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**PRACTICE BOOK**

**CS VAIBHAV CHITLANGIA**



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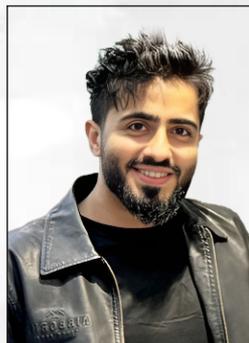
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Welcome to YES Family!!

To begin with, we endorse our heartfelt thank you for showing your trust and confidence in YES Academy. We take pride to welcome you to this prestigious Academy, foundations of which are based on commitment, quality education and integrity. It has been our constant endeavor to deliver better and better. In our attempt to achieve mark of excellence and beyond, we would be even more grateful to have received your continued faith and love. We assure you, your trust will not go in vain and as reflected by our Vision Statement, we would continue to produce top achievers and successful professionals in Chartered Accountancy, Company Secretary, Cost & Management Accountancy and Law Entrance courses as we have been doing for almost a decade now.

Combined experience of Team YES is 80+ years and adding value each day. We have delivered outstanding results in the past with a bouquet of All India Rankers across all the levels of CA, CS, CMA and Law entrance examinations, and with your efforts, we are confident we will grow together.

Student convenience has always occupied a centre place at YES Academy and we strive to improve ourselves each day as we sincerely believe that improvement always has its own space, no matter what. Any suggestions from you are always welcome. Though Team shares a very good rapport with all of its students and the students feel very comfortable talking to any of their Teachers, still, if you wish to send us a suggestion, please feel free to write to us [yesacademypune@gmail.com](mailto:yesacademypune@gmail.com) or get in touch with us at 8888 235 235 /8888 545 545.

We assure you the best of success and pride. And yes, it's not just a bond of your course duration, but a relationship for life now. We welcome you in advance to this prestigious journey of professional excellence.

On behalf of TEAM YES

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**CS VIKAS VOHRA**  
(Founder)

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**CA CS HARISH A. MATHARIYA**  
(Founder)

CMA FOUNDATION

**BUSINESS MATHS**

**&**

**STATISTICS**

**PRACTICE BOOK**



- *CS Adv. Vaibhav Chitlangia*

(CS, BA, LLM, DCL, PGDMLE)

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Dear Students,

First of all, thank you for showing trust in me and making me a part of this first step of your journey as a CA Student. As both your teacher and the author of this book, I am excited to guide you through this mathematical journey. Mathematics is not just about equations and formulae — it's a way of thinking that can help you solve problems and understand the world in new ways.

I want you guys to know that I've been in your shoes. As an All India Rank holder through all the levels of the CS Course, I've faced the same challenges you might encounter through your CA journey, and have discovered strategies that have made all the difference in my success. I'm committed to using my experience to help you overcome obstacles and build a strong foundation in this subject. You'll learn not only from the concepts in this book but also from my own journey and the techniques that worked for me.

While this subject can sometimes feel difficult, remember that persistence and a positive mindset are key to success. I am here to support you every step of the way. Together, we will work through challenges, celebrate your progress, and help you achieve the success you're capable of.

Let's make this journey exciting, and let's succeed together!

Warm Regards,

Vaibhav

*I dedicate this book to Paridhi, my partner—  
Without you it would simply not have been possible for me to take this subject up.  
Thankyou for sticking around as my pillar of strength!*



## Module 1 - Arithmetic

## Ratio, Proportion &amp; Variations

1. If  $Q : W = 2 : 3$ ,  $W : T = 4 : 5$  and  $T : Y = 6 : 7$ , find  $Q : Y$ .
  - (a) 35 : 51
  - (b) 16 : 35
  - (c) 16 : 51
  - (d) 35 : 51
  
2. Two numbers are in the ratio 7 : 9, if the sum of the numbers is 288, then the smaller number is
  - (a) 126
  - (b) 288
  - (c) 162
  - (d) 144
  
3. When the number 1580 is increased in the ratio 5 : 9, the new number is
  - (a) 788
  - (b) 2488
  - (c) 878
  - (d) 2844
  
4. The ratio of the number of faces to the number of edges of a box is
  - (a) 3 : 8
  - (b) 8 : 3
  - (c) 1 : 2
  - (d) 2 : 1
  
5. Find the fourth proportional to 6, 8, 9 is
  - (a) 18
  - (b) 12
  - (c) 7
  - (d) 13
  
6. Find the compounded ratio of: 15: 8 and 18: 5
  - (a) 27: 4
  - (b) 4: 27
  - (c) 27: 8
  - (d) 8: 27

7. Find the third proportional to  $6\frac{1}{4}$  and 5
- (a)  $9\frac{1}{2}$   
(b)  $3\frac{1}{5}$   
(c) 4  
(d) 8
8. Find the Duplicate ratio of:  $8a : \sqrt{4}b$
- (a)  $64a^2 : 2b^2$   
(b)  $16a^2 : b^2$   
(c)  $32a^2 : 4b^2$   
(d)  $32a^2 : 8b^2$
9. If  $A \propto 1/B$  and  $A = 7$  when  $B = 3$ , then when  $B = 2\frac{1}{3}$ , A is
- (a)  $\frac{3}{7}$   
(b) 3  
(c) 9  
(d) 1
10. If  $AB \propto XY$  and  $A/B + B/A = X/Y + Y/X$  then
- (a)  $A^2 + B^2 \propto X^2 + Y^2$   
(b)  $A + B \propto XY$   
(c)  $AB \propto X + Y$   
(d)  $A + B \propto 1/(X + Y)$
11. Using the properties of proportion, solve the following equation for y, given  $341/91 = (y^3 + 3y)/(3y^2 + 1)$
- (a) 14  
(b) 11  
(c) 12  
(d) 10
12. The ratio of 45 seconds to  $5\frac{3}{4}$  minutes is
- (a) 5 : 21  
(b) 3 : 23  
(c) 2 : 19  
(d) 1 : 27
13. A class consists of 48 male students and 23 female students. Find the ratio of female students to total strength of the class.
- (a) 23 : 48  
(b) 48 : 23

- (c) 48 : 71  
(d) 23 : 71

14. The mean proportional between 80 and  $\frac{1}{5}$  is

- (a) 16  
(b) 4  
(c) 8  
(d) 32

15. Find the Triplicate Ratio of  $\frac{1}{3} : \frac{1}{2}$

- (a) 8 : 27  
(b) 27 : 8  
(c) 4 : 9  
(d) 9 : 4

16. If 4, 6, p, 27, q are in continued proportion, find the values of p and q.

- (a)  $p = 9, q = 9$   
(b)  $p = 9, q = 81$   
(c)  $p = 81, q = 9$   
(d)  $p = 81, q = 81$

17. If a Stadium having spectators divided into groups of Young Generation and Old Generation and the number of young spectators are 1525 and old spectators are 1875. Find the ratio of Total Spectators to Young Spectators.

- (a) 136 : 75  
(b) 136 : 85  
(c) 75 : 61  
(d) 136 : 61

18. Find two numbers whose mean proportional is 8 and the 1st number is square of the 2nd number.

- (a) 8, 8  
(b) 4, 2  
(c) 16, 4  
(d) 64, 8

19. What number must be subtracted from each of the numbers 12, 13, 24 and 29 to make them proportional?

- (a) 9  
(b) 8  
(c) 35  
(d) 36

20. The ratio of the pocket money saved by Rakesh and his sister is 5 : 6. If the sister saves ₹60 more, how much more the brother should save in order to keep the ratio of their savings unchanged?
- (a) ₹60
  - (b) ₹40
  - (c) ₹50
  - (d) ₹70
-

**Time value of Money and Annuity – Simple and Compound Interest**

21. AMS & Co. borrows ₹1,20,000 for one year at 15% annual interest, compounded monthly. Find their monthly payment.
- (a) ₹11,380  
(b) ₹10,830  
(c) ₹11,430  
(d) ₹10,740
22. A certain sum of money invested at a certain rate of compound interest doubles in 8 years. In how many years will it become 16 times?
- (a) 31 years  
(b) 28 years  
(c) 30 years  
(d) 32 years
23. Calculate the present value of an annuity of ₹3,000 received at the beginning of each year for 5 years at a discount factor of 6%.
- (a) ₹13,998  
(b) ₹13,398  
(c) ₹14,398  
(d) ₹14,898
24. A.L.P is expecting to receive a certain sum of money five years from now. If the present value of this sum is ₹38,400 at current market interest rate of 6% when the interest is compounded monthly, then how much amount they will receive after 5 years?
- (a) ₹52,684  
(b) ₹52,884  
(c) ₹51,904  
(d) ₹51,794
25. What sum will amount to ₹5,480 in 6 years at 10% p.a. compound interest payable half-yearly?
- (a) ₹3,051  
(b) ₹2,051  
(c) ₹3,501  
(d) ₹2,501
26. Mr. Singh deposits ₹2,000 at the beginning of each year for 5 years. How much do these accumulate at the end of 5th year at an interest rate of 6%?
- (a) ₹10,272  
(b) ₹11,591

- (c) ₹10,727  
(d) ₹11,951

27. A buys a shop for ₹48,750 down payment and ₹60,000 after one year. If the money is worth 10% per year compounded half-yearly, find the purchase price of the shop.

- (a) ₹94,280  
(b) ₹1,03,170  
(c) ₹45,530  
(d) ₹54,420

28. A loan of ₹20,000 has been issued for 5 years. Compute the amount to be repaid to the lender if simple interest is charged @ 8% per year.

- (a) ₹28,000  
(b) ₹25,000  
(c) ₹27,000  
(d) ₹24,000

29. A sum of ₹4,895 borrowed from a money lender at 5% p.a. compounded annually. Find the annual instalment, if amount borrowed is to be paid back in three equal annual instalments.

- (a) ₹1,597  
(b) ₹1,997  
(c) ₹1,397  
(d) ₹1,797

30. AMS & Co. makes a monthly payment for ₹11,350 for one year at 11% annual interest, compounded monthly. Find the amount borrowed by them.

- (a) ₹1,31,889  
(b) ₹1,38,284  
(c) ₹1,22,025  
(d) ₹1,22,802

31. Calculate the present value of an annuity of ₹5,000 received annually for 4 years at a discount rate of 5%.

- (a) ₹17,720  
(b) ₹12,250  
(c) ₹22,250  
(d) ₹27,720

32. Find the Principal, if the compound value is ₹9,750 at the interest rate of 6.25% p.a. compounded annually for 16 years.

- (a) ₹4,287  
(b) ₹3,857

- (c) ₹3,696  
(d) ₹4,857

33. Find the amount and the compound interest of ₹9,350 at the rate of 8% p.a. compounded half-yearly for four years.

- (a) ₹12,795 and ₹3,445  
(b) ₹12,720 and ₹3,370  
(c) ₹12,758 and ₹3,408  
(d) ₹12,835 and ₹3,485

34. When the effective rate of interest is 7.82% payable quarterly, what would be the nominal rate of interest?

- (a) 8.00%  
(b) 7.60%  
(c) 7.00%  
(d) 8.20%

35. Find the present value of perpetuity of ₹2,725 at 0.50% per month compound interest.

- (a) ₹45,167  
(b) ₹45,417  
(c) ₹44,517  
(d) ₹44,157

36. A sum of money double itself at 7% p.a. compound interest in

- (a) 10.27 years  
(b) 10.00 years  
(c) 12.07 years  
(d) 12.00 years

37. A Laptop depreciated in value each year at 15% of its previous value and at the end of fourth year, the value was ₹36,331. Find its original value.

- (a) ₹69,600  
(b) ₹69,200  
(c) ₹69,300  
(d) ₹69,500

38. A wants to create an endowment fund of ₹51,750 to provide for a prize of every year. If the fund can be invested at 11% p.a. compound interest, find the amount of prize.

- (a) ₹5,933  
(b) ₹5,963  
(c) ₹5,993  
(d) ₹5,693

39. Accumulated series of deposits as future sum money is classified as –

- (a) Annuity Fund
- (b) Sinking Fund
- (c) Marginal Fund
- (d) Nominal Fund

40. The compound interest on ₹27,500 at 8% p.a. is ₹7,142. Calculate the required time.

- (a) 3 years
  - (b) 2.5 years
  - (c) 3.5 years
  - (d) 4 years
-

**Arithmetic Progression and Geometric Progression**

Solve Q. Nos. 41 to 50 using the following information.

For the series 5, 12, 19, 26, 33, 40, .....

