

Science and Engineering Aptitude Test

PAKISTAN ATOMIC ENERGY COMMISSION

ENTRANCE TEST FOR POST DIPLOMA TRAINING PROGRAM AT KINPOE AND CHASCENT, 2009

Instructions:

- Encircle the letters A, B, C or D in the Answer Sheet corresponding to the correct answer from the given four options (See example below)
- Each correct answer carries **THREE** marks while **ONE** mark will be deducted for **EACH** incorrect answer.
- Carry out your rough work somewhere in the question paper. **DO NOT** use any side of the answer sheet for rough work.
- **More than one** answers for a single question will be considered as **INCORRECT**

Example : In the example below, your answer to Q. 1 is 'B' ; for Q. 22 is 'D' (since 'B' is crossed out) ; Q.42 will be canceled (two answers are marked).

SAMPLE ANSWER SHEET

Q	A	B	C	D
Q. 1		☒		
Q. 2				
	A	B	C	D
Q. 41				
Q. 42	☒	☒	☒	☒
	A	B	C	D

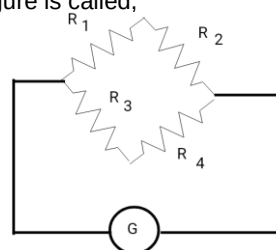
QUESTION BOOK

1. bomber drops a bomb from an aircraft flying at 2000 km/hr. at an altitude of 7km. The speed at which the bomb will strike the earth would be
 A) greater than 2000 km/hr. B) less than 2000 km/hr.
 C) equal to 2000 km/hr. D) Can't be compared with the given data
2. The velocity of a body was noted to be constant during five minutes of its motion. What was its acceleration during this interval ?
 A) 9.81 m/s^2 B) -9.81 m/s^2 C) $6.67 \times 10^{11} \text{ m/s}^2$ D) 0 m/s^2
3. Which of the following is /are vector(s)
 A) Force B) Velocity C) Weight D) All of the above
4. If V_1 and V_2 be two vectors at 90° from each other, having magnitudes of 10 and 20 units each, what will be the value of $V_1 \cdot V_2$?
 A) Equal to 200 units B) Equal to 10 units C) Equal to 20 units D) Equal to 0
5. Four samples of different material having the same mass were noted to have the following volumes, 5cc, 10cc, 3cc and 19cc. Which of them is more dense?
 A) The one having volume 5cc. B) The one having volume 10cc.
 C) The one having volume 3cc. D) The one having volume 19cc.
6. The centripetal force of a body having mass m and rotating at a linear speed of v in a circle of radius r is given by
 A) mv/r B) mvr C) mv^2/r D) mv/r^2
7. The unit of specific gravity in S.I. units is
 A) g/cm^3 B) kg/m^3 C) g/litre D) kg/litre
8. Temperature of 100°C is equal to
 A) 100°F B) 212°F C) 112°F D) 5°F
9. Specific heat is defined as the amount of heat required to

