P.G. ENTRANCE TEST, MAY 2012.

Test Name: PHYSICS

HALL TICKET No.: ____________

INSTRUCTIONS TO CANDIDATES

This question paper booklet consists of THREE Sections A, B and C. Sections A and B contain 30 multiple choice questions each. Section C contains 40 multiple choice questions.

Clearly write your Hall Ticket Number in the space provided on the question paper booklet (if necessary on the OMR answer sheet) without corrections or overwriting. If any correction is made, get it certified by the invigilator.

You are prohibited from writing your name or Hall Ticket No. on any part of the Question paper booklet or on the OMR answer sheet except in the space provided.

No paper should be detached from the question paper booklet and it should be returned to the invigilator along with the OMR answer sheet.

You are supplied with OMR answer sheet for answering the questions.

Before you start answering, please read the instructions given in the OMR answer sheet.

Do not tear/mutilate/scrabble the OMR answer sheet.

For answering the questions darken the appropriate circle completely with HB pencil only.

If you wish to change your answer, erase already darkened circle and then darken the appropriate circle.

Do not make any stray marks/scrabble on the bar code of the OMR answer sheet.

Any rough work should be done in the space provided at the end of the question paper booklet.
Test Name: PHYSICS

Time: 90 minutes

Maximum: 100 marks

Answer ALL questions.

Each question carries ONE mark.

SECTION A

1. What is the angle between two vectors \( \vec{V}_1 = -\hat{i} + 2\hat{j} + \hat{k} \) and \( \vec{V}_2 = 2\hat{i} + 3\hat{j} - 4\hat{k} \)?
   \( \text{(a)} \ 45^\circ \quad \text{(b)} \ 90^\circ \quad \text{(c)} \ 30^\circ \quad \text{(d)} \ 0^\circ \)

2. Evaluate \( A \times B \) and \( B \times A \) when \( A = 10\hat{i} - 6\hat{j} \) and \( B = -4\hat{i} + 3\hat{j} \).
   \( A = 10\hat{i} - 6\hat{j} \quad \text{and} \quad B = -4\hat{i} + 3\hat{j} \)  
   \( \text{Then} \quad A \times B = -4\hat{i} + 3\hat{j} \quad \text{and} \quad B \times A = -10\hat{i} + 6\hat{j} \)
   \( \text{(a)} \ -2\hat{k} \quad \text{(b)} \ -4\hat{k} \quad \text{(c)} \ -6\hat{k} \quad \text{(d)} \ -5\hat{k} \)

3. In Stoke's theorem \( \oint A \cdot dI = \)
   \( \int \int \oint (\nabla \times A) \cdot dS \)
   \( \text{(a)} \ \int \int \oint (\nabla \times A) \cdot dS \quad \text{(b)} \ \int \int (\nabla \cdot A) \cdot dS \)
   \( \text{(c)} \ \int \int \text{curl} A \cdot dV \quad \text{(d)} \ \int \int A \cdot dV \)

4. The rocket is an example of system of
   \( \quad \text{(a)} \ \text{variable mass} \quad \text{(b)} \ \text{variable velocity} \)
   \( \text{variable speed} \quad \text{(d)} \ \text{variable kinetic energy} \)
5. The total energy in any system always remain
(a) double (b) variable
(c) no change (d) constant

6. Impact parameter is also known as
(a) Collision parameter (b) Rutherford scattering coefficient
(c) Elastic parameter (d) Solid parameter

7. Find the maximum velocity attained by a rocket when \( u=2000 \text{ m/s}, \ M_0=45,000 \text{ kg}, \ M=5000 \text{ kg} \).

\[ u=2000 \text{ m/s}, \ M_0=45,000 \text{ kg}, \ M=5000 \text{ kg} \]

(a) 5.32 km/sec (b) 4.39 km/sec
5.32 \( \text{km}/\text{sec} \) \( \frac{4.39 \text{ km}}{\text{sec}} \)
(c) 6.92 km/sec (d) 8.2 km/sec
6.92 \( \text{km}/\text{sec} \) \( \frac{8.2 \text{ km}}{\text{sec}} \)

8. A car develops 75 kw power when rotating at a speed of 1000 rpm. What is the torque acting on it?

1000 rpm వంతెన రక్షితం 75 kw పవర్ ఉంది. దేవురు లేదు అంటే రక్షితం?

