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

CLASS: BE/IMSC **SEMESTER: II**
BRANCH: BT/CHEMICAL/CP&P/CIVIL/MECH/PROD/FT/PHYSICS **SESSION: SP/2020**

SUBJECT: EC101 BASIC ELECTRONICS & COMMUNICATION ENGINEERING

TIME: 2 HOURS **FULL MARKS: 25**

INSTRUCTIONS:
1. The total marks of the questions are 25.
2. Candidates may attempt for all 25 marks.
3. Before attempting the question paper, be sure that you have got the correct question paper.
4. The missing data, if any, may be assumed suitably.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

				CO	BL
Q1	(a)	Explain the Intrinsic & Extrinsic Semiconductor with suitable examples.	[2]	CO1	L2
Q1	(b)	An abrupt *pn* junction in silicon has doping densities N_A =10^{18} atoms/cm^3 and N_D = 10^{19}/cm^3 atoms/cm^3. Calculate the junction built-in potential Ψ_o with intrinsic concentration of n_i= 1.5x10^{10} atoms/cm^3.	[3]	CO1	L3
Q2	(a)	An abrupt *pn* junction in silicon has doping densities N_A =10^{15} atoms/cm^3 and N_D = 10^{16} atoms/cm^3. Calculate the reverse bias voltage at depletion-layer depths (penetration in p-side) is 3.5μ and junction built-in potential Ψ_o =638 mV at 300ºK.	[2]	CO1	L3
Q2	(b)	Demonstrate the charge density, electric field and electrostatic potential with suitable energy diagram if abrupt PN junction in reverse bias. Show the use of diode if operate in avalanche region.	[3]	CO1	L3
Q3	(a)	Demonstrate the half wave and full wave rectifier and evaluate the DC voltage and current. Explain the need of filter after first stage of full wave rectifier.	[2]	CO1	L3& L2
Q3	(b)	In Figure1, the Zener voltage is 15V, the knee current is negligible and the Zener resistance is 30Ω. If the input voltage (V_i) ranges from 40V to 50V, then calculate output voltage (Vout) ranges.	[3]	CO1	L3

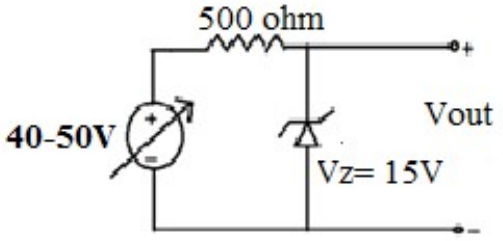

Fig.1.

Q4	(a)	Explain the working region of BJT. Show the relation between α, ß, and γ in common base, common emitter and common collector configuration.	[2]	CO2	L2&L3

Q4 (b) From Figure2 calculate the base current I_B, collector current I_C and collector base voltage V_{CB}. [3] CO2 L3

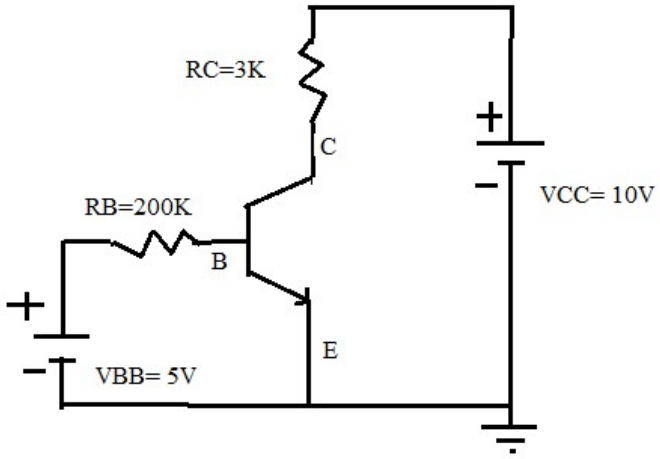

Fig.2

Q5 (a) Show the structure of JFET, channel formation, pinch Off and saturation voltage characteristics. [2] CO2 L2

Q5 (b) Prepare the fabrication view of NMOS transistor and also draw the I_{DS}(drain to source current)- V_{DS} (drain to source voltage) characteristics and explain the working region of transistors. [3] CO2 L2

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