MAULANA AZAD NATIONAL URDU UNIVERSITY

Ph.D Physics (Research Admission Test) RAT - 2022

QUESTION PAPER BOOKLET

Time: 2 hours Max. Marks: 100

Hall Ticket No.

OMR Serial No.

INSTRUCTIONS TO THE CANDIDATES

1. Candidate should write their Hall Ticket number and OMR number on the space provided above. Candidate should not write their Hall Ticket number and OMR at any other place.
2. This booklet contains 12 pages. The last one page is for Rough Work. Candidate should check the booklet before taking the test. In case of misprint or irregularity in question numbers / pages, etc., should report to the Invigilator immediately.
3. There are 100 Multiple Choice Questions in the booklet. For each question there are four options. The candidate is required to choose the correct answer and darken the circle with blue / black ballpoint pen in the OMR sheet against the corresponding answer number.
4. Candidate will get one mark each for each correct reply in the OMR sheet. If the candidate does not bubble the correct answer against the corresponding question number in the OMR sheet, he will not get marks.
5. If the candidate bubbles more than one circle in OMR Sheet for any question, marks shall not be awarded for the question.
6. There are no Negative marks.
7. At the end of Entrance Test, candidates are allowed to take their question booklet.

PART-A
Research Methodology

1. In how many generations a computer can be classified?
   (A)3 (B) 4
   (C) 5 (D) 6

2. The smallest unit of data in the computer is……?
   (A)Bit (B) Nibble
   (C) KB (D) Bytes

3. ENIAC stands for……..?
   (A) Electronic numerical integrator and computer
   (B) Electronic number input and computer
   (C) Both (D) None of above

4. Which of the following is used in RAM?
   (A) Conductor (B) Semi-Conductor
   (C) Vacuum Tubes (D) Transistor

5. USB is which type of device?
   (A) Primary (B) Secondary
   (C) Tertiary (D) None of above

6. In which light photosynthesis is the fastest?
   (A) Blue Light (B) Sun Light
   (C) Red Light (D) Green Light

7. Which one of the following is the purest form of Iron?
   (A)White cast Iron (B) Grey cast Iron
   (C) Wrought Iron (D) Steel

8. What is the SI unit for measuring the intensity of sound for noise?
   (A) Decibel (B) Mole
   (C) Ampere (D) Candela

9. At what temperature do the numerical values on Celsius and Fahrenheit scales become equal?
   (A) 0 (B) 100
   (C) 40 (D) -40

10. Which gas is involved in Bhopal Gas Tragedy?
    (A) Carbon monoxide (B) Chlorine
    (C) Methyl isocyanate (D) Ammonia

11. Among the following mediums, the speed of sound will be maximum in
    (A) Air (B) Vacuum
    (C) Iron (D) Water

12. In NEP 2020, the current 10+2 system to be replaced by a new curricular structure. What is the new curricular structure?
    (A) 3 + 4 + 4+ 5 (B) 5 + 3 + 3 + 4
    (C) 4 + 3 + 3 + 5 (D) 5 + 4+ 3+ 3

13. In NEP 2020, regarding the multiple entry and exit option in UG stream, which of the following pair is not correctly matched?
    (A) Certificate after one year (B) Diploma after two years
    (C) Bachelor's after three years (D) Bachelors with research after five years

14. Which of the following is not mentioned in NEP 2020?
    (A) Gender Inclusion fund (B) Bal Bhavans
    (C) Samajik Chetna Kendras (D) Zonal Talent Hunt

15. If C is coded 3, DASH is coded 32. Then DANCE will be coded as
    (A) 20 (B) 25
    (C) 26 (D) 27

16. Corona virus is related to which of the following disease?
    (A) SARS (B) MERS
    (C) Both A & B (D) None of these

17. The presence of …… brings sweetness to the milk.
    (A) Microse (B) Lactose
    (C) Sucrose (D) Maltose

18. Find the missing number from the given alternatives.

7	10	5
16	40	8
15	?	9

    (A) 75 (B) 45
    (C) 20 (D) 30

19. Choose the correct number to complete the series.
    5, 11, 24, 51, 106, ____
    (A) 122 (B) 217
    (C) 120 (D) 153

20. Who said that "Research is a systematic effort to gain new knowledge"?
    (A) Webster (B) Redman and Mory
    (C) J. W. Best (D) None of these

21. What is the main objective of research?
    (A) To review the literature
    (B) To summarise what is already known
    (C) To get an academic degree
    (D) To discover new facts or to make a fresh interpretation of known facts

