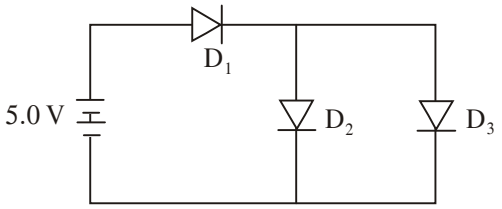
PART–B
PHYSICS

51. Given the circuit, find the voltage drop across the element of D_3, only D_1 being an ideal diode.



(A) 0.0 V

(B) 5.0 V

(C) 2.5 V

(D) None of these.

52. The maximum power efficiency of PUSH-PULL Class B transistor amplifier system is

(A) $\pi/8$

(B) $\pi/4$

(C) $\pi/3$

(D) $\pi/2$.

53. In a *n*-channel silicon FET with distance in gates (channel width, $2a$) = 6×10^{-4} cm and donors per cubic cm 'N_D' = 10^{15} electrons and dielectric constant of silicon = $\frac{1}{3\pi \times 10^9}$ F/m, the pinch-off voltage is

(A) 6.8 V

(B) 5.8 V

(C) 4.8 V

(D) 3.8 V.

54. For a π-filter of rectifiers the ripple factor changes with load resistance, how?

(A) Increases

(B) Decreases

(C) No change

(D) All of these.

55. The thermal noise voltage generated in an electronic amplifiers is proportional to

(A) R

(B) R^2

(C) $1/R^2$

(D) $\sqrt{R}$.

56. Recovering an amplitude modulated wave one uses

(A) Power amplitude modulation

(B) Bias modulation

(C) Diode demodulation

(D) None of these.

57. In a feedback amplifier with negative gain to become an oscillator with maintained oscillations which condition is followed (using standard notations)

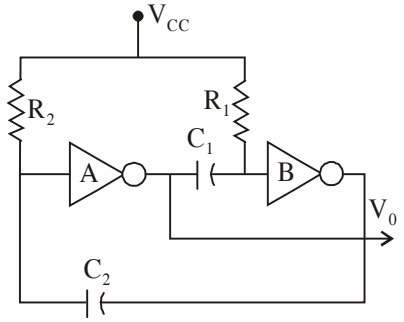
(A) $|A\beta| > 1$

(B) $|A\beta| < 1$

(C) $|A\beta| = 1$

(D) All of these three conditons.

58. In an astable multivibrator the time of complete cycle of the circuit is proportional to



(A) C_1R_1
(B) C_2R_2
(C) $C_1R_1 + C_2R_2$
(D) $1.0/(C_1R_1 + C_2R_2)$.

59. Add 16 bit binary numbers by a first generation micro computer like a 8-bit microprocessor, numbers

0000 1111 1010 1100
+ 0011 1000 0111 1111

results

(A) 0110 1000 1010 0011
(B) 0100 1000 0100 0011
(C) 0100 1000 0101 1011
(D) 0100 1000 0010 1011.

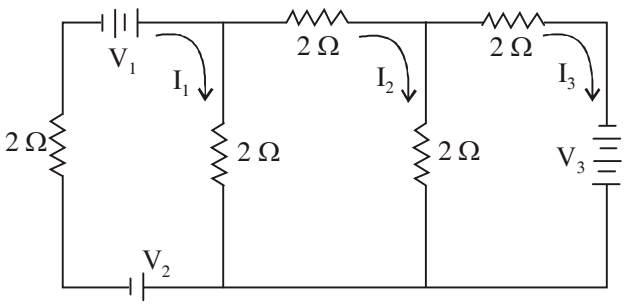
60. Passive transducer

(A) example is : thermocouple
(B) is that which works without auxiliary power supply
(C) is that which needs further amplification
(D) is that which requires exterior power supply.

61. In a NPN common grounded emitter amplifier circuit the input and output phases of a signal is changed by

(A) $\pi/2$
(B) π
(C) $3\pi/2$
(D) 2π or zero.

62. Given the circuit of figure, find the current in the generator V_3, if $V_1 = 2$ V, $V_2 = 1$ V and $V_3 = 3$ V.



(A) 0.0 amp
(B) 1.0 amp
(C) 2.0 amp
(D) 3.0 amp.

63. A dielectric has a relative permittivity of 9. The velocity of the e.m. wave travelling through this dielecric is

(A) 3×10^8 m/sec
(B) 9×10^8 m/sec
(C) 27×10^8 m/sec
(D) None of these.

64. The characteristic impedance of a transmission line to transmit a signal is purely resistive for a line having

(A) Only R (resistance per unit length)

(B) Only R and L (inductance per unit length)

(C) Only R and C (capacitance per unit length)

(D) Only L and C.

