ESE Prelim Exam

UPSC Engineering Services Examination

General Studies & Engineering Aptitude

PRACTICE BOOK

3300+

Topicwise Solved Questions

- ✓ Engineering Aptitude Covering Logical Reasoning and Analytical Ability
- ✓ Engineering Mathematics and Numerical Analysis
- ✓ General Principles of Design, Drawing, Importance of Safety
- ✓ Standards and Quality Practices in Production, Construction, Maintenance and Services
- ✓ Basics of Energy and Environment
- ✓ Basics of Project Management
- ✓ Basics of Material Science and Engineering
- ✓ Information and Communication Technologies
- ✓ Ethics and Values in Engineering Profession

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Preface

B. Singh (Ex. IES)

To get a thorough knowledge and to succeed in the growing competition in Engineering Services Examination reading just the theory will not suffice. To supersede other competitors, an aspirant needs a thorough practice of variety of questions. With the introduction of 9 Non-Technical subjects and Current Affairs in Paper-I of ESE Prelims, it has become mandatory to get well versed with these subjects by getting acquainted with every possible variety of question. To help every aspirant to score high marks in the exam, MADE EASY has come up with revised edition of **General Studies and Engineering Aptitude Practice Book** – a 3300+ topicwise question bank.

MADE EASY team has put sincere efforts in framing and compilation of questions with accurate explanations, supplemented with relevant theory and illustrations of subjects namely:

- Engineering Aptitude covering Logical Reasoning and Analytical Ability
- Engineering Mathematics and Numerical Analysis
- General Principles of Design, Drawing, Importance of Safety
- Standards and Quality Practices in Production, Construction, Maintenance and Services
- Basics of Energy and Environment
- Basics of Project Management
- Basics of Material Science and Engineering
- Information and Communication Technologies (ICT)
- Ethics and Values in Engineering Profession

For Current Affairs, students are advised to go through the MADE EASY Current Affairs Magazine Annual Edition.

It is impossible to acknowledge all the individuals who helped us, but would like to sincerely thank all authors, editors and reviewers for putting their painstaking efforts to publish this book.

With Best Wishes

B. Singh

CMD, MADE EASY

General Studies and Engineering Aptitude : Practice Book

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■■■■

Engineering Aptitude Covering Logical Reasoning and Analytical Ability

1

1. Number Systems

Q.1 What will come in place of the question mark(?) in the following number series?
5 7 ? 25 45 75
(a) 11 (b) 13
(c) 15 (d) 19

Q.2 What should come in place of question mark(?) in the following number series?
132 156 ? 210 240 272
(a) 196 (b) 182
(c) 199 (d) 204

Q.3 Simplify the following equation
$2003 \times 2004 - 2001 \times 2002 = ?$
(a) 8010 (b) 8020
(c) 8030 (d) 8040

Q.4 If R and S are different integers both divisible by 5, then which of the following is not necessarily true?
(a) R – S is divisible by 5
(b) R + S is divisible by 10
(c) R × S is divisible by 25
(d) R2 + S2 is divisible by 5

Q.5 What will come in place of the question mark(?) in the series?
3, 8, 27, 112, (?), 3396
(a) 565 (b) 452
(c) 560 (d) 678

Q.6 Police officers of a particular batch are preparing for a drill and are made to stand in different rows. If 4 officers are extra in each row, then there would be 2 rows less. But there would be 4 more rows if 4 officers are less in each row. Find the number of officers in the batch?
(a) 96 (b) 56
(c) 69 (d) 65

Q.7 Father said his son, "I was as old as you are at present at the time of your birth. "If the father age is 38 now, the son age 5 years back was:
(a) 14 (b) 19
(c) 33 (d) 38

Q.8 In a two-digit number, the digit in the unit's place is more than twice the digit in ten's place by 1. If the digits in the unit's place and the ten's place are interchanged, difference between the newly formed number and the original number is less than the original number by 1. What is the original number?
(a) 35 (b) 36
(c) 37 (d) 39

Q.9 Fill in the blank indicated by a star in the number 4 * 56 so as to make it divisible by 33.
(a) 3 (b) 4
(c) 5 (d) None of these

Q.10 What will come in place of the question mark(?)
82 : 06 :: 76 : ?
(a) 15 (b) 01
(c) 12 (d) 24

Q.11 What will come in place of the question mark(?)
121, 222, 424, ?
(a) 646 (b) 828
(c) 626 (d) 524

Q.12 What will come in place of the question mark(?)
2, 3, 5, 9, 17, ?
(a) 31 (b) 32
(c) 33 (d) 34

Q.13 What will come in place of the question mark(?)
23 : 13 :: 54 : ?
(a) 40 (b) 41
(c) 44 (d) 39

2. Percentage

Directions (Q.14 to Q.15): Answer the questions on the basis of the information given below:

In an examination, there are 100 questions divided into three groups A, B and C such that each group contains atleast one question. Each question in group A carries 1 mark, each question in group B carries 2 marks and each question in group C carries 3 marks. It is known that the questions in group A together carry atleast 60% of the total marks.

Q.14 If group B contains 23 questions, then how many questions are there in group C?
(a) 1 (b) 2
(c) 3 (d) Cannot be determined

Q.15 If group C contains 8 questions and group B carries atleast 20% of the total marks, which of the following best describes the number of questions in group B?
(a) 11 or 12 (b) 12 or 13
(c) 13 or 14 (d) 14 or 15

Q.16 Anita's mathematics test had 70 problems carrying equal marks i.e., 10 arithmetic, 30 algebra and 30 geometry. Although she answered 70% of the arithmetic, 40% of the algebra and 60% of the geometry problems correctly, she did not pass the test because she got less than 60% marks. The number of more questions she would have to answer correctly to earn a 60% passing marks is:
(a) 1 (b) 5
(c) 7 (d) 9

Q.17 In a class, there are 18 very tall boys. If these constitute three-fourths of the boys and the total number of boys is two-thirds of the total number of students in the class, what is the number of girls in the class?
(a) 6 (b) 12
(c) 18 (d) 21

Q.18 Consider the following statements:
1. Either A and B are of the same age or A is older than B
2. Either C and D are of the same age or D is older than C
3. B is older than C

Which of the following conclusions can be drawn from the above statements?
(a) A is older than B
(b) B and D are of the same age
(c) D is older than C
(d) A is older than C

