



**UNIT1: RATIO, PROPORATION AND PERCENTAGE**

**Multiple Choice Questions**

1. In a library, the ratio of number of story books to that of non-story books was 4:3 and total number of story books was 1248. When some more story books were bought, the ratio became 5:3. Find the number of story books bought.

- a. 312
- b. 321
- c. 936
- d. 1560

2. The ratio of the present age of father to that of son is 7:2. After 10 years their ages will be in the ratio of 9:4. The present ages of the father is

- a. 35 years
- b. 40 years
- c. 30 years
- d. 25 years

3. Rs. 8400 is divided among A, B, C and D in such a way that the shares of A and B, B and C, and C and D are in the ratios of 2:3, 4:5 and 6:7 respectively. The share of A is

- a. Rs. 1280
- b. Rs. 8400
- c. Rs. 8210
- d. Rs. 1320

4. In a library, the ratio of number of story books to that of non-story books was 4:3 and total number of story books was 1248. When some more story books were bought, the ratio became 5:3. Find the number of story books bought.

- a. 312
- b. 321
- c. 936
- d. 1560

5. Ajay and Raj together have Rs. 1050. On taking Rs. 150 from Ajay, Ajay will have same amount as what Raj had earlier. Find the ratio of amounts with Ajay and Raj initially.

- a. 3:4
- b. 7:1
- c. 1:3
- d. 4:3



6. Price of each article of type P, Q, and R is Rs. 300, Rs. 180 and Rs. 120 respectively. Suresh buys articles of each type in the ratio 3:2:3 in Rs. 6480. How many articles of type Q did he purchase?

- a. 8
- b. 14
- c. 20
- d. None of the above

7. The ratio of market prices of wheat and paddy is 2:3 and the ratio of quantities consumed in a family is 5:4. Find the ratio of expenditure of wheat and paddy.

- a. 6:5
- b. 5:6
- c. 1:1
- d. 8:15

8 The ratio of numbers of girls and boys participating in sports of a school is 4:5. If the number of girls is 212, determine the number of boys participating in the sports.

- a. 256
- b. 265
- c. 251
- d. 263

9. The three numbers are in the ratio  $1/2 : 2/3 : 3/4$ . The difference between greatest and smallest numbers is 36. Find the numbers.

- a. 72, 84, 108
- b. 60, 72, 96
- c. 72, 84, 96
- d. 72, 96, 108

10 If  $A:B = 2:3$ ,  $B:C = 4:5$  and  $C:D = 6:7$ , then  $A:B:C:D$  is

- a. 18:24:30:35
- b. 16:24:30:35
- c. 16:22:30:35
- d. 16:24:15:35

11. If  $a:b = 5:7$  and  $c:d = 2a:3b$ , then  $ac : bd$  is

- a. 20:38
- b. 50:147
- c. 10:21
- d. 50:151



12. If  $x:y = 3:4$ , then  $(7x+3y):(7x-3y)$  is equal to

- a. 5:2
- b. 4:3
- c. 11:3
- d. 37:19

13. The product of two positive numbers is 4752 and their ratio is 11:12. The smaller of these numbers is

- a. 72
- b. 60
- c. 66
- d. 75

14. Two numbers are in ratio 2:3. If 2 be subtracted from the first and 2 be added to the second, the ratio becomes 1:2. Find the sum of the numbers.

- a. 30
- b. 28
- c. 24
- d. 10

15. How to divide 3395 in ratio of 42 : 32 : 23?

- a. 1470, 1120 and 805
- b. 1550, 1235 and 610
- c. 1245, 1150 and 1000
- d. 1764, 1022 and 529

16.  $a:b = 3:7$  and  $b:c = 9:5$ . What is  $a:b:c$ ?

- a. 3:15:5
- b. 21:16:45
- c. 3:7:5
- d. 27: 63:35

17. Income ratio of Ramesh and Suresh is 5:6. Their spending ratio is 7:9. Ramesh saves 4000 and Suresh saves 3000. Income and spending respectively of Ramesh and Suresh are

- a. Ramesh - 25000, 21000; Suresh – 30000, 27000
- b. Ramesh - 36000, 32000; Suresh – 30000, 27000
- c. Ramesh - 30000, 27000; Suresh – 36000, 32000
- d. None of the above



18.  $10/13 = 11/28 = 21/11 = 12/11 = K$ . What is K?

- a.  $6/7$
- b.  $12/13$
- c.  $10/11$
- d.  $59/63$

19. Find the mean proportional between 7 and 63?

- a. 35
- b. 21
- c. 27
- d. 30

20. Find A:B:C:D when A:B = 2:3 ; B:C = 7:9 ; C:D = 5:7

- a. 70 : 105 : 135 : 189
- b. 105 : 115 : 236 : 189
- c. 70 : 124 : 155 : 201
- d. 12 : 78 : 256 : 189

21. What is 4<sup>th</sup> proportional in 9, 13 and 153?

- a. 251
- b. 181
- c. 175
- d. 221

22. Ratio of two numbers is 3:8. On adding 5 to both numbers, the ratio becomes 2:5. Which is the smaller number out of the two?

- a. 64
- b. 120
- c. 45
- d. 105

23. The 3<sup>rd</sup> proportional to 18 and 54 is?

- a. 144
- b. 72
- c. 162
- d. 972

24. 285 is summation of 3 numbers. Ratio between 2<sup>nd</sup> and 3<sup>rd</sup> numbers is 6:5. Ratio between 1<sup>st</sup> and 2<sup>nd</sup> numbers is 3:7. The 3<sup>rd</sup> number is?

- a. 135
- b. 150
- c. 124
- d. 105



25 Which of the following two ratios is greater 17:18 and 10:11?

- a. 17/18
- b. 10/11
- c. Both are same
- d. Cannot determine

26 Two numbers are in the ratio of 6 : 8. If 10 is subtracted from each, the new numbers are in the ratio 16 : 32. Find the smaller number.

