ECAT

Engineering College Admission Test

PRE-ENGINEERING (MATHEMATICS GROUP)

Full Official-Style Mock Paper • With Answers • Highlighted MCQs

■ Mathematics	■ Physics	■ English	■ Intelligence
40 Marks · 40 MCQs	**30** Marks · 30 MCQs	**10** Marks · 10 MCQs	**10** Marks · 10 MCQs

■ **Total Questions**	90 MCQs
■ **Time Allowed**	3 Hours (180 Minutes)
■ **Total Marks**	90 (1 mark per question)
■ **Negative Marking**	None
■ **Exam Format**	All Multiple Choice Questions (4 options each)
■ **Answer Key**	Correct option highlighted in GREEN on every question
■ **Eligibility**	FSc Pre-Engineering / Intermediate Mathematics Group
■ **Conducted by**	UET Lahore & affiliated engineering universities

GENERAL INSTRUCTIONS

1. This paper contains 90 Multiple Choice Questions divided into 4 sections.

2. Each correct answer carries ONE mark. There is NO negative marking.

3. Only ONE option is correct for each question.

4. Do NOT spend too much time on any single question.

5. Mathematics section requires careful calculation — manage your time wisely.

6. Rough work may be done in the margin of your question booklet.

7. The correct answer is highlighted in GREEN for study and revision.

8. Calculators are NOT allowed in the actual ECAT examination.

9. Eligibility: FSc Part-II (Pre-Engineering) or equivalent with Maths, Physics, English.

SECTION: MATHEMATICS | 40 Marks | 40 Questions

Q1. If A = {1,2,3} and B = {2,3,4}, then A ∩ B is:

(A) {1,2,3,4}

(B) {2,3} ✔

(C) {1,4}

(D) {1,2,3}

Q2. The solution set of |2x - 4| = 6 is:

(A) {-1, 5} ✔

(B) {1, -5}

(C) {5, -1}

(D) {-5, 1}

Q3. If $\log_2 x = 5$, then x equals:

(A) 10

(B) 32 ✔

(C) 25

(D) 16

Q4. The sum of roots of $3x^2 - 5x + 2 = 0$ is:

(A) 5/3 ✔

(B) -5/3

(C) 2/3

(D) 3/5

Q5. The product of roots of $x^2 + 4x - 12 = 0$ is:

(A) 12

(B) -12 ✔

(C) 4

(D) -4

Q6. If $f(x) = 2x^2 + 3$, then f(-2) is:

(A) 7

(B) 11 ✔

(C) -5

(D) 19

Q7. The 10th term of the A.P. 3, 7, 11, 15 ... is:

(A) 39 ✔

(B) 43

(C) 47

(D) 35

Q8. The sum of first 8 terms of G.P. 2, 4, 8, ... is:

(A) 510 ✔

(B) 508

(C) 512

(D) 506

Q9. If $nC_3 = 56$, then n =

(A) 6

(B) 7

(C) 8 ✔

(D) 9

Q10. The number of diagonals in a hexagon is:

(A) 9 ✔

(B) 12

(C) 15

(D) 6

Q11. sin 2A equals:

(A) 2 sinA

(B) 2 sinA cosA ✔

(C) $\sin^2 A - \cos^2 A$

(D) $1 - 2\sin^2 A$

Q12. The value of cos 60° + sin 30° is:

(A) 0

(B) 1 ✔

(C) 2

(D) √3

Q13. tan(45° + 45°) is equal to:

(A) 1

(B) 0

(C) Undefined ✔

(D) √3

Q14. In a triangle, if a = 5, b = 7, C = 90°, then c =

(A) √24

(B) √74 ✔

(C) √12

(D) √35

Q15. The period of sin 2x is:

(A) π ✔

(B) 2π

(C) π/2

(D) 4π

Q16. If vectors A = 2i + 3j and B = i - j, then A · B =

(A) -1 ✔

(B) 1

(C) 5

(D) -5

Q17. The slope of the line 3x - 4y + 7 = 0 is:

(A) 3/4 ✔

(B) -3/4

(C) 4/3

(D) -4/3

Q18. The distance between points (3,4) and (0,0) is:

