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SUBJECT- MATHS, LOGICAL REASONING & STAT

Test Code – CFN 9267

BRANCH - () (Date :)

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1. $\frac{{}_{15}P_{r-1}}{{}_{16}P_{r-2}} = \frac{3}{4}$

$\therefore\ 4 \times 15P_{r-1} = 3 \times {}_{16}P_{r-2}$

$\therefore\ 4 \times \frac{15!}{(15-r+1)!} = 3 \times \frac{16!}{(16-r+2)!}$

$\therefore\ 4 \times \frac{15!}{(16-r)!} = 3 \times \frac{16 \times \mathbf{15}!}{(18-\boldsymbol{r})!}$

$\therefore\ \frac{4}{(16-r)!} = \frac{3 \times 16}{(18-r)(17-r)(16-r)!}$

$\therefore$ (18 – r) (17 – r) = 4 × 3

$\therefore$ 18 – r = 4

$\therefore$ r = 14 **[Ans. : A]**

2. divisors of 420 are

1, 420, 2, 210, 3, 140, 4, 105, 5, 84, 6, 70, 7, 60, 10, 42, 12, 35, 14, 30, 15, 28, 20, 21,

OR

420 = 2 × 2 × 3 × 5 × 7 = 2 × 3 × 5 × 7

$\therefore$ No. of divisors = 3 × 2 × 2 × 2 = 24 **[Ans.: B]**

3. Here $S_n = 2n^2 + n$

$\therefore\ S_1 = 2 + 1 = 3 = T_1 = a$ $\qquad \therefore\ a = 3$

$S_2 = 8 + 2 = 10 = T_1 + T_2$ $\qquad \therefore\ T_2 = 7$

$\therefore$ d = 4

Now, $T_{10} = a + 9d = 3 + 36 = 39$

$\therefore\ T_{10} - T_1 = 39 - 3 = 36$ **[Ans.: B]**

4. By trial & error method,

3 geometric means between 4 and 324 are 12, 36, 108

$\therefore$ 4, 12, 36, 108, 324 are in G.P. **[Ans.: B]**

5. SI = Pin

$SI_1 = 845 \times 0.10 \times n \quad = 84.5n$

$SI_2 = 750 \times 0.10 \times n \quad = 75n$

Here (84.5 – 75) · n = 57

$\therefore$ 9.5n = 57

$\therefore$ n = 6 years **[Ans.: C]**

6. 3 digits even numbers by 0, 1, 2, 3, 4, 5

$$
\begin{array}{ccccccccc}
- & - & - & \quad & \text{OR} & \quad & - & - & - \\
 & & \uparrow & & & & \uparrow & & \uparrow \\
 & & 0 & & & & \cancel{0} & & 2,4
\end{array}
$$

${}_1P_1 \times {}_5P_2 \;+\; {}_2P_1 \times {}_4P_1 \times {}_4P_1$

$= 20 + 2 \times 4 \times 4 = 20 + 32 = 52$ **[Ans.: B]**

7. No. of Shake hands = $nC_2 = {}_{10}C_2 = \frac{10 \times 9}{2 \times 1}$

$= 45$ **[Ans.: A]**

8. $S_n = \frac{a[r^n - 1]}{r-1}$ Here a = 1.03
r = 1.03

$\therefore$ r – 1 = 0.03

$\therefore S_n = \frac{1.03\,[(1.03)^n - 1]}{0.03}$

$\therefore S_n = \frac{103}{3}\,[(1.03)^n - 1]$ **[Ans.: C]**

9. 7 + 77 + 777 + …………

= 7 [1 + 11 + 111 + …………..]

$= \frac{7}{9}$ [9 + 99 + 999 + ………..]

$= \frac{7}{9}$ [(10 – 1) + (100 – 1) + (1000 – 1) + …….]

$= \frac{7}{9}$ [(10 + 100 + 1000 + ……) – (1 + 1 + 1 + ……..)