(a) 820.3 N-m (b) 629.2 N-m
820.3 నెమ్మెని నెమ్మెని నెమ్మెని
(c) 716.3 N-m (d) 420.2 N-m
716.3 నెమ్మెని నెమ్మెని నెమ్మెని

(Test No. 12) 4
9. Find the angular velocity \( \omega_p \) of precession with the following data:
\[
r = 0.04 \text{ m}; \quad m = 0.5 \text{ kg}; \quad I = 5 \times 10^{-4} \text{ kg} \cdot \text{m}^2.
\]
\[
r = 0.04 \text{ m}; \quad m = 0.5 \text{ kg}; \quad I = 5 \times 10^{-4} \text{ kg} \cdot \text{m}^2 \text{cm} \quad \text{cm} \quad \text{cm} \quad \text{cm} \quad \text{cm}
\]
\[
\omega_p \quad \text{(a)} \quad 1.05 \text{ rad/s} \quad \text{and} \quad 1.05 \frac{\text{rad}}{\text{s}}
\]
\[
\omega_p \quad \text{(b)} \quad 6.02 \text{ rad/s} \quad \text{and} \quad 6.02 \frac{\text{rad}}{\text{s}}
\]
\[
\omega_p \quad \text{(c)} \quad 3.16 \text{ rad/s} \quad \text{and} \quad 3.16 \frac{\text{rad}}{\text{s}}
\]
\[
\omega_p \quad \text{(d)} \quad 2.08 \text{ rad/s} \quad \text{and} \quad 2.08 \frac{\text{rad}}{\text{s}}
\]

10. The gyroscope has greater stability of its axis of
\[
\text{rotation} \quad \text{(a)} \quad \text{vibration} \quad \text{(b)} \quad \text{constant momentum} \quad \text{(c)} \quad \text{spin} \quad \text{(d)} \quad \text{rotation}
\]

11. Calculate Poisson's ratio for silver using \( Y = 7.25 \times 10^{10} \text{ N/m}^2 \) and \( K = 1 \times 10^{10} \text{ N/m}^2 \) values.
\[
\text{for} \quad Y = 7.25 \times 10^{10} \text{ N/m}^2 \quad \text{and} \quad K = 1 \times 10^{10} \text{ N/m}^2 \quad \text{values}
\]
\[
\text{(a)} \quad 0.29 \quad \text{(b)} \quad 1.25 \quad \text{(c)} \quad 3.24 \quad \text{(d)} \quad 0.39
\]

12. Depression at the free end of plane beam
\[
\frac{wL^2}{3EI} \quad \text{(a)} \quad \frac{wL^2}{3EI} \quad \text{and} \quad \frac{wL^2}{3EI}
\]
\[
\frac{Mg}{3EI} \quad \text{(c)} \quad \frac{Mg}{3EI} \quad \text{and} \quad \frac{Mg}{3EI}
\]

13. The limiting values of Poisson's rations are
\[
\text{(a) } -0.1 \text{ and } 0.5 \quad \text{(b) } -1 \text{ and } 0.5
\]
\[
\text{(c) } -0.1 \text{ and } 0.5 \quad \text{(d) } -1 \text{ and } 0.5
\]
\[
\text{(c) } 1.01 \text{ and } 5.1 \quad \text{(d) } -11.0 \text{ and } 0.3
\]
\[
\text{(c) } 1.01 \text{ and } 5.1 \quad \text{(d) } -11.0 \text{ and } 0.3
\]
14. Centripetal force on satellite is
   ఐసంమేధ ఘటన గణితాన్ని
   (a) \( \frac{mv^2}{r} \)  (b) \( \frac{mvr^2}{G} \)
   (c) \( \frac{4GM}{2v^2r} \)  (d) \( \sqrt{\frac{GM}{R+h}} \)

15. The velocity of light in free space is
   రాళ్ళ స్థానంలో రాళ్ళ విత్తనం
   (a) constant  (b) variant
   (c) uncontrolled  (d) not known

16. Find how fast would a rocket have to go to relative to an observer for its length to be contracted 99% of its length at rest.
   రక్కోత్తె నించి రక్కోత్తె విత్తనాన్ని సంఖ్యాగారత్వం చేయడానికి రక్కోత్తె విత్తనం ఎంత ధానయం చేయాలి?
   (a) \( 5.24 \times 10^9 \) ms\(^{-1} \)  (b) \( 4.24 \times 10^7 \) ms\(^{-1} \)
   (c) \( 4.32 \times 10^8 \) ms\(^{-1} \)  (d) \( 4.62 \times 10^6 \) ms\(^{-1} \)