Q.19 The monthly average salary paid to all the employees of a company was ₹ 5000. The monthly average salary paid to male and female employees was ₹ 5200 and ₹ 4200 respectively. Then the percentage of males employed in the company is
(a) 75% (b) 80%
(c) 85% (d) 90%

Q.20 Two numbers X and Y are respectively 20% and 28% less than a third number Z. By what percentage is the number Y less than the number X?
(a) 12% (b) 10%
(c) 9% (d) 8%

Q.21 A piece of tin is in the form of a rectangle having length 12 cm and width 8 cm. This is used to construct a closed cube. The side of the cube is:
(a) 2 cm (b) 3 cm
(c) 4 cm (d) 7 cm

Q.22 In an election only two candidates contested 20% of the voters did not vote and 120 votes were declared as invalid. The winner got 200 votes more than his opponent thus he secured 41% votes of the total voters on the voter list. Percentage votes of the defeated candidate out of the total votes casted is:
(a) 47.5% (b) 41%
(c) 38% (d) 45%

Q.23 The total emoluments of two persons are the same, but one gets allowances to the extent of 65% of his basic pay and the other gets allowances to the extent of 80% of his basic pay. The ratio of the basic pay of the former to the basic pay of the latter is:
(a) 16 : 13 (b) 5 : 4
(c) 7 : 5 (d) 12 : 11

Q.24 When 75 is added to 75% of a number, the answer is the number. Find 40% of that number.
(a) 100 (b) 80
(c) 120 (d) 160

Q.25 An annual report consists of 20 sheets each of 55 lines and each line consists of 65 characters. This report is reduced into sheets each of 65 lines such that each line consists of 70 characters. The percentage reduction in the number of sheets will be:
(a) 30% (b) 20%
(c) 5% (d) 35%

Q.26 In an election between two candidates, one got 55% of the total valid votes, 20% of the votes were invalid. If the total number of votes was 7500, the number of valid votes that the other candidate got, was:
(a) 2500 (b) 2700
(c) 2900 (d) 3100

Q.27 If each side of a square is increased by 25%, find the percentage change in its area?
(a) 65.25 (b) 56.25
(c) 65 (d) 56

Q.28 If 20% of $a = b$, then b% of 20 is the same as:
(a) 4% of a (b) 6% of a
(c) 8% of a (d) 10% of a

Q.29 Fresh fruit contains 68% water and dry fruit contains 20% water. How much dry fruit can be obtained from 100 kg of fresh fruits?
(a) 20 (b) 30
(c) 40 (d) 50

Q.30 A candidate scoring 25% in an examination fails by 30 marks, while another candidate scores 50% mark, gets 20 marks more than the minimum pass marks. Find the minimum pass marks.
(a) 20 (b) 50
(c) 80 (d) 200

Q.31 In an election, a candidate who gets 84% of the votes is elected by a majority of 476 votes. What is the total number of votes polled?
(a) 900 (b) 810
(c) 600 (d) 700

Q.32 The salaries of A, B, and C are in the ratio of 1 : 2 : 3. The salary of B and C together is ₹ 6000. By what percent is the salary of C more than that of A?
(a) 100 % (b) 200%
(c) 300% (d) 600%

Q.33 There are 1650 students in a college. The difference between the number of boys and girls in the college is 400. What is the percentage of girls in the college?
(a) 49 (b) 34
(c) 43 (d) 38

Q.34 The length, breadth and height of a room are in the ratio 7 : 3 : 1. If the breadth and height are doubled while the length is halved, then by what percent the total area of the 4 walls of the room will be increased?
(a) 90% (b) 88%
(c) 85% (d) 84%

3. Profit and Loss

Q.35 By selling 45 lemons for ₹ 40, a man loses 20%. How many should he sell for ₹ 24 to gain 20 % in the transaction?
(a) 16 (b) 18
(c) 20 (d) 22

Q.36 A student has to obtain 33% of the total marks to pass. He got 125 marks and failed by 40 marks. The maximum marks are:
(a) 500 (b) 600
(c) 800 (d) 1000

Q.37 If the price of a book is first decreased by 25% and then increased by 20%, then the net change in the price will be:
(a) ₹ 10 (b) ₹ 20
(c) ₹ 30 (d) ₹ 40

Q.38 A and B invest in a business in the ratio 3 : 2. If 5% of the total profit goes to charity and A's share is ₹ 855, the total profit is:
(a) ₹ 500 (b) ₹ 1000
(c) ₹ 1500 (d) ₹ 2000

Q.39 The cost price of 20 articles is the same as the selling price of x articles. If the profit is 25%, then the value of x is:
(a) 15 (b) 16
(c) 18 (d) 25

Q.40 A and B are partners in a business. A contributes $\frac{1}{4}$ of the capital for 15 months and B received $\frac{2}{3}$ of the profit. For how long B's money was used?
(a) 3 months (b) 6 months
(c) 10 months (d) 12 months

Q.41 If books bought at prices ranging from ₹ 200 to ₹ 350 are sold at prices ranging from ₹ 300 to ₹ 425, what is the greatest possible profit that might be made in selling eight books?
(a) ₹ 600 (b) ₹ 1200
(c) ₹ 1800 (d) None of these

Q.42 Salaries of Ravi and Sumit are in the ratio 2 : 3. If the salary of each is increased by ₹ 4000, the new ratio becomes 40 : 57. What is Sumit's salary?
(a) ₹ 34000 (b) ₹ 6800
(c) ₹ 36700 (d) ₹ 50000

Q.43 Two bus tickets from city A to B and three tickets from city A to C cost ₹ 77 but three tickets from city A to B and two tickets from city A to C cost ₹ 73. What are the fares for cities B and C from A?
(a) ₹ 4, ₹ 23 (b) ₹ 13, ₹ 17
(c) ₹ 15, ₹ 14 (d) ₹ 17, ₹ 13

Q.44 If the cost price of 12 pens is equal to the selling price of 8 pens, the gain percent is
(a) 12% (b) 30%
(c) 50% (d) 60%

Q.45 The cost price of a table is ₹ 3,200. A merchant wants to make 25% profit by selling it. At the time of sale he declares a discount of 20% on the marked price. The marked price (in ₹) is:
(a) 5,000 (b) 6,000
(c) 4,000 (d) 4,500

Q.46 Charging 30% above its production cost a radio maker puts a label of ₹ 286 on a radio as its price. But at the time of selling it, he allows 10% discount on the labelled price. What will his gain be?
(a) ₹ 257.40 (b) ₹ 254.40
(c) ₹ 198 (d) ₹ 37.40

