NEW

Part II 3-Tier

2015

ELECTRONICS

(Honours)

PAPER—VA

(PRACTICAL)

Full Marks : 50

Time : 3 Hours

The figures in the right-hand margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary

Answer any *one* question.

Group—A

(*Electrical*)

1. Determination of self inductance of a coil by Anderson's bridge :

(a) Theory and circuit diagram. 3+4

(b) Circuit implementation. 3

(c) Data for measurement of resistance of the coil (d.c. balance). 6

(d) Data for measurement of self inductance of the coil (a.c. balance) for three capacitors. 12

(e) Drawing of r *vs.* $\frac{1}{C}$ graph. 3

(f) Calculation of self inductance. 4

2. Drawing of e-t curve, determination of thermoelectric power of a thermocouple and measurement of unknown temperature using it :

(a) Theory and circuit diagram. 3+3

(b) Calculation of the resistance connected in series with the potentiometer. 2

(c) (Resistance of the potentiometer is to be suppled). Circuit implementation. 2

(d) Data for thermo emf at five different temperatures of hot junction between 50°C and 90°C. (The cold junction is to be kept in melting ice). 13

(e) Data for unknown temperature (specified by the examiner). 3

(f) Drawing of e-t curve. 4

(g) Determination of thermoelectric power at a temperature mentioned by the examiner. 3

(h) Determination of unknown temperature. 2

3. Verification of Norton's Theorem by using a resistive Wheatstone bridge network :

(a) Theory and circuit diagram. 3+4

(b) Circuit implementation. 2

(c) Measurement of load voltage (V_L) and load current (I_L) for 8 different load resistances. 8

(d) To plot I_L against V_L and to find I_N and R_N from the plot. 4+2

(e) Measurement of I_N and R_N from direct experiment and to compare these values with those obtained in (d). 2+2+1

(f) To calculate the power (P_L) dissipated in the load (R_L) and to draw a graph between P_L and R_L. 3+4

4. Verification of Thevnin's Theorem by using a resistive Wheatstone bridge network :

(a) Theory and circuit diagram. 3+3

(b) Circuit implementation. 2

(c) Data for load voltage (V_L) *vs.* load current (I_L) graph for 8 different load resistances. 8

(d) To plot I_L against V_L and to find I_{Th} and R_{Th} from the plot. 4+2

(e) Measurement of I_{Th} and R_{Th} from direct experiment and to compare these values with those obtained in (d). 2+2+1

(f) To calculate the power (P_L) dissipated in the load (R_L) and to draw a graph between P_L and R_L and to make comment on the graph. 3+4+1

5. Measurement of magnetic flux density between two pole pieces of an electromagnet by a search coil, a ballistic galvanometer and a standard solenoid (constants of search coil and standard solenoid will be supplied) :

(a) Theory and circuit diagram. 3+3

(b) Circuit implementation. 3

(c) Data for I-d graph (three readings). 3

(d) Drawing of I-d graph. 3

(e) Ballistic throws for six different magnetizing currents of the electromagnet. 12

(f) Calculation of B. 4

(g) Drawing I-B graph. 4

6. To draw the resonance curve of a series L-C-R circuit, find the Q-factor of the circuit and to draw Drawing Z_L-f and $1/Z_c$-f curves :

(a) Theory and circuit diagram. 3+2

(b) Circuit implementation. 2

(c) Readings of V_R, V_L and V_C at different frequencies : (data for I – f, Z_L – f and $1/Z_C$ – f curves). 15

(d) Drawing resonance curve (I – f curve). 4

(e) Calculation of Q factor from resonance curve. 3

(f) Drawing Z_L – f and $1/Z_C$ – f curves. 3+3

Marks distribution

1. Experiment (*Group A*) : 35 Marks
2. Laboratory Note Book : 05 Marks
3. Viva-voce : 10 Marks

Total : 50 Marks

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Answer any *one* question.

Group—B

(*Solid State Devices and Circuits*)

1. Study of a P-N junction diode :

(a) Theory and circuit diagram. 3+2

(b) Circuit implementation on a bread board. 2

(c) Data for forward bias characteristic of the diode. 5

(d) Drawing forward bias characteristic curve. 4

(e) Determination of cut-in voltage, static resistance and dynamic resistance from the graph. 2+3+3

(f) Drawing lnI *vs.* V graph. 5

(g) Determination of reverse saturation current and ideality factor from lnI *vs.* V graph. 3+3

2. Use of diodes in half wave rectifier circuit and bridge rectifier circuit :

(a) Working formula for ripple factor. 2

(b) Circuit diagrams of half wave and bridge rectifier circuits. 2+3

(c) Implementation of the circuits on bread board. 2+2

(d) With a suitable input A.C. signal, displaying the output waveforms from half wave and bridge rectifier circuits in a CRO monitor (to be verified by the examiner). 3+3

(e) Determination of ripple factors of the outputs of half wave and bridge rectifiers with the help of A.C. and D.C. voltmeters. 3+3

(f) Determination of ripple factors of the outputs of half wave and bridge rectifiers with the help of A.C. and D.C. voltmeters with a single capacitor filter in each case. 3+3

(g) Comparison of the results of (d) to those of (e) with proper explanation. 3+3

3. Study of Zener diode :

(a) Theory. 3

(b) Circuit diagram and implementation of circuit on bread board for reverse bias characteristics, load regulation and line regulation. 2+2+2

(c) Data for reverse bias characteristic of the Zener diode. 3

(d) Drawing reverse bias characteristic curve. 3

(e) Determination of breakdown voltage from reverse bias characteristic curve. 2

(f) Data for Load regulation and Line regulation characteristics. 3+3

(g) Drawing Load regulation and Line regulation characteristics. 3+3

(h) Calculation of % of regulation for Load and Line regulations. 3+3

4. To construct a regulated power supply with a power transistor as pass element and an OPAMP as comparator :

(a) Working formula and circuit diagram. 3+4

(b) Calculation of components. 6

(c) Circuit implementation on bread board (to be verified by the examiner). 6

(d) Data for Load regulation and Line regulation characteristics. 5+5

(e) Drawing Load regulation and Line regulation characteristics. 3+3

5. To determine the hybrid parameters of an n-p-n transistor using D.C. and A.C. sources :

(a) Theory and circuit diagram for static output characteristics in CE configuration. 2+3

(b) Circuit implementation for static output characteristics. 2

(c) Data for output characteristics with specified base currents. 6

(d) Drawing output characteristics. 6

(e) Determination of from h_{fe} and h_{oe} from output and input characteristics. 2+2

(f) Theory and circuit diagram for determination of h_{fe} and h_{oe} with A.C. source. 2+3

(g) Circuit implementation. 3

(h) Determination of h_{fe} and h_{oe}. 2+2

6. To draw the characteristics of photo electric cell and to determine the stopping potential of the material of the cathode (for lights of three given frequencies of the incident light) :

(a) Theory and circuit diagram. 3+2

(b) Circuit implementation. 2

(c) Photo current *vs.* voltage data with intensity as a parameter for three given wavelengths of incident light (for three intensities with each colour → total 3×3 = 9 curves). 16

(d) Drawing photo current *vs.* voltage curves with intensity as a parameter for three given wavelengths of incident light (for three intensities with each colour → total 3×3 = 9 curves). 9

(e) Determination of stopping potentials for the three given wavelengths. 3

Marks distribution

1. Experiment (*Group B*)	:	35 Marks
2. Laboratory Note Book	:	05 Marks
3. Viva-voce	:	10 Marks
Total	:	50 Marks