41. Identify the type of given series.

- (a) A.P.
- (b) G.P.
- (c) H.P.
- (d) None of the Above

42. Find the value of the 12th term of the series.

- (a) 89
- (b) 92
- (c) 82
- (d) 75

43. Which term of the series would be 68?

- (a) 10
- (b) 9
- (c) 12
- (d) 8

44. What would be the value of the 9th term?

- (a) 66
- (b) 68
- (c) 59
- (d) 61

45. What would be the sum of the first 11 terms of the series?

- (a) 419
- (b) 440
- (c) 420
- (d) 426

46. Which term of the series would be 82?

- (a) 12
- (b) 11
- (c) 10
- (d) 14

47. If the sum of the series is 297, how many terms are there in the series?

- (a) 8
- (b) 9
- (c) 10
- (d) 7

48. What is the value of 'a'?

- (a) 40
- (b) 12
- (c) 5
- (d) 7

49. Find the value of 'd'?

- (a) 7
- (b) 5
- (c) -7
- (d) -5

50. Value of 'd' is \_\_\_\_\_ ?

- (a) Zero
- (b) Negative
- (c) Positive
- (d) Undefined

51. Find the next 5 terms for the series: 2, -4, 8, -16, 32

- (a) -64, 128, -256, 512, -1024
- (b) 64, -128, 256, -512, 1024
- (c) 64, 128, 256, 512, 1024
- (d) -64, -128, -256, -512, -1024

52. Find the value of 'r' for the series: 729, 243, 81, 27, 9

- (a) 3
- (b) -3
- (c) 1/9
- (d) 1/3

53. For any series having 50 terms forming A.P. with first term equal to 25, what will be the value of 'n'?

- (a) 50
- (b) 25
- (c) 75
- (d) 100

54. Find the next 6 terms for the series: 128, 139, 150, 161, 172, 183
- (a) 194, 205, 216, 228, 240, 252
  - (b) 194, 205, 217, 229, 242, 256
  - (c) 194, 205, 218, 231, 245, 259
  - (d) 194, 205, 216, 227, 238, 249
55. For the given series: 66, 71, 76, 81, 86, 91, 96, ..... 666, 671, 676  
With 'n' terms in the series, what will be the value of 'd'?
- (a) -5
  - (b) 15
  - (c) -3
  - (d) 5
56. Identify the type of series and the value of 'a': -85, -83, -81, -79, -77
- (a) A.P.,  $a = -85$
  - (b) A.P.,  $a = -2$
  - (c) G.P.,  $a = -2$
  - (d) G.P.,  $a = -85$
57. For any G.P. starting with 28, if each term is obtained by dividing the preceding one by 2, what would be value of 'r'?
- (a) 2
  - (b) -2
  - (c)  $1/2$
  - (d)  $-1/2$
58. If the First term is 748, Last Term is 28, and the value between two consecutive terms is 9 deducted, find the number of terms in the series.
- (a) 9
  - (b) 8
  - (c) 10
  - (d) None of the above
59. If the Last term is 187, First Term is 371, value between two consecutive terms is 8 deducted, find the number of terms in the series.
- (a) 25
  - (b) 22
  - (c) 23
  - (d) 24

60. Identify the type of series: 1, 2, 3, 4, 5

- (a) H.P.
  - (b) G.P.
  - (c) Either of 'a' or 'b'
  - (d) A.P.
-

## Time and Distance

61. When a Bike had travelled for 78 km in 3 hours 45 minutes in the evening, how much distance would the Bike travelled in 2 hours?
- (a) 41.60 km  
(b) 48.88 km  
(c) 52 km  
(d) 55 km
62. A cycle travels a distance of 300 m in every second. What is the distance covered in an hour by the cycle?
- (a) 300 km  
(b) 1080 km  
(c) 1800 km  
(d) 2160 km
63. A Car takes 4 hours to travel 90 km. If time is reduced by 15 minutes, how much distance would be covered in the given time?
- (a) 84.375 km  
(b) 80 km  
(c) 95.625 km  
(d) 90 km
64. A Train takes 35 hours to reach Punjab from Kolkata (1940 km) and takes 42 hours to reach Kolkata from Gujarat (2160 km). But it took 25 hours from Punjab to Gujarat (1420 km). How many days it take for a trip from Kolkata-Punjab-Gujarat-Kolkata and what is the distance covered?
- (a) 4 days 6 hours and 5520 km  
(b) 3 days 18 hours and 5520 km  
(c) 4 days and 2680 km  
(d) 5 days and 2680 km
65. If Bike had travelled at the speed of 40 km/hr for 2 hours and scooty had travelled at the speed of 25 km/hr for 3 hours, which one of them covered more distance and how much more was covered?
- (a) Scooty, 30 km  
(b) Bike, 80 km  
(c) Bike, 5 km  
(d) Scooty, 75 km
66. If Bike covers 165 km in 3 hours and scooty covers 100 km in 2 hours, in order to cover 1025 km, how much time would be required by bike and scooty?
- (a) 12.42 hours and 12.42 hours  
(b) 21.50 hours and 19.63 hours

- (c) 19.52 hours and 19.52 hours  
(d) 18.63 hours and 20.50 hours
67.  $y$  is the yardstick to measure the performance of two vehicles where  $y = \text{Speed} \times \text{Time} \times \text{Distance}$ . If Time taken by one of the vehicle (1st Vehicle) is increased by 10%, what would be the impact on the yardstick?  
(a) No change  
(b) 1st vehicle would be better than 2nd Vehicle  
(c) 2nd Vehicle would be better than 1st Vehicle  
(d) None of the Above
68. If a student is travelling at a speed of 45 km/hr, how long should it take to travel 90 km?  
(a) 2 hours  
(b) 3 hours  
(c) 100 minutes  
(d) 90 minutes
69. With 5% increase in Distance and 2.50% increase in Time, what would be the impact on Speed?  
(a) Decrease by 2.44%  
(b) Increase by 2.44%  
(c) Increase by 2.38%  
(d) Decrease by 2.38%
70. If a Car covered 200 km at a speed of 25 kmph and a Bike covered 150 km at a speed of 30 kmph, which one of them took more time to cover the distance and what time taken?  
(a) Car, 3 hrs  
(b) Bike, 8 hrs  
(c) Car, 8 hrs  
(d) Bike, 5 hrs
71. If Toto had travelled at the speed of 15 km/hr for 11 hours and Car had travelled at the speed of 45 km/hr for 3.5 hours, which one of them covered shorter distance and how much short?  
(a) Car, 7.50 km  
(b) Toto, 7.50 km  
(c) Car, 15 km  
(d) Toto, 15 km
72. If ratio between Speed (km/hr) and Time (Hrs) is 7 : 5, what will be the distance (km)?  
(a) 30 km  
(b) 35 km  
(c) 36 km  
(d) 42 km

73. The distance between two terminal stations of Metro is 240 km. A metro rail takes 2 hours to cover the distance. Calculate the total distance covered in 5 days, if 10 trips to and fro takes place between the two stations in a day?
- (a) 6,000 km
  - (b) 12,000 km
  - (c) 24,000 km
  - (d) 18,000 km
74. If A takes 3 hours to cover a distance of 60 km, B takes 2 hours to cover a distance of 50 km, how much time would A take more than B to cover 300 km?
- (a) 6 hours
  - (b) 12 hours
  - (c) 15 hours
  - (d) 3 hours
75. If Toto covered 240 km at a speed of 40 kmph while Scooty covered 180 km at a speed of 60 kmph, which one of them took less time to cover the distance and what was the time taken?
- (a) Scooty, 3 hrs
  - (b) Toto, 6 hrs
  - (c) Toto, 3 hrs
  - (d) Scooty, 6 hrs
76. With 10% decrease in Distance and 5% increase in Time, what would be the impact on Speed?
- (a) Decrease by 16.67%
  - (b) Increase by 16.67%
  - (c) Increase by 14.28%
  - (d) Decrease by 14.28%
77. The distance between two terminal metro stations A & B is 300 km. A metro rail takes 1.50 hours to cover the distance. Calculate the total time worked by the driver (in terms of days) in a week, if 6 trips from Station A to Station B takes place in a day?
- (a) 2.625 days
  - (b) 5.25 days
  - (c) 2.50 days
  - (d) 4.25 days
78.  $y$  is the yardstick to measure the performance of two vehicles, where  $y = \text{Speed} \times \text{Time} \times \text{Distance}$ . If Distance travelled by one of the vehicle (2nd Vehicle) is increased by 2%, what would be the impact on the yardstick?
- (a) 1st Vehicle would travel 4% more distance
  - (b) 2nd Vehicle would travel 4% more distance

- (c) No change in the distance travelled by any of the vehicle  
(d) None of the above

79. If a Toto travels for 6 hours on a working day to cover 1.5 times the distance travelled on holiday and on a holiday it takes 4 hours to cover 110 km, then for a span of 7 days (5 Working and 2 Holidays), how much distance is covered?

- (a) 1054 km  
(b) 1045 km  
(c) 880 km  
(d) 990 km

80. If ratio between Time (seconds) and Speed (m/s) is 12 : 13, what will be the distance (m)?

- (a) 156 m  
(b) 1.56 km  
(c) 0.0156 m  
(d) 15.6 km
-

## State True or False

1. Mean Proportional of  $p$  and  $q$  is same as their Mean.
2. If  $3x + 4y : 5x - 3y = 5 : 3$  then  $x : y = 27 : 16$
3. The ratio of two numbers is  $12 : 5$ . If antecedent is 45 then the consequent is 108
4. If the ratio of two positive numbers is  $4 : 5$  and their L.C.M is 140 then the numbers are 35, 45
5. The compound ratio of sub-duplicate ratio and sub-triplicate ratio of  $729 : 64$  is  $81 : 8$
6. The ratio of two numbers is  $11 : 15$ . The sum of 3 times the first number and twice the second number is 630. The H.C.F of the numbers is 10
7. The mean proportional of  $4x$  and  $16x^3$  is  $12x^2$
8. The third proportional of 1 hr 20 minutes, 1 hr 40 minutes is 2 hrs
9. The fourth proportional of ₹5, ₹3.50, and 150 gm is 125 gm
10. If  $A : B = B : C = C : D = 5 : 6$  then  $A : B : C : D = 125 : 150 : 180 : 216$
11. If the first and third numbers of four positive numbers in continued proportion are 3 and 12 respectively then the fourth number is 36
12. A sum of money amounts to ₹720 in 2 years and ₹789 in 3 years. The rate of simple interest is 12%
13. The S.I at  $x\%$  for  $x$  years will be ₹ $x$  on a sum of  $x$
14. The S.I on a sum of money at 8% p.a for 6 years is half the sum. The sum is ₹640
15. If the interest on ₹1,200 more than the interest on ₹1,000 by ₹50 in 3 years then the rate of interest is  $8\frac{1}{3}\%$
16. The rate of S.I p.a when a sum of money grows to one and a half times itself in 8 years is  $6\frac{1}{4}\%$
17. The C.I on a certain sum of money for 1 year at 8% p.a compounded quarterly is ₹824 then the sum is ₹10,033
18. In 3 years ₹1,600 amount to ₹1,936 at 10% p.a C.I
19. The C.I on ₹5,000 for 2 years at a certain rate of interest p.a amounts to ₹1,050 then the rate of interest is 10%
20. The difference between S.I and C.I on ₹1,000 for 1 year at 4% payable quarterly is Re. 0.40

Fill in the Blanks

1. ₹2530 is distributed between Ram and Hari such that Ram gets  $\frac{11}{12}$  part of that Hari gets. Then Hari gets \_\_\_\_\_
2. Some amount of money is distributed among Rama, Mitra and Shipra such that twice the money that Rama gets = thrice the amount of money that Mitra gets = four times the amount of money that Shipra gets. Then the continued ratio of their money is \_\_\_\_\_
3. In a map 2 cm denotes a distance of 3 km, then the scale in the map is \_\_\_\_\_
4. The ratio of two numbers is 2 : 3. If 6 is subtracted from the second number then the number which is subtracted from the first number so that the new ratio becomes the same as that of the previous, is \_\_\_\_\_
5. The sub-duplicate ratio of 49 : 81 is \_\_\_\_\_
6.  $(\frac{1}{2} + \frac{1}{3}) : (\frac{1}{2} \times \frac{1}{3}) =$  \_\_\_\_\_
7. The compound ratio of 1.2 : 2.5, 2.1 : 3.2 and 5 : 3 is \_\_\_\_\_
8. If  $A : B = 3 : 4$ ,  $B : C = 2 : 5$ , then  $A : B : C =$  \_\_\_\_\_
9. Two numbers are in the ratio 5 : 8 and if 6 be subtracted from each of them then the remainders are in the ratio 1 : 2, then the numbers are \_\_\_\_\_
10. If 3, x, 27 are in continued proportion then  $x =$  \_\_\_\_\_
11. For the ratio 8 : 27, the Triplicate Ratio of its Subtriplicate Ratio is \_\_\_\_\_
12. A certain sum of money at S.I amounts to ₹500 in 3 years and to ₹600 in 5 years then the principal is \_\_\_\_\_
13. In \_\_\_\_\_ time the Simple interest on ₹900 at 6% will be equal to S.I on ₹540 for 8 years at 5%
14. Due to fall in the rate of simple interest from 12% to  $10\frac{1}{2}\%$  p.a money lender's yearly income diminished by ₹90. The capital is \_\_\_\_\_
15. A sum was put at S.I at a certain rate for 2 years. Had it been put at 2% higher rate, it would have fetched ₹100 more. The sum is \_\_\_\_\_
16. At \_\_\_\_\_ percent rate, the Simple interest will be equal to the principal amount in 10 years.
17. I lent ₹4,000 for 9 months at 12% p.a. If C.I is reckoned quarterly what will I get after 9 months is \_\_\_\_\_
18. The C.I on ₹5,000 for 3 years, when the rate of interest is 5%, 6% and 7% for the 1st, 2nd and 3rd years respectively, is \_\_\_\_\_
19. The difference between S.I and C.I of ₹4,000 for  $2\frac{1}{2}$  years @ 10% p.a is \_\_\_\_\_
20. The sum of money will amount to ₹6,050 in 2 years at 10% p.a C.I is \_\_\_\_\_
21. The C.I on a certain sum of money for 2 years at 8% p.a compounded annually is ₹1,040. The sum is \_\_\_\_\_



## MODULE 2 - ALGEBRA

## Set Theory &amp; Venn Diagram

A customer feedback survey of 60, it was found Coke was liked by 24, Fanta by 27, Coca Cola by 11, Thums Up by 9. While, 18 liked both Fanta and Coke and 15 liked both Thums Up and Coca Cola and 11 liked all. Based on the above information answer Q. Nos. 1 to 10.

1. How many people liked any one of the products?
  - (a) 33
  - (b) 18
  - (c) 11
  - (d) 27
  
2. How many people liked Fanta?
  - (a) 18
  - (b) 11
  - (c) 24
  - (d) 27
  
3. How many people did not like any of the products?
  - (a) 33
  - (b) 13
  - (c) 9
  - (d) 15
  
4. How many people liked either Fanta or Thums Up?
  - (a) 27
  - (b) 36
  - (c) 37
  - (d) 28
  
5. How many people liked Fanta, Coke or Thums Up?
  - (a) 42
  - (b) 53
  - (c) 41
  - (d) 54
  
6. How many people liked Mazaa?
  - (a) 0
  - (b) Not available as product (None of them)

- (c) Zero  
(d) All of the above
7. How many people liked any two products?  
(a) 18  
(b) 15  
(c) 33  
(d) 22
8. How many people liked Thums Up, Coke, Coca Cola and Fanta?  
(a) 11  
(b) 49  
(c) 60  
(d) 50
9. How many people liked all the products?  
(a) 60  
(b) 11  
(c) 09  
(d) 12
10. How many people liked either Coke or Thums Up?  
(a) 24  
(b) 11  
(c) 09  
(d) 33
11. If Set  $A = \{Q, W, E, R, T, Y\}$  and Set  $B = \{B, G, R, E, O, K\}$ , find  $(A - B)$ .  
(a) Set  $(A - B) = \{Q, W, T, Y\}$   
(b) Set  $(A - B) = \{B, G, O, K\}$   
(c) Set  $(A - B) = \{E, R\}$   
(d) None of the Above
12. If  $A = \{W, N, M, I\}$ ;  $B = \{Q, E, H, J\}$ ;  $C = \{I, L, E, R\}$ . Find  $A \cup (B \cap C)$ .  
(a)  $\{W, O, E, H, J\}$   
(b)  $\{Q, I, L, E, R\}$   
(c)  $\{E, W, N, M, I\}$   
(d)  $\{T, I, L, E, R\}$
13. If Set  $B = \{B, G, R, E, O, K\}$  is a subset of Set  $A = \{Q, E, R, T, Y, U, I, O, P, K, G, B\}$ , find  $B'$ .  
(a) Set  $B' = \{B, G, R, E\}$   
(b) Set  $B' = \{Q, E, G, B\}$

- (c) Set  $B' = \{E, R, T, Y\}$   
 (d) Set  $B' = \{Q, T, Y, U, I, P\}$

14. If Set  $A = \{8, 9, 7, 5, 6, 2\}$  and Set  $B = \{1, 4, 9, 3, 8, 2\}$ , find the union of B and A.

- (a) Set  $(B \cup A) = \{8, 9, 7, 5, 6, 2, 1, 4, 9, 3, 8, 2\}$   
 (b) Set  $(B \cup A) = \{8, 9, 2\}$   
 (c) Set  $(B \cup A) = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$   
 (d) None of the Above

15. If  $P_1 = \{78, 77, 76, 75\}$ ;  $P_2 = \{71, 72, 73, 74\}$ ;  $P_3 = \{80, 79, 70, 69\}$ .

Find  $(P_1 \cap P_2) \cup (P_2 \cap P_3)$ .

