B. N. Bandodkar College of Science, Thane

First Term Examination, October, 2011
B. N. Bandodkar College of Science, Thane.

S. Y. B. Sc.

PHYSICS : PAPER – II

Duration : 2 Hours] [Marks : 60

N.B. (1) All questions are compulsory.
(2) Figures to the right indicate full marks.
(3) Use of non programmable calculator is allowed.

1. (a) Attempt any **THREE** of the following: 12

i) Explain the working of velocity selector
ii) An electron is accelerated from rest by a potential difference of 2000 volts; calculate the velocity acquired by electron.
(e =1.6 $X10^{-19}$ C; m_e=9.1$X10^{-31}$kg)
iii) State why silicon devices are preferred over germanium devices.
iv) Explain how negative feedback can increase the value of the bandwidth of an amplifier.
v) Convert Binary to Decimal using Double-dable method -101011

(b) Add the following binary numbers 3
1011101
+
0111010

2. (a) Attempt any **ONE** of the following: 8

i) For the motion of a charge particle ‘q’ having mass ’m’ in sinusoidal electric field $E = E_0 sin\omega t$, obtain the expressions for acceleration, velocity and displacement.

ii) Explain the construction and working of Cyclotron.

(b) An electron is revolving in a magnetic field of 10^{-4} Wb/m^2acting perpendicular to the plane of its path. Find the frequency of revolution. 4
(e =1.6 $X10^{-19}$ C; m_e=9.1$X10^{-31}$kg)

(c) Show that the kinetic energy of a charge particle remains constant in magnetic field. 3

P.T.O.

3. (a) Attempt any **ONE** of the following: 8

i) Explain how mid-point biasing provides best possible ac amplification from the transistor circuit.

ii) What is feedback in amplifier. Derive the relation between the gain without feedback and gain with feedback when negative feedback is introduced.

(b) For a voltage divider bias circuit R_1= 6k**Ω**, R_2= 4k**Ω**, R_c=R_e=5k**Ω**, β=100 and V_{cc}=30V determine V_{Th}, R_{Th}, I_c.I_b. 4

(c) An amplifier has the following characteristics **R_i=2.5k**Ω**, R_o=50k**Ω** and **A_v=100**. If **3%** negative voltage feedback in series with the input is used, determine its voltage gain. 3

4. (a) Attempt any **ONE** of the following: 8

i) Explain Sum of products **(SOP)** using 3 inputs.

ii) Draw the logic circuit of an **RS** flip flop using **NAND** gates. Write down its state transition table.

(b) Convert the following numerical form into sum of the product form **f(A,B,C)= ∑ m(0,1,7).** 4

(c) Explain the terms ‘Up counter’ and ‘Down counter’. 3

~*~*~*~*~*~*~*~*~