STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086.
(For candidates admitted during the academic year 2011-12 & thereafter)

SUBJECT CODE: 11PH/AC/PM23

B.Sc. DEGREE EXAMINATION APRIL 2015
BRANCH I – MATHEMATICS
SECOND SEMESTER

REG. No._____

COURSE : ALLIED – CORE
PAPER : PHYSICS FOR MATHEMATICS – II
TIME : 30 MINS. MAX. MARKS: 30

SECTION – A

TO BE ANSWERED IN THE QUESTION PAPER ITSELF
ANSWER ALL QUESTIONS: (30x1=30)

Choose the correct Answer:

1.On a moving charge of 20 C by 2cm, 2J of work is done, then the potential difference between the points is

a) 0.1V b) 8V c) 2V d) 0.5V

2. If the electric flux entering and leaving an enclosed surface respectively is φ_1 and φ_2 the electric charge inside the surface will be

a) $(\varphi_1 + \varphi_2)\ \varepsilon_0$ b) $(\varphi_2 - \varphi_1)\ \varepsilon_0$ c) zero d) φ_2/ε_0

3. An electron and a proton enter a magnetic field with equal velocities which one of them experience more force

a) Electron b) proton c) both d) cannot be predicted

4. A conductor of length 2m carrying a current of 1 A is placed in magnetic field of 0.5 tesla then the force experienced by the conductor is

a) 1N b) 0.5N c) 2N d) 3N

5. If F is the focal length of the objective and f is the focal length of the eye piece then the magnification of the telescope is

a) f/F b) F/f c) Fxf d) -F/f

6. If λ and R are the wave length of light used and radius of curvature of the lens then the radii of the rings are proportional to

a) $1/\lambda$ b) 1/R c) $(r\lambda)^{1/2}$ d) λR

7. The effect of rays from an object point not situated on the axis of the lens results in an aberration

a) coma b) spherical aberration
c) astigmatism d) distortion

8. To obtain Fraunhoffer diffraction the incident wave front must be

a) Spherical b) plane c) elliptical d) cylindrical

..2

9. If μo, μE, and μc represent the refractive index of ordinary extraordinary and Canada balsm respectively then

   a) μo= μE=, μc b) μo< μE<μc c) μo>μE>μc d) μc >μE> μo

10. An ideal op amp has

    a) Infinite gain b) infinite input impedance

    c) large band width d) all the above

11. $\overline{A}$ B +$\overline{B}$ A equal to

    a) $\overline{A\,B}$ +AB b) AB c) A+AB d) $\overline{\overline{AB}\ +\ AB}$

12. The binary equivalent of (0.8125)10 is

    a) $(0.1101)_2$ b) $(0.1010)_2$ c) $(0.1111)_2$ d) $(0.0010)_2$

13. If Ad and AC are differential gain and common mode gain then CMRR is

    a) AC Ad b) Ad/ AC c) AC/ Ad d) (AC/ Ad)1/2

14. Let a parallel plate capacitor has a capacitance 4μF. If a dielectric of value 2 is filled between the plates the capacitance of the capacitor becomes

    a) 1 μF b) 2Mf c) 16 μF d) 8 μF

15. $(1010)_2$ / $(100)_2$ is

    a) $(10.1)_2$ b) $(101)_2$ c) $(010)_2$ d) $(1.01)_2$

Fill in the blanks:

16. According to gauss law the flux due to a charge q is _____.

17. If the distance between the parallel plate capacitor is reduced by half then the capacitance of the capacitor is _____.

18. The variation in the magnification produced by a lens for different axial distances results in an aberration called _____.

19. A ray of light propagating along _____ does not suffer double refraction.

20. According to Boolean algebra A(A+B) =_____.

State whether TRUE/FALSE:

21. A+BC= (A+B) (A+C).

22. For an ideal op-amp CMRR is zero.

23. Molecular spectra is also called as band spectra.

24. The electric field, polarization and displacement vectors are related by D = ε_0 E + P.

25. In reflecting telescope the objective lens is replaced by a concave mirror.

Answer briefly:

26. Write any two Maxwell's electromagnetic equation.

27. What is astigmatism?

28. Give two advantages of reflecting telescopes.

29. Give the relation between Electric potential and field strength.

30. Draw the circuit of an inverting amplifier.

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SECTION – B

ANSWER ANY FIVE QUESTIONS: (5×6=30)

1. With a neat diagram explain Herschel's telescope and Cassegrain's telescope.
2. Explain construction of AND, OR and NOT gates using diodes and transistors.
3. Two thin lenses of focal lengths f_1 and f_2 separated by distance d have an equivalent focal length 40 cm. The combination satisfies the conditions for no chromatic aberration and minimum spherical aberration .Find the values of f_1, f_2 and d. Assume that both lenses are of same material.
4. In a Newton's rings experiment the diameter of the 15^{th} ring was found to be 0.59 cm and that of the 5^{th} ring was 0.366 cm. If the radius of the plano convex lens is 100 cm calculate the wavelength of light used.
5. Light of wavelength 5000 angstrom is incident normally on a plane transmission grating. Find the difference in the angles of deviation in the first and third order spectra. The number of lines per cm on the grating surface is 6000.
6. Calculate the excess (equal in number) of electrons that must be placed on each of two small spheres spaced 3cm apart so that the force of repulsion between the spheres is 10-19.
7. The distance between the plates of a parallel plate condenser is 0.02 m. A rectangular slab of thickness 0.01 m and dielectric constant 5 is placed between them and the distance between the plates is increased in such a way that the condenser is unaltered. What is the new distance?

SECTION – C

ANSWER ANY TWO QUESTIONS: (2 × 20 = 40)

8. With neat diagram explain the theory of moving coil ballistic galvanometer.
9. Discuss in detail the methods of minimizing spherical aberration.
10. Explain plane transmission grating with a neat diagram.
11. Explain difference, integral and differential amplifier

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