DF-2988
Second Year B. Sc. (CBCS) (Sem. III) Examination
March / April - 2016
Physics : Paper - V

Time : 2 Hours] [Total Marks : 50

सूचना/Instructions :

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

(2) Non-programmable scientific calculator can be used.

(3) Notations used in the question paper are as usual meaning.

Q. 1 to 12 Multiple Choice Questions are each of 1 Mark
Q. 13 to 22 Multiple Choice Questions are each of 2 Marks
Q. 23 to 28 Multiple Choice Questions are each of 3 Marks

O.M.R. Sheet भरणा अनेक-अनेक अभ्यासी सूचनाओ आवश्यक
O.M.R. Sheet-ली पाएक आवश्यक हो.

Important instructions to fillup O.M.R. Sheet are given on back side of the provided O.M.R. Sheet.
1. In one A.C. network current becomes zero 120 times in one second, then what is the frequency of A.C. current?

   (A)  120 Hz
   (B)  1 Hz
   (C)  200 Hz
   (D)  60 Hz

2. When A.C. bridge is balanced, current flowing through detector is ____ A.

   (A) infinity
   (B) zero
   (C) 1
   (D) None of these
In an L–C–R series network, the voltage difference across the two terminals of L, C & R are \( V_L, V_C \) & \( V_R \) respectively, then the voltage of A.C. source is ________.

(A) \( V_L + V_R - V_C \)  
(B) \( V_L - V_R + V_C \)  
(C) \( V_L + V_C + V_R \)  
(D) \( \sqrt{V_R^2 + (V_L + V_C)^2} \)

Generally, ________ is used to measure unknown inductance in terms of resistance & a standard fixed capacitor.

(A) Anderson's bridge  
(B) Owen's bridge  
(C) Maxwell's bridge  
(D) none of these
5. In parallel resonant circuit, at resonance the impedance of the circuit is ________.

(A) infinity
(B) zero
(C) one
(D) none of these

6. The circuit in which currents of unwanted frequencies are not allowed to pass is ________.

(A) parallel resonant circuit
(B) acceptor
(C) series resonance circuit
(D) filter
7 The condition for stiff voltage source is __________.

(A) \( R_s = 0.01 \ R_L \)

(B) \( R_s = 0.001 \ R_L \)

(C) \( R_s > 0.01 \ R_L \)

(D) \( R_s < 0.01 \ R_L \)

8 The true mathematical relation between Thevenin resistance \( R_{TH} \) & Norton's resistance \( R_N \) is __________.

(A) \( R_{TH} < R_N \)

(B) \( R_{TH} = R_{TN} \)

(C) \( R_{TH} > R_N \)

(D) none of these
Thevenin voltage of a circuit equals ________.

(A) Short-terminal voltage
(B) EMF of the battery
(C) Open circuit terminal voltage
(D) Load voltage

The disadvantage of voltage divider bias is that it has ________.

(A) high stability factor
(B) low base current
(C) many resistors
(D) None of these
11 JFET ________ वाल्वनी जैसी वर्तने है।

(A) डायड

(B) पेंटोड

(C) ट्रायडोड

(D) टेट्रोड

A JFET is similar in operation to ________ valve.

(A) diode

(B) pentode

(C) triode

(D) tetrode

12 अगर तापमान बढ़े तो $V_{BE}$ ने मूल्य ________。

(A) अधिक रहे हैं

(B) बढ़े हैं

(C) घटे हैं

(D) आपेक्षिक पैक्स एक अधिक पड़ा

If the temperature increases, the value of $V_{BE}$ ________.

(A) remains the same

(B) is increased

(C) is decreased

(D) None of these
In a series L–C–R circuit, $V = 100$ volts, $R = 1 \Omega$, $L = 1$ H & $C = 7.04 \mu F$.
Then what will be the maximum current in the circuit?

(A) 10 A
(B) 100 A
(C) 10 $\mu$A
(D) 10 mA

In one L–C–R circuit $L$ & $R$ are connected in series and $C$ is connected in parallel with combination. If $L=1$ H, $C=10 \mu F$, $R=100 \Omega$ & A.C. supply is of 220V 50Hz Then the impedance is maximum for $\omega =$ ________ rad/sec.

(A) 316
(B) 300
(C) 157
(D) None of these
15 \[ L = 0.2 \, \text{H}, \, R = 10 \, \Omega \, \& \, C = 10 \, \mu\text{F} \] ने श्रेणी अनुपाती परिपथाने 200V, 50Hz-ना अंशी उत्पाद साधे जोडेव छे, तो परिपथाने अवधार ________.