22. What type of research is conducted for the problems which have not been researched before?
    (A) Explanatory research (B) Exploratory research
    (C) Historical research (D) Analytical research

23. The principles of fundamental research are used in_____.
    (A) Action research (B) Applied research
    (C) Philosophical research (D) Historical research

24. In the positivism approach, which method is mainly used
    (A) Theological (B) Hypostatical
    (C) Scientific (D) All of these

25. The first step of research is_____.
    (A) selecting a problem (B) searching a problem
    (C) finding a problem (D) identifying a problem

26. The synopsis of research is called.
    (A) Blueprint (B) Mapping of problem
    (C) Base of a problem (D) All of these

27. A research paper can be presented in _____.
    (A) Journals (B) Symposium
    (C) Seminars (D) All of these

28. Who plays a pivotal role in a workshop?
    (A) The participants (B) The expert
    (C) The director (D) All of the above

29. Which of the following is /are essential element(s) of report writing?
    (A) Research methodology (B) Reference
    (C) Conclusion (D) All of these

30. A thesis statement is_____.
    (A) An observation (B) A fact
    (C) An assertion (D) A discussion

31. The main part of the research is_____.
    (A) Title page (B) Trunk region
    (C) Posterior region (D) All of these

32. The ethics in research is related to_____.
(A) Scientific method (B) Humanity
(C) Reliability (D) All of these

33. The next term in the series, ABD, DGK, HMS, MTB, SBL, …… is.
(A) ZKW (B) KZU
(C) ZKU (D) ZCA

34. In the series 1,6, 15, 25, 45,……..the next term will be.
(A) 76 (B) 56
(C) 84 (D) 66

35. What is SWAYAM?
(A) Non-Governmental organisation
(B) Digital programme to achieve the principle of education
(C) On line platform
(D) Name of a web site

36. MOOC stand for_____.
(A) Media Online Open Course (B) Massachusetts Open Online Course
(C) Massive open online course (D) Myrind open online course

37. Fly ash is composed of _____.
(A) Aluminium silicate (B) Silicon dioxide
(C) Calcium oxide (D) All of these

38. Science is broadly divided into _____.
(A) Natural and Social (B) Natural and Physical
(C) Physical and Mental (D) Social and Physical

39. The most hazardous metal pollutant in the automobile exhaust is _____.
(A) Mercury (B) Cadmium
(C) Lead (D) Copper

40 Which of the following is/are the objective(s) of NACC?
(A) To grade institutions of higher education and their programmes
(B) To help institutions realise their academic objective
(C) To encourage innovations, self-evaluation and accountability in higher education
(D) All of these

41. The South Asian University is situated in_____.
(A) Colombo (B) Dhaka
(C) New Delhi (D) Kathmandu

42. In internet technology, DNS stand for_____ .
(A) Dynamic Name System (B) Domain Name System
(C) Distributed System (D) All of these

43. Which of the following is an example of primary data?
(A) Book (B) Journal
(C) News Paper (D) Census Report

44. Among the following fuels of energy, which is the most environment friendly?
(A) Biogas (B) CNG
(C) Hydrogen (D) Ethanol

45. In which year the Supreme Court of India gave a ruling that Environmental Education course should be mandatory at undergraduate level?
(A) 1992 (B) 1985
(C) 1990 (D) 1991

46. Which of the following is not correct?
(A) Good research is systematic (B) Good research is logical
(C) Good research is empirical (D) Good research should be complicated

47. Criteria of Good Research is_____?
(A) Research should be clearly defined
(B) Research should be procedural design
(C) The validity and reliability of the data should be checked carefully
(D) All of these

48. Computer language used for calculation is_____?
(A) LOGO (B) FORTRAN
(C) BASIC (D) C++

49. The full form of PDF is?
(A) Portable Data Format (B) Portable Document Form
(C) Portable Document Format (D) Portable Data Form

50. Select the related letters/word/number from the given alternatives.
ABCD: WXYZ: EFGH: ?
(A) STUV (B) ZYXW
(C) VUTS (D) WXZY

Part - B

(Physics)

51. The Electron, Proton and Neutron respectively discovered by:
(A) Rutherford, Thomson & Chadwick (B) Thomson, Rutherford & Chadwick
(C) Plant, Thomson and Rutherford (D) Chadwick, Thomson, Rutherford

