ROLL NO. _____

Code: AE103 **Subject: ELECTRONIC DEVICES & CIRCUITS**

AMIETE – ET *{NEW SCHEME}*

Time: 3 Hours **JUNE 2014** **Max. Marks: 100**

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE: There are 9 Questions in all.

- **Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.**
- **The answer sheet for the Q.1 will be collected by the invigilator after 45 minutes of the commencement of the examination.**
- **Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.**
- **Any required data not explicitly given, may be suitably assumed and stated.**

Q.1 Choose the correct or the best alternative in the following: **(2×10)**

a. The current through capacitor

(A) Leads by 90^0 the voltage across it
(B) Lags by 90^0 the voltage across it
(C) Leads by 180^0 the voltage across it
(D) Lags by 180^0 the voltage across it

b. LEDs are manufactured using

(A) Germanium **(B)** Silicon
(C) Gallium Arsenide **(D)** Aluminium

c. For the circuit shown in Fig.1, if the transistor has β = 100, then the value of I_C is

(A) 2 mA
(B) 21.5 mA
(C) 2.15 mA
(D) 3.33 mA

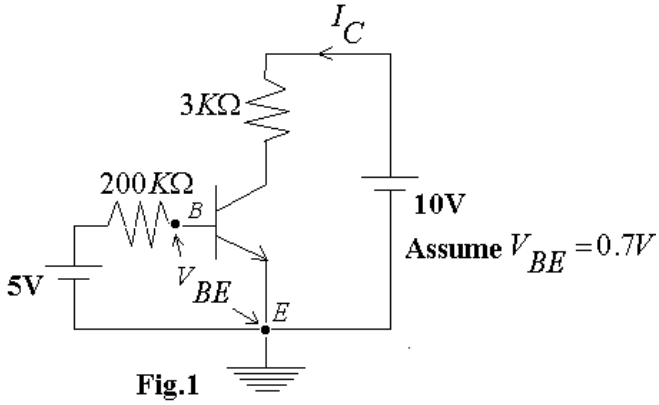

Fig.1

d. The Emitter Follower circuit has

(A) High voltage gain **(B)** Low current gain
(C) High power gain **(D)** Voltage gain close to unity

e. If two BJTs have same f_T, the one with smaller β will have

(A) Smaller bandwidth **(B)** Larger bandwidth
(C) Zero bandwidth **(D)** Infinite bandwidth

f. The maximum theoretical efficiency of Class B power amplifier is

(A) 78.54% **(B)** 25.54%
(C) 50.54% **(D)** 85.54%

g. Which of the following amplifiers exhibits the crossover distortion?

(A) Class A **(B)** Class B
(C) Class AB **(D)** Class C

h. In a voltage series feedback connection

(A) R_i increases & R_o decreases **(B)** R_i decreases & R_o increases
(C) Both R_i & R_o increase **(D)** Both R_i & R_o decrease

i. Which of the following oscillator provides high frequency stability?

(A) Phase shift oscillator **(B)** Wein bridge oscillator
(C) Colpitt's oscillator **(D)** Crystal oscillator

j. The method used for producing clearly defined shallow regions with uniform concentration of impurity

(A) Ion implantation **(B)** Epitaxial growth
(C) Photolithography **(D)** Diffusion

Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.

Q.2 a. State Superposition Theorem. **(2)**

b. In the circuit shown below, determine (i) I (ii) find I_S for $V_S = 16V$ and I=0 (iii) find V_S for $I_S = 16\,A$ and I = 0 **(6)**

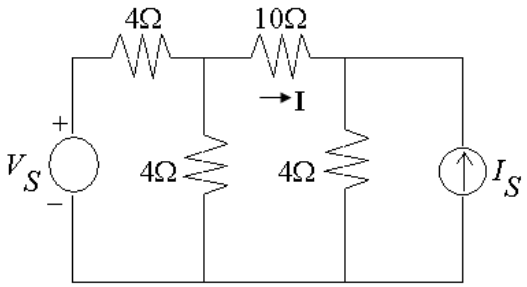

Fig.2

c. Define the terms (i) Node (ii) Branch (iii) Loop (iv) Mesh and write the procedure for writing nodal equations**.** **(8)**

Q.3 a. Explain about n-type doping and p-type doping. **(8)**

b. Explain PN junction behaviour under forward and reverse bias**.** **(8)**

Q.4 a. Explain the operating of PNP transistor. **(8)**

b. For the transistor circuit shown below, calculate I_C, I_E and I_B, if the transistor's $\beta = 50$. **(8)**

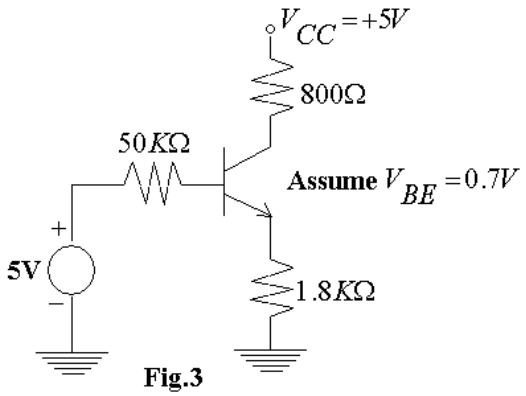

Fig.3

Q.5 a. Explain h-parameter model of an amplifying device and draw h-parameter models of BJT. **(8)**

b. Discuss the BJT biasing circuit with voltage feedback. **(8)**

Q.6 a. Explain the mid-frequency response of RC coupled amplifier. **(8)**

b. In the BJT RC-coupled amplifier of Fig.4 determine:
(i) V_o for $V_s = 5mV$ (ii) R_{in} and (iii) R_{out} in the mid-frequency region.
Given $r_\pi = 600\Omega, \beta = 100$. **(8)**

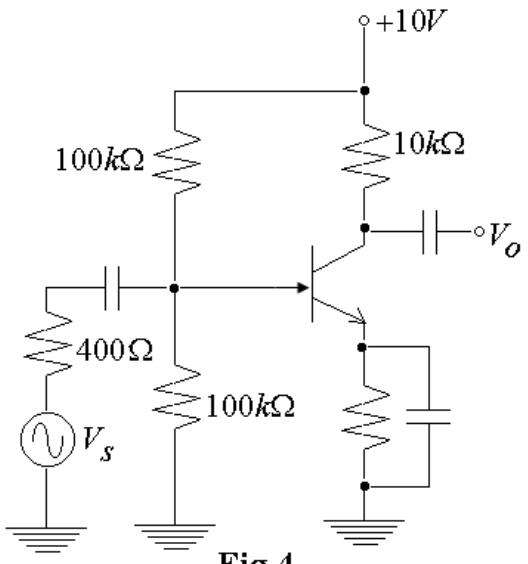

Fig.4

Q.7 a. Explain the working of Class B transformer coupled push-pull amplifier and derive the expression for its efficiency. **(10)**

b. Explain Crossover distortion in the push-pull operation of Class B amplifier. **(6)**

Q.8 a. Explain the effect of feedback on impedances. **(8)**

b. Draw the circuit of Wien bridge oscillator and derive the expression for its frequency of oscillation. **(8)**

Q.9 a. Explain the following processes in IC fabrication
(i) Diffusion (ii) Ion implantation **(8)**

b. Explain the fabrication of NMOS enhancement type MOSFET. **(8)**