- (a)  $(P_1 \cap P_2) \cup (P_2 \cap P_3) = \{ \}$   
 (b)  $(P_1 \cap P_2) \cup (P_2 \cap P_3) = \emptyset$   
 (c) Both 'a' and 'b'  
 (d) None of the Above

16. If  $A = \{W, R, Y, I\}$ ;  $B = \{Q, E, T, U\}$ ;  $C = \{Q, W, E, R\}$ . Find  $A \cap (B \cup C)$ .

- (a)  $A \cap (B \cup C) = \{W, R\}$   
 (b)  $A \cap (B \cup C) = \{Q, E\}$   
 (c)  $A \cap (B \cup C) = \{Y, I\}$   
 (d)  $A \cap (B \cup C) = \{T, U\}$

17. If Set  $A = \{Q, W, E, R, T, Y\}$  and Set  $B = \{B, G, R, E, O, K\}$ , find  $(B - A)$ .

- (a) Set  $(B - A) = \{Q, W, T, Y\}$   
 (b) Set  $(B - A) = \{B, G, O, K\}$   
 (c) Set  $(B - A) = \{E, R\}$   
 (d) None of the Above

18. If  $A = \{8, 11, 14, 17\}$ ;  $B = \{5, 7, 9, 15\}$ ;  $C = \{19, 21, 17, 15\}$ . Find  $A \cup (B \cap C)$ .

- (a)  $A \cup (B \cap C) = \{8, 11, 14, 15, 17\}$   
 (b)  $A \cup (B \cap C) = \{8, 5, 7, 9, 15\}$   
 (c)  $A \cup (B \cap C) = \{11, 19, 21, 17, 15\}$   
 (d)  $A \cup (B \cap C) = \{11, 19, 21, 15, 8\}$

19. In Venn diagram, Universal Set is represented by \_\_\_\_\_.

- (a) Stars  
 (b) Squares  
 (c) Rectangle  
 (d) Circles

20. According to De Morgan's Law:  $(B \cap C)' = \text{-----}$ .

(a)  $B' \cup C'$

(b)  $B' \cap C'$

(c)  $B \cup C'$

(d)  $B' \cap C$

## Indices &amp; Logarithms

21. Find the value of:  $3^9 \times 3^3$
- (a)  $3^{12}$
  - (b) 531441
  - (c)  $19683 \times 27$
  - (d) All of the above
22. Find the value of  $(2.85)^4$ , when  $0.0016 = (1/5)^4$ .
- (a) 2.85
  - (b)  $(2.85)^2$
  - (c)  $(2.85)^{-1}$
  - (d) Either 'b' or 'c'
23. When the value of  $p > m$ , simplify  $q^p \times q^m$ .
- (a)  $q^{m+p}$
  - (b)  $q^{m-p}$
  - (c)  $q^{p-m}$
  - (d) None of the above
24. What will be the value of  $(9^3)^2$  ?
- (a)  $59004 \times 9$
  - (b)  $59049 \times 9$
  - (c)  $49005 \times 9$
  - (d)  $49059 \times 9$
25. Find the value of  $11^{78} / 11^{81}$  ?
- (a)  $11^3$
  - (b)  $1 / 11^3$
  - (c) 1331
  - (d) -1331
26. What will be the value of  $3^6 \times 3^4 \times 3^{-2} \times 3^{-3} \times 3^6$  ?
- (a)  $3^{21}$
  - (b)  $3^6$
  - (c)  $3^9$
  - (d)  $3^{11}$
27. Find the value of  $6^6 \times 6^{-6} \times 6^5 \times 6^4$
- (a) 0
  - (b) 1

- (c) 6
- (d) 216

28. Find the value of  $b$  when  $(a/b)^{ab} = (a)^{a-b}$  and  $a = 2b$

- (a) 2
- (b)  $2a$
- (c)  $2^2$
- (d)  $a^2$

29. What will be the value of  $(7^3)^2$  ?

- (a) 117649
- (b) 196471
- (c) 16807
- (d) 18607

30. What will be the value of  $9^6 \times 9^4 \times 9^2 \times 9^3 \times 9^7$  ?

- (a)  $9^{13}$
- (b)  $9^{21}$
- (c) Both 'a' and 'b'
- (d) None of the above

31. Find the value of  $(9^2 / 3^3) \times (3^4 / 9)$  ?

- (a)  $3^4$
- (b)  $3^5$
- (c)  $3^3$
- (d)  $3^6$

32. Find the value of  $(1.25)^4$ , when  $(1/3)^4 = (6561)^{-1}$

- (a)  $1.5 + 0.0625$
- (b) 1.5625
- (c)  $(1.25)^2$
- (d) All of the above

33. Simplify  $3(a)^2b / 6b^2(a^3)^1$

- (a)  $1/(2ab)$
- (b)  $1/2 \times ab$
- (c)  $2ab$
- (d) None of the above

34. Evaluate  $(2^{13} \cdot 8^{2/3} \cdot 6^{-5/4} \cdot 3^{-3/4} \cdot 9) / \sqrt[3]{16}$

- (a)  $1/\sqrt{2}$
- (b) 2

- (c)  $\sqrt{2}$   
(d) None of the above

35. Simplify  $7^{19} \times 7^{29} \times 7^{49} \times 7^1 \times 7^{49}$

- (a) 7  
(b) 1  
(c) 0  
(d) None of the above

36. When  $a^2 = b^2 = c^2$  and  $b^2 = ac$  then  $1/x, 1/y, 1/z$  should be in \_\_\_\_\_

- (a) G.P  
(b) A.P  
(c) H.P  
(d) None of the above

37. What will be the value of  $7^{-5} \times 7^8 \times 7^4 \times 7^3 \times 7^6$  ?

- (a) -7  
(b) 1  
(c) 7  
(d) None of the above

38. Find the value of  $(3^1 / 9^2) \times (9^3)$  ?

- (a)  $3^{-1}$   
(b)  $3^2$   
(c)  $3^{-3}$   
(d)  $3^7$

39. What will be the value of  $(6^3 \times 6^2) / (6^3 \times 6^4)$  ?

- (a)  $(6)^2$   
(b)  $6^5$   
(c) 6  
(d) None of the above

40. Find the value of  $19^9 / 19^2$

- (a)  $19^2$   
(b)  $19^7$   
(c)  $19^9$   
(d)  $19^0$

41. Express  $\log_9 1 = 0$  in exponential form.

- (a)  $9^1 = 0$   
(b)  $9^0 = 1$

(c)  $1^0 = 1$

(d)  $0^0 = 0$

42. Express  $4^3 = 64$  in logarithmic form.

(a)  $\log_4 6 = 3$

(b)  $\log_{64} 3 = 4$

(c)  $\log_4 64 = 3$

(d)  $\log_3 64 = 4$

43. Solve:  $\log_{10}(8y + 3) = 3$

(a)  $1003/8$

(b)  $997/8$

(c)  $1008/3$

(d)  $992/3$

44. If  $\log_4(t - 1) + 1 = 2 \times \log_4 t$ , find the value of  $t$ .

(a) 1

(b) 0

(c) 4

(d) 2

45. Find  $t$  when  $\log_3 t = 6$

(a) 729

(b) 27

(c) 81

(d) 243

46. Find the logarithm of 324 with the base  $3\sqrt{2}$ .

(a) -4

(b) 0

(c) -2

(d) 4

47. Find the value of  $z$  :  $100z = z^{200}z^{-2}$

(a) 100

(b)  $1/10$

(c) Both 'a' and 'b'

(d) None of the above

48. For the logarithms to be in A.P. Series, the positive numbers should be following -----.

(a) H.P.

(b) G.P.

- (c) A.P.  
(d) None of the above

49. If  $\log_x(1/2) = 1/3$ , what will be the value of base?

- (a)  $1/2$   
(b)  $1/4$   
(c)  $1/8$   
(d)  $-1/2$

50. Find  $x$  when  $\log_5 3125 = 5$

- (a) 5  
(b) 125  
(c) 25  
(d) 625

51. State True or False:  $\log 2 + 2 \log (25/24) = 3 \log (81/80) + 7 \log (10/9)$

- (a) True  
(b) False  
(c) Not possible  
(d) None of the above

52. State True or False:  $\log_5 10 + \log_5 125 = 1$

- (a) Not possible  
(b) True  
(c) May be true  
(d) None of the above

53. State True or False:  $\log_8 32 = 2.15$  when  $\log 2 = 0.30103$

- (a) False  
(b) True  
(c) LHS > RHS  
(d) LHS < RHS

54. Find the value of the logarithm of 2<sup>nd</sup> number (b) for 3 consecutive numbers (a, b, c).

- (a)  $\log(1 + ac)$   
(b)  $1/3 \times 2 \times \log(1 + ac)$   
(c)  $1/2 \times \log(1 + ac)$   
(d)  $2 \times \log(1 + ac)$

55. If  $\log_y 32 = 10$ , then which of the following is the value of  $y$  ?

- (a) 4  
(b) 2

- (c)  $\sqrt{4}$
- (d)  $\sqrt{2}$

56. Find the base when 3 is the logarithm of 729.

- (a) 7
- (b) 11
- (c) 9
- (d) 3

57. If  $\log_7 (7y - 5) = 2$ , find the value of  $y$ .

- (a) 15
- (b) 10
- (c) 08
- (d) 07

58. For any series of positive numbers which are in G.P., their logarithms would be in \_\_\_\_\_.

- (a) G.P.
- (b) A.P.
- (c) H.P.
- (d) None of the Above

59. Solve:  $\log (9t - 2) = 2$

- (a)  $102/9$
- (b)  $98/9$
- (c)  $109/2$
- (d)  $91/2$

60. Find the logarithm of 125 to the base  $\sqrt[5]{5}$

- (a) 6
- (b) 4
- (c) 3
- (d) 2

61. Compute  $12! / (8! \times 4!)$

- (a) 3960
- (b) 495
- (c) 99
- (d) 440

62. Find the value of  $y$ , if  $(y - 1)! \times 20 = (y + 1)!$

- (a) 0
- (b) 2

(c) 4

(d) 5

## Permutations &amp; Combinations

63. Determine the number of ways in which a digit and a vowel can be selected from 10 digits and 26 letters of Alphabet?
- (a) 50
  - (b) 210
  - (c) 105
  - (d) None of the Above
64. Find the LCM of  $\{12!, 14!, 13!\}$
- (a)  $11!$
  - (b)  $15!$
  - (c)  $12!$
  - (d)  $14!$
65. When 9 local trains are running between Haldia and Burdwan. In how many ways can a passenger travel from Burdwan to Haldia and return by a different train?
- (a) 72 ways
  - (b) 70 ways
  - (c) 64 ways
  - (d) 60 ways
66. If  ${}^n P_6 : {}^n P_5 = 1 : 3$ , find the value of  $n$ .
- (a) 3
  - (b) 4
  - (c) 7
  - (d)  $16/3$
67. Find the value of  $2/36! - 1/35! - 1/35!$
- (a)  $-35/18!$
  - (b)  $-1/18!$
  - (c)  $-2/36!$
  - (d)  $-70/36!$
68. Find the number of permutations for 15 scooters if 3 scooters are to be considered at a time.
- (a) 2730
  - (b) 2370
  - (c) 2184
  - (d) 2814

69. Find the value of  $(10! - 9!) / 8!$

- (a) 81
- (b) 80
- (c) 10
- (d) 9

70. How many ways can 5 drivers refill their tanks from 5 refills, assuming no refills in the fuel station remain unused?

