

SEAL

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Invigilator's signature

Question Booklet No.

930223

2018

TGT — PAPER - I : PHYSICS

Time : 2 Hours

Maximum Marks : 100

ROLL NO.

INSTRUCTIONS FOR CANDIDATES

1. This Question Booklet contains 50 optional questions. Each question comprises four responses (answers). You will select ONLY ONE response which you consider the best and darken the bubble on the OMR RESPONSE SHEET.
2. DO NOT write your Name or anything else except Roll No. and the actual answers to the question, anywhere on the OMR RESPONSE SHEET.
3. DO NOT handle your OMR RESPONSE SHEET in such a manner as to mutilate, fold, etc.
4. No candidate shall be admitted to the Examination Hall **20 minutes** after commencement of distribution of the Test Booklet. The invigilator of the Examination Hall will be the time-keeper and his decision in this regard is final.
5. No candidate shall have in his/her possession inside the Examination Hall any book, notebook or loose paper, calculator, mobile phone, etc., except his/her admit card and other things paper permitted by the Commission.
6. Immediately after the final bell indicating the closure of the examination, stop bubbling. Be seated till the OMR RESPONSE SHEET is collected by the invigilator, thereafter you may leave the Examination Hall.
7. Violation of any of the above rules will render the candidate liable to expulsion from the examination and disqualification from the examination, and according to the nature and gravity of his/her offence, he/she may be debarred from future examinations and interviews to be conducted by the Commission and other such organization (i.e., UPSC, SSC and SPSCs).

NB: CANDIDATES ARE ALLOWED TO TAKE THIS QUESTION BOOKLET ONLY AFTER COMPLETION OF 2 (TWO) HOURS OF EXAMINATION TIME.

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1. 1 femtometre is equal to
 - (A) 10^{15} m
 - (B) 10^{-15} m
 - (C) 10^{12} m
 - (D) 10^{-12} m
2. 1 picometre is equal to
 - (A) 10^{-10} m
 - (B) 10^{10} m
 - (C) 10^{-12} m
 - (D) 10^{12} m
3. 1 kilometre per hour (1km/h) is equivalent of
 - (A) 0.3728 m/s
 - (B) 0.2778 m/s
 - (C) 0.4778 m/s
 - (D) 0.5778 m/s
4. The dimensional formula of work is
 - (A) ML^2T^{-2}
 - (B) MLT^{-2}
 - (C) $M^2L^2T^2$
 - (D) $ML^{-2}T^2$
5. The dimensional formula of stress is
 - (A) $ML^{-1}T^{-2}$
 - (B) ML^2T^{-2}
 - (C) $ML^{-2}T$
 - (D) M^2LT^2
6. The displacement of a body in rectilinear motion is given by $x = a + bt + ct^2$, where x is in m and t in s. If the values of a , b and c are 1, 2 and 3 respectively, the acceleration of the body after $t = 2$ s is
 - (A) 6 ms^{-2}
 - (B) 3 ms^{-2}
 - (C) 1.5 ms^{-2}
 - (D) zero
7. In the light of significant figures, the correct value of 8.7685×6.45 is
 - (A) 56.556225
 - (B) 56.557
 - (C) 56.556
 - (D) 56.6
8. The thickness of a metal sheet as measured by a screw gauge is found to be 2.5 ± 0.2 mm. If the zero reading of the screw gauge be recorded as 1.2 ± 0.2 mm, the percentage error to be quoted in the measurement of the thickness is
 - (A) 20%
 - (B) 30%
 - (C) 40%
 - (D) 50%