65. Rectangular wave guide can support in this propagating mode a

(A) TM_{10} wave

(B) TE_{10} wave

(C) TM_{01} wave

(D) TE_{00} wave.

66. Laminations are used to build magnetic circuits operating under ac conditions to reduce

(A) Eddy current loss

(B) Hysteresis loss

(C) Both (A) and (B)

(D) None of these.

67. A long solenoid is carying a current I. The associated power

(A) Does not flow at all

(B) Flow along the radial direction

(C) Flows along the axis of the solenoid

(D) Flows along the circumferential direction.

68. A charged particle with an initial velocity in the y-direction enters a region with uniform magnetic field in z-direction. The trajectory of the particle in the form

(A) $y = x$

(B) $y^2 = x$

(C) $x^2 + y^2 =$ constant

(D) $y \propto x^2$.

69. The capacitance of a pair of parallel wires :

(A) Increases with radius and decreases with separation

(B) Increases with radius and separation

(C) Increases with separation and decreases with radius

(D) Independent of radius and decreases with separation.

70. Which of the following is incorrect in different guided e.m. waves?

(A) Magnetic field intensity component is zero along the propagation of a TM wave

(B) Electric field intensity component is zero along the propagation of a TE wave

(C) Electric field intensity component is zero along the propagation of a TEM wave

(D) Magnetic field intensity component is non-zero along the propagation of TEM wave.

71. In these isotopes $^{6}_{3}Li$ and $^{7}_{3}Li$

(A) Both are Bosons

(B) Both are Fermions

(C) Ist fermion and 2nd Boson

(D) Ist Boson and 2nd fermion.

72. The ground state angular momenta predicted by the shell model for these nuclic $^{5}_{2}He$, $^{17}_{8}O$, $^{60}_{28}Ni$ are

(A) 5/2, 3/2, 1/2

(B) 3/2, 5/2, 0

(C) 5/2, 0, 3/2

(D) 3/2, 5/2, 1/2.

73. A submarine requires a 100 MW engine to run for one day. The mass of $^{235}_{92}U$ required to generate this much energy (assuming there are no losses), energy released per fission is equal to 200 MeV, is equal to

(A) 1.05 gm

(B) 10.5 gm

(C) 105 gm

(D) 1050 gm.

74. The nuclear reaction $n = e^{+} + e^{-}$ do not take place. Explain in terms of the conservation laws, who this is so?

(A) Conservation of charge

(B) Conservation of electron Lepton number

(C) Conservation of Baryon number

(D) None of these.

75. In an electron-positron pair-production the minimum energy of incident photon is

(A) Less than .51 MeV

(B) Equal to .51 MeV

(C) Less than 1.00 MeV

(D) Greater than 1.00 MeV.

76. A nuclear reaction is a Photon-nuclear reaction if it is

(A) Bombarded by protons and results the emission of one or more γ-rays

(B) Bombarded by neutrons and emit γ-rays

(C) Bombarded by γ-rays

(D) All of these cases.

77. The intensity of radiations from the star is maximum for λ = 3500 Å, then the temperature of the star is

(A) 8257 K

(B) 8357 K

(C) 8457 K

(D) 8557 K.

78. Pauli's exclusion principle can be explained by

(A) M.B. Statistics

(B) B.E. Statistics

(C) F.D. Statistics

(D) None of these.

79. Average energy of Planck's oscillator is

(A) $E = h\nu$

(B) $E = mc^2$

(C) $E = \dfrac{h\nu}{e^{\frac{h\nu}{RT}} - 1}$

(D) $E = \dfrac{h\nu}{e^{\frac{h\nu}{RT}} + 1}$

80. Find the specific rotation of the given sample of sugar solution if the plane of polarisation is turned through 13.2°. The length of the tube containing 10% sugar solution is 20 cm.

(A) $[S]^t_\lambda = 69°$

(B) $[S]^t_\lambda = 68°$

(C) $[S]^t_\lambda = 66°$

(D) None of these.

81. When a very small-angled air wedge film is viewed by a mono charomatic light of 6000 Å incident normally, the interference fringes 4 mm apart are observed. If the same air space is now filled with water, how far apart will the fringes be observed?

(A) 0.15 cm

(B) 0.20 cm

(C) 0.30 cm

(D) 0.33 cm.

82. Lowest temperature can be achieved by

(A) Joule-Thomson process

(B) Cascade process

(C) Adiabatic expansion

(D) Adiabatic demagnetisation.

