

total number of printed pages – 7

B. Tech  
CPES 5202

Third Semester Examination – 2008

**ANALOGUE ELECTRONICS CIRCUIT**

Full Marks – 70

Time : 3 Hours

IWL Answer Question No. 1 which is compulsory  
and any five from the rest.

The figures in the right-hand margin  
indicate marks.

Answer the following in brief. Provide suitable  
illustrations wherever necessary : 2×10

- (a) Draw the small signal hybrid model of a  
n-channel FET.

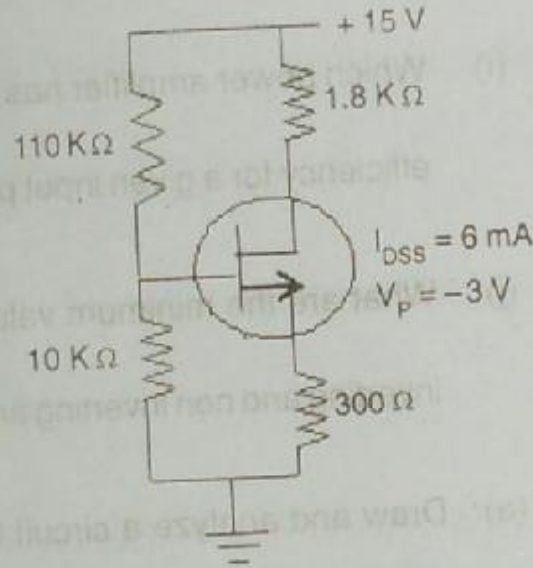
P.T.O.

- (b) Which h-parameters one can determine from the input characteristics and the output characteristics of a BJT?
- (c) Write down two salient features of a voltage series feedback.
- (d) What is the roll-off factor in a Bode plot? Justify.
- (e) Why is a fixed bias called so? Justify.
- (f) Prove that in a constant current source circuit current is indeed a constant.
- (g) Write down two advantages of a push-pull power amplifier.

- (h) Give the dc load line for a fixed bias circuit with  $V_{cc} = 9\text{ V}$ ,  $\beta = 100$  and  $R_B = 20\text{ K}\Omega$  that uses a silicon transistor.
- (i) Which power amplifier has the maximum efficiency for a given input power? Why?
- (j) What are the minimum values of gain in inverting and non inverting amplifiers?
2. (a) Draw and analyze a circuit that can add four voltages of 1 V, 1.5 V, 2 V and 2.5 V. Find out the output voltage. State the assumptions used. 6
- (b) Draw to scale the output waveform of an integrator when a square waveform of

$\pm 2\text{ V}$  is applied to its input. Derive the formula used. 4

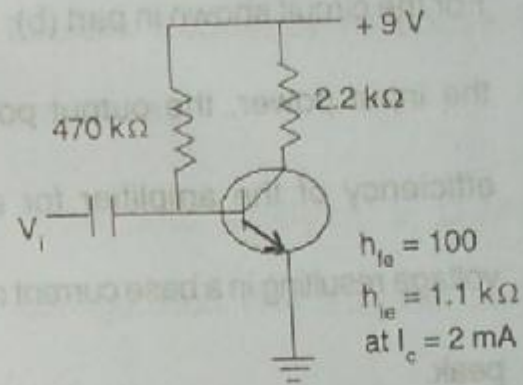
3. (a)



For the circuit shown above, draw the transfer characteristics. 6

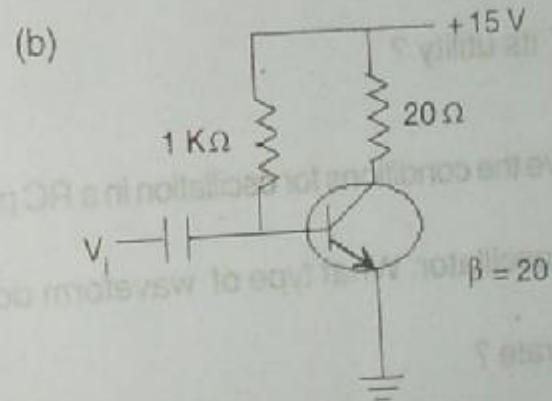
(b) For the circuit as shown in (a), find out  $V_G$ . Draw the d.c. load line. 4

4.



For the circuit shown above, determine  $Z_i$ ,  $Z_o$ ,  $A_v$  and  $A_i$  using the h-parameter model. Derive the formulae used. 10

5. (a) Derive the maximum efficiency of a series fed class A power amplifier. 5





For the circuit shown in part (b), calculate the input power, the output power and efficiency of the amplifier for an input voltage resulting in a base current of 10 mA peak. 5

6. (a) Explain square wave testing of an amplifier. What information does it provide? 6

(b) Explain a cascode configuration. What is its utility? 4

7. Derive the conditions for oscillation in a RC phase shift oscillator. What type of waveform does it generate? 10

8. (a) Explain frequency response of BJT amplifiers. 5

(b) Draw and analyze a D-MOSFET configuration. Why is it called so? 5