9. Two rods A and B having original length in the ratio of $2 : 3$ and coefficient of expansion in the ratio of $3 : 2$ are heated from 0°C to 100°C . The expansion will be in the ratio
- (A) $2 : 3$
 (B) $3 : 2$
 (C) $4 : 9$
 (D) $1 : 1$
10. If the pressure of a given amount of a gas be doubled and volume be halved, the temperature in K will
- (A) be increased 4 times
 (B) be increased 2 times
 (C) remain unchanged
 (D) be decreased 2 times
11. At what temperature the RMS velocity of gas molecules will be double of its value at 0°C ?
- (A) 273°C
 (B) 546°C
 (C) 819°C
 (D) 1092°C
12. If the radius and length of rod be both doubled, its thermal conductance will increase
- (A) 8 times
 (B) 4 times
 (C) 16 times
 (D) 2 times
13. A Carnot engine will be 100% efficient if the temperature of sink is
- (A) 0°C
 (B) 0°F
 (C) 0°R
 (D) 0 K
14. If 10 g of ice at -10°C and 10 g water at 10°C are mixed up, the resulting temperature of the mixture is
- (A) 6.6°C
 (B) 0°C
 (C) 5°C
 (D) -5°C
15. If the temperature of a gas increases by 1°C , the molecular kinetic energy will increase by
- (A) $\frac{3}{2}R$
 (B) $\frac{3}{2}\frac{R}{N}$
 (C) $\frac{1}{2}R$
 (D) $\frac{1}{2}\frac{R}{N}$
- [R is universal gas constant and N is Avogadro number]
16. The number of degree of freedom of a triatomic molecular corresponding to vibrational motion (atoms do not lie in a line) is
- (A) 3
 (B) 6
 (C) 7
 (D) 10
17. Which of the following represents a simple harmonic progressive wave?
- (A) $y = A(x - vt)$
 (B) $y = A\sqrt{(x - vt)}$
 (C) $y = A \cos(kx - vt)$
 (D) $y = A(x + vt)^2$

18. The displacement of vibrating particle at any time t is given as $y = 6\sin\left(50\pi t + \frac{\pi}{4}\right)$. The frequency of the particle is
- (A) 50 Hz
(B) 25 Hz
(C) 12.55 Hz
(D) 30 Hz
19. At 0°C the velocity of sound in air is 332 ms^{-1} . At what temperature will the velocity of sound be doubled?
- (A) 919°C
(B) 819°C
(C) 719°C
(D) 609°C
20. A man standing between two parallel hills fires a gun. He hears one echo after 2 s and another after 3 s. If the velocity of sound is 340 ms^{-1} , the distance between the hills will be
- (A) 850 m
(B) 800 m
(C) 750 m
(D) 700 m
21. A train blowing a whistle of 500 Hz approaches and then passes a stationary observer at a constant speed of 20 ms^{-1} . Ratio of the pitch of the note as heard by the observer is
- (A) 2.00
(B) 1.5
(C) 1.125
(D) 0.75
22. The loudness of small source at unit distance is 50 db. Its loudness at a distance of 10 units will be
- (A) 30 db
(B) 5 db
(C) 0.5 db
(D) 500 db
23. A 1.6 m tall man stands 2 m away from a large vertical plane mirror. The height of the image of man formed by the mirror is
- (A) 1.6 m
(B) 2 m
(C) 3.2 m
(D) 0.8 m
24. A hunter desires to shoot a fish that appears 1 m below the water surface. He should aim at
- (A) 1 m
(B) 1.33 m
(C) 2 m
(D) 0.75 m
25. A shaving mirror produces an image twice the normal size when a man stands 50 cm from it. The radius of curvature of the mirror is
- (A) 50 cm
(B) 1 m
(C) 2 m
(D) 25 cm
26. A short-sighted person cannot see objects distinctly more than one metre away. To see distinct objects clearly he needs spectacle lenses of power
- (A) -1 D
(B) +1 D
(C) +100 D
(D) -100 D