- A) raise the temperature of a body by 273°C
 B) change the temperature of unit mass of a body through 1°C
 C) change the state of unit mass of a body
 D) change the temperature of unit mass of a body through 212°F
10. The volume of a gas
 A) is always independent of pressure
 B) is proportional to temperature at constant pressure
 C) is proportional to pressure at constant temperature
 D) both B) and C)
11. On heating, the viscosity of liquids generally
 A) Decreases
 B) Increases
 C) Remains the same
 D) It depends upon the liquid
12. A chemical compound having only carbon and hydrogen is called:
 A) Sulfuric acid
 B) hydrocarbon
 C) hydride
 D) All of above
13. Which of the following is/are Halogens
 A) Chlorine
 B) Iodine
 C) Fluorine
 D) All of above
14. Atomic number of an atom is equal to the number of
 A) Protons
 B) Electrons
 C) Neutrons
 D) Protons and Neutrons
15. Which of the following is closer to the value of standard atmospheric pressure:
 A) 14.7 psi
 B) 760 mm Hg
 C) 101.3 k Pa
 D) All of the above
16. If pressure of the liquid is decreased, the boiling point will
 A) Increase
 B) Decrease
 C) Remain the same
 D) Increase or decrease depending upon some other parameters
17. Cane Sugar is mainly composed of
 A) Sucrose
 B) Sodium chloride
 C) Iodine
 D) None of above
18. If a body falls freely under gravity, the gravitational acceleration will be equal to
 A) 9.8 m/s^2
 B) -8.9 m/s^2
 C) -9.8 m/s^2
 D) None of above.
19. The temperature at which the volume of a gas theoretically becomes zero is called:
 A) Absolute zero
 B) Zero Celsius
 C) Freezing point
 D) Boiling point
20. A vessel used for production of steam is called:
 A) Turbine
 B) Boiler
 C) Condenser
 D) Steam ejector
21. $(a + 2b)^2 =$ _____
 A) $a^2 + b^2 + 2ab$
 B) $a^2 + 4b^2 + 8ab$
 C) $a^2 + 4b^2 + 4ab$
 D) $a^2 + b^2 - 4ab$
22. If A and B be two matrices such that $A = \begin{bmatrix} x & y \\ 1 & 0 \\ a & b \end{bmatrix}$ and $B = \begin{bmatrix} 1 & b \\ y & x \\ a & 0 \end{bmatrix}$ the " $A^{-1} = B$ "
 A) The statement is false because inverse of 3×2 matrix is not possible
 B) The statement is false because A^{-1} has some other value than the given above.
 C) The statement may be false or true depending upon the values of a,b and x,y
 D) The statement is true
23. A swimmer can swim with an average speed of 9km/hr in still water. What would be his net speed if he is crossing a river flowing at 20 km/hr, trying to swim straight along the breadth of the river?
 A) About 22 km/hr
 B) Exactly 20 km/hr
 C) About 18 km/hr
 D) Exactly 9km/hr
24. The unit of solid angle is
 A) Solid angle
 B) Radian
 C) Seradian
 D) Candela
25. LPG stands for
 A) Liquid petroleum gas
 B) Low pressure gas
 C) Lubricated and purified gas
 D) Low performance gas
26. A moving coil galvanometer can be used as an ammeter by adding;
 A) A series resistance with its coil
 B) A parallel resistance with its coil
 C) A diode in series with its coil
 D) A diode in parallel with its coil
27. Thermal parameters can be measured by
 A) RTD
 B) Thermocouple
 C) Bi-metallic strip
 D) All of above
28. The working of thermocouple is based upon the principle called
 A) Seebeck effect
 B) Newton's Law
 C) Thomson effect
 D) Photoelectric effect
29. For a liquid flowing through a tube, Bernoulli's theorem at a point states that
 A) sum of pressure energy, P.E. and K.E. are constant
 B) sum of pressure energy, P.E. and K.E. are variable
 C) P.E and K.E are constant only
 D) None of above
30. The range of temperature on Kelvin scale can be
 A) -273° to 273°
 B) 0° to 373°
 C) -1000° to 273°
 D) -100° to 100°
31. Vacuum can be measured with the help of a;
 A) Pyrometer
 B) Strip meter
 C) Induction meter
 D) Bourden Gauge

32. Electromagnetic induction principle is employed in
 A) Moving coil instrumentation B) Bourden tube
 C) Aneroid barometer D) Flow venture

33. The arrangement of resistances (R_1, R_2, R_3, R_4) and a galvanometer (G) in figure is called,
 A) Kirchoff's apparatus B) Wheatstone bridge
 C) Wheatmarble bridge D) Voltammeter



34. A galvanometer can be converted into a voltmeter by placing
 A) Shunt resistance with its coil B) Series resistance with its coil
 C) voltage can directly be measured D) voltage cannot be measured with the help of a galvanometer

35. A Geiger-Mueller tube is used for:
 A) Flow rate measurement of gases B) Flow rate measurement of volatile liquids
 C) Measurement of very high voltage D) Detection of ionizing radiation

36. If the flow rate is $2 \text{ m}^3/\text{s}$ then what will be the velocity of the liquid through the tube having diameter of 50 cm nearly

- A) 10 m/s B) 15 m/s C) 3.6 m/s D) 4 m/s

37. The linear speed of a body revolving at 1200 rpm in a circular path of 0.8 meter radius would be closed to
 A) 400 m/s B) 300 m/s C) 200 m/s D) 100 m/s

38. Which of the following atoms contains least number of neutrons?

- A) ${}_{92}\text{U}^{235}$ B) ${}_{93}\text{Np}^{240}$ C) ${}_{92}\text{U}^{238}$ D) ${}_{93}\text{Np}^{239}$

39. For what value of x is it true that $\frac{1}{x-3} < 4$?

- A) All values of x B) All values of x except
 C) All values of x greater than D) All values of x less than

40. If $y=3 \sin x$ then $dy/dx =$

- A) $3 \sin x$ B) $3 \cos x$ C) 0 D) 3

41. A circle has its centre at (0,0). The line $y = -2$ is tangent to it. The radius of the circle is

- A) 1 B) 2 C) 5 D) 6

42. The Ozone layer is useful for us because

- A) It protects us from harmful radiation B) It provides fresh air
 B) It absorbs Earth pollution D) Ozone layer is not useful for us

43. pH of a perfect neutral solution is

- A) 0 B) 7 C) 9 D) 1

44. 125 cm^3 of a gas is collected at 150°C and 755 mm of Hg. What is the volume of gas at STP?

