# B.E/B.TECH, M.E/M.TECH, MBA, MCA, POLYTECHNIC & SCHOOLS

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## Question Paper Code : 20209

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2022.

Second Semester

Aeronautical Engineering

BE 8253 – BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION ENGINEERING

(Common to Aerospace Engineering/Automobile Engineering/Industrial Engineering/Industrial Engineering and Management/Manufacturing Engineering/Marine Engineering/Material Science and Engineering/Mechanical Engineering/Mechanical Engineering (Sandwich)/Mechanical and Automation Engineering/Mechatronics Engineering/Production Engineering/Robotics and Automation)

(Regulations 2017)

Time : Three hours                           Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define Kirchoff's voltage and current law.

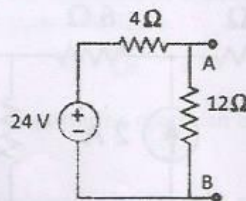2. Find the Norton's equivalent circuit for the circuit shown in Fig. 1.



Fig. 1

3. Find the RMS and average value of a pure sinusoidal signal with peak amplitude '$V_m$'.

4. What are the materials used for electric wiring?

5. Write the working principle of an electrical machine which is used for converting mechanical energy into electrical energy.

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6.    What are the types of single phase induction motor?

7.    Why collector region is made larger than base region in a transistor?

8.    List out the ideal characteristics of an operational amplifier.

9.    What are the types of transducers?

10.   Why CT secondary shall never be kept open?

PART B — (5 × 13 = 65 marks)

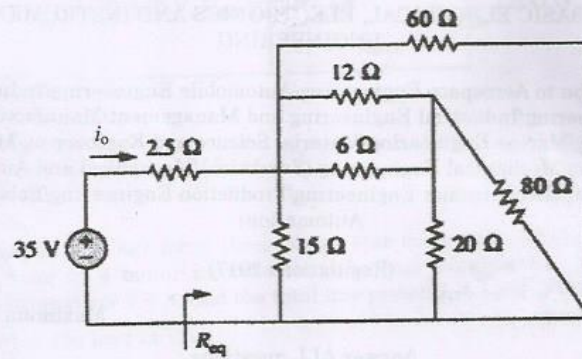11.   (a)   Find $R_{eq}$ and $i_0$ in the circuit shown in Fig. 2.



Fig. 2

Or

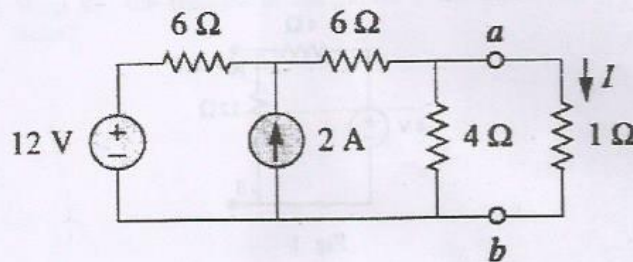(b)   Find 'I' using Thevenin's theorem for the circuit shown in Fig. 3



Fig. 3

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12. (a) Prove that two watt-meters are sufficient to measure power in a balanced three phase system with necessary equations and phasor diagram. Also derive the expression for power factor.

Or

(b) Determine the RMS value of the current waveform in Fig. 4. If the current is passed through a 2 Ω resistor; find the average power absorbed by the resistor.
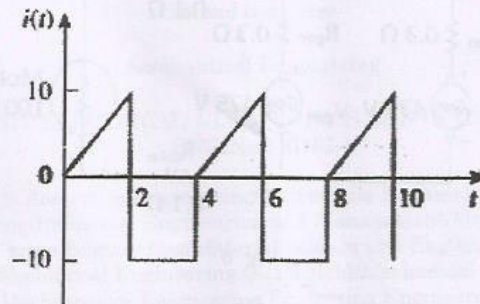


Fig. 4

13. (a) Explain in detail the constructional details and working principle of a DC motor.

Or

(b) With neat schematics explain the constructional details and working principle of a three phase induction motor.

14. (a) Explain in detail, the operation of a PN junction diode under forward biased and reverse biased condition.

Or

(b) Explain with neat diagram the operation of inverting amplifier and non-inverting amplifier.

15. (a) Explain the constructional details and working of an inductive type linear variable differential transformer (LVDT) transducer.

Or

(b) Explain the constructional details and working principle of a moving coil instrument.

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PART C — (1 × 15 = 15 marks)

16. (a) Calculate the amount of current drawn by the motor and the voltage measured across the motor's terminals, taking into account all the resistances shown in Fig. 5 (generator internal resistance $R_{gen}$, wiring resistance $R_{wire}$ and the motor's equivalent resistance) using superposition theorem.
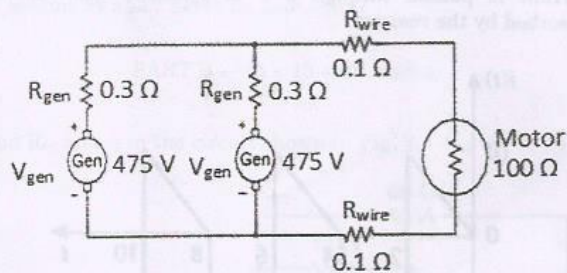


Fig. 5

Or

(b) Meter readings for a three phase star connected alternator supplying power to a motor indicate that the line voltages are 330 V, the line currents are 8.4 A, and the total line power is 4.5 kW. Find :

(i) the load in VA

(ii) the load power factor

(iii) the phase current

(iv) the phase voltage

(v) reactive power and the active power.

What are the changes in the values if the alternator is connected in delta?

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