$= \frac{7}{9}\left[\frac{10\,(10^n - 1)}{10-1} - n\right]$

$= \frac{7}{9}\left[\frac{10}{9}(10^{n-}\,1) - n\right]$

$= \frac{70}{81}\,(10^n - 1) - \frac{7n}{9}$

$= \frac{7}{81}(10^{n+1} - 10) - \frac{7n}{9}$ **[Ans.: C]**

10. P × 1.03 × 1.02 × 1.01 = 15916.59

$\therefore$ P = 15000 **[Ans.: A]**

11. Rank of word "MOTHER"

E ……………. = 5! = 120
H …………… = 5! = 120

ME ………… = 4! = 24
MH …………. = 4! = 24
MOE…… = 3! = 6
MOH….. = 3! = 6
MOR…. = 3! = 6
MOTE …. = 2! = 2

MOTHER = $\frac{1}{309}$

$\therefore$ Rank = 309 **[Ans.: B]**

12. Here $a = 100$, $d = -5$, $S_n = 975$, $n = ?$

$S_n = \frac{n}{2}[2a + (n-1)d]$

$\therefore 975 = \frac{n}{2}[200 + (n-1)(-5)]$

$\therefore 1950 = n[200 - 5n + 5]$

$\therefore 1950 = n[205 - 5n]$

$\therefore 1950 = 205n - 5n^2$

$\therefore Sn^2 - 205n + 1950 = 0$

$\therefore n^2 - 41n + 390 = 0$

$\therefore (n-15)(n-26) = 0$

$\therefore$ n = 15 OR n = **26 not valid**

$\therefore n = 15$ **[Ans.: B]**

13. 6(G) 4(L) 10

3	2	5
2	3	
4	4	

$= {}_6C_3 \times {}_4C_2 + {}_6C_2 \times {}_4C_3 + {}_6C_1 \times {}_4C_4$

$= 20 \times 6 + 15 \times 4 + 6 \times 1$

$= 120 + 60 + 6 = 186$ **[Ans.: D]**

14. $GM^2 = AM \times HM$

$\therefore GM^2 = 32 \times 2$

$\therefore GM^2 = 64$

$\therefore GM = 8$ **[Ans.: (A)]**

15. Here P = 200, $I = \frac{5\%}{4} = 1.25\% = 0.0125$

$n = 10 \times 4 = 40$, P.V. ?

$PV = P\left[\frac{1+i^n-1}{i(1+i)^n}\right]$

$\therefore$PV = 200 $\left[\frac{(1.0125)^{40}-1}{0.0125(1.0125)^{40}}\right]$ = 6265.38 **[Ans.: C]**

16. No. of ways = $\frac{(n-1)!}{2} = \frac{(7-1)!}{2} = \frac{6!}{2}$

= $\frac{720}{2}$ = 360 **[Ans.: B]**

17. Reciprocals of the terms of a GP is also G.P.

[e.g. 10, 20, 40 80, ……… GP

$\frac{1}{10}, \frac{1}{20}, \frac{1}{40}, \frac{1}{80}$, …………GP **[Ans.: B]**

18. Here a = 50, d = – 5, S_n = 0, n = ?

$S_n = \frac{n}{2}$ [2a + (n – 1)d]

$\therefore$ 0 = $\frac{n}{2}$ [100 + (n – 1) (–5)]

$\therefore$0 = 100 – 5n + 5

$\therefore$ S_n = 105

$\therefore$ n = 21 **[Ans.: B]**

19. ${}_{1000}C_{98} = {}_{999}C_{97}$ + x C_{901}

$\therefore$ ${}_{1000}C_{902} = {}_{999}C_{902} + {}_{x}C_{901}$

[By ${}_{n+1}C_r = {}_nC_r + {}_nC_{r-1}$]

x = 999 **[Ans.: A]**

20. i = $\frac{12\%}{4}$ = 0.03, n = 2.5 × 4 = 10

A = 13440, P = ?

