TEACHERS RECRUITMENT BOARD, CHENNAI - 6
Written Competitive Examination for

PHYSICS

Time Allowed: 3 Hours

[Maximum Marks: 150]

Each question carries four options namely A, B, C and D. Choose one correct option and mark in appropriate place in the OMR Answer Sheet:

1. Who was the Viceroy of India, when the Rowlatt Act was passed?
   A) Lord Irwin
   B) Lord Chelmsford [正确]
   C) Lord Wavell
   D) Lord Wellington.

2. Which one of the following is the softest?
   A) Sodium
   B) Aluminium
   C) Iron
   D) Lithium.

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| Turn over |
3. As a non-member who can participate in the proceedings of either of House of Parliament?
   A) Vice-President
   B) Chief Justice
   C) Attorney General
   D) Chief Election Commissioner.

4. Which is the river on which Indira Sagar Dam is planned to be constructed?
   A) Mahanadi
   B) Godavari
   C) Krishna
   D) Narmada.

5. The first astronomer who gave the idea, 'The earth rotates on its axis', is
   A) Bhaskara
   B) Aryabhatta
   C) Varahamihira
   D) Kalpana Chawla.
6. Which one of the following angles cannot be constructed using an unmarked ruler and compass only?

A) 75°  
B) 90°  
C) 50°  
D) 22 1/2°

7. For a Frequency Polygon, the points are plotted against

A) mid-point of the class interval vs frequency  
B) lower limit of the class interval vs frequency  
C) upper limit of the class interval vs frequency  
D) real limit of the class interval vs frequency.

8. AICTE was established in

A) November, 1945  
B) November, 1955  
C) November, 1985  

AICTE இந்தோனேனியம் பல்கலைக்கழகம் என்னும் குழு முதலில் அடையாளம்

A) நவம்பர், 1945  
B) நவம்பர், 1955  
C) நவம்பர், 1985  
D) நவம்பர், 1975.
9. One of the main publications of John Dewey is
A) Secrets of Childhood  B) Education Today
C) Education of Man  D) The Social Contract.

10. According to David Ausubel, “Verbal Learning” is
A) learning a new language
B) oral practice
C) understanding verbal information
D) passive learning experience.

11. The Southern Regional Office of UGC is in
A) Hyderabad  B) Bangalore
C) Chennai  D) Mumbai.

12. National Population Policy was evolved in the year
A) 1976  B) 1979
13. According to Abraham Maslow, 'Self-Actualisation' in the hierarchy is
   A) first step  B) final step
   C) third step  D) fourth step.

14. Who is the author of 'Emile'? 
   A) Dewey  B) Bertrand Russell
   C) Froebel  D) Rousseau.

15. The university that has no affiliated colleges is
   A) Madras University
   B) Madurai Kamaraj University
   C) Thanjavur Tamil University
   D) Manonmanium Sundaranar University.

   கல்வியக்கள் கொண்டு விளையாட்டு விளிம்பு கல்வியக்கள் தொகுப்புற்று
   A) கல்வியக்கள் கொண்டு விளையாட்டு
   B) மன்னர் விளையாட்டு கல்வியக்கள்
   C) தொகுப்புற்று விளையாட்டு
   D) மானியம்மனியம் கல்வியக்கள் தொகுப்புற்று.

   [ Turn over }
16. Human Rights Day is
   A) December 10    B) December 7
   C) December 26    D) July 17.

17. Which one of the following models is not on curriculum development?
   A) The Tylor model    B) The Ausubel’s model
   C) The Taba model    D) The Hunkin’s model.

18. The chief objective of pre-primary education is to promote ................. of the child.
   A) physical development    B) mental development
   C) social development    D) overall development.

19. If the teacher finds in learner’s activities something new or original, then the child is supposed to be
   A) intelligent    B) creative
   C) critical    D) motivated.
20. Which one of the following is not a learning domain?

A) Cognitive domain  B) Psychomotor domain
C) Psychomotor domain  D) Affective domain.

21. The magnetic permeability $\mu_a$ is

A) $\mu_a = I/H$  B) $\mu_a = H/I$
C) $\mu_a = B/H$  D) $\mu_a = H/B$.

