Physics Sem-II ATKT Sept. 2016

D 21/9/2016

VCD F.Y. B.Sc.ATKT PHYSICS-I II- SEM 2016-17 75 MARKS 2 1/2HRS.

Note: i) All the questions are compulsory.

ii) Figures to the right indicate full marks.

iii) Use of non programmable calculator is allowed.

Q.1) A) Attempt any one. **[8 Marks]**

a) What is time constant of an L-R series circuit? Derive an expression for it by considering decay of current in an L-R circuit.

b) State superposition theorem .Illustrate it with suitable sample .State its Prerequisites.

Q.1) B) Attempt any one. **[7 Marks]**

a) State and explain maximum power transfer theorem.

b) Derive an expression for charging of capacitor in C-R series circuit.

Q. 1) C) Attempt any one. **[5 Marks]**

a) State Constant current source and explain in brief.

b) A capacitor of capacity 0.5 μF discharge through a resistance of 1 M Ω .Find the time taken for the charge to reduce to 50% of its initial value.

Q.2) A) Attempt any one. **[8 Marks]**

a) A sinusoidal voltage is applied across a series L-R combination .Calculate the expression for the current through the circuit.

b) What is an AC bridge? State its applications. Obtain the conditions required to balance an AC bridge.

Q.2) B) Attempt any one. **[7 Marks]**

a) Draw a parallel LCR circuit. Derive an expression for the resonance frequency.

b) Show how to measure the inductance of coil using Maxwell's inductance bridge.

Q.2) C) Attempt any one. **[5 Marks]**

a) An Ac source specified as V=220cos1000t, is connected across 500 Ω resistance. Calculate the rms emf and frequency of the source. Also calculate the rms current thought the circuit.

b) De sauty's capacitance bridge as C_1 =0.47 μF, R_2= 1200Ω and R_4 =800Ω.Find the value of the other capacitance when the bridge is balanced.

(P.T.O)

Q.3) A) Attempt any one. **[8 Marks]**

a) Define the current amplification factor for CE configuration and hence find its relation with current amplification factor in CB configuration.

b) What is ripple factor? Obtain the expression for full wave rectifier.

Q.3) B) Attempt any one. **[7 marks]**

a) Explain NAND and NOR gates with the help of their logic statements, logic symbol, truth table and logic diagram.

b) Explain the input output characteristics of CB configuration. State the conclusion drawn from them.

Q.3) C) Attempt any one. **[5 marks]**

a) What is EX-OR gate? What is the difference between inclusive OR gate and exclusive OR gate?

b) A 400 mW zener diode with breakdown voltage 5V as negligible resistance .Find the maximum current its can carry. What is the current limiting resistor for this zener to carry maximum current if the supply voltage is 15 V?

Q.4) Attempt any three. **[15 Marks]**

a) State the following theorems

i) Thevenin's Theorem

ii) Norton's Theorem

b) An inductance of 4 Henry and a resistance of 1 Ω are connected in series with a dc source of 6V emf. Calculate the current in the circuit 4 sec after it is switched on.

c) In a series LCR circuit, L=400 μH, R = 10Ω and C= 25μF .Find the resonant frequency for the circuit .Also, Find the Q –factor at resonance.

d) A Wein's bridge circuit has the following component value R_1= 1KΩ, R_2= 2 KΩ, C_1= 0.1 μF, C_2= 0.2 μF, R_4=1 KΩ. Find the value of R_3 and frequency of the applied voltage required to balance the bridge.

e) Proof that: $A + \bar{A}B + AB = A + B$

f) Calculate the emitter current in CE , transistor configuration for which β=100 and I_B= 25μA . Hence calculate α.

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