17. Write the equation for length contraction
   పైకాయ్ కుంటితిత్తె పైకాయ్ విత్తనాన్ని కంప్రెన్సియం
   (a) \( l = l_0 \sqrt{1 + \frac{v^2}{c^2}} \)  (b) \( l = l_0 \left(1 - \frac{v^2}{c^2}\right)^{\frac{1}{2}} \)
   (c) \( l = l_0 \sqrt{1 - \frac{2v^2}{c^2}} \)  (d) \( l = l_0 \sqrt{1 - \left(\frac{v^2}{c^2}\right)^2} \)

18. Calculate the speed of a particle whose mass will be 5 times its rest mass.
   పారిష్క మాసం కొరకు పారిష్క మాసం ఎగిర్తూ పారిష్క మాసంతో 5 గణితాన్ని వ్యాపారం
   (a) 0.89 C  (b) 0.69 C
   (c) 0.98 C  (d) 1.05 C

(Test No. 12) 6
19. Photo-electric effect cannot take place with

(a) free betatron  (b) free protons
(c) mass of the nuclei  (d) free electron

20. What is the value of \( \frac{m-m_0}{m_0} \) if particle velocity is 0.1 C?

(a) 0.005  (b) 0.001  (c) 0.002  (d) 0.008

21. Example for conservation of angular momentum is

(a) scattering of \( \alpha \)-particles by a heavy nucleus
(b) reflection of \( \alpha \)-particles by a nucleus
(c) motion of a car in a circular orbit
(d) none

22. With the given data, evaluate the amplitude of the oscillator \( v_{\text{max}} = 0.4 \text{ m/s}, \)
\( a_{\text{max}} = 0.8 \text{ m/sec}, T = 3.14 \text{ sec.} \)

(a) 0.3 metre  (b) 0.4 metre
0.3 aska  0.4 aska
(c) 0.2 metre  (d) 0.6 metre
0.2 aska  0.6 aska
23. Calculate the value of undamped frequency with \( m = 0.2 \) kg and \( K = 100 \) N/m. 
\( m = 0.2 \) kg, \( K = 100 \) N/m నిమ్మ సమాధానం చేయడానికి నియంత్రించండి విశ్లేషించండి

(a) 3.56 Hz  
(b) 2.82 Hz  
(c) 1.96 Hz  
(d) 7.20 kg

24. Lissajous figures are helpful in predicting

(a) the vibration of a rod  
(b) magnetic fields  
(c) vibration of violin string  
(d) areas of the loops

25. Lissajous Figures depend on

(a) Magnetic field applied  
(b) Phase difference between two vibrations  
(c) Amplitude and the voltage  
(d) All

26. In forced vibrations, the amplitude is ———— at a particular frequency.

(a) constant  
(b) maximum  
(c) infinity  
(d) small

(Test No. 12)
27. Smaller is damping ———— is resonance.
   చట్టికి పాతితైనంతే, ప్రవేశం ———— నాసతీయం.
   (a) Sharper  (b) Broaden
   పాతితైనంం  ప్రవేశం
   (c) Zero  (d) Negligible
   పాతితైనంం  నాసతీయం

28. Assume the frequency of a circuit with \( L = 2 \text{ mH} \), \( C = 5 \text{ \mu F} \) and \( R = 0.2 \text{ \Omega} \).
   \( L = 2 \text{ mH} \), \( C = 5 \text{ \mu F} \) కి విషయం రేటు ప్రత్యేకత కూడా కనిపిస్తుంది
   (a) 1592 Hz  (b) 1618 Hz
   (c) 2012 Hz  (d) 1952 Hz

29. What are limitations of Fourier's theorem?
   ఫిరూయేర్ విధానానికి సమాప్తి విషయం ఉండటం?
   (a) The function should be finite and square shape
       పదార్థం సమాప్తి పాత్రలు వైపు ప్రతిభ కాండం
   (b) The function should be finite and single valued
       పదార్థం సమాప్తి పాత్రానికి ఒక భాగం కాండం
   (c) The function should be finite and minimum
       పదార్థం సమాప్తి విధానం లాంటి అతిరికత కాండం
   (d) The function should be finite and has no value
       పదార్థం సమాప్తి భాగం ప్రతిభ విచ్చే కాండం