22. According to De Morgan's second theorem $\overline{A \cdot B} =$

A) $\overline{A} \cdot \overline{B}$  B) $A + B$
C) $\overline{A + B}$  D) $\overline{A} + \overline{B}$.

A) $\overline{A} \cdot \overline{B}$  B) $A + B$
C) $\overline{A + B}$  D) $\overline{A} + \overline{B}$.
23. It is a type of machine in which the frequency of electric field is kept constant and magnetic field is varied. It is known as

A) linear accelerator  B) betatron
C) van de Graaff generator  D) synchrotron.

24. Which material has high elastic limit?

A) Rubber  B) Aluminium
C) Quartz  D) Copper.

25. Dimension of stress is

A) \( MLT^{-2} \)  B) \( ML^{-2} T^{-2} \)
C) \( ML^{-1} T^{-1} \)  D) \( ML^{-1} T^{-2} \).

26. When \( n_1 = 1.48, \ n_2 = 1.46 \), what is the value of numerical aperture?

A) 0.24  B) 0.10
C) 0.85  D) 0.90.
27. Which type of defect is electronic defect?
   A) Line defect
   B) Surface defect
   C) Point defect
   D) Volume defect.

28. ............... is used as a relaxation oscillator.
   A) UJT
   B) FET
   C) PNP transistor
   D) NPN transistor.

29. If 1 kg of substance is fully converted into energy, how much energy is released?
   A) $9 \times 10^{16}$ joules
   B) $3 \times 10^{16}$ joules
   C) $9 \times 10^8$ joules
   D) $0.9 \times 10^{16}$ joules.
30. Geiger-Nuttal law is

A) \( R = a \gamma^3 \)  
B) \( \log \lambda = A + B \log R \)  
C) \( \sqrt{v} = a(z - b) \)  
D) \( \lambda = \frac{hc}{eV} \).

31. Zinc plate will emit photoelectrons when which of the lights falls on it?

A) Visible  
B) Infrared  
C) Ultraviolet  
D) Laser.

32. In hydrogen atom \( H_\alpha \) line is due to the transition of electron from the state \( n \) of which the value is three to which value of \( n \)?

A) 1  
B) 2  
C) 4  
D) 5.

33. The refractive index of the core of an optical fibre is higher than that of cladding because of

A) better confinement of light  
B) maximum distance operation  
C) easy to handle  
D) higher life time of the material.

A}
34. What is half the angular width of the principal maximum when the number of lines on the grating surface is large?

A) Zero  
B) Small  
C) Large  
D) Equal to the number of lines.

35. What is the change in entropy when 10 gram of ice at 0°C is converted into water at the same temperature? (L = 80 cal/g)

A) 0.03 cal/K  
B) 2.93 cal/K  
C) 0.29 cal/K  
D) 0 cal/K.

36. Heat engines convert heat energy into

A) mechanical energy  
B) electrical energy  
C) chemical energy  
D) light energy.

A) தொழில் கருத்துறை  
B) விளக்கு கருத்துறை  
C) செல்லு கருத்துறை  
D) தொட்டு கருத்துறை.

A [ Turn over
37. In superconducting state
   A) entropy increases and thermal conductivity decreases
   B) entropy and thermal conductivity decrease
   C) entropy and thermal conductivity increase
   D) entropy decreases and thermal conductivity increases.

38. Which of the following is commonly used as local oscillator in radio receiver?
   A) Cyclotron
   B) Betatron
   C) Hartley oscillator
   D) Synchrotron.

39. What is the particle Y in the given nuclear reaction?
   \[ _4^{10}\text{Be} + _2^4\text{He} \rightarrow _6^{12}\text{C} + Y \]
   A) electron
   B) positron
   C) proton
   D) neutron.
40. In a betatron, electron is accelerated by
   A) static magnetic field
   B) static electric field
   C) changing electric field
   D) changing magnetic field.

41. Which is used to produce velocity modulation in Klystron oscillator?
   A) Transit time of the electron
   B) Width of the drift space
   C) Energy of the electron
   D) Electric field.