(A) 7

(B) 5 ✔

(C) 4

(D) 3

Q19. The equation $x^2 + y^2 = 25$ represents a circle with radius:

(A) 25

(B) 5 ✔

(C) √5

(D) 10

Q20. The focus of parabola $y^2 = 8x$ is at:

(A) (2,0) ✔

(B) (8,0)

(C) (0,2)

(D) (4,0)

Q21. The derivative of sin x is:

(A) -cos x

(B) cos x ✔

(C) tan x

(D) -sin x

Q22. If $y = x^4 - 3x^2 + 5$, then dy/dx at x=1 is:

(A) 0

(B) 1

(C) 2 ✔

(D) -2

Q23. $\int 2x\,dx$ equals:

(A) 2x + C

(B) $x^2 + C$ ✔

(C) $2x^2 + C$

(D) x + C

Q24. The limit of $(x^2-1)/(x-1)$ as $x \to 1$ is:

(A) 0

(B) 1

(C) 2 ✔

(D) Undefined

Q25. The maximum value of $f(x) = -x^2 + 4x$ occurs at x =

(A) 4

(B) 2 ✔

(C) 1

(D) -2

Q26. If A = [[1,2],[3,4]], the determinant |A| is:

(A) 2

(B) -2 ✔

(C) 10

(D) -10

Q27. The transpose of [[1,2,3],[4,5,6]] has order:

(A) 2×3

(B) 3×2 ✔

(C) 2×2

(D) 3×3

Q28. A square matrix is singular if its determinant is:

(A) 1

(B) -1

(C) 0 ✔

(D) Positive

Q29. If A is a 3×3 matrix with |A| = 6, then |2A| =

(A) 12

(B) 24

(C) 48 ✔

(D) 6

Q30. The mean of 4, 8, 6, 5, 7 is:

(A) 5

(B) 6 ✔

(C) 7

(D) 8

Q31. The median of {3, 5, 7, 9, 11} is:

(A) 5

(B) 7 ✔

(C) 9

(D) 11

Q32. P(A ∪ B) = P(A) + P(B) when A and B are:

(A) Dependent

(B) Mutually exclusive ✔

(C) Exhaustive

(D) Independent

Q33. A coin is tossed twice. P(both heads) =

(A) 1/4 ✔

(B) 1/2

(C) 3/4

(D) 1

Q34. The 4th term of $(x + y)^6$ is:

(A) $20x^3y^3$ ✔

(B) $15x^4y^2$

(C) $20x^2y^4$

(D) $6xy^5$

Q35. The coefficient of x^3 in $(1 + x)^5$ is:

(A) 5

(B) 10 ✔

(C) 15

(D) 20

Q36. The modulus of z = 3 + 4i is:

(A) 3

(B) 4

(C) 5 ✔

(D) 7

Q37. i^4 equals:

(A) -1

(B) i

(C) 1 ✔

(D) -i

Q38. The conjugate of 2 - 5i is:

(A) 2 + 5i ✔

(B) -2 + 5i

(C) 2 - 5i

(D) -2 - 5i

Q39. If z = 1 + i, then z^2 =

(A) 2i ✔

(B) 2 + 2i

(C) 1 + 2i

(D) 2

Q40. The argument of z = -1 + 0i is:

(A) 0

(B) π/2

(C) π ✔

(D) -π/2

SECTION: PHYSICS | 30 Marks | 30 Questions

Q41. A body travels 20 m in 4 s with uniform acceleration from rest. The acceleration is:

(A) 2.5 m/s^2 ✔

(B) 5 m/s^2

(C) 10 m/s^2

(D) 1.25 m/s^2

Q42. Newton's second law of motion relates:

(A) Velocity and time

(B) Force and acceleration ✔

(C) Mass and volume

(D) Energy and power

Q43. The SI unit of work is:

(A) Watt

(B) Joule ✔

(C) Newton

(D) Pascal

Q44. A projectile launched at 30° has maximum range when angle is:

(A) 30°

(B) 45° ✔

(C) 60°

(D) 90°

Q45. The moment of inertia depends on:

(A) Mass only

(B) Speed only

(C) Mass distribution and axis ✔

(D) Temperature

Q46. At what height is gravitational potential energy zero?

