



ESE 2026

UPSC Engineering Services Examination

Preliminary Examination

— TOPIC WISE —

Previous Year Questions with Detailed Solution



GENERAL STUDIES & ENGINEERING APTITUDE

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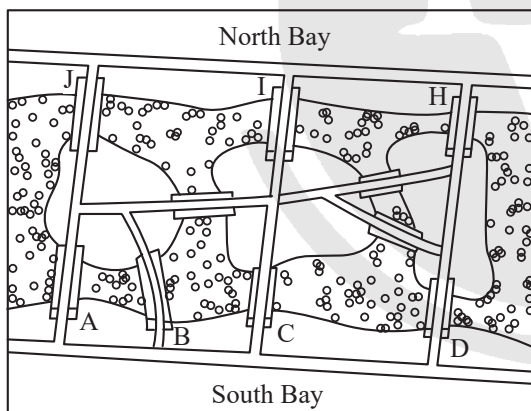
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Quantitative Aptitude

Data Interpretation

- Three hundred passengers are travelling in white, silver and black cars; each of these cars is carrying 6, 5 and 3 passengers, respectively. If the number of white and silver cars is equal and there is only one black car, what is the total number of cars? [ESE-2017]
 (a) 52 (b) 53
 (c) 54 (d) 55
- The following map shows the 10 bridges and 3 islands between the suburbs of North Bay and South Bay. During your morning workout, you decide to jog over each bridge exactly once. Which one of the following statements is correct? [ESE-2024]



- You want to start from North Bay and that your workout concludes after you jog over the 'D' bridge.
 - You want to start from North Bay and that your workout concludes after you jog over the 'E' bridge.
 - You want to start from North Bay and that your workout concludes after you jog over the bridge.
 - You want to start from North Bay and that your workout concludes after you jog over the 'G' bridge.
- Fifty people were asked to rank their preferences of five varieties of chocolate candy, using 1 for their favorite and 5 for their least favorite. The results are shown in the table below.

	Rankings					
Caramel center	5	4	4	4	2	4
Vanilla center	1	5	5	5	5	5
Almond center	4	1	1	3	4	2
Solid chocolate	3	2	3	2	1	1
Number of voters	17	11	9	8	3	2

According to the table (see the column in grey), three voters ranked solid chocolate first, caramel centers second, almond centers third, toffee centers fourth, and vanilla centers fifth. According to this table, which variety of candy would win the taste test using the plurality voting system? [ESE-2024]

- Almond centers
 - Vanilla centers
 - Toffee centers
 - Caramel centers
- The members of a club are going to elect a president from four nominees. In each first-place vote receives 4 points, each second-place vote receives 3 points, each third-place vote receives 2 points, and each last place vote receives 1 point. If the 100 members of the club mark their ballots as shown in the table below, who will be elected president? [ESE-2024]

	Rankings					
Avalon	2	2	2	2	3	2
Branson	1	4	4	4	2	1
Columbus	3	3	1	3	1	3
Dunkirk	4	1	3	1	4	4
Number of voters	30	24	18	12	10	6

- Avalon
- Branson
- Columbus
- Dunkirk

Numerical Computation

5. Rajiv spends 40% of his salary on food, 20% on house rent, 10% on entertainment and 10% on conveyance. If his savings at the month end are ₹ 2,000, then his monthly salary is [ESE-2017]
- (a) ₹ 6,000
(b) ₹ 8,000
(c) ₹ 10,000
(d) ₹ 12,000
6. A total of 324 notes comprising of ₹ 20 and ₹ 50 denominations make a sum of ₹ 12,450. The number of ₹ 20 notes is [ESE-2017]
- (a) 200 (b) 144
(c) 125 (d) 110
7. Five Men can paint a building in 20 days, 8 Women can paint the same building in 25 days and 10 Boys can paint it in 30 days. If a team has 2 Men, 6 Women and 5 Boys, how long will it take to paint the building? [ESE-2017]
- (a) 12 days
(b) 13 days
(c) 14 days
(d) 15 days
8. A group of workers estimate to finish a work in 10 days, but 5 workers could not join the work. If the rest of them finished the work in 12 days, the number of members present in the team originally is [ESE-2017]
- (a) 50 (b) 45
(c) 35 (d) 30
9. A small production unit now works 6 days per week with $3\frac{1}{3}$ hours of first shift every one of the 6 days and 3 hours of second shift for each of the first 5 days. Wage negotiations led to an agreement to work on 5 days a week with both shifts together clocking $7\frac{1}{2}$ hours per day with an 8% increase in weekly wages. How much change in the hourly production would mean parity in the agreement for both management and employees? [ESE-2018]
- (a) 3.68%
(b) 2.15%
(c) 1.82%
(d) 1.33%

10. Let the sum of the squares of successive integers 0, 1, 2, ..., n - 1, n be denoted by S. Let the sum of the cubes of the same integers be denoted by C. It is desirable that

$\frac{C}{S}$, as n increases in steps of 'unity' from 'zero', is given

by the series: $\frac{0}{1}, \frac{3}{3}, \frac{9}{5}, \frac{18}{7}, \frac{30}{9}, \dots$ (for n = 0, 1, 2, 3, 4, ...).