Q.47 A shopkeeper allows a discount of 12.5% on the marked price of a certain article and makes a profit of 20%. If the article costs the shopkeeper ₹ 210, then the marked price of the article will be
(a) ₹ 387 (b) ₹ 350
(c) ₹ 386 (d) ₹ 288

Q.48 A shopkeeper buys an article for ₹ 360. He wants to make a gain of 25% on it after a discount of 10%. The marked price is
(a) ₹ 486 (b) ₹ 450
(c) ₹ 500 (d) ₹ 460

Q.49 A shopkeeper marks his goods 40% above the cost price. He allows a discount of 5% for cash payment to his customers. He receives ₹ 1064 after paying the discount. His profit is
(a) ₹ 264 (b) ₹ 164
(c) ₹ 200 (d) ₹ 800

Q.50 Tarun got 30% concession on the labelled price of an article and sold it for ₹ 8750 with 25% profit on the price he bought. What was the labelled price?
(a) ₹ 10000 (b) ₹ 12000
(c) ₹ 13000 (d) ₹ 14000

Q.51 The price of 2 oranges, 3 bananas and 4 apples is ₹ 15. The price of 3 oranges, 2 bananas and 1 apple is ₹ 10. What will be price of 4 oranges, 4 bananas and 4 apples?
(a) ₹ 10 (b) ₹ 15
(c) ₹ 20 (d) ₹ 25

Q.52 Selling an item for ₹ 1800 at a discount of 10%, a shopkeeper had a gain of ₹ 200. Had he sold the item without discount, the percentage of profit would have been
(a) 10% (b) 20%
(c) 25% (d) 30%

Q.53 Jasmine allows 4% discount on the marked price of her goods and still earns a profit of 20%. What is the cost price of a shirt if its marked price is ₹ 850?
(a) ₹ 650 (b) ₹ 720
(c) ₹ 700 (d) ₹ 680

Q.54 A shopkeeper sells the quantity in the same price rate for which he has bought. But he gives 20% less quantity to the customer. Find his profit percent.
(a) 15% (b) 20%
(c) 18% (d) 25%

Q.55 The C.P. of an article is 40% of the S.P. The percent that S.P. of C.P. is:
(a) 250 (b) 240
(c) 60 (d) 40

Q.56 The value of a machine depreciates at the rate of 10% every year. It was purchased 3 years ago. If its present value is ₹ 8748, its purchase price was:
(a) ₹ 10000 (b) ₹ 12000
(c) ₹ 14000 (d) ₹ 16000

Q.57 A trader mixes 26 kg of rice at ₹ 20 per kg with 30 kg of rice of other variety at ₹ 36 per kg and sells the mixture at ₹ 30 per kg. His profit percent is:
(a) No profit, no loss (b) 5%
(c) 8% (d) 10%

4. Simple Interest & Compound Interest

Q.58 The difference between the compound interest and simple interest on a certain sum for 2 years at 10% per annum is ₹ 300. Find the sum
(a) ₹ 31,000 (b) ₹ 31,500
(c) ₹ 30,000 (d) ₹ 30,500

Q.59 Lasya invested certain amount for two rates of simple interests at 5% p.a. and 4% p.a. What is the ratio of Lasya's investments if the interests from those investments are equal?
(a) 4 : 5 (b) 5 : 4
(c) 7 : 6 (d) 6 : 7

Q.60 A bank offers 5% compound interest calculated on half-yearly basis. A customer deposits ₹ 1600 each on 1st January and 1st July of a year. At the end of the year, the amount he would have gained by way of interest is:
(a) ₹ 120 (b) ₹ 121
(c) ₹ 123 (d) ₹ 122

Q.61 A sum of ₹ 25000 becomes ₹ 27250 at the end of 3 years when calculated at simple interest. Find the rate of interest.
(a) 1% (b) 2%
(c) 3% (d) 4%

Q.62 Find the present worth of ₹ 78000 due in 4 years at 5% interest per year.
(a) ₹ 55000 (b) ₹ 50000
(c) ₹ 45000 (d) ₹ 65000

Q.63 A certain principal amounts to ₹ 15000 in 2.5 years and to ₹ 16500 in 4 years at the same rate of interest. Find the rate of interest.
(a) 2% (b) 4%
(c) 6% (d) 8%

Q.64 Find the compound interest on ₹ 3000 at 5% for 2 years, compounded annually.
(a) ₹ 307.5 (b) ₹ 400.5
(c) ₹ 500.5 (d) ₹ 600.5

Q.65 Find the compound interest on ₹ 10000 at 12% rate of interest for 1 year, compounded half-yearly.
(a) ₹ 1230 (b) ₹ 1232
(c) ₹ 1234 (d) ₹ 1236

Q.66 The difference between SI and CI compounded annually on a certain sum of money for 2 years at 8% per annum is ₹ 12.80. Find the principal.
(a) ₹ 1000 (b) ₹ 3000
(c) ₹ 2000 (d) ₹ 4000

Q.67 Find the simple interest on ₹ 5000 at a certain rate if the compound interest on the same amount for 2 years is ₹ 253.125.
(a) ₹ 200 (b) ₹ 250
(c) ₹ 300 (d) ₹ 400

Q.68 Sum of ₹ 600 amounts to ₹ 720 in 4 years at simple interest. What will it amount to if the rate of interest increased by 2%?
(a) ₹ 648 (b) ₹ 768
(c) ₹ 726 (d) ₹ 792

Q.69 How long will it take a certain amount to increase by 30% at the rate of 15% simple interest?
(a) 1% (b) 2%
(c) 3% (d) 4%

Q.70 If the simple interest on a sum of money for 2 years at 5% per annum is ₹ 60, what is the compound interest on the same at the same rate and for the same time?
(a) ₹ 63.5 (b) ₹ 62
(c) ₹ 61.5 (d) ₹ 64

5. Ratio and Proportion

Q.71 The ratio of the ages of two persons is 4 : 7 and the age of one of them is greater than that of the other by 30 years. The sum of their ages (in years) is
(a) 110 (b) 100
(c) 70 (d) 40

Q.72 30 gm of sugar was mixed in 180 ml water in a vessel A, 40 gm of sugar was mixed in 280 ml water in vessel B and 20 gm of sugar was mixed in 100 ml of water in vessel C. The solution in vessel B is
(a) Sweeter than that in C
(b) Sweeter than that in A
(c) As sweet as that in C
(d) Less sweet than that in C

Directions (Q.73 to Q.75): Study the following information carefully and answer the questions that follow:

The students of a school have an option to study only Hindi, only Sanskrit or a composite subject Hindi and Sanskrit. Out of the 175 students in the school, boys and girls are in the ratio of 3 : 4 respectively. 40% of boys have opted for only Hindi; 44% of the students have opted for only Sanskrit. Out of the total number of girls 32% have opted for the composite subject. The number of boys who opted for only Sanskrit and that for composite subject are in the ratio of 2 : 1 respectively.