- a. 22
- b. 12
- c. 38
- d. 15

27. It was intended that Rs. 585 be divided among P, Q and R in the ratio of 4 : 3 : 2, but by mistake the distribution was made in the proportion of  $1/4 : 1/3 : 1/2$ . How much does 'R' gain by the error?

- a. Rs. 99
- b. Rs. 126
- c. Rs. 140
- d. Rs. 152
- e. None of these

28.  $a : b :: 3 : 5$ ,  $b : c :: 4 : 3$  and  $c : d :: 4 : 5$ ,  $a : d = ?$

- a. 4 : 5
- b. 16 : 25
- c. 64 : 25
- d. 64 : 125
- e. 16 : 125

29. By giving Rs. 50 to M, A would have the amount equal to what M had earlier. If the sum of the amounts with A and M is Rs. 650. What is the ratio of the amount with A to that with M earlier?

- a. 7 : 4
- b. 5 : 3
- c. 2 : 1
- d. 7 : 6



30. By giving Rs. 50 to M, A would have the amount equal to what M had earlier. If the sum of the amounts with A and M is Rs. 650. What is the ratio of the amount with A to that with M earlier?

- a. 7 : 4
- b. 5 : 3
- c. 2 : 1
- d. 7 : 6
- e. 2 : 3

31. What will be the fraction of 20%

- a.  $\frac{1}{4}$
- b.  $\frac{1}{5}$
- c.  $\frac{1}{10}$
- d. None of above

32. What will be the fraction of 4%

- a.  $\frac{1}{20}$
- b.  $\frac{1}{5}$
- c.  $\frac{1}{75}$
- d.  $\frac{1}{25}$

33. The ratio 5:20 expressed as percent equals to

- a. 50 %
- b. 125 %
- c. 25 %
- d. None of above

34. 2.09 can be expressed in terms of percentage as

- a. 2.09%
- b. 20.9%
- c. 209%
- d. 0.209%

35. Half of 1 percent written as decimal is

- a. 5
- b. 0.5
- c. 0.05



d. 0.005

36. What is 15 percent of 34

- a. 5.10
- b. 4.10
- c. 3.10
- d. 2.10

37. A's salary is 50% more than B's. How much percent is B's salary less than A's?

- a.  $33\frac{1}{4}\%$
- b.  $33\frac{1}{3}\%$
- c.  $33\frac{1}{2}\%$
- d. 33%

38. The price of cooking oil has increased by 25%. By what percent should a family reduce the consumption of cooking oil so as not to increase the expenditure in this account?

- a. 20%
- b. 25%
- c. 18%
- d. 16%

39. Ramesh's salary was reduced by 10% and then the reduced salary was increased by 10%. What was his ultimate loss?

- a. 0%
- b. 10%
- c. 1%
- d. 5%

40. 5% of 5% of Rs. 100 is

- a. Rs. 0.25
- b. Rs. 0.50
- c. Rs. 10
- d. Rs. 25

ANSWER KEY

1a	2a	3a	4a	5d	6a	7b	8b	9a	10b
11b	12c	13c	14a	15a	16d	17a	18a	19b	20a
21d	22c	23c	24d	25a	26d	27c	28b	29d	30d
31b	32d	33c	34c	35d	36a	37b	38a	39c	40a



## UNIT2: PROFIT AND LOSS

### Multiple Choice Questions

1. person sold a stove for Rs. 423 and incurred a loss of 6%. At what price would it be sold so as to earn a profit of 8%?
  - a. Rs. 525
  - b. Rs. 500
  - c. Rs. 490
  - d. Rs. 486
2. A fruit seller buys lemons at 2 for a rupee and sells then at 5 for three rupees. His gain percent is
  - a. 10%
  - b. 15%
  - c. 20%
  - d. 25%
3. A sells a car to B at 10% loss. If B sells it for Rs. 54000 and gains 20%, the cost price of the car for A was
  - a. Rs. 25000
  - b. Rs. 50000
  - c. Rs. 37500
  - d. Rs. 60000
4. Ramesh sold a statue for a price 25% higher than the original price of the statue. He had however bought the statue at 20% discount on the original price. With the profit of Rs. 2025, find the original price of the statue.
  - a. Rs. 6000
  - b. Rs. 7500
  - c. Rs. 3500
  - d. Rs. 4500
5. If selling price of 40 articles is equal to cost price of 50 articles, the loss or gain percent is
  - a. 25% loss
  - b. 20% loss
  - c. 25% gain
  - d. 20% gain





6. Two bicycles were sold for Rs. 3990 each, gaining 5% on one and losing 5% on the other. The gain or loss percent on the whole transaction is

- a. Neither gain nor loss
- b. 2.5% gain
- c. 2.5% loss
- d. 0.25% loss

7. The ratio of cost price and selling price is 4:5. The profit percent is

- a. 10%
- b. 20%
- c. 25%
- d. 30%

8. If a person sells a 'sari' for Rs. 5200, making a profit of 30%, then the cost price of the sari is

- a. Rs. 4420
- b. Rs. 4000
- c. Rs. 3900
- d. Rs. 3800

9. A shopkeeper earns a profit of 15% after selling a book at 20% discount on the printed price. The ratio of the cost price and printed price of the book is?

- a. 20:23
- b. 23:20
- c. 16:23
- d. 23:16

10. Simran bought pet food worth Rs. 56000. She then sold  $\frac{1}{3}$ rd of it incurring a loss of 40%. What profit she must earn on rest of the supplies to nullify this loss?

- a. 25%
- b. 20%
- c. 45%
- d. 50%

11. Ramesh gets a profit of 20% in one trade and suffers a loss of 20% in the second when he sells 2 cycles for Rs. 4000 each. What is his profit or loss in the entire trade?