30. The density of Aluminium is \( 2.8 \times 10^4 \text{ kg/m}^3 \). Calculate the velocity of sound with the given data \( Y = 7 \times 10^{10} \text{ Pascal} \).
   అల్మినియం భారం \( 2.8 \times 10^3 \text{ kg/m}^3 \). నిమిషం \( Y = 7 \times 10^{10} \text{ Pascal} \) ద్వారా కాలు నిమియం నిమియం
   (a) \( 5 \times 10^3 \text{ m/s} \)  (b) \( 5 \times 10^4 \text{ m/s} \)
   (c) \( 5 \times 10^2 \text{ m/s} \)  (d) \( 5 \times 10^{-3} \text{ m/s} \)
SECTION B

31. The mean free path of a gas is inversely proportional to the ________ of a gas.
   (a) Boltzmann constant  (b) Momentum
   (c) Temperature  (d) Density

32. The most probable speed $C_p$ of a molecule in a gas is:
   $C_p \approx \sqrt{\frac{2kT}{m}}$
   (a) $\sqrt{\frac{2kT}{m}}$  (b) $\sqrt{\frac{2kTm}{N}}$
   (c) $\sqrt{\frac{2kT}{3m}}$  (d) $\sqrt{\frac{1}{3} \frac{m}{nT^2}}$

33. The coefficient of viscosity ($\eta$) is defined as:
   $\eta = \frac{m \overline{C}}{2\sqrt{3} d^2}$
   (a) $\frac{m \overline{C}}{2\sqrt{3} d^2}$  (b) $\frac{m \overline{C}}{3\sqrt{2\pi l^2}}$
   (c) $\frac{2m \overline{C}}{3\sqrt{\pi d^2}}$  (d) $\frac{m \overline{C}}{2\sqrt{3} \pi l}$

34. The coefficient of diffusion is directly proportional to:
   $D \propto \frac{T^2}{\rho}$
   (a) $T^2$  (b) $T^{1/2}$
   (c) $T^2/\rho$  (d) $T^{3/2}$

35. Find the R.M.S. value of hydrogen at N.T.P. and at 127°C?
   (a) 3.2 $\times 10^5$ cm/sec  (b) 6.1 $\times 10^5$ cm/sec
   (c) 2.3 $\times 10^5$ cm/sec  (d) 4.2 $\times 10^5$ cm/sec

(Test No. 12)
36. Relation between Pressure $P$, Temperature $T$ and ratio of two specific heats of a gas $\gamma$ is
\[(a) \quad P^{1-\gamma} = \text{constant} \quad (b) \quad PV^\gamma = T^2 \quad (c) \quad PTV^{\gamma-1} = \text{constant} \quad (d) \quad PV = \frac{1}{3} T \gamma\]

37. How is the efficiency of a Carnot’s engine will be improved?
(a) increased by decreasing $(T_2/T_1)$  (b) decreased by increasing $(T_2/T_1)$
(c) increased by decreasing $(T_1/T_2)$  (d) decreased by increasing $(T_1/T_2)$

38. Entropy is increasing while the available energy is
(a) decreasing  (b) constant
(c) double  (d) exponential

39. The r.m.s. speed of hydrogen molecule is 1.84 km/sec: What will be the r.m.s. speed of oxygen molecule at the same temperature?
(a) 0.24 km/sec  (b) 0.51 km/sec
(c) 0.82 km/sec  (d) 0.46 km/sec

40. Clausius-Clapeyron latent heat equation for $\frac{\partial P}{\partial T}$ is
\[(a) \quad \frac{L}{T (V_2 - V_1)} \quad (b) \quad \frac{L}{V (T_1 - L)} \quad (c) \quad \frac{L}{T_1 (V_2 - V_1)} \quad (d) \quad \frac{L}{T (V_1 - V_2)}\]

(Test No. 12)
41. Maxwell's fourth thermodynamic relation is

\[ \left( \frac{\partial S}{\partial P} \right)_T = - \left( \frac{\partial V}{\partial T} \right)_V \]

(a) \( \left( \frac{\partial S}{\partial P} \right)_T = - \left( \frac{\partial V}{\partial T} \right)_V \)

(b) \( \left( \frac{\partial P}{\partial S} \right)_V = - \left( \frac{\partial T}{\partial V} \right)_T \)

(c) \( \left( \frac{\partial S}{\partial P} \right)_T = - \left( \frac{\partial V}{\partial T} \right)_P \)

