ANDHRA UNIVERSITY ENTRANCE EXAM PAPER – 2008

Time: 75 Min **Max. Marks: 90**

PART – A

1. When the distance between two equal charges is decreased to half and their magnitude of charge also deceased to half, the force between them [ ]
a) Reduces to half b) becomes double c) becomes four times d) remains unchanged

2. The electric field intensity of an infinite long charge line varies inversely proportional the [ ]
a) square of the distance from it b) distance from it
c) square root of the distance from it d) cube of the distance from it

3. In a charged bubble the mechanical force due to charge is counter balanced by [ ]
a) Force of gravitation b) Viscosity c) surface tension d) none of these

4. The dimensions of potential are same as that of [ ]
a) work b)Electric field c) Work per unit charge d) Force per unit charge

5. Electric field lines and equipotential lines are [ ]
a) always orthogonal b) orthogonal only when electric field is uniform
c) orthogonal when potential does not change d) none of these

6. Which of the following statement is correct [ ]
a) Dielectric constant and permeability are the same
b) Permittivity and permeability are one and same thing
c) Dielectric constant and relative permittivity
d) permeability and the relative permittivity

7. The effect of the dielectric is to [ ]
a) increase the capacitance b) decrease the capacitance
c) reduce the working voltage d)increase the distance between plates

8. The electric susceptibility of a material is 36×10^{-12} C/N-m^2 . Calculate the value of absolute permittivity of the material (Take $\varepsilon_0 = 9 \times 10^{-12}$ F/m) [ ]
a) 4.5×10^{-12} F / m b) 4.5×10^{-11} F / m c) 4.5×10^{-10} F / m d) 4.5×10^{-9} F / m

9. The unit of displacement (D) is [ ]
a) V/m^2 b) coul/m^2 c) V/m d)coul/m

10. The capacity of a capacitor is influenced by [ ]
a) area of the plates, thickness of the plates and the rate of charge
b) area of the plates, dielectric and the rate of charge
c) distance between the plates, dielectric and thickness of the plates
d) distance between the plates, area of the plates and dielectric

11. To increase the capacitance of a capacitor, the plates must be placed [ ]
a) Further apart b) closer together c) in series d) none of these

12. The capacity of a parallel plate condenser is 0.2 μ F. Potential difference between the plates is 2 volts. Calculate the energy stored by the charged condenser [ ]
a) 0.4×10^{-5} joule b) 0.4×10^{-6} joule c) 0.4×10^{-7} joule d) 0.4×10^{-8} joule

13. If the direction of the linear motion of a cork screw represents the direction of current through the conductor, the direction of rotation of cork screw gives the direction of magnetic field. This was stated by [ ]
a) Lenz b) Amper c) Maxwell d) Faraday

14. In a strong magnetic field an electron is injected at rest. The force immediately acting on the electron [ ]
a) Infinitie b) Very large c) very small d) zero

15. If two conductors carry current in opposite directions these will [ ]
a) repel each other b) attract each other
c) not experience force between them d) none of these

16. The strength of the magnetic shell is equivalent to [ ]
a) magnetic induction b) capacitance c) current d) magnetic moment

17. A copper wire 0.254 cm in diameter carries a current of 50 ampere. Find the magnetic field induction B at the surface of the wire.
The permeability constant ($\mu_0 = 4\pi \times 10^{-7}$ wb/A –m) [ ]
a) 5.96 x 10^{-3}w/m^2 b) 7.87 x 10^{-3}w/m^2 c) 9.73 x 10^{-3}w/m^2 d) 4.39 x 10^{-3}w/m^2

18. The ratio of the intensity of magnetic field at the centre of a very long solenoid to that at the extreme end is [ ]
a) 2 b)1/2 c) 4 d) ¼

19. The condition for moving coil galvanometer to be ballistic [ ]
a) The period of oscillation should be large b) The period of oscillation should be small
c) The period of oscillation should be zero d) The period of oscillation should be infinite

