Write a progression for the data?

PROGRESSIONS

Introduction: -

An Arithmetic Progression (A.P)	Geometric Progression (G.P)
→An arithmetic progression is a sequence in which terms increase (or) decrease by the same constant called the common difference of A.P	→A geometric progression (G.P) is a sequence of numbers where first term is non-zero and each of there succedding terms is equal to the preceding terms multiplied by some fixed non zero number called the common ration of the G.P.
→General form of an AP is a, a+d, a+2d .... a+ (n-1)d where a is called first term and 'd' is called the common difference A.P $a = a_2 - a_1 = a_3 - a_2$ ... $a_n - a_{n-1}$	→General form of an G.P is a, ar, ar², ar³... a.rⁿ⁻¹ Here a is first term, r is common ration $r = \frac{a_2}{a_1}$ $\frac{a_3}{a_2} \dots \dots \frac{a_n}{a_{n-1}}$
→nth term $a_n = a+(n-1)d$	→nth term $a_n = a.r^{n-1}$
→Sum of n terms S_n = $S_n = \frac{n}{2}[a+l]$ where l is last term	→$S_n = \frac{a(1-r^n)}{1-r}$ if r < 1 $S_n = \frac{a(r^n-1)}{r-1}$ if r > 1
→The arithmetic mean of a and b is $\frac{a+b}{2}$	→The G.M of a and b is $\sqrt{ab}$
→If a, x, b are in A.P then $x = \frac{a+b}{2}$	→If a, b are in G.P then $x = \sqrt{ab}$ (or) (ab)^{1/2}
→If $x_1, x_2, \dots x_n$ are n. A.M's between then $d = \frac{b-a}{n+1}$	→If $x_1, x_2, \dots x_n$ are n G.M between then $r = \left(\frac{b}{a}\right)^{\frac{1}{n+1}}$

→Sum of infinite terms in G.P $S_\infty = \frac{a}{1-r}$ if r < 1

$\quad S_\infty = \frac{a}{1-r}$ if r > 1

→The reciprocal of the terms of an A.P is called Harmonic progression

→H.M of a and b is $\frac{2ab}{a+b}$

→Relation between A.M and G.M, H.M is $G^2 = AH$

→$1+2+3+\dots+n = \varepsilon n = \frac{n(n+1)}{2}$

→$1^2+2^2+\dots+n^2 = \varepsilon n^2 = \frac{n(n+1)(3n+1)}{6}$

→$1^3+2^3+3^3+\dots+n^3 = \varepsilon n^3 = \frac{n^2(n+1)^2}{4} = (\varepsilon n)^2$

→$1+3+5+\dots+(2n-1) = \frac{n}{2}[1+(2n-1)] = n^2$

→$2+4+6+\dots+2n = \frac{n}{2}[2+2n] = n(x+1)$

→Any three consecutive number in A.P will be taken as a-d, a, a+d and four such numbers can be taken as a-3d, a-d, a+d, a+3d

→Any three consecutive numbers in G.P will be taken as a/r, a, ar and four such numbers can be taken as a/r³, a/r, ar, ar³

→If $a_1, a_2 \dots a_n$ are in G.P(Where ai > o ∀ i) then log a_1, log a_2, ... log a_n are in A.P and conversely

→If a, b, c are in A.P then i) a+x, b+x, c+x are also in A.P, ii) a-x, b-x, c-x are also in AP, iii) ka, kb, kc are also in A.P

→If every term of a G.P is multiplied by a fixed number then the resulting one is also G.P

→The reciprocal of G.P also from c G.P

1 Mark Questions & Answers

1) Find x so that x, x+2, and x+3 are three consecutive terms of G.P

A) x, x+2 and x+3 are three consecutive terms of G.P

$\frac{x+2}{x} = \frac{x+3}{x+2}$ $\left(\because \frac{a_2}{a_1} = \frac{a_3}{a_2}\right)$