- a. Loss = 4%
- b. Loss = 16%
- c. Profit = 16%
- d. Profit = 4%



12. Suman buys 160 chocolates for Rs. 480. She wanted to earn 30% profit by selling them. But Rakesh visited her and she gave him 25% of those chocolates at the cost price itself. But even after doing this, she earned a profit of 30% as decided. For how much did she sell each chocolate?

- a. Rs. 3.8
- b. Rs. 4.2
- c. Rs. 6
- d. Rs. 3

13. Guddi buys some oranges in a shop at 4 per rupee. She goes to other shop and buys same number of oranges at 5 per rupee. She then combines them in a basket and sells them at 4 per rupee. Will she get a profit or loss? And how much?

- a. Profit =  $100/9$  %
- b. Loss =  $100/9$  %
- c. Profit =  $116/9$  %
- d. Loss =  $116/9$  %

14. Chaman sells 40 fans at 10% profit. He wants a total of 20% profit on the entire sale. Since he got 160 fans at rate of Rs. 100 each, at what profit must he sell the remaining fans?

- a. 70/3%
- b. 160/58%
- c. 30%
- d. 100/3%

15. Uma wants to gain 15% profit on her sale of sugar. She buys 120 kg of sugar at Rs. 24 per kg to mix with 180 kg of sugar bought at Rs. 28 per kg. She sells the sugar mix at ....

- a. Rs. 8159
- b. Rs. 9108
- c. Rs. 9756
- d. Rs. 8564

16. Rohit got profit of  $11\frac{1}{2}$ % by selling his old car. However he realized that had he sold it for Rs. 8100 more, his profit would be 38.5%. At what price did he buy the car?

- a. Rs. 44500
- b. Rs. 55000
- c. Rs. 41000
- d. Rs. 30000



17. Rambabu sells paper planes at the rate of 20 planes for Re. 1. If he gets profit of 20%, how many planes did he buy in 1 rupee?

- a. 16
- b. 40
- c. 24
- d. 36

18. A cheater manipulated his weighing machine so that it shows 1kg for 970 grams. How much profit does he get?

- a.  $397/100\%$
- b. 0.3 %
- c. 0.03%
- d.  $300/97\%$

19. Ajay incurred loss of 20% by selling a vase for Rs. 2880. To get a profit of 20% at what price should he sell the vase?

- a. Rs. 4320
- b. Rs. 5760
- c. Rs. 1440
- d. Rs. 3500

20. A sold a car to B at a profit of 25%. B incurred loss of 15% while selling the same car to C. A spent Rs. 50000 for this car. At what price did C buy it?

- a. Rs. 62500
- b. Rs. 60000
- c. Rs. 53125
- d. Rs. 90000

21. What will be selling price, if cost price is Rs. 120 and gain is 35%?

- a. Rs. 135
- b. Rs. 85
- c. Rs. 155
- d. Rs. 162

22. A and B enter into a partnership with respective capitals of Rs. 20,000 and Rs. 40,000. At the end of the year, the total profit is Rs. 33,000. If A receives Rs. 15,000 as both his salary and profit, then what is his salary?

- a. Rs. 2000
- b. Rs. 4000
- c. Rs. 3500
- d. Rs. 3000



23. An article costs Rs. 600. What should be the marked price of an article so that after 10% discount, the trader makes 20% profit?

- a. Rs. 800
- b. Rs. 950
- c. Rs. 1100
- d. Rs. 1040

24. A man buys 50 pens at marked price of 46 pens from a whole seller. If he sells these pens giving a discount of 1% , what is the profit percent?

- a. 5.3 %
- b. 7.6 %
- c. 10.6 %
- d. 12 %

25. P sells an article to Q at 10 % profit. Q sells it to R at 25 % profit. If R pays Rs. 250 for it, What did P pay for it ?

- a. Rs. 225
- b. Rs. 198..50
- c. Rs. 181.81
- d. Rs. 162.30
- e. None of these

26. Sagar purchased 10 kg of rice at the rate of Rs. 15 per kg and 25 kg of rice at the rate Rs. 14 per kg. He mixed the two and sold the mixture. Approximately at what rate per kg should he sell the mixture to make 40 % profit in the transaction?

- a. Rs. 20.00
- b. Rs. 19.50
- c. Rs. 15
- d. Rs. 17.5

27. A trader has 200 kg of sugar, out of which he sells some with 10% profit and the rest with 25% profit. He gains 15% on the whole. Find the quantity of sugar sold at 25% profit?

- a. 120 kg
- b. 96.5 kg
- c. 84 kg
- d. 67 kg
- e. None of these



28. Anil purchased 30 kg of wheat at the rate of Rs. 22 per kg and 20 kg of wheat at the rate of Rs. 24 per kg. He mixed the two. Approximately at what rate per kg should he sell the mixture to make 25% profit?

- a. Rs. 25
- b. Rs. 28
- c. Rs. 30
- d. Rs. 32.5

29. At what price should the Karan mark a sewing machine that costs him Rs. 1200/- so that even after offering a 20% discount, he makes 25% profit?

- a. Rs. 2,025/-
- b. Rs.1,900/-
- c. Rs. 1,675/-
- d. Rs. 1,875/-
- e. None of these

30. Virat buys an old car for Rs. 50000 and spends Rs. 4000 on its repairs. If he sells the scooter for Rs. 60000, his gain percent is:

- a. 3 (4/7)
- b. 11 (1/9) %
- c. 12 (2/3) %
- d. 12%

31. P, Q, R subscribe Rs. 50,000 for a business. P subscribes Rs. 4000 more than Q and Q Rs. 5000 more than R. Out of a total profit of Rs. 25,000, what will be P's share?

- a. Rs. 8400
- b. Rs. 10,500
- c. Rs. 13,600
- d. Rs. 14,700

32. A trader purchases several articles at the rate of 13 for Rs. 10 and sells them at the rate of 10 for Rs. 13. What is his gain/loss?