Q.73 What is the ratio between the number of boys who have opted for only Hindi and the number of girls who have opted for the composite subject respectively?
(a) 15 : 16 (b) 10 : 7
(c) 10 : 9 (d) 11 : 12

Q.74 How many boys have opted for the composite subject?
(a) 30 (b) 15
(c) 21 (d) 32

Q.75 How many girls have opted for only Sanskrit?
(a) 72 (b) 47
(c) 51 (d) 77

Q.76 A bus starts from city A. The number of men in the bus is twice the number of women. In city Z, 5 women enter and 20 men leave the bus. Now, the number of women and men are equal. In the beginning, how many passengers entered the bus?
(a) 25 (b) 50
(c) 100 (d) 75

Q.77 A bag contains 50 P, 25 P and 10 P coins in the ratio 5 : 9 : 4, amounting to ₹ 206. Find the number of coins of each type respectively.
(a) 360, 160, 200 (b) 160, 360, 200
(c) 200, 360,160 (d) 200,160,300

Q.78 Tea worth of ₹ 135/kg and ₹ 126/kg are mixed with a third variety in the ratio 1 : 1 : 2. If the mixture is worth ₹ 153 per kg, the price of the third variety per kg will be _____?
(a) ₹ 169.50 (b) ₹ 170
(c) ₹ 175.50 (d) ₹ 180

Q.79 A mixture contains alcohol and water in the ratio 4 : 3. If 5 liters of water is added to the mixture, the ratio becomes 4 : 5. Find the quantity of alcohol in the given mixture.
(a) 10 (b) 12
(c) 15 (d) 18

Q.80 A, B, C started a business with their investments in the ratio 1 : 3 : 5. After 4 months, A invested the same amount as before and B as well as C withdrew half of their investments. The ratio of their profits at the end of the year is:
(a) 1 : 2 : 3 (b) 3 : 4 : 15
(c) 3 : 5 : 10 (d) 5 : 6 : 10

Q.81 A man spends 35% of his income on food, 25% on children's education and 80% of the remaining on house rent. What percent of his income he is left with?
(a) 6% (b) 8%
(c) 10% (d) 12%

Q.82 The diagonal of a rectangle is 17 cm long and its perimeter is 46 cm. Find the area of the rectangle.
(a) 110 (b) 120
(c) 130 (d) 140

Q.83 A sum of ₹ 427 is to be divided among A, B and C such that 3 times A's share, 4 times B's share and 7 times C's share are all equal. The share of C is:
(a) 84 (b) 140
(c) 196 (d) 240

Q.84 Seats for Mathematics, Physics and Biology in a school are in the ratio 5 : 7 : 8. There is a proposal to increase these seats by 40%, 50% and 75% respectively. What will be the ratio of increased seats?
(a) 1 : 2 : 3 (b) 2 : 3 : 4
(c) 3 : 4 : 5 (d) 4 : 5 : 6

Q.85 The students in three classes are in the ratio 2 : 3 : 5. If 20 students are increased in each class, the ratio of changes to 4 : 5 : 7. The total number of students before the increase was
(a) 100 (b) 120
(c) 130 (d) 140

Q.86 The ratio of the number of boys and girls in a school is 2 : 3. If 25% of the boys and 30% of the girls are scholarship holders, the percentage of the school students who are not scholarship holders is
(a) 72 (b) 36
(c) 54 (d) 60

Q.87 The age of Ram is double as that of Shyam and half as that of Suresh. If the sum of their ages is 70, what is the age of Ram?
(a) 20 (b) 40
(c) 30 (d) 10

Q.88 If out of 10 selected students for an examination, 3 were of 20 years age, 4 of 21 and 3 of 22 years, the average age of the group is
(a) 22 years
(b) 21 years
(c) 21.5 years
(d) 20 years

Answer Key : Engineering Aptitude Covering Logical Reasoning and Analytical Ability

1. (b)	2. (b)	3. (a)	4. (b)	5. (a)	6. (a)	7. (a)	8. (c)
9. (a)	10. (b)	11. (b)	12. (c)	13. (c)	14. (a)	15. (c)	16. (b)
17. (b)	18. (d)	19. (b)	20. (b)	21. (c)	22. (d)	23. (a)	24. (c)
25. (b)	26. (b)	27. (b)	28. (a)	29. (c)	30. (c)	31. (d)	32. (b)
33. (d)	34. (a)	35. (b)	36. (a)	37. (a)	38. (c)	39. (b)	40. (c)
41. (c)	42. (a)	43. (b)	44. (c)	45. (a)	46. (d)	47. (d)	48. (c)
49. (a)	50. (a)	51. (c)	52. (c)	53. (d)	54. (d)	55. (a)	56. (b)
57. (b)	58. (c)	59. (a)	60. (b)	61. (c)	62. (d)	63. (d)	64. (a)
65. (d)	66. (c)	67. (b)	68. (b)	69. (b)	70. (c)	71. (a)	72. (d)
73. (a)	74. (b)	75. (b)	76. (d)	77. (c)	78. (c)	79. (a)	80. (d)
81. (b)	82. (b)	83. (a)	84. (b)	85. (a)	86. (a)	87. (a)	88. (b)
89. (c)	90. (d)	91. (a)	92. (b)	93. (a)	94. (a)	95. (d)	96. (b)
97. (b)	98. (c)	99. (a)	100. (c)	101. (c)	102. (b)	103. (c)	104. (b)
105. (c)	106. (d)	107. (a)	108. (b)	109. (b)	110. (a)	111. (b)	112. (d)
113. (b)	114. (a)	115. (a)	116. (a)	117. (d)	118. (c)	119. (a)	120. (b)
121. (b)	122. (d)	123. (b)	124. (a)	125. (d)	126. (d)	127. (d)	128. (c)
129. (d)	130. (a)	131. (d)	132. (b)	133. (c)	134. (b)	135. (d)	136. (a)
137. (a)	138. (c)	139. (c)	140. (a)	141. (c)	142. (b)	143. (c)	144. (c)
145. (b)	146. (c)	147. (b)	148. (c)	149. (b)	150. (a)	151. (b)	152. (b)
153. (b)	154. (b)	155. (b)	156. (d)	157. (b)	158. (b)	159. (b)	160. (c)
161. (b)	162. (a)	163. (c)	164. (c)	165. (c)	166. (b)	167. (d)	168. (d)
169. (b)	170. (d)	171. (b)	172. (b)	173. (b)	174. (b)	175. (a)	176. (c)
177. (d)	178. (c)	179. (d)	180. (c)	181. (b)	182. (d)	183. (c)	184. (c)
185. (c)	186. (c)	187. (d)	188. (a)	189. (a)	190. (c)	191. (d)	192. (b)
193. (a)	194. (c)	195. (c)	196. (a)	197. (b)	198. (b)	199. (c)	200. (a)
201. (b)	202. (a)	203. (b)	204. (d)	205. (b)	206. (d)	207. (c)	208. (a)
209. (d)	210. (c)	211. (d)	212. (c)	213. (d)	214. (b)	215. (c)	216. (a)
217. (c)	218. (a)	219. (b)	220. (d)	221. (a)	222. (b)	223. (d)	224. (b)
225. (a)	226. (d)	227. (c)	228. (c)	229. (b)	230. (a)	231. (a)	232. (b)
233. (a)	234. (b)	235. (b)	236. (d)	237. (b)	238. (c)	239. (a)	240. (d)
241. (c)	242. (d)	243. (c)	244. (a)	245. (b)	246. (d)	247. (d)	248. (d)
249. (d)	250. (c)	251. (b)	252. (a)	253. (d)	254. (c)	255. (d)	256. (a)

