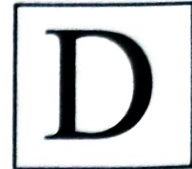


DO NOT OPEN THIS TEST BOOKLET TILL YOU ARE ASKED TO DO SO.

TR/TES/E-II/DIP/16

Test Booklet Series

TEST BOOKLET
ELECTRICAL ENGINEERING PAPER – II
(DIPLOMA)



(Signature of the Candidate)

(Invigilator's Signature)

Time Allowed–3 hours (Three hours)

Maximum Marks–200

I N S T R U C T I O N S

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET DOES NOT HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS ETC. IF SO, GET IT REPLACED BY A TEST BOOKLET OF SAME SERIES.
2. ENCODE CLEARLY THE TEST BOOKLET SERIES IN THE APPROPRIATE PLACE IN THE ANSWER SHEET BY BLACK BALL POINT PEN ONLY.
3. This Test Booklet is divided into three sections, i.e Section - A, Section - B & Section - C.
 - (A) **Section -A (MCQ pattern)** contains 40 items (questions). Each question, carrying 2 (two) marks only, has four responses (answers). You will select the response which you want to mark on the **OMR Sheet**. In case you feel that there is more than one correct response, mark the response which you consider the most appropriate. In any case, choose **ONLY ONE** response for each item. There shall be no negative marking for wrong / multiple answer.
 - (B) Questions under **Section-B (Conventional Method) & Section-C (Conventional Method)** are to be answered in separate **answer book**.
4. You have to mark all your responses of Section - A by **Black Ball Point Pen** only on the separate **OMR Answer Sheet** provided. See directions in the Answer Sheet.
5. Before you proceed to answer the responses to various items in the Test Booklet, you have to fill in some particulars both in the Answer sheet for Section-A and in the Answer book for Section-B and Section-C
6. On completion of the Examination, you should hand over the OMR Answer Sheet for Section - A & Answer Book for Section - B & C to the Invigilator only. You are permitted to take the Test Booklet with you.
7. Sheets for rough work are appended on the Test Booklet at the end.

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All symbols have their usual meaning.

SECTION - A

Answer *all* questions. Each question carries 2 (two) marks.

Choose the correct answer from the four alternatives provided with each question and mark on the OMR Sheet.

Example : Common emitter transistor has

40×2=80

- (A) low current gain and low voltage gain
- (B) high current gain and low voltage gain
- high current gain and high voltage gain
- (D) low current gain and high voltage gain.

1. Which of the following constitutes a bilateral element ?

- (A) resistor
- (B) FET
- (C) Diode
- (D) none of the above

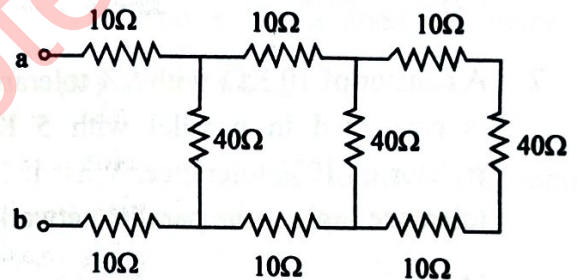
2. The voltage V across an inductor L carrying current i equals to

- (A) Li
- (B) Li^2
- (C) $L \frac{di}{dt}$
- (D) $L \int i dt$

3. A wire conductor of resistance 1Ω is doubled in length. Its resistance becomes

- (A) 1Ω
- (B) 2Ω
- (C) 0.5Ω
- (D) 4Ω

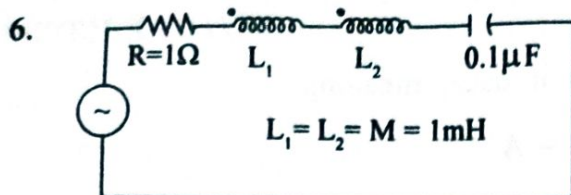
4. Equivalent resistance of the given network between (a) and (b) is



- (A) 60.5Ω
- (B) 40Ω
- (C) 80Ω
- (D) 40.95Ω

5. Power is drawn from a source of power factor 0.8. $P_{av} = 200$ watt. The reactive power is given as

- (A) 200 VAR
- (B) 160 VAR
- (C) 150 VAR
- (D) 120 VAR



The resonant frequency of the above circuit is

(A) $\frac{50}{3\pi}$ KHz

(B) $\frac{50}{2\pi}$ Hz

(C) $\frac{100}{2\pi}$ KHz

(D) $\frac{200}{3\pi}$ KHz

7. A resistor of 10 KΩ with 5% tolerance is connected in parallel with 5 KΩ resistor of 10% tolerance. What is the tolerance limit of the parallel network ?