A = P(1 + i)^n

$\therefore$ 13440 = P(1.03)^{10}

$\therefore$ 13440 = P(1.344)

$\therefore$ P = 10000 **[Ans.: A]**

21. M W M W M W M

${}_4P_4 \times {}_3P_3$ = 24 × 6 = 144 **[Ans.: A]**

22. Here S_∞ = 15 $\therefore$ $\frac{a}{1-r}$ = 15

$\therefore$ a = 15(1 – r) ………..(i)

Sum of square of infinite = $\frac{a^2}{1-r^2}$ = 45

$\therefore$ a^2 = 45 (1 – r^2)

$\therefore$ 225 $(1 - r)^2$= 45(1 – r) (1 + r)

$\therefore$ 225 – 225r = 45 + 45r

$\therefore$ 180 = 270 r

$\therefore$ r = $\frac{180}{270}$ = 2/3 **[Ans.: D]**

23. $3^n - 2n - 1$ is divisible by 4.

Taking n = 3, $3^3 - 6 - 1$ = 20 divisible by 4] **[Ans.: D]**

24. C = 1, 25,000, i = 10%, S = ?, n = 20

S = C $(1 - i)^n$

$\therefore$S = $125000(0.09)^{20}$ = 125000(0.1215)

= 15187.5 **[Ans.: A]**

25. ${}_5C_3 + {}_5C_4 + {}_5C_5$ = 10 + 5 + 1 = 16 **[Ans.: D]**

26. $T_5 = 3\sqrt{3}$ $\therefore$ $a \cdot r^4 = 3^{1/3}$

Now, $T_1 \cdot T_2 \cdot T_3 \cdot T_4 \cdot T_5 \cdot T_6 \cdot T_7 \cdot T_8 \cdot T_9$

$= a \cdot ar \cdot ar^2 \cdot ar^3 \cdot ar^4 \cdot ar^5 \cdot ar^6 \cdot ar^7 \cdot ar^8$

$= a^9 \times r^{36} = (a \cdot r^4)^9 = \left(3^{1/3}\right)^9 = 3^3 = 27$ **[Ans.: B]**

27. Here P = 1200, I = 0.08, n = 12

1200 payable at the beginning of each year so we have to use concept of due Annuity

FV = P $\left[\frac{(1+i)^n-1}{i}\right]$ (1 + i)

1200 $\left[\frac{(1.08)^{12}-1}{0.08}\right]$ (1.08)

= 24,594.36 **[Ans.: B]**

28. No. of triangles = ${}_nC_3 - {}_rC_3$

$= {}_{12}C_3 - {}_7C_3$

$= 220 - 35 = 185$ **[Ans.: A]**

29. $4! \times 6! = 24 \times 720$

$= 17, 280$ **[Ans.: A]**

30. Let P = 100, A = 200, n = 8, i = ?

$A = P(1 + i)^n$

$200 = 100\,(1 + i)^8$

$\therefore\ 2 = (1 + i)^8$

$\therefore\ i = 0.09$

i.e. 9% **[Ans.: C]**

31. $x^{1/a} = y^{1/b} = z^{1/c} = k$

$\therefore x^{1/a} = k,\ y^{1/b} = k,\ z^{1/c} = k$

$\therefore\ x = k^a,\ y = k^6,\ z = k^c$

Here x, y, z are in G.P.

$\therefore\ y^2 = xz$

$\therefore\ (k^b)^2 = k^a\ k^c$

$\therefore\ k^{2b} = k^{a + c}$

$\therefore 2b = a + c$

$\therefore$ a, b, c are in AP **[Ans.: A]**

32. a, b, c are in G.P.