257. (b)	258. (a)	259. (c)	260. (a)	261. (d)	262. (c)	263. (a)	264. (d)
265. (a)	266. (d)	267. (c)	268. (b)	269. (b)	270. (a)	271. (b)	272. (d)
273. (c)	274. (b)	275. (b)	276. (a)	277. (a)	278. (d)	279. (d)	280. (b)
281. (a)	282. (d)	283. (c)	284. (b)	285. (b)	286. (a)	287. (d)	288. (b)
289. (d)	290. (a)	291. (d)	292. (a)	293. (b)	294. (d)	295. (c)	296. (b)
297. (b)	298. (d)	299. (d)	300. (b)	301. (a)	302. (d)	303. (b)	304. (b)
305. (a)	306. (d)	307. (a)	308. (b)	309. (c)	310. (b)	311. (a)	312. (d)
313. (b)	314. (a)	315. (d)	316. (c)	317. (a)	318. (d)	319. (c)	320. (b)
321. (b)	322. (a)	323. (c)	324. (b)	325. (c)	326. (b)	327. (b)	328. (b)
329 (d)	330. (b)	331. (c)	332. (a)	333. (b)	334. (b)	335. (c)	336. (b)
337. (a)	338. (c)	339. (b)	340. (d)	341. (a)	342. (b)	343. (a)	344. (b)
345. (a)	346. (a)	347. (b)	348. (a)	349. (d)	350. (b)	351. (b)	352. (a)
353. (d)	354. (d)	355. (d)	356. (a)	357. (c)	358. (c)	359. (a)	360. (c)

Explanations : Engineering Aptitude Covering Logical Reasoning and Analytical Ability

1. (b)

The series given follow the pattern

+2, +2 + 4, +2 + 4 + 6, +2 + 4 + 6 + 8, +2 + 4 + 6 + 8 + 10,...

Here ? = 7 + 2 + 4 = 13

2. (b)

The given series follows a logic that

11 × 12, 12 × 13, 13 × 14, 14 × 15, 15 × 16, ...

So the missing number is 13 × 14 = 182

3. (a)

(2000 + 3)(2000 + 4) – (2000 + 1) (2000 + 2) = ?

Since (2000 × 2000) – (2000 × 2000) is equal to zero ?

= (8000 + 6000 + 12) – (4000 + 2000 + 2)

= 14012 – 6002

= 8010

4. (b)

If R and S are multiple of 5, then R + S may or may not be divisible by 10.

To solve such problems, always take actual values and check.

For example, if R = 20 and S = 15, we can see that only option (b) is the right option.

5. (a)

$3 \times 2 + 2 = 8$

$8 \times 3 + 3 = 27$

$27 \times 4 + 4 = 112$

$112 \times 5 + 5 = 565$

6. (a)

Let the number of officers in each row be x and the number of rows be y.

Total number of officers = xy, According to question,

$(x + 4)(y - 2) = xy$ ...(i)

$(x - 4)(y + 4) = xy$ ...(ii)

Solving (i) and (ii), we get:

$x = 12;\ y = 8$

Thus, total number of officers would be

$= 2 \times 8 = 96$

7. (a)

Let the son's present age be x years.

Then, $(38 - x) = x$

$x = 19$

Son's age 5 years back = (19 – 5) = 14 years

8. (c)

Let the ten's digit be x

Then, unit's digit = $2x + 1$

$[10x + (2x + 1)] - [\{10(2x + 1) + x\} - \{10x + (2x + 1)\}] = 1$

$\Rightarrow \quad (12x + 1) - (9x + 9) = 1 \Leftrightarrow 3x = 9, x = 3$

So, ten's digit = 3 and unit's digit = 7

Hence, original number = 37

9. (a)

4 * 56 is divisible by 33 if and only if it is divisible by 3 and 11.

4 * 56 will be divisible by 3 if * will be equal to 0, 3, 6, 9.

4 * 56 is divisible by 11 if (4 + 5) – (* + 6) will be divisible by 11. So * should be 3.

10. (b)

82 means 8 – 2 = 06

Similarly, 76 means 7 – 6 = 01

11. (b)

121 > 222 > 424 > 828

The first and the third digit get doubled.

12. (c)

2 + 1 = 3

3 + 2 = 5

5 + 4 = 9

9 + 8 = 17

17 + 16 = 33

13. (c)

As 23 – 10 = 13

Similarly 54 – 10 = 44

14. (a)

Group B contains 23 questions which carry 46 marks If group C contains 1 question which will carry 3 marks.

∴ Group A will contains 76 questions which will carry 76 marks.