42. What is the uncertainty in the momentum of the electron located in the diffraction of a beam of electrons?
   A) \( \Delta p = \frac{2h}{\lambda} \sin \theta \)
   B) \( \Delta p = \frac{h}{2 \lambda} \sin \theta \)
   C) \( \Delta p = \frac{\lambda}{2h} \sin \theta \)
   D) \( \Delta p = \frac{2h}{\lambda \sin \theta} \)

43. At threshold frequency the K.E. of the photoelectron is
   A) maximum
   B) zero
   C) minimum
   D) unity.
44. Sir C. V. Raman got Nobel prize for scattering of light in which year?
   A) 1928  B) 1930
   C) 1929  D) 1931.

45. What is the transformer ratio in step-down transformer?
   A) $k = 0$  B) $k = 1$
   C) $k < 1$  D) $k > 1$.

46. For a magnetic substance what is the hysteresis loss per unit volume?
   A) $\frac{1}{4} \pi$ times the area of the $I-H$ loop
   B) 4 times the area of the $I-H$ loop
   C) area of the $I-H$ loop
   D) 2 times the area of the $I-H$ loop.

47. According to the theory of interference fringes, the fringe width $\beta$ is
   A) inversely proportional to $d$  B) directly proportional to $n$
   C) inversely proportional to $\lambda$  D) directly proportional to $d$.  

48. The condition used in the optical instruments to calculate the resolving power is

A) Fraunhofer’s criterion  B) Fresnel’s criterion
C) Rayleigh’s criterion  D) Thomson’s criterion.

49. The critical temperature in the van der Waals’ equation is

A) \( T_c = \frac{8a}{27Rb} \)  B) \( T_c = \frac{a}{27b^2} \)
C) \( T_c = \frac{8b}{27Ra} \)  D) \( T_c = \frac{27Rb}{8a} \)

50. If the spheres are perfectly elastic, the loss in K.E. due to direct impact between them is

A) one  B) \( \frac{1}{2} I (u_1 - u_2) \left( 1 - p^2 \right) \)
C) \( \frac{m_1 m_2 (u_1 - u_2)^2}{2 (m_1 + m_2)} \)  D) zero.

A) \( \frac{m_1 m_2 (u_1 - u_2)^2}{2 (m_1 + m_2)} \)  B) \( \frac{1}{2} I (u_1 - u_2) \left( 1 - p^2 \right) \)
C) \( \frac{m_1 m_2 (u_1 - u_2)^2}{2 (m_1 + m_2)} \)  D) கூட்டம்.
51. In class A amplifier the output remains in which region? 
   A) Cut-off region  
   B) Active region  
   C) Saturation region  
   D) Between cut-off and saturation regions.

52. Application of reverse bias to a PN diode
   A) increases the potential barrier  
   B) lowers the potential barrier  
   C) decreases the majority carrier current  
   D) decreases the minority carrier current.

53. Fusion reactions can take place only at
   A) low temperature  
   B) high temperature  
   C) very high temperature  
   D) medium temperature.
54. A device that counts individual particles but cannot measure their energy is

A) G. M. counter  
B) moving coil galvanometer  
C) spectrometer  
D) potentiometer.

55. In Raman effect $\gamma$ is the frequency of the incident radiation, $\gamma'$ is the frequency of the scattered radiation, then

i) $\gamma' = \gamma$ or $\lambda' = \lambda$  
ii) $\gamma' < \gamma$ or $\lambda' > \lambda$  
iii) $\gamma' > \gamma$ or $\lambda' < \lambda$

Using it find the correct answer from the following:

A) (i) — a (ii) — c (iii) — b  
B) (i) — b (ii) — c (iii) — a  
C) (i) — a (ii) — b (iii) — c  
D) (i) — c (ii) — b (iii) — a.
56. Infrared spectra can be analysed using

A) Cornu's prism spectroscope
B) Optical fibre
C) Wordsworth spectroscope
D) Aston's mass spectroscope.

57. When three capacitors 2 μF, 3 μF and 6 μF are connected in parallel, what is their effective capacitance?

A) 11 μF
B) 8 μF
C) 3 μF
D) 1 μF.

2 μF, 3 μF and 6 μF capacitors are connected in parallel. What is the equivalent capacitance?

