QP Code: RD21BTECH055 | Reg. No | | | | | | | | | | | AR 21

GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Third Semester - Regular) Examinations, December – 2022

21BECPC23001 – Analog Electronic Circuits

(ECE)

Time: 3 hrs | Maximum: 70 Marks

Answer ALL questions

(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** questions		CO #	Blooms Level
a.	Why BJT is a current-controlled device whereas FET is a voltage-controlled device?	CO-1	K1
b.	Determine the value of g_m of JFET.	CO-2	K3
c.	What do you mean by slew rate of an OPAMP?	CO-1	K1
d.	Neatly sketch and label DC load line of an Emitter stabilized bias circuit with Vcc = 12V, RC = 1.5 KΩ, RE = 1.8 KΩ, RB = 82 KΩ.	CO-2	K2
e.	Draw the drain and transfer V-I characteristic of N-Channel JFET.	CO-3	K1

PART – B **(15 x 4 = 60 Marks)**

Answer ***ALL*** the questions		Marks	CO #	Blooms Level
2. a.	Define biasing of BJT and explain need for biasing.	8	CO-1	K1
b.	For a Emitter Stabilized bias circuit with VCC = 16V, RB = 470 KΩ, RC = 2.7 KΩ, β = 90.Determine: i) $S_{(ICO)}$ ii) $S_{(VBE)}$ iii) $S(\beta)$ using β (T1) as specified in the diagram and β (T2) as 25% more. iv) Determine the net change in I_C if a change in operating conditions results in I_{CO} increasing from 0.2 to 10 V_{BE} drops from 0.7 to 0.5 V, and increases 25%.	7	CO-1	K2
	(OR)			
c.	Draw the circuit of voltage divider bias. Take the circuit parameter as, V_{CC} = 10V, R_2 = 17KΩ, R_1 = 83KΩ, R_C = 2KΩ, R_E = 0.5KΩ, find I_B, I_C, V_{CE}, V_C, V_E. The transistor has β=100 and V_{BE} = 0.7V.	8	CO-3	K2
d.	Explain the self-biasing of a JFET.	7	CO-3	K2
3.a.	Show that the trans-conductance g_m of a JFET is related to the drain current I_{DS} given by $g_m = \frac{2}{\lvert V_P \rvert}\sqrt{I_{DSS} I_{DS}}$ where the symbols have their usual meanings	8	CO-2	K3
b.	Determine the following for the voltage divider biasing of JFET (i) *IDQ* and *VGSQ*. (ii) *VD*. (iii) *VS*. (iv) *VDS*. If R_1 = 2.1MΩ, R_2 = 270KΩ, R_D = 2.4 KΩ, R_S = 1.5 KΩ, I_{DSS} = 8mA, V_P = - 4V.	7	CO-2	K1
	(OR)			
c.	Draw an emitter follower circuit. Draw its r_e equivalent circuit. Derive its voltage gain.	8	CO-1	K2
d.	Draw the ac equivalent circuit for self-bias configuration V_{GS} = 2.6 V and I_D = 2.6 mA, with I_{DSS} = 8 mA and V_P = 6 V. (i) Determine g_m. (ii) Find Zi (iii) Calculate Zo. (iv) Calculate Av.	7	CO-3	K1
4.a.	Design a OPAMP based analog circuits which will give an output voltage, Vo = 0.5 V1 – 2 V2 + 0.25 V3, where V1, V2 and V3 are three input voltages.	8	CO-2	K1
b.	Write short notes on integrator and differentiator using Op-Amp.	7	CO-3	K1

(OR)

c.	Derive the conditions of oscillation in a Wein-bridge oscillator.	8	CO-1	K1
d.	Derive the conditions for oscillation in a RC phase shift oscillator. What type of waveform does it generate?	7	CO-1	K1
5.a.	List the characteristics of an ideal op-amp. Draw the equivalent circuit diagram.	8	CO-1	K2
b.	Derive an expression for the voltage gain of an instrumentation amplifier. What are its applications?	7	CO-2	K1

(OR)

c.	Explain the concept of negative feedback. Also derive a term for gain with feedback.	8	CO-3	K2
d.	Draw a neat circuit diagram of push pull class B amplifier. Explain its working	7	CO-2	K1

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