$(x+2)^2 = x(x+3) \Rightarrow x^2+4x+4 = x^2+3x$

$\Rightarrow 4x - 3x = -4 \Rightarrow x = -4$ $\boxed{value \ of \ x = -4}$

2) If 4/5, a, 2 are three consecutive terms of an A.P then find the value of a

A) 4/5, a, 2 three consecutive terms of an A.P

$\therefore a - \frac{4}{5} = 2 - a$ $(\because a_2 - a_1 = a_3 - a_2)$

$a + a = \frac{4}{5} + 2 \Rightarrow 2a = \frac{4+10}{5} \Rightarrow 2a = \frac{14}{5}$

$a = \frac{14}{2 \times 5} = \frac{7}{5}$ $\boxed{value \ of \ a = \frac{7}{5}}$

3) The hand – bore well driller charges 200/- for the first one meter only and raises drilling charges at the rate of 30/- for every subsequent meter write a progression for the above data.

A) Charges for drilling the (I) one meter = 200/- For every subsequent meter drilling charge are raised by 30/- drilling second (II) meter = 230/-, drilling third (III) meter = 260/-

∴ Progression is 200, 230, 260, ...

4) Write the common difference of an Arithmetic progression whose nth term is given by tn = 3n+7

A) $a_1 = 10$, $a_2 = 13$, common difference $d = a_2 - a_1 = 13 - 10 = 3$

Practice Questions: -

5) Find the sum of first 200 natural numbers

6) In a G.P tn = (-1)ⁿ. 2018 find the common ration

7) The nth term of an A.P is 6n + 2 find the common difference

8) Can 2n² + 3 be the nth term of an A.P justify ?

9) Can $x + 2, x + 4, x + a$ are in A.P? Justify your Answer and also find x

10) In the triangle ABC the angle A, B, C are in A.P then find the value of angle B ?

11) If $a_n = 3n + 4$ is nth term of an A.P then find the first four terms

2 Marks Questions: -

1) Explain the terms in the formula

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

A) $S_n = \frac{n}{2}[2a + (n-1)d]$; Here n = no of terms in the A.P series ; a = first term in A.P series ; d = common difference

2) Measures of sides of a Triangle are in A.P its perimeters is 30 cm and the difference between the longest and shortest side is 4 cm ; then find the measures of the sides

A) Let the 3 sides of a given triangle is a – d, a, a + d

Then its perimeter is $a - d + a + a + d = 30 \Rightarrow 3a = 30$

$\Rightarrow a = \frac{30}{3} = 10$ ∴ The large side = a + d

Short side =a–d as per the problem (a + d) – (a – d) = 4

$\Rightarrow a + d - a + d = 4 \Rightarrow 2d = 4 \Rightarrow d = \frac{4}{2} = 2$

∴ so the sides a – d = 10 – 2 = 8; a = 10, a + d = 10 + 2 = 12

∴ required sides are 8, 10, 12

3) Find the value of 'K' so that K + 2, 4K - 6, and 3K - 2 are the three consecutive terms of an A.P

A) K + 2, 4K - 6, and 3K – 2 are three consecutive terms in A.P

(4K - 6) - (K + 2) = (3K - 2) - (4K - 6)

$(\because a_2 - a_1 = a_3 - a_2)$

4K – 6 – K – 2 = 3K – 2 – 4K 6 ⇒ 3K – 8 = - K + 4

$\Rightarrow 3K + K = 4 + 8 \Rightarrow 4K = 12 \Rightarrow K = \frac{12}{4} = 3$

$\therefore \boxed{Value \ of \ K = 3}$

4) Find the sum of first 10 terms of an A.P 3, 15, 27, 39....