- a. 69 % gain
- b. 56.25 % gain
- c. 56.25 % loss
- d. 25 % loss
- e. None of these

33. A boy pays Rs. 369 for an article marked at Rs. 600, by enjoying two successive discounts. If the first discount is of 25%, how much should be the second discount?



- a. 20 %
- b. 10 %
- c. 25 %
- d. 18 %
- e. None of these

34. By purchasing an article at 20 % discount on the original price and then selling it at a price of 25% above the original price, a trader earns Rs. 200 as the profit. What was the original price of the article?

- a. Rs. 444.44
- b. Rs. 255.50
- c. Rs. 100.10
- d. Rs. 810
- e. None of these

35. A boy incurs 5% loss by selling a book for Rs. 1000. At what price should the book be sold to earn 5 % profit?

- a. Rs. 1105.26
- b. Rs. 1251.50
- c. Rs. 1085.13
- d. Rs. 1885.13

36. Find the resultant profit if A sells a cupboard at a profit of 6% to B and B sells the same to C at a profit of 9%.

- a. 15%
- b. 16%
- c. 14.5%
- d. 15.54%

37. If Harsh sold a match ticket for Rs.340 at a profit of 25%, at what price did he purchased the ticket?

- a. 280
- b. 255
- c. 300
- d. 272

38. Eleven bags are bought for Rs.1000 and sold at 10 for Rs.1100. What is the gain or loss in percentage?

- a. 10%
- b. 21%
- c. 25%
- d. 20%



39. Vijay sells a cupboard at 14% below cost price. Had he got Rs.2086 more, he would have made a profit of 14%. What is the cost price of the cupboard?

- a. 7450
- b. 14900
- c. 7400
- d. 7500

40. If selling price of 12 pens is equal to the cost price of 18 pens, find the profit percent.

- a. 40%
- b. 33.3%
- c. 50%
- d. 25%

**ANSWER KEY**

1d	2c	3d	4b	5a	6d	7c	8b	9c	10b
11a	12b	13c	14b	15a	16d	17c	18d	19a	20c
21d	22b	23a	24b	25c	26a	27d	28b	29d	30a
31b	32a	33d	34a	35a	36d	37d	38b	39a	40c





### UNIT3: INTEREST

#### Multiple Choice Questions

1. Sam borrowed some money from his friend at simple interest of 6% per annum. He returned his friend Rs. 15600. After how much time did Sam return the money if he borrowed Rs. 12000?
  - a. 8 years
  - b. 2.5 years
  - c. 5 years
  - d. 3.5 years
2. Kabir paid Rs. 9600 as interest on a loan he took 5 years ago at 16% rate of simple interest. What was the amount he took as loan?
  - a. Rs. 16400
  - b. Rs. 12000
  - c. Rs. 12500
  - d. Rs. 18000
3. Suresh for 2 years invested Rs. 500 in SBI. He also invested Rs. 300 in ICICI for 4 years. At the end he received Rs. 220 from both banks as simple interest. What must have been rate of interest?
  - a. 10%
  - b. 12%
  - c. 11%
  - d. 5.5%
4. Raman paid Rs. 11400 as interest after 9 years. He had borrowed some money at rate of 6% for first two years, 9% for next three years and 14% for rest of the period. How much money did he borrow?
  - a. Rs. 10000
  - b. Rs. 15000
  - c. Rs. 12000
  - d. Rs. 12500
5. Ram gets Rs. 2600 for Rs. 2000 in 5 years at some rate of simple interest. Had he invested in other places where rate of simple interest is 3% more than current rate, how much would have Ram got in same time?
  - a. Rs. 2900
  - b. Rs. 3000
  - c. Rs. 3100
  - d. Rs. 2800





6. Guddi invested some money in a bank at rate of 6% per annum. At simple interest, after 9 years, she got Rs. 8470. How much did she invest?

- a. Rs. 5250
- b. Rs. 6550
- c. Rs. 6400
- d. Rs. 5500

7. Aman got a salary of Rs. 8600. The salary was invested by him in two parts. Find the difference between the two parts of his salary, if in first part he got some simple interest at 15% per annum in 4 years, which was same as the second part which he invested at 20% for 3 years.

- a. Rs. 0
- b. Rs. 2400
- c. Rs. 100
- d. Rs. 4500

8. Aman invests Rs. 8000 at some rate of interest. Being simple interest the money doubles in 5 years. Raj sees this and invests Rs. 6250 for 3 years at same rate of interest. How much interest does Raj get?

- a. Rs. 3750
- b. Rs. 6250
- c. Rs. 3125
- d. Rs. 4250

9. If simple interest for 2 years for a sum is Rs. 600 and compound interest for the same sum for 2 years and same rate of interest is Rs. 645, what will be the rate of interest?

- a. 10%
- b. 15%
- c. 30%
- d. 5%

10. In 4 years the simple interest on certain sum of money is  $\frac{9}{25}$  of the principal. The annual rate of interest is

- a. 4%
- b.  $4\frac{1}{2}\%$
- c. 9%
- d. 10%

11. If simple interest on a certain sum for 15 months at  $7\frac{1}{2}\%$  per annum exceeds the simple interest on the same sum for 8 months at  $12\frac{1}{2}\%$  per annum by Rs. 32.50, then the sum (in Rs.) is

- a. 312
- b. 312.50



- c. 3120
- d. 3120.50

12. A sum becomes Rs. 3000 at the rate of 12% per annum (simple interest). The same sum becomes Rs. 3300 at the rate of 15% per annum (simple interest) in the same duration. Find the sum and the duration.

- a. Rs. 2000 and 20 years
- b. Rs. 1900 and 8.25 years
- c. Rs. 1500 and 7 years
- d. Rs. 1800 and 5.5 years

13. An amount becomes 7 times in 15 years. In how many years will the same amount become 10 times? The rate of interest remains the same for both cases.