- (a) 24 ways
- (b) 120 ways
- (c) 5 ways
- (d) 60 ways

71. In how many ways 8 cardholders stand in a queue at fair price shop?

- (a) 40320 ways
- (b) 40230 ways
- (c) 20430 ways
- (d) 20340 ways

72. Find the number of permutations for 11 bikes if 5 bikes are to be taken at a time.

- (a) 55440
- (b) 55440
- (c) 44550
- (d) 45450

73. Find the value of  $9/7! - 3/6! + 12/7!$

- (a) 0
- (b)  $1/7!$
- (c)  $-1/7!$
- (d) None of the above

74. If  ${}^n P_7 : {}^n P_8 = 1 : 4$ , find the value of  $n$ .

- (a) 12
- (b) 10
- (c) 11
- (d) 13

75. Find the value of  $a$ , if  $(a - 2)! \times 24 = (a + 1)!$

- (a) 0
- (b) 2
- (c) 4
- (d) 3

76. What would be the factorial notation for  $11 \times 10 \times 9 \times 8 \times 7$
- (a)  $11! / 6!$
  - (b)  $11! / 5!$
  - (c)  $10! / 6!$
  - (d)  $10! / 5!$
77. How many ways can 8 people get vaccinated from 8 vaccinators, assuming no vaccinator is idle?
- (a) 40320 ways
  - (b) 5040 ways
  - (c) 5760 ways
  - (d) 35280 ways
78. In how many different ways can 4 different cars, one of each of the 4 manufacturers, be parked in a parking lane?
- (a) 20 ways
  - (b) 22 ways
  - (c) 24 ways
  - (d) 26 ways
79. Find the value of  $3/13! - 2/12! - 2/12!$
- (a)  $-49/13!$
  - (b)  $-30/13!$
  - (c)  $-25/12!$
  - (d)  $-50/12!$
80. In how many ways 6 customers stand in a queue for depositing cash in bank?
- (a) 680 ways
  - (b) 480 ways
  - (c) 600 ways
  - (d) 720 ways

## Quadratic Equations

81. Examine the nature of the roots for the following equation  $16x^2 - 24x + 9 = 0$

- (a) Real and unequal
- (b) Unreal and Imaginary
- (c) Real and Rational
- (d) None of the above

82. For what value of  $c$ , would the product of roots be zero?

- (a)  $a = 1, b = 1, c = 1$
- (b)  $a = 1, b = 0, c = 1$
- (c)  $a = 1, b = 1, c = 0$
- (d)  $a = 1, b = 2, c = 2$

83. Form the equation whose roots are  $9, -4$

- (a)  $x^2 + 5x - 36 = 0$
- (b)  $x^2 - 5x - 36 = 0$
- (c)  $x^2 - 5x + 36 = 0$
- (d)  $x^2 + 5x + 36 = 0$

84. Form quadratic equation with roots as  $a - t, a + t$

- (a)  $x^2 - 2ax + a^2 - t^2 = 0$
- (b)  $x^2 + 2ax + a^2 - t^2 = 0$
- (c)  $x^2 - 2ax - a^2 + t^2 = 0$
- (d)  $x^2 + 2ax - a^2 + t^2 = 0$

Solve Q85 - Q90 using the following information

When  $\alpha$  and  $\beta$  are the roots of  $5x^2 - 7x + 9 = 0$  then find the values of:

85.  $1/\beta + 1/\alpha$

- (a)  $7/9$
- (b)  $-7/9$
- (c)  $9/7$
- (d)  $-9/7$

86.  $\beta^2 + \alpha^2$

- (a)  $41/25$
- (b)  $-41/25$
- (c)  $139/25$
- (d)  $-139/25$

87. Sum of the Roots

- (a)  $9/5$
- (b)  $5/9$
- (c)  $-7/5$
- (d)  $7/5$

88. Product of the Roots

- (a)  $-7/5$
- (b)  $7/5$
- (c)  $-9/5$
- (d)  $9/5$

89.  $\alpha/\beta + \beta/\alpha$

- (a)  $369/5$
- (b)  $-41/45$
- (c)  $-369/5$
- (d)  $41/45$

90.  $\alpha + \beta + 4$

- (a)  $27/5$
- (b)  $29/5$
- (c)  $28/5$
- (d)  $24/5$

91. If  $b^2 - 4ac > 0$ , is a perfect square, the nature of roots would be

- (a) Real and Equal
- (b) Imaginary
- (c) Unreal
- (d) Real and Unequal

92. For what values of  $a$  and  $b$ , the product of roots would be equal to  $c$ ?

- (a)  $a = c \neq b$
- (b)  $a \neq b = c$
- (c)  $a = 1$
- (d)  $a \leq 0$

93. Choose the correct form (From the alternatives given below) in which quadratic equation is generally written.

- (a)  $ax^2 + bx + c = 0$
- (b)  $x^2 + ax - b = 0$
- (c)  $ax^2 - bx + c = 0$
- (d)  $x^2 - bx + c = 0$

94. Choose the correct condition for any equation to be Quadratic equation.
- (a) 5 constants and all constants  $> 0$
  - (b) 5 constants and all constants  $< 0$
  - (c) 3 constants and  $a > 0$
  - (d) 3 constants and  $a \neq 0$
95. Which one of the following is Discriminant of a quadratic equation?
- (a)  $-b + b^2 - 4ac$
  - (b)  $-b^2 - 4ac$
  - (c)  $b^2 - 4ac$
  - (d)  $\sqrt{(b^2 + 4ac)}$
96. When are nature of roots real rather than imaginary?
- (a) If Discriminant is negative
  - (b) If Discriminant is less than zero
  - (c) If Discriminant is more than or equal to zero
  - (d) None of the above
97. For what values of  $a$  and  $c$ , value of sum of the roots would be equal to  $b$ .
- (a)  $a = 1, c = n$
  - (b)  $a = -1, c = n$
  - (c)  $a = n, c = -1$
  - (d)  $a = n, c = 1$
98. For any sum of roots of quadratic equation, 'b' represents -
- (a) Coefficient of  $x$
  - (b) Constant term
  - (c) Coefficient of  $x^2$
  - (d) All of the above
99. Find the square of the difference of the roots of  $115 + 5(x^2 - 12x) = 0$
- (a) 24
  - (b) 48
  - (c) 26
  - (d) 52
100. For any sum of roots of quadratic equation, 'a' represents -
- (a) Coefficient of  $x$
  - (b) Coefficient of  $x^2$
  - (c) Constant term
  - (d) None of the above

State True or False

1. The statement  $(A \cap B)' = A' \cup B'$  is true (or) False
2. If the set A has 4 elements, B has 3 elements then the number of elements in  $A \times B$  is 12 elements
3. The Statement  $\{2\} \notin \{2, 3, 5\}$  is true (or) False
4. The statement  $\{1\} \subset \{1, 2, 3\}$  is true (or) False
5. The statement "Equivalent sets" are always equal is True (or) False
6. If  $x = \sqrt[3]{2+1} - \sqrt[3]{2-1}$  then the value of  $x^3 + 3x$  is 2
7. If  $x = 5 + 2\sqrt{6}$  and  $xy = 1$ , then  $1/x^3 + 1/y^3$  is 89
8. If  $2^{x+2y} - 2^{2x-y} = \sqrt{8}$ , then  $x = 9/10$  and  $y = 10/3$
9. If  $x = 2 + \sqrt{5}$ , then  $x^3 + 3x^2 - 29x$  is 7
10.  $\log 3 + \log 5$  is  $\log 15$
11. The value of  $\log_2 \log_2 \log_3 81 = 2$
12. The logarithm of 324 to base  $\sqrt[3]{2}$  is  $-4$
13. The logarithms with base 10 are called Natural logarithm
14. The logarithms with base e are called common Logarithm
15. The logarithm of one to any base is zero
16. The logarithm of a number which is not equal to one with itself as base is zero
17. The integral part of the value of logarithm of a number is called characteristic
18. The decimal part of the value of logarithm of a number is called mantissa
19. The logarithm of same number for different bases are different
20. A polygon has 44 diagonals then the number of its sides is 8
21. The total number of 9 digit numbers which have all different digits is  $9 \times 9$
22. There are 8 questions in an examination paper and each question has an alternative. The number of ways in which a student can give his answers is 6561
23. In a football competition there were 153 matches. A match occurs between two teams. The total number of teams took part in the competition is 18
24. If  ${}^nC_{n-1} = 1$ , then  $0! = 1$
25. If the roots of the equation  $2x^2 + 8x + c = 0$  are equal then  $c = 8$
26. The g.c.d of the equations  $2x^2 - x - 1 = 0$  and  $4x^2 + 8x + 3 = 0$  is  $3x + 1$
27.  $x^2 - 4x - 1 = 0$  is the quadratic equation whose roots are 2 and 5
28. The roots of the equation  $(x - 4)^2 (x - 2)(x + 4) = 0$  are 4,  $-4$ , 2 and  $-2$
29. The degree of the expression  $3x^5 + xyz^2 + y^3$  is 3

Fill in The Blanks

1. If  $A = \{1, 2, 3, 4\}$ ,  $B = \{2, 4, 6\}$ , then  $A \Delta B$  is \_\_\_\_\_  
[ $A \Delta B = (A - B) \cup (B - A)$  and is known as the symmetric difference of two sets]
2. If  $A$  and  $B$  are two sets then  $A \cap (B - A)$  is \_\_\_\_\_
3. If  $A = \{1, 2, 3\}$ ,  $B = \{2, 3, 4\}$ ,  $C = \{1, 2, 5, 6\}$  then  $A \cup (B \cap C)$  is \_\_\_\_\_
4. If  $A$  and  $B$  are two sets then  $A \cap B = A \cup B$  if and only if \_\_\_\_\_
5. If  $A$  and  $B$  are two disjoint sets then  $n(A \cup B)$  is equal to \_\_\_\_\_
6. If  $A$  has 2 elements,  $B$  has 4 elements and  $A \subset B$  then  $A \cap B$  has \_\_\_\_\_ elements
7. If  $A$  and  $B$  are the two sets of positive and negative integers respectively then  $A \cup B$  is \_\_\_\_\_
8. If  $a^3 + b^3 + c^3 = 0$ , then  $(a + b + c)^3 =$  \_\_\_\_\_
9. If  $y = x^{13} - x^{-13}$ , then  $y^3 + 3y =$  \_\_\_\_\_
10. If  $a = 2 + \sqrt[3]{2} + \sqrt[3]{4}$ , then  $a^3 - 6a^2 + 12a =$  \_\_\_\_\_
11. If  $64^x = 2\sqrt{2}$ , then  $x =$  \_\_\_\_\_
12. If  $x = 8$ ,  $y = 27$ , then the value of  $(x^{4/3} + y^{2/3})^{1/2} =$  \_\_\_\_\_
13. If  $\log_x 0.1 = 1/3$  then the value of  $x$  is \_\_\_\_\_
14. If  $\log_{32} x = 0.8$  then  $x$  is equal to \_\_\_\_\_
15. If  $\log_4 x + \log_2 x = 6$  then  $x$  is equal to \_\_\_\_\_
16. If  $\log_x x + \log_x (1/6) = 1/3$  then the value of  $x$  is \_\_\_\_\_
17. If  $\log 2 = 0.30103$ , then the number of digits in  $4^{50}$  is \_\_\_\_\_
18. If  $\log 2 = 0.30103$ , then the number of digits in  $5^{20}$  is \_\_\_\_\_
19. The value of  $\log_{1/3} 81$  is equal to \_\_\_\_\_
20. The value of  $\log_{\sqrt{3}} (1728)$  is equal to \_\_\_\_\_
21. The value of  $\log_2 (\log_5 625)$  is \_\_\_\_\_
22. The value of  $1/3 \log_{10} 125 - 2 \log_{10} 4 + \log_{10} 32$  is \_\_\_\_\_
23. There are 10 lamps in a room. Each one of them can be switched on independently. The number of ways in which the hall can be illuminated is \_\_\_\_\_
24. There are 11 questions in an examination paper of mathematics. A candidate has to answer 6 questions of which the question under 1 is compulsory. The total number of selections of his answering in questions is \_\_\_\_\_
25. There are two groups in a question paper, each group contains 7 questions. A candidate has to answer 9 questions but taking not more than 5 from any group. The total number of selections of 9 questions is \_\_\_\_\_
26. There are 10 points in plane and among them 4 are collinear. The total number of triangles formed by joining them is \_\_\_\_\_
27. Out of 18 points in plane, no three are in the same straight line except 5 points which are collinear. Then the number of straight lines obtained by joining them is \_\_\_\_\_
28. If the equations  $x^2 - 7x + 12 = 0$  and  $x^2 + mx + 5 = 0$  have common roots the value of  $m$  is equal to \_\_\_\_\_
29. The least positive value of  $n$  for which the equation  $x^2 + mx + 4 = 0$  has real roots is \_\_\_\_\_
30. The value of  $m$  for which the difference between the roots of the equation  $x^2 + mx + 4 = 0$  is 2 are \_\_\_\_\_

31. If  $p, q$  are the roots of the equation  $f(x) = 6x^2 + x - 2 = 0$  the value of  $p/q$  is -----



## MODULE 3 - CALCULAS

1.  $\lim_{x \rightarrow 3} (x^3 + 1)$ 
  - (a) 52
  - (b) 53
  - (c) 55
  - (d) 54
  
2.  $\lim_{x \rightarrow \infty} (4x^2 + 7x + 5)$ 
  - (a) 4
  - (b) 7
  - (c) 5
  - (d) 16
  
3.  $\lim_{x \rightarrow 4} (x^2 - 16) / (x - 4)$ 
  - (a) 2
  - (b) 4
  - (c) 8
  - (d) 6
  
4. If  $y = xe^x$  then  $dy/dx = ?$ 
  - (a)  $xe^x$
  - (b)  $e^x (x + 1)$
  - (c)  $e^x (x - 1)$
  - (d)  $e^x / x$
  
5.  $f(x) = x^5/5 + x^4/4 + x^3/2 - 7x^2 + 18$ .  $f'(x) = ?$ 
  - (a)  $x^4/4 + x^3/3 + 3x^2/2 + 14x$
  - (b)  $x^6/6 + x^5/5 + x^4/4 - 7x^2 + 18x$
  - (c)  $x^4 - x^3 - 3x^2/2 + 14x$
  - (d)  $x^4 + x^3 + 3x^2/2 - 14x$
  
6. When  $y = 4^x$  then derivative of  $y$  is ----
  - (a)  $x(4^x)$
  - (b)  $4^x / (2 \log 2)$
  - (c)  $4^x (2 \log 2)$
  - (d) None of these
  
7. Find the differential coefficient of  $y = e^x / (e^x + 1)$ 
  - (a)  $e^x / (e^x + 1)^2$
  - (b)  $e^{2x} / (e^x + 1)^2$

(c)  $e^x / (e^{2x} + 1)^2$

(d)  $e^x / (e^x + 2)^2$

8.  $y = (4x - 3)^3 + (5x - 2)^2$ . Calculate  $y'$ .

(a)  $182x^2 + 13x + 29$

(b)  $96x^2 + 13x + 29$

(c)  $12x^2 + 26x + 29$

(d)  $192x^2 + 26x + 58$

9.  $x^2/16 + y^2/4 = 1$  is an Implicit function. The derivative of this function is \_\_\_\_\_

(a)  $-x / 4y$

(b)  $-x / 4y$

(c)  $x / 2y$

(d)  $-x / 2y$

10. The result of differentiation of  $y = \log(3x^2 + 13x + 10)$  is \_\_\_\_\_

(a)  $(6x + 13) / (3x^2 + 13x + 10)$

(b)  $(3x^2 + 13x^2 + 10x) / (6x + 13)$

(c)  $(6x + 13) / (3x^2 + 13x + 10)$

(d)  $19 / (6x + 13)$

11. A soft-drink manufacturer has a revenue function  $R = 7Q^2 - 19Q + 30$  and the cost function is given by  $9Q$ . Find the number of cans produced by the firm, under perfect competition.

