| Question Paper Code | 13024 |

# B.E / B.Tech  DEGREE EXAMINATIONS, NOV / DEC 2024

Second Semester

## Civil Engineering

## 20ESEE202 - BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

Regulations - 2020

Duration: 3 Hours                                                    Max. Marks: 100

## PART - A (MCQ) (20 × 1 = 20 Marks)
### Answer ALL Questions

|  |  | Marks | K-Level | CO |
|---|---|---|---|---|
| 1. | If a resistor has 5.5V across it and 3mA flowing through it, calculate the power.<br>(a) 16.5mW          (b) 15mW          (c) 1.83mW          (d) 16.5W | 1 | K1 | CO1 |
| 2. | The nodal method of circuit analysis is based on<br>(a) KVL and Ohm's law          (b) KCL and Ohm's law<br>(c) KCL and KVL          (d) KCL, KVL and Ohm's law | 1 | K1 | CO1 |
| 3. | As per Maximum Power Transfer Theorem, when will a load resistance abstract maximum power from a power source?<br>(a) Load resistance is less than the internal resistance of the source.<br>(b) Load resistance is more than the internal resistance of the source.<br>(c) Load resistance has an infinite high resistance.<br>(d) Load resistance is equal to the internal resistance of the source. | 1 | K1 | CO1 |
| 4. | The instantaneous current in a circuit is given by $i = 4 \cos(\omega t + \theta)$ A. The RMS value of the current is_____<br>(a) $3\sqrt{3}$ A          (b) zero          (c) $4\sqrt{2}$ A          (d) $2\sqrt{2}$ A | 1 | K1 | CO2 |
| 5. | In delta connection, the relation between phase voltage ($V_p$) and line voltage ($V_L$) is _____<br>(a) $V_p = V_L$          (b) $V_p = \sqrt{3} V_L$          (c) $V_p = V_L/\sqrt{2}$          (d) $V_p = V_L/\sqrt{3}$ | 1 | K1 | CO2 |
| 6. | The phasor combination of resistive power and reactive power is called<br>(a) True power     (b) Apparent power     (c) Reactive power     (d) Average power | 1 | K1 | CO2 |
| 7. | The armature of DC motor is laminated to _____<br>(a) To reduce mass          (b) To reduce hysteresis loss<br>(c) To reduce eddy current loss          (d) To reduce inductance | 1 | K1 | CO3 |
| 8. | The efficiency of a distribution transformer is mainly depends on<br>(a) Core loss          (b) Copper loss          (c) Stray loss          (d) dielectric loss | 1 | K1 | CO3 |
| 9. | A single phase induction motor can rotate at a speed which is_____<br>(a) equal to the synchronous speed     (b) slightly greater than the synchronous speed<br>(c) twice of the synchronous speed     (d) slightly less than the synchronous speed | 1 | K1 | CO3 |
| 10. | For silicon diode, the value of the forward bias voltage typically<br>(a) Greater than 0.3V<br>(b) Greater than 0.7V<br>(c) depends on the width of the depletion region<br>(d) depends on the concentration of majority carriers | 1 | K1 | CO4 |
| 11. | Conventional flow of current in a P-N-P transistor is from _____<br>(a) Emitter to Base   (b) Base to Emitter   (c) Base to Collector   (d) Emitter to Collector | 1 | K1 | CO4 |
| 12. | A Field effect transistor operates on<br>(a) Majority carriers only          (b) Minority carriers only<br>(c) Positively charged ions only          (d) Negatively charged ions only | 1 | K1 | CO4 |

*K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create*                    **13024**

13. The breaking torque provided by a permanent magnet in a single phase energy meter can be changed by　　*1　K1　CO5*
    (a) Providing a magnetic shunt and changing its position
    (b) Changing the distance of the permanent magnet from the centre of the revolving disc
    (c) Both a and b
    (d) None of the above.

14. The type of damping use for moving iron instruments is _____.　　*1　K1　CO5*
    (a) Air friction damping　　　　　　　(b) Fluid friction damping
    (c) Eddy current damping　　　　　　(d) Gravity friction damping

15. Two wattmeter methods is appropriate for measurement of three phasepower and is applicable for _____ loads of both balanced and unbalanced.　　*1　K1　CO5*
    (a) star as well as delta　　(b) only star　　(c) only delta　　(d) None of the above

16. The wattmeter reading while measuring the reactive power with wattmeter is　　*1　K1　CO5*
    (a) $V_L I_L sec\emptyset$　　　(b) $V_L I_L sin\emptyset$　　　(c) $V_L I_L tan\emptyset$　　　(d) $V_L I_L cos\emptyset$

17. Which of the following converts a physical parameter to an electrical signal?　　*1　K1　CO6*
    (a) Transformer　　　(b) Crystal　　　　　(c) Speaker　　　　(d)Transducer

18. Which of the following transducers are classified as passive transducers?　　*1　K1　CO6*
    1. LVDT
    2. Strain gauge
    3. Piezoelectric transducer
    4. Thermocouple
    5. Capacitive microphone
    Select the correct answer using the code given below:
    (a) Only 1, 2 and 4　　(b) Only 1, 2 and 3　　(c) Only 1, 2 and 5　　(d) 1, 2, 3, 4 and 5