(A) 5%

(B) 6.67%

(C) 10%

(D) 8.33%

8. The PMMC type instruments normally use

(A) air-friction damping

(B) fluid friction damping

(C) Eddy current damping

(D) None of the above

9. Inductance is measured by

(A) Wien bridge

(B) Schering bridge

(C) Maxwell's bridge

(D) Owen bridge

10. Which bridge is used to determine the frequency of an ac signal ?

(A) Anderson bridge

(B) De Sauchy's bridge

(C) Wien bridge

(D) Campbell's bridge

11. Creeping is observed in

(A) Energy meter

(B) P. F. meter

(C) Watt meter

(D) None of the above

12. The error in C.T. are mainly due to

(A) Leakage flux

(B) Secondary load

(C) Core loss

(D) None of the above

13. Siemens is a unit for measuring

- (A) conductance
- (B) resistance
- (C) flux density
- (D) electric field

14. The form factor in ac is the ratio of

- (A) peak to average value
- (B) peak to r.m.s value
- (C) r.m.s value to average value
- (D) r.m.s value to peak value

15. A CRO can display

- (A) a.c signal
- (B) d.c signal
- (C) both a.c and d.c signals
- (D) time invariant signal

16. A potential transformer (P.T) is a device which is

- (A) electrostatically coupled
- (B) electrically coupled
- (C) electro-magnetically coupled
- (D) conductively coupled

17. One electron volt equals to

- (A) 1.6×10^{-19} Joule
- (B) 1.6×10^{16} Joule
- (C) 9.1×10^{-31} Joule
- (D) 91.1×10^{16} Joule

18. An intrinsic semiconductor at absolute zero temperature

- (A) has only a few holes and a few electrons
- (B) has very large number of holes and electron
- (C) behaves like a good conductor
- (D) behaves like a good insulator

19. The units of the terms 'RC' and 'L/R' are respectively

- (A) ohm and H/m
- (B) ohm / farad and second
- (C) second and second
- (D) coulomb and ampere

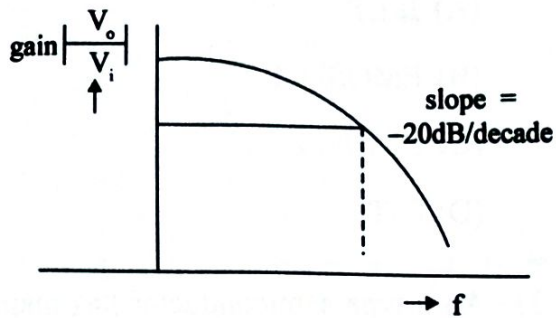
20. In a SCR circuit the angle of conduction can be changed by changing

- (A) anode voltage
- (B) anode current
- (C) forward current
- (D) gate current

21. A SCR has
- two PN junction
 - four PN junction
 - three PN junction
 - one PN junction
22. In a SCR circuit the relation between holding current I_H and latching current I_L is
- $I_H < I_L$
 - $I_H > I_L$
 - $I_L = I_H$
 - $I_H \times 3 = I_L$
23. A diode whose internal resistance is 5Ω is to supply power to a 100Ω load from a 110V (r.m.s.) source. The peak load current is
- 1.0 A
 - 2.0 A
 - 1.48 A
 - 3.5 A
24. A transformer has a turn ratio of 4:1. What is the peak secondary voltage if 115V r.m.s. is applied to the primary winding ?
- 40.7 V
 - 64.6 V
 - 163 V
 - 650 V
25. The load voltage is approximately constant when a zener diode is
- forward biased
 - reverse biased
 - operating in the breakdown region
 - unbiased
26. The time period of the wave produced by a 6-pole alternator which is driven at 1000 rpm is
- 0.01 s
 - 0.03 s
 - 0.04 s
 - 0.02 s
27. The equation of an alternating current $i = 42.42 \sin 628t$. Determine the average value of the alternating current.
- 20A
 - 27A
 - 28A
 - 30A
28. The impedance of the coil at 50 Hz operating frequency with $R = 1\Omega$ and $L = 1 \text{ mH}$ is given by
- 3Ω
 - 5.5Ω
 - 1.048Ω
 - none of the above

