Institute of Actuaries of India

ACET June 2026

Mathematics

Q.1 The minimum value of $f(x) = |3x^2 - 6x + 5|$ is:

A. 2
B. 4
C. 5
D. None of the Above

1 mark

Q.2 If $f(x) = x^3 - 6x^2 + 9x + 2$, then f is strictly decreasing on:

A. (1, 3)
B. (0, 1)
C. $(3, \infty)$
D. $(-\infty, 1) \cup (3, \infty)$

2 marks

Q.3 The equation $2x^3 + 3x + 5 = 0$ has:

A. 3 real roots
B. Exactly 2 real roots
C. Exactly 1 real root
D. No real roots

1 mark

Q.4 The coefficient of x^3 in the expansion of $(x + 2)^5$ is:

A. 80
B. 40
C. 10
D. 32

1 mark

Q.5 $\lim(x \to 0) [\sin(5x) - \sin(3x)] / x$ equals:

A. 2

B. 8
C. 5
D. None of the Above

1 mark

Q.6 If a and b are roots of $x^2 - 8x + 15 = 0$, then the equation with roots a^2, b^2 is:

A. $x^2 - 34x + 225 = 0$
B. $x^2 - 30x + 225 = 0$
C. $x^2 - 34x + 64 = 0$
D. None of the above

1 mark

Q.7 If $\vec{v} = 5i + 12j$,the unit vector in the direction of $\vec{v}$is:

A. (5/13)i + (12/13)j
B. (5/17)i + (12/17)j
C. (1/5)i + (1/12)j
D. None of the above

1 mark

Q.8 Which of the following is/are true?

$$X: \vec{a} \cdot (\vec{b} + \vec{c}) = \vec{a} \cdot \vec{b} + \vec{a} \cdot \vec{c}$$

$$Y: \vec{a} \times (\vec{b} + \vec{c}) = \vec{a} \times \vec{b} + \vec{a} \times \vec{c}$$

A. Only X
B. Only Y
C. Both X and Y
D. Neither X nor Y

1 mark

Q.9 If A is a 3×3 matrix with |A| = 4, then |2A| equals:

A. 8
B. 16
C. 32
D. 64

1 mark

Q.10 For a 3×3 matrix M, adj(adj(M)) equals:

A. M
B. $|M| \cdot M$

C. $|M|^2 \cdot M$
D. None of the above

1 mark

Q.11 If ω is a complex cube root of unity ($\omega \neq 1$), then $1 + \omega + \omega^2$ equals:

A. 1
B. 0
C. ω
D. 3

1 mark

Q.12 If $z = (2 + 3i)(1 - i)$, then $|z|$ equals:

A. √13
B. √26
C. 5
D. √29

1 mark

Q.13 Using the Trapezoidal rule with h = 0.5, the approximation of $\int_0^2 (x^3 + 1)\, dx$ is:

A. 6.0
B. 6.25
C. 6.50
D. 7.0

3 marks

Q.14 Using Newton–Raphson method to solve $x^2 - 7 = 0$ with $x_0 = 3$, the value of x_1 is:

A. 2.67
B. 2.83
C. 2.50
D. None of the above

2 marks

Q.15 If $e^x = \cos y$, then dy/dx at x = 0 is:

A. -1
B. 1
C. 0
D. None of the Above

2 marks

Q.16 A geometric progression satisfies $a_4 = 24$ and $a_7 = 3$. The common ratio r equals:

A. 1/2
B. 1/3
C. 2/3
D. None of the Above

2 marks

Q.17 Evaluate ∫ x·sin(x) dx between the limits 0 and π.