A) 3, 15, 27 39 .... are in A.P here a = 3,

d = $a_2 - a_1$ = 15 – 3 = 12

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

Here m = 10, $S_{10} = \frac{10}{2}[2 \times 3 + (10-1)12]$

$\Rightarrow S_{10} = 5[6 + 9 \times 12] \Rightarrow S_{10} = 5(6 + 108)$

$\Rightarrow S_{10} = 5(114) = 570$ ∴

$\boxed{Sum \ of \ the \ first \ 10 \ Terms = 570}$

5) Is "Zero" a term of the A.P 31, 28, 25, ... ? Justify your answer

A) Let 31, 28, 25, ... Here a = 31, d = $a_2 - a_1$

d = 28 – 31 = -3 ∴$a_n = 0$

$\boxed{We \ know \ that \ a_n = a + (n-1)d}$

31 + (n - 1) – 3 = 0 ⇒ 31 – 3n + 3 = 0 ⇒ -3n + 34 = 0

$\Rightarrow 3n = 34 \Rightarrow n = \frac{34}{3}$

∴This is impossible so there is no terms as zero

Practice Questions:

6) Find the sum of all two digit numbers which are divisible by 7

7) Write a sequence of difference of consecutive perfect squares (subtracting smaller from the larger) is it an A.P? Justify?

8) If seven times of 7th term of an A.P is equal to 11 times of 11th term of it, then find the 18th term of that A.P

9) If 6th term of a G.P is 9375 and its 4th term is 375 find its 9th term

10) How many multiples of 4 line between 10 and 250?

4 Marks Questions: -

1) The sum of 5th term and 9th term of A.P is 72 and the sum of 7th and 12th terms is 97 find the A.P

A) Given an A.P in which $t_5 + t_9 = 72$

$\Rightarrow (a + 4d) + (a + 8d) = 72 \Rightarrow 2a + 12d = 72$ ----- ①

$t_7 + t_{12} = 97 \Rightarrow (a + 6d) + (a + 11d) = 97$

$\Rightarrow 2a + 17d = 97$ ------- ②

Solving ① and ②

2a + 12d = 72

2a + 17d = 97

$\frac{}{-5d = -25}$

$d = \frac{25}{5} = 5$

substituting d = 5 in equation ①

2a + 12(5) = 72 ⇒ 2a + 60 = 72

$\Rightarrow 2a = 72 - 60 = 12$

$\Rightarrow a = \frac{12}{2} = 6$

∴ The A.P is a, a+d, a+2d, a+3d..... i.e. 6, 6+5, 6+10, 6+15, 6+20 ..... 6, 11, 16, 21, 26 ......

10th Class Special

2) Find the sum of all three digit natural numbers, which are divisible by 3 and not divisible by 6

A) Let three digit numbers are 100, 101, ... 999 let the numbers are divisible log 3 are 102, 105, 108 ....999 The no s that are not divisible by 6 are 105, 111, ...999 are in A.P

Here a = 105, d = $a_2 - a_1$ = 111 - 105 = 6, let the number of terms = n ; The nth term = 999

$\boxed{We \ know \ that \ a_n = a + (n-1)d}$

999 = 105 + (n - 1)6 ⇒ 999 = 105 + 6n - 6

⇒ 999 = 6n + 99 ⇒ 6n = 999 – 99 = 900

n = $\frac{900}{6}$ = 150 ∴ Now sum of n terms in A.P

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

Here l = last term (or) an

$S_n = \frac{150}{2}[105 + 999] = \frac{150}{2} \times \overset{552}{1104} = 150 \times 552$

$\therefore \boxed{S_n = 82,800}$

3) The sum of the three terms which are in an A.P is 33. If the product of the first and the third terms exceeds the second term by 29. Find the A.P

A) Let three terms of A.P are a – d, a, a + d

Given sum of three terms = 33

(a - d) + a + (a + d) = 33 ⇒ a – d + a + a + d = 33

$\Rightarrow 3a = 33 \Rightarrow a = \frac{33}{3} = 11$ ∴ value of a = 11

The product of first and third terms exceeds the second term by 29

∴ (a – d) (a + d) = a + 29

$a^2 - d^2 = a + 29 \Rightarrow 11^2 - d^2 = 11 + 29$ (∵ a = 11)