A) 11 μF
B) 8 μF
C) 3 μF
D) 1 μF.

58. What is the purpose of using high resistance in the potentiometer circuit?

A) Reduce the internal resistance of the accumulator
B) Increase the internal resistance of the accumulator
C) Safeguard the galvanometer
D) Safeguard the potentiometer.
59. What is the excess of pressure inside a soap bubble of radius $R$ and surface tension $\sigma$ ?

A) $p = 4\sigma / R$
B) $p = \sigma / R$
C) $p = 2\sigma / R$
D) $p = 4\sigma / R^2$

60. If $r$ is the position vector, what is $\text{div} \ r$ ?

A) 1
B) $\phi$
C) 3
D) 9.

61. In a transistor $\alpha = 0.9$. What is the value of $\beta$ ?

A) 0.9
B) 1
C) 9
D) 90.

62. Which type of waves are used in Radar ?

A) Microwaves
B) Radio waves
C) Audio waves
D) Ultrasonic waves.
63. Which type of defect may be called as dislocation?

A) Surface defect  
B) Point defect  
C) Volume defect  
D) Line defect.

64. Type I superconductors belong to which type of magnetic material?

A) Paramagnetic  
B) Diamagnetic  
C) Combination of para- and ferro-magnetic  
D) Ferromagnetic.

65. What is the energy equivalent of 1 a.m.u. in MeV?

A) 93.13 MeV  
B) 9.313 MeV  
C) 931.3 MeV  
D) 0.9313 MeV.

A) 93.13 MeV  
B) 9.313 MeV  
C) 931.3 MeV  
D) 0.9313 MeV.
66. The same radioactive nucleus may emit
   A) \( \alpha, \beta, \gamma \) simultaneously
   B) only \( \alpha \) and \( \beta \) simultaneously
   C) either \( \alpha \) or \( \beta \) and \( \gamma \) at a time
   D) \( \alpha, \beta \) and \( \gamma \) one after another.

67. Raman effect is similar to which effect?
   A) Tyndall effect
   B) Photoelectric effect
   C) Compton effect
   D) Polarisation effect.

68. Population inversion will be achieved when
   A) \( w > \frac{1}{\tau_{10}} \)
   B) \( w = \frac{1}{\tau_{10}} \)
   C) \( w < \frac{1}{\tau_{10}} \)
   D) \( w > \tau_{10} \).
69. A quantum state is defined by a set of four quantum numbers 
\( (n, l, m_l, \text{ and } m_s) \). For \( 1s^2 \) state, the relevant quantum numbers are

A) \( 1, 0, 0, \pm \frac{1}{2} \)  
B) \( 1, 1, 0, \pm \frac{1}{2} \)  
C) \( 1, 0, 1, \pm \frac{1}{2} \)  
D) \( 1, 1, 1, \pm \frac{1}{2} \).

70. As the wavelength of X-rays is smaller than that of visible light, the velocity of X-rays in vacuum is

A) greater than the velocity of light
B) less than the velocity of light
C) infinity
D) same as the velocity of light.

71. When white light is incident on a thin film, the film will appear coloured. This is due to which effect?

A) Diffraction  
B) Interference  
C) Reflection  
D) Total internal reflection.

A) வெளிவடை  
B) வேறுபாடு  
C) தெளிவு  
D) குறுகுத் தொடர்பு.
72. What is the susceptibility of diamagnetic material?

A) Low negative value
B) High negative value
C) High positive value
D) Low positive value.

73. Compressibility of a body is

A) reciprocal of bulk modulus
B) reciprocal of modulus of rigidity
C) product of bulk modulus and Young's modulus
D) product of Young's modulus and rigidity modulus.

74. M.K.S. unit of surface tension is

A) \( \text{newton/m}^2 \)
B) \( \text{newton-m} \)
C) \( \text{newton/m} \)
D) \( \text{newton} \cdot \text{sec}^{-2} \)
26. In simple harmonic motion
   A) potential energy is constant   B) kinetic energy is constant
   C) amplitude is constant         D) phase is constant.

27. At which temperature water has maximum specific heat?
   A) 0°C                           B) 100°C
   C) 4°C                           D) 50°C.