20. A cyclotron having dees of radius 40 cm is adjusted for accelerating hydrogen nuclei. The polarity of dees is reversed 30 x 10^6 times/sec. Find the energy of the issuing proton (mass of proton is 1.67 x 10^{-27} kg) [ ]
a) 29.63 x 10^2 eV b) 29.63 x 10^4 eV c) 29.63 x 10^6 ev d) 29.63 x 10^6 eV

21. A copper strip 2 cm wide and 1mm thick is placed in a magnetic field with B = 1.5 wb/m^2 with its thickness parallel to B. If a current of 200 amp is set up in the strip, what Hall potential is developed across the strip. The number of conduction electrons in the copper strip is 8.4 x 10^{28}/m^3 [ ]
a) 2.75 x 10^{-5}volt b) 2.55 x 10^{-5}volt c) 2.73 x 10^{-5}volt d) 2.23 x 10^{-5}volt

22. Betatron condition ϕ_B = [ ]
a) $2\pi r^2 B$ b) $2\pi r^2 B/r^2$ c) $2\pi r^2/B$ d) $Br^2/2\pi$

23. Calculate the self inauctance of a solenoid of length 1 meter and area of cross-section 0.01sq.m with 2000 turns. [ ]
a) 60.8mH b) 39.7mH c) 50.3mH d) 80.3mH

24. Calculate the energy stored in the magnetic field of solenoid of inductance 5mH when a maximum current of 3amp flows through it [ ]
a) 22.5 x 10^{-6}joule b) 22.5 x 10^{-3}joule c) 22.5 x 10^3joule d) 22.5 x 10^6joule

25. One henry is [ ]
a) Volt/amp/sec b) Coul/sec^2 c) wb-sec d) wb/amp^2

26. When co-efficient of coupling k=1,then [ ]
a) there is no coupling between the coils b) the coupling is tight
c) there is optimum coupling d) There is leakage flux

27. A $(20/\pi)\,\mu$F capacitor is discharged through a $(50/\pi)$mH inductor. Compute the frequency of discharge [ ]
a) 200 cycles/sec b) 300 cycles/sec c) 400 cycles/sec d) 500 cycles/sec

28. In parallel resonant circuit, current at resonance [ ]
a) minimum b) maximum c) infinite d) zero

29. A coil of self inductance 50 Henry and resistance 100 Ω joined in series to a 2 volt battery calculate the time constant and maximum current. [ ]
a) 0.5sec, 0.04 amp b) 0.4sec, 0.05 amp c) 0.5sec, 0.02 amp d) 0.2sec, 0.05 amp

30. In series LCR circuit, the voltage across the capacitor [ ]
a) leads the current by 90^0 b) lags behind the current by 90^0
c)In phase with the current d) Opposite to the current

31. The differential form of Ampere's law [ ]
a)curl B = μ_0 i b)div B = $\frac{\partial E}{\partial t}$ c) curl B = $\mu_0 (j+\frac{\partial D}{\partial t})$ d)div B = $\frac{\partial D}{\partial t}$

32. The electromagnetic wave equation is [ ]
a) $\nabla^2 B = -\mu\varepsilon\,\partial E^2/\partial t^2$ b) $\nabla^2 E = \mu\varepsilon\,\partial \mathbf{B}^2/\partial t^2$ c) $\nabla^2 E = -\mu\varepsilon\,\partial \mathbf{B}^2/\partial t^2$ d) $\nabla^2 \mathbf{B} = \mu\varepsilon\,\partial^2 \mathbf{B}/\partial t^2$

33. Poyinting vector is [ ]
a) E x H b)E x B c) E x D d) E x E

34. Calculate its common base short-circuit gain. [ ]
a) 0.996 b) 0.995 c)0.998 d) 0.997

35. The heavy doping produces the following effect [ ]
a) The reverse breakdown voltage increases b) The width of depletion layer is infinite
c) The width of depletion layer is zero d) The reverse breakdown voltage decreases

