10. (a) Applying Maxwell velocity distribution laws. Evaluate the number of molecule whose velocity lies between u and u+du in :

(i) Spherical-Polar coordinate system

(ii) Momemtum space.

5+5=10

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UG Odd Semester Examination, 2022

EDUCATION B.Sc. B.Ed

(7th Semester)

Course No.: BSPH-701

(Electronics & Statistical Mechanics)

Full Marks: 50

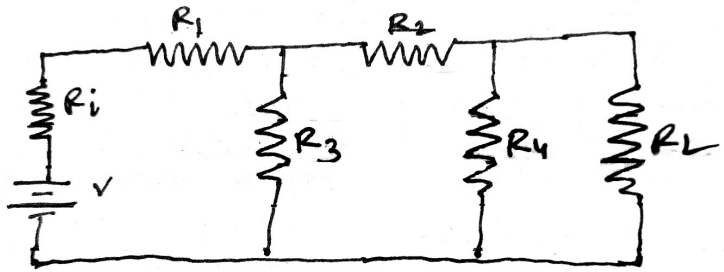
Pass Marks: 20

Time: 2 hours

The figures in the right margin indicate full marks for the question.

Answer the following five (5) questions

1. A votage source 'V' with internal resistance 'R_i' is connected with resistances R_1, R_2, R_3, R_4 and R_2 as shown in figure.



(a) Evaluate the expression for current flowing through load resistance R_L applying both Thevening and Norton theorem. 8+2=10

(b) Derive the condition for maximum power transfer to load resistance R_L.

Hence calculate en expression for maximum power transferred to R_L.

Or

2. (a) Considering the circuit diagram of question number 1, justify the statement of 'reciprocity theorem. 6+2x2=10

(b) Write short notes on :

(i) Shunt capacitor filter

(ii) L-Section and II-Section

3. Derive the expressions for the followings ponameters considering the h-parameters equivalent circuit of common emitter transister amplifier. 2.5x4=10

(i) Current gain

(ii) Voltage gain

(iii) Output impedence

(iv) Input inpedence

Or

4. (a) Write short notes on ac and dc load line.

(b) Describe the operating point of class A, B, AB amplifiers.

(c) Describe the frequency response of two stage R-C coupled C-E amplifier. 3+3+4=10

5. (a) Write short notes on Tank circuit.

(b) Ina Hartley oscillator, the tank circuit has two inductances 60 mtt and 20 mtt. Frequency of oscillation is $2x10^4$HZ. Neglecting the mutual inductance of tank coil, evaluate the value of capacitor.

(c) Write short notes on : Bankhausen Criteria

2+6+2=10

Or

6. (a) Describe with circuit diagram phone shift R-C oscillator. 7+3=10

(b) Explain the working mechanism of heterodyne radio receiver.

7. (a) Write short notes on CMRR.

(b) Describe the working mechanism of an OPAMP as on inverters and non-inverting amplifier.

2+4x2=10

Or

8. Describe the working mechanism of an OP-AMP as on 3x2+4=10

(i) Integrator and differentiator

(ii) Subtractor

9. (a) Derive an expression for probility distribution function of a grand cannonical ensemble of a system.

(b) Derive the expression for probability distribution function of a cannonical ensemble of a system.

(c) Derive expressions for the following thermodynamic parameters in terms of pontition function. Consider, the system in obeying laws of cannonical ensemble :

(i) work done

(ii) entropy 3+3+2x2=10

Or