- a. 20 years
- b. 18.75 years
- c. 22.50 years
- d. 21.50 years

14. In 40 years an amount becomes 6 times the original amount. What is the rate of interest?

- a. 12.5%
- b. 24%
- c. 6.67%
- d. 34%

15. A TV can be bought for Rs. 20000 cash or by paying in four equal monthly installments with an initial down payment of Rs. 4000. If the rate of interest for this facility is 8% per annum, then what would be the installment charged for each month?

- a. Rs. 4000
- b. Rs. 4106.67
- c. Rs. 4050.33
- d. Rs. 4066.01

16. How much should be the annual installment to completely pay off a debt of Rs. 1078 in 6 years at 9% per annum rate of interest?

- a. Rs. 146.35
- b. Rs. 156.25
- c. Rs. 126.55
- d. Rs. 118.35

17. An amount of Rs. 6500, at simple quarterly interest of 8%, will yield how much in 2 and half years?

- a. Rs. 6300
- b. Rs. 7050
- c. Rs. 6600



d. Rs. 7800

18. Rs. 20400 was divided in two parts and then invested. One part invested at 6.25% for 8 years yields the same interest as the other part invested at 7% for 5 years. What is the value of smaller part?

- a. 9600
- b. 8400
- c. 10100
- d. 6500

19.  $\frac{1}{5}$  part of an amount was given at 3% simple interest,  $\frac{1}{3}$  part was given at 5% simple interest,  $\frac{2}{5}$  parts at 9% simple interest and remaining part at 11% simple interest. The total interest received was Rs.297. How much amount was originally given?

- a. 4500
- b. 5500
- c. 3950
- d. 4200

20. A man got Rs. 130 less, as simple interest, when he invested Rs. 2000 for 4 years as compared to investing Rs. 2250 for same duration. What is the rate of interest?

- a. 12%
- b. 13%
- c. 12.5%
- d. 10.50%

21. Find the principal which yields a simple interest of Rs. 20 and compound interest of Rs. 21 in two years, at the same percent rate per annum?

- a. Rs. 520
- b. Rs. 480
- c. Rs. 420
- d. Rs. 200

22. A sum of Rs. 4000 amounts to Rs. 4600 in 5 years at a certain rate of simple interest. What would be the amount, if the rate of interest is increased by 3 %.

- a. Rs. 4900
- b. Rs. 5000
- c. Rs. 5200
- d. Rs. 5600
- e. None of these



23. Akhil borrowed a certain sum of money at the rate of 6%, 9% and 14% for a period of first two years, next three years and beyond the period of five years respectively. If at the end of nine years, he paid Rs. 8550 as interest, then find the sum of money he had borrowed.

- a. Rs. 9,000
- b. Rs. 14,000
- c. Rs. 15,000
- d. Rs. 18,000
- e. None of these

24. Karan borrowed a certain amount at 6% per annum simple interest for 9 years. After 9 years, he returned Rs. 8110/-. Find out the amount that he borrowed.

- a. Rs. 4,900
- b. Rs. 5,000
- c. Rs. 5,100
- d. Rs. 5266
- e. None of these

25. In how many years, Rs. 200 will produce the same interest @ 5% as Rs. 900 produce in 2 years @  $3\frac{1}{2}\%$ ?

- a. 6.3 years
- b. 8.2 years
- c. 9 years
- d. 12 years

26. A certain sum earns simple interest of Rs. 800 in 2 years at a certain rate of interest. If the same sum earns compound interest of Rs. 845 in the same period of 2 years, What must be the rate of interest?

- a. 5% p.a.
- b. 7.5% p.a.
- c. 10% p.a.
- d. 12.5% p.a.

27. Find the simple interest on Rs. 78000 at  $15\frac{2}{5}\%$  per annum for 9 months.

- a. Rs. 7804
- b. Rs. 8979
- c. Rs. 8046
- d. Rs. 9009



28. Simple interest at  $x\%$  for  $x$  years will come out to be Rs  $x$  on a sum of Rs?

- a.  $x$
- b.  $100/x$
- c.  $100/x^2$
- d.  $100x$

29. What is the minimum number of years upon which SI on Rs 2600 at 6.67% interest rate will be in whole number?

- a. 2
- b. 6
- c. 3
- d. 4

30. What time will be taken by an amount of Rs. 900 to yield Rs. 81 as interest at 4.5% per annum of simple interest?

- a. 2 years
- b. 1 years
- c. 3 years
- d. 4 years

**ANSWER KEY**

<b>1c</b>	<b>2b</b>	<b>3a</b>	<b>4c</b>	<b>5a</b>	<b>6d</b>	<b>7a</b>	<b>8a</b>	<b>9b</b>	<b>10c</b>
<b>11c</b>	<b>12d</b>	<b>13c</b>	<b>14a</b>	<b>15d</b>	<b>16a</b>	<b>17d</b>	<b>18b</b>	<b>19a</b>	<b>20b</b>
<b>21d</b>	<b>22c</b>	<b>23a</b>	<b>24d</b>	<b>25a</b>	<b>26a</b>	<b>27d</b>	<b>28b</b>	<b>29c</b>	<b>30a</b>

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**UNIT4: MATICES AND DETERMINANTS**

**Multiple Choice Questions**

1.If the equations  $a(y + z) = x$ ,  $b(z + x) = y$  and  $c(x + y) = z$ , where  $a \neq -1$ ,  $b \neq -1$ ,  $c \neq -1$  admit non-trivial solution, then  $(1 + a)^{-1} + (1 + b)^{-1} + (1 + c)^{-1}$  is

- a. 2
- b. 1
- c. 1/2
- d. None of these

2.The order of matrix A is  $m \times p$ . And the order of B is  $p \times n$ . Then the order of matrix AB is ?