$\Rightarrow 1x - d^2 = 40$ d² = 121 – 40 ⇒ d² = 81

$\Rightarrow d = \sqrt{81} = 9$

∵ a = 11, d = 9 then a – d = 11 – 9 = 2, a = 11 (a + d) = 11 + 9 = 20

∴ the required A.P is 2, 11, 20

4) A manufacture of TV sets produced 500 sets in the third year and 700 sets in the seventh year. After that the production increase uniformly by a fixed number every year find (i) The production of TV sets in the 15th year (ii) The total production of TV sets in the first 10 years

A) Given $a_3 = 500$, $a_7 = 700$ $\boxed{an = a + (n-1)d}$

A + 2d = 500 → ① a + 6d = 700 → ②

Solving ① and ②

a + 2d = 500

a + 6d = 700

$\frac{}{-4d = -200}$

$d = \frac{200}{4} = 50$

Substituting d = 50 in eq.① a + 2(50) = 500

⇒ a + 100 = 500 ⇒ a = 500 – 100 = 400
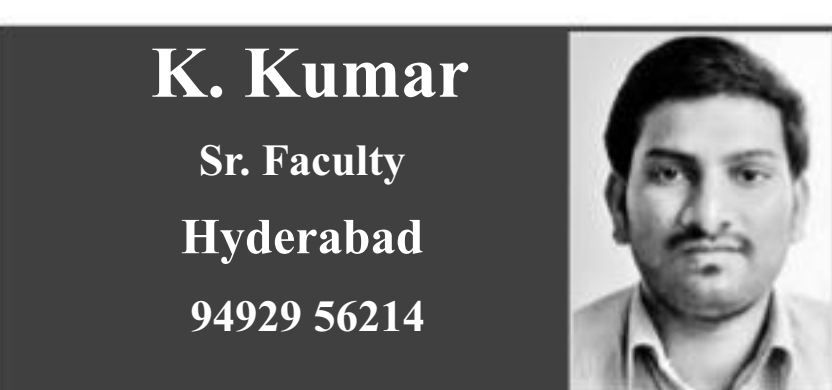
Eq: (i)

∴ $a_{15} = a + 14d = 400 + 14 \times 50$

= 400 + 700 = 1100

∴ $\boxed{a_{15} = 1100}$

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

Eq.(ii)

$S_{10} = \frac{10}{2}[2 \times 400 + (10-1)50] = 5[800 + 9 \times 50]$

= 5 (800 + 450) = 5 [1250] = 6250 ∴ $\boxed{S_{10} = 6250}$

5) If the sum of first 5 terms of an A.P is 25 and that of first 15 terms is 225. Then find the sum of the first n terms.

A) Let 'a' be the first term and the 'd' be the common difference

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

As per the problem;

$S_n = \frac{5}{2}[2a + (5-1)d] = \frac{5}{2}[2a + 4d] = 25$

$\Rightarrow 2a + 4d = \frac{25 \times 2}{5} = 10 \Rightarrow 2a+4d = 10 \to$ ①

$s_{15} = \frac{15}{2}[2a + (15-1)d] = \frac{15}{2}(2a + 14d) = 225$

$\Rightarrow 2a + 14d = \frac{225 \times 2}{15} = 30 \Rightarrow 2a + 14d = 30 \to$ ②

Solving ① and ②

2a + 4d = 10

2a + 14d = 30

$\frac{}{-10d = -20}$

$d = \frac{20}{10} = 2$

Substituting d = 2 in eq: ① 2a + 4(2) =10

2a + 8 = 10 ⇒ 2a = 10 – 8

$\Rightarrow 2a = 2 \Rightarrow a = \frac{2}{2} = 1$

∴ a = 1 , d = 2

∴ sum of first n terms = $\frac{n}{2}(2a + (a-1)d)$

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

$\Rightarrow S_n = \frac{n}{2}(2n) = \frac{2n^2}{2} = n^2 \boxed{\therefore S_n = n^2}$

Practice questions:-

6) Find $\left(\frac{5-1}{n+1}\right) + \left(\frac{10-2}{n+1}\right) + \left(\frac{15-3}{n+1}\right) + \dots \dots$ upto 'n' terms

7) Which term of G.P : 3,9,27,......is 2187?

