

No. of Pages. 16

Code No.

Y – 3053

Register Number :

Time : 2 Hours

Name :

Max.Marks : 100

**Entrance Examination for Admission to the P.G. Courses in the
Teaching Departments, 2026**

CSS

**PHYSICS WITH SPECIALIZATION IN (APPLIED ELECTRONICS/SPACE
PHYSICS/RENEWABLE ENERGY/NANO SCIENCE)**

GENERAL INSTRUCTIONS

1. The Question Paper is having 100 Objective Questions, each carrying one mark.
2. The answers are to be marked **only** in the “**OMR Sheet**” provided.
3. **Negative marking** : **0.25 marks** will be deducted for each wrong answer .

INSTRUCTIONS FOR FILLING THE OMR SHEET

- The OMR sheet should not be folded or crushed.
- Use only blue/black ball point pen to fill the circles.
- Use of pencil is strictly prohibited.
- Circles should be darkened completely and properly.
- Cutting and erasing on this sheet is not allowed.
- Do not leave any stray marks on the sheet.
- Do not use marker or white fluid to hide the mark.
- **WRONG METHODS**



CORRECT METHOD



DO NOT WRITE HERE

Choose appropriate answer from the options in the questions.

(100 × 1 = 100 marks)

1. The band gap is highest in :
A. Conductor
B. Insulator
C. Semiconductor
D. Metal

2. Poynting vector represents :
A. Electric field
B. Magnetic field
C. Charge density
D. Energy flux

3. The Hamiltonian represents :
A. Potential energy
B. Work done
C. Total energy
D. Kinetic energy

4. For the isothermal process, the work done depends on :
A. Initial and final volume B. Temperature only
C. Pressure only D. Heat only
5. The magnetic field inside a toroid is :
A. Zero B. Constant
C. Varies as $1/r$ D. Infinite
6. The displacement current is associated with :
A. Changing electric field B. Constant field
C. Magnetic field D. Charge flow
7. The entropy of isolated system :
A. Decreases B. Constant
C. Zero D. Increases
8. For the adiabatic process :
A. Heat exchanged is zero B. Temperature constant
C. Pressure constant D. Volume constant
9. Hooke's law is valid for :
A. Elastic limit B. Plastic region
C. Breaking point D. All
10. Output of OR gate for inputs (0 ,1) :
A. 0 B. 1
C. -1 D. Undefined
11. A particle in SHM has maximum velocity at :
A. Extreme position B. Half amplitude
C. Anywhere D. Mean position
12. At resonance in RLC circuit, impedance is :
A. Maximum B. Minimum
C. Zero D. Infinite
13. For central force motion, angular momentum is :
A. Variable B. Zero
C. Conserved D. Infinite

14. Work done in moving charge in equipotential surface is :
A. Zero
B. Maximum
C. Minimum
D. Infinite
15. The Maxwell-Boltzmann distribution is valid for :
A. Identical fermions
B. Identical bosons
C. Photons only
D. Classical distinguishable particles
16. Determinant zero means :
A. Singular matrix
B. Identity
C. Orthogonal
D. Symmetric
17. For ideal gas, internal energy depends only on :
A. Pressure
B. Volume
C. Temperature
D. Density
18. Divergence of curl is _____.
A. One
B. Infinity
C. Zero
D. Undefined
19. Gauss law is valid for _____.
A. Any closed surface
B. Only sphere
C. Only cube
D. Only conductor
20. Escape velocity depends on _____.
A. Mass and radius of planet
B. Only mass
C. Only radius
D. Height of projectile
21. Electro magnetic waves are _____.
A. Longitudinal
B. Scalar
C. Transverse
D. Stationary
22. Zeroth law of thermodynamics defines _____.
A. Heat
B. Work
C. Entropy
D. Temperature

23. Bose-Einstein condensation occurs at :
A. High temperature
B. Low temperature
C. High pressure
D. High volume
24. Efficiency of Carnot engine depends on :
A. Pressure
B. Temperature
C. Volume
D. Work
25. In a simple cubic lattice, number of atoms per unit cell is :
A. 1
B. 2
C. 4
D. 8
26. Heisenberg uncertainty principle relates :
A. momentum and energy
B. displacement and momentum
C. energy and displacement
D. momentum and time
27. Which function is used to plot graphs in Python (matplotlib)?
A. draw()
B. graph()
C. showplot()
D. plot()
28. The Schrödinger equation is :
A. Heat equation
B. Wave equation
C. Diffusion equation
D. Maxwell equation
29. The ground state energy of infinite well depends on :
A. L
B. L^2
C. Constant
D. $1/L^2$
30. The wave function must be _____.
A. Discontinuous
B. Infinite
C. Continuous
D. Complex only
31. In C, which data type is typically used for real numbers?
A. int
B. char
C. void
D. float
32. Radioactivity decreases with time :
A. Exponentially
B. Linearly
C. Constant
D. Random