36. A certain transistor has α_{dc} of 0.98 and a collector leakage current I_{co} of 1 μA .Calculate collector current, when I_E =1mA [ ]
a) 0.709mA b) 0.534mA c) 0.981mA d) 0.257mA

37. The advantage of negative feedback [ ]
a) Increases the band width of the amplifier b) Decreases the input impedance of the amplifier
c) Increases the gain of the amplifier d) Increases the output impedance of the amplifier

38. The ripple factor of full wave rectifier is [ ]
a)0.48 b) 1021 c) 8.12 d) 4.06

39. Find the binary equivalent of 786 [ ]
a)100100000 b)1010110000 c)1100010010 d)1001001011

40. De Morgan's second theorem [ ]
a) $\overline{A+B} = \overline{A}.\overline{B}$ b) $\overline{A}.\overline{B} = \overline{A.B}$ c) $\overline{A}+\overline{B} = \overline{A+B}$ d) $\overline{A.B} = \overline{A}+\overline{B}$

PART - B

41. The coefficient of viscosity is [ ]
a) $\eta\alpha\sqrt{2T}$ b) $\eta\alpha\sqrt{T}$ c) $\eta\alpha\sqrt{3T}$ d) $\eta\alpha\frac{1}{\sqrt{T}}$

42. The R.M.S. velocity of hydrogen at N.T.P is [ ]
a) 1.85 x10^5 cm/sec b) 18.5 x10^5 cm/sec c) 1.85 x10^6 cm/sec d) 18.5 x10^6 cm/sec

43. How much work must be supplied to transfer 1000 joules of heat from a cold reservoir at -73^{0}C to a hot reservoir at 27^{0}C by means of a refrigerator [ ]
a) 250 J b) 400 J c) 500 J d) 650 J

44. In free expansion entropy [ ]
a) decreases b) increases c) Zero d) no change

45. The sudden and fast stretching of a spring is called [ ]
a) isothermal b) adiabatic c) reversible process d)irreversible process

46. In Isobaric & Isochoric process ----------quantities are constants respectively. [ ]
a) volume & pressure b) pressure & volume c) Temp & heat d) heat & Temp

47. Calculate the temperature of inversion of Helium gas given [ ]
a= 3.44X10^{-3} Nt-m^4/mol^2
b=0.0237X10^{-3} m^3/mol
R=8.31 Joul / (mol-k)
a) 238^{0}C b) 138^{0}C c) -138^{0}C d) -238^{0}C

48. In the refrigerator, which of the followng statement about the refrigerant is incorrect ? [ ]
a) It should be non-flamble b) It should be liquid at normal temperatre and pressure
c) It should have high themal conductivity d) It should have low freezing point

49. The critical temperature of helium is [ ]
a) -268^{0}C b) -258^{0}C c) -248^{0}C d) -238^{0}C

50. What is the temperature of the sun, if the wien's constant is 2.85 x 10^{-3}M.K.S. units and the wavelength corresponding to maximum emission is 4753 A.U. [ ]
a) 5.995^{0}K b) 59.95^{0}K c) 599.5^{0}K d) 5995^{0}K

51. Calculate the surface temperature of the sun from the following data : solar constant S = 1340 watt/m^2, radius of sun R = 6.92 x 10^8 m, distance of sun from earth r = 1.5 x 10^{11} m, Stefan's constant σ = 5.67 x w/m^2/k^4 [ ]
a) 6000^0 b) 5773^{0}k c) 4897^{0}k d) 7938^{0}k

50. In optical or spectral pyrometers, the temperature of the body can be calculated by using the formula, [ ]
a) Raleigh-Jeans formula b) Kirchoff's law c) Stetan's law d) Plank's law

53. Application of Fermi-Dirac distribnution law [ ]
a) Election gas b) Photon gas c) Ideas gas d) None of these

54. Bose-Einstein's distribution law applies to [ ]
a) distinguishable, identical, integral spin b) distinguishable, identical half integral spin
c) indistinguishable, identical, integral spin d) indistinguishable, identical, zero spin