(a) 2

(b) 4

(c) 6

(d) 8

12. A tin manufacturer has a revenue function given by:  $R = 11Q^2 - 110Q + 70$  and the cost function is given by:  $C = 22Q$ . Find the number of tins to be produced by the manufacturer.

(a) 2

(b) 6

(c) 10

(d) 14

13. A demand function is given by:  $P = a - bQ$  and the cost function is given by  $C = Q^2$ . Find the value of  $Q$  for which profit will be maximum under perfect competition.

(a)  $a / (a + 1)$

(b)  $a / 2(b + 1)^2$

(c)  $a / 2(b + 1)$

(d)  $b / 2(a + 1)$

14. The demand function is given by:  $P = 1400 - 25Q$  and the cost function is given by  $C = 10Q^2$ . Find the value of  $Q$  at the equilibrium point.
- (a) 10  
(b) 20  
(c) 30  
(d) 40
15. A revenue function is given by  $R = 3Q^2 - 8Q + 15$  and the cost function is given by  $C = 28Q$ . Find the value of  $Q$  for achieving highest profit.
- (a) 3  
(b) 9  
(c) 6  
(d) 12
16. A demand function is given by:  $P = 1500 - 3Q$  and the cost function is given by:  $C = 12Q^2$ . Find the value of  $Q$  at the equilibrium point.
- (a) 50  
(b) 100  
(c) 150  
(d) 125
17. A firm has a fixed production cost of ₹90 and a marginal variable production cost of ₹9. The price of the product is ₹18. Find the cost function, revenue function, and the value of  $Q$  at the Break Even point.
- (a)  $2Q + 20$ ;  $9Q$ ; 10  
(b)  $9Q + 90$ ;  $18Q$ ; 10  
(c)  $4Q + 90$ ;  $36Q$ ; 20  
(d)  $Q + 10$ ;  $5Q$ ; 50
18. A sugar industry has a fixed cost of ₹290 and a marginal cost of 50 paise. He sells sugar at the price of ₹15/kg. Find the quantity of sugar sold for breaking even.
- (a) 10  
(b) 30  
(c) 20  
(d) 40
19. A cotton mill has a fixed cost of ₹1540 and a marginal cost of ₹33. He sells a shirt at a price of ₹110. Find the minimum number of shirts sold so the mill incurs no loss.
- (a) 23  
(b) 20  
(c) 26  
(d) 29

20. Given:  $C(x) = 900 + 30x + 0.6x^2$ ,  $P = 90$ . Find the value of  $x$  at equilibrium point.
- (a) 40
  - (b) 50
  - (c) 70
  - (d) 30
21. Given:  $C(x) = 2x^2 - 3x - 12$ ,  $P = 33$ . Find the value of  $x$  at equilibrium point.
- (a) 9
  - (b) 12
  - (c) 15
  - (d) 18
22. Given:  $R(x) = 3x^2 + 24x + 2$ ,  $MC(x) = 42$  and the fixed cost is 90. Find the value of  $x$  at equilibrium point.
- (a) 2
  - (b) 3
  - (c) 7
  - (d) 11
23. Given:  $R(x) = 6x^2 - 11x - 35$ ,  $C(x) = 5x^2 - 3x + 16$ . Find the value of  $x$  for which profit is maximum.
- (a) 2
  - (b) 4
  - (c) 6
  - (d) 12
24. Given:  $R(x) = 20x^2 - 15x - 10$ ,  $C(x) = x^2 + 99x + 27$ . Find the value of  $x$  for which profit is maximum.
- (a) 3
  - (b) 15
  - (c) 25
  - (d) 10
25. Given:  $R(x) = 3x^2 + 4x + 2$ ,  $MC(x) = 16$  and the fixed cost is 24. Find the profit maximising value of  $x$  under perfect competition.
- (a) 1
  - (b) 3
  - (c) 4
  - (d) 2
26. A manufacturer has a monthly fixed cost of ₹1,00,000 and a production cost of ₹50 per unit produced. The product is sold at ₹75. Find the cost function and the number of products be sold by the manufacturer to have break even.

- (a)  $25x + 50,000$ ; 2000
- (b)  $50x + 1,00,000$ ; 4000
- (c)  $5x + 1,00,000$ ; 3000
- (d)  $2.5x + 10,000$ ; 5000

27. A cement industry has a yearly fixed cost of ₹96,000 and a monthly production cost of ₹13 per unit produced. The product is sold at ₹39 per unit. Find the cost function

- (a)  $13x + 8000$
- (b)  $13x + 96,000$
- (c)  $39x + 96,000$
- (d)  $39x + 8000$

28. Find the monthly profit function if a firm's yearly fixed cost is ₹60,000 and yearly production cost is ₹120 per piece. Each unit is sold at ₹15.

- (a)  $\pi = 5x - 5000$
- (b)  $\pi(x) = 15x - 5000$
- (c)  $\pi(x) = 20x - 5000$
- (d)  $\pi(x) = 25x - 5000$

29. Given:  $C(x) = 9x + 350$  and  $P = 14$ . Find the condition of getting break-even point

- (a)  $5x - 350 = 0$
- (b)  $7x - 350 = 0$
- (c)  $-14x - 350 = 0$
- (d) None of these

30. With reference to Q.29 find the break-even quantity

- (a) 50
- (b) 70
- (c) 110
- (d) 100

---

From Q.31 to Q.39, find whether the function is maximum or minimum:

31.  $f(x) = 6x^2 + 11x - 35$

- (a) Maximum
- (b) Minimum
- (c) No Curvature
- (d) None of the above

32.  $f(x) = -4x^2 - 7x - 35$

- (a) Maximum
- (b) Minimum

- (c) No Curvature
- (d) None of the above

33.  $f(x) = 20x^2 - 15x - 10$

- (a) Maximum
- (b) Minimum
- (c) No Curvature
- (d) None of the above

34.  $f(x) = 3x^2 - 4x + 2$

- (a) Maximum
- (b) Minimum
- (c) No Curvature
- (d) None of the above

35.  $f(x) = -x^2 + 6x + 18$

- (a) Maximum
- (b) Minimum
- (c) No Curvature
- (d) None of the above

36.  $f(x) = 9x^2 - 6x + 1$

- (a) Maximum
- (b) Minimum
- (c) No Curvature
- (d) None of the above

37.  $f(x) = -x^2 + 4x - 2$

- (a) Maximum
- (b) Minimum
- (c) No Curvature
- (d) None of the above

38.  $f(x) = 3x^2 + 2$

- (a) Maximum
- (b) Minimum
- (c) No curvature
- (d) None of the above

39.  $f(x) = x^2 - 3x$

- (a) Maximum
- (b) Minimum

- (c) No curvature  
(d) None of the above

Find the values of  $x$  for which the functions of Q. No. 40 to 50 have maximum and minimum points

40.  $f(x) = ax^3 + bx^2 + cx + d$ ;  $a < 0$ ;  $b < 0$ ;  $c > 0$  and  $a < b$

- (a) Maximum,  $x = (-b + \sqrt{b^2 - 3ac}) / 3a$ ; Minimum,  $x = (-b - \sqrt{b^2 - 3ac}) / 3a$   
(b) Minimum,  $x = (-b + \sqrt{b^2 - 3ac}) / 3a$ ; Maximum,  $x = (-b - \sqrt{b^2 - 3ac}) / 3a$   
(c) No Curvature  
(d) None of the above

41.  $f(x) = x^3/3 - 9x^2 + 81x + 70$

- (a) Maximum,  $x = 9$ ; Minimum,  $x = 9$   
(b) Minimum,  $x = 3$ ; Maximum,  $x = 5$   
(c) No curvature  
(d) None of the above

42.  $f(x) = 2/3 x^3 + 9/2 x^2 - 11x - 21$

- (a) Maximum,  $x = 2$ ; Minimum,  $x = -9/2$   
(b) Maximum,  $x = -11/2$ ; Minimum,  $x = 1$   
(c) Maximum,  $x = -3/2$ ; Minimum,  $x = -3$   
(d) No curvature

43.  $f(x) = 4/3 x^3 - 5x^2 + 4x - 9$

- (a) Maximum,  $x = 4$ ; Minimum,  $x = -3/2$   
(b) Maximum,  $x = 1/2$ ; Minimum,  $x = 2$   
(c) Maximum,  $x = 2$ ; Minimum,  $x = -1$   
(d) No curvature

44.  $f(x) = x^3 - 2x^2 - 4x$

- (a) Maximum,  $x = -2/3$ ; Minimum,  $x = 2$   
(b) Maximum,  $x = 3/4$ ; Minimum,  $x = 1$   
(c) Maximum,  $x = 3$ ; Minimum,  $x = -1/3$   
(d) No curvature

45.  $f(x) = x^3/3 - 4.5x^2 + 8x + 2$

- (a) Maximum,  $x = 1$ ; Minimum,  $x = 8$   
(b) Maximum,  $x = 4$ ; Minimum,  $x = 2$   
(c) Maximum,  $x = 3$ ; Minimum,  $x = -5$   
(d) No curvature

46.  $f(x) = x^3/3 - 3/2 x^2 + 2x - 3$

- (a) Maximum,  $x = 3$  ; Minimum,  $x = 5$
- (b) Maximum,  $x = 1$  ; Minimum,  $x = 2$
- (c) Maximum,  $x = 6$  ; Minimum,  $x = -1$
- (d) No curvature

47.  $f(x) = 2/3 x^3 - 3/2 x^2 - 5x$

- (a) Maximum,  $x = -1$  ; Minimum,  $x = 5/2$
- (b) Maximum,  $x = 1$  ; Minimum,  $x = 3$
- (c) Maximum,  $x = -1$  ; Minimum,  $x = -3/2$
- (d) No curvature

48.  $f(x) = -x^3/3 + 4x^2 - 15x$

- (a) Maximum,  $x = 1$  ; Minimum,  $x = 3$
- (b) Maximum,  $x = 5$  ; Minimum,  $x = 3$
- (c) Maximum,  $x = -3$  ; Minimum,  $x = -5$
- (d) No curvature

49.  $f(x) = x^3/3 - x^2/2 - 2x$

- (a) Maximum,  $x = -1$  ; Minimum,  $x = 2$
- (b) Maximum,  $x = 1$  ; Minimum,  $x = -2$
- (c) Maximum,  $x = -3$  ; Minimum,  $x = 5$
- (d) No curvature

50.  $f(x) = x^3/3 + 2x^2 + 3x + 7$

- (a) Maximum,  $x = -3$  ; Minimum,  $x = -1$
- (b) Maximum,  $x = 1/2$  ; Minimum,  $x = 2$
- (c) Maximum,  $x = 1$  ; Minimum,  $x = 4$
- (d) No curvature



## MODULE 4 - STATISTICAL REPRESENTATION OF DATA

1. The word 'Statistics' has been derived from the Latin word 'Status' which means
  - (a) A numerical state
  - (b) A mathematical state
  - (c) A neutral state
  - (d) A political state
  
2. Which one of the following has synonymous words?
  - (a) Status, Staistik, Statista
  - (b) Staistik, Statista, Stats
  - (c) Statistic, Statistia, Stats
  - (d) Statistic, Statistia, Status
  
3. Statistics is a tool in the hands of mankind
  - (a) To translate complex facts into simple and understandable statements of facts
  - (b) To translate statistical information into mathematical statements of facts
  - (c) To translate business information into simple and understandable statements of facts
  - (d) To translate complex facts into presentable forms through tables and diagrams
  
4. The word statistics in plural form means
  - (a) The science of statistics that collect data in a systematic manner with some definite aim or object towards further analysis in graphical way
  - (b) The numerical data collected in a systematic manner with some definite aim or object in view such as the number of persons unemployed in a country
  - (c) The numerical data collected in a systematic manner for analysing the state of affairs with the help of mathematical applications
  - (d) The science of statistics that deals with the principles, devices or statistical methods of collecting, analyzing and interpreting numerical data
  
5. The word statistics in singular form means
  - (a) The science of statistics that collect data in a systematic manner with some definite aim or object towards further analysis in graphical way
  - (b) The numerical data collected in a systematic manner with some definite aim or object in view such as the number of persons unemployed in a country
  - (c) The numerical data collected in a systematic manner for analysing the state of affairs with the help of mathematical applications
  - (d) The science of statistics that deals with the principles, devices or statistical methods of collecting, analyzing and interpreting numerical data

6. Which one of the following is not a characteristic of Plural form of Statistics?
- (a) Statistics should be collected for a pre-determined purpose
  - (b) Statistics should be enumerated or estimated
  - (c) Statistics are always graphically expressed
  - (d) Statistics are affected by a large number of causes
8. Measurement of skewness is
- (a) Analysis of data
  - (b) Presentation of data
  - (c) Organisation of data
  - (d) Interpretation of data
9. Find the odd one out from the following
- (a) Regression
  - (b) Kurtosis
  - (c) Sampling
  - (d) Central Tendency
10. Raw data is
- (a) Information which can be interpreted to take decision
  - (b) Information which can't be put to use directly
  - (c) Information which is not amenable to conversion
  - (d) Information which are useless
11. There are four person named A, B, C, & D. A is a sales person whereas B, C, D are students. A collected sales figures for his region and B, C, D used these data in order to study sales pattern. Which one of the following is correct?
- (a) B uses secondary data
  - (b) A & B both are using primary data
  - (c) A, B, C, D all are using secondary data
  - (d) B, C, D are using primary data
12. Which one of the following is a method of collecting primary data?
- (a) Information collected through newspapers and periodicals
  - (b) Information obtained from the publications of trade associations
  - (c) Information collected by Government through Census
  - (d) Information gathered from research paper published in research journal
13. Classification of data is
- (a) The process of arranging things in groups or classes according to their common frequencies
  - (b) The process of arranging things in groups or classes according to their common characteristics and affinities

- (c) The process of arranging things in groups or classes according to their common differences and tally marks
- (d) The process of arranging things in groups or classes according to their common deviations from respective mean

14. In Statistics classification

- (a) Separates data into different unrelated parts
- (b) Separates data into different dispersed groups
- (c) Separates data into different but related parts
- (d) Separates data into different modal groups

15. Which one of the following is a characteristic of a good classification?

- (a) Classification should be heterogeneous
- (b) Classified groups must have overlapping data
- (c) Classification should be stable
- (d) Classification should not be inclusive

