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

Total Number of Pages: 02 **B.Tech.**
PEL3I102

3rd Semester Regular / Back Examination 2017-18
ANALOG ELECTRONIC CIRCUITS
BRANCH: EEE
Time: 3 Hours
Max Marks: 100
Q.CODE: B779

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) In a common emitter, unbypassed resister provides
   a) Voltage shunt feedback
   b) Current series feedback
   c) Negative voltage feedback
   d) Positive current feedback

b) A CC amplifier has the highest
   a) Voltage gain
   b) Power gain
   c) Current gain
   d) Output impedance

c) The effective channel length of a MOSFET in a saturation decreases with increase in:
   a) Gate voltage
   b) Drain voltage
   c) Source voltage
   d) Body voltage

d) The ideal OP-AMP has the following characteristics:
   a) $R_i = \infty$, $A = \infty$, $R_0 = 0$
   b) $R_i = 0$,$A = \infty$, $R_0 = 0$
   c) $R_i = \infty$,$A = \infty$, $R_0 = \infty$
   d) $R_i = 0$, $A = \infty$, $R_0 = \infty$

e) If the feedback signal is returned to the input in series with the applied voltage, input impedance:
   a) Decreases
   b) Increases
   c) Does not change
   d) Becomes infinity

f) The maximum possible collector circuit efficiency of an ideal class power amplifier is:
   a) 15%
   b) 25%
   c) 50%
   d) 75%

g) The 'slew rate' of an operational amplifier indicates:
   a) how fast its output current can change
   b) how fast its output impedance can change
   c) how fast its output power can change
   d) how fast its output voltage can change

h) The large signal bandwidth of an op-amp is limited by:
   a) loop gain
   b) slew rate
   c) output impedance
   d) input frequency

i) The feedback factor β at the frequency of oscillation of a Wien bridge oscillator is:

a) 3
b) 1/3
c) 1/29
d) 3/29

j) The only drawback of using negative feedback in amplifiers is that it involves:
a) Gain sacrifice
b) Gain stability
c) Temperature sensitivity
d) Frequency dependence

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

a) Differentiate between BJT and FET.

b) Calculate β for two transistors for which α = 0.99 and 0.98. For collector current of 10 mA, find the base current of each transistor.

c) Discuss about load line in BJT biasing circuit.

d) Among the various biasing circuits which one is commonly used and why.

e) Discuss about the series and parallel configurations of semiconductors diodes.

f) Whether the output of a CE configuration is in phase or out of phase with the input? Justify.

g) Differentiate between small-signal amplifier and large-signal amplifier.

h) What is the role of bypass capacitor in an amplifier circuit?

i) What are the advantages and disadvantages of negative feedback in an amplifier?

j) State and explain Barkhausen criteria of self oscillation.

Q3 **a)** Explain the effect of coupling capacitor and bypass capacitor on the low frequency response of BJT amplifier. **(10)**

b) Compare the properties of CB, CE, CC configurations of BJT and explain which configuration is suitable for use in cascade amplifier stages. Justify your answer. **(5)**

Q4 **a)** Determine the lower cut off frequency for the voltage divider bias BJT amplifier with C_S= 10μF, C_E= 20μF, R_s= 1KΩ, R_1= 10KΩ, R_2= 10KΩ, R_E= 2KΩ, R_c= 4KΩ, R_l= 2.2KΩ, β=100, r_o=∞, Vcc=20v . **(10)**

b) Draw and explain the principle of operation of an emitter follower circuit. Justify its name. Derive expressions for its input and output impedances and the voltage gain **(5)**

Q5 **a)** Describe the Hybrid parameters of a BJT and hence develop the Hybrid model and the simplified Hybrid model of the transistor. **(10)**

b) A BJT used in CE configuration with following parameters: **(5)**
R_L= 10KΩ , R_s= 2KΩ , h_{ie} = 1KΩ, h_{re} = $2x10^{-4}$, h_{fe} = 50 and h_{oe} = 25μ
Calculate the values of A_I, R_i , A_v, A_{vs} and Z_o .

Q6 **a)** For voltage series feedback amplifier topology, obtain expression for A_v and R_{if}. Also explain the principle of voltage amplifier used in feedback amplifiers. **(10)**

b) Sometimes an amplifier using negative feedback oscillates. Give reason for its oscillation. **(5)**

Q7 **a)** Obtain an expression for frequency of oscillation in Colpitt's Oscillator. **(10)**

b) Explain the concept of positive feedback used in oscillator . **(5)**

Q8 **a)** Draw the JFET common drain configuration(source-follower) circuit. Derive Z_i, Z_o, A_v, using small signal model. Write its characteristics. **(10)**

b) Explain the structure of depletion mode MOSFET. **(5)**

Q9 **a)** What do you mean by power amplifier? Draw circuit diagram of push pull amplifier using a pair of complementary transistors and explain its operation. **(10)**

b) Explain comparator Circuit with neat diagram. **(5)**