83. Entropy of a substance is maximum in which state?

(A) Gas

(B) Liquid

(C) Solid

(D) All of these

84. In a gas the r.m.s. speed of its molcules at 800 K is

(A) Same as at 200 K

(B) Twice the value at 200 K

(C) Four time the value at 200 K

(D) Half the value at 200 K.

85. Using Hamilton-Jacobi equation for transition from classical to Quantum Mechanics if we deduce de-Broglie relation from classical phase velocity, a proportional constant value is

(A) 2π

(B) h

(C) $2\pi h$

(D) $h/2\pi$

86. Poisson brackets relation of the components of linear momentum 'p' and angular momentum 'L' satisfy

(A) $[L_x, p_x] = 0$

(B) $[L_x, p_x] = -p_z$

(C) $[L_z, L_x] = L_y$

(D) All of these.

87. In a two-body harmonic oscillator, the reduced mass of a CO molecule (with mass of C = 12 amu and mass of O = 16 amu) is approximately equal to

(A) 7 amu

(B) 14 amu

(C) 28 amu

(D) 48 amu.

88. Observation of recessional red shift of spectral lines from stars by Doppler effect, we say that

(A) Stars are moving towards us

(B) Universe is expanding

(C) Universe is contracting

(D) None of these.

89. An electron gains energy so that its mass becomes 2 m_o. Its speed is

(A) $\sqrt{3}/2$ C

(B) 3/4 C

(C) $3/2\sqrt{2}$ C

(D) $\sqrt{3}/2$ C.

90. Consider a vector field

$$A = x^2\hat{i} + y^2\hat{j} + z^2\hat{k}.$$

What is true?

(A) Field is irrotational

(B) Field is rotational

(C) Divergence of field vanishes

(D) All of these.

91. Albert Einstein was awarded Noble Prize for discovery of

(A) Theory of relativity which resulted $E = mc^2$

(B) Photo electric effect

(C) Unified field theory

(D) Both for option (A) and (B).

92. A particle is diffracted at a certain angle and the uncertainty in the measurement of the angle is one second of angle. The error in the measurement of its angular momentum is

(A) 1.36×10^{-28} Joule-sec

(B) 6.6×10^{-34} Joule-sec

(C) 1.11×10^{-35} Joule-sec

(D) None of these.

93. The value of a Gamma function $\Gamma(6)$ is equal to

(A) 6

(B) 30

(C) 120

(D) 216.

94. One Barn (unit of scattering cross-section) is measured as

(A) 10^{-8} cm^2

(B) 10^{-12} cm^2

(C) 10^{-18} cm^2

(D) 10^{-24} cm^2.

95. First order perturbation in energy levels in hydrogen atom placed in uniform external magnetic field is (using standard notations)

(A) $\frac{eH}{2\pi\mu C}$

(B) $\frac{-eH}{2\pi\mu C}$

(C) 0

(D) All of these.

96. Out of which following applications, variational method estimate better over W.K.B. method.

(A) Theory of α-decay

(B) Gound state of Helium

(C) Tunneling or penetration through a barrier

(D) None of these

97. The exciting line at 5000 Å of a sample in Raman spectra experiment gives stokes line 5100 Å. Wavelength of antistokes line is

(A) 4900 Å

(B) 4904 Å

(C) 4950 Å

(D) 4996 Å.

98. Which of these models has not helped us to explain the energy band theory of solids?

(A) Heisenberg model

(B) Kronig-penney model

(C) Bloch fomulation

(D) Tight-binding approximation.

99. For NMR (Nuclear magnetic resonance) and ESR (Electron spin resonance) in materials, which is ture

(A) Both occur at same frequency

(B) ESR occur at higher frequency than NMR

(C) NMR occur at higher frequency than ESR

(D) All of these.

100. The primitive translation vectors of a hexagonal space lattice are

$$\vec{a} = 2\hat{i} + \hat{j},\ \vec{b} = 2\hat{j},\ \vec{c} = \hat{k}$$

The volume of reciprocal lattice is

(A) $2\pi^3$

(B) $4\pi^3$

(C) $8\pi^3$

(D) 4.

ROUGH WORK

Answer Key: Physics

Q No	Answer
51	C
52	B
53	A
54	B
55	D
56	C
57	C
58	C
59	D
60	D
61	B
62	B
63	A
64	D
65	B
66	A
67	B
68	C
69	A
70	D
71	D
72	B
73	C
74	C
75	D

Q No	Answer
76	C
77	A
78	C
79	C
80	C
81	C
82	D
83	A
84	B
85	D
86	D
87	A
88	B
89	A
90	A
91	B
92	A
93	C
94	D
95	D
96	B
97	B
98	A
99	B
100	A