16. When the basis of classification is according to differences in time it is called

- (a) Temporal Classification
- (b) Quantitative Classification
- (c) Spatial Classification
- (d) Qualitative Classification

17. Dichotomous Classification is

- (a) When data is classified according to presence or absence of two attributes
- (b) When data is classified into two groups containing all the attributes
- (c) When data is classified according to presence of two attributes
- (d) When data is classified into two groups according to presence or absence of one attribute

18. Tabulation condenses classified data so that

- (a) Data may be more easily understood
- (b) Data may be easily presented textually
- (c) Data may be more easily synchronized
- (d) More comprehensive secondary result could be obtained

19. Tabulation is preferred to textual presentation because

- (a) Tabulation never compares between rows and columns
- (b) Tabulation is helpful for diagrammatic representation
- (c) Tabulation always get constructed with simple data
- (d) None of the above

20. With respect to accuracy

- (a) Diagrammatic presentation is preferable to Tabular presentation
- (b) Textual presentation is preferable to diagrammatic presentation
- (c) Tabular presentation is preferable to Diagrammatic presentation
- (d) Textual presentation is preferable to Tabular presentation

### State True or False

1. The class boundaries are the limits up to which the two limits, (actual) of each class may be extended to fill up the gap that exists between the classes;
2. In an exclusive series the class limits are extended to class boundaries by the adjusting adjustment factor;
3. In a Continuous Series lower limit of each class actually represents exact value;
4. Ratio of the class frequency to the total frequency expressed as a percentage is called percentage frequency
5. In Histogram class intervals are taken as heights and corresponding frequencies as breadth;
6.  $\text{Frequency density} = \text{Class frequency} / \text{Width of class interval}$ ;
7. A discrete variable can assume only integral values and therefore is not capable of exact measurement;
8. Variables or observations those with names of places, attributes, and things etc., as possible values are called descriptive variables;
9. A raw data is a statistical data in original form before any statistical technique is applied to redefine process or summarize it;
10. Any character which can vary from one individual to another is called a variable or a variate



## MODULE 5 - MEASURES OF CENTRAL TENDENCY AND DISPERSION

- Which one of the following is a Positional Average?
  - Geometric Mean;
  - Harmonic Mean;
  - Mode;
  - Progressive Average;
- Because of heavy rain on Sunday average rainfall of a city for the week increased to 0.6 inch from the average rainfall 0.3 inch measured from Monday to Saturday. The rainfall on Sunday was-
  - 2.4 inch;
  - 0.3 inch;
  - 2.1 inch;
  - 1.5 inch
- The mean of the frequency distribution  $((x_1, f_1), (x_2, f_2), (x_3, f_3) \dots \dots \dots (x_n, f_n))$  is
  - $\Sigma x / \Sigma f$  ;
  - $\Sigma x / n$  ;
  - $\Sigma fx / n$  ;
  - $\Sigma fx / \Sigma f$  ;
- $\Sigma x$  (from  $i = 1$  to  $20$ ) = 54120; While computing this, it was observed that two entries were wrongly entered as 850 and 320 instead of 580 and 230. Correct value of  $\bar{x}$  is
  - 2688;
  - 2746.5;
  - 2720;
  - 2662;
- $\Sigma (X - \bar{X})$  is always equal to
  - 1;
  - 1;
  - 0;
  - $\infty$ ;
- The sum of the squares of deviations of a set of observations is the minimum when deviations are taken from the
  - Geometric Mean;
  - Harmonic Mean;
  - Arithmetic Mean;
  - Mode;

7. If each of the values of a variable  $x$  with mean  $\bar{x}$  is multiplied by  $K$  then the new mean of the variable is  
 (a)  $\bar{x} / K$ ;  
 (b)  $K\bar{x}$ ;  
 (c)  $\bar{x}$ ;  
 (d)  $K\bar{x}$ ;
8. Assumed mean is 35,  $\Sigma fd = -425$  &  $\Sigma f = 63$ .  $\bar{x}$  is  
 (a) 20;  
 (b) 25.87;  
 (c) 28.25;  
 (d) 19.34;
9. If  $A = 500$ ,  $i = 1000$  &  $\Sigma fd' = 232$  &  $\Sigma f = 120$ ,  $\bar{x}$  is  
 (a) 2433.33;  
 (b) 527.84;  
 (c) 501.93;  
 (d) 1017.24;
10. The mean daily salary paid to all employees in a certain company was ₹600. The mean daily salaries paid to the male and female employees were ₹620 and ₹520 respectively. Male to female employees ratio in the company is  
 (a) 3:2;  
 (b) 4:5;  
 (c) 5:7;  
 (d) 4:1;

11. The pass result of 50 students who took up a class test is given below:

Marks:	4	5	6	7	8	9
No of Students:	8	10	9	6	4	3

If the average marks for all the fifty students was 5.16, the average marks of the students who failed is

- (a) 0.42;  
 (b) 3.06;  
 (c) 4.74;  
 (d) 2.1;
12. For a certain frequency table which has only been partly reproduced below for which the mean is 1.46

No of accidents:	0	1	2	3	4	5
Frequency:	46	$f_1$	$f_1$	25	10	5

If  $\Sigma f = 200$  Unknown frequencies are

- (a)  $f_1 = 0, f_2 = 114$ ;
- (b)  $f_1 = 114, f_2 = 0$ ;
- (c)  $f_1 = 76, f_2 = 38$ ;
- (d)  $f_1 = 57, f_2 = 57$ ;

13. The sum of the deviations of a certain number of observations measured from 4 is 72 and the sum of the deviations of the observations from 7 is  $-3$ . Mean of the observations is

- (a) 6.88;
- (b) 25;
- (c) 3.63;
- (d) Cannot be ascertained with given data;

14. The mean of a certain number of items is 42. If one more item 64 is added to the data, the mean becomes 44. The no of items in the original data is

- (a) 20;
- (b) 10;
- (c) 43;
- (d) 440

15. The weighted average from the following observation is ₹46.23.

Price per tonne (₹):	45.60	50.70	?
Tonnes Purchased:	135	40	25

Simple average of the observation is

- (a) ₹46.23;
- (b) ₹46.26;
- (c) ₹66.63;
- (d) ₹46.24;

16. In a certain factory a unit of work is completed by A in 4 minutes, by B in 5 minutes, by C in 6 minutes, by D in 10 minutes, and by E in 12 minutes. Average number of units of work completed per minute is

- (a)  $25/4$ ;
- (b)  $5/48$ ;
- (c)  $4/25$ ;
- (d)  $25/48$ ;

17. A person walks 8 km at 4 km an hour, 6 km at 3 km an hour and 4 km at 2 km an hour. Average speed per hour is

- (a) 0.33;
- (b) 2;

- (c) 3;
- (d) 0.5;

18. It is the most suitable average when it is desired to give greater weight to smaller observations and less weight to larger ones. It is

- (a) AM;
- (b) HM;
- (c) GM;
- (d) Median;

19. Which one of the following is not a feature of Arithmetic Mean (AM)?

- (a) AM is affected very much by extreme values;
- (b) AM is widely used in the study of qualitative phenomenon;
- (c) AM provides a good basis for comparison;
- (d) AM is rigidly defined so different interpretation by different people are not possible;

20. Which one of the following is a feature of Geometric Mean (GM)?

- (a) GM is affected much by the presence of externally small or large observations;
- (b) GM gives the actual value of the series;
- (c) GM is useful when a given phenomenon has a limit for lower value;
- (d) GM is imaginary if any of the observations is zero;

### State True or False

1. *The arithmetic mean is always the best measure of central tendency*
2. *The sum of the deviation of the individual observations from mean is zero*
3. *In a moderately skewed distribution  $A.M. < G.M. < H.M$*
4. *The addition of a constant value to each of the values of a series increases the average by the same value of the constant.*
5. *Average alone is enough to throw light on the main characteristics of a statistical series.*
6. *Median is a mathematical average*
7. *The value of median and mode can be determined graphically*
8. *Combined median can be calculated as in case of arithmetic mean*
9. *Percentile divides the series in ten equal parts*
10. *Range is the best measure of Dispersion.*
11. *Mode is the value that has maximum frequency*
12. *Mode can be located graphically*
13. *In a positively skewed distribution  $mode > mean$*
14. *Mode is a mathematical average*
15. *A distribution with more than two modes is called multimodal*
16. *Geometric mean is a positional measure of central tendency*
17. *Geometric mean is more suitable for dealing with problems of rates and speed*
18. *Geometric mean can be computed in case of open end series*
19. *Combined G.M. of two or more series can be calculated*
20. *The geometric mean is the  $n$ th root of the product of  $n$  items in a given distribution.*

## Short Answer Type Questions

1. What do you mean by "Measures of Central Tendency"?
2. What are different types of averages?
3. If some A.M.s are given of different series, how can we find combined  $\bar{X}$  for all of those? Also provide the formula.
4. What do you mean by Weighted Arithmetic Mean? How to calculate it? Give its formula also.
5. Define –
  - (a) Median
  - (b) Quartiles
  - (c) Lower Quartile
  - (d) Upper Quartile
  - (e) Decile
  - (f) Percentile
6. How can we calculate (i) Median (ii)  $Q_1$  (iii)  $Q_3$  (iv) Decile (v) Percentile in Individual or Discrete Series? Also write steps to calculate.
7. How to calculate the above said measures in a continuous series? Write steps to calculate.
8. What amendments are to be made for
  - (i) Inclusive Series
  - (ii) Cumulative series
  - (iii) Open End series
  - (iv) Unequal Interval Series
9. What are Positional Value or Partition Measures? What are its various types?
10. Define mode.
11. What is the Empirical relation between Mean, Mode and Median? Who invented it?
12. When is empirical formula used to calculate Mode? How is it used?
13. Give the precise definition of G.M. along with the formula of its calculation.
14. G.M. is calculated as average. Explain.
15. Give three merits of G.M.
16. Give three demerits of G.M.
17. Give three important properties of G.M.
18. Which formula is used to show the rise in prices or the increase in population?
19. Give meaning of H.M.
20. Give three Merits of H.M.



**CHAPTER 6 CORRELATION AND REGRESSION**

1. From the following table calculate the coefficient of correlation by Karl Pearson's method and also fill the gap.

X	8	4	12	6	10
Y	11	13	?	10	9

Arithmetic means of X and Y series are 8 and 10 respectively.

2. Given number of pairs of observations of X and Y = 9

X Series Arithmetic average = 70.5

X Series Standard deviation = 9.07

X Series Assumed average = 65.0

Y Series Assumed average = 108.0

Y Series Arithmetic Average = 121.5

Y Series Standard deviation = 11.85

Summation of product of corresponding deviation of X and Y series = 1451

Calculate coefficient of correlation.

3. Find the rank correlation for the following distribution

Marks in Economics	48	60	72	62	56	40	39	52	30
Marks in Accountancy	62	78	65	70	38	54	60	32	31

4. Calculate correlation coefficient from the following results:

$$N = 10,$$

$$\Sigma x = 100,$$

$$\Sigma y = 150,$$

$$\Sigma(X - 10)^2 = 180,$$

$$\Sigma(Y - 15)^2 = 215,$$

$$\Sigma(X - 10)(Y - 15) = 60$$

5. If the covariance between X and Y variables is 10 and the variance of X and Y are respectively 16 and 9, find the coefficient of correlation.

From the data given below, find the number of items (Where x and y are deviations from arithmetic average).

$$r = 0.5,$$

$$\Sigma xy = 120,$$

$$\Sigma x^2 = 90,$$

$$\sigma_y = 8$$

7. From the following data compute the coefficient of correlation between X and Y:

	X - Series	Y - Series
Arithmetic Mean	15	28
Sum of Squares of deviations from mean	144	225

Summation of product of deviations of X and Y series from their respective means = 20

8. In a question on correlation the value of  $r$  is 0.64 and its P.E. = 0.1312. What was the value of  $N$ ?

9. From the marks obtained by 8 students in Accountancy and Statistics, compute rank coefficient of correlation.

Marks in Accountancy	60	15	20	28	12	40	80	20
Marks in Statistics	10	40	30	50	30	20	60	30

10. The coefficient of rank correlation between marks in Quantitative Mathematics and Economics obtained by a certain group of students is  $7/11$ . The sum of the squares of differences in ranks is 60. What is the number of students in the group?

11. The coefficient of rank correlation of the marks obtained by 10 students in statistics and accountancy was found to be 0.5. It was later discovered that the difference in ranks in the two subjects obtained by one of the students was wrongly taken as 3 instead of 7. Find the correct coefficient of rank correlation.

12. Find correlation coefficient for data given below:

Age (years)	42	36	48	43	55	52	38
Blood Pressure	132	120	140	133	142	148	122

13. Calculate Karl Pearson's coefficient of correlation between expenditure on advertisement and sales from the data given below:

Advertisement expense in ₹ '000	39	78	65	62	90	82	75	25	98	36
Sales in lakh ₹	47	84	53	58	86	62	68	60	91	51

14. Find the coefficient of correlation and probable error from the data:

X	67	69	71	75	85	93	87	73
Y	95	80	87	80	79	75	80	85

15. From the following data compute the coefficient of correlation between X and Y.

	X - Series	Y - Series
Arithmetic Mean	25	18
Sum of Squares of deviations from mean	136	138

Summation of product of deviations of X and Y series from their respective means = 122.

Number of pairs of values is 15.

16. Ten competitors in a beauty contest are ranked by 3 judges in the following order:

Judge A	1	6	5	10	3	2	4	9	7	8
Judge B	3	5	8	4	7	10	2	1	6	9
Judge C	6	4	9	8	1	2	3	10	5	7

Use Rank correlation coefficient to determine which pair of judges has the nearest approach to common taste in beauty.

17. Calculate the coefficient of correlation by any suitable method:

A	115	168	170	127	118	129	135	140
B	2	6	8	11	1	1	4	3

Also calculate probable error.

18. From the data given below, compute the correlation coefficient by the method of concurrent deviations.

Year	1996	1997	1998	1999	2000	2001	2002
Supply	150	154	160	172	160	165	180
Price	200	180	170	160	190	180	172

19. Consider the data summarized below:

X	42	44	58	55	89	98	66
Y	56	49	53	58	65	76	58

The coefficient of correlation between variables X and Y is 0.64, their covariance is 16. The variance of X is 9. Find the standard deviation of Y.