- a.  $m \times n$
- b.  $n \times m$
- c.  $n \times p$
- d.  $m \times p$

3. If A and B are matrices, then which from the following is true ?

- a.  $A + B \neq B + A$
- b.  $(A^t)^t \neq A$
- c.  $AB \neq BA$
- d. all are true

$$B = \begin{bmatrix} 1 & 4 \\ 2 & a \end{bmatrix}$$

4. What is 'a', if  $B$  is a singular matrix?

- a. 5
- b. 6
- c. 7
- d. 8

5. If  $A = \begin{bmatrix} 2i & i \\ i & -i \end{bmatrix}$  then  $|A| = ?$

- a. 2
- b. 3
- c. 4
- d. 5



6. If  $\begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \\ a_{31} & a_{32} \end{bmatrix} A = \begin{bmatrix} b_{11} & b_{12} & b_{13} \\ b_{21} & b_{22} & b_{23} \\ b_{31} & b_{32} & b_{33} \end{bmatrix}$  then order of matrix A = ?

- a. 2 x 2
- b. 2 x 3
- c. 3 x 2
- d. 3 x 3

7. The number of values of t for which the system of equations  $(a - t)x + by + c = 0$ ,  $bx + (c - t)y + az = 0$ ,  $cx + ay + (b - t)z = 0$  has non-trivial solution is

- a. 1
- b. 2
- c. 3
- d. 4

8. If A is any square matrix, then which of the following is skew-symmetric?

- a.  $A + A^T$
- b.  $A - A^T$
- c.  $AA^T$
- d.  $A^T A$

9. Total number of possible matrices of order  $3 \times 3$  with each entry 2 or 0 is

- (a) 9
- (b) 27
- (c) 81
- (d) 512

10. If A and B are matrices of the same order, then  $(AB' - BA')$  is a

- (a) skew-symmetric matrix
- (b) null matrix
- (c) symmetric matrix
- (d) unit matrix

**ANSWER KEY**

1a	2a	3c	4d	5b	6b	7c	8b	9d	10a
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## UNIT5: LINEAR PROGRAMMING PROBLEM

### Multiple Choice Questions

1. Operation research approach is
  - a. Multi-disciplinary
  - b. Artificial
  - c. Intuitive
  - d. All of the above
2. Operation research analysis does not
  - a. Predict future operation
  - b. Build more than one model
  - c. Collect the relevant data
  - d. Recommended decision and accept
3. Mathematical model of Linear Programming is important because
  - a. It helps in converting the verbal description and numerical data into mathematical expression
  - b. decision makers prefer to work with formal models.
  - c. it captures the relevant relationship among decision factors.
  - d. it enables the use of algebraic techniques.
4. A constraint in an LP model restricts
  - a. value of the objective function
  - b. value of the decision variable
  - c. use of the available resources
  - d. all of the above
5. In graphical method of linear programming problem if the iOS-cost line coincide with a side of region of basic feasible solutions we get
  - a. Unique optimum solution
  - b. unbounded optimum solution
  - c. no feasible solution
  - d. Infinite number of optimum solutions
6. A feasible solution of LPP
  - a. Must satisfy all the constraints simultaneously
  - b. Need not satisfy all the constraints, only some of them
  - c. Must be a corner point of the feasible region
  - d. all of the above





7. The objective function for a L.P model is  $3x_1 + 2x_2$ , if  $x_1 = 20$  and  $x_2 = 30$ , what is the value of the objective function?
- 0
  - 50
  - 60
  - 120
8. Maximization of objective function in LPP means
- Value occurs at allowable set decision
  - highest value is chosen among allowable decision
  - none of the above
  - all of the above
9. Alternative solution exist in a linear programming problem when
- one of the constraint is redundant
  - objective function is parallel to one of the constraints
  - two constraints are parallel
  - all of the above
10. The linear function of the variables which is to be maximize or minimize is called
- Constraints
  - Objective function
  - Decision variable
  - None of the above
11. The true statement for the graph of inequations  $3x+2y\leq 6$  and  $6x+4y\geq 20$  , is
- Both graphs are disjoint
  - Both do not contain origin
  - Both contain point (1, 1)
  - None of these
12. The value of objective function is maximum under linear constraints
- At the center of feasible region
  - At (0,0)
  - At any vertex of feasible region
  - The vertex which is at maximum distance from (0, 0)
13. If the value of the objective function  $z$  can be increased or decreased indefinitely, such solution is called
- Bounded solution
  - Unbounded solution
  - Solution
  - None of the above



14. A model is
  - a. An essence of reality
  - b. An approximation
  - c. An idealization
  - d. All of the above
  
15. The first step in formulating a linear programming problem is
  - a. Identify any upper or lower bound on the decision variables
  - b. State the constraints as linear combinations of the decision variables
  - c. Understand the problem
  - d. Identify the decision variables
  
16. Constraints in an LP model represents
  - a. Limitations
  - b. Requirements
  - c. balancing, limitations and requirements
  - d. all of above
  
17. The best use of linear programming is to find optimal use of
  - a. money
  - b. Manpower
  - c. Machine
  - d. All the above
  
18. Which of the following is assumption of an LP model
  - a. divisibility
  - b. proportionality
  - c. additivity
  - d. all of the above
  
19. Before formulating a formal LP model, it is better to
  - a. Express each constraints in words
  - b. Express the objective function in words
  - c. verbally identify decision variables
  - d. all of the above
  
20. Non-negative condition in an LP model implies
  - a. a positive coefficient of variables in objective function
  - b. a positive coefficient of variables in any constraint
  - c. non-negative value of resource
  - d. none of the above



