BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: BTECH/IMSC **SEMESTER : II/ADD**
BRANCH: BT/CHEMICAL/CIVIL/ME/PIE/FT/PHYSICS **SESSION : SP/2025**

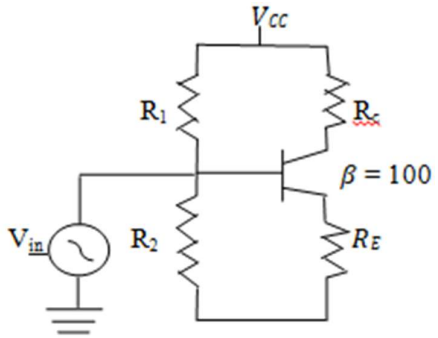
SUBJECT: EC24101 BASIC ELECTRONICS / EC101 BASICS OF ELECTRONICS & COMMUNICATION ENGG.

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:

1. **The question paper contains 5 questions each of 10 marks and total 50 marks.**
2. **Attempt all questions.**
3. **The missing data, if any, may be assumed suitably.**
4. **Before attempting the question paper, be sure that you have got the correct question paper.**
5. **Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.**

			CO	BL
Q.1(a)	Describe the working principle of a Zener diode as a voltage regulator. Sketch the circuit diagram and explain its operation in breakdown region.	[5]	CO1, CO2	1,3
Q.1(b)	Design a Zener diode regulator circuit converting 12V DC to 5V with a 2W Zener diode and 1kΩ load resistance. Calculate the maximum current flowing through the Zener diode, Rs and I_L .	[5]	CO1, CO2	3
Q.2(a)	With suitable diagram h-model for CE configuration. Justify the units of h-parameters of h_{ie}, h_{fe}, h_{oe}, h_{re}?	[5]	CO2, C03	4,3
Q.2(b)	In a voltage divider biasing circuit, V_{CC}=12V, R_1=100 $k\Omega$, R_2 = 25$k\Omega$, R_C = 2.2 $k\Omega$, R_E = 1 $k\Omega$, β = 100.Calculate the base voltage (V_B), emitter voltage (V_E), and collector voltage (V_C).	[5]	CO1, CO3	3



Q.3(a)	Briefly describe the pinch-off voltage's significance and the transfer properties of an n-channel JFET.	[5]	CO2, C03	2,3
Q.3(b)	An n-channel JFET has I_{DSS} = 4mA, V_P = −2V. Evaluate V_{GS} for I_D = 1 mA.	[5]	C04	4
Q.4(a)	Discuss operational amplifier (op-amp) parameters and list the ideal characteristics of an operational amplifier.	[5]	CO2, C03	2,3
Q.4(b)	Describe the working of an op-amp-based integrator circuit with a suitable circuit diagram. Derive the output voltage of an ideal integrator for a constant DC input.	[5]	CO2, C03	4,3
Q.5(a)	Simplify the Boolean expression XY'Z+ YZ+X'Z+X'Y.	[5]		
Q.5(b)	Explain the working of a full adder circuit with the help of a truth table, logic diagram, and Boolean expressions.	[5]		

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