20. Calculate the coefficient of correlation by concurrent deviation method from the following:

X	60	55	50	55	30	70	40	35	80	80	75
Y	65	40	35	75	63	80	35	20	80	60	60

21. Calculate Pearson's coefficient of correlation from the data using 44 and 26 as the origin of X and Y respectively.

X	43	44	46	40	44	42	45	42	38	40	42	57
Y	29	31	19	18	19	27	27	29	41	30	26	10

22. Given the bivariate data

X	2	6	4	3	2	3	8	4
Y	7	2	1	1	2	3	2	6

Obtain regression equations taking deviations from 5 in case of X and 4 in case of Y.

23. Past 10 years data on Rainfall and Yield of wheat in a certain village offered the following results:

Particulars	Value
Av. Wheat Yield	25 Qtl
Av. Rainfall	20 Cms
Variance of wheat output	3 Qtl
Variance of Rainfall	5 Cms
Correlation Coefficient	0.65

Find the most likely yield output per acre when rainfall is 35 cms.

24. In a partially destroyed laboratory record relating to correlation data, the following results are legible:

$\sigma_x^2 = 9$ , Regression equations:

$$8X - 10Y + 66 = 0$$

$$40X - 18Y = -214$$

What were (a) the mean values of X and Y, (b)  $\sigma_y$ , (c) the coefficient of correlation between X and Y?

25. Given

	X - Series	Y - Series
Arithmetic Mean	18	100
Standard Deviation	14	20

Coefficient of correlation between X and Y is +0.8. Find out

(a) The most probable value of Y if X is 70 and most probable value of X if Y is 90.

(b) If the regression coefficient is 0.8 and 0.6, what would be the value of coefficient of correlation?

26. Given that the means of  $X$  and  $Y$  are 65 and 67, their standard deviations are 2.5 and 3.5 respectively and the coefficient of correlation between them is 0.8.
- (i) Write down the equations of the regression lines.  
 (ii) Obtain the best estimate of  $X$  when  $Y = 70$ .  
 (iii) Using the estimated value of  $X$  as the given value of  $X$ , estimate the corresponding value of  $Y$ .
27. The correlation coefficient between the variables  $X$  and  $Y$  is  $r = 0.60$ . If  $\sigma_x = 1.50$ ,  $\sigma_y = 2.00$ ,  $X = 10$ ,  $Y = 20$ , find the equations of the regression lines (i)  $Y$  on  $X$  (ii)  $X$  on  $Y$ .
28. Find out  $\sigma_x$  and  $r$  from the following data:  
 $3x = y$ ,  $4y = 3x$  and  $\sigma_y = 2$ .
29. Given that the regression equations of  $Y$  on  $X$  and  $X$  on  $Y$  are respectively  
 $Y = X$  and  $4X - Y = 3$ .  
 Find the correlation coefficient between  $X$  and  $Y$ .
30. From the following data calculate (i) coefficient of correlation (ii) Standard deviation of  $Y$ .  
 $X = 0.854 Y$ ;  
 $Y = 0.89X$ ;  
 $\sigma_x = 3$ .
31. If the two lines of regression are  
 $4X - 5Y + 30 = 0$   
 and  $20X - 9Y - 107 = 0$   
 Which of these is the line of regression of  $X$  on  $Y$ ? Find  $r$  and  $\sigma_y$  when  $\sigma_x = 3$ .
32. From the following regression equations, calculate  $X$ ,  $Y$  and  $r$   
 $20X - 9Y = 107$   
 $4X - 5Y = -33$
33. The following table gives the age of car of a certain make and annual maintenance costs. Obtain the regression equation for cost related to age. Estimate maintenance cost of a car whose age is 10 Years.
- |   |    |    |    |    |
|---|----|----|----|----|
| Age of cars ( $X$ ) in years              | 2  | 4  | 6  | 8  |
| Maintenance Cost in hundreds of ₹ ( $Y$ ) | 10 | 20 | 25 | 30 |
34. Find two regression equations from the following data:  
 $X$ : 10, 25, 34, 42, 37, 35, 36, 45;  
 $Y$ : 56, 64, 63, 58, 73, 75, 82, 77;

35. Obtain the line of regression of  $Y$  on  $X$  for the following data:

Age (Years): 6, 38, 56, 42, 72, 36, 63, 47, 55, 45;

Blood Pressure  $Y$ : 145, 124, 147, 125, 160, 118, 149, 128, 150, 124;

Estimate the blood pressure of a man whose age is 50 years.

36. In trying to evaluate the effectiveness in its advertising campaign, a firm compiled the following information.

Year	1998	1999	2000	2001	2002	2003	2004	2005
Advertisement expenditure (₹'000)	12	15	15	23	24	38	42	48
Sales (₹ lakhs)	5	5.6	5.8	7	7.2	8.8	9.2	9.5

Calculate the regression equation of sales on advertising expenditure. Estimate the probable sales when advertisement expenditure is ₹60 thousand.

37. Two random variables have the least square regression lines with equations

$$3x + 2y - 26 = 0$$

$$\text{and } 6x + y - 31 = 0.$$

Find the mean value and the correlation coefficient between  $X$  and  $Y$ .

38. The following data show the years of services ( $x$ ) and average salary per month ( $y$ ) with respect to 7 persons working in a college. Fit a straight line regression of  $Y$  on  $X$ .

Sr. No.	1	2	3	4	5	6	7
$X$ (years)	1	3	7	6	2	4	5
$Y$ (₹'000)	5	7	7	8	6	4	3

Multiple Choice Questions (MCQ)

- If  $b_{yx}$  and  $b_{xy}$  are regression coefficients of series X on series Y and regression coefficients of series Y on series X respectively then which one of the following is correct?
  - $b_{yx} \times b_{xy} = r$ , where  $r$  is the correlation coefficient
  - $b_{xy} \times b_{yx} = r^2$ , where  $r$  is the correlation coefficient
  - $b_{xy} \times b_{yx} = -r$ , where  $r$  is the correlation coefficient
  - $b_{xy} \times b_{yx} = 1/r$ , where  $r$  is the correlation coefficient
- If  $b_{yx}$  and  $b_{xy}$  are regression coefficients of series X on series Y and regression coefficients of series Y on series X respectively then which one of the following is correct?
  - $b_{yx}$  and  $b_{xy}$  will be either both positive or both negative
  - $b_{yx}$  will be positive and  $b_{xy}$  will be negative
  - $b_{yx}$  will be negative and  $b_{xy}$  will be positive
  - Nothing can be said like this, it depends on X & Y values
- Say true or false:  
 "If  $r$  is the correlation coefficient between two series X & Y then covariance between X & Y is given as  $r \times \text{variance of series X} \times \text{variance of series Y}$ "

4. Match the items in column A with the items in column B

Column A	Column B
(a) $Y - \bar{Y}$	(i) is used to obtain the best estimates of X for given values of Y
(b) $X - \bar{X} = b_{xy} (Y - \bar{Y})$	(ii) is equal to $r \sigma_x \sigma_y$
(c) $b_{yx} = 1 / b_{xy}$	(iii) is equal to $b_{xy} (X - \bar{X})$
(d) $\sigma_x \times b_{yx}$	(iv) is a condition for making $r^2 = 1$

- Which one of the following is correct?
  - Regression equation predicts maximum probable values of one variable for specified values of other variable
  - Regression equation predicts most likely values of one variable for specified values of other variable
  - Regression equation predicts maxi-min values of one variable for specified values of other variable
  - Regression equation predicts minimum probable values of one variable for specified values of other variable
- If  $r = 0.52$ ,  $\sigma_x = 4.6$  &  $\sigma_y = 36.8$  then  $b_{yx}$  is equal to
  - 0.24
  - 4.16
  - +1
  - 0.065

7. If  $b_{YX}$  &  $b_{XY}$  are regression coefficients between X on Y and Y on X respectively and  $r$  is the correlation coefficient between X and Y then
- $(b_{YX} + b_{XY}) / 2 \leq r$
  - $(b_{YX} + b_{XY}) / 2 \leq r^2$
  - $(b_{YX} + b_{XY}) / 2 \geq r$
  - $(b_{YX} + b_{XY}) / 2 = r^2$
8. If  $b_{YX}$  &  $b_{XY}$  are regression coefficients between X on Y and Y on X respectively then
- $\sqrt{(b_{YX} \times b_{XY})} \leq 1$
  - $\sqrt{(b_{YX} \times b_{XY})} \geq 1$
  - $\sqrt{(b_{YX} \times b_{XY})} = -1$
  - $\sqrt{(b_{YX} \times b_{XY})} \leq 1$
9. In a regression equation
- Regression coefficient represents the increment in the value of the independent variable for a unit change in the value of the dependent variable
  - Regression coefficient represents the increment in the value of the dependent variable for a unit change in the value of the independent variable
  - Regression coefficient represents the mean value of the independent variable for a unit change in the value of the dependent variable
  - Regression coefficient represents the mean value of the dependent variable for a unit change in the value of the independent variable
10. If  $r^2 = 0.3$  &  $b_{YX} = -1.5$  then  $b_{XY}$  is equal to
- +1
  - 0.2
  - 1
  - 0.45
11. In a bivariate regression analysis  $\Sigma XY = 1355.25$ ,  $(\Sigma X)(\Sigma Y) = 6396$ ,  $\Sigma X^2 = 591.50$  &  $\Sigma X = 52$ . If there are 5 items then  $b_{YX}$
- 1
  - 0.97
  - 0.667
  - 1.5
12.  $X = 1.36Y - 5.2$  &  $Y = 0.61X + 1.51$  are two regression equations. Correlation coefficient between X & Y is
- 0.67
  - 0.911
  - 0.911
  - 0.67

13. In a bivariate regression analysis comprising of series X & Y, if  $\Sigma (X - \bar{X})^2 = \Sigma (Y - \bar{Y})^2$  then

- (a)  $b_{yx} = b_{xy}$
- (b)  $b_{yx} > b_{xy}$
- (c)  $b_{yx} < b_{xy}$
- (d) Correlation coefficient = 1

14. Match the items in column A with the items in column B

Column A	Column B
(a) Coefficient of correlation	(i) is a functional relationship which shows dependence of one variable on the other
(b) Arithmetic mean of regression coefficients	(ii) is the geometric mean between regression coefficients
(c) Regression Analysis	(iii) is the mean values of the variables X and Y in case of two variables case
(d) Intersection point of lines of regression	(iv) is greater than equal to correlation coefficient

15. In a bivariate regression analysis the difference between actual value of dependent variable and the predicted value of the dependent variable is called

- (a) Outlier
- (b) Slope
- (c) Residual
- (d) Scattered point

16. Consider the following results:

$$N = 12, \Sigma dx = 0, \Sigma dy = 4, \Sigma dx^2 = 1344, \Sigma dy^2 = 215, \Sigma dx dy = -4360$$

Appropriate regression coefficient of y on x is

- (a) -0.821
- (b) 1
- (c) 5.67
- (d) -3.244

17. In a bivariate regression analysis for dependent variable if  $d = \text{Actual value} - \text{Predicted value}$  then at different values of independent variable

- (a) Best fit curve occurs when  $d_1^2 + d_2^2 + \dots + d_n^2$  is minimum
- (b) Best fit curve occurs when  $d_1^2 + d_2^2 + \dots + d_n^2$  is maximum
- (c) Best fit curve occurs when  $d_1^2 + d_2^2 + \dots + d_n^2$  is zero
- (d) Best fit curve occurs when  $d_1^2 + d_2^2 + \dots + d_n^2$  is one

18. Consider the following results:

$$N = 6, \Sigma y = 42, \Sigma y^2 = 318, b_{yx} = 11/34, \Sigma x^2 - (1/n)(\Sigma x)^2 = 34$$

Then  $b_{xy}$  is

- (a)  $11/34$
- (b)  $11/24$
- (c)  $-34/11$
- (d)  $-11/24$

19. In a bivariate analysis if two regression equations are

$$mx - y + 10 = 0 \text{ \& } -2x + 5y = 14.$$

If coefficient of correlation between  $x$  &  $y$  is  $1/\sqrt{10}$ , then value of  $m$  is

- (a) 10
- (b)  $5/2$
- (c) 4
- (d) 1

20. In a bivariate analysis if two regression equations are

$$8x - 10y + 66 = 0 \text{ \& } 40x - 18y - 214 = 0.$$

Then  $\bar{x}, \bar{y}$  the mean of the series  $x$  &  $y$  are respectively

- (a) 13, 17
- (b) 17, 17
- (c)  $5/4, 20/9$
- (d) 8, 18



## MODULE 7 - PROBABILITY

1. Probability theory is often referred to as
  - (a) Science of prediction
  - (b) Science of uncertainty
  - (c) Science of chance
  - (d) Science of decision making
  
2. In general probability is
  - (a) A numerical value between 0 and 1, exclusive, describing the absolute possibility an event will occur
  - (b) A numerical value between 0 and 1, inclusive, describing the absolute possibility an event will occur
  - (c) A numerical value between 0 and 1, exclusive, describing the relative possibility an event will occur
  - (d) A numerical value between 0 and 1, inclusive, describing the relative possibility an event will occur
  
3. The probability of two events A and B are 0.05 and 0.95 respectively. We can infer that
  - (a) Event A is more probable to happen
  - (b) Event B is more improbable to happen
  - (c) Event B is more probable to happen
  - (d) Event A & B are sure to happen
  
4. "Sun will disappear from blue sky today forever". With our available information & belief which one of the following value is most appropriate as probability to this event?
  - (a) 0.2
  - (b) 0.8
  - (c) 1
  - (d) 0
  
5. For an event Odds in favour are "five to two". This means that
  - (a) In a total of seven trials the event will occur five times
  - (b) In a total of seven trials the event will occur two times
  - (c) In a total of five trials the event will occur two times
  - (d) In a total of seven trials the event will not occur five times
  
6. Classical probability is based on the assumption that
  - (a) The outcomes of an experiment are already known
  - (b) The outcomes of an experiment are equally likely
  - (c) The probability of all outcomes in an experiment is always 1
  - (d) None of the above

