

- Instructions :** (1) All questions are compulsory.
 (2) Illustrate your answers with neat sketches wherever necessary.
 (3) Figures to the right indicate full marks.
 (4) Assume suitable data, if necessary.
 (5) Preferably, write the answers in sequential order.

1. Attempt any **NINE** of the following :

[18]

- (a) Define : (i) Electric current (ii) 1Ω
 (b) State the working principle of Wheatstone's network
 (c) Calculate the potential drop across a potentiometer wire of length 200 cm so as to have potential gradient of 10^{-3} V/m.
 (d) A capacitor of capacitance $5\mu\text{F}$ is connected to a supply of 10V. Calculate the charge on the capacitor.
 (e) State the values or range of values of energy band gap for conductors, semiconductors and insulators.
 (f) Explain the p-type semiconductor.
 (g) Define : (i) Threshold frequency (ii) Work function
 (h) State Einstein's photoelectric equation with the meaning of all the symbols involved.
 (i) Explain the term "Stimulated Absorption" in lasers.
 (j) State any two engineering applications of X-Rays.
 (k) Classify nanomaterials according to their dimensions.
 (l) State any two engineering applications of nanomaterials.

2. Attempt any **FOUR** of the following :

[16]

- (a) Calculate the resistance of wire of length 50 cm and cross section area of $0.02 \times 10^{-6} \text{ m}^2$. (Given – specific resistance of the wire = $3.5 \times 10^{-7} \Omega\text{-m}$)
 (b) State and explain the balancing condition of Wheatstone's network.
 (c) (i) State and explain the principle of potentiometer.
 (ii) Give any two uses of potentiometer.
 (d) Define: (i) P-N junction diode (ii) Depletion layer
 (iii) Forward bias (iv) Reverse bias of P-N junction diode
 (e) Draw the symbol and state the principle of photodiode. State its any two applications.
 (f) Plot and explain the I-V characteristics of a p-n junction diode.

3. Attempt any **FOUR** of the following :

[16]

- (a) Three condensers are connected in series across 220V supply. If the voltage drops across the condensers are 50V, 60V and 110V respectively and the charge on each condenser is $6\mu\text{F}$, calculate the capacitance of each condenser and hence the effective capacitance of the combination.

- (b) Explain the production of X-rays using Coolidge tube with a neat labeled diagram.
- (c) Differentiate between spontaneous and stimulated emission of light with diagram.
- (d) State any four engineering applications of laser.
- (e) With neat labelled diagram, explain the working of He-Ne laser.
- (f) Write the names of any four physical methods of synthesis of nanoparticles.

Paper Discussion Schedule for all Subject: FY Diploma Sem-II

Date	Day	Timing	Centre
9 April 2017	Sunday	9 a.m. to 11 a.m.	Dadar
9 April 2017	Sunday	12 p.m. to 2 p.m.	Thane
9 April 2017	Sunday	9 a.m. to 11 a.m.	Ghatkopar
9 April 2017	Sunday	12 p.m. to 2 p.m.	Borivali
9 April 2017	Sunday	12 p.m. to 2 p.m.	Nerul
9 April 2017	Sunday	3 pm to 5 pm	Kalyan