(d) \( \left( \frac{\partial P}{\partial S} \right)_P = - \left( \frac{\partial V}{\partial T} \right)_T \)

42. \( \left( \frac{\partial T}{\partial P} \right)_H = \frac{1}{C_p} \left[ T \left( \frac{\partial V}{\partial T} \right)_P - V \right] \)

if \( \left( \frac{\partial T}{\partial P} \right)_H \) is positive then gives

(a) heating effect

(b) no heating effect

(c) cooling effect

(d) no change

43. In adiabatic expansion, the cooling is due to

(a) High pressure

(b) Internal work

(c) External work

(d) High temperature and low pressure

44. Helium gas is liquified at

(a) \(-268°C\)

(b) \(-320°C\)

(c) \(-180°C\)

(d) \(-238°C\)

(Test No. 12)
45. Calculate the temperature of inversion of helium gas. Given \( a = 3.44 \times 10^{-3} \text{ nt-m}^2/\text{mol}^2 \) and \( b = 0.0237 \times 10^{-3} \text{ m}^3/\text{mol} \) and \( R = 8.31 \text{ Joule/(mol - K)} \).

\[ T = \frac{a}{b} \]

\( T = \frac{3.44 \times 10^{-3}}{0.0237 \times 10^{-3}} = 145 \text{ K} \)

(a) \(-268^\circ C\)  (b) \(-320^\circ C\)
(c) \(-180^\circ C\)  (d) \(-238^\circ C\)

46. Rayleigh-Jeans formula agrees for

(a) shorter wavelength region  (b) infrared region
(c) long wavelength region  (d) microwave region

47. In Wein's displacement law, the maximum intensity of radiation emitted is displaced towards

(a) shorter wavelength region  (b) infrared region
(c) micro wavelength region  (d) long wavelength region

48. Pyrometers are used for measurement of

(a) High pressures  (b) Low temperatures
(c) High temperatures  (d) Low pressures
49. Solar constant value is

(a) 1240 Wm\(^{-2}\)  (b) 1540 Wm\(^{-2}\)
(c) 1260 Wm\(^{-2}\)  (d) 1340 Wm\(^{-2}\)

50. Determine the temperature of sum with the help of Wein's law given

\[ b = 2.92 \times 10^{-3} \text{ mK. Maximum wavelength} = 4900 \text{ Å}. \]

\[ b = 2.92 \times 10^{-3} \text{ mK. ప్రపంచ ప్రాంతం} = 4900 \text{ అంలేట్} దైర్యుణ రెండు వ్యాసం మాత్రము అంతంలేట్ ఎంతాంతం ఉంటుంది \]

(a) 5967 K  (b) 6240 K
(c) 2895 K  (d) 8920 K

51. Maxwell Boltzmann distribution law states that low energy cell will contain

(a) less  (b) more
(c) equal  (d) infinity

52. The root mean square speed of a molecule is

\[ \text{(a) } 1.73 \sqrt{\frac{KT}{m}} \quad \text{(b) } 1.92 \sqrt{\frac{Km}{T}} \]
\[ \text{(c) } 1.82 \sqrt{\frac{KT}{m}} \quad \text{(d) } 2.92 \sqrt{\frac{KT}{m}} \]

(Test No. 12) 14
53. Example of Boson is
(a) Nucleus
(b) \(\alpha\) - particles
(c) Photons
(d) Protons

54. The distribution function of B.E. Statistics

\[
\begin{align*}
&\text{(a)} \quad \frac{1}{e^{\frac{\alpha - t}{kT + 1}}} \\
&\text{(b)} \quad \frac{1}{e^{\frac{\alpha + t}{kT - 1}}} \\
&\text{(c)} \quad \frac{1}{e^{\alpha + t/kT}} \\
&\text{(d)} \quad \frac{1}{e^{\alpha - t/kT}}
\end{align*}
\]

55. If \(A = \begin{bmatrix} 1 & -2 & 3 \\ -4 & 2 & 5 \end{bmatrix}\) and \(B = \begin{bmatrix} 2 & 3 \\ 4 & 5 \\ 2 & 1 \end{bmatrix}\). Find \(BA\) value.

