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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST - 2 EXAMINATION – APRIL 2019

B.TECH IV SEMESTER (BT)

COURSE CODE: 15B11EC411 **MAX. MARKS: 25**

COURSE NAME: BASIC ELECTRONICS

COURSE CREDITS: 04 **MAX. TIME: 1Hr. 30Mts.**

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

1(a). In the circuit shown in Fig. 1(a), calculate the power supplied by the voltage source. [CO-1] 2

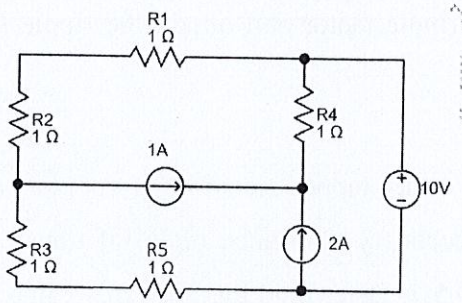

Fig. 1(a)

(b). Find current I and voltage across 4Ω resistor for Fig. 1(b). [CO-1] 2

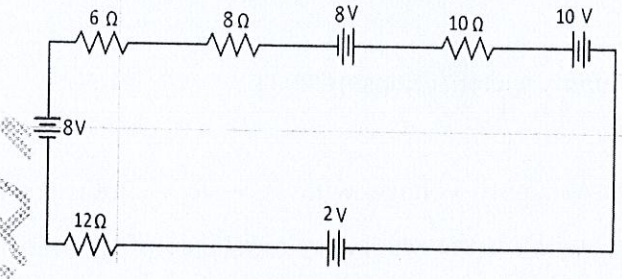

Fig. 1(b)

(c). An independent voltage source has an open circuit voltage of 48V and an internal resistance of 1.5Ω. Transform the voltage source into an equivalent current source and draw its equivalent circuit which supplies a load of 20Ω. [CO-1] 1

2(a). Consider a semiconductor doped with a donor density N_D and no acceptors. Let $n_i = 10^{10}/cm^3$ for the semiconductor. Determine the free electron and hole densities in equilibrium if N_D is $10^{12}/cm^3$. [CO-2] 2

(b). A current density of $10^3 A/cm^2$ flows through an n-germanium crystal which has resistivity of 0.05ohm-m. Calculate the time taken for electrons in the material to travel 50μm. Electron mobility in the material is $0.38 m^2/V\text{-}S$. Neglect diffusion. [CO-2] 2

3(a).	An ideal germanium p-n junction diode has at a temperature of 125 ^{0}C a reverse saturation current of 30μA. At a temperature of 125 ^{0}C, find the dynamic resistance for 0.02V bias in (i) the forward direction (ii) the reverse direction [CO-2]	2
(b).	(i). Define PIV (ii). What is the PIV for a full wave rectifier using ideal diodes? [CO-2]	2
4(a).	Sketch the circuit for a full wave rectifier using centre tapped transformer and explain its working with appropriate wave forms. [CO-4]	2
(b).	Derive the expression for ripple factor and obtain the ripple factor for half wave and full wave rectifier. [CO-4]	1
(c).	A full wave rectifier with centre tapped transformer supplies a d-c current of 100mA to a load of R_L = 20Ω. The secondary resistance of R_s of transformer is 1Ω. Each diode has forward resistance R_F of 0.5Ω. Determine the (i). r.m.s value of the signal voltage (V_{rms}) across each half of the Secondary (ii) dc power (P_{dc}) supplied to the load (iii) PIV rating of each diode (iv) ac power (P_{ac}) input to the rectifier. [CO-4]	2
5(a)	List important power supply specifications. [CO-1]	2
(b)	Consider a 12-V 100mA supply voltage with $R_f + R_s$ = 20Ω, where R_f is the forward resistance of the diode and R_s is the secondary resistance of the transformer. Calculate the percentage regulation. [CO-1]	1
(c).	Draw the appropriate load voltage waveform V_0 in a full wave capacitor filtered rectifier and carry out approximate analysis. [CO-4]	2
6(a).	If the emitter current of a transistor is 8mA and I_B is 1/100 of I_C, determine the levels of I_C and I_B. [CO-2]	1
(b).	Which of the transistor currents is always the largest? Which is always the smallest? Which two currents are relatively close in magnitude? [CO-2]	1