27. A person is hurt on kicking a stone due to
   A) reaction                      B) mass
   C) velocity                      D) momentum.

28. Which of the following harbours is not a natural harbour?
   A) Cochin                         B) Chennai
   C) Mumbai                         D) Paradwip.

   Which of the following harbours is not a natural harbour?
   A) கோசிக்                  B) சென்னை
   C) மும்பை                  D) பார்ட்டுவுக்.
79. Recently one Indian cricket player has become the Sixth Batsman to score 10,000 runs in Test Cricket. The name of the player is

A) Sachin Tendulkar  
B) Virender Sehwag

C) Sourav Ganguly  
D) Rahul Dravid.

80. The battle of Wandiwash was fought between

A) Marathas and Portuguese

B) the English and the French

C) the English and Portuguese  
D) Marathas and the English.

81. Linear programming is designed by

A) B. F. Skinner  
B) E. L. Thorndike

C) L. P. Pavlov  
D) Clark L. Hull.

A) पी. पी. पाव्लोव  
B) ए. ए. ट्हार्नडाइक

C) पी. एच. स्कीनर  
D) एच. ली. हूल.
82. Which of the following first identified the Secondary Education as a weak link and suggested improvement?
A) The Tarachand Committee (1948)
C) The University Education Commission (1949)

83. Intelligence test scores are reasonably stable after the age of
A) one
B) two
C) five
D) twenty.

84. Which one is not an S-R theory with reinforcement?
A) E. L. Thorndike's theory
B) Hull's theory
C) B. F. Skinner's theory
D) Tolman's theory of learning.
85. The emphasis of National Board for Adult Education on Curriculum is that it must be
A) need-based          B) functional
C) job-oriented        D) production-oriented.

86. World First Aid Day is
A) September 11        B) September 12

87. For the following scores
10, 11, 13, 10, 15, 17, 18, 15, 10
the value of mode is
A) 10                B) 13
C) 15                D) 18.

A) 10                B) 13
C) 15                D) 18.
88. Educational Technology means
A) Technology in Education
B) Technology of Education
C) both of these
D) none of these.

89. Which one of the following is not a cause for forgetting?
A) When something learned and not used repeatedly
B) Interference with present learning
C) Lack of reorganisation of the learning material
D) Learning on the basis of short-term remembrance.

90. When the reason for acting is in the action, motivation is said to be
A) extrinsic
B) intrinsic
C) extrinsic & intrinsic
D) none of these.
91. National Integration Day is
   A) November 19
   B) December 19
   C) September 19
   D) May 19.

92. The importance of Teacher Education was first emphasized by
   A) the Woods Dispatch
   B) the Hunter Commission
   C) Calcutta University Commission
   D) the White Paper.

93. Taxonomy of educational objectives was first developed by
   A) Mager
   B) Skinner
   C) Bloom
   D) Thorndike.
94. SSA is established for achievement of
   A) Elementary Education   B) Secondary Education
   C) Higher Education       D) Vocational Education.

   SSA சார்பு என்றென் உலகிலேயே விளங்கும் கல்வியுடன் இணைந்து வேண்டும்  ?
   A) எளியக் கல்வி   B) மையக் கல்வி
   C) மத்தியக் கல்வி   D) வழிபட்டு கல்வி.

95. Whose philosophy is characterised as “Naturalistic in its setting, Idealistic in its
aim and Pragmatic in its method and Programme of work”?
   A) Sri Aurobindo   B) Gandhiji
   C) Rousseau       D) Tagore.

   வியாருடன் விலகாத உலகிலே விளங்கும், இனங்குகளும் அதுவுடன் உலகிலே விளங்கும் கல்வியில் பெறுமல்துடன் இருந்து உலகிலே விளங்கும் கல்வியுடன் இணைந்து வேண்டும் விலகாத கல்வியுடன் என உரைச்சிக்கும் என்ன போறை?
   A) எளியக் கல்வி   B) மையக் கல்வி
   C) மத்தியக் கல்வி   D) வழிபட்டு கல்வி.