In a series resonant circuit \( L = 0.2 \, \text{H}, \, R = 10 \, \Omega \, \& \, C = 10 \, \mu\text{F} \) are connected with A.C. supply of 200V, 50Hz. The impedance of circuit ________.

(A) 32.6 \, \Omega

(B) 390 \, \Omega

(C) 380 \, \Omega

(D) 255 \, \Omega

16 \[ C = 12.5 \, \mu\text{F} \] ने कैपेशिटरो 60 Hz आवृत्ति माटे अवधार ________.

The capacitive reactance of \( C = 12.5 \, \mu\text{F} \) with \( f = 60 \, \text{Hz} \) is ________.

(A) 4.71m\,\Omega

(B) 121\,\Omega

(C) 212\,\Omega

(D) 4650\,\Omega
In a Maxwell bridge a resistance of 45 Ω is connected in series with unknown inductance $L_1$ in branch AB, resistance 290 Ω is connected in branch BC, in branch CD there is a parallel combination of capacitor & resistance of values 0.8 μF & 580 Ω respectively. In branch AD there is resistance of 90 Ω and a detector is connected between B & D. Also A.C. voltage source is connected between A & C. Find $L_1$ when bridge is balanced.

(A) 21 mH  
(B) 12 mH  
(C) 11 mH  
(D) 12 H

For given circuit find $V_{TH}$ & $R_{TH}$.

(A) 24V, 5.33 kΩ  
(B) 12V, 5.33 kΩ  
(C) 24V, 6 kΩ  
(D) None of these
19. CE transistor parasitic collector leakage path is the adverse effect of transistor bias (2V, 1mA) energy. If $\beta = 100$ and $V_{BE} = 0.7\, \text{V}$ then $R_B =$ ________.

By using biasing with collector feedback method, a transistor in CE configuration the operating point is set at (2V, 1mA). If $\beta = 100$ and $V_{BE} = 0.7\, \text{V}$ then $R_B =$ ________.

(A) 130$\, \Omega$

(B) 1300$\, \Omega$

(C) 130k$\, \Omega$

(D) 1.3k$\, \Omega$

20. An CE VDB parasitic Ge transistor's leakage energy is adverse. If $\alpha = 0.985$, $V_{CC} = 16\, \text{V}$, $R_2 = 20k\, \Omega$, $R_E = 2k\, \Omega$ adverse parasitic leakage (2V, 1mA) energy to $R_2$ angle magnitudo voltage drop.

In CE germanium transistor VDB circuit, $\alpha = 0.985$, $V_{CC} = 16\, \text{V}$, $R_2 = 20k\, \Omega$, $R_E = 2k\, \Omega$ and operating point is (2V, 1mA). Give the value of Voltage across $R_2$.

(A) 4.3 V

(B) 4 V

(C) 11.7 V

(D) None of these
21 JFET \( I_{DSS} = 12 \) mA, \( V_{GS} = -4 \) V and \( V_{GS(off)} = -5 \) V \( \Rightarrow \) \( I_D = \) ______.

JFET has \( I_{DSS} = 12 \) mA, \( V_{GS} = -4 \) V & \( V_{GS(off)} = -5 \) V then \( I_D = \) ______.

(A) 0.48 mA
(B) 0.24 mA
(C) 17 mA
(D) None of these

22 Consider the JFET circuit where \( V_{DD} = 10 \) V, \( V_{EE} = 5 \) V, \( R_D = 1 \) k\( \Omega \), \( R_G = 1 \) M\( \Omega \), \( V_{BE} = 0.7 \) V & \( R_E = 2 \) k\( \Omega \), \( \Rightarrow \) \( V_{DS} = \) ______.

In a current source bias JFET circuit, \( V_{DD} = 10 \) V, \( V_{EE} = 5 \) V, \( R_D = 1 \) k\( \Omega \), \( R_G = 1 \) M\( \Omega \), \( V_{BE} = 0.7 \) V & \( R_E = 2 \) k\( \Omega \), then the drain voltage is ______.

(A) 4.3 V
(B) 7.85 V
(C) 15 V
(D) 5 V
A JFET has $I_{DSS} = 35 \text{ mA}$, $V_P = 12 \text{ V}$ & $g_{m0} = 5100 \mu\text{S}$. For $V_{GS} = -6 \text{ V}$ the values of $I_D$ & $g_m$ are ________.

(A) 8.75 mA, 255 μS

(B) 8.75 mA, 2550 μS

(C) 7.5 mA, 255 μS

(D) None of these

A bridge network ABCD is arranged as follows: Resistance between terminals A & B, B & C, C & D, D & A and B & D are 10 Ω, 30 Ω, 15 Ω, 20 Ω, and 40 Ω, respectively. A 2 V d.c battery of negligible internal resistance is connected between terminals A & C. For this circuit the values of $V_{TH}$, $R_{TH}$ & current through BD branch are ________.