What will this ratio be for n = 8? [ESE-2018]

- (a) $\frac{108}{17}$ (b) $\frac{103}{17}$
(c) $\frac{103}{15}$ (d) $\frac{100}{15}$

11. Given that 0.8 is one root of the equation

$x^3 - 0.6x^2 - 1.84x + 1344 = 0$. The other roots of the equations will be- [ESE-2018]

- (a) 1.1 and -1.4 (b) -1.2 and 1.4
(c) 1.2 and -1.4 (d) -1.1 and 1.4

12. The equation, $x^3 - 8x^2 + 37x - 50 = 0$ is factored and it has $(3 + 4i)$ as one of its roots. What is the real roots of this equation? [ESE-2018]

- (a) 2 (b) 4
(c) 6.5 (d) 13

13. What is the form of the function $f(x)$ for the following data? [ESE-2018]

x	0	1	2	3
f(x)	3	6	11	18

- (a) $x^2 + 2x + 3$ (b) $x^2 - 2x + 3$
(c) $x^2 + 2x - 3$ (d) $x^2 - 2x - 3$

14. What is the maximum value of z, if $z = 10x + 6y$ subject to the constraints [ESE-2018]

$$3x + y \leq 12, 2x + 5y \leq 34, x \geq 0, y \geq 0?$$

- (a) 56 (b) 52
(c) 52 (d) 40

15. The objective function $z = 3x_1 + 5x_2$ is to be maximized subjected to constraints. [ESE-2018]

$$x_1 + 2x_2 \leq 200$$

$$x_1 + x_2 \leq 150$$

$$x_1, x_2 \geq 0$$

The values of x_1 and x_2 in this context are, respectively

- (a) 100 and 75 (b) 125 and 75
(c) 100 and 50 (d) 125 and 50

**ANSWER KEY**

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

**SOLUTIONS**

1. (d)

Given,

Total passengers = 300

and white, silver & Black car carrying 6, 5 & 3 passengers respectively.

Let, no. of white cars be x , so no. of Silver cars is also x .

now, Total passenger will be

$$6x + 5x + (3 \times 1) = 300$$

$$\Rightarrow 11x = 297$$

$$\Rightarrow x = 27$$

So, Total no. of cars = $x + x + 1$

$$= 27 + 27 + 1$$

$$= 55$$

2. (b)

H to G to E to J to A to B to F to C to D to E

3. (c)

Caramel Center (1) Rank = 0

Vanilla Center (1) Rank = 17

Almond Center (1) Rank = 8

Toffee center (1) Rank = $11 + 9 = 20$ Solid Chocolate (1) Rank = $3 + 2 = 5$

4. (b)

Avalon $\rightarrow 180 + 30 = 210$ Branson $\rightarrow 30 + 216 + 26 = 272$ Column bus $\rightarrow 244$ Dunkirk $\rightarrow 225$

5. (c)

$$\text{Total expenditure} = 40\% + 20\% + 10\% + 10\% = 80\%$$

$$\therefore \text{Savings} = (100 - 80) = 20\%$$

$$\text{Thus } 20\% \text{ of income} = 2,000$$

$$\text{Income} = 2,000 \times \frac{100}{20} = 10,000$$

6. (c)

If we consider all 324 notes to be of ₹ 50, then

$$\text{Amount} = 324 \times 50 = 16200$$

$$\text{But Amount given} = 12450$$

$$\text{Difference} = (16200 - 12450) = 3750$$

The difference of ₹ 30 gives ₹ 20 notes every time

$$\therefore \text{₹ 20 notes} = \frac{3750}{30} = 125$$

OR

$$\text{₹ 20 notes} = T ; \text{₹ 50 notes} = F$$

$$T + F = 324$$

$$20T + 50F = 12450$$

$$50T + 50F = 16200 \quad (324 \times 50)$$

$$\begin{array}{r} - \quad + \quad - \\ -30T = -3750 \end{array}$$

$$T = \frac{3750}{30} = 125$$

7. (d)

$$5 \text{ Men per day} = \frac{1}{20}$$

$$\therefore 1 \text{ Man} = \frac{1}{20 \times 5} = \frac{1}{100}$$



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A detailed image of a red circuit board with various electronic components, including a large black integrated circuit, capacitors, and resistors, serving as a background for the bottom section of the cover.

**ELECTRONICS &
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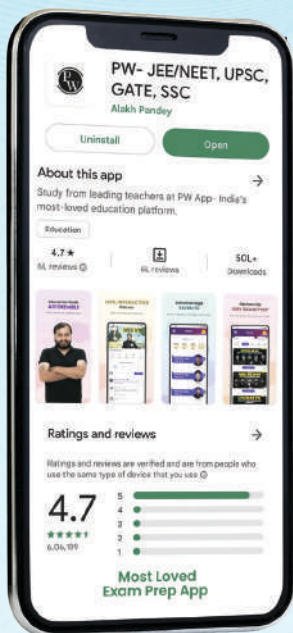
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