27. A telescope has an objective of 25 cm and eyepiece of 50 cm focal length. When sighted on a distant object, the telescope produces a magnification power of
 (A) 125
 (B) 5
 (C) 1/5
 (D) 6
28. The frequency of visible light is of the order of
 (A) 10^{14} Hz
 (B) 10^{10} Hz
 (C) 10^7 Hz
 (D) 10^3 Hz
29. In hydrogen atom an electron revolves round a proton at a distance of 0.5\AA . The electromagnetic forces between the two charges is approximately
 (A) 10^{-16} N
 (B) 10^{-8} N
 (C) 10^{-19} N
 (D) 10^{-27} N
30. A metal sphere of radius 10 cm has a charge of 10^{-8} C. The potential at its centre is
 (A) zero
 (B) 10^{-10} V
 (C) 90 V
 (D) 0.9 V
31. Three capacitors $2\ \mu\text{F}$, $3\ \mu\text{F}$ and $6\ \mu\text{F}$ capacitance can yield the minimum capacitance of
 (A) $2\ \mu\text{F}$
 (B) $1.5\ \mu\text{F}$
 (C) $11\ \mu\text{F}$
 (D) $1\ \mu\text{F}$
32. A bar magnet of pole-strength m is divided into two equal parts so that the length of each part is half of the original magnet. The pole strength of each part will be
 (A) $m/2$
 (B) $2m$
 (C) m
 (D) $3m$
33. The magnetic field due to a magnetic pole strength 10 Am at a distance 5 cm away from the pole will be
 (A) 6×10^{-4} T
 (B) 4×10^{-4} T
 (C) 2×10^{-4} T
 (D) zero
34. The magnetic moment of a dipole is $2\ \text{Am}^2$. The potential at a distance of 10 cm from the dipole at an angle of 60° from the direction of the dipole moment is
 (A) 10^{-10} J/Am
 (B) 10^{-8} J/Am
 (C) 10^{-5} J/Am
 (D) 10^{-4} J/Am
35. A current of 1 A flows in an electric lamp for 1 hour. The amount of electric charge that flows through the lamp is
 (A) 1 C
 (B) 60 C
 (C) 360 C
 (D) 3600 C

36. An electric bulb dissipates 100 W when connected to a 250 V source. The current in the bulb is
- (A) 4 A
(B) 2.5 A
(C) 0.4 A
(D) 0.25 A
37. A wire of 6Ω is stretched to double its original length. The resistance of stretched wire will be
- (A) 10Ω
(B) 24Ω
(C) 36Ω
(D) 6Ω
38. Two circular coils of radius 10 cm and 20 cm are connected in series. The ratio of field induction at the centre is
- (A) 1 : 2
(B) 2 : 1
(C) 1 : 1
(D) 4 : 1
39. The ionization potential of hydrogen atom is 13.6 V. The energy required to remove an electron from the second orbit of electron is
- (A) 27.2 eV
(B) 6.8 eV
(C) 13.6 eV
(D) 3.4 eV
40. The half-life of radon is 3.8 days. Three-fourth of a radon sample decays in
- (A) 11.4 days
(B) 15.2 days
(C) 3.8 days
(D) 7.6 days
41. An electron jumps to the fourth orbit. The number of spectral lines emitted when the electron jumps back to the lower energy level is
- (A) 3
(B) 5
(C) 8
(D) 6
42. The velocity of an electron in the n th orbit of hydrogen atom depends on n as
- (A) $v \propto \frac{1}{n}$
(B) $v \propto \frac{1}{n^2}$
(C) $v \propto n$
(D) $v \propto n^2$
43. The unit of trans-conductance (g_m) is
- (A) ohm
(B) mho
(C) V/A
(D) None of the above
44. The band gap of semiconductor is of the order of
- (A) 0.1 eV
(B) 100 eV
(C) 500 eV
(D) 1000 eV
45. In n -type semiconductor the impurity atom is
- (A) trivalent
(B) tetravalent
(C) pentavalent
(D) None of the above

46. At temperature 0 K pure germanium, Ge is
- (A) extrinsic semiconductor
 - (B) insulator
 - (C) intrinsic semiconductor
 - (D) super conductor
47. The temperature coefficient of a resistance for a semiconductor is
- (A) positive
 - (B) negative
 - (C) 0
 - (D) None of the above
48. Which mode of communication is employed to transmit very high frequency and ultra-high frequency signals?
- (A) Ground wave propagation
 - (B) Sky wave propagation
 - (C) Space wave propagation
 - (D) None of the above
49. Demodulation is done in which of the following systems ?
- (A) Receiving antenna
 - (B) Transmitter
 - (C) Radio receiver
 - (D) Transmitting antenna
50. Which of the following connectors is used for cable TV, which uses a push / pull locking system?
- (A) SC connector
 - (B) BC connector
 - (C) ST connector
 - (D) MT-RJ connector