7. If an experiment has a set of events that includes every possible outcomes, then the set is called
- Mutually Exclusive set
  - Mutually Exhaustive set
  - Collectively Exhaustive set
  - Exhaustive & Exclusive set
8. Classical probability is
- Probability of an event = Number of favourable outcomes / Total number of possible outcomes
  - Probability of an event = Number of favourable outcomes / Total number of trials
  - Probability of an event = Number of possible outcomes / Total number of trials
  - Probability of an event = Number of trials / Number of possible outcomes
9. Addition rule for mutually exclusive events A & B is
- $P(A \text{ or } B) = P(A) + P(B)$
  - $P(A \text{ or } B) = P(A + B)$
  - $P(A \text{ or } B) = P(A) + P(B) - P(AB)$
  - $P(A \text{ or } B) = P(A + B - AB)$
10. If two unbiased coins are tossed once, the probability of getting both the heads is
- 0.25
  - 0.50
  - 0.75
  - 1
11. The probability that a leap year selected at random contains 53 Sundays is
- 0.143
  - 1
  - 0.286
  - 0.48
12. A lot contains 10 items of which 3 are defective. Three items are chosen from the lot at random one after another without replacement. The probability that all the three are defective is
- 0.008
  - 0.992
  - 0.067
  - 0.05
13. If  $P(A) = 0.3$ ,  $P(B) = 0.2$  and  $P(C) = 0.1$ , then assuming A, B and C are independent events, the probability of occurrence of at least one of the three events is
- 0.7
  - 0.8

- (c) 0.006  
(d) 0.496
14. In IPL Kolkata Knight Riders plays 70% of their games at night (8 O'clock slot) and 30% during the day (4 O'clock slot). The team wins 50% of their night games and 90% of their day games. According to today's newspaper they won yesterday. The probability that the game was played at night is  
(a) 0.4667  
(b) 0.5645  
(c) 0.35  
(d) 0.5
15. When two events happen simultaneously which of the following is true?  
(a) The outcome of the first event always have an effect on the outcome of the second event  
(b) The outcome of the first event may or may not have an effect on the outcome of the second event  
(c) The outcome of the first event does not have any effect on the outcome of the second event  
(d) The outcome of the first event have always a 50% effect on the outcome of the second event
16. A survey by Air travelers' association revealed that 60% of its members made airline reservations last year. Two members are selected at random. The probability that both the members made airline reservations last year is  
(a) 0.60  
(b) 0.40  
(c) 0.36  
(d) 0.16
17. If an unbiased coin is tossed once, then the two events head and tail are  
(a) Mutually exclusive  
(b) Exhaustive  
(c) Equally likely  
(d) All these
18. Sum of probability of an event A and its complement is \_\_\_  
(a) 1  
(b) 0  
(c)  $1/2$   
(d)  $-(1/2)$
19. If  $p : q$  are the odds in favour of an event, then the probability of that event is  
(a)  $p/q$   
(b)  $p/(p + q)$   
(c)  $q/(p + q)$   
(d) None of these

20. A bag contains 30 balls numbered from 1 to 30. One ball is drawn at random. The probability that the number of the drawn ball will be multiple of 3 or 7 is
- (a)  $7/15$
  - (b)  $13/30$
  - (c)  $1/2$
  - (d) None of these
21. Three coins are tossed together. The probability of getting exactly two heads is
- (a)  $5/8$
  - (b)  $3/8$
  - (c)  $1/8$
  - (d) None
22. Two dice are thrown together. The probability of the event that the sum of numbers shown is greater than 5 is
- (a)  $13/18$
  - (b)  $15/18$
  - (c) 1
  - (d) None
23. Probability of throwing an even number with an ordinary six faced die is
- (a)  $1/2$
  - (b) 1
  - (c) 0
  - (d)  $-1/2$
24. 4 coins are tossed. The probability that there are 2 heads is
- (a)  $1/2$
  - (b)  $3/8$
  - (c)  $1/8$
  - (d) None of these
25. A bag contains 10 red and 10 green balls. A ball is drawn from it. The probability that it will be green is
- (a)  $1/10$
  - (b)  $1/3$
  - (c)  $1/2$
  - (d) None of these

**MODULE 8 - INDEX NUMBERS AND TIME SERIES**

1. By using arithmetic mean method the index number from the following data is

Commodity	Base price	Current price	Weight
Rice	30	52	8
Wheat	25	30	6
Fish	130	150	3
Potato	35	49	5
Oil	70	105	7

- (a) 144.92
- (b) 202.34
- (c) 161.87
- (d) 115.22

2. From the data given below the wholesale price index number for the year 1 taking year 0 as base using simple arithmetic average of relatives method is

Commodity	Price year 0	Price year 1
A	80	120
B	120	150
C	40	80
D	100	150
E	200	240

- (a) 180
- (b) 112
- (c) 134
- (d) 149

3. Consider the following:

Year	1	2	3	4	5	6	7	8
Annual Sales (₹ '0000)	3.6	4.3	4.3	3.4	4.4	5.4	3.4	2.4

5 year moving average against year 4 is

- (a) 3.80
- (b) 4.00
- (c) 4.36
- (d) 4.18

4. Consider the following:

Year	1	2	3	4	5	6	7	8
Annual Sales (₹ '0000)	3.6	4.3	4.3	3.4	4.4	5.4	3.4	2.4

4 year centered moving average against year 6 is

- (a) 4.00
- (b) 4.24
- (c) 4.26
- (d) 4.025

5. Consider the following table:

Item	Year 1 Unit Price	Year 1 Quantity	Year 2 Unit Price	Year 2 Quantity
I	1	16	3	15
II	3	15	8	20
III	5	18	10	21

Paasche's price index of year 2 with respect to year 1 is

- (a) 189.13
- (b) 230.56
- (c) 245.12
- (d) 256.78

6. Fisher's ideal index for prices from the following data is

Item	Base Year Unit Price	Base Year Quantity	Current Year Unit Price	Current Year Quantity
A	8	6	12	5
B	10	5	11	6
C	15	8	10	5

- (a) 97.72
- (b) 80.15
- (c) 95.67
- (d) 89.14

7. Consider the following series of observation.

Year	1	2	3	4	5	6	7	8	9	10	11
Sales (₹)	2	6	1	5	3	7	2	6	4	8	3

4 year centered moving average against year 6 is

- (a) 5.125
- (b) 3.875
- (c) 3.625
- (d) 4.375

8. Consider the following series of observation.

Year	1	2	3	4	5	6	7	8	9	10	11
Sales (₹)	2	6	1	5	3	7	2	6	4	8	3

5 year weighted moving average with weights 1, 2, 2, 2, 1 against year 6 is

- (a) 5.125
- (b) 3.875
- (c) 3.625
- (d) 4.375

9. Consider the following series of observation.

Year	1	2	3	4	5	6	7	8	9	10	11
Sales (₹)	2	6	1	5	3	7	2	6	4	8	3

5 year moving average against year 6 is

- (a) 3.6
- (b) 4.6
- (c) 4.4
- (d) 5.4

10. Consider the following:

Commodity	Base Price (₹)	Current Price (₹)	Weight
A	22	40	8
B	15	15	6
C	80	90	7
D	110	130	3
E	25	30	5

Weighted aggregative index number is

- (a) 123.34
- (b) 156.11
- (c) 176.52
- (d) 142.89

11. Consider the following:

Commodity	Base Price (₹)	Current Price (₹)	Weight
A	22	40	8
B	15	15	6
C	80	90	7
D	110	130	3
E	25	30	5

Weighted A.M of price relative index number is

- (a) 123.34
- (b) 128.79
- (c) 130.92
- (d) 182.13

12. From the following find the Fisher's Quantity index

Item	Base Year Unit Price ( $P_0$ )	Base Year Quantity ( $Q_0$ )	Current Year Unit Price ( $P_1$ )	Current Year Quantity ( $Q_1$ )
A	8	6	12	5
B	10	5	11	6
C	17	8	8	5

- (a) 32.76
- (b) 72.34
- (c) 82.89
- (d) 12.74

13. From the following find the Simple average (AM) of Relative Quantity index

Item	Base Year Quantity	Current Year Quantity
A	8	12
B	10	11
C	15	10

- (a) 111.45
- (b) 108.89
- (c) 32.45
- (d) 115.46

14. From the following find the Simple average (GM) of Relative Quantity index

Item	Base Year Quantity	Current Year Quantity
A	8	12
B	10	11

Item	Base Year Quantity	Current Year Quantity
C	15	10

- (a) 100.23
- (b) 111.45
- (c) 190.15
- (d) 103.23

15. From the following data the five year moving average against year 5

Year	1	2	3	4	5	6	7	8	9
Sales (₹)	36	43	43	34	44	54	34	24	14

- (a) 40
- (b) 43.6
- (c) 34
- (d) 41.8

16. From the following data the four year centered moving average against year 6

Year	1	2	3	4	5	6	7	8	9
Sales (₹)	36	43	43	34	44	54	34	24	14

- (a) 40.25
- (b) 40.625
- (c) 35.25
- (d) 40

17. From the following series find out a three year moving average against year 4 is

Year	1	2	3	4	5	6	7
Values	12	14	15	17	18	20	23

- (a) 20.33
- (b) 18.33
- (c) 16.67
- (d) 15.33

18. From the following series find out a three year weighted moving average against year 4 with weights 1, 4, 1 is

Year	1	2	3	4	5	6	7
Values	12	14	15	17	18	20	23

- (a) 20.17
- (b) 16.83

(c) 18.17

(d) 15.17

19. Consider the following table:

Commodity	Weights	Base price p.u. (₹)	Current price p.u. (₹)
A	40	16	30
B	25	40	70
C	5	0.5	1.5
D	20	5.12	7.25
E	10	2	2.5

Weighted A.M price relative index is

(a) 146.98

(b) 174.57

(c) 124.33

(d) 156.01

20. From the following four year centered moving average against year 4 is

Year	1	2	3	4	5	6	7
Import (₹ m)	229	231	206	191	195	184	193

(a) 190.671

(b) 199.875

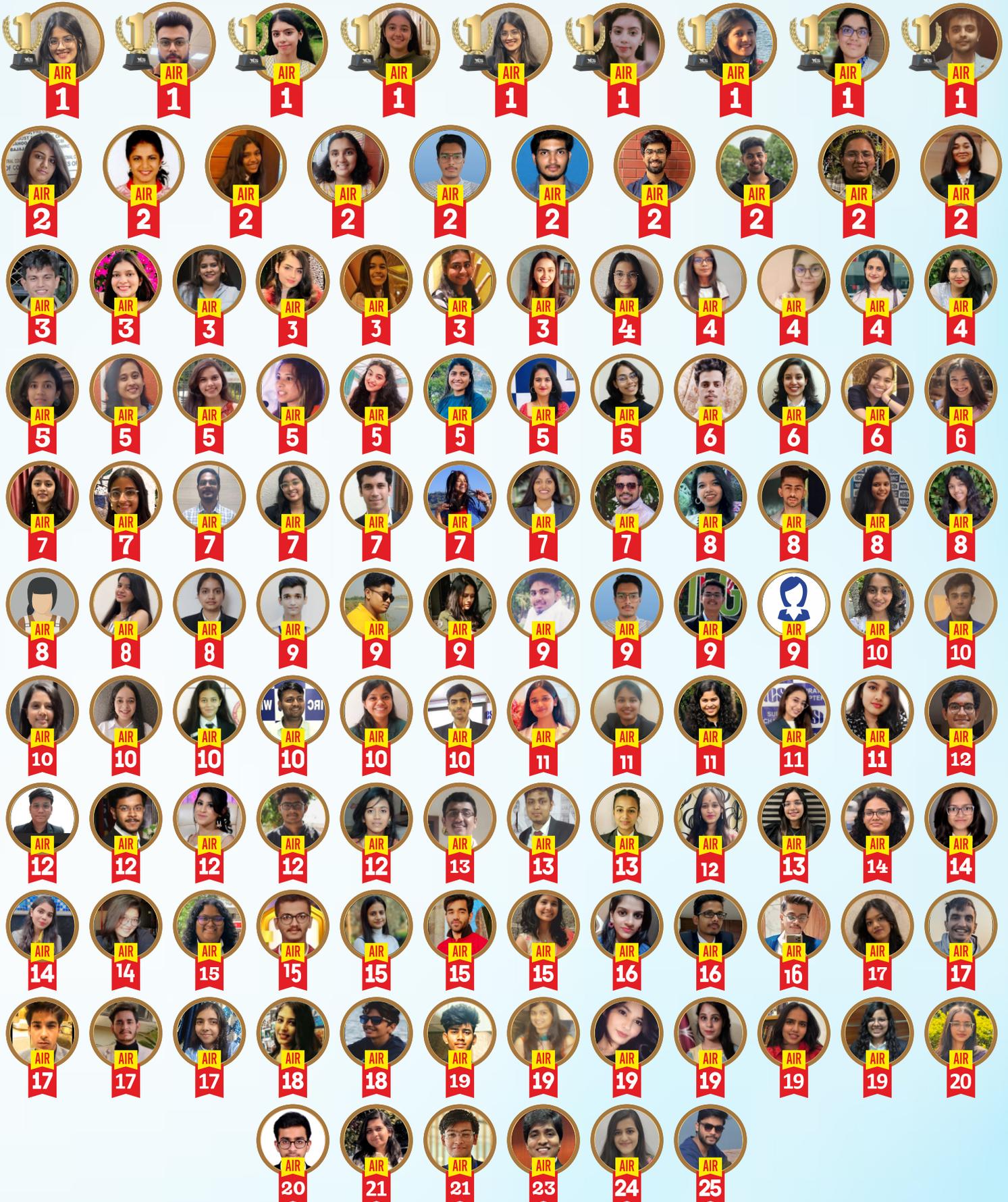
(c) 192.375

(d) 210



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Vaibhav Chitlangia is a law graduate from ILS Law College, Pune, and a Company Secretary with All India Ranks at all three levels of the program. He secured All India Rank 15 in the Foundation Programme (June 2016), All India Rank 22 in the Executive Programme (June 2017), and All India Rank 4 in the Professional Programme (June 2018). In addition, he holds an LLM degree with specialization in Corporate Laws, a Diploma in Cyber Laws, and a Post Graduate Diploma in Medical Law and Ethics.

Known for his intellectual brilliance and tireless work ethic, Vaibhav ensures the success of his students by providing them with the best learning experience possible. His teaching style is engaging and student-centric. Vaibhav is known for making complex concepts easy to understand, using real-world examples and practical scenarios to bridge the gap between theory and practice. His method includes breaking down difficult topics into bite-sized chunks, allowing you to grasp each concept thoroughly before moving on to the next. This approach not only boosts your confidence but also helps you apply what you've learned effectively.

Vaibhav has also gained invaluable experience working with AZB & Partners, one of India's leading law firms. abroad. Since 2018, he has been guiding CA, CS, and Law students and has taught students across the country.

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