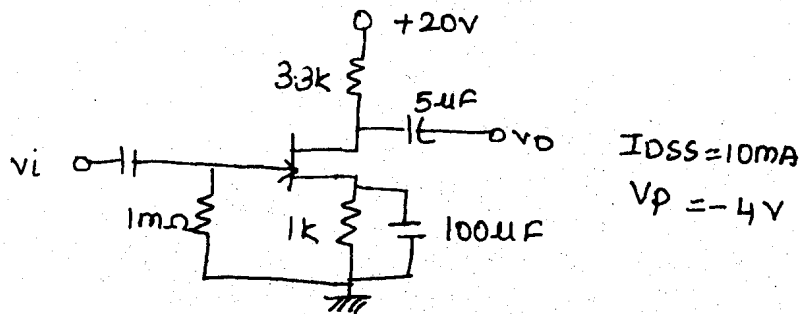
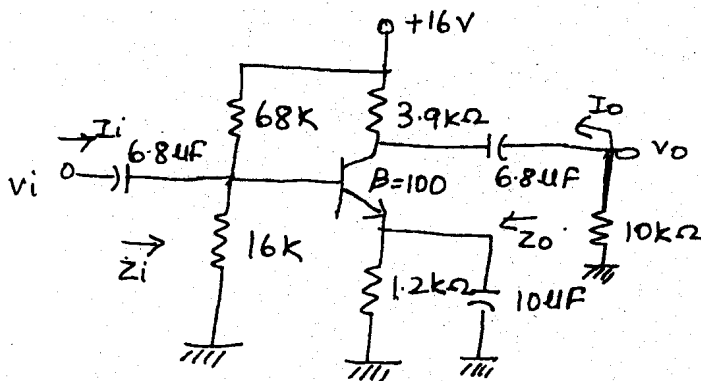


- N.B. : (1) Question No. 1 is compulsory.  
 (2) Answer any four out of remaining six questions.  
 (3) Assume any suitable data wherever required.

1. Answer the following questions :-
- Compare common base, common collector and common emitter BJT amplifier. 5
  - Derive the condition for zero temperature drift biasing of FET. 5
  - Draw the circuit diagram of voltage multiplier and explain its operation. 5
  - Explain Zener as Voltage Regulator. 5
2. (a) Draw the common emitter  $r_{\pi}$  equivalent circuit of the BJT transistor with RE unbypassed 10  
 and drive the expression for the following :-  
 (i) Input resistance  
 (ii) Output resistance  
 (iii) Voltage gain.
- (b) Derive the equations for  $A_v$ ,  $Z_i$ ,  $Z_o$  and determine  $A_v$ ,  $Z_i$  and  $Z_o$  for a given network. 10



3. (a) Draw a circuit diagram of a fullwave rectifier with C filter. Derive expression for ripple 10  
 factor and also explain the basic rectifier operation.
- (b) For the given circuit find :- 10
- Determine  $Z_i$ ,  $Z_o$  and  $A_v$  no load
  - $A_v$  with load
  - $A_f$



4. Design a single stage CS JFET amplifier using potential divider biasing for the following 20  
 specification :-

$$V_0 = 2V, f_L = 20 \text{ Hz}, I_D = 3.3 \pm 0.6 \text{ mA}$$

$$|A_v| = 11. \text{ Use BFW 11}$$

Calculate  $R_i$ ,  $R_o$  and  $V_0$  (max) for the designed amplifier.

5. Design a single stage CE amplifier for voltage gain  $A_v \geq 170$ ,  $V_0 = 6V$  rms, 20  
 $f_L = 20 \text{ Hz}$ ,  $S_{ICO} \geq 10$ .  
 Calculate  $Z_i$ ,  $Z_o$  and  $A_v$  for the designed circuit.  
 Use a suitable transistor from the data sheet.
6. (a) Explain construction, working principle and characteristic of E MOSFET. 10  
 (b) Compare L and C Filter. 5  
 (c) Compare MOSFET and FET. 5

7. Write a short note on the following :-

20

- (a) Schottky diode
  - (b) Diode clamping circuits : Working and waveforms.
  - (c) Temperature effects in MOSFET
  - (d) Transistor as a switch.
- 

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DBEC DATA SHEET

Transistor type	Pdmax @ 25°C Watts	Icmx @ 25°C Amps	Vce(sat) volts d.c.	Vce(sus) volts d.c.	Vce(sus) volts d.c.	Vce(sus) volts d.c.	Vce(sus) volts d.c.	Vbeo volts d.c.	Tj max °C	D.C. current		Signal typ.	h <sub>FE</sub> max.	V <sub>BE</sub> max.	θ <sub>JA</sub> °C/W	Derate above 25°C W/°C
										min	typ.					
055	115-5	15-0	1-1	60	70	90	7	200	20	50	70	50	120	1-8	1-5	0-7
055	50-0	5-0	1-0	50	55	60	5	200	25	50	100	75	125	1-5	3-5	0-4
149	30-0	4-0	1-0	50	—	—	8	150	30	50	110	60	115	1-2	4-0	0-3
100	5-0	0-7	0-6	70	65	—	6	200	50	90	280	90	280	0-9	35	0-05
7A	0-25	0-1	0-25	50	50	—	6	125	115	180	220	220	260	0-9	—	—
055(PNP)	0-25	0-5	0-25	85	—	—	—	100	35	—	65	45	—	—	—	—
7B	0-25	0-1	0-25	50	50	—	6	125	200	290	450	330	500	0-9	—	—

BFW 11—JFET MUTUAL CHARACTERISTICS

-V <sub>GS</sub> volts	I <sub>D</sub> max		I <sub>D</sub> typ.		I <sub>D</sub> min.		g <sub>fs</sub> (typical)		r <sub>ds</sub>		θ <sub>JA</sub>	
	0-0	0-2	0-4	0-6	0-8	1-0	1-2	1-6	2-0	2-4	2-5	3-0
I <sub>D</sub> max. mA	10	9-0	8-3	7-6	6-8	6-1	5-4	4-2	3-1	2-2	2-0	1-1
I <sub>D</sub> typ. mA	7-0	6-0	5-4	4-6	4-0	3-3	2-7	1-7	0-8	0-2	0-0	0-0
I <sub>D</sub> min. mA	4-0	3-0	2-2	1-6	1-0	0-5	0-0	0-0	0-0	0-0	0-0	0-0

Channel JFET

Type	V <sub>DS</sub> max. Volts	V <sub>GS</sub> max. Volts	P <sub>D</sub> max. @25°C	T <sub>J</sub> max.	I <sub>D</sub> max.	I <sub>D</sub> max. (typical)	-V <sub>GS</sub> , Volts	r <sub>ds</sub>	Derate above 25°C	θ <sub>JA</sub>
22	50	50	300 mW	175°C	2 mA	3000 μV	6	50 KΩ	2 mW/°C	0-59°C/mW
11 (typical)	30	30	300 mW	200°C	7 mA	5600 μV	2-5	50 KΩ	—	0-59°C/mW