MATHS — Mathematics for Computer Engineering

Scanned question papers, topic-wise · Dec 2025 (QP 00720) + May 2026 (QP 14664)

Every question is the original scanned print from the university paper — nothing re-typed.

Pattern: Q1 compulsory (any 5 of 6 shorts × 3M) + any 3 of Q2–Q6 (15M each) = 60 marks, 2 hours.

SOLVING QUESTIONS

Topic-wise · Dec 2025 + May 2026 · 42 questions

Module I — Linear Algebra (8 questions)

Dec 2025 · Q1a · 3 marks

a. If $A = \begin{bmatrix} 3 & 2 & 1 \\ 0 & -1 & 4 \\ 0 & 0 & -2 \end{bmatrix}$, find Eigen values of $A^{-1} + 6I$ 3

Dec 2025 · Q3c · 6 marks

c. Find Eigen values and Eigen vectors of the matrix 6

$$A = \begin{bmatrix} 3 & -1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{bmatrix}$$

Dec 2025 · Q4b · 5 marks

b. Show that the matrix $A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$ is diagonalisable, hence find it's diagonalisable matrix. 5

Dec 2025 · Q5a · 4 marks

Que.5 a. Verify Cayley- Hamilton theorem for matrix 4

$$A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$$

May 2026 · Q1a · 3 marks

Q.1. Attempt any **Five Questions** from the following.

a) Find the sum and product of the eigenvalues of $A = \begin{bmatrix} -2 & -9 & 5 \\ -5 & -10 & 7 \\ -9 & -21 & 14 \end{bmatrix}$ 3

May 2026 · Q3c · 6 marks

c) Find eigen values and eigen vectors of $A = \begin{bmatrix} -9 & 4 & 4 \\ -8 & 3 & 4 \\ -16 & 8 & 7 \end{bmatrix}$ 6

May 2026 · Q4c · 6 marks

c) Check whether the matrix $A = \begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$ is diagonalizable, if yes, find the diabolizing matrix P and the diagonal matrix D. 6

May 2026 · Q5a · 4 marks

Q5.
a) Verify Cayley-Hamilton theorem for matrix $A = \begin{bmatrix} 3 & 2 & 1 \\ 1 & 2 & 2 \\ 3 & 2 & 1 \end{bmatrix}$ 4

Module II — LPP & NLPP (6 questions)

Dec 2025 · Q1b · 3 marks

b. Transform the LPP to standard form 3
Maximise $Z = 2x_1 + x_2 + 4x_3$
$x_1 - x_2 + 2x_3 \leq 5$
$3x_1 + x_2 + 5x_3 \geq 14$ $x_1, x_2 \geq 0$

Dec 2025 · Q5c · 6 marks

c. Applying Simplex method, Solve the following LPP 6
Maximise $Z = 3x_1 + 2x_2$
Subject to constraint $x_1 + x_2 \leq 4$
$x_1 - x_3 \leq 2$ $x_1, x_2 \geq 0$

Dec 2025 · Q6c · 6 marks

c. Using the method of Lagrange's multipliers solve the following NLPP 6
Optimize $z = -x_1^2 - x_2^2 + 4x_1 + 8x_2$
Subject to: $x_1 + x_2 = 4$ $x_1, x_2 \geq 0$

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May 2026 · Q1b · 3 marks

b) Construct the dual of the following LPP 3
Maximise $Z = 5x_1 + 4x_2$
Subject to constraint $2x_1 + 6x_2 \leq 5$
$7x_1 + 3x_2 \leq 2$
$x_1, x_2 \geq 0$

May 2026 · Q5b · 5 marks

b) Maximise $Z = 7x_1 + 5x_2$ 5
Subject to constraint $-x_1 - 2x_2 \geq -6$
$4x_1 + 3x_2 \leq 12$
$x_1, x_2 \geq 0$

May 2026 · Q6c · 6 marks

c) Using the method of Lagrange's multipliers, solve the following NLPP 6
Maximise $Z = x_1^2 + x_2^2 + x_3^2 - 10x_1 - 6x_2 - 4x_3$
Subject to constraint $x_1 + x_2 + x_3 = 7$ $x_1, x_2, x_3 \geq 0$

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Module III — Modular Arithmetic (6 questions)

Dec 2025 · Q1e · 3 marks

e. What is the remainder when 13^{70} is divided by 21 3

Dec 2025 · Q3b · 5 marks

b. By using Chinese Remainder theorem, Solve 5
$x \equiv 1(mod\ 3),\ \ x \equiv 2(mod\ 4),\ \ x \equiv 3(mod\ 5)$

Dec 2025 · Q4c · 6 marks

c. In RSA System the public key (E, N) of user A is defined as (7,187). Calculate φ(N) and private key 'D". What is the cipher text for M=10 using the public key. 6

