STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086.
(For candidates admitted during the academic year 2004-05 & thereafter)

B.Sc. DEGREE EXAMINATION APRIL 2008
BRANCH I – MATHEMATICS
SECOND SEMESTER

REG. No._____

COURSE   :   **ALLIED – CORE**
PAPER   :   **GENERAL PHYSICS – II**
TIME   :   **30 MINS.**   MAX. MARKS : 30

SECTION – A

TO BE ANSWERED IN THE QUESTION PAPER ITSELF

ANSWER ALL QUESTIONS: (30 x 1 = 30)

I   CHOOSE THE CORRECT ANSWER:

1.   Workdone in moving electric charge on equipotential surface is
         a) infinity   b) zero   c) minimum

2.   SI unit of electric flux is
         a) $Nm^2\,C^{-1}$ b) $Nm^{-2}\,C^{-2}$ c) $Nm\,C^2$

3.   Electrostatic force between two point charges kept at a distance 'd' apart in a
         medium of $\in_r = 6$ is 0.3N. The force between them at the same separation in
         vacuum is
         a) 20N   b) 0.5N   c) 1.8N

4.   The magnitude and direction of Lorentz force is given by the expression
         a) $\vec{F} = v\left(\vec{q} \times \vec{B}\right)$ b) $\vec{F} = q\left(\vec{v} \times \vec{B}\right)$ c) $\vec{F} = \vec{q}\left(\vec{v} \times \vec{B}\right)$

5.   Direction of a force acting an a current carrying conductor placed in a magnetic
         field is given by
         a) Fleming's right hand rule
         b) Fleming's left hand rule
         c) end rule

6.   A diffraction pattern is obtained using a beam of red light, what happens if the red
         light is replaced by blue light?
         a) bands disappear
         b) no change is noticed
         c) diffraction pattern becomes narrower and crowded together

7. Spectrum which is the characteristic of the absorbing substance is
    a) absorption spectrum
    b) line emission spectrum
    c) band emission spectrum

8. A 300 mm long tube containing 60cc of sugar solution produces a rotation of 9°
    when placed in a polarimeter if the specific rotation is 60°, the quantity of sugar
    contained in the solution in
    a) 3g   b) 0.3g   c) 30g

9. In Newton's ring experiment the ratio of the radii of 4th and 9th ring is
    a) 16 : 81   b) 2 : 3   c) 4 : 9

10. The ratio of $\dfrac{R_1}{R_2}$ in the crossed lens to minimize spherical aberration is

    a) $-\dfrac{1}{5}$ b) $\dfrac{1}{4}$ c) $-\dfrac{1}{6}$

11. _____ is a reverse biased, heavily doped semiconductor PN junction diode.
    a) LED   b) LCD   c) zener diode

12. If the output of the following circuit is 1, then the input A, B, C must be
    a) 0, 1, 0
    b) 1, 0, 0
    c) 1, 0 , 1

13. In a transistor with $\beta = 40$, the Base current in 25 μ A then the collector current
    Ic is
    a) 1mA   b) 100mA   c) 10mA

14. The binary equivalent of the decimal number 5 is
    a) 101   b) 110   c) 011

15. The ratio of number of holes and number of conduction electrons in an intrinsic
    semiconductor is
    a) 1   b) less than 1   c) more than 1

II   FILL IN THE BLANKS:

16. If the current carrying conductor is placed perpendicular to the magnetic field, the
    conductor experiences _____ force.

17. $\nabla \times E =$ _____

18. Substances which rotate the plane of vibration to left in called as _____
    rotatory.

19. Emitter's main function is to supply _____ carriers.

..3

20. The difference of potential from one side of the barrier to the other side of the PN junction is known as _____.

III STATE WHETHER TRUE OR FALSE:

21. The capacitor of a parallel plate capacitor increases from 5 μ F to 60 μ F when a dielectric is filled between the plates. (The value of dielectric constant is 12).

22. The expression for voltage sensitivity of a galvanometer is $\dfrac{nBA}{C}$.

23. Using Fraunhofer lines in the solar spectrum the elements present in the Sun's atmosphere have been identified.

24. The efficiency of a half wave rectifier in approximately 40.6%.

25. NAND and NOR gates are called basic logic gates.

IV ANSWER IN ONE OR TWO SENTENCES:

26. Define coulomb.

27. Define electric field intensity.

28. Write the difference between refracting and reflecting telescope.

29. Why the centre of the Newton's ring is dark.

30. Define input impedance of a transistor.

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SUBJECT CODE : **PH/AC/GP22**

B.Sc. DEGREE EXAMINATION APRIL 2008
BRANCH I – MATHEMATICS
SECOND SEMESTER

COURSE   :   **ALLIED – CORE**
PAPER   :   **GENERAL PHYSICS – II**
TIME   :   **2 HOURS**   MAX. MARKS : **70**

SECTION – B

ANSWER ANY FIVE QUESTIONS: (5 x 6 = 30)

1. A parallel plate capacitor is maintained at some potential difference. A 3mm thick slab is introduced between the plates to maintain the plates at the same potential difference, the distance between the plates is increased by 2.4mm. Find the dielectric constant of the slab.

2. Calculate the focal lengths of a convex lens of crown glass (dispersive power 0.012) and a concave lens of flint glass (dispersive power 0.020) so that when placed in contact they form an achromatic converging combination of focal length 30cm.

3. a) If the plane of vibration of the incident beam makes an angle of 30° with the optic axis. Compare the intensities of extraordinary and ordinary light.

   b) A 200mm long tube containing 48 cm³ of sugar solution produces an optical rotation of 11° when placed in Saccharimeter. If the specific rotation of sugar solution is 66°. When placed in Saccharimeter. Calculate the quantity of sugar contained in the tube in the form of a solution.

4. Calculate the i) electric potential and intensity at a point due to a charge of 4×10^{-7}c located at 3cm away. ii) Workdone in bringing a charge of 3nc from infinity to the point.

5. The base current of the transistor is 75A and collector current is 37.5mA. Determine the values of β and α.

6. a) In Newton's rings experiment the diameter of certain order dark ring is measured to be double that of second ring. What is the order of the ring.
   b) A parallel beam of monochromatic light is allowed to incident normally as a plane transmission grating 5×10^3 lines /cm. A second order spectral line is found to be diffracted at an angle of 30°. find the wavelength of light.

7. Perform the following addition, subtraction and multiplication in the binary number system.
   a) 12 + 13   b) 93 – 36   c) 15 x 15

SECTION – C

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

8.   a) What is known as quantization of electric charge?   (2)

     b) State Gauss's law.   (2)

     c) Deduce an expression for the capacitance of a parallel plate capacitor when a
        dielectric slab is partially introduced between the plates.   (10)

9.   a) Define current and charge sensitivity.   (4)

     b) Explain in detail the principle, construction and theory of the moving coil
        Ballistic galvanometer.   (16)

10. a) What is polarization.   (2)

     b) Define angle of polarization.   (2)

     c) Give the construction and working of an astronomical telescope. (10)

     d) Calculate the magnifying power of an astronomical telescope when the final
        image is formed at the near point. Draw the necessary ray diagram .(6)

11. a) Explain an experiment to determine the characteristics of a transistor in CE
        configuration. Explain how the transistor parameter can be evaluated. (12)

     b) State and prove De Morgan's theorem.   (8)

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