JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT TEST -3 EXAMINATION- 2023

B.Tech-III Semester (ECE)

COUR	SE CODE (CREDITS): 18B11EC313 (4)	MAX. MARKS: 35
COUR	SE NAME: ELECTRONIC DEVICES AND CIRCUITS	
COUR	SE INSTRUCTORS: Dr. Shruti Jain	MAX. TIME: 2 Hours
(b)Mar (c) The	(a)All questions are compulsory. ks are indicated against each question in square brackets. candidate is allowed to make Suitable numeric assumptions w problems	
	Section A (Short Answers : $1 \times 5 = 5$ man	Ks)
1.		
i. ii. iii. iv.	The transconductance of a junction FET can be expressed as JFET is acontrolled device withinput imped The location of Q-point on the dc load line of an FET is at	point.
V.	In a class A amplifier the current flows through output circuit for _	
	Section B (Long Answers: $6 \times 5 = 30 \text{ mas}$	rks)
2. Sita	a is studying Bipolar Junction Transistor (BJT), Help her in answering	following questions:
i. 	Which transistor current is always largest and smallest?	
ii.	Which two currents are relatively close in magnitude	
iii. :	Why is collector region of BJT larger than emitter and base regions	s?
iv.	Mention the biasing of emitter base and collector base juncti	ons in different modes of
v.	transistor operation What is the significance of arrow in the transistor symbol?	[5, CO2]
3. Det	ermine the collector current and collector to emitter voltage for	[2.5.1.2.5.000]
i.	Fig.1. Assume $V_{\rm BE} = 0.65 \text{V}$ and $\beta = 60$.	[2.5 + 2.5, CO3]
ii.	Fig 2. Assume $V_{\rm BE} = 0.7 \rm V$ and $\beta = 75$.	
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4. ii.	Why are amplifiers connected in cascade? Which transistor configured for cascade amplifier?	[5, CO6] guration is most commonly
	used for cascade amplifier?	
iii.		fication?
. 111.	Why coupling capacitor in RC coupled amplifier is known as blo	ocking capacitor? With the
iv.	help of diagram show all capacitor with their names.	
17.	Draw the frequency response of cascade amplifier and mark the different party of the hardwidth with the half of the	fferent frequencies. How to
v.	evaluate bandwidth with the help of frequency response?	
γ.	What is the difference between RC coupled and direct coupled amn	lifier?

5.

6.

- Determine the value of drain current, gate to source voltage and drain to ground voltage i. (shown in Fig 3), when $I_{DSS} = 5 \text{mA}$, $V_P = -6 \text{V}$, $R_D = 1000 \Omega$, $R_S = 1500 \Omega$, $R_1 = 500 \text{k}\Omega$, $R_2 = 1$ $M\Omega$ and $V_{DD} = 15$ V.
- In an n-channel JFET biased by potential divider method (shown in Fig 4), it is desired to set ii. the operating point at $I_D = 2.5 \text{mA}$ and $V_{DS} = 8 \text{V}$. If $V_{DD} = 30 \text{ V}$, $R_1 = 1 \text{M}\Omega$, and $R_2 = 500 \text{k}\Omega$, $I_{\rm DSS}$ = 10M Ω , and $V_{\rm GS \, (off)}$ = -5V. Find the value of $R_{\rm S}$.

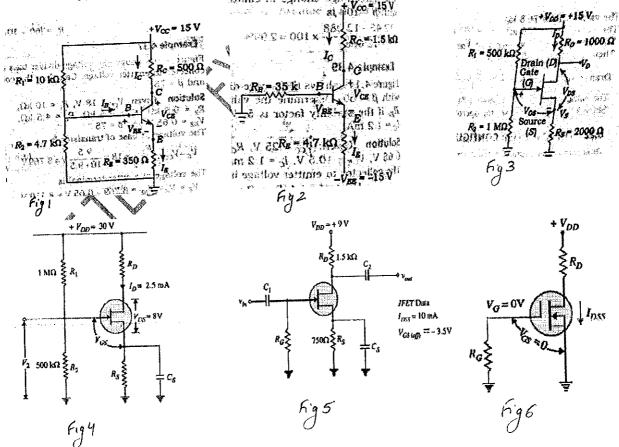
[2.5 + 1.5 + 1/CQ4]

1.5, CO5]

- Describe the construction and working principle of an N-channel JFET with diagrams. Draw i. the device characteristics. Write the Schokley equation.
- Prove that transconductance of FET is a function of gate to source voltage. ii.
- Define the drain resistance, amplification factor and transconductance of FET. Derive the iii. relationship between three.

7.

- For the JFET amplifier circuit as shown in Fig 5, calculate voltage gain with (i) $R_{\rm S}$ bypassed i. by a capacitor, (ii) R_S unbypassed. Assume $I_D = 2.3 \text{ mA}$
- Determine the drain to source voltage in the circuit shown in Fig 6 if $V_{\rm DD} = 18 \text{V}$, $R_{\rm D} = 620 \Omega$, ii. $V_{\rm GS \, (off)}$ = -8V, and $I_{\rm DSS}$ = 12mA.
- For a certain FET, $V_{GS \text{ (off)}} = -8V$, and $I_{DSS} = 10\text{mA}$ iii.
 - a) Is this an n-channel or p-channel.
 - b) Calculate I_D at $V_{GS} = -3V$.



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