8) How many terms of A.P 2,4,6,8........ must be taken So that their sum is 156

9) Find the sum of all the three digit numbers which are divisible by 4

10) An arithmetic progression consists three numbers whose sum is 15 and the sum of the square of the extreams is 58 find the numbers

11) If the geometric progressions 162,54,18 ..... and $\frac{2}{81}, \frac{2}{27}, \frac{2}{9} \dots \dots$ have their nth term equal find the value of 'n'

12) If the sum of the first 8 terms of an A.P is 64 that of 18 terms in 324 then find sum of 'n' terms and also S₃₅ =?

Find the odd one out?

Classification or Odd man out

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For All Competitive Exams

Model-I

1. (a) Tomato (b) Cabbage (c) Calliflower (d) Brinjal (e) cucumber
2. (a) Foot (b) finger (c) Tongue (d) Eye (e) Ear
3. (a) Wall (b) sand (c) stone (d) Cement (e) lime
4. (a) Lizard (b) cobra (c) snake (d) Earthworm (e) Fox
5. (a) vollyball (b) Hockey (c) Football (d) cricket (e) Polo
6. (a) Bird (b) mynah (c) Duck (d) crow (e) Parrot
7. (a) Jujube (b) Turnip (c) Banana (d) Pomegranate (e) mango
8. (a) sanders (b) champa (c) Rose (d) marigold (e) Jasmine
9. (a) Television (b) Drama (c) Cinema (d) play (e) Radio
10. (a) Polite (b) Gentle (c) Religious (d) Humble (e) good
11. (a) cow (b) pomther (c) ox (d) crocodile (e) lion

