

BSC (PART – I) EXAMINATION, 2014

PHYSICS

Paper Third : Circuit Fundamentals and Basic Electronics

Note : Attempt all Sections as per instructions.

Section – A (Very Short Answer Type Questions)

Attempt all parts. Give answer of each part in about 50 words.

1 × 10 = 10

1. (i) Explain the nature of current in C-Z circuit during charging and discharging of condensers.
- (ii) Write about the biasing of a semiconductor junction diode.
- (iii) What is a rectifier?
- (iv) Differentiate between an amplifier and an oscillator.
- (v) State Kirchhoff's law.
- (vi) What do you mean by ' α ' and ' β ' in a transistor and give the relation between them.
- (vii)
- (viii) Write the Barkhausen criterion for sustained oscillator?
- (ix) Write the basic requirements of an oscillator.
- (x) What are L-section and π -section filters?

Section – B (Short Answer Type Questions)

Attempt all questions. Give answer of each question in about 200 words.

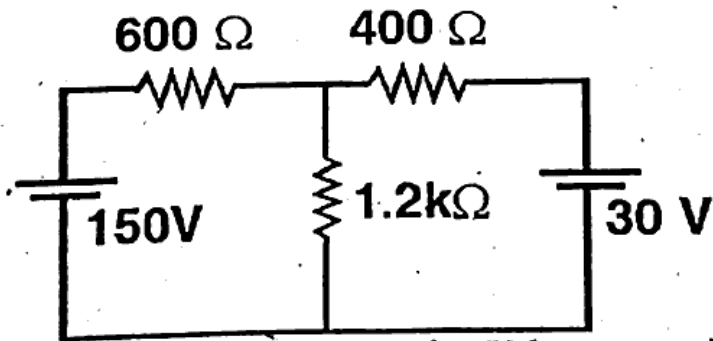
5 × 5 = 25

2. Describe Wein's bridge theory for the measurement of capacitance. Discuss how the power factor of the capacitor is determined by this bridge. Or
State and prove Norton's Network theorem.
3. What do you understand by Zener breakdown? Draw its characteristic diagram. Or
Explain the working of P-N junction diode under forward and reverse biasing.
4. What is transistor? Explain transistor action. Define α and β Parameters of transistor and show that :

$$\beta = \frac{\alpha}{1 - \alpha}$$

or

For the circuit, calculate the voltage across load resistance R_L (1.2k Ω) using super position theorem.



5. Explain amplitude modulation. Derive Voltage equation of an AM Wave. Or Show that the conductivity of a semiconductor increases with the rise in temperature.
6. Explain R-C coupled amplifier and draw its circuit diagram. Or Describe the action of PNP Transistor as an amplifier.

Section – C (Long Answer Type Questions)

Attempt any two questions. Give answer of each question in about 500 words.

$7 \frac{1}{2} \times 2 = 15$

7. What is an Oscillator? Give the circuit diagram of Hartley Oscillator. Explain its Working. Obtain the condition for sustained oscillation.
8. Define rectification. What are half and full wave rectifier? Explain its working with circuit diagram.
9. Differentiate between PNP and NPN transistor. Draw and explain circuit diagram for static characteristics of a common emitter transistor.
10. What do you mean by detection? Explain the function of diode detector for AM Wave.
11. Draw the circuit of a two stage R-C coupled amplifier (CE) and Sketch its frequency response curve. What factors affect the gain at the amplifier at low frequency and Why?

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