3EU3041
B. Tech. III-Sem. (Main) Exam., Dec.-2016
3EEU01 Electronic Devices & Circuits (EDC)

Time: 3 Hours

Maximum Marks: 100

Instructions to Candidates:

PART - A : Short answer questions (up to 25 words) 10×2 marks =20 marks.

All ten questions are compulsory.

PART - B : Analytical/Problem solving questions (up to 100 words). 6×5 marks =30 marks.

Candidates have to answer six questions out of eight.

PART - C : Descriptive/Analytical/Problem solving questions. 5×10 mark =50 marks.

Candidates have to answer five questions out of seven.

PART – A (up to 25 words)

[2×10=20]

Attempt all questions :-

Q.1 Draw the symbols of N – channel JFET, P channel E – MOSFET, NPN Transistor.

Q.2 Define mass action law.

Q.3 Explain load line concept and quicent point.

Q.4 Give differences b/w avalanche break down and zener break down.

Q.5 What is depletion width of P – N junction? (Write Formula also)

Q.6 Define trans conductance (9m) in the FET. (Write Formula also)

Q.7 Write miller's theorem.

Q.8 Define threshold voltage of Enhancement type MOSFET.

Q.9 Write the definition for α and β. (Current gains)

Q.10 Define coupling capacitor (C_c) and Emitter – by – pass capacitor (C_E) of BJT amplifier.

PART – B (up to 100 words)

Attempt any six   [6×5=30]

Q.1   Explain half wave rectifier and full wave rectifier.

Q.2   Explain clamper and its types. State basic components of clampers.

Q.3   Draw PNP transistor layer diagram and Explain and Show its current components

Q.4   A Step graded, Ge diode having $N_D = 500 N_A$ having acceptor impurity to the extent of $2:10^8$ is added at room temperature. Find its contact potential. Assume $n_i = 2.5 \times 10^{13}$ atm/cm^3 and total number of atoms 4.42×10^{22}/cm^3. (No = donar concentration NA = acceptor concentration)

Q.5   Explain JFET with neat diagram. Draw pinch – off – voltage in its output characteristics.

Q.6   For the given Fig 1 $I_{DSS} = 10m A$ and $Vp = 4v$ Determine V_{DS} ?
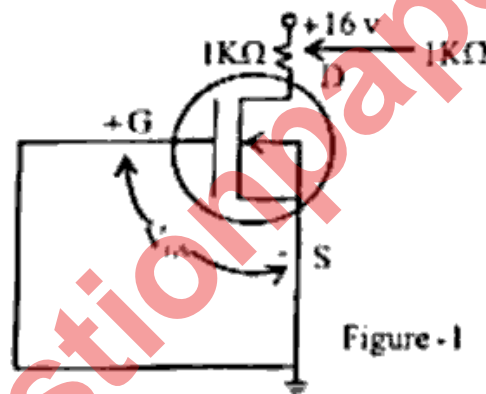
Figure - 1

Q.7   Explain Ebers – moll model with neat diagram.

Q.8   Write the output waveform for given circuit (in figure-2) if input is a sinusoidal wave $(5 \sin (200 \pi t))$ (consider diode as ideal diode)
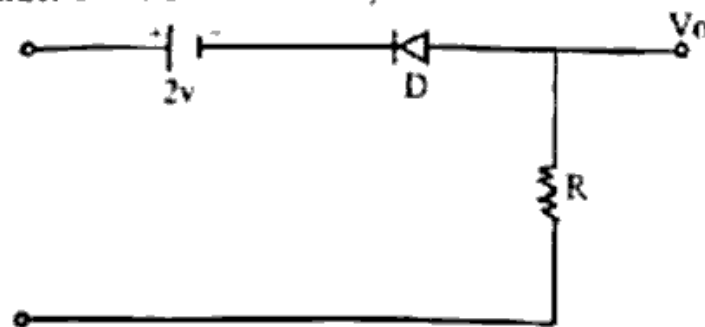
Figure - 2