$\therefore\ a = k,\ b = kr,\ c = kr^2$

$\therefore\ a^2 + b^2,\ ab + bc,\ b^2 + c^2$

$= k^2 + k^2r^2,\ k^2r + k^2r^3,\ k^2r^2 + k^2r^4$

$= k^2\,(1 + r^2),\ k^2 \cdot r\,(1 + r^2),\ k^{2} \cdot r^2\,(1 + r^2)$

Which are in G.P. **[Ans.: B]**

33. $P = 100$, $i = \frac{0.05}{2} = 0.025$, $n = 8 \times 2 = 16$

$A = ?$

$A = P(1 + i)^n = 100\ (1.025)^{16} = 148.45$ **[Ans.: A]**

34. ${}_nP_r = 1680$, ${}_nC_r = 70$

$r! = \dfrac{{}_np_r}{{}_nC_r}$

$= \frac{1680}{70} = 24$

$\therefore\ r! = 4!$

$\therefore\ r = 4$

${}_nP_r = 1680$

$\therefore\ {}_nP_4 = 8 \times 7 \times 6 \times 5 = {}_8P_4$

$\therefore\ n = 8$ **[Ans.: C]**

35. x, y, z are in GP

$\therefore\ y^2 = xz$

Now, $xyz = \frac{27}{8}$

$\therefore\ y \cdot (xz) = \frac{27}{8}$

$\therefore\ y \cdot y^2 = \frac{27}{8}$

$\therefore\ y^3 = \left(\frac{3}{2}\right)^3$

$\therefore\ y = 3/2$ **[Ans. A]**

36. $d = 2$, $T_7 = 13$

$\therefore\ a + 6d = 13$

$\therefore\ a + 12 = 13$

$\therefore\ a = 1$

$S_n = 49$

$\therefore\ \frac{n}{2}\ [2a + (n - 1)\ d] = 49$

$\therefore\ n\ [2 + (n - 1)\ (2)] = 98$

$\therefore\ n\ [2 + 2n - 2] = 98$

$\therefore n\,(2n) = 98$

$\therefore\ 2n^2 = 98$

$\therefore\ n^2 = 49$

$\therefore\ n = 7$ **[Ans. C]**

37. Let P = 100 $\therefore\ A = 120$,

$i = 0.02$, $n = ?$

$A = P(1 + i)^n$

$\therefore\ 120 = 100\,(1.02)^n$

$\therefore\ 1.2 = (1.02)^n$

$\therefore\ n = 9.21$ years **[Ans.: B]**

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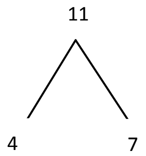

Mathematics Vowels $\Rightarrow$ a, e, a, i = 4

Consonants $\Rightarrow \underline{7}$

11

No. of ways = $\frac{4!\times 7!\times 2!}{2!2!2!} = \frac{4\times 3!\times 7!}{2\times 2}$

$= 6 \times 7!$ **[Ans.: A]**

39.

I(5)	II(5)	10
2	4	6
3	3	
4	2	

No. of ways = ${}_5C_2 \times {}_5C_4 + {}_5C_3 \times {}_5C_3 + {}_5C_4 \times {}_5C_2$

$= 10 \times 5 + 10 \times 10 + 5 \times 10$

$= 50 + 100 + 50 = 200$ **[Ans.: B]**

40. $P = 600$, $i = \frac{6\%}{4} = 0.015$, $n = 5 \times 4 = 20$,

$FV = P\left[\frac{(1+i)^n-1}{i}\right](1 + i)$ (Due Annuity)

$= 600\left[\frac{(1.015)^{20}-1}{0.015}\right](1.015)$

$= 14{,}082.3$ **[Ans.: A]**

41. SI = Pin

44000

P = x y z

i =	0.06	0.08	0.06
n =	2	3	6
SI =	0.12x	0.24y	0.36z

Here 0.12x = 0.24y = 0.36z

$\therefore$ x = 2y = 3z = k

$\therefore$ x = k, y = $\frac{k}{2}$, z = $\frac{k}{3}$

$\therefore$ x + y + z = 44,000

$\therefore$ k + $\frac{k}{2} + \frac{k}{3}$ = 44,000

$\frac{6k+3k+2k}{6}$ = 44,000

$\therefore$ 11k = 6 × 44,000

$\therefore$ k = 24,000

Lowest = z = $\frac{k}{3} = \frac{24000}{3}$ = 8000 **[Ans. : C]**

42. FV of Annuity = 75000 – 10000 = 65,000

i = $\frac{0.10}{4} =$ 0.025, n = 8 × 4 = 32, P = ?