- A) 118 cm^3 B) 135 cm^3 C) 100 cm^3 D) 10 cm^3

45. Sum of the masses of constituent nucleons is greater than mass of a nucleus. The difference is due to

- A) Energy level within nucleus B) Binding energy
 C) Potential energy D) Ionization potential

46. The Voltage drop across a 500 Watt electric heater having resistance of 5 Ohm is

- A) 50 Volt B) 250 Volt C) 2500 Volt D) 100 Volt

47. The speed of a synchronous motor with 60 Hz. power supply is

- A) 100 rpm B) 600 rpm C) 3600 rpm D) 4000 rpm

48. γ - rays

- A) are positively charged particles B) are negatively charged particles
 C) are neutral particles D) can have any charge

49. A nuclear bomb is more dangerous than an equivalent TNT bomb because

- A) of more weight B) of radiation C) of bad smell D) both B and C

50. ${}_{6}\text{C}^{11}$ and ${}_{5}\text{B}^{11}$ are two

- A) isotopes B) isobars C) isotones D) isomers

51. Mass can be converted to energy. Einstein gave a mathematical relation for this statement. How much energy can be obtained approximately from 1 micro-gram of mass according to that formula?

- A) 1 micro-joule B) 900 joules C) 90000 joules D) 90×10^9 joules

52. Which of the following is/are NOT real number(s)?

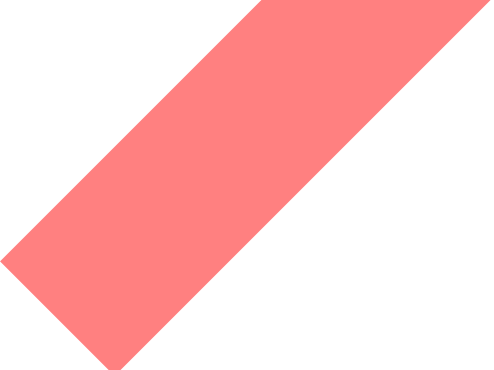
- A) 0 B) $-\sqrt{-1}$ C) $\sqrt{-1}$ D) All of the above are real numbers