96. Multi-factor theory of Intelligence was developed by
   A) Charles Spearman   B) E. L. Thorndike
   C) L. L. Thurstone     D) Dr. J. P. Guilford.

   தனியார் விளகாத உலகிலே விளங்கும் உலகிலே விளங்கும் கல்வியில் என்று உரைச்சிக்கும்
   A) எளியக் கல்வி   B) மையக் கல்வி
   C) மத்தியக் கல்வி   D) வழிபட்டு கல்வி.

97. What are the primary colours used in colour TV?
   A) Red, Green and Blue   B) Red, Blue and Yellow
   C) Blue, Green and Yellow D) Red, Yellow and Black.
98. If the output of an amplifier is 10 V and 100 mV is feedback from output to the input, then the feedback fraction is
A) 0.1
B) 0.01
C) 1
D) 10.

99. When the current is 1 ampere, what is the force per unit length between two parallel conductors?
A) $4 \times 10^{-7}$ N/m
B) $4\pi \times 10^{-7}$ N/m
C) $2 \times 10^{-7}$ N/m
D) $2\pi \times 10^{-7}$ N/m.

100. For a 4d state, the value of the orbital quantum number is
A) 1
B) 2
C) 3
D) 4.

4d நிறைக்கும் நிறுவனத்தை கண்டுபிடித்து விளக்கிய நிலையின் மதிப்பு
A) 1
B) 2
C) 3
D) 4.
101. What are the inputs of two input NAND gate at which the output is zero?

A) \( A = 0, \ B = 0 \)  \hspace{1cm} B) \( A = 0, \ B = 1 \)

C) \( A = 1, \ B = 1 \)  \hspace{1cm} D) \( A = 1, \ B = 0 \).

102. Which properties are necessary to increase the temperature of a vessel?

A) Low specific heat capacity and thermal conductivity  
B) High thermal conductivity and low specific heat capacity  
C) High specific heat capacity and low thermal conductivity  
D) High thermal conductivity and specific heat capacity.

103. In \( \beta \)-decay an uncharged particle of zero mass and spin \( \frac{1}{2} \) is emitted with the electron which is

A) positron  \hspace{1cm} B) negatron

C) antineutron  \hspace{1cm} D) neutrino.

\( \beta \)-பெருகையில், \( \beta \)-தொடர்பின்  என்று செலுத்தல் \( \frac{1}{2} \) செலுத்தலின் உட்பட எளிமையான வேறு தொடர்பிற்கு எடுத்துரித்து வேண்டும். 

A) போசிட்ரோன்  \hspace{1cm} B) அன்லெக்னோன்

C) அணிரென்  \hspace{1cm} D) நீற்றினோன்.

A
104. During the formation of a bond
A) energy remains constant  B) some energy is gained
C) some energy is lost  D) total mass decreases.

105. The colour of light transmitted by chromium atom in Ruby laser is
A) ultraviolet and green  B) ultraviolet and yellow
C) green and yellow  D) red and blue.

106. The pressure of neon gas in the He – Ne laser is ............ of Hg.
A) 0.1 mm  B) 0.01 mm
C) 1 mm  D) 0.001 mm.

107. The electrical intensity at a point due to a charge of strength \( q \) coulomb at a
distance \( r \) is
A) \( \frac{q}{4\pi \varepsilon_0 r} \) N/C  B) \( \frac{q^2}{4\pi \varepsilon_0 r^2} \) N/C
C) \( \frac{q^2}{4\pi \varepsilon_0 r} \) N/C  D) \( \frac{q}{4\pi \varepsilon_0 r^2} \) N/C.

\[ \text{Turn over} \]
108. In a ballistic galvanometer, the suspension fibre vibrates in the magnetic field for a longer time because of
A) M.I. of the suspension fibre is small
B) resistance of the suspension fibre
C) friction of air
D) M.I. of the suspension fibre is large.

109. Impulse has the same unit as
A) work
B) angular momentum
C) linear momentum
D) force.

110. Coefficient of viscosity of water is
A) 0.01 N.s.m\(^{-2}\)
B) 0.001 N.s.m\(^{-2}\)
C) 0.0001 N.s.m\(^{-2}\)
D) 0.00001 N.s.m\(^{-2}\).

