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.

Name of the Examination : SECOND YEAR B. Sc. (CBCS) (SEM. 3)
Name of the Subject : PHYSICS : PAPER - 5

(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 भरना अंतिम अवसर-वर सूचनाओ अपेक्ष
O.M.R. Sheet-ल पात्र भर्ने आवश्यक
Important instructions to fillup O.M.R. Sheet are given on back side of the provided O.M.R. Sheet.

DF-2988_C | 1 [ Contd...
1. Generally, _______ is used to measure unknown inductance in terms of resistance & a standard fixed capacitor.

(A) Maxwell's bridge
(B) none of these
(C) Anderson's bridge
(D) Owen's bridge

2. In parallel resonant circuit, at resonance the impedance of the circuit is _______.

(A) one
(B) none of these
(C) infinity
(D) zero
3  श्रेणी परिपथम विनिर्दुर्नी अवृत्तिवाणी प्रवाह पसार ना थरी शरे ते ________.

(A) श्रेणी अनुपादी परिपथ
(B) हिल्टर
(C) सभार अनुपादी परिपथ
(D) असेम्ब्लर

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

(A) series resonance circuit
(B) filter
(C) parallel resonant circuit
(D) acceptor

4  अक्ष्ण (stiff) बोल्टेज उद्देश स्रोतनी शरत ________.

The condition for stiff voltage source is ________.

(A) \( R_s > 0.01 \ R_L \)
(B) \( R_s < 0.01 \ R_L \)
(C) \( R_s = 0.01 \ R_L \)
(D) \( R_s = 0.001 \ R_L \)
The true mathematical relation between Thevenin resistance $R_{TH}$ & Norton's resistance $R_N$ is ________.

(A) $R_{TH} > R_N$

(B) none of these

(C) $R_{TH} < R_N$

(D) $R_{TH} = R_{TN}$

Thevenin voltage of a circuit equals ________.

(A) Open circuit terminal voltage

(B) Load voltage

(C) Short-terminal voltage

(D) EMF of the battery
7  The disadvantage of voltage divider bias is that it has _______.

(A) many resistors

(B) None of these

(C) high stability factor

(D) low base current

8  A JFET is similar in operation to _______ valve.

(A) triode

(B) tetrode

(C) diode

(D) pentode
9 जो तापमान वर्गे तो $V_{BE}$ पुढे मूल्य ________.

(A) घटे छें
(B) आपेक्षिक पैक्ले एक पशांच नाइल
(C) समान र写作 छें
(D) वर्गे छें

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

(A) is decreased
(B) None of these
(C) remains the same
(D) is increased

10 एक ऑ.सी. परिपथांमध्ये एक सेक्टरांमध्ये 120 वजन्य प्रवाह घूर्ण्य घरा ठोऱ्या तो ऑ.सी. प्रवाहाची आपूर्ति किती ?

In one A.C. network current becomes zero 120 times in one second, then what is the frequency of A.C. current ?

(A) 200 Hz
(B) 60 Hz
(C) 120 Hz
(D) 1 Hz
When A.C. bridge is balanced, current flowing through detector is ___ A.

(A) 1

(B) None of these

(C) infinity

(D) zero

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) \( V_L + V_C + V_R \)

(B) \( \sqrt{V_R^2 + (V_L + V_C)^2} \)

(C) \( V_L + V_R - V_C \)

(D) \( V_L - V_R + V_C \)
13. JFET निदर्शन I_{DSS} = 12 mA, \( V_{GS} = -4\) V and \( V_{GS(\text{off})} = -5\) V निदर्शन I_D = ________.

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

(A) 17 mA

(B) None of these

(C) 0.48 mA

(D) 0.24 mA

14. त्रिशंकु सीलेक्टर JFET परिपथ मुद्दे \( V_{DD} = 10\) V, \( V_{EE} = 5\) V,

\( R_D = 1\) kΩ, \( R_G = 1\) MΩ, \( V_{BE} = 0.7\) V \& \( R_E = 2\) kΩ, त्रिशंकु सीलेक्टर = ________.

In a current source bias JFET circuit, \( V_{DD} = 10\) V, \( V_{EE} = 5\) V,

\( R_D = 1\) kΩ, \( R_G = 1\) MΩ, \( V_{BE} = 0.7\) V \& \( R_E = 2\) kΩ, then the drain voltage is ________.