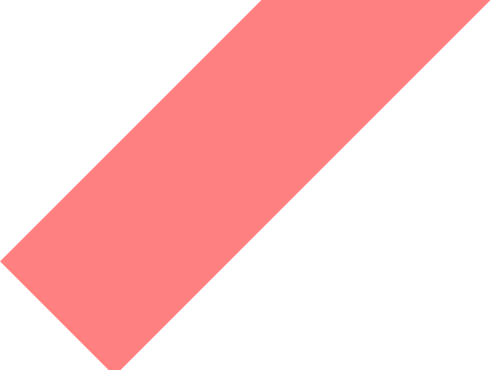
53. A quadratic equation has ALWAYS

- A) real roots B) imaginary roots C) equal roots D) None of the above

54. $\log_5 124$ is

- A) greater than 0 and less than 1
C) greater than 2 and less than 3
- B) greater than 1 and less than 2
D) greater than 3 and less than 4
55. The equation of a line with slope -2 and passing through the point $(2,3)$ is
A) $x - y = 0$ B) $x + 4y = 16$ C) $2y + 4x - 16 = 0$ D) $x + 2y + 16 = 0$
56. The probability to draw a QUEEN OR a KING from a deck of 52 cards is
A) 52 B) 13 C) 8 D) $2/13$
57. How many possibilities are there to select a team of 3 members from 9 players?
A) 20 B) 34 C) 70 D) 84
58. A bus leaves a station at 5 O'clock with an average speed of 50 km/h. A car leaves the same station at 8 O'clock with an average speed of 80 km/h. At what time will the car catch the bus?
A) 11 O'clock B) 12 O'clock C) 1 O'clock D) 30 past 1 O'clock
59. Choose fourth member for the team of Jamal, Kamal, Latif
A) Akram B) Majid C) Aman D) Ali
60. Separate the odd member from "Iron, Gold, Carbon, Silver"
A) Iron B) Gold C) Carbon D) Silver
61. Complete the series 23, 32, 43, 56, 71, -----, -----
A) 100, 127 B) 98, 128 C) 88, 107 D) 92, 111
62. If $X = A t + B t^2$ where X is in kilograms and t is in hours, the unit of B will be
A) kg^2/hr B) kg/hr^2 C) kg/hr D) kg
63. If A be a binary number then $A + \bar{A} =$ _____
A) A B) $\bar{A}$ C) 0 D) 1
64. The area of a square is 40000 cm^2 . What will be length of diagonal?
A) $2\sqrt{2}$ meter B) 2 meter C) $\sqrt{2}$ meter D) 200 meter
65. Base and perpendicular of a right-angle triangle are 1, 1, then hypotenuse is.
A) 1 B) 2 C) .5 D) 1.414
66. A quadrilateral having opposite sides parallel is called
A) Kite. B) Triangle. C) Parallelogram. D) Trapezoid.
67. Two angles of a triangle measure 60° , 80° , the measure of third angle is
A) 60° B) 80° C) 40° D) 20°
68. In an isosceles triangle, two angles are
A) Complementary B) Supplementary C) Congruent D) Right angle
69. $1 + \tan^2\theta =$
A) $\sin^2\theta$ B) $\cos^2\theta$ C) $\cot^2\theta$ D) $\sec^2\theta$
70. $x + 2 = 9$ is a _____.
A) Linear equation. B) Radical equation C) Quadratic equation D) Cubic equation
71. A father is 35 years of age. 3 years ago, he was 4 times as old as his son. The age of the son at that time was
A) 4 years B) 8 years C) 10 years D) 6 years
72. Rabia purchased 2.5 meters Lattha & 4.5 meter Mulmal both at the rate of Rs.25 per meter. She had a total amount of Rs.300. What amount remained with her after paying for the cloth purchased?
A) 125 B) 130 C) 200 D) 225
73. A rectangular park is 170 m long & 130 m wide. A road 5 m wide has been constructed in the inner side of the boundary. Find the area of road.
A) 2900 m^2 B) 22100 m^2 C) 3000 m^2 D) 2100 m^2
74. One horse power is equivalent to
A) 647 watts B) 467 watts C) 746 watts D) None of the above
75. The gas used in refrigerator is usually
A) Hydrogen B) Oxygen C) Freon D) Sulphur dioxide
76. The relation between frequency (f) and time period (T) of a wave is
A) $f = 2T$ B) $f = 1/T$ C) $f = T^2$ D) None of the above
77. $2+14$ in Hexadecimal numbers is equal to
A) 16 B) 12 C) 10 D) A
78. The area of triangle formed by the lines $y=5-x$, $y=1$ and $x=0$ is
A) 16 B) 8 C) 4 D) 2
79. Simplifying the expression $[AB+ABC+AB(CD+AD+AB.CD)]$ using Boolean algebra will give.
A) ABD B) $AB(CD.AD)$ C) ABCD D) AB
80. The price of sugar was Rs. 25.00 on November 30, 2006. It got increased in December by 40%. In April the price was reduced by 40%. The new price will be
A) Rs. 25.00 /kg B) More than Rs. 25.00 /kg
C) Less than Rs. 25.00 /kg D) Can not be calculated from the given data

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1. A
 2. D
 3. D
 4. D
 5. C
 6. C
 7. B
 8. B
 9. B
 10. B
 11. A
 12. B
 13. D
 14. A
 15. D
 16. B
 17. A
 18. A
 19. A
 20. B
 21. C
 22. A
 23. A
 24. C
 25. A
 26. B
 27. D
 28. A
 29. A
 30. B
 31. D
 32. A
 33. B
 34. B
 35. D
 36. A
 37. C
 38. A
 39. B
 40. B
 41. B
 42. A
 43. B
 44. A
 45. B
 46. B
 47. C
 48. C
 49. B
 50. B
 51. D

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52. C
 53. D
 54. C
 55. C
 56. D
 57. C
 58. C
 59. D
 60. C
 61. A
 62. B
 63. D
 64. A
 65. D
 66. C
 67. C
 68. C
 69. D
 70. A
 71. D
 72. A
 73. A
 74. C
 75. C
 76. B
 77. D
 78. B
 79. D
 80. C