May 2026 · Q1e · 3 marks

e) What is the remainder when 5^{11} is divided by 7 3

May 2026 · Q3b · 5 marks

b) By using Chinese Remainder theorem, solve $x \equiv 3(mod\ 4),\ \ x \equiv 5(mod\ 7)$ 5

May 2026 · Q5c · 6 marks

c) Perform key generation encryption and decryption for RSA Algorithm with the following parameters primes p=3, q= 11 message, M=5 6

Module IV — Fourier Series (6 questions)

Dec 2025 · Q1c · 3 marks

c. Find the value of a_n in the expansion of Fourier Series for $f(x) = 4 - x^2$ in $(0,\ 2\pi)$ 3

Dec 2025 · Q2c · 6 marks

c. Expand Fourier series for $f(x) = x^2$ in $(0,\ 2)$ 6

Dec 2025 · Q6b · 5 marks

b. Find Fourier series for the function $f(x) = x\ ,0 < x < 2\pi$ 5

May 2026 · Q1c · 3 marks

c) Find value of a_n in the expansion of Fourier series for $f(x) = x^2\ in\ (-\pi, \pi)$ 3

May 2026 · Q2c · 6 marks

c) Expand Fourier series for $f(x) = x^2\ in\ (0,2)$ 6

May 2026 · Q6a · 4 marks

Q6.
a) Expand Fourier series for $f(x) = x\ in\ (-\pi,\ \pi)$ 4

Module V — Statistics (8 questions)

Dec 2025 · Q1f · 3 marks

f. Obtain Spearman's rank correlation coefficient for following data 3

X	24	24	24	55	25
Y	24	31	51	40	38

Dec 2025 · Q2b · 5 marks

b. Five students got the following percentage of marks in mathematics and statistics 5

Maths	28	34	18	25	75	23	24	33	37	43
Stats	24	31	11	34	65	24	23	53	53	42

Calculate the coefficient of correlation.

Dec 2025 · Q3a · 4 marks

Que. 3 a. Obtain equations of line of regression of x on y for following data. 4

X	31	44	65	49	41
Y	48	32	21	66	43

Dec 2025 · Q6a · 4 marks

Que.6 a. Fit a straight line of the form y=a+bx to the following data 4

X	1	4	7	9	8	10
Y	18	14	19	27	18	28

May 2026 · Q1f · 3 marks

f) Obtain Spearman's rank correlation coefficient for following data 3

X	18	17	13	17	19	21
Y	21	22	14	17	18	13

May 2026 · Q2b · 5 marks

b) Calculate the correlation coefficient for the following heights of fathers(X) and their sons(Y) 5

X	65	66	67	67	68	69	70	72
Y	67	68	65	68	72	72	69	71

May 2026 · Q3a · 4 marks

Q.3.

a) Fit a straight line of the form y=a+bx to the following data 4

X	1	3	5	7	8	10
Y	8	4	5	7	8	4

May 2026 · Q6b · 5 marks

b) Obtain the equation of line of regression of X on Y 5

X	21	23	25	27	28	20
Y	8	12	15	17	18	20

Module VI — Probability (8 questions)

Dec 2025 · Q1d · 3 marks

d. A random variable x defines the possible outcomes of tossing of a fair die, find moment generating function of x about origin 3

Dec 2025 · Q2a · 4 marks

Que. 2 a. It is known that the probability of an item produced by a certain machine will be defective is 0.001. If the produced items are sent to the market in packets of 100, find the number of packets containing at least 2 are defective in the consignment of 2000 Packets.

Dec 2025 · Q4a · 4 marks

Que. 4 a. A random variable X has probability density function 4

$f(x) = x^2 e^{-x} \qquad x \geq 0$

Find 2 moments about origin and mean.

Dec 2025 · Q5b · 5 marks

b. The height of school children of one school is normally distributed with mean of 54 inches and standard deviation 12 inches. What proportion of students have height between i. 46 and 56 inches ii. More than 56 5

May 2026 · Q1d · 3 marks

d) Calculate first 2 raw moments for probability density function 3

$$f(x) = \begin{cases} xe^{-x} & x \geq 0 \\ 0 & Otherwise \end{cases}$$

May 2026 · Q2a · 4 marks

Q.2.

a) The number of traffic accidents that occur on a particular stretch of road during a month follows a Poisson distribution with a mean of 7. Find the probability of observing exactly three accidents on this stretch of road next month 4

May 2026 · Q4a · 4 marks

A·P - 10664 (2/2)

Q4.

a) A random variable X has the following probability distribution 4

X	1	2	3	4
P(X=x)	0.2	0.3	0.3	0.2

Find moment generating function about origin of x, hence find first two raw moments.

May 2026 · Q4b · 5 marks

b) The distribution of wait times at a drive-through restaurant is approximately normal with mean 185 seconds and standard deviation 15 seconds. find the percentage of wait times that are 5

i. between 155 and 215 seconds.

ii. more than 170 seconds.

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