(A) 15 V

(B) 5 V

(C) 4.3 V

(D) 7.85 V
15 In a series L–C–R circuit, $V = 100$ volts, $R = 1 \Omega$, $L = 1 \text{ H}$ & $C = 7.04 \mu\text{F}$, to what extent would the current be reduced?

(A) 10 µA

(B) 10 mA

(C) 10 A

(D) 100 A

16 In an L–C–R circuit, L and R are connected in series and C is connected in parallel with combination. If $L = 1 \text{ H}$, $C = 10 \mu\text{F}$, $R = 100 \Omega$ and A.C. supply is of 220V 50Hz then the impedance is maximum for $\omega = \ldots$ rad/sec.

(A) 157

(B) None of these

(C) 316

(D) 300
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) $380\, \Omega$

(B) $255\, \Omega$

(C) $32.6\, \Omega$

(D) $390\, \Omega$

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

(A) $212\, \Omega$

(B) $4650\, \Omega$

(C) $4.71\, \text{m}\, \Omega$

(D) $121\, \Omega$
In a Maxwell bridge a resistance of 45Ω is connected in series with unknown inductance $L_1$ in branch AB, resistance 290Ω is connected in branch BC, in branch CD there is a parallel combination of capacitor & resistance of values 0.8μF & 580Ω respectively. In branch AD there is resistance of 90Ω 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) 11 mH
(B) 12 H
(C) 21 mH
(D) 12 mH

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

(A) 24V, 6 kΩ
(B) None of these
(C) 24V, 5.33 kΩ
(D) 12V, 5.33 kΩ
21 CE transistor characteristics of the circuit are in question. The biasing is at 2V, 1mA. 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) 130kΩ
(B) 1.3kΩ
(C) 130Ω
(D) 1300Ω

22 An CE VDB circuit Ge transistor as shown. If \( \alpha = 0.985, V_{CC} = 16 \text{ V}, R_2 = 20k\Omega, R_E = 2k\Omega \) at the operating condition (2V, 1mA) find the value of \( R_2 \) and the voltage across it.

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 the voltage across \( R_2 \).

(A) 11.7 V
(B) None of these
(C) 4.3 V
(D) 4 V

DF-2988_C ] 12 [ Contd...
23 In VDB CE (Si) transistor circuit, $V_{CC} = 15V$, $R_1 = 10 \, k\Omega$, $R_2 = 2.2 \, k\Omega$, $R_E = 1 \, k\Omega$, $V_{BE} = 0.7 \, V$, $R_C = 3.6 \, k\Omega$ and $\beta_{dc} = 200$, then $V_{CE} =$ ________ and $I_E =$ ________.

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

(A) 11.07 V, 2 mA
(B) 11.07 V, 2 A
(C) 11.07 V, 1 A
(D) 5.8 V, 2 mA

24 In a stiff VDB design, the following are the parameters: $V_{CC} = 10V$, $V_{CE} =$ ________, $I_C = 1 \, mA$ and $\beta_{dc} = 70$ to 200. $V_{BE} = 0.7V$ and $R_E =$ ________.

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

(A) 13.67 kΩ, 280 Ω, 1 kΩ
(B) 342 Ω, 200 Ω, 150 Ω
(C) 13.67 Ω, 280 Ω, 100 Ω
(D) 13.67 kΩ, 2.8 kΩ, 1 kΩ
A JFET has $I_{DSS} = 35\, mA$, $V_p = 12\, V$ and $g_m = 5100\, \mu S$. For $V_{GS} = -6\, V$ the values of $I_D$ and $g_m$ are ________.

(A) $7.5\, mA$, $255\, \mu S$

(B) None of these

(C) $8.75\, mA$, $255\, \mu S$

(D) $8.75\, mA$, $2550\, \mu S$

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

(A) $0.645\, V$, $16\, \Omega$, $11.5\, mA$

(B) None of these

(C) $1.5\, V$, $18\, \Omega$, $20\, A$

(D) $0.86\, V$, $16.6\, \Omega$, $11.5\, A$
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 1000Ω 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) 100 Ω & 796 Hz
(B) 100 Ω & 96 Hz
(C) 400 Ω & 796 Hz
(D) 200 Ω & 960 Hz

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°) amperes. If L = 0.01H then what are the values of R & C ?

(A) 20 Ω, 33.3 μF
(B) 30 Ω, 33.3 μF
(C) 30 Ω, 3.33 μF
(D) 28 Ω, 3.33 μF