33. Zeeman effect is due to :
- | | |
|-------------------|-------------------|
| A. Magnetic field | B. Electric field |
| C. Gravity | D. Pressure |
34. The binding energy per nucleon is maximum for :
- | | |
|-------------|-----------|
| A. Hydrogen | B. Iron |
| C. Uranium | D. Helium |
35. The Coriolis force acts in :
- | | |
|-------------------------|-----------------------|
| A. Inertial frame | B. Vacuum |
| C. Only circular motion | D. Non-inertial frame |
36. Fourier series represents :
- | | |
|----------------------|-----------------|
| A. Periodic function | B. Non periodic |
| C. Random | D. Linear |
37. Visibility of fringes is maximum when amplitudes are :
- | | |
|----------|-------------|
| A. Equal | B. Unequal |
| C. Zero | D. Infinite |
38. Half-period zones concept is used in :
- | | |
|---------------------------|------------------------|
| A. Fraunhofer diffraction | B. Interference |
| C. Polarization | D. Fresnel diffraction |
39. Liquid drop model explains :
- | | |
|-------------------|------------------|
| A. Binding energy | B. Energy levels |
| C. Spin only | D. Orbitals |
40. Electric field inside a conductor is :
- | | |
|-------------|----------------------|
| A. Constant | B. Infinite |
| C. Zero | D. Depends on charge |
41. Maxwell added displacement current to satisfy :
- | | |
|------------------------|----------------|
| A. Continuity equation | B. Ohm law |
| C. Gauss law | D. Faraday law |
42. Phase velocity equals group velocity in :
- | | |
|----------------------|--------------------------|
| A. Dispersive medium | B. Non-dispersive medium |
| C. Vacuum only | D. Solid only |

43. Fresnel diffraction occurs when :
- | | |
|------------------------------|-----------------------|
| A. Source at finite distance | B. Source at infinity |
| C. Only parallel rays | D. No aperture |
44. Fraunhofer diffraction requires :
- | | |
|--------------------|-------------------|
| A. Converging rays | B. Diverging rays |
| C. Parallel rays | D. Random rays |
45. For Miller indices (1 1 1), intercepts are :
- | | |
|---------------------|---------------------|
| A. (a, a, ∞) | B. (a, a, a) |
| C. (∞, a, a) | D. (a, ∞, a) |
46. Fringe width increases if :
- | | |
|------------------------------|---------------------------------|
| A. Slit separation increases | B. Distance to screen increases |
| C. Wavelength decreases | D. Source intensity decreases |
47. Meissner effect implies :
- | | |
|-------------------------|-------------------------|
| A. Perfect diamagnetism | B. Zero resistance only |
| C. High resistance | D. Infinite current |
48. In thin films, bright fringe occurs when path difference is :
- | | |
|----------------------|----------------|
| A. $(2m+1)\lambda/2$ | B. $\lambda/4$ |
| C. $\lambda/8$ | D. $m\lambda$ |
49. Newton's rings are formed due to :
- | | |
|-----------------|----------------|
| A. Interference | B. Diffraction |
| C. Polarization | D. Refraction |
50. Light becomes plane polarized on incidence to a transparent medium by :
- | | |
|----------------|---------------|
| A. Diffraction | B. Refraction |
| C. Absorption | D. Reflection |
51. Nicol prism works on :
- | | |
|-----------------|----------------------|
| A. Diffraction | B. Double refraction |
| C. Interference | D. Reflection |
52. Optical activity rotates :
- | | |
|--------------------------|---------------|
| A. Intensity | B. Frequency |
| C. Plane of polarization | D. Wavelength |

53. Resolving power of microscope depends on :
- A. Numerical aperture B. Focal length
C. Magnification D. Intensity
54. Population inversion means
- A. Lower state more populated
B. Higher energy state more populated
C. Equal population
D. No population
55. A plane wavefront is incident on a convex lens. The emerging wavefront is :
- A. Plane B. Cylindrical
C. Spherical converging D. Spherical diverging
56. Holography is based on :
- A. Diffraction B. Reflection
C. Refraction D. Interference
57. In ferromagnets above Curie temperature, material becomes :
- A. Diamagnetic B. Paramagnetic
C. Antiferromagnetic D. Superconducting
58. Frenkel defect does not change density because :
- A. Atoms are removed B. Atoms remain inside lattice
C. Volume changes D. Mass changes
59. Effective mass is inversely proportional to :
- A. Band curvature B. Energy
C. Velocity D. Momentum
60. In BCS theory, Cooper pairs form due to :
- A. Coulomb repulsion
B. Electron-phonon interaction
C. Magnetic field
D. Impurities
61. Ground state energy of harmonic oscillator is :
- A. 0 B. $\frac{1}{2} \hbar \omega$
C. $\hbar \omega$ D. $\frac{3}{2} \hbar \omega$

