CLUSTER UNIVERSITY SRINAGAR
University Entrance Examination
Integrated Physics   (50 x 1= 50 MARKS)   Time One Hour
Note: Each wrong answer will lead to the deduction of 0.25 marks from the total score of the candidate.

1. The energy of a quantum of radiation is, $E = h\upsilon$; where υ is frequency and h is Planck's constant having the dimensions:
    a) $M^1L^1T^{-1}$ b) $M^1L^{-2}T^{-1}$ c)$M^1L^2T^{-1}$ d) $M^1L^1T^{-3}$

2. If two vector forces of equal magnitude combine such that their resultant is equal to either of the given forces, the angle between the given two forces is:
    a) 30^0 b) 120^0 c) 136.6^0 d) 160.8^0

3. A projectile of mass m is projected with velocity u at angle θ with the horizontal. The ratio of kinetic energy at the highest point to that at the point of projection is equal to:
    a) $Cos^2 θ$ b) $Sin^2 θ$ c) Tanθd)   d) 1

4. The radius of earth if becomes one-tenth of its present radius without change in its mass, the escape velocity will increase by the factor:
    a) 31.62   b) 3.162   c) 0.3162   d)   infinite

5.   A circular ring, a circular disc, a hollow sphere and a solid sphere all with same mass and radius start together from rest at the top of an inclined plane and roll down without slipping. Then,
    a) All of these reach the bottom at the same time
    b) Disc reaches first, then hollow sphere, then solid sphere and then ring
    c) Solid sphere reaches first, then disc, then hollow sphere and then ring
    d) Solid sphere reaches first, then ring and then hollow sphere and disc together

6. A raindrop reaching the ground with terminal velocity has momentum P. Another raindrop of three- times the radius also reaches the ground with momentum equal to:
    a) P   b) 72P   c) 243P   d) 1024P

7. A vertical cylinder is filled with water up to the height h. If the same cylinder is filled with mercury up to the height 2h. Then, the ratio of forces exerted by water to that of mercury at the bottom will be :
    a) 1/1.36   b) 1/6.8   c) 1/27.2   d)   1/136

8. A monoatomic gas, a diatomic gas and   a polyatomic gas have one type of motion common, that motion is:
    a) translational   b) rotational   c) vibrational   d) all of these

9. A bar magnetic of magnetic dipole moment 0.054 J/T and moment of inertia 24 gm-cm^2 oscillates harmonically in a uniform magnetic field of 100 G. Time taken to complete 50 oscillations is:
    a) 5.04 Sec   b) 6.9Sec   c)20.95Sec   d)50.66Sec

10. A coil of inductance 0.4H, a capacitor of capacity 500nF and a resistor of resistance 400Ω are connected in series. What is the quality factor of the circuit at resonance?

a) 2.236　　　　　　b) 3.667　　　　　　c) 6.98　　　　　　d) 31.61

11. A convex lens has refractive index of 1.6. The radius of curvature of its front surface is 12cm and that of its back surface is 15cm. what is the power of the lens?

a) – 1 diopter　　　　b) +1 diopter　　　c) – 2.5 diopter　 d) +2.5 diopter

12. A tennis ball of mass 25gm is thrown at a speed of 144km/hr. The wave-length associated with the ball is:

a) 6.63×10^{-34} m　　b) 6.63×10^{-11} m　c) 6.63×10^{4} m　d) 6.63×10^{41} m

13. Which of the following sub-atomic particles obey Pauli's exclusion principle:

a) neutrons　　　　　b) protons　　　　　c) electrons　　d) all of these

14. Every fundamental interaction is mediated by the exchange of field particles. The electromagnetic interaction is mediated by :

a) bosons　　b) photons　　　　　c) gluons　　　　　d) gravitons

15. If density of water is 1g/cc, its value in Kg/m^3 is:

a) 10　　　　b) 100　　　　　　c) 1000　　　　　d)　0.001

16. The numerical ratio of velocity to speed is:

a) always less than one　　　　　　b) always greater than one
c) always equal to one　　　　　　d) equal to or less than one

17. In which of the following motions, no force is required:

a) accelerated motion along a straight path　　　b) retarded motion in a straight path
c) motion with constant velocity along a straight path　　d) uniform motion in a circle

18. when one walks on a road, the force of friction exerted by the road on the person is in:

a) forward direction b) backward direction c) first forward and then backward   d) zero

19. when the velocity of a body is three-folded, its kinetic energy is:

a) doubled　　　　b) four folded　　c) nine fold　　　d) none of these

20. The rotational kinetic energy K, moment of inertia I, and the angular momentum L, are related to one another by the relation:

a) $L = K^2/2I$　　　　b) $K = L^2/2I$　　　　c) $L = KI$　　　　d)　$L = IK^2$

21. The tidal waves in the sea are primarily due to :

a) atmospheric effect of earth　　　　b) gravitational effect of moon on earth
c)gravitational effect of sun on earth　　　d) effect of artificial satellites on earth

22. The internal energy of a gram-molecule of an ideal gas depends upon:

a) pressure　　b) temperature　　c) volume　　d) both pressure and temperature

23. A Carnot's engine takes in 3000Kcal of heat from a reservoir at 627^0C and gives it to a sink at 27^0C. The work done by the engine is:

a) $4.2 \times 10^6 J$　　　b) $8.4 \times 10^6 J$　　c) $16.8 \times 10^6 J$　　　d) zero