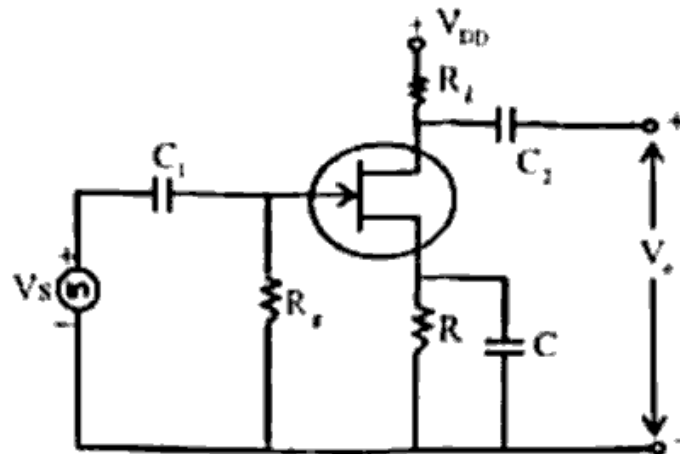Q.1   [5×10=50]

Figure - 3

A common source (cs) Amplifier is shown in figure-3 using N channel FFT for which the parameters are $V_p = -2V$, $I_{DSS} = 1.65mA$, $I_D = 0.8mA$, $V_{DD} = 24V$ Find V_{gs}, g_m, and g_{mo}.

Q.2   Explain density of state (DOS), g (E) and Electron occupation probability (Both Bolts man Statics and Fermi – dirac Statics f (E)). And also write the expression for Finding. "Number of occupied states n (E)" in terms of g (E) and f (E).

Q.3   Explain P – N junction in Forward and reverse bias. Draw its V – I characteristics. Find forward current of Ge diode for forward voltage 0.1V Reverse saturation current given 10 uA at room temperature.

Q.4   Compute the over all gain for two stage R - C – coupled amplifier shown in below figure given $V_{BE} = 0.7v$, $\beta_1 = \beta_2 = 100$, hie = 1.1 KΩ hre = h_{oe} = 0
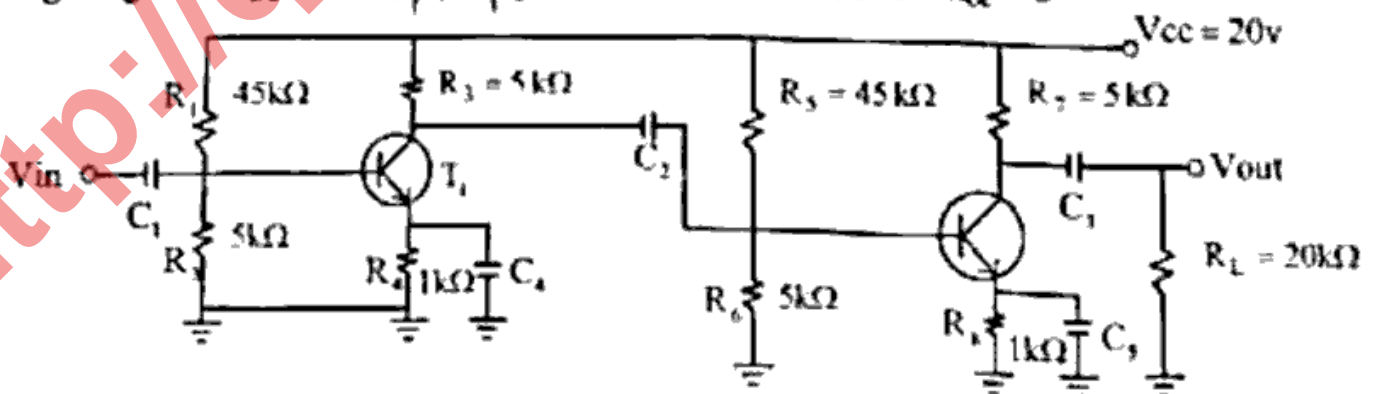

Figure - 4

Q.5 Explain Enhancement type MOSFET, construction and working. Draw Drain characteristics and Transfer characteristics for N – channel Enhancement type MOSFET.

Q.6 Explain different types of biasing for BJT with neat diagram.

Q 7 Find the conductivity of Si

(i) Under intrinsic condition at 300°K

(ii) With donor impurity of 1 part in 5×10^7 and

(iii) With acceptor impurity of 1 part in 5×10^7. Given at 300°K

Intrinsic concentration $(n_i) = 1.5 \times 10^{10}$/cm³

Mobility of Electron $(u_e) = 1300$ cm²/ v–s

Mobility of holes $(u_n) = 500$ cm²/v–s

$e = 1.6 \times 10^{-19}$ c, No. of Si atoms $= 5 \times 10^{22}$ /cm³