71. A disc and ring roll with same speed. Which has more total energy? (Mass and radius are same for both) :
- A. Disc
B. Same
C. Depends on radius
D. Ring
72. A silicon diode (0.7 V drop) is in series with $1\text{ k}\Omega$ across 5 V. Current is :
- A. 4.3 mA
B. 5 mA
C. 3.3 mA
D. 2.5 mA
73. Inverting amplifier with $R_f = 100\text{ k}\Omega$, $R_{in} = 10\text{ k}\Omega$. Gain will be :
- A. 10
B. -10
C. 0.1
D. -0.1
74. Trace of matrix equals :
- A. Product of eigenvalues
B. Determinant
C. Zero always
D. Sum of eigenvalues
75. Determinant of identity matrix of order n is :
- A. 0
B. 1
C. n
D. -1
76. Speed of EM wave in vacuum depends on :
- A. Frequency
B. Wavelength
C. Amplitude
D. μ_0, ϵ_0
77. Power factor at resonance is :
- A. 0
B. 1
C. 0.5
D. Infinite
78. Two charges q and $2q$ are separated by distance r . Force becomes how many times if distance becomes $r/2$?
- A. 2
B. 4
C. 8
D. 16
79. Ratio of energy E_2/E_1 in hydrogen atom is :
- A. 2
B. $1/4$
C. 4
D. $1/2$

87. Assertion [A] : No interference without coherence.
Reason [R] : Phase difference must remain constant.
- A. Both true, [R] explains [A]
 - B. Both true, [A] not explanation
 - C. [A] true, [R] false
 - D. [A] false, [R] true
88. Assertion [A] : Python is widely used in physics simulations.
Reason [R] : It has libraries like NumPy and SciPy.
- A. Both true, [R] explains [A]
 - B. Both true, not explanation
 - C. [A] true, [R] false
 - D. [A] false, [R] true
89. Assertion [A] : Laser light is coherent.
Reason [R] : Stimulated emission produces identical photons.
- A. Both true, [R] not explanation
 - B. [A] true, [R] false
 - C. Both true, [R] explains [A]
 - D. [A] false, [R] true
90. Assertion [A] : Intrinsic semiconductor conductivity increases with temperature.
Reason [R] : Carrier concentration increases exponentially.
- A. Both true, [R] explains [A]
 - B. Both true, not explanation
 - C. [A] true, [R] false
 - D. [A] false, [R] true
91. Assertion [A] : Work done by centripetal force is zero.
Reason [R] : Force is perpendicular to displacement.
- A. Both true, [R] not explanation
 - B. [A] true, [R] false
 - C. [A] false, [R] true
 - D. Both [A] and [R] true, [R] correct explanation

92. Assertion [A] : Binding energy per nucleon decreases for very heavy nuclei.
Reason [R] : Nuclear forces are short range.
- A. Both true, [R] explains [A]
 - B. Both true, [R] not explanation
 - C. [A] true, [R] false
 - D. [A] false, [R] true
93. Assertion [A] : Heat cannot flow from cold body to hot body.
Reason [R] : Such a process violates second law of thermodynamics.
- A. Both true, [R] explains [A]
 - B. Both true, [R] not explanation
 - C. [A] true, [R] false
 - D. [A] false, [R] true
94. Assertion [A] : Divergence of curl of any vector field is zero.
Reason [R] : Curl represents rotational nature of field.
- A. Both true, [R] explains [A]
 - B. Both true, [R] not explanation
 - C. [A] true, [R] false
 - D. [A] false, [R] true
95. Assertion [A] : Superconductors show zero resistance.
Reason [R] : Electrons form Cooper pairs.
- A. Both true, [R] explains [A]
 - B. Both true, [R] not explanation
 - C. [A] true, [R] false
 - D. [A] false, [R] true
96. Assertion [A] : Pressure inside a liquid drop is greater than outside.
Reason [R] : Surface tension acts tangentially along the surface.
- A. Both true, [R] explains [A]
 - B. Both true, [R] not explanation
 - C. [A] true, [R] false
 - D. [A] false, [A] true

97. Assertion [A] : Wave function must be continuous everywhere.
Reason [R] : Probability density must be finite.
- A. Both true, [R] explains [A]
 - B. [A] true, [R] false
 - C. Both true, [R] not explanation
 - D. [A] false, [R] true
98. Assertion [A] : A body can have acceleration even if its speed is constant.
Reason [R] : Acceleration depends only on magnitude of velocity.
- A. Both true, [R] explains [A]
 - B. Both true, [R] not explanation
 - C. [A] true, [R] false
 - D. [A] false, [R] true
99. Assertion [A] : Oscillators require positive feedback.
Reason [R] : Positive feedback compensates energy loss.
- A. Both true, [R] explains [A]
 - B. Both true, [R] not explanation
 - C. [A] true, [R] false
 - D. [A] false, [R] true
100. Assertion [A] : NAND gate is a universal gate.
Reason [R] : Any Boolean function can be implemented using only NAND gates.
- A. Both true, [R] explains [A]
 - B. Both true, [R] not explanation
 - C. [A] true, [R] false
 - D. [A] false , [R] true
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ROUGH WORK

ROUGH WORK