24. A star emits continuous radiations with maximum intensity at wavelength of $4000A^0$. Then, the surface temperature of the star is nearly:

a) 75　　　　b) 750K　　　c) 7500K　　　　d) 75000K

25. The ratio of the speed of an aircraft to the speed of the sound is called:

   a) Sonic index   b) Doppler ratio   c) Refractive index   d) Mach number

26. The equation of a plane progressive wave is; $y = 4Sin(100t-2x)$ where y and x are measured in cm, t in seconds, the maximum displacement is:

   a) 2cm   b) 4cm   c) 50cm   d) 100cm

27. When the prongs of a tuning fork are filed, the frequency of the tuning fork will:

   a) remain same   b) increase   c) decrease   d) none of these

28. when two progressive waves of the same frequency and same amplitude travel in opposite directions along a straight collinear path and superimpose, they give rise to:

   a) beats   b) interference   c) stationary waves   d) diffraction

29. Optical fibers used in medical examination works on the principle of:

   a) interference   b) total internal reflection   c) dispersion   d) refraction

30. For a given prism, the refractive index of violet colour is 1.524 and that of red colour is 1.514, then the dispersive power of material of the prism will be:

   a) 0.019   b) 0.19   c) 1.9   d) 19

31. The electron microscope having magnification of 10^5;works on the principle of

   a) Light travels along a straight path   b) light has wave nature
   c) electron is deflected in electric field   d) electron has wave nature

32. An un-polarized beam of light is one whose vibrations:

   a) are confined to a single plane   b) occur in all directions
   c) occur in all directions perpendicular to the direction of propagation   d) none of these

33. An oil drop develops a negative charge of 96nC. Determine the number of electrons gained by it:

   a) 6.00×10^{11} b) 6.00×10^{19} c) 6.00×10^{41} d) 6.00×10^{61}

34. If 64 joule of energy is required to move a charge of 25milli-Coulomb between two points then' the potential difference between the points will be:

   a) 2.56 volt   b) 25.6 volt   c) 256 volt   d) 2560 volt

35. The radius of H-atom is $0.5A^0$, the electric field intensity produced on electron due to proton will be:

   a)6.40×10^4 N/C   b) 5.76×10^{11}N/C   c) 6.08×10^{19}N/C   d) 3.92×10^{19}N/C

36. A capacitor of 20 µF and charged to 500 V is connected in parallel to another capacitor of 10µF charged to 200 V, the common potential of the system of capacitors will be:

   a) 100 V   b) 200 V   c) 300 V   d) 400 V

37. In a carbon resistor, the first band colour is green, second band red , third band again red and the fourth band golden, the colour coded resistance of the resistor will be:

   a) 520 Ω ± 5%   b) 5200 Ω ± 5%   c)52000Ω ± 5%   d)520000 ± 10%

38. A piece of silver and another of germanium having same length and thickness are cooled from room temperature to 100 kelvin. The resistance of:

   a) each of these increases   b) each of these decreases
   c) silver increases, germanium decreases   d) silver decreases, germanium increases

39. A uniform wire of copper of resistance R is cut into n-equal parts. The parts are then connected in parallel. The equivalent resistance of the combination will be:
a) n R
b) R / n
c) n^2R
d) R /n^2

40. Two thin copper wires separated by a distance 1 m in free space each carry current of 1 A in the same direction. The magnitude of force per unit length exerted by one wire on the other will be:
a) 0.2 microN/m
b) 0.2 milliN/m
c) 0.2N/m
d) 0.2 kilo N/m

41. A current passing through a circular coil of two turns produced a magnetic field B at its centre. The coil is then rewound so that number of turns becomes four. Without change in current, the magnetic field at the centre becomes:
a) B/2
b) 2B
c) 4B
d) 16B

42. What is the coefficient of mutual inductance for a system of two coils when magnetic flux changes by 0.02 Wb and current change is 0.01A?
a) 0.4 Henry
b) 2 Henry
c) 4 Henry
d) 62 Henry

43. Power factor is defined as:
a) apparent power × true power
b) true power/apparent power
c) apparent power/true power
d) true power / 3×apparent power

44. The relation between electric field Eand the magnetic field induction B in an electromagnetic waves having speed c:
a) E = B/c
b) B = E/c
c) E = c / B^2
d) none of these

45. In a hydrogen spectrum, which of the following belong to ultraviolet region of the electromagnetic spectrum:
a) Lyman series
b) Balmer series
c)Paschen series
d)Pfund series

46. The work function of a metal surface is 2.31eV, what is the maximum kinetic energy associated with the photoelectron when a photon of frequency 8.6×10^{14} Hz is made incident on the metal?
a) 1.25eV
b)12.57eV
c) 78.56eV
d) 931.48 eV

47. A radioactive substance has a half- life of 5.6 sec. What is the disintegration constant of that substance?

a). 0.0012375/ Sec
b) 0.12375/ Sec
c) 1.2375/Sec
d) 12.375/Sec

48. The process of superposition of audio frequency waves on a radio frequency waves is known as:
a) demodulation
b) modulation
c) amplification
d) oscillation

49. If α is the current gain in common base configuration and β the current gain in common emitter configuration for a given transistor, then
a) β= α/ 2
b) β= α/ 1-α
c) β= / 1+α
d) β= 3α

50. Which of the following logic gates can be used as multiplier?
a) AND gate
b) OR gate
c) NOT gate
d) XOR gate

KEY PHYSICS PAPER

Question Number	Answer	Question Number	Answer	Question Number	Answer	Question Number	Answer	Question Number	Answer
1	c	11	b	21	b	31	d	41	c
2	b	12	a	22	b	32	c	42	b
3	a	13	d	23	b	33	a	43	b
4	b	14	b	24	c	34	d	44	b
5	c	15	c	25	d	35	b	45	a
6	c	16	d	26	b	36	d	46	a
7	c	17	c	27	b	37	b	47	b
8	a	18	a	28	c	38	d	48	b
9	c	19	c	29	b	39	d	49	b
10	a	20	b	30	a	40	a	50	a