SUBJECT CODE: 15PH/AC/PH23

B.Sc. DEGREE EXAMINATION APRIL 2017
BRANCH I – MATHEMATICS
SECOND SEMESTER

REG. No._____

COURSE	:	ALLIED – CORE
PAPER	:	PHYSICS– 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. Capacitance of a capacitor _____ if a dielectric is placed between the plates.
    (a) Increases   (b) decreases   (c) becomes zero   (d) remains the same

2. The number of flux lines passing through a normal surface is proportional to _____.
    (a) Current   (b) charge   (c) magnetic field   (d) permittivity

3. Capacitance of a parallel plate capacitor is given by_____
    (a) $C = \varepsilon_o A/d$ (b) $C = kA/d$ (c) $C = Ed$ (d) $C = \frac{1}{2}(QV)$

4. While ordinary galvanometers measure current, ballistic galvanometers measure
    _____.
    (a) Voltage   (b) charge   (c) magnetic field   (d) resistance

5. The charge sensitivity of a ballistic galvanometer is ____times the current sensitivity.
    (a) π/T (b) $2\pi/T^2$ (c) $2\pi/T$ (d) $T/2\pi$

6. The SI unit of magnetic field vector **B** is _____
    (a) Wb/m^2 (b) Newton/Coulomb   (c) Joule/Coulomb   (d) ampere/m^2

7. The resultant force on a charged particle moving through a region where both electric and magnetic fields are present is given by _____.
    (a) Lorentz force   (b) Lenz's law   (c) Coulomb force   (d) Gauss's law

8. Hubble space telescope was built by_____.
    (a) NASA   (b) ISRO   (c) European Space Agency   (d) Russian Space Agency

9. A radio telescope has _____as main parts.
    (a) Convex lens and collimator   (b) camera
    (c) plane and concave mirrors   (d) dish and antenna

10. The variation of image distance from the lens, with refractive index is a measure of
_____.
  (a) Axial chromatic aberration   (c) lateral chromatic aberration
  (b) longitudinal spherical aberration   (d) lateral spherical aberration

11. Polarisation phenomenon helped scientists to establish that light waves are
_____waves.
  (a) Electromagnetic   (b) longitudinal   (c) stationary   (d) transverse

12. In the expression $(a + b)\sin\theta_n = n\lambda$, $(a + b)$ is called_____
  (a) Path difference   (b) grating element   (c) slit width   (d) primary maxima

13. The interference pattern is observed due to the _____of two wave trains within the
region of cross-over.
  (a) Reflection   (b) superposition   (c) refraction   (d) damping

14. The three operations used in Boolean algebra are OR, AND and _____.
  (a) NAND   (b) ExNOR   (c) ExOR   (d) NOT

15. The solution for the Boolean expression AC + ABC is_____
  (a) AB   (b) A   (c) AC   (d) B

Fill in the blanks:

16. The unit of electric field intensity is _____.

17. The Maxwell's equation that is based on Gauss's law is_____.

18. In order to have achromatic combination of two lenses placed in contact, one of the lenses
should be _____ and the other concave.

19. In Fraunhoffer diffraction, the source and screen are at _____distance from the
aperture.

20. In Boolean algebra, $A + \bar{A} =$ _____.
  (a) 0   (b) 1   (c) A   (d) −A

State whether true or false:

21. Gauss's law is converse of Coulomb's law.

22. The perpendicular to a line of induction at any point gives the direction of vector **B** at that
point.

23. The refractive index for violet light is more than for red light.

24. There is no loss of energy due to the phenomenon of interference.

25. In an ideal OP-AMP, any signal, common to both the inputs is doubled at the output.

Answer briefly:

26. State Coulomb's law of force between charges.

27. Write any two Maxwell's equations.

28. Define angular magnification of telescope.

29. Define optical activity.

30. Define CMRR of OP-AMP.

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COURSE   :   ALLIED – CORE
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SECTION – B
ANSWER ANY FIVE QUESTIONS: **(5×5=25)**

1. A parallel plate capacitor consists of two square metal plates 5.0 cm of side and separated by 1 cm. A sulphur slab 6 mm thick is placed on the lower plate. Calculate the capacitance of the capacitor. (Dielectric constant of sulphur = 4).

2. A condenser charged to 2 volts is discharged through a ballistic galvanometer, when the corrected deflection is 9.6 cms and the current sensitivity is 4.54 x 10^2 mm/µA and the time period is 12 seconds. Calculate the capacity of the condenser.

3. Explain the various methods by which spherical aberration produced by lenses can be minimised.

4. The object glass of a telescope is an achromat of focal length 90 cm. If the magnitude of dispersive powers of the two lenses are 0.024 and 0.036, calculate their focal lengths.

5. A plane grating has 15000 lines per inch. Find the angle of separation of the 5048 angstrom and 5016 angstrom lines on helium in the second order spectrum.

6. State and prove the DeMorgan's theorems.

7. Simplify the given expressions using laws of Boolean algebra:
    (i) $A + \bar{A}B = A + B$
    (ii) $AB + ABC + \bar{A}B + A\overline{B}C$

SECTION – C
ANSWER ANY THREE QUESTIONS: **(3×15 =45)**

8. State Gauss's law and prove it.

9. Give the theory and working of ballistic galvanometer.

10. Define angular magnification of a telescope. With the help of necessary ray diagrams, explain the formation of image in refracting astronomical telescope and terrestrial telescope.

11. Discuss how Newton's rings are formed by reflected light. How will you determine the wavelength of sodium light by forming Newton's rings.

12. Drawing neat circuit diagrams, explain the working of OP-AMP as:
    (i) summer and   (ii) integrator.

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