29. A series R-L-C circuit will have unity p.f if operated at a frequency of
- (A) $\frac{1}{LC}$
- (B) $\frac{1}{\omega\sqrt{LC}}$
- (C) $\frac{1}{\omega^2 LC}$
- (D) $\frac{1}{2\pi\sqrt{LC}}$
30. An energy meter disc makes 10 rev in 100 seconds when a load of 450W is connected to it. The meter constant (in rev / Kwh) is
- (A) 1000
- (B) 500
- (C) 1600
- (D) 800
31. The expression of power consumed in a three phase balanced star-delta connected load is given by
- (A) $P = 3V_L I_L$
- (B) $P = \sqrt{3} V_L I_L \cos \phi$
- (C) $P = \sqrt{3} V_L I_L \sin \phi$
- (D) $P = 3 V_L I_L \cos \phi$
32. Which one of the following is not a unipolar junction transistor ?
- (A) JFET
- (B) EMOSFET
- (C) DMOSFET
- (D) BJT
33. An n-type semiconductor has majority carriers in
- (A) Conduction band
- (B) Valence band
- (C) Both (a) and (b)
- (D) None of the above
34. Conductivity of a material is a function of
- (A) mobility of charges
- (B) density of charges
- (C) both mobility and density of charges
- (D) none of the above
35. Application of zener diode is usually in
- (A) voltage amplifier
- (B) voltage stabiliser
- (C) clamping
- (D) providing reference voltage

36. The name of the frequency response curve given below is

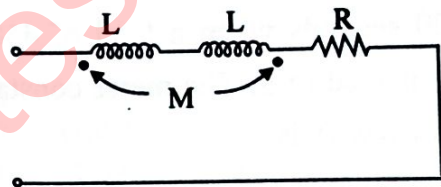


- (A) Low pass active filter frequency response
(B) High pass frequency response
(C) Band pass frequency response
(D) None of the above
37. Which of the following metal is used in RTD ?
- (A) Nickel
(B) Copper
(C) Platinum
(D) All of the above
38. Power factor of purely resistive circuit is
- (A) zero
(B) one
(C) 0.5
(D) infinity

39. A resistance strain gauge with gauge factor of 2 is connected to a steel member which is subjected to a strain of 1×10^{-6} . If the original resistance of the gauge is 130Ω , the change in resistance is

- (A) $300 \mu\Omega$
(B) $100 \mu\Omega$
(C) $150 \mu\Omega$
(D) $260 \mu\Omega$

40. The equivalent inductance of the given network is



- (A) $L_{eq} = 2L - 2M$
(B) $L_{eq} = L + M$
(C) $L_{eq} = L - M$
(D) $L_{eq} = 2L + 2M$

SECTION – B

Answer *all* the questions.

15×6=90

1. Explain the working principle of zener diode in breakdown region.
2. How do you measure phase difference of two signals using CRO ?
3. Define the following terms w.r.t a measuring instrument. 2+2+2=6
 - (A) Resolution
 - (B) Accuracy
 - (C) Precision
4. Draw a neat sketch for Cathode Ray Tube (CRT). Label the main parts of the CRT.
5. Explain instrument transformer. Mention their utilities.
6. Show the application of proportional plus derivative plus integral (PID) controller.
7. Write down the equation for V- I characteristics of Diode. Also draw the characteristic curve. 3+3=6
8. Find the Laplace transform of an unit step function.
9. What are the transients ? Why they are produced ? 2+4=6
10. What is the difference between active and passive filter ? Why are active filters preferred ? 2+4=6
11. Draw a circuit diagram for band pass filter using operational amplifier.
12. Why do we use Megger ?
13. Explain 'hysteresis loop' w.r.t a magnetic material.
14. Draw the circuit diagram of p-n-p BJT in common base (CB) configuration.
15. Compare single phase and three phase systems.

SECTION - C

5×6=30

Answer all the questions.

1. The power input to a 400V, 50 Hz, 3 ϕ motor running on full load at an efficiency of 85% is measured by two wattmeters, which indicates 60 Kwatt and 20 Kwatt respectively. Calculate the line current.
2. Estimate the static and dynamic resistance of a forward biased germanium diode at a room temperature of 300°K . The forward bias voltage is 0.3V and reverse saturation current is 10 μ A.
3. The β of a transistor (npn) is given as 120. If its emitter current is 1A, find its base and collector current.
4. A balanced star connected load is supplied from a symmetrical 3 ϕ , 410V system. The current in each phase is 30A and lags 30° behind the phase voltage. Find total power.
5. An alternating current is given by
 $i = 20 \sin 600t$ A.
Find the (i) frequency
(ii) peak value of current
(iii) the time taken from $t = 0$ for the current to reach a value of 10A