DE-2922
First Year B. Sc. (Sem. I) Examination
March / April – 2016
Electronics : Paper - I
(Basic Electrical Circuits)

Time : 2 Hours] [Total Marks : 50
Instructions :

(1) Fill up strictly the details of signs on your answer book.

(2) There are total 28 questions in this question paper.

(3) Figure on the right indicates full marks

(4) All symbols and abbreviations have their usual meaning.

(5) Non-programmable calculators are allowed.

(6) Assume data if necessary.

Q. 1 to 12 Multiple choice questions : (1 mark)
Q. 13 to 22 Multiple Choice Questions : (2 marks)
Q. 23 to 28 Multiple Choice Questions : (3 marks)

O.M.R. Sheet भरवा अंगे-अंगे अनगत नी सूचनाओ आपेक्ष
O.M.R. Sheet-सी पहल भरे हे.
Important instructions to fill up O.M.R. Sheet
is given back side of provided O.M.R. Sheet.
1. According to Thevenin's theorem, any network with two open terminals can be replaced by a voltage source $V_{th}$ in ______ with a single resistance $R_{th}$.
   (A) series
   (B) parallel
   (C) short
   (D) open

2. The first goal to accomplish in analyzing a complex series-parallel circuit is to
   (A) equate all parallel components
   (B) equate all series components
   (C) solve for all the voltage drops
   (D) solve for the total current and resistance

3. _______ is a device whose resistance depends upon the quantity of light falling on its surface.
   (A) LDR
   (B) VDR
   (C) thermistor
   (D) LCD

4. Which one of the following is not the passive component?
   (A) resistor
   (B) inductor
   (C) capacitor
   (D) varactor diode
5 The distance that a signal's energy can travel in the time it takes for one cycle to occur is called the signal's:

(A) amplitude
(B) frequency
(C) wavelength
(D) period

6 In DPDT switch there are total _____ terminals.

(A) 2
(B) 3
(C) 6
(D) 9

7 Which type of test equipment is used to measure current?

(A) ohmmeter
(B) ammeter
(C) voltmeter
(D) wattmeter

8 As current travels within a conductor:

(A) the magnetic field aids the current
(B) a magnetic field is developed around it
(C) the wire tries to point north
(D) an electrostatic field opposes the current
9. Lead $Z_L$ for maximum power transfer is

(A) $R$
(B) $R + j\omega L$
(C) $R - j\omega L$
(D) None

10. _______ has one winding common with the primary and secondary.
    (A) Power transformer
    (B) Auto transformer
    (C) Audio transformer
    (D) Line transformer

11. ________ is often used to analyze multiple-source circuits.
    (A) Thevenin's theorem
    (B) Superposition
    (C) Kirchhoff's law
    (D) Ohm's law

12. Kirchhoff's voltage law is concerned with
    (A) IR drops
    (B) junction voltage
    (C) battery EMFs
    (D) both IR drops and junction voltage
13. A capacitor stores 0.15 C at 5 V. Its capacitance is
(A) 0.75 F
(B) 0.75 μF
(C) 0.03 F
(D) 0.03 μF

14. In a purely inductive circuit,
(A) current leads voltage by 90°
(B) voltage lags current by 90°
(C) voltage leads current by 90°
(D) voltage and current are in phase (0°)

15. What is the number of turns required in the secondary winding for a transformer when 120 volts is applied to a 2400-turn primary to produce 7.5 Vac at the secondary?
(A) 75 turns
(B) 150 turns
(C) 900 turns
(D) 1920 turns

16. What is the total inductance of a 5 H and a 100 mH coil connected in parallel?
(A) 4.76 mH
(B) 33.3 mH
(C) 98.0 mH
(D) 150.0 mH

17. What is the total inductance in the given circuit?
(A) 160 mH
(B) 300 mH
(C) 900 mH
(D) 1700 mH
18 The voltage across a coil when \( \frac{di}{dt} = 20 \text{ mA/s} \) and \( L = 8 \text{ H} \) is

(A) 16 mV
(B) 160 mV
(C) 1.6 mV
(D) 2.5 mV

19 If \( R_3 \) opens in the given circuit, the total resistance \( (R_T) \) between points A and B equals ________.

![Circuit Diagram]

(A) 900 \( \Omega \)
(B) 100 \( \Omega \)
(C) 110 \( \Omega \)
(D) infinite resistance

20 Reactance in an inductive circuit will:

(A) increase with frequency
(B) decrease with frequency
(C) be independent from frequency
(D) depend on the value of \( X_c \)

21 Kirchhoff's current law state that

(A) net current flow at the junction is positive
(B) algebraic sum of currents meeting at the junction is zero
(C) no current can leave the junction
(D) total sum of currents meeting at the junction is zero

22 For \( p = \frac{V^2}{R} \), a decrease in resistance should produce:

(A) a decrease in power
(B) an increase in ohms
(C) an increase in power
(D) a decrease in current
23. A 33 kΩ resistor with a 20% tolerance checks out as ok with which of the following ohmmeter readings?

(A) 26400 ohms
(B) 24183 ohms
(C) 6600 ohms
(D) 39970 ohms

24. How many amps are used by a 100 watt, 120 volt light bulb?

(A) 1.2 amps
(B) 12000 amps
(C) 830 mA
(D) 12 amps

25. How many ohms of resistance allow a current of 720 µA to flow when 3.6 kV is applied?

(A) 200 nΩ
(B) 5 kΩ
(C) 200 kΩ
(D) 5 MΩ
26 Two similar coils have self inductance of 1 mH each. Coefficient of coupling is 0.5. The mutual inductance $M$ is

(A) 0.25 mH  
(B) 0.5 mH  
(C) 0.707 mH  
(D) 1 mH

27 With 21 V applied, if $R_1 = 5$ ohms, $R_2 = 35$ ohms, and $R_3 = 14$ ohms, what is the current of $R_2$ if $R_1$ is series connected with parallel circuit $R_2$ and $R_3$?

(A) 200 mA  
(B) 800 mA  
(C) 600 mA  
(D) 400 mA

28 The Thevenin's equivalent of network in figure(1) is a 10 V source in series with 2$\Omega$ resistance. If a 3$\Omega$ resistance is connected across AB as shown in figure(2) the Thevenin's equivalent is

(A) 10 V in series with 1.2 $\Omega$ resistance  
(B) 6 V in series with 1.2 $\Omega$ resistance  
(C) 10 V in series with 5 $\Omega$ resistance  
(D) 6 V in series with 5 $\Omega$ resistance