55. Find the focal length for a lens placed in air and made of glass of refractive index 1.5 and radius of curvature 50 cm each [ ]
a) 10 cm b) 25 cm c) 50 cm d) 100 cm

56. Two thin converging lenses of powers 5 diopters and 4 diopters are placed co-axially 10cm apart. Find the focal length of the combination. [ ]
a) 14.3 m b) 14.3 cm c) 1.43 m d) 1.43 cm

57. Find the focal lenghs of two lenses of crown and fling glasses with dispersive powers

0.015 and 0.025 respectively in order to make an achromatic converging lens of focal lengths 25 cm [ ]
a) 10 cm, -16.7 cm b) 25 cm, -20 cm c) 12.2 cm, -30 cm d)10 cm, -25 cm

58. The deviation produced by lens is [ ]
a) proportional to the focal length b) proportional to square of the focal length
c) inversely proportional to focal length d) inversely proportional to square of the focal length

59. The condition for minimum spherical aberration for a system of two thin planoconvex lens of focal length f_1 and f_2 separated by a distance 'd' is [ ]
a) $d = (f_1+f_2)/2$ b) $d = f_1f_2$ c) $d = f_1+f_2$ d) $d = f_1-f_2$

60. Light passes through narrow slits with a separation of 0.5 mm. On a screen 1.5 m away the distance between two second order maximums is 2.5 mm what is the wavelength of light used [ ]
a) 8000 A^0 b) 8340 A^0 c) 8560 A^0 d) 8734 A^0

61. In the Newton's ring experiment, when the point of contact is perfect, the central spot is dark, then the radius of first dark ring [ ]
a) $\sqrt{\lambda R}$ b) $\sqrt{4\lambda R}$ c) $\sqrt{2\lambda R}$ d) $\sqrt{3\lambda R}$

62. A parallel beam of sodium light of wavelength 5890 A^0 is incident at an angle of 30^0 on a film of olive oil (μ =1.6) on water. Calculate the smallest thickness of the film which will make it appear dark [ ]
a) 1938 x 10^{-10} cm b) 19.38 x 10^{-10} cm c) 1938 x 10^{-8} cm d)1938 x 10^{-8} m

63. In diffraction pattern fringe width of various fringes is [ ]
a) equal b) zero c) may or may not equal d) never equal

64. Find the number of lines per cm in a diffraction grating, if a green line of mercury of wave length 5460^0A is seen in the first order spectrum at an angle of 19^08^1. The grating is receiving light at normal incidence ($\sin 19^08^1 = 0.3278$) [ ]
a) 6000 b) 6002 c) 6004 d) 6006

65. Zone plate shows [ ]
a) spherical aberration b) coma
c) monochromatic aberration d) chromatic aberration

66. Calculate the thinkness of a half wave plate of quartz, to be used with sodium light λ = 5893 A^0 , μ_0 = 1.544 and μ_e = 1.533. [ ]
a) 2.67 x 10^{-8} cm b) 2.67 x 10^{-3} cm c) 2.67 x 10^{-7} cm d) 2.67 x 10^{-5} cm

67. A sugar solution of specific rotation 52^0 per decimeter per gm/c.c. causes a rotation of 12^0 in a column of 10 cm long. What is the concentration of the solution. [ ]
a) 0.23 gm/c.c . b) 0.76 gm/c.c. c) 3.273 gm/c.c. d) 0.10 gm/c.c.