111. N-type semiconductor as a whole is
A) electrically neutral
B) negatively charged
C) positively charged
D) more positive charge and less negative charge.
112. What is the ripple factor of a full-wave rectifier?

A) 1.21  
B) 0.8  
C) 0.48  
D) 2.

113. The critical magnetic field of a superconductor can be represented by

A) \( H_c = H_0 \left( 1 - \frac{T^2}{T_c^2} \right) \)  
B) \( H_c = H_0 \left( 1 - \frac{T_c^2}{T^2} \right) \)  
C) \( H_c = H_0 \left( \frac{T^2}{T_c^2} - 1 \right) \)  
D) \( H_c = H_0 \left( \frac{T_c^2}{T^2} - 1 \right) \).

114. When the bond length is decreased, the bond energy

A) remains constant  
B) increases  
C) decreases  
D) may increase or decrease.

A  | Turn over
115. In Newtonian mechanics, the motion of the bodies travelling at velocities is

A) equal to that of light
B) greater than the velocity of light
C) less than the velocity of light
D) very much less than the velocity of light.

116. What is the function of carbon-12 in carbon-nitrogen cycle?

A) Auto-catalyst
B) Catalyst
C) Auto-oxidant
D) Oxidant.

117. It is the interference pattern formed when scattered radiation from a material and the reference radiation interfere with each other. What is it?

A) Photographic plate
B) Gramophone record
C) Hologram
D) Compact disk.
118. What happens to the mass of the electron as its velocity approaches the velocity of light?
A) 0  B) 1  C) 2  D) ∞

119. Elliptical orbit for an electron was proposed by
A) Niels Bohr  B) Rutherford  C) Pauli  D) Sommerfeld.

120. Which type of cells does not require external battery to operate?
A) Photoemissive cell  B) Photoconductive cell  C) Photovoltaic cell  D) Simple voltaic cell.

121. In which Indian city was fibre optic system introduced first?
122. Antimony and Bismuth are preferred in a thermocouple. Why?

A) Thermo e.m.f. is \( \infty \)  
B) Thermo e.m.f. is small

C) Thermoelectric current is large  
D) Thermo e.m.f. is large.

123. For a given material, if the Young’s modulus is 2-4 times its rigidity modulus, what is its Poisson’s ratio?

A) 1.2  
B) 0.2

C) 0.4  
D) 0.

124. Which one of the following vector relations is correct?

A) \( \nabla \cdot (fA) = f(\nabla \cdot A) + A \cdot \nabla f \)

B) \( \nabla \cdot (\nabla \times A) = \text{Curl grad } f \)

C) \( \nabla \times \nabla \times A = \nabla^2 (\nabla \cdot A) - \nabla \cdot A \)

D) \( \nabla \times f A = f(\nabla \cdot A) - A \times \nabla f \).
125. In SHM equation \( y = 6 \sin \left( 2 \pi t + \pi/3 \right) \). What is the period of oscillation?

   A) 4 sec           B) 5 sec
   C) 2.5 sec         D) 1 sec.

126. A Carnot engine operates between 627°C and 27°C. Its efficiency is

   A) 90%            B) 60%
   C) 66.6%         D) 50%.

127. What type of force is in between molecules of a polymer?

   A) Gravitational force   B) Viscous force
   C) Molecular force       D) Force of attraction.

128. The hardness of pure ceramic oxide can be increased by adding which elements?

   A) Carbide and Chromium   B) Carbide and Nitride
   C) Nitride and Chloride   D) Nitride and Acetate.
129. This is related to a particle in motion. This must be well behaved, that is single valued, finite and continuous everywhere. This is

A) energy  B) momentum  
C) velocity  D) wave function.

130. According to special theory of relativity, space and time have

A) absolute meaning  B) relative meaning  
C) selective meaning  D) vague meaning.

131. The value of Lande’s splitting factor $g_1$ for an s-electron is

A) 0  B) 1  
C) $\frac{1}{2}$  D) 2.

A) 0  B) 1  
C) $\frac{1}{2}$  D) 2.
132. How many types of Bravais lattices are possible?
A) 12
B) 14
C) 16
D) 18.