19. Which of the following can be measured using tachometers?　　*1　K1　CO6*
    (a) Angular speed　　(b) Linear speed　　(c) Acceleration　　(d) Vibration

20. _____ describes current flow between two junctions formed by two different metals.　　*1　K1　CO6*
    (a) Peltier effect　　(b) Thomson effect　　(c) Seebeck effect　　(d) None of the mentioned

### PART - B (10 × 2 = 20 Marks)
#### Answer **ALL** Questions

21. Find the value of unknown resistance $R_2$ and total resistance in the circuit shown in Figure 21.　　*2　K1　CO1*
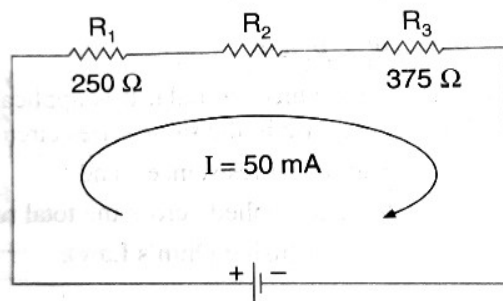


Figure 21

22. What is the circuit of a practical voltage source and its equivalent current source?　　*2　K1　CO1*

23. Choose the three-phase power expression in terms of phase values.　　*2　K1　CO2*

24. Infer the points to be considered for power factor improvement.　　*2　K2　CO2*

25. How transformers classified according to their construction?　　*2　K1　CO3*

26. Interpret why single phase induction motor is not self-starting.　　*2　K2　CO3*

27. Compare between the PN and Zener diode.　　*2　K2　CO4*

28. Name whether FET is a voltage (or) current controlled device.　　*2　K1　CO4*

| 29. | What is the use of copper shading bands? | 2 | K1 | CO5 |
| 30. | What is Hall effect? Mention the applications. | 2 | K1 | CO6 |

## PART - C (6 × 10 = 60 Marks)
### Answer ALL Questions

31. a) Identify the current in 5 Ω resistor in the circuit shown in Figure 31 (a)  10  K3  CO1
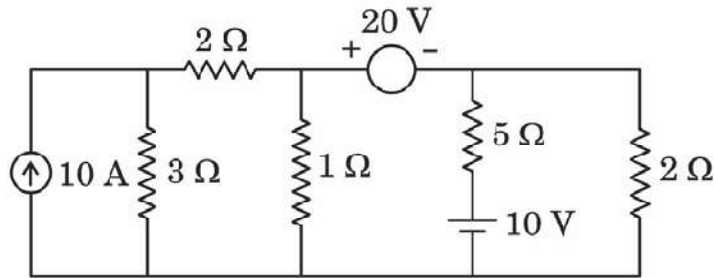


Figure 31 (a)

**OR**

b) For the circuit shown Figure 31((b),Identify  10  K3  CO1
   (i) The total resistance between terminals A and B,
   (ii) The total current drawn from a 6V source connected from A to B,
   (iii) The current through 4.7 kΩ and
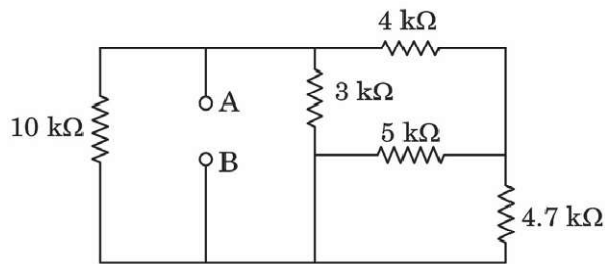   (iv) Voltage across 3 kΩ.



Figure 31 (b)

32. a) Summarize the details of RMS value of Sinusoidal waveform.  10  K2  CO2

**OR**

b) Outline a simple wiring layout for domestic house hold appliances with necessary electrical accessories and distribution power points.  10  K2  CO2

33. a) Explain the construction and working principle of DC Generator with Open circuit, Internal and External characteristics.  10  K2  CO3

**OR**

b) Illustrate the construction and working principle of single phase transformer and discuss the applications.  10  K2  CO3

34. a) Explain the construction and operation of forward and reverse biased PN junction diode and sketch the V-I characteristics.  10  K2  CO4

**OR**

b) i) Compare the features and characteristics of CE and CC transistor configurations.  5  K2  CO4

   ii) Interpret the concept and types of Operational amplifier.  5  K2  CO4

35. a) Summarize the concept and types of Indicating Instruments with neat sketch and mention the merits and its limitations.  10  K2  CO5

**OR**

b) i) Explain the three phase power measurement using two-wattmeter method.  5  K2  CO5

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ii) Compare the features and applications of Current and Potential transformer. *5 K2 CO5*

36. a) Explain the working principle of transducer and discuss the Resistive and Inductive transducer with examples. *10 K2 CO6*

**OR**

b) Outline the concept and applications of Piezoelectric and Photoelectric transducer. *10 K2 CO6*