12. (a) oil (b) chimney (c) Wick (d) Flame (e) Lamp
13. (a) Earth (b) cloud (c) Horizon (d) sun (e) Moon
14. (a) Bull (b) Horse (c) Goat (d) Buffalo (e) cow
15. (a) Brown (b) paint (c) white (d) yellow (e) Black
16. (a) petticoat (b) saree (c) Turban (d) Blouse
17. (a) Wolf (b) Elephant (c) Deer (d) wild (e) wild Buffalo
18. (a) Quarter (b) Garage (c) Apartment (d) Flat
19. (a) Lorry (b) Truck (c) Tractor (d) Ski
20. (a) Direction (b) Advice (c) consultation (d) suggestion
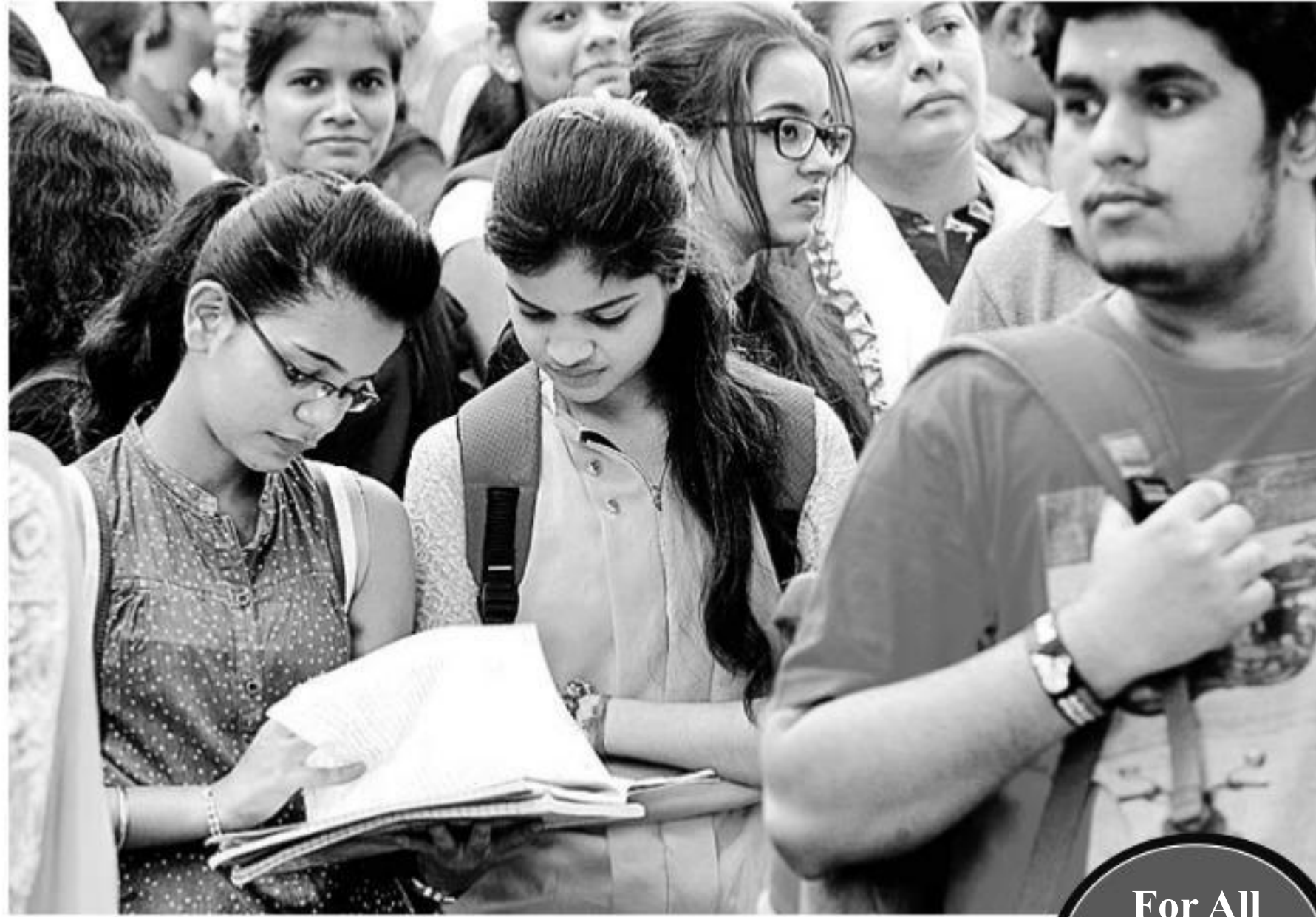
21. (a) Tractor (b) khurpa (c) Farmer (d) spade (e) plough
22. (a) Root (b) stem (c) plant (d) mango (e) Tree
23. (a) piano (b) Guitar (c) Harmonium (d) musician (e) Flute
24. (a) pedlar (b) Trader (c) Tailor (d) seller
25. (a) Banana (b) Barfi (c) Rubber (d) Juice
26. (a) silk (b) cloth (c) cotton (d) Jute
27. (a) spine (b) Navel (c) Eye (d) Elbow
28. (a) kathak (b) kathakali (c) karnatic (d) manipuri
29. (a) swarm (b) Flock (c) union (d) Team
30. (a) walk (b) Run (c) Listen (d) slip
31. (a) Hill (b) valley (c) Dam (d) River (e) Mountain
32. (a) clutch (b) Wheel (c) Break (d) car (e) Gear
33. (a) copper (b) silver (c) Gold (d) Diamond (e) platinum
34. (a) sesame (b) mustard (c) potato (d) coconut (e) ground nut
35. (a) coal (b) Aluminium (c) plastic (d) Iron (e) Wood
36. (a) pistol (b) sward (c) Gun (d) Rifle (e) cannon
37. (a) poland (b) Turkey (c) spain (d) sweden
38. (a) carrot (b) potato (c) Tomato (d) Ginger (e) Beetroot
39. (a) charmeleon (b) crocodile (c) Alligator (d) Locust (e) salamender
40. (a) Tiger (b) Leopard (c) Elephant (d) Dog (e) cat
41. (a) Editor (b) Doctor (c) Author (d) proof-reader (e) Translater
42. (a) cube (b) Rhombus (c) Trapezium (d) parallelogram
43. (a) clock (b) speedometer (c) Thermometer (d) Galvano meter (e) compass- needle
44. (a) Elegy (b) Epic (c) Fable (d) Ballad (e) Ode
45. (a) Fist (b) Gums (c) Arm (d) Lung (e) Tears
46. (a) Hockey (b) polo (c) Tennis (d) cricket (e) Golf
47. (a) Apple (b) orange (c) papaya (d) Water-melon (e) Mango
48. (a) Vit-A (b) Vit-B (c) Vit-C (d) Vit-D (e) Vit-K
49. (a) Aryabhatta (b) Apple (c) Rohini (d) Apollo-soyuz (e) Bhaskara
50. (a) Ere (b) Eve (c) Ewe (d) Eke (e) Ese
51. (a) January (b) march (c) June (d) october (e) september
52. (a) Apple (b) Banana (c) peach (d) Fig (e) Turnip
53. (a) Trousers (b) spectacles (c) scissors (d) scales (e) pilers
54. (a) Watch man (b) Retailer (c) Boatsman (d) Physician (e) Abattoir
55. (a) Rice (b) Wheat (c) Barley (d) mustard (e) Bajra
56. (a) tortoise (b) Frog (c) Rat (d) mangoose (e) snake
57. (a) Listen (b) Feel (c) think (d) sing (e) Hear
58. (a) Three (b) Four (c) Five (d) Six (e) nine
59. (a) pencil (b) sharpener (c) Black Board (d) Chalk (e) pen
60. (a) cheese (b) Butter (c) milk (d) curd (e) Ghee
61. (a) Now (b) After (c) Then (d) Before (e) Again
62. (a) Ammonia (b) Urea (c) potash (d) Nitrogen (e) manure
63. (a) Jupiter (b) mars (c) Earth (d) Uranium (e) pitcher
64. (a) Bucket (b) Tap (c) Bottle (d) Glass (e) pitcher
65. (a) Rose (b) Jasmine (c) Hibiscus (d) marigold (e) Lotus