21. For the constraint of a linear optimizing function  $z=x_1+x_2$  given by  $x_1+x_2\leq 1$ ,  $3x_1+x_2\geq 3$  and  $x_1, x_2\geq 0$
- There are two feasible regions
  - There are infinite feasible regions
  - There is no feasible region
  - None of these
22. The set of decision variable which satisfies all the constraints of the LPP is called as-----
- Solution
  - Basic Solution
  - Feasible solution
  - None of the above
23. The intermediate solutions of constraints must be checked by substituting them back into
- Objective function
  - Constraint equations
  - Not required
  - None of the above
24. A basic solution is called non-degenerate, if
- All the basic variables are zero
  - None of the basic variables is zero
  - At least one of the basic variables is zero
  - None of these
25. If the number of available constraints is 3 and the number of parameters to be optimized is 4, then
- The objective function can be optimized
  - The constraints are short in number
  - The solution is problem oriented
  - None of these
26. The graph of  $x\leq 2$  and  $y\geq 2$  will be situated in the
- First and second quadrant
  - Second and third quadrant
  - First and third quadrant
  - Third and fourth quadrant
27. A solution which satisfies non-negative conditions also is called as-----
- Solution
  - Basic Solution
  - Feasible solution
  - None of the above



28. A solution which optimizes the objective function is called as -----
- Solution
  - Basic Solution
  - Feasible solution
  - Optimal solution
29. In. L.P.P----
- objective function is linear
  - constraints are linear
  - Both objective function and constraints are linear
  - None of the above
30. If the constraints in a linear programming problem are changed
- The problem is to be re-evaluated
  - Solution is not defined
  - The objective function has to be modified
  - The change in constraints is ignored.
31. Linear programming is a
- Constrained optimization technique
  - Technique for economic allocation of limited resources
  - Mathematical technique
  - All of the above
32. A constraint in an LP model restricts
- Value of objective function
  - Value of a decision variable
  - Use of the available resources
  - All of the above
33. The distinguishing feature of an LP model is
- Relationship among all variables is linear
  - It has single objective function & constraints
  - Value of decision variables is non-negative
  - All of the above
- 34 Non-negativity condition is an important component of LP model because
- Variables value should remain under the control of the decision-maker
  - Value of variables make sense & correspond to real-world problems
  - Variables are interrelated in terms of limited resources
  - None of the above



- 35 Before formulating a formal LP model, it is better to
- Express each constrain in words
  - Express the objective function in words
  - Verbally identify decision variables
  - All of the above
- 36 Maximization of objective function in an LP model means
- Value occurs at allowable set of decisions
  - Highest value is chosen among allowable decisions
  - Neither of above
  - Both a & b
- 37 Which of the following is not a characteristic of the LP model
- Alternative courses of action
  - An objective function of maximization type
  - Limited amount of resources
  - Non-negativity condition on the value of decision variables.
38. The best use of linear programming technique is to find an optimal use of
- Money
  - Manpower
  - Machine
  - All of the above
39. Which of the following is not a characteristic of the LP
- Resources must be limited
  - Only one objective function
  - Parameters value remains constant during the planning period
  - The problem must be of minimization type
40. Non-negativity condition in an LP model implies
- A positive coefficient of variables in objective function
  - A positive coefficient of variables in any constraint
  - Non-negative value of resources
  - None of the above
41. Which of the following is an assumption of an LP model
- Divisibility
  - Proportionality
  - Additivity
  - All of the above



42. Which of the following is a limitation associated with an LP model
- The relationship among decision variables in linear
  - No guarantee to get integer valued solutions
  - No consideration of effect of time & uncertainty on LP model
  - All of the above
43. The graphical method of LP problem uses
- Objective function equation
  - Constraint equations
  - Linear equations
  - All of the above
44. A feasible solution to an LP problem
- Must satisfy all of the problem's constraints simultaneously
  - Need not satisfy all of the constraints, only some of them
  - Must be a corner point of the feasible region
  - Must optimize the value of the objective function
45. Which of the following statements is true with respect to the optimal solution of an LP problem
- Every LP problem has an optimal solution
  - Optimal solution of an LP problem always occurs at an extreme point
  - At optimal solution all resources are completely used
  - If an optimal solution exists, there will always be at least one at a corner
46. An iso-profit line represents
- An infinite number of solutions all of which yield the same profit
  - An infinite number of solution all of which yield the same cost
  - An infinite number of optimal solutions
  - A boundary of the feasible region
47. If an iso-profit line yielding the optimal solution coincides with a constraint line, then
- The solution is unbounded
  - The solution is infeasible
  - The constraint which coincides is redundant
  - None of the above
48. While plotting constraints on a graph paper, terminal points on both the axes are connected by a straight line because
- The resources are limited in supply
  - The objective function as a linear function
  - The constraints are linear equations or inequalities
  - All of the above



49. A constraint in an LP model becomes redundant because
- a. Two iso-profit line may be parallel to each other
  - b. The solution is unbounded
  - c. This constraint is not satisfied by the solution values
  - d. None of the above

50. Constraints in LP problem are called active if they
- a. Represent optimal solution
  - b. At optimality do not consume all the available resources
  - c. Both a & b
  - d. None of the above

ANSWER KEY

1d	2a	3a	4d	5d	6a	7d	8b	9d	10b
11a	12c	13b	14d	15d	16d	17d	18d	19d	20c
21c	22a	23b	24b	25b	26b	27c	28d	29c	30a
31d	32d	33a	34	35b	36d	37a	38b	39d	40d
41d	42d	43d	44d	45a	46d	47a	48d	49a	50a

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## UNIT6: TRANSPORTATION PROBLEM