68. In tourmaline crystal [ ]
a) ellipsoid lies outside the sphere b) sphere lies outside the ellipsoid
c) ellipsoid and sphere coincide each other d) none of these

69. Among the terminology, which term is not related to Holography [ ]
a) Coherent light b) wave front construction
c) Interference fringes d) Fixed focus

70. Lasers can be used to improve the storage capacity in the computers due to its property [ ]
a) coherence b) high intensity c) narrow band width d) directionality

PART – C

71. Curl grad S is [ ]
a) 0 b) 1 c) 2 d) 3

72. If ϕ is a scalar and A is a vector, then div (ϕ A) is [ ]
a) grad ϕ x A b) ϕ curl A c) ϕ curl A . grad ϕ x A d) ϕ div A + A . grad ϕ

73. A rocket of mass 20 kg has 180 kg fuel. Then exhaust velocity of the fuel is 1.6 km/sec. Calculate the minimum rate of consumption of fuel so that the rocket may rise from the ground [ ]
a) 1225 kg/s b) 122.5 kg/s c) 12.25 kg/s d) 1.225 kg/s

74. When the external torque is zero then [ ]
a) the angular momentum increases b) the angular momentum decreases
c) the angular momentum is constant d) the angular momentum is zero

75. The rate of precession of spinning top is inversely proportional to the [ ]
a) angular momentum b) angle c) mass d) torque

76. The kinetic energy of metal disc rotating at constant speed of 5 revolutions per second is 100 joules. Find the angular momentum of the disc. [ ]
a) 7.458 kg/m^2/sec b) 6.368 kg/m^2/sec^2 c) 9.793 kg/m^2/sec d) 6.758 kg/m^2/sec^2

77. Curl of a conservative force (F) [ ]
a) F b) F^2 c) 1/F d) 0

78. In kepler's first law, if $\varepsilon > 1$ then orbit is [ ]
a) circle b) parabola c) hyperbola d) ellipse

79. Calculate the poisson's ratio for steel given that young's modulus is 2 x 10^{11}pascal and rigidity modulus 8 x 10^{10} pa [ ]
a) 0.25 b) 25 c) 250 d) 2500

80. In following answers which is not limitations of Fourier's theorem [ ]
a) finite b) single valued c) continuous d) discontinuous

81. A particle with a mean proper lifetime of 2 μ sec. moves through the laboratory with a speed of 0.9 c. Calculate its life time as measured by an observer in the laboratory. [ ]
a) 4.58 x 10^{-10} sec b) 4.58 x 10^{-8} sec c) 4.58 x 10^{-6} sec d) 4.58 x 10^{-4} sec

82. When a particle executing SHM passes through its extreme position, it has [ ]
a) Max. P.E and Min. K.E b) Max. P.E and Man. K.E
c) Min. P.E and Max. K.E d) Min. P.E and Min. K.E

83. A body of mass 4.9 kg hangs from a spring and oscillates with a period of 0.6 sec. How much will the spring shorten when the body is removed [ ]
a) 0.089 mm b) 0.89 mm c)0.89 m d) 8.9 cm

84. The quality factor of a sonometer wire is 2 x 10^3. On plucking it makes 240 vibrations per second. Calculate the time in which amplitude decreases to half the initial value [ ]
a) 1840 sec b) 184.0 sec c) 18.40 sec d) 1.840 sec

85. In the case of critical damping [ ]
a) $b^2 > \omega^2$ b) $b^2 = \omega^2$ c) $b^2 < \omega^2$ d) $b^2 + \omega^2 = 0$

86. The ratio of transverse force and transverse velocity of a string is equal to [ ]
a) Resistance b) Capacitance c) Impedance d) Quality factor

87. If the energy flows across every plane in direction of propagation of the wave, then it is [ ]
a) stationary wave b) progressive wave c) electromagnetic wave d) none of the above

88. In a coupled pendulum, the phase angle between the two pendulums in the first normal mode is [ ]
a) 0^0 b) 90^0 c) 180^0 d) 270^0

89. Calculate the capacitance to produce ultrasonic waves of 10^6 Hz with an inductance of 1 Hendry [ ]
a) 25 μF b) 0.25 μF c) 0.025 μF d) 2.5 μF

90. The speed of propagation of ultra Sonics depends upon their [ ]
a) amplitude b) frequency c) energy d) phase