Model -II

✓ In each of the following questions three of the given four pairs are alike in a certain way and so form a group. Find the odd one out.

66. (a) criminal and prison (b) Bird and Nest (c) student and Teacher (d) Fish and River
67. (a) cow and calf (b) sheep and Lamb (c) ox and Buffalo (d) Bitch and puppy
68. (a) Ear- Nose (b) Head- Hair (c) mouth- Teeth (d) Face-mouth
69. (a) Disease-Death (b) pleasure-Delight (c) Distress-War (d) peace-pleasure
70. (a) Lion and Roar (b) Tambourine and pat (c) Bird and Trumpet (d) ASS and Bray

ANSWERS					
1-a	2-c	3-a	4-e	5-e	6-c
7-b	8-a	9-e	10-c	11-d	12-d
13-b	14-e	15-b	16-c	17-c	18-b
19-d	20-a	21-c	22-d	23-d	24-c
25-c	26-b	27-a	28-c	29-d	30-c
31-c	32-d	33-a	34-c	35-c	36-b
37-e	38-c	39-d	40-c	41-b	42-a
43-c	44-c	45-e	46-e	47-e	48-e
49-d	50-e	51-a	52-e	53-d	54-e
55-d	56-e	57-e	58-d	59-b	60-c
61-e	62-e	63-d	64-b	65-e	66-c
67-c	68-a	69-c	70-c		