(A) 1.5 V, 18 Ω, 20A

(B) 0.86 V, 16.6 Ω, 11.5A

(C) 0.645 V, 16 Ω, 11.5 mA

(D) None of these
25  अंक पाईने ब्रिज परिपथ ABCD नीचे मुख्य नामांकन छ. AB शाखा 200Ω, ना अवरोध साथे 1μF ना डिप्सिटरनु प्राप्त तोड़ी, BC शाखा 400Ω ना अवरोध, DC शाखा 100Ω नो अवरोध, अने AD शाखा RΩ ना अवरोध साथे 2μF ना डिप्सिटरनु ब्रिजी तोड़ी तर हिंदु A अने C व्यवे अन.सी.बेटी तथा हिंदु B वर्दे डिप्सिटर होत्या, आयन ब्रिज परिपथ संतुलन शास्त्र तयारे R अने आवृत्तिने मूल्यो शोधो.

The four arms of Wien's bridge ABCD are made up by following data values:

AB branch have 200Ω resistance in parallel with 1μF capacitor, BC branch has 400Ω resistance, CD branch has 100Ω resistance, AD branch has a resistance R in series with a 2μF capacitor. An A.C. source is connected between point A & C and detector is connected between point B & D. Find the value of R & frequency when bridge is balanced.

(A)  400 Ω & 796 Hz
(B)  200 Ω & 960 Hz
(C)  100 Ω & 796 Hz
(D)  100 Ω & 96 Hz

26  LCR श्रेणी परिपथम 400 cos (3000 t − 10°)V नो वोल्टेज आपवाही परिपथभरां वहेती 10√2 cos (3000 t − 55°)A छ. जे L = 0.01H तो र अने C नां मूल्यो क्षेत्री?

In a series LCR circuit, when a voltage of 400 cos (3000 t − 10°)V is applied, the current flowing is 10√2 cos (3000 t − 55°) ampere. If L = 0.01H then what are the values of R & C ?

(A)  30Ω, 3.33 μF
(B)  28Ω, 3.33 μF
(C)  20Ω, 33.3 μF
(D)  30Ω, 33.3 μF
27) In a VDB CE (Si) transistor circuit, $V_{CC} = 15\text{V}$, $R_1 = 10\ \text{k}\Omega$, $R_2 = 2.2\ \text{k}\Omega$, $R_E = 1\ \text{k}\Omega$, $V_{BE} = 0.7\ \text{V}$, $R_C = 3.6\ \text{k}\Omega$ and $\beta_{dc} = 200$, then $V_{CE}$ is _______ and $I_E$ is _______.

In VDB CE (Si) transistor circuit, $V_{CC} = 15\text{V}$, $R_1 = 10\ \text{k}\Omega$, $R_2 = 2.2\ \text{k}\Omega$, $R_E = 1\ \text{k}\Omega$, $V_{BE} = 0.7\ \text{V}$, $R_C = 3.6\ \text{k}\Omega$ and $\beta_{dc} = 200$. Then

$V_{CE}$ is _______ and $I_E$ is _______.

(A) 11.07 V, 1 A

(B) 5.8 V, 2 mA

(C) 11.07 V, 2 mA

(D) 11.07 V, 2 A

28) In a stiff VDB circuit, the following transistor circuit uses $V_{CC} = 10\text{V}$, $V_{CE}$ is $\mu$V, $I_C = 1\ \text{mA}$, $\beta_{dc} = 70$, and $V_{BE} = 0.7\ \text{V}$. Obtain the values of $R_1$, $R_2$, and $R_E$:

$R_1$ = _______, $R_2$ = _______ and $R_E$ = _______.

Using stiff VDB design guidelines and given data values: $V_{CC} = 10\text{V}$, $V_{CE}$ is at mid point, $I_C = 1\ \text{mA}$ and $\beta_{dc} = 70$ to 200, $V_{BE} = 0.7\ \text{V}$, the values of $R_1$ = _______, $R_2$ = _______ and $R_E$ = _______.

(A) 13.67 $\Omega$, 280 $\Omega$, 100 $\Omega$

(B) 13.67 k$\Omega$, 2.8 k$\Omega$, 1 k$\Omega$

(C) 13.67 k$\Omega$, 280 $\Omega$, 1 k$\Omega$

(D) 342 $\Omega$, 200 $\Omega$, 150 $\Omega$