133. In a Newton's ring experiment the diameter of 5th ring changes from 1.8 cm to 1.2 cm when a liquid is introduced between the lens and the plate. What is the μ of the liquid?
A) 1.5
B) 2.25
C) 2.8
D) 3.0.

134. The magnifying power of a telescope depends on
A) wavelength of the light
B) diameter of the lens
C) refractive index of the lens
D) focal length of the lens.

135. In damped harmonic oscillations, the amplitude of oscillations
A) gradually decreases
B) gradually increases
C) remains constant
D) becomes infinity.

| Turn over |
136. Ultrasonic waves can be generated by
   A) Piezoelectric effect
   B) Doppler effect
   C) Kerr effect
   D) Thomson effect.

137. Cobalt is used in the preparation of
   A) ceramic material
   B) Thermoelectric material
   C) cermet material
   D) optical material.

138. Zener diode is used as
   A) voltage regulator
   B) rectifier
   C) amplifier
   D) oscillator.

139. The empirical formula for the nuclear radius is
   A) \( R = r_0 A^{-2/3} \)
   B) \( R = r_0 A^{-1/3} \)
   C) \( R = r_0 A^{2/3} \)
   D) \( R = r_0 A^{1/3} \).

   \( \text{ஆனால் அவற்றின் நூற்றண்டு சூலோகம்} \)
   A) \( R = r_0 A^{-2/3} \)
   B) \( R = r_0 A^{-1/3} \)
   C) \( R = r_0 A^{2/3} \)
   D) \( R = r_0 A^{1/3} \).
140. In the following reactions which one is possible?

A) \( \Lambda^0 \rightarrow \pi^+ + p \)  
B) \( p + p \rightarrow n + p + \pi^+ \)  
C) \( e^+ + e^+ \rightarrow \mu^+ + \mu^- \)  
D) \( p + p \rightarrow p + \Sigma^+ \).  

141. Which condition is to be satisfied by a normalized wave function?

A) \( \int_a^b \psi^*(x) \psi_1(x) \, dx = 0 \)  
B) \( \int \psi \psi^* \, dx \, dy \, dz = 1 \)  
C) \( \int_a^b \psi^*(x) \psi_1(x) \, dx = 1 \)  
D) \( \int \psi \psi^* \, dx \, dy \, dz = 0 \).  

142. A rod 1 m long is moving with a velocity 0.6 c. Its length as its appears to a stationary observer is

A) 1 m  
B) 2 m  
C) 0.36 m  
D) 0.8 m.  

1. 2 m

[ Turn over
143. The weight of deuterium is
   A) thrice that of hydrogen   B) twice that of hydrogen
   C) equal to that of hydrogen   D) four times that of hydrogen.

144. The frequency of the microwave generated by the magnetron oscillator depends on
   A) breadth of the resonant cavities
   B) thickness of the resonant cavities
   C) frequency of RF oscillation existing in the resonant cavities
   D) magnetic field.

145. The potential at a point due to a charge of 100 micro-coulomb at a distance of 9 m is
   A) $10^4$ volts
   B) $10^9$ volts
   C) $10^7$ volts
   D) $10^5$ volts.
146. What is the current sensitivity of a moving coil galvanometer?

A) \( \frac{T}{2\pi} \cdot \frac{C}{nAB} \)
B) \( \frac{InAB}{C} \)
C) \( \frac{C}{nAB} \)
D) \( \frac{nAB}{C} \)

147. The flexible optical fibre bundles are used in medical instrumentation. What is its name?

A) Stethoscope
B) Endoscope
C) Oscilloscope
D) Kaleidoscope.

148. What is the highest order spectrum which may be seen with monochromatic light of wavelength 5000 Å by means of a diffraction grating with 5000 lines/cm when adjusted for normal incidence?

A) 3
B) 2
C) 5
D) 4.

[ Turn over ]
49. The rate of loss of heat of a body depends upon

A) mass of the body
B) temperature difference between the body and surroundings ✓
C) colour of the body
D) specific heat capacity.

50. For a perfectly elastic collision the coefficient of restitution is

A) less than one
B) equal to zero
C) more than one ✓
D) equal to one.
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