∴ Total marks = 125

Now 76 marks of 125 marks are = 60·8%

Hence, group C will contain only 1 question.

15. (c)

In group C there are 8 questions

→ 24 marks

If in group B there are 14 questions

→ 28 marks

∴ In group A there are 78 questions

→ 78 marks

Total mark = 130

∴ % marks in group B = 130 = 21·54

If in group B there are 13 questions! 26 marks

∴ Mark of group C = 24 and

Marks of group A = 79 = 26 × 100

∴ % marks in group B = 129 = 20·15%

Hence, group B contains either 13 or 14 questions.

16. (b)

Number of more questions she would have to answer correctly to earn a 60% passing marks are 5.

17. (b)

The number of girls in the class 12.

18. (d)

A is older than C

19. (b)

Percentage of males employed in the company is 80%.

20. (b)

Number Y less than the number X by 10%.

21. (c)

The side of the cube is 4 cm.

22. (d)

Let there be x voters and k votes goes to loser then

$0.8x - 120 = + (k + 200)$ ...(i)

$k + 200 = 0.41x$ ...(ii)

So, $k = 1440$

and $(k + 200) = 640$

Therefore $\frac{1440}{3200} \times 100 = 45\%$

23. (a)

The ratio of the basic pay of the former to the basic pay of the latter is 16 : 13.

24. (c)

Let the number be x

$x \times 0.75 + 75 = x$

$x \times \frac{3}{4} + 75 = x$

So, $x = 300$

Hence, the 40% of x will be = 120

25. (b)

Value of report = 20 × 55 × 65

Number of sheets finally used = 'N'

N × 65 × 70 = 20 × 55 × 65

$N = \frac{110}{7} = 15.7 \approx 16$

$$\% \text{ reduction} = \frac{20-16}{20} = 20\%$$

Hence, (b) is the correct option.

26. (b)

Total number of votes = 7500

Given that 20% of Percentage votes were invalid

$\Rightarrow$ Valid votes = 80%

Total valid votes = $7500 \times 0.8 = 6000$

1st candidate got 55% of the total valid votes.

Hence the 2nd candidate should have got 45% of the total valid votes

$\Rightarrow$ Valid votes that 2nd candidate got = Total valid votes $\times$ 0.45

$= 7500 \times 0.8 \times 0.45 = 2700$

27. (b)

Let each side of the square be a, then area = $a \times a$

As given that The side is increased by 25%, then

New side = $0.125a$

New area = $(0.125a)(0.125a)$

$$\text{Increased area} = \left(\frac{25}{16}\right)(a)(a) - (a)(a)$$

$$\text{Increase\%} = \frac{\left(\left(\frac{25}{16}\right)(a)(a) - (a)(a)\right)}{(a.a)}$$

$= 56.25\%$

28. (a)

20% of $a = b$ means $0.20 \times a = b$

b% of 20 = $0.b \times 20 = 0.20 \times a \times 20$ = 4% of a.

29. (c)

The fruit content in both the fresh fruit and dry fruit is the same.

Given, fresh fruit has 68% water. So remaining 32% is fruit content. Weight of fresh fruits is 100 kg

Dry fruit has 20% water. So remaining 80% is fruit content. Let weight of dry fruit be y kg.

Fruit % in fresh fruit = Fruit% in dry fruit

So $\frac{32}{100} \times 100 = \frac{80}{100} \times y$

We get, $y = 40$ kg

30. (c)

Let x be the maximum marks,

Then (25% of x) + 30 = (50% of x) – 20

$$\frac{x}{4} + 30 = \frac{x}{2} - 20$$

So $2x - x = 120 + 80$

Hence $x = 200$

Hence maximum marks = 200

The minimum pass marks

= 25% or 200 + 30 = 80

31. (d)

If one candidates gets 84% of votes, than the other gets 16%. Let the total number of votes be x

$\Rightarrow$ (84% – 16%) of $x = 476$

$\Rightarrow$ 68% of $x = 476$

$\Rightarrow$ $x = 700$

32. (b)

Let the salaries of A, B, C be x, $2x$ and $3x$ respectively.

Then, $2x + 3x = 6000 \Rightarrow x = 1200$

A's salary = ₹ 1200, B's salary = ₹ 2400 and C's salary ₹ 3600

Excess of C's salary over A's

$$= \left[\frac{2400}{1200} \times 100\right] = 200\%$$

33. (d)

Let number of boys be 'B' and number of girls be 'G'.

Here from given data,

$B + G = 1650$ ...(i)

$B - G = 400$ ...(ii)

From (i) and (ii), we get

$2B = 2050$

$\Rightarrow$ $B = 1025$

$\Rightarrow$ $G = 1650 - 1025 = 625$

Hence, the % of girls = $625 \times \frac{100}{1650} = 37.87$

$\Rightarrow$ 38% (approx).

34. (a)

Let length, breadth and height of the room be 7, 3, 1 unit respectively.

Area of walls = $2(l + b) \times h$

$= 2(7 + 3) \times 1 = 20$ sq. unit.

Now, length, breadth and height of room will become 3.5, 6 and 2 respectively.

Area of walls = $2(l + b) \times h$

$= 2(3.5 + 6) \times 2 = 38$ sq. unit.

% Increase in the area of walls

$$= (38 - 20) \times \frac{100}{20} = 90\%$$

35. (b)

Let S.P. of 45 lemons be ₹ x

Then, 80 : 40 = 120 : x or x

$$= \frac{40\times120}{80} = 60$$

For ₹ 60, lemons sold = 45

For ₹ 24, lemons sold = $\frac{45\times24}{60} = 18$

36. (a)

Given that the student got 125 marks and still he failed by 40 marks

⇒ The minimum pass mark = 125 + 40 = 165

Given that minimum pass mark = 33% of the total mark

Total marks*(0.33) = 165

So, total marks = 500

37. (a)

Let the original price be ₹ 100.

New final price = 120 % of (75 % of ₹ 100)

$$= ₹\frac{120}{100}\times\frac{75}{100}\times100 = ₹\ 90$$

Decrease = 10%

38. (c)

Let the total profit be ₹ 100

After paying to charity, A's share

$$= 95\times\frac{3}{5} = ₹\ 57$$

If A's share is ₹ 57, total profit = ₹ 100

If A's share is ₹ 855, total profit

$$= \frac{100}{57}\times855 = 1500$$

39. (b)

Let C.P. of each article be ₹ 1 C.P. of x articles = ₹ x.