\[
A = \begin{bmatrix} 1 & -2 & 3 \\ -4 & 2 & 5 \end{bmatrix} \quad \text{and} \quad B = \begin{bmatrix} 2 & 3 \\ 4 & 5 \\ 2 & 1 \end{bmatrix}
\]

\[
A = \begin{bmatrix} 1 & -2 & 37 \\ -16 & 2 & 21 \end{bmatrix} \quad \text{and} \quad B = \begin{bmatrix} 2 & 3 \\ 4 & 5 \\ 2 & 1 \end{bmatrix}
\]

\[
A = \begin{bmatrix} 10 & 2 & 37 \\ -16 & 2 & 21 \end{bmatrix} \quad \text{and} \quad B = \begin{bmatrix} 2 & 3 \\ 4 & 5 \\ 2 & 1 \end{bmatrix}
\]

\[
A = \begin{bmatrix} 2 & 3 \\ 4 & 5 \\ 2 & 1 \end{bmatrix}
\]

56. Thick lens formula is

\[
\begin{align*}
&\text{(a)} \quad \frac{1}{f} = (\mu - 1) \left( \frac{1}{R_1} + \frac{1}{R_2} + \frac{(\mu - 1)t}{\mu R_1 R_2} \right) \\
&\text{(b)} \quad \frac{1}{f} = (\mu + 1) \left( \frac{1}{R_1} + \frac{1}{R_2} + \frac{(\mu - 1)t}{\mu R_1 R_2} \right) \\
&\text{(c)} \quad \frac{1}{f} = (\mu - 1) \left( \frac{1}{R_1} + \frac{1}{R_2} + \frac{(\mu + 1)t}{\mu R_1 R_2} \right) \\
&\text{(d)} \quad \frac{1}{f} = (\mu - 1) \left( \frac{1}{R_1} + \frac{1}{R_2} + \frac{(\mu - 1)t}{\mu R_1 R_2} \right)
\end{align*}
\]

15 (Test No. 12)
57. Number of cardinal points for a lens system

(a) 2  (b) 6
(c) 4  (d) 8

58. Example of uniaxial crystals

(a) Calcite  (b) Glass
(c) Quarter wave plate  (d) Topaz

59. Optically active substance is

(a) Calcite  (b) Quartz
(c) Glass  (d) Topaz

60. Calculate the thickness of a quarter-wave plate made of quartz with the given data \( \lambda = 6000 \text{ Å} \), \( \mu_0 = 1.544 \) and \( \mu_e = 1.553 \).

\[ \text{Thickness} = \frac{\lambda}{4 \mu_0} \]

(a) \( 1.52 \times 10^{-3} \text{ cm} \)  (b) \( 1.45 \times 10^{-3} \text{ cm} \)
(c) \( 1.92 \times 10^{-3} \text{ cm} \)  (d) \( 1.66 \times 10^{-3} \text{ cm} \)
SECTION C

61. Spontaneous emission is _________ of incident radiation density.

(a) Independent
(b) Dependent
(c) Number of protons dependent
(d) Life time of the atom

62. No lenses are required to study

(a) Fresnel's diffraction
(b) Fraunhofer diffraction
(c) Polarization
(d) Reflection

63. In the case of nuclear reactions, the charge is

(a) unconserved
(b) absorbed
(c) conserved
(d) allowed to cross the boundary

64. The unit of electric field is

(a) Coulomb
(b) Newton
(c) Newton per coulomb
(d) Newton/cm

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65. The electric potential of the earth is assumed to be
(a) 1  (b) \( \infty \)
(c) zero  (d) \(-1\)

66. If \( q_1 \) and \( q_2 \) are in coulombs, \( r \) in metre and force in newton, then \( \frac{1}{4\pi\epsilon_0} \) value
is
\( q_1, q_2 \) in coulombs, \( r \) in metre and force in newton, then \( \frac{1}{4\pi\epsilon_0} \) value
(a) \( 9.0 \times 10^9 \) N/m\(^2\)  (b) \( 9.0 \times 10^8 \) Newton - m\(^2\)/coulomb\(^2\)
(c) \( 9.0 \times 10^9 \) Coulomb/Joule  (d) \( 8.9 \times 10^{12} \) N/m\(^2\)

67. Example for Polar molecule
(a) CO  (b) CO\(_2\)
(c) N\(_2\)  (d) Benzene

68. Which material has large dielectric constant?
(a) Glass  (b) Iron
(c) Paraffin  (d) Water

69. The unit for the electric susceptibility is
(a) \( \frac{C}{N - m^2} \)  (b) \( \frac{F}{m} \)
(c) \( \frac{C^2}{N - m^2} \)  (d) \( \frac{C}{m^2} \)

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70. Gauss law in a dielectric is expressed as $K \oint E \cdot dS = \ldots$.

