



PAQ-003-001502

Seat No. _____

B. Sc. (Sem. V) (CBCS) Examination

October / November - 2018

PHYSICS : Paper - P-502

(Electricity, Magnetism and Solid State Electronics)

Faculty Code : 003

Subject Code : 001502

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

- Instructions :** (1) All questions are compulsory.
(2) Figures on right hand side indicate marks.
(3) Symbols have their usual meanings.

1 Write very short answers to the following questions : **20**

- (1) Electric field is "negative of gradient of a scalar potential" – Do you agree ?
- (2) What is S.I. unit of an electric flux ?
- (3) Define current density.
- (4) Write differential form of Ampere's law.
- (5) Write differential form of Faraday's law.
- (6) The stationary charges produce magnetic fields. – Is it true or false ?
- (7) How much force does a charge q experience when it moves with velocity v in the direction parallel to magnetic field B ?
- (8) Which power station produces large amount of smoke and fumes ?
- (9) Which type of fuel is used in nuclear power plants ?
- (10) R-C coupled amplifier has very good impedance matching. – Is it true or false ?
- (11) Transformer coupling is used for power amplification. – Do you agree ?
- (12) What is "cascading" in case of multistage amplifiers?

- (13) Output impedance of voltage amplifier is very high. – Is it true or false ?
- (14) What is Distortion in an amplifier ?
- (15) Efficiency of Class-A amplifier is very high. – Is it true or false ?
- (16) In C-E amplifier, how much phase difference occurs between output and input signal ?
- (17) Write types of voltage regulators (only names).
- (18) What is the main drawback of a series regulator ?
- (19) Fill in the blank : The sensitivity of an electronic instrument is very _____ (high / low)
- (20) Which circuits are used in digital instruments ?

2 Answer the following :

- (a) Write short answers to the following : (any **three**) **6**
 - (1) Write Laplace's and Poisson's equations.
 - (2) Give a statement and expression of Gauss's law.
 - (3) What is μ_0 ? Give its value with S.I. units.
 - (4) Write Maxwell's four equations of electrodynamics for free space.
 - (5) Write Lorentz's force law for a charge moving in electric and magnetic field.
 - (6) Give names of different sources of energy.

- (b) Give answers to the following : (any **three**) **9**
 - (1) Derive equation of continuity.
 - (2) Explain : Electrostatic potential.
 - (3) Explain Faraday's law.
 - (4) Describe force on a current loop in an uniform magnetic field
 - (5) Write a note on nuclear power station.
 - (6) Discuss : Gas power plant.

- (c) Write in detail : (any **two**) **10**
 - (1) Explain electric potential and from that derive formula for an electric field.
 - (2) Show that magnetic induction B is the curl of a vector potential.

- (3) Write Maxwell's equations and prove Poynting's theorem.
- (4) Draw schematic arrangement of Steam power station and describe its various sections.
- (5) Describe : Diesel power station.

3 Answer the following :

(a) Write short answers to the following : (any **three**) **6**

- (1) Explain: Decibel gain.
- (2) Write disadvantages of Transformer coupled amplifier.
- (3) Derive expression for collector efficiency of power amplifier.
- (4) Write a brief note on Class-C power amplifier.
- (5) Justify the need of regulated power supplies.
- (6) List out any four scientific and engineering applications of C.R.O.

(b) Give answers to the following : (any **three**) **9**

- (1) Discuss frequency response of transformer-coupled amplifier.
- (2) Describe : An ordinary D.C. power supply.
- (3) Discuss : Frequency determination with Lissajous figures.
- (4) Explain : Transistor series voltage regulator.
- (5) Write a note on Thermal runaway.
- (6) Give comparison of different types of coupling.

(c) Write in detail : (any **two**) **10**

- (1) Draw circuit diagram and explain operation and frequency response of R-C coupled amplifier.
- (2) Describe the role of Electron gun assembly and Deflecting plates in case of Cathode Ray Tube.
- (3) Describe Push-pull amplifier.
- (4) Explain with diagram : Transistor shunt voltage regulator.
- (5) Discuss: Digital voltmeter.