(A) At surface

(B) At infinity ✔

(C) At centre of Earth

(D) At 6400 km

Q47. A simple pendulum of length L has period T = 2π√(L/g). If L is quadrupled, T becomes:

(A) T/2

(B) T

(C) 2T ✔

(D) 4T

Q48. Which law states that pressure × volume = constant at constant temperature?

(A) Charles's law

(B) Boyle's law ✔

(C) Gay-Lussac's law

(D) Avogadro's law

Q49. The speed of sound in air at 0°C is approximately:

(A) 300 m/s

(B) 332 m/s ✔

(C) 340 m/s

(D) 360 m/s

Q50. Beats are produced when two sources have:

(A) Same frequency

(B) Slightly different frequencies ✔

(C) Very different frequencies

(D) Same amplitude

Q51. The phenomenon of light bending around edges is called:

(A) Refraction

(B) Reflection

(C) Diffraction ✔

(D) Polarisation

Q52. Ohm's law states: V =

(A) I/R

(B) IR ✔

(C) I + R

(D) I^2R

Q53. The unit of electric charge is:

(A) Ampere

(B) Volt

(C) Coulomb ✔

(D) Ohm

Q54. Resistors in series: the total resistance is:

(A) Sum of all ✔

(B) Product of all

(C) Less than smallest

(D) Harmonic mean

Q55. The magnetic force on a charge q moving with velocity v in field B is:

(A) qvB sinθ ✔

(B) qvB cosθ

(C) qB/v

(D) qv/B

Q56. Faraday's law relates induced EMF to:

(A) Current only

(B) Rate of change of magnetic flux ✔

(C) Voltage applied

(D) Resistance

Q57. The capacitance of a capacitor depends on:

(A) Charge only

(B) Voltage only

(C) Geometry and dielectric ✔

(D) Temperature only

Q58. Photoelectric effect proves light has:

(A) Wave nature

(B) Particle nature ✔

(C) Both

(D) Neither

Q59. The mass number of an atom equals:

(A) Number of protons

(B) Number of neutrons

(C) Protons + Neutrons ✔

(D) Electrons only

Q60. Half-life of a radioactive substance is the time for:

(A) All atoms to decay

(B) Half the atoms to decay ✔

(C) Quarter to decay

(D) Activity to double

Q61. $E = mc^2$ gives equivalence of:

(A) Energy and velocity

(B) Mass and energy ✔

(C) Force and mass

(D) Power and time

Q62. The first law of thermodynamics is based on conservation of:

(A) Momentum

(B) Energy ✔

(C) Mass

(D) Charge

Q63. Absolute zero temperature in Celsius is:

(A) -100°C

(B) -200°C

(C) -273°C ✔

(D) -373°C

Q64. A convex lens has focal length 20 cm. Its power is:

(A) 5 D ✔

(B) 0.05 D

(C) 20 D

(D) 2 D

Q65. Snell's law: $n_1 \sin \theta_1 =$

(A) $n_2 \sin \theta_2$ ✔

(B) $n_2 \cos \theta_2$

(C) $n_2 \tan \theta_2$

(D) $n_1 \sin \theta_2$

Q66. Total internal reflection occurs when light travels from:

(A) Rare to denser medium

(B) Denser to rarer medium at angle > critical ✔

(C) Air to glass

(D) Vacuum to water

Q67. Bernoulli's principle applies to:

(A) Solid mechanics

(B) Ideal fluid flow ✔

(C) Heat transfer

(D) Wave motion

Q68. Pascal's law states pressure applied to enclosed fluid is:

(A) Halved

(B) Doubled

(C) Transmitted equally ✔

(D) Lost

Q69. Centripetal acceleration $a = v^2/r$ acts:

(A) Along velocity

(B) Towards centre ✔

(C) Away from centre

(D) Tangentially

Q70. Angular velocity ω has unit:

(A) m/s

(B) rad/s ✔

(C) m/s^2

(D) Hz

SECTION: ENGLISH | 10 Marks | 10 Questions

Q71. Choose the correct spelling:

(A) Accomodation

(B) Acommodation

(C) Accommodation ✔

(D) Acomodation

Q72. The synonym of 'DILIGENT' is:

(A) Lazy

(B) Hardworking ✔

(C) Careless

(D) Reckless

Q73. The antonym of 'OBSCURE' is:

(A) Dark

(B) Hidden

(C) Clear ✔

(D) Vague

Q74. Identify the correct sentence:

(A) She don't know the answer.