A. 0
B. π
C. 2π
D. π/2

3 marks

Q.18 Evaluate: $\int_0^1 x \cdot e^x dx$

A. 1
B. e - 1
C. e - 2
D. 2e - 1

3 marks

Q.19 The value of $1^2 + 2^2 + 3^2 + \ldots + 20^2$ is:

A. 2870
B. 2650
C. 3080
D. 2500

1 mark

Q.20 The function $f(x) = x^4 – 4x^3 + 6$ has a local minimum at:

A. x = 0
B. x = 1
C. x = 3
D. x = 4

1 mark

Statistics

Q.21 A fair 4-sided die (outcomes 1– 4) is rolled. The median outcome is:

A. 2
B. 2.5
C. 3
D. Cannot be determined

1 mark

Q.22 A dataset has mean 50, median 48 and mode 45. The distribution is:

A. Symmetric
B. Negatively skewed
C. Positively skewed
D. Cannot be determined from this information

1 mark

Q.23 A club has 6 boys and 4 girls. A 5-member team must include at least 2 girls. The number of possible teams is:

A. 120
B. 156
C. 186
D. None of the Above

1 mark

Q.24 Two batches: Batch X has 30 students with mean 60. Batch Y has 20 students with mean 75. The combined mean is:

A. 65
B. 66
C. 67.5
D. 68

1 mark

Q.25 For events A and B with $P(A) = 0.4$, $P(B) = 0.6$, $P(A \cup B) = 0.76$. Then $P(A|B)$ equals:

A. 1/6
B. 1/4
C. 1/3
D. None of the Above

1 mark

Q.26 A fair coin is tossed. If Heads: a fair 4-sided die is rolled and Y is the outcome. If Tails: two fair 4-sided dice are rolled and Y is the sum. Then E[Y] equals:

A. 3.75
B. 4.375
C. 5.0
D. 6.25

2 marks

Q.27 Let X ~ Uniform(–1, 3). The IQR of X is:

A. 1
B. 2
C. 3
D. 4

1 mark

Q.28 A lifetime T has an exponential distribution with mean 5. The probability that T exceeds 10 is:

A. e^(–2)
B. e^(–1/2)
C. e^(–5)
D. 1 – e^(–2)

1 mark

Q.29 If X ~ N(5, 16) and Y = 3X + 2, the standard deviation of Y is:

A. 12
B. 16
C. 48
D. 144

1 mark

Q.30 A fair coin is tossed 8 times. The probability of getting exactly 5 heads is:

A. 7/32
B. 7/64
C. 7/128
D. 7/256

1 mark

Q.31 For a Poisson(λ) variable X, if P(X = 2) = P(X = 3), then λ equals:

A. 2
B. 3

C. 4
D. 6

1 mark

Q.32 Let X have exponential distribution with mean θ. Given P(X > 3) / P(X > 6) = e^(3/2), the variance of X is:

A. 2
B. 4
C. 8
D. 16

2 marks

Q.33 A discrete random variable X has the following CDF:

F(x) = 0 for $x < 0$

F(x) = 0.15 for $0 \leq x < 1$

F(x) = 0.45 for $1 \leq x < 2$

F(x) = 0.75 for $2 \leq x < 3$

F(x) = 0.95 for $3 \leq x < 4$

F(x) = 1 for $x \geq 4$

The probability that X is even is:

A. 0.35
B. 0.50
C. 0.55
D. 0.60

1 mark

Q.34 Using the same CDF as Q33, the median of X is:

A. 1
B. 2
C. 3
D. None of the above

1 mark

Q.35 The stem-and-leaf plot below shows marks (out of 50):

Stem | Leaves

1 | 5 8

2 | 2 5 5 9

3 | 0 3 7 7 7

4 | 1 4 6 8 8

5 | 0 0 2

Which of the following is correct?

A. The dataset has a unique mode of 37
B. The dataset has two modes: 37 and 48
C. The dataset has three modes: 25, 37, and 48
D. The dataset has no mode

2 marks

Q.36 For variables X and Y, the regression line of Y on X is $3Y - 2X + 4 = 0$. The sample standard deviations are $s_x = 3$, $sy = 2$. Which of the following is true about the correlation coefficient ρ?

