=\frac{x-s}{-1}=\frac{y+6}{4}=\frac{z-7}{-3}$$

48. Ans. D.

Let the equation of the required ellipse be

$$\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$$

Coordinates of foci = (±3, 0) ...(ii)

We know that,

Coordinates of foci = (±c, 0) ...(iii)

∴ From eq. (ii) and (iii), we get

c = 3

We know that,

$C^2 = a^2 - b^2$

$\Rightarrow (3)^2 = a^2 - b^2$

$\Rightarrow 9 = a^2 - b^2$

$\Rightarrow b^2 = a^2 - 9$ ...(iv)

Given that ellipse passing through the points (4, 1)

So, point (4, 1) will satisfy the eq. (i)

Taking point (4, 1) where x = 4 and y = 1

Putting the values in eq. (i), we get

$\frac{4^2}{a^2} + \frac{1^2}{b^2} = 1$

$\frac{4^2}{a^2} + \frac{1^2}{a^2 - 9} = 1$

$16a^2 - 144 + a^2 = a^2(a^2 - 9)$

$\Rightarrow 17a^2 - 144 = a^4 - 9a^2$

$\Rightarrow a^4 - 9a^2 - 17a^2 + 144 = 0$

$\Rightarrow a^4 - 26a^2 + 144 = 0$

$\Rightarrow a^4 - 8a^2 - 18a^2 + 144 = 0$

$\Rightarrow a^2(a^2 - 8) - 18(a^2 - 8) = 0$

$\Rightarrow (a^2 - 8)(a^2 - 18) = 0$

$\Rightarrow a^2 - 8 = 0$ or $a^2 - 18 = 0$

$\Rightarrow a^2 = 8$ or $a^2 = 18$

If $a^2 = 8$ then

$b^2 = 8 - 9 = -1$

Since the square of a real number cannot be negative. So, this is not possible

If a^2 = 18 then

b^2 = 18 – 9= 9

So, equation of ellipse if a2 = 18 and b2 = 9

$\frac{x^2}{18}+\frac{y^2}{9}=1$

49. Ans. D.

Total number of elementary events=6^3

Favorable number of events=coefficient of x^0 in $(x+x^1+x^0+x^{-2}+x^2+x^3)^3$

= coefficient of x^0 in $\left(\frac{1+x+x^2+x^3+x^4+x^5}{x^2}\right)^3$

= coefficient of x^6 in $(1+x+x^2+x^3+x^4+x^5)^3$

= coefficient of x^6 in $\left(\frac{1-x^6}{1-x}\right)^3$

= coefficient of x^6 in $(1-x^6)^3(1-x)^{-3}$

= coefficient of x^6 in $[1-{}^3C_1x^6+\ldots..][1-x]^{-3}$

= coefficient of x^6 in $[1-x]^{-3}$. ${}^3C_1$ coefficient of x^0 in $[1-x]^{-3}$

= ${}^{6+3-1}C_{3-1}-{}^3C_1$

= ${}^8C_2$ - ${}^3C_1$=25

Required probability= 25/216

50. Ans. D.

= $\text{Probability for rain} = \frac{25}{100} = \frac{1}{4}$

= **Probability for getting one rainy day within a period of seven days**

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