**Registration No:** | | | | | | | | | | |

**Total Number of Pages: 02** **B.Tech.**
**PET3I101**

**3rd Semester Regular / Back Examination 2017-18**
**ANALOG ELECTRONIC CIRCUITS**
**BRANCH: ECE, ETC**
**Time: 3 Hours**
**Max Marks: 100**
**Q.CODE: B780**

**Answer Question No.1 and 2 which are compulsory and any four from the rest.**
**The figures in the right hand margin indicate marks.**

**Q1** **Answer the following questions: *multiple type or dash fill up type*** **(2 x 10)**

**a)** The small signal gain of the amplifier $V_c/V_s$ is .

**b)** In an amplifier the increase in gain is 12 dB if the frequency doubled. If the frequency is increased by 10 times, then the increase in gain will be
a) 2.4 dB b) 20 dB c) 40 dB d) 60 dB

**c)** In a single stage RC coupled common emitter amplifier, the phase shift is at the lower 3 dB frequency is
a) $0^0$ b) $135^0$ c) $180^0$ d) $225^0$

**d)** Which op-amp circuit uses a capacitor in series with input and resistance in feedback path?
a) Differentiating amplifier b) Integrating amplifier
c) Logarithmic amplifier d) None of the above

**e)** In the analysis of common emitter amplifier, we may neglect
a) $h_{ie}$ b)$h_{re}$c)$h_{fe}$d)$h_{oe}$

**f)** In a push pull circuit the two transistors are
a) both *pnp* b) both *npn*c) one *pnp* and other *npn* d) either (a) or (b)

**g)** The current gain of a BJT is
a) $g_m r_0$ b) $g_m/r_0$ c) $g_m r_\pi$ d) $g_m/r_\pi$

**h)** In a FET, $g_m$ varies as
a) $I_{DSS}$ b) $\frac{1}{I_{DSS}}$ c) $\frac{I_{DSS}}{2}$ d)$\sqrt{I_{DSS}}$

**i)** An inverting amplifier has $R_1$ = 10 KΩ, and $R_f$ = 150 KΩ then the O/P voltage, if input voltage $V_i$ = 1 volt
a) -15 V b) -10 V c) 15 V d) -14 V

**j)** Which op-amp circuit uses a resistance in series with input and a capacitor in feedback path?
a) Differentiating amplifier b) Integrating amplifier
c) Logarithmic amplifier d) None of the above

**Q2** **Answer the following questions: *Short answer type*** **(2 x 10)**

**a)** For a transistor amplifier with self-biasing network the following components are used: $R_1$= 4KΩ, $R_2$= 4KΩ, Rc= 1KΩ. Find the approximate value of the stability factor 'S'.

**b)** What is the approximate value of input impedance of a common emitter amplifier with emitter resistance Re?

**c)** The two stages of a cascade amplifier have individual upper cutoff frequencies f1= 5 MHz and f2= 3.33MHz. What is the best approximation for the upper cutoff frequency of the cascade combination?

**d)** Why square wave is fed to an amplifier for testing purpose?

**e)** What is a Barkhausen criterion for oscillation for an oscillator?

**f)** $h_{12}$ and $h_{21}$are small signal low frequency equivalent hybrid parameters of a transistor. Interpret them.

**g)** An RC amplifier stage has a bandwidth of 500 KHz. What will be the rise time of this amplifier stage?

**h)** A non-inverting Op-Amp with input voltage of 1V is connected to a power supply of 10V. If input resistance of the amplifier is 45 KΩ and feedback resistance is 540 KΩ, then what is the maximum output voltage?

**i)** What is the rate (in $mV/^0C$) of decrease of base to emitter voltage $V_{BE}$ in a transistor in the forward bias with increase in temperature?

**j)** A BJT is biased with a power supply of 12 V. For minimum dissipation, what is the drop across the transistor?

**Q3** **a)** Consider a fixed Bias circuit of a transistor. Obtain expressions for stability factor $S_{ICO}$, $S_{VBE}$& $S_{\beta}$. Draw the circuit diagram. **(10)**

**b)** Design a voltage divider bias circuit for the given condition. $I_c$=1mA, $S_{ico}$=20, β=100, $V_E$=1V, $V_{CE}$=6V and $V_{CC}$=12V. Draw the circuit diagram. **(5)**

**Q4** **a)** With equivalent circuit obtain the expression of $Z_i$, $Z_o$&$A_v$of E-MOSFET drain feedback configuration. **(10)**

**b)** Compare FET over BJT. **(5)**

**Q5** **a)** State and explain the Barkhausen criterion for sustained oscillations. Discuss its importance in operation of an oscillator circuit. **(10)**

**b)** Describe Miller's effect and derive an equation for Miller input and output capacitance. **(5)**

**Q6** **a)** Sketch the circuit of a Wein-bridge oscillator and explain its operation. What determines its frequency of oscillation? Will oscillation take place if the bridge is balanced? Explain. **(10)**

**b)** Explain the low frequency response of single stage RC coupled amplifier. **(5)**

**Q7** **a)** A complimentary symmetry push pull amplifier is operated with Vcc=±10V, $R_L$ = 5Ω. Determine maximum output power, power rating of transistors and DC input power. **(10)**

**b)** Discuss square wave testing of an amplifier. How it is useful? **(5)**

**Q8** **a)** Draw and explain the principle of operation of a Cascade and a Cascode amplifier. **(10)**

**b)** Explain the Instrumentation amplifier with circuit diagram. **(5)**

**Q9** **a)** Which feedback technique is there in an emitter follower circuit? Draw the topology and derive the expression of input impedance $Z_{if}$ for that feedback network. **(10)**

**b)** Show that OP-AMP can be used as voltage buffer and controlled sources. **(5)**