A. $\rho = 2/3$
B. $\rho = 1$
C. $|\rho| > 1$, so the given information cannot all be correct
D. $\rho = 4/9$

3 marks

Q.37 For X and Y, the regression of Y on X is $Y = 2X + 1$, and the regression of X on Y is $X = 0.4Y + 0.5$. Then ρ^2 equals:

A. 0.8
B. 0.4
C. 1.6
D. None of the above

2 marks

Q.38 Let X be the outcome of a fair 6-sided die (values 1–6). Define $Y = X^2$. The covariance Cov(X, Y) is:

A. 35.4
B. 6.25
C. 8.75
D. 20.42

3 marks

Q.39 Events A and B satisfy $P(A) = 0.5$, $P(B) = 0.6$, $P(A \cap B) = 0.30$. Which of the following statements is true?

X: A and B are independent.

Y: A and B^c are independent.

A. Both X and Y
B. Only X
C. Only Y
D. Neither X nor Y

2 marks

Q.40 A biased 4-sided spinner has outcomes {1, 2, 3, 4} where P(outcome = k) is proportional to k. A player wins £k if outcome is k. The expected winnings are:

A. 2.5
B. 3
C. 3.2
D. 4

2 marks

Data Interpretation

Q.41 The table below shows the number of units sold (in thousands) by four branches of a retail company across five months:

Branch	January	February	March	April	May
North	45	50	55	60	65
South	60	55	65	70	60
East	35	40	45	40	50
West	50	60	50	55	70

The table below shows the profit margin (%) for each branch:

Branch	Profit Margin (per unit, ₹ thousands)
North	18%
South	22%
East	15%
West	20%

What is the total number of units sold (in thousands) by all branches combined in March?

A. 200

B. 210
C. 215
D. 225

1 mark

Q.42 Which branch recorded the largest absolute increase in sales from January to April?

A. North
B. South
C. East
D. West

2 marks

Q.43 Using May sales and profit margins, the total profit (₹ thousands) across all branches in May is:

A. 47.5
B. 49.7
C. 51.5
D. 46.4

2 marks

Q.44 In which month was the combined sales of all branches the highest?

A. February
B. March
C. April
D. May

1 mark

Q.45 The table below shows the monthly average temperature (°C) recorded in two cities, City P and City Q, over the months January to June.

MM	Jan	Feb	Mar	Apr	May	Jun
City P (°C)	12	14	18	23	28	32
City Q (°C)	20	21	24	26	27	29

In which month is the difference in temperature between City P and City Q the smallest?

A. January
B. April
C. May
D. June

1 mark

Q.46 In which month does City P first exceed City Q in temperature?

A. June
B. April
C. March
D. May

1 mark

Q.47 During which period does City P show its first sharpest month-on-month increase in temperature?

A. Jan–Feb
B. Feb–Mar
C. Mar–Apr
D. Apr–May

1 mark

Q.48 In which month is the combined temperature of City P and City Q the highest?

A. April
B. May
C. June
D. March

1 mark

Q.49 The table below shows the attendance percentage of four departments over four months:

Department	January	February	March	April
Commerce	88%	85%	87%	90%
Science	76%	80%	78%	82%
Arts	91%	89%	93%	92%
Law	84%	88%	86%	85%

Which department had the highest average attendance over the four months?

A. Commerce
B. Science
C. Arts
D. Law

2 marks

Q.50 Which of the following departments had the lowest attendance on any given month?

A. Commerce

B. Science
C. Arts
D. Law

1 mark

Q.51 Which department showed the greatest gap between the highest and lowest attendance (largest range)?

A. Commerce
B. Science
C. Arts
D. Law

2 marks

English

Q.52 Choose the word that best completes the sentence: The scientist's _____ research eventually led to a breakthrough in cancer treatment.

A. superficial
B. diligent
C. erratic
D. negligent

1 mark

Q.53 Choose the word closest in meaning to 'verbose'.

A. concise
B. wordy
C. silent
D. aggressive

2 marks

Q.54 Choose the word that is the opposite of 'benevolent'.