(B) She doesn't knows the answer.

(C) She doesn't know the answer. ✔

(D) She not know the answer.

Q75. The word 'LUMINOUS' means:

(A) Dark

(B) Heavy

(C) Bright ✔

(D) Slow

Q76. Choose the correct passive voice of 'He writes a letter':

(A) A letter is written by him. ✔

(B) A letter was written by him.

(C) A letter has been written.

(D) A letter is being written by him.

Q77. The plural of 'criterion' is:

(A) Criterions

(B) Criterias

(C) Criteria ✔

(D) Criteries

Q78. 'Lingua franca' means:

(A) A French city

(B) A common language between speakers of different tongues ✔

(C) A type of food

(D) An ancient script

Q79. Which word is a conjunction?

(A) Quickly

(B) Although ✔

(C) Beautiful

(D) Run

Q80. The sentence 'The book was read by the student' is in ___ voice:

(A) Active

(B) Passive ✔

(C) Interrogative

(D) Imperative

SECTION: INTELLIGENCE | 10 Marks | 10 Questions

Q81. Complete the series: 2, 6, 12, 20, 30, ___

(A) 38

(B) 40

(C) 42 ✔

(D) 44

Q82. If CAT = 3+1+20 = 24, then DOG =

(A) 24

(B) 26 ✔

(C) 28

(D) 30

Q83. Find the odd one out: 3, 5, 7, 9, 11

(A) 3

(B) 9 ✔

(C) 7

(D) 5

Q84. A is taller than B. B is taller than C. Who is shortest?

(A) A

(B) B

(C) C ✔

(D) Cannot determine

Q85. If BOOK is coded as CPPL, then PENCIL is coded as:

(A) QFODJM ✔

(B) QFODMJ

(C) RFODLJ

(D) QENDIM

Q86. What comes next: 1, 4, 9, 16, 25, ___

(A) 30

(B) 36 ✔

(C) 49

(D) 32

Q87. Mirror image: if 'p' is reflected, it looks like:

(A) b

(B) q ✔

(C) d

(D) p

Q88. Pointing to a man, a woman says 'His mother is the only daughter of my mother.' How is the woman related to the man?

(A) Sister

(B) Mother ✔

(C) Aunt

(D) Grandmother

Q89. If 5 men can dig a trench in 6 days, 3 men can dig it in:

(A) 8 days

(B) 10 days ✔

(C) 12 days

(D) 15 days

Q90. Complete the analogy: FIRE : ASH :: CANDLE : ___

(A) Light

(B) Wax ✔

(C) Smoke

(D) Flame

COMPLETE ANSWER KEY

MATHEMATICS

Q1 B	Q2 A	Q3 B	Q4 A	Q5 B	Q6 B	Q7 A	Q8 A	Q9 C	Q10 A
Q11 B	Q12 B	Q13 C	Q14 B	Q15 A	Q16 A	Q17 A	Q18 B	Q19 B	Q20 A
Q21 B	Q22 C	Q23 B	Q24 C	Q25 B	Q26 B	Q27 B	Q28 C	Q29 C	Q30 B
Q31 B	Q32 B	Q33 A	Q34 A	Q35 B	Q36 C	Q37 C	Q38 A	Q39 A	Q40 C

PHYSICS

Q41 A	Q42 B	Q43 B	Q44 B	Q45 C	Q46 B	Q47 C	Q48 B	Q49 B	Q50 B
Q51 C	Q52 B	Q53 C	Q54 A	Q55 A	Q56 B	Q57 C	Q58 B	Q59 C	Q60 B
Q61 B	Q62 B	Q63 C	Q64 A	Q65 A	Q66 B	Q67 B	Q68 C	Q69 B	Q70 B

ENGLISH

Q71 C	Q72 B	Q73 C	Q74 C	Q75 C	Q76 A	Q77 C	Q78 B	Q79 B	Q80 B

INTELLIGENCE

Q81 C	Q82 B	Q83 B	Q84 C	Q85 A	Q86 B	Q87 B	Q88 B	Q89 B	Q90 B