(a) $\frac{q}{\varepsilon_0}$  
(b) $\frac{q}{\varepsilon}$  
(c) $q(\varepsilon_0 + X)$  
(d) $\frac{q}{(\varepsilon_0 + X)}$

71. The electric susceptibility of a material is $26.55 \times 10^{-12}$ coul$^2$/nt$^{-1}$m$^2$. What is the value of dielectric constant?

(a) 5  
(b) 3  
(c) 6  
(d) 4

72. In a capacitor, the energy is stored in the form of

(a) Magnetic field  
(b) Kinetic energy  
(c) Electric field  
(d) Voltage

73. Electrolytic capacitors have ________ capacities.

(a) large  
(b) negligible  
(c) equal  
(d) zero
74. Two concentric spheres of radii 9 and 10 cm have air between them. Find the capacitance of the spherical capacitor.

9. 10 సెంమీ మూల వ్యాసానికి రెండు మూల వ్యాసానికి నడిపబడి కనిపించబడింది. అనేక ప్రమాణాలు నిర్ణయించబడింది.
(a) 1000 μF  (b) 10 PF
(c) 100 μF  (d) 100 PF

75. Magnetic susceptibility is the ratio of
మాండాంకాల విశేషాత్మకతా యొక్క సహాత్మకత సాధారణాత్మకత నిర్ణయించినది.
(a) $\frac{B}{IH}$  (b) $\frac{I}{H}$
(c) $\frac{B}{H}$  (d) $\frac{I}{IH}$

76. Example for diamagnetic substance
ముగిశ్శెయుల సంస్థ రూపాలు కలిగినది.
(a) Silver (b) Platinum
ముంగిశెయుల సంస్థ రూపాలు కలిగినది.
(c) Magnetite (d) Iron

77. In MKS system, the unit for magnetic induction is
MKS సంస్థలో, అంశాంశాల నామానికి ప్రతివిధానానికి
(a) Weber/mm²  (b) Tesla
(b) Weber/mm²  (c) Newton/m²amp
(c) Newton/m²amp (d) Weber

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78. The electric force is ________ independent.

(a) Magnetic field
(b) Pressure
(c) Velocity
(d) Direction

79. Hall effect is helpful in understanding

(a) electric conduction
(b) magnetic induction
(c) insulators
(d) displacement of particles

80. The maximum available particle energy is limited in

(a) synchro-cyclotron
(b) cyclotron
(c) proton-synchtron
(d) positron

81. A long solenoid has 20 turns per cm. Calculate the magnetic induction at the interior point on the axis for a current of 20 mA.

(a) $25.12 \times 10^{-6}$ web/m²
(b) $50.24 \times 10^{-6}$ web/m²
(c) $12.46 \times 10^{-6}$ web/m²
(d) $25.12 \times 10^{-6}$ Amp/m.
82. Neumann's law is defined as
\[ -N \left( \frac{d\phi B}{dt} \right) \]
(b) \[ -E \left( \frac{d\phi B}{dt} \right) \]
(c) \[ B \left( \frac{d\phi E}{dt} \right) \]
(d) \[ \int B \cdot \phi E \]

83. Ballistic galvanometer is used to measure ___________ of a coil.

(a) conductance
(b) self-inductance
(c) charge carriers
(d) logarithmic decrement

84. The form factor gives an identification of ___________ of alternating current.

(a) The wave shape
(b) RMS value
(c) Frequency
(d) Q-factor

85. A condenser of capacitance 0.6 \( \mu F \) discharges through a resistance of 10 M ohm. Find its time constant.

0.6 \( \mu F \) గుణానం కోసం 10 M రోస్ట్రం నుండి వద్ద ఉంటుంది. నిమ్మ సమయం ఉంటుంది

(a) 60 sec
(b) 25 sec
(c) 6 sec
(d) 3 sec

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86. Quality factor is equal to $2\pi$ times the ratio of

\[
\frac{\text{energy loss}}{\text{energy gain per period}} = \frac{\text{energy stored}}{\text{energy loss per period}}
\]

(a) \(\frac{\text{energy loss}}{\text{energy gain per period}}\) \(\frac{\text{energy stored}}{\text{energy loss per period}}\)

(b) \(\frac{\text{energy stored}}{\text{energy gain per period}}\) \(\frac{\text{energy stored}}{\text{energy gain per period}}\)