### Multiple Choice Questions

- Operations research is the application of \_\_\_\_\_ methods to arrive at the optimal Solutions to the problems.
  - economical
  - scientific
  - a and b both
  - artistic
- In operations research, the -----are prepared for situations.
  - mathematical models
  - physical models diagrammatic
  - diagrammatic models
- Operations management can be defined as the application of ----- --to a problem within a system to yield the optimal solution.
  - Suitable manpower
  - mathematical techniques, models, and tools
  - Financial operations
- Operations research is based upon collected information, knowledge and advanced study of various factors impacting a particular operation. This leads to more informed -----.
  - Management processes
  - Decision making
  - Procedures
- OR can evaluate only the effects of -----.
  - Personnel factors.
  - Financial factors
  - Numeric and quantifiable factors.
- By constructing models, the problems in libraries increase and cannot be solved.
  - True
  - False
- The objective function and constraints are functions of two types of variables, \_\_\_\_\_ variables and \_\_\_\_\_ variables.
  - Positive and negative
  - Controllable and uncontrollable





- c. Strong and weak
  - d. None of the above
8. Operations research was known as an ability to win a war without really going in to \_\_\_\_
- a. Battle field
  - b. Fighting
  - c. The opponent
  - d. Both A and B
9. Who defined OR as scientific method of providing executive departments with a quantitative basis for decisions regarding the operations under their control?
- a. Morse and Kimball (1946)
  - b. P.M.S. Blackett (1948)
  - c. E.L. Arnoff and M.J. Netzorg
  - d. None of the above
10. What enables us to determine the earliest and latest times for each of the events and activities and thereby helps in the identification of the critical path?
- a. Programme Evaluation
  - b. Review Technique (PERT)
  - c. Both A and B
  - d. Deployment of resources
11. In Degenerate solution value of objective function \_\_\_\_\_.
- a. increases infinitely
  - b. basic variables are nonzero
  - c. decreases infinitely
  - d. One or more basic variables are zero
12. Operations research was known as an ability to win a war without really going in to \_\_\_\_
- a. Battle field
  - b. Fighting
  - c. The opponent
  - d. Both A and B
13. Who defined OR as scientific method of providing executive departments with a quantitative basis for decisions regarding the operations under their control?
- e. Morse and Kimball (1946)
  - f. P.M.S. Blackett (1948)
  - g. E.L. Arnoff and M.J. Netzorg
  - h. None of the above



14. OR has a characteristics that it is done by a team of
- Scientists
  - Mathematicians
  - Academics
  - All of the above
15. Feasible solution satisfies \_\_\_\_\_
- Only constraints
  - only non-negative restriction
  - [a] and [b] both
  - [a],[b] and Optimum solution
16. When total supply is equal to total demand in a transportation problem, the problem is said to be
- Balanced
  - Unbalanced
  - Degenerate
  - None of the above
17. Which of the following methods is used to verify the optimality of the current solution of the transportation problem
- Least cost method
  - Vogel's approximation method
  - Modified distribution method
  - All of the above
18. The degeneracy in the transportation problem indicates that
- Dummy allocation(s) needs to be added
  - The problem has no feasible solution
  - The multiple optimal solution exist
  - a & b but not c
19. The dummy source or destination in a transportation problem is added to
- Satisfy rim conditions
  - Prevent solution from becoming degenerate
  - Ensure that total cost does not exceed a limit
  - None of the above
20. The occurrence of degeneracy while solving a transportation problem means that
- Total supply equals total demand
  - The solution so obtained is not feasible
  - The few allocations become negative
  - None of the above



21. An alternative optimal solution to a minimization transportation problem exists whenever opportunity cost corresponding to unused route of transportation is:
- Positive & greater than zero
  - Positive with at least one equal to zero
  - Negative with at least one equal to zero
  - None of the above
22. One disadvantage of using North-West Corner rule to find initial solution to the transportation problem is that
- It is complicated to use
  - It does not take into account cost of transportation
  - It leads to a degenerate initial solution
  - All of the above
23. The solution to a transportation problem with 'm' rows (supplies) & 'n' columns (destination) is feasible if number of positive allocations are
- $m+n$
  - $m*n$
  - $m+n-1$
  - $m+n+1$
24. If an opportunity cost value is used for an unused cell to test optimality, it should be
- Equal to zero
  - Most negative number
  - Most positive number
  - Any value
25. During an iteration while moving from one solution to the next, degeneracy may occur when
- The closed path indicates a diagonal move
  - Two or more occupied cells are on the closed path but neither of them represents a corner of the path.
  - Two or more occupied cells on the closed path with minus sign are tied for lowest circled value
  - Either of the above
26. The large negative opportunity cost value in an unused cell in a transportation table is chosen to improve the current solution because
- It represents per unit cost reduction
  - It represents per unit cost improvement
  - It ensure no rim requirement violation
  - None of the above



27.The smallest quantity is chosen at the corners of the closed path with negative sign to be assigned at unused cell because

- a. It improve the total cost
- b. It does not disturb rim conditions
- c. It ensure feasible solution
- d. All of the above

28.The quantitative approach to decision analysis is a

- a. Logical approach
- b. Rational approach
- c. Scientific approach
- d. All of the above

29.The qualitative approach to decision analysis relies on

- a. Experience
- b. Judgement
- c. Intuition
- d. All of the above

30.. The mathematical model of an LP problem is important because

- a. It helps in converting the verbal description & numerical data into mathematical expression
- b. Decision-makers prefer to work with formal models
- c. It captures the relevant relationship among decision factors
- d. It enables the use of algebraic technique

**ANSWER KEY**

<b>1b</b>	<b>2a</b>	<b>3b</b>	<b>4b</b>	<b>5c</b>
<b>6b</b>	<b>7b</b>	<b>8d</b>	<b>9a</b>	<b>10c</b>
<b>11d</b>	<b>12d</b>	<b>13a</b>	<b>14d</b>	<b>15c</b>
<b>16c</b>	<b>17a</b>	<b>18c</b>	<b>19a</b>	<b>20b</b>
<b>21b</b>	<b>22b</b>	<b>23c</b>	<b>24b</b>	<b>25c</b>
<b>26a</b>	<b>27c</b>	<b>28c</b>	<b>29d</b>	<b>30a</b>