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[4657]-543

S.E. (E & TC/Electronics) (First Semester) EXAMINATION, 2014
ELECTRONICS DEVICES AND CIRCUITS
(2012 PATTERN)

Time : Two Hours**Maximum Marks : 50**

N.B. :— (i) Answer Q. No. 1 or 2, Q. No. 3 or 4, Q. No. 5 or 6, Q. No. 7 or 8.

(ii) Neat diagrams drawn wherever necessary.

(iii) Figures to the right indicate full marks.

(iv) Use of calculator is allowed.

(v) Assume suitable data if necessary.

1. (a) Draw h -parameter models for C_E , C_B and C_C transistor configurations. [6]
- (b) For the circuit shown in Fig. 1. Silicon transistor with $\beta = 100$ is used. Calculate I_B , I_C and V_{CE} . [6]

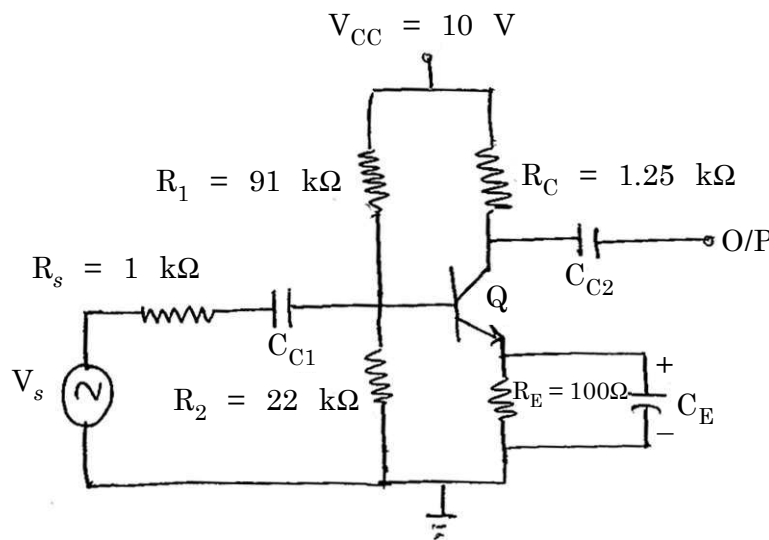


Fig. 1

P.T.O.

Or

2. (a) For the circuit shown in Fig. 1, silicon transistor with $h_{ie} = 1.1 \text{ k}\Omega$, $h_{fe} = 50$, $h_{re} = 2.5 \times 10^{-4}$, $h_{oe} = 25 \text{ }\mu\text{A/V}$ is used. Calculate A_i , A_v , R_i , R_i' , R_o and R_o' . [6]
- (b) Derive the expression for stability factor S for the voltage divider bias circuit. [6]
3. (a) Draw and explain Hartley oscillator using BJT. Calculate frequency of oscillation, when $C = 0.001 \text{ }\mu\text{F}$, $L_1 = L_2 = 100 \text{ }\mu\text{H}$ and mutual inductance between L_1 and L_2 is $20 \text{ }\mu\text{H}$. [6]
- (b) Derive the expression for lower cut-off frequency and higher cut-off frequency in terms of percentage tilt and rise time respectively. [6]

Or

4. (a) Determine the input resistance of a series input connection and the output resistance of a shunt output connection for an ideal feedback voltage amplifier in which $A_v = 10^5$ and $A_{vf} = 50$. Assume that input and output resistances of the basic amplifier are $R_i = 10 \text{ k}\Omega$ and $R_o = 20 \text{ k}\Omega$ respectively. [6]

- (b) Explain the effect of internal capacitances of transistor used in amplifier circuit on bandwidth of amplifier with frequency response curve. Define F_α and F_β separately. [6]
5. (a) Draw class B push pull power amplifier and show that maximum efficiency is 78.5%. [6]
- (b) A transformer coupled class A power amplifier draws a current of 200 mA from a collector supply of 10 V when no signal is applied to it. Determine : [7]
- (i) Maximum output power
(ii) Maximum collector efficiency
(iii) Power rating of the transistors.
- If the load connected across transformer. Secondary is of 2Ω and transformer turns ratio is 5 : 1.

Or

6. (a) Explain with circuit diagram, how even harmonics are eliminated in class B push-pull power amplifier. [6]
- (b) A sinusoidal signal $V_S = 1.75 \sin (600 t)$ is fed to a power amplifier. The resulting output current is $I_0 = 15 \sin 600 t + 1.5 \sin 1200 t + 1.2 \sin 1800 t + 0.5 \sin 2400 t$. Calculate the percentage increase in the power due to distortion. [7]

7. (a) Explain various non-ideal current voltage characteristics of EMOSFET. [6]
- (b) For the circuit shown in Fig. 2, the MOSFET parameters are $V_T = 3V$, $k = 0.4 \text{ mA/V}^2$. Determine V_{GS} , V_{DS} and I_D and show that MOSFET is biased in the saturation region : [7]

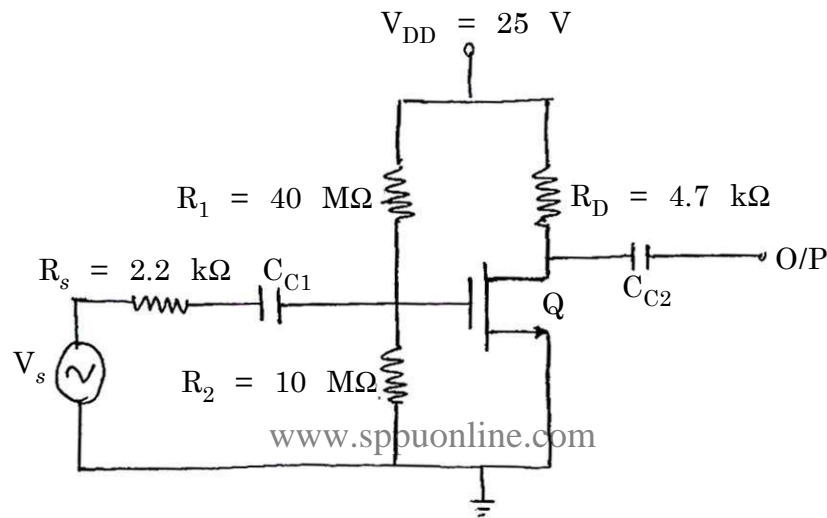


Fig. 2

Or

8. (a) For the circuit shown in the Fig. 2, determine g_m , A_v , R_i , R_i' , R_o and R_o' . Given $V_T = 3V$, $k = 0.4 \text{ mA/V}^2$ and $r_o = 40 \text{ k}\Omega$. [7]
- (b) Describe Bi-CMOS technology of MOSFET with circuit diagram. [6]