S.P. of x articles = ₹ 20

Profit = ₹$(20 - x)$

So, $\frac{20-x}{x}\times100 = 25$

$2000 - 100x = 25x$

$125x = 2000$

$x = 16$

40. (c)

Let the total profit be ₹ z

Then,

B's share = ₹ $\frac{2z}{3}$, A's share

$$= ₹\ z - \frac{2z}{3} = ₹\frac{z}{3}$$

$$A : B = \frac{z}{3} : \frac{2z}{3} = 1 : 2$$

Let the total capital be ₹ x and suppose B's money was used for x months. Then.

$$\frac{\frac{x}{4}\times15}{\frac{3x}{4}\times y} = \frac{1}{2}$$

$$\Leftrightarrow \quad y = 15\times\frac{2}{3} = 10$$

Thus, B's money was used for 10 months

41. (c)

Least Cost Price = ₹ (200 × 8) = ₹ 1600

Greatest Selling Price = ₹ (425 × 8) = ₹ 3400

Required profit = ₹(3400 – 1600) = ₹ 1800

42. (a)

Let the original salaries of Ravi and Sumit be ₹ $2x$ and ₹ $3x$ respectively.

Then, $\frac{2x+4000}{3x+4000} = \frac{40}{57}$

$\Rightarrow \quad 57\times(2x + 4000) = 40\times(3x + 4000)$

$\Rightarrow \quad 6x = 68{,}000$

$\Rightarrow \quad 3x = 34{,}000$

43. (b)

Let ₹ x be the fare of city B from city A and ₹ y be the fare of city C from city A.

Then, $2x + 3y = 77$ ...(i) and

$3x + 2y = 73$ ...(ii)

Multiplying (i) by 3 and (ii) by 2 and subtracting,

We get $5y = 85$ or $y = 17$

Putting $y = 17$ in (i),

We get $x = 13$

44. (c)

Friends, we know we will need gain amount to get gain percent, right. So lets get gain first.

Let the cost price of 1 pen is Re. 1

Cost of 8 pens = ₹ 8

Selling price of 8 pens = 12

Gain = 12 – 8 = 4

$$\text{Gain\%} = \frac{\text{Gain}}{\text{Cost}}\times100\%$$

$$= \frac{4}{8}\times100 = 50\%$$

45. (a)

C.P of the table = ₹ 3200

Desired S.P = 3200 + 25% of 3200

$= ₹\ 4000$

Let marked price be x

So, 80% of $x = 4000$

Hence, $x = 5000$

46. (d)

Label price $= ₹\ 286$

Let the C.P or the production cost be x

So, $1.3x = 286$ hence, $x = 220$

Selling price after 10% discount = 257.4

Net profit $= ₹\ 257.4 - 220 = ₹\ 37.4$

47. (d)

C.P of the article = 210

Desired S.P. = 210 + 20% of 210 = 252

Let the marked price be x

So, 87.5% of $x = 252$

Hence, $x = 288$

48. (c)

Marked price of the article = ₹ x

$$\frac{x\times 90}{100} = \frac{360\times 125}{100}$$

$x = ₹\ 500$

49. (a)

Cost price of article = ₹ x

$$x\times\frac{140}{100}\times\frac{95}{100} = 1064$$

$x = ₹\ 800$

So, Gain 1064 – 800 = ₹ 264

50. (a)

$$\text{Cost Price} = ₹\frac{100}{125}\times 8750$$

$= ₹\ 7000$

Let the labelled price be ₹ x.

Then, $\frac{70}{100}x = 7000$

So, $x = ₹\ 10000$

51. (c)

Let the Oranges be 'O', Bananas be 'B' and Apples be 'A'.

From the given data,

$2O + 3B + 4A = 15$ ...(i)

$3O + 2B + A = 10$ ...(ii)

On adding (i) and (ii),

$5O + 5B + 5A = 25$

$O + B + A = 5$

$4O + 4B + 4A = 20$

52. (c)

Market Price (MP) of article before discount ₹ 2000

S.P of item after allowing discount = ₹ 1800.

Profit on selling price is ₹ 200.

Hence the C.P = ₹ 1600.

Difference between MP and CP is ₹ 400

Hence profit will be $\frac{400}{1600}\times 100 = 25\%$

53. (d)

Market price of shirts = ₹ 850

S.P after allowing 4% discount.

$850\times 0.04 = 816$

Let the C.P is ₹ x, then ₹ 816

120% of x

$x \times 1.2 = 816$

$x = 680$

Hence, the C.P of article is ₹ 680.

54. (d)

Let the indicated weight be 100 gm and C.P. and S.P. be 1 ₹/gm

Now quantity given to the customer

$= (1 - 0.2) \times 100 = 80$ gm

So investment of shopkeeper $= 80 \times 1 = ₹\ 80$

The amount gained from the customer

$= 100 \times 1 = ₹\ 100$

$$\text{Profit \%} = \frac{100-80}{80}\times 100$$

$= 25\%$ profit

55. (a)

$$\text{C.P.} = \frac{40}{100}\times \text{S.P. i.e. S.P.} = \frac{5}{2}\ \text{C.P.}$$

$\therefore$ S.P. $= 250\%$ of C.P.

56. (b)

Its purchase price was = ₹ 12000

57. (b)

C.P. of 56 kg rice = ₹ $(26 \times 20 + 30 \times 36)$

$= ₹\ (520 + 1080) = ₹\ 1600$

S.P. of 56 kg rice = ₹ $(56 \times 30) = ₹\ 1680$

Gain: $\frac{80}{1600}\times 100 = 5\%$

58. (c)

$$300 = P\times\frac{10}{100}\times\frac{10}{100}$$

$P = ₹\ 30000$

59. (a)

Let x be the investment of Lasya in 5% and y be in 4%

$$\frac{x\times 5\times n}{100} = \frac{y\times 4\times n}{100}$$

$$\Rightarrow \quad \frac{x}{y} = \frac{4}{5}$$

$$x : y = 4 : 5$$

60. (b)