FV = P $\left[\frac{(1+i)^n-1}{i}\right]$

$\therefore$ 65000 = P $\left[\frac{(1.025)^{32}-1}{0.025}\right]$

$\therefore$ P = 1349.89 **[Ans.: D]**

43. CI – SI = Pi^2 for 2 years

$\therefore$ 41 – 40 = Pi^2

$\therefore$ Pi^2 = 1 …….. (i)

Now, SI = Pi n

$\therefore$ 40 = Pi × 2

$\therefore$ Pi = 20 …….(ii)

From (i) and (ii) $\frac{Pi^2}{Pi} = \frac{1}{20}$ $\therefore$ I = 0.05 i.e. 5%

From (ii) P × 0.05 = 20

$\therefore$ p = 400 **[Ans.: B]**

44. Perpetuity Annuity = $\frac{P}{C}$

$\therefore$ 1,40,000 = $\frac{1750}{i}$

$\therefore$ i = $\frac{1750}{140000}$ = 0.0125 (month)

$\therefore$ Annual interest rate = 0.0125 × 12

= 0.15

i.e. 15% **[Ans.: D]**

45. A = P(1 + i)^n

$\therefore$ 12167 = P(1 + i)^3 and

13992 = P(1 + i)^4

$\therefore$ 1 + i = $\frac{13992}{12167}$ = 1.15

$\therefore$ i = 0.15

i.e. 15%

Now, 12167 = P(1 + i)^3

$\therefore$ 12167 = P(1.15)^3

$\therefore$ P = 8000 **[Ans.: B]**

46. SI = Pin & A = P (1 + in)

Here 6300 = P(1 + 2i)

$\therefore$ 6300 = P + 2Pi ……….. (i)

& 7875 = P(1 + 3.75 i) n = 3years 9 months

$\therefore$ 7875 = P + 3.75Pi …….(ii) = 3.75 years

From (i) & (ii)

7875 = P + 3.75 pi
<u>6300 = P + 2pi</u>
1575 = 1.75 Pi

$\therefore$ Pi = 900 ………… (iii)

From (i) 6300 = P + 2(900)

$\therefore$ 6300 = P + 1800

$\therefore$ P = 4500 ……. (iv)

From (iii) 4500 × i = 900

$\therefore$ i = 0.2

i.e., 20% **[Ans.: A]**

47. Given

C = The redemption price = Rs. 1000.

R = Periodic dividend payment

= 10% of 1000 = Rs. 100

i = yield rate per period = 14%

n = No. of periods before redemption = 3.

V = Present value of bond = Purchase price = PV of resumed price + PV of all periodic dividend

$= 1000\left(1+\frac{14}{100}\right)^{-3} + 100\left[\frac{1-\left(1+\frac{14}{100}\right)^{-3}}{0.14}\right]$

= Rs. 907.135 **[Ans.: A]**

48. A = P$(1 + i)^n$

1000 = P$(1.07)^4$

$\therefore$ P = 762.92 **[Ans.: C]**

49. P = 800, i = $\frac{6\%}{4}$ = 0.015, n = 6 × 4 = 24

FV = P $\left[\frac{(1+i)^n-1}{i}\right]$

FV = 800 $\left[\frac{(1.015)^{24}-1}{0.015}\right]$ = 22906.82 **[Ans.: A]**

50. P = 2000, PV of Annuity = 20,000, i= 0.05, n = ?

PV = P $\left[\frac{(1+i)^n-1}{i(1+i)^n}\right]$

$\therefore$ 20000 = 2000 $\left[\frac{(1.05)^n-1}{0.05\,(1.05)^n}\right]$

By Trial & error, n = 14 **[Ans.: C]**