52. The value of e/m for an electron is:
(A) 1.76×10^6 c/g (B) 1.76×10^8 c/g
(C) 1.76×10^{10} c/g (D) 1.76×10^{12} c/g

53. Who invented the Electron Microscope?
(A) Thomson (B) Robert Koch
(C) Knoll and Ruska (D) Galileo

54. The range of wavelength for this visible spectrum is:
(A) 3900^0A - 7600^0 A (B) 3900^0 A-8000^0 A
(C) 8500^0 A-98000 A (D) 1300^0 A-30000 A

55. The SI unit measured for the distance between the stars is:
(A) Steller Time (B) Cosmic Kilometer
(C) Galactic Unit (D) Light year

56. If two vectors A = $A = 5\hat{i} + 7\hat{j} + 3\hat{k}$ and B= $B = 2\hat{i} + a\hat{j} + 8\hat{k}$ are perpendicular, then the value of 'a' is.
(A) -2 (B) -8
(C) 2 (D) 8

57. In india, for domestic electric power supply the frequency will be:
(A) 50 Hz (B) 49.9 Hz
(C) 230 Hz (D) 110 Hz

58. The differential form of Gauss Law in CGS system is :
(A) $\vec{\nabla}.\vec{E} = 4\pi\rho$ (B) $div\,\vec{E} = 4\pi\rho$
(C) $\vec{\nabla}.\vec{E} = \frac{\rho}{\varepsilon_o}$ (D) $\vec{\nabla}.\vec{E} = \varepsilon_o\rho$

59. The unit for plank's constant is:
(A) J/S (B) JS
(C) JS^2 (D) J/S^2

60. The application of Hall Effect leads to measure:
(A) Type of Insulator (B) Type of Conductor
(C) Hall Area (D) Charge Carrier Concentration

61. The instrument used to measure the ocean depth is:
(A) Audio-meter (B) Actino-meter
(C) Fatho-meter (D) Barko-meter

62. At room temperature, the number of electrons and holes are …… in a pure semi conductor.
(A) Zero (B) Equal
(C) Not equal (D) Infinite

63. The velocity of a particle is not more than the velocity of light in …… medium.
(A) A medium (B) Vacuum
(C) (A) and (B) both (D) None of these

64. The ratio of Electric and Magnetic fields in EM Wave is:
(A) 1 : 2 (B) 1 : 3
(C) 1 : 4 (D) 1 : 1

65. The SI unit for Magnetic permeability is :
(A) Amper-meter (B) Henry/meter
(C) $Ampere^2$ (D) Henry-meter

66. Earth's atmosphere pressure is almost equal to :
(A) 1.01×10^4 N/m^2 (B) 1.01×10^5 N/m
(C) 1.01×10^6 N/m (D) 1.01×10^7 N/m

67. The equation for a Simple Harmonic Oscillator is :
(A) $\frac{d^2x}{dt^2} + w^2x = 0$ (B) $\frac{d^2x}{dt^2} + \frac{w^2}{x^2} = 0$
(C) $\frac{dt^2}{dx^2} - w^2x = 0$ (D) $\frac{d^2x}{dt^2} - w^2x = 0$

68. The time period formula for Compound Oscillator is :
(A) $2\pi\sqrt{\frac{l^2+k^2}{g}}$ (B) $2\pi\sqrt{\frac{l^2+k^2}{K}}$
(C) $2\pi\sqrt{\frac{l^2+k^2}{\lg}}$ (D) $2\pi\sqrt{\frac{l^2+k^2}{l}}$

69. Kilo Watt Hour is the unit of :
(A) Force (B) Electric Current
(C) Charge Quantity (D) Energy

70. The energy required to convert one milligram of matter into Energy:
(A) $9x10^5$ joules (B) $9x10^{10}$ joules
(C) $9x10^3$ joule (D) $9x10^4$ joules

71. The Poynting Vector is represented as :
(A) $H \times E$ (B) $E \times H$
(C) $E \times H \times I$ (D) $E \times H \times V$

72. The permeabilities for the Para and Ferromagnetic materials will be :
(A) Equal to 1 (B) Negative
(C) Less than 1 (D) Greater than 1

73. Mass-Energy Equation is presented by this scientist:
(A) Newton (B) C.V. Raman
(C) Young (D) Einstein

74. If $0.5\hat{i} + 0.8\hat{j} + c\hat{k}$ a unit vector then the value of 'c' is:
(A) $\sqrt{0.11}$ (B) 0.11
(C) 0.89 (D) $\sqrt{0.89}$