Amount after 1 year on ₹ 1600 (deposited on 1st January) at 5% when interest calculated half-yearly

$$= P\left(1+\frac{R}{2\times 100}\right)^{2T}$$

$$= 1600\times\left(1+\frac{5}{2\times 100}\right)^{2}$$

$$= 1600\left(1+\frac{1}{40}\right)^{2}$$

Amount after $\frac{1}{2}$ year on ₹ 1600 (deposited on 1st July) at 5% when interest calculated half-yearly

$$= P\left(1+\frac{R}{2\times 100}\right)^{2T}$$

$$= 1600\left(1+\frac{5}{2\times 100}\right)$$

$$= 1600\left(1+\frac{1}{40}\right)$$

Total Amount after 1 year

$$= 1600\times\left(1+\frac{1}{40}\right)^{2} + 1600\times\left(1+\frac{1}{40}\right)$$

$$= 1600\times\left(\frac{41}{40}\right)^{2} + 1600\times\frac{41}{40}$$

$$= 1600\times\frac{41}{40}\times\left[1+\frac{41}{40}\right]$$

$$= 1600\times\frac{41}{40}\times\frac{81}{40} = 41\times 81 = ₹\ 3321$$

Compound Interest = ₹ 3321 – ₹ 3200 = ₹ 121

61. (c)

Simple interest = 27250 – 25000 = 2250

Time = 3 years

$$SI = \frac{PTR}{100} \rightarrow R = SI\times\frac{100}{PT}$$

$$R = \frac{2250\times 100}{25000\times 3} \rightarrow R = 3\%$$

62. (d)

Amount with interest after 4 years = ₹ 78000

Therefore, simple interest = 78000 – Principal

Let the principal amount be p.

$$78000 - p = p\times 4\times\frac{5}{100} \rightarrow p = 13000$$

Principal = 78000 – 13000 = ₹ 65000

63. (d)

Amount becomes 15000 in 2.5 years and 16500 in 4 years.

Simple interest for (4 – 2.5) years = 16500 – 15000

Therefore, SI for 1.5 years = ₹ 1500

$$\text{SI for 2.5 years} = \frac{1500}{1.5}\times 2.5 = 2500$$

$$\text{Principal amount} = 15000 - 2500 = ₹\ 12500$$

$$\text{Rate of Interest} = \frac{2500\times 100}{12500\times 2.5}$$

$$\rightarrow \quad R = 8\%$$

64. (a)

$$\text{Amount with CI} = 3000\times 1+\frac{5}{100^{2}} = ₹\ 3307.5$$

Therefore, CI = 3307.5 – 3000 = ₹ 307.5

65. (d)

$$\text{Amount with CI} = 10000\left[1+\left(\frac{12}{2\times 100}\right)\right]^{2}$$

$$= ₹\ 11236$$

Therefore, CI = 11236 – 10000 = ₹ 1236

66. (c)

Let the principal amount be x.

$$SI = x\times 2\times\frac{8}{100} = \frac{4x}{25}$$

$$CI = x\left[1+\frac{8}{100}\right]^{2} - x \rightarrow \frac{104x}{625}$$

Therefore, $\frac{104x}{625} - \frac{4x}{25} = 12.80$

Solving which gives x, Principal = ₹ 2000

67. (b)

Let the rate of interest be r.

$$5000\left[1+\frac{r}{100}\right]^{2} = 5000 + 253.125$$

$$\Rightarrow \quad \left[1+\frac{r}{100}\right]^2 = \frac{5253.125}{5000}$$

Solving which gives

$$\left[1+\frac{r}{100}\right]^2 = \frac{1681}{1600}$$

$$\Rightarrow \quad 1+\frac{r}{100} = \frac{41}{40}$$

$$\Rightarrow \quad r = 2.5$$

Therefore, $SI = 5000 \times 2 \times \frac{2.5}{100} = ₹\ 250$

68. (b)

$P = ₹\ 600,\ A = ₹\ 720$

$T = 4$ years, $R = ?$

$$R = \frac{S.I.\times 100}{P\times T}$$

$$= \frac{120\times 100}{600\times 4} = 5\%$$

At 7% rate

$$S.I. = \frac{600\times 7\times 4}{100} = 168$$

$$A = 600 + 168 = 768$$

69. (b)

Let the principal be ₹ x.

$$\text{Simple interest} = \frac{x\times 30}{100} = \frac{3x}{10}$$

$$T = \frac{100\times SI}{PR} = \frac{\frac{100\times 3x}{10}}{x\times 15} = 2\%$$

Alternatively, this can be solved by considering principal amount to be ₹ 100.

Then simple interest becomes ₹ 30.

Then, $$T = \frac{100\times 30}{100\times 15} = 2\%$$

70. (c)

Sum, $$P = \frac{100\times SI}{RT} = \frac{100\times 60}{5\times 2} = ₹\ 600$$

Amount after 2 years on ₹ 600 at 5% per annum when interest is compounded annually

$$= P\left(1+\frac{R}{100}\right)^T = 600\left(1+\frac{5}{100}\right)^2$$

$$= 600\times\frac{105}{100}\times\frac{105}{100} = ₹\ 661.5$$

Compound Interest = 661.5 – 600 = 61.5

71. (a)

The age of two persons are 4 m and 7 m year so,

$7\ m - 4\ m = 30$

$3\ m = 30$

So, $m = 10$

Sum of their ages $= 4\ m + 7\ m = 11\ m$

$= 11 \times 10 = 110$ year

72. (d)

$$\text{Content of sugar in A} = \frac{30\,gm}{180\ ml} = \frac{1\,gm}{6\ ml}$$

$$\text{Content of sugar in B} = \frac{40\,gm}{280\ ml} = \frac{1\,gm}{7\ ml}$$

$$\text{Content of sugar in C} = \frac{20\,gm}{100\ ml} = \frac{1\,gm}{5\ ml}$$

Hence vessels C is the sweetest, followed by vessels A and B.

Hence answer is option (d).

Solution (Q.73 to Q.75):

$$\text{Number of boys} = \frac{3}{7}\times 175 = 75$$

Number of girls = 175 – 75 = 100

Number of boys who option only Hindi = 40% of 75 = 30

Remaining boys = 75 – 30 = 45

Number of boys who option only Sanskrit

$$= \frac{2}{3}\times 45 = 30$$

Number of boys who option composite subjects = 45 – 30 = 15

Total number of students who option only Sanskrit = 44% of 175 = 77

Number of girls who option only Sanskrit

= 77 – 30 = 47

Number of girls who option composite subjects = 32

Number of girls who option Hindi only

= 100 – (32 + 47) = 21

73. (a)

From above, the required ratio = 30 : 32

$\Rightarrow$ 15 : 16

86. (d)

$M = 2W$

$M - 20 = W + 5$

$2W - 20 = W + 5$

$W = 25$

$M = 50$

Total = 75