A. generous
B. charitable
C. malevolent
D. indifferent

1 mark

Q.55 Identify the error: 'Neither of the students have submitted their assignment on time.' *1*

A. Neither of the students
B. have submitted
C. their assignment

D. on time

1 mark

Q.56 Fill in the blank: 'The committee finally reached a _____ after hours of debate.

A. consensus
B. census
C. concession
D. convention

1 mark

Q.57 A person who hates mankind is called a _____.

A. philanthropist
B. misanthrope
C. narcissist
D. egotist

2 marks

Q.58 When someone 'beats around the bush', they are:

A. Being very direct
B. Avoiding the main topic
C. Getting angry
D. Working very hard

1 mark

Q.59 Doctor : Stethoscope :: Carpenter : ?

A. Hammer
B. Needle
C. Paintbrush
D. Plough

1 mark

Q.60 Read the passage below and answer Q.60:

Renewable energy sources such as solar, wind, and hydroelectric power are increasingly being adopted worldwide. Governments are investing in these technologies to reduce dependence on fossil fuels and lower carbon emissions. While initial installation costs can be high, the long-term savings and environmental benefits make them an attractive alternative. Critics, however, argue that renewable energy cannot yet reliably meet peak demand without significant advancements in storage technology.

Which of the following is NOT a valid inference from the passage?

A. Renewable energy can help reduce carbon emissions.
B. Governments are supporting the transition to renewable energy.
C. Renewable energy is already fully capable of meeting all energy demands.
D. Long-term financial benefits make renewable energy attractive.

2 marks

Q.61 The following sentences are jumbled. Choose the correct sequence:

I. This eventually led to a revision of the company's pricing strategy.

II. Customers began complaining about the high cost of the product.

III. Sales dropped sharply over the next quarter.

IV. Management ordered an urgent review of customer feedback.

A. II, III, IV, I
B. II, IV, III, I
C. III, II, IV, I
D. IV, II, III, I

2 marks

Q.62 Consider the following sentences:

I. She is more smarter than her classmates.

II. He refused accepting the offer.

III. The team has worked hardly to meet the deadline.

Which sentences are erroneous?

A. I and II
B. I and III
C. II and III
D. I, II and III

1 mark

Logical reasoning

Q.63 Today is 15th August 2024 and it falls on a Thursday. In which of the following years will 15th August again fall on a Thursday?

A. 2030

B. 2031
C. 2035
D. 2036

2 marks

Q.64 Between 6:00 p.m. and 7:00 p.m., how many times do the minute and hour hands of a clock form a straight line (180°)?

A. 0
B. 1
C. 2
D. 3

1 mark

Q.65 A solid cube of side 4 cm is painted red on all faces and then cut into 64 small cubes of side 1 cm each. How many small cubes have paint on exactly 2 faces?

A. 8
B. 24
C. 32
D. 48

2 marks

Q.66 If A is C's mother's brother's daughter, then C is A's:

A. Uncle / Aunt
B. Cousin
C. Nephew / Niece
D. Son / Daughter

1 mark

Q.67 Six students A, B, C, D, E, F sit in a row facing north.

D is immediately to the right of C.

F sits at the left end.

A is somewhere to the right of D.

B is somewhere to the right of A.

Which of the following must be true?

A. B sits next to F
B. E sits next to A
C. B does not sit next to D
D. A is not at the right end

1 mark

Q.68 Statements:

1. All pilots are engineers.

2. Some engineers are doctors.

3. No doctor is a teacher.

Which of the following is definitely true?

A. Some pilots are teachers
B. No engineer is a teacher
C. Some engineers are not teachers
D. All doctors are engineers

1 mark

Q.69 Arrange in a logical sequence: T = Training, R = Recruitment, I = Interview, P = Promotion

A. I, R, T, P
B. T, R, P, I
C. I, S, R, P
D. I, R, P, T

1 mark

Q.70 Find the wrong number in the series: 2, 5, 11, 23, 47, 96, 191

A. 11
B. 23
C. 96
D. 191

1 mark

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