75. Full form of BCD is :
(A) Binary Coded Digit (B) Binary Coded Decimal
(C) Binary Cell Decoder (D) Binary Cell Digit

76. Expanded form of CRO is :
(A) Cathode Ray Oscilloscope (B) Cathode Ray Tube
(C) Cathode Ring Oscilloscope (D) Cathode Ray Oscillator

77. At ……. temperature the density of water is maximum.
(A) 0^0C (B) 100^0C
(C) 4^0C (D) 273^0C

78. The relation among H, B and I is :
(A) $B = \mu o(HxI)$ (B) $B = \mu o(H + I)$
(C) $B = \mu o(H / I)$ (D) $B = \mu o(H - I)$

79. In Raman Effect the Inelastic Collision between …….. and ……..
(A) Electron with Atom (B) Electron with Photon
(C) Photon with Electrons (D) Photon with Molecule

80. …….. atmospheric layer will help in Radio Transmission.
(A) Ionosphere (B) Troposphere
(C) Stratosphere (D) Mesosphere

81. …… law is applicable for an Electro-magnetic Induction phenomenon:
(A) Coulomb's Law (B) Ohm's Law
(C) Faraday's Law (D) Lenz's Law

82. The phenomenon for Interference of Light is discovered by:
(A) Newtown (B) Huygen
(C) Fresnel (D) Young

83. In LASER, the Population Inversion is due to :
(A) Chemical Reaction (B) Electron Excitation
(C) Photon Excitation (D) All of these

84. Boolean equation $Y = \overline{A}B + A\overline{B}$ represents this digital Gate:
(A) OR (B) X-OR
(C) X-NOR (D) X-NAND

85. The main purpose of an Operational Amplifier is to enhance ……..
(A) a.c. signal (B) d.c. signal
(C) (A) and (B) both (D) None of these

86. When quantum number increases then the difference between connecting energy levels of Hydrogen Atom will be:
(A) No change (B) Decreases
(C) Increase (D) Increases slowly

87. In LCR circuit, the Resonance Curve's sharpness depends upon :
(A) Decreases when L increase (B) Decreases when C increases
(C) Decreases when R increases (D) All of these

88. The condition for a transistor to act as an Amplifier is :
(A) Emitter-Base Junction as forward biased and Collector-Base junction as reversed biased.
(B) Emitter-Base Junction as reversed biased and Collector-Base junction as forward biased.
(C) Both junctions as forward biased (D) Both junctions as reversed biased

89. ……. law is applicable for the measurement of a Metal's Purity.
(A) Boyle's Law (B) Charle's Law
(C) Pascal's (D) Archimedes principle

90. The invention of Radar is :
(A) Austin (B) Bush Wall
(C) Fleming (D) Robert Watson

91. Curie is the unit of ……
(A) Heat (B) Radio Activity
(C) Energy (D) Temperature

92. The purpose of a transformer is :
(A) Conversion of AC into DC (B) Conversion of DC into AC
(C) To increase/decrease AC voltage (D) To increase DC voltage

93. The ultrasonic waves can be generated with the help of following method.
(A) Piezoelectric Generator (B) Magnetostriction Generator
(C) Gatton's Whistle (D) All of these

94. The formula for the Velocity of light in air:
(A) $C = \sqrt{\mu_o \varepsilon_o}$ (B) $C = \sqrt{\frac{\mu_o}{\varepsilon_o}}$
(C) $C = \sqrt{\frac{1}{\mu_o \varepsilon_o}}$ (D) $C = \sqrt{\frac{\varepsilon_o}{\mu_o}}$

95. The scale to change the properties of a matter is :
(A) Vernier Scale (B) Micro Scale
(C) Main Scale (D) Nano Scale

96. In Nanotechnology, CVD means:
(A) Chemical Vapour Deposition (B) Chemical Value Decimal
(C) Chemistry Value Deposition (D) Chemical Value Deposition

97. ……. is the phenomenon in Optical Fibers:
(A) Reflection (B) Refraction
(C) Total Internal Reflection (D) Transmission

98. For Fiber Optical, the value of Numerical Aperture is …….
(A) 11^0 (B) 12^0
(C) 13^0 (D) 14^0

99. LASER stands for:
(A) Light Amplification by Stimulated Emission of Radiation
(B) Light Amplification by Spontaneous Emission of Radiation
(C) Light Amplification by Spatial Emission of Radiation
(D) All of the above

100. MASER stands for:
(A) Microwave Amplification by Stimulated Emission of Radiation
(B) Microwave Amplification by Spontaneous Emission of Radiation
(C) Microwave Amplification by Spatial Emission of Radiation
(D) All of these

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