87. For sharp tuning of a radio circuit, the quality factor must be

(a) low
(b) negative
(c) zero
(d) large

88. The series resonant circuit, the impedance is equal to

\[
Z_r = \frac{1}{R}
\]

(a) \(Z_r = \frac{1}{R}\)
(b) \(Z_r = \frac{1}{CR}\)
(c) \(Z_r = R\)
(d) \(Z_r = \frac{LC}{R}\)

89. In good conductors, the displacement current is

(a) high
(b) negligible
(c) considerable
(d) low

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90. The refractive index of conducting medium will be equal to
\[ \sqrt{\frac{\mu \sigma}{2w}} \]
(a) \( C \left( \frac{\mu \sigma}{2w} \right)^{\frac{1}{2}} \)
(b) \( C \left( \frac{\mu \sigma}{2w^2} \right)^{\frac{1}{2}} \)
(c) \( \left( \frac{w \epsilon}{2\mu \sigma} \right)^{\frac{1}{2}} \)
(d) \( \frac{w}{2\mu \epsilon} \)

91. Electromagnetic waves are propagating in space with the velocity
\[ \frac{1}{\sqrt{\mu \epsilon}} \]
(a) \( \frac{1}{\sqrt{\mu \epsilon}} \)
(b) \( \frac{1}{\sqrt{\mu \epsilon}^2} \)
(c) \( \frac{1}{\sqrt{\mu \epsilon}} \)
(d) \( \frac{1}{3\sqrt{\mu \epsilon}} \)

92. Example for Donar atom in semiconductors
(a) Arsenic
(b) Aluminium
(c) Boron
(d) Iron

93. The resistivity of a semiconductor is
\[ 1.7 \times 10^{-10} \text{ ohm} - \text{metre} \]
(a) \( 1.7 \times 10^{-10} \text{ ohm} - \text{metre} \)
(b) \( 1.1 \times 10^{-8} \text{ ohm} - \text{metre} \)
(c) \( 9 \times 10^{11} \text{ ohm} - \text{metre} \)
(d) \( 10^{-4} \text{ to } 0.5 \text{ ohm} - \text{metre} \)

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94. Electron-hole pair generation increases ______ properties in semiconductors.

(a) Diffusivity  (b) Magnetic
(c) Conduction  (d) Insulating

95. The relation between emitter current amplification ($\alpha$) and base current amplification factor ($\beta$) is

(a) $\beta = \frac{\alpha}{1+\alpha}$  (b) $\alpha = \frac{\beta}{1+\alpha}$
(c) $\beta = \frac{\alpha}{1-\alpha}$  (d) $\beta = \frac{\alpha}{1-2\beta}$

96. A transistor has an $I_C$ of 100 mA and $I_B$ of 0.5 mA. What is the value of $\alpha_{dc}$?

100 mA $I_C$, 0.5 mA $I_B$ నిష్టెలిపతు ఎంపికాలు కలిగేది. తలు $\alpha_{dc}$ ఎంత ఉండి?

(a) 0.895  (b) 0.995
(c) 1.025  (d) 0.795

97. Convert 13 into binary form.

13 ని ఇన్నియాని బీహారు చేసుకోండి

(a) $(1101)_2$  (b) $(1011)_2$
(c) $(1001)_2$  (d) $(1110)_2$
98. Convert binary number 0.101 to a decimal number.

0.101 సంఖ్యను దశాంశ సంఖ్యకు మరియుత్తును మారుతుంది

(a) \(0.525\)\(_{10}\)                         (b) \(0.825\)\(_{10}\)
(c) \(0.625\)\(_{10}\)                         (d) \(0.265\)\(_{10}\)

99. A NAND gate can be built by using

చిహ్నం మారికోనే గుడ్డి క్రింద సమసించబడాలు

(a) Diode-transistor logic
   విడ్రేత-ట్రాన్సిస్టర్ జాతి
(b) Resistor-transistor combination
   రిసాయిట్-ట్రాన్సిస్టర్ జాతి
(c) NOR and NOT Gate combination
   నరి అండు-ట్రాన్సిస్టర్ జాతి
(d) AND and OR Gate
   ఏండ్ అండు-ఓర్ జాతి

100. Subtract \((0.111)\)\(_2\) from \((1001)\)\(_2\)

\((1001)\)\(_2\) క్రింద \((0.111)\)\(_2\) ని విభజించేది

(a) 0001                         (b) 0010
(c) 0100                         (d) 0110

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