DB-003-001603 Seat No. _____

B. Sc. (Sem. VI) (C.B.C.S.) Examination

April / May – 2015

Physics

Faculty Code : 003
Subject Code : 001603

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions : (i) All questions are compulsory.

(ii) Figures on the right side indicate marks.

(iii) Symbols have their usual meaning.

1 Select the correct answer from the given options : **20**

(1) When a transistor is driven to saturation, ideally the output is _____.

(A) V_{CC} (B) 0

(C) $V_{CC} / 2$ (D) $2V_{CC}$

(2) _____ multivibrator is a square wave oscillator.

(A) Monostable (B) Astable

(C) Bistable (D) None of these

(3) If 10 V dc is supplied to the input of differential circuit, its output will be _____.

(A) 20 V (B) 10 V

(C) 0 V (D) None of the above

(4) For the integrating circuit, the capacitive reactance X_C, should be _____ than the resistance R.

(A) 10 times greater (B) 10 times smaller

(C) 5 times smaller (D) 5 times greater

(5) Which relation is correct for SCR anode current ?

(A) $I_A = \left[\frac{\alpha_2 I_g}{1+(\alpha_1+\alpha_2)}\right]$ (B) $I_A = \left[\frac{\alpha_1 I_g}{1-(\alpha_1+\alpha_2)}\right]$

(C) $I_A = \left[\frac{\alpha_2 I_g}{1-(\alpha_1+\alpha_2)}\right]$ (D) None of these

(6) Which of these is not a Thyristor ?

(A) LASCR (B) LASCS

(C) SBS (D) LDR

(7) A TRIAC behaves like ____.

(A) two inverse parallel SCRs with common gate

(B) four layer diodes in parallel

(C) two inverse parallel diodes

(D) two transistors with base of one connected to collector of another.

(8) A TIRAC can be triggered into conduction by ____.

(A) only positive voltage at either anode

(B) positive or negative voltage at either anode

(C) positive or negative voltage at either gate

(D) both (B) and (C)

(9) The angle at which the device is triggered is known as ____.

(A) phase angle (B) firing angle

(C) conduction angle (D) infinite

(10) Which of these thyristor is bidirectional ?

(A) SCR (B) SCS

(C) LASCR (D) DIAC

(11) ____ cannot fabricated in monolithic IC.

(A) Capacitor (B) Resistor

(C) Diode (D) Inductor

(12) Isolation in monolithic IC is ____.

(A) Good (B) Excellent

(C) Poor (D) Very poor

(13) Basically Op-Amp is designed to perform the ____.

(A) Logic operation

(B) Analog operation

(C) Mathematical operation

(D) Digital operation

(14) In monolithic IC capacitor, the SiO_2 acts as ____.

(A) positive plate

(B) negative plate

(C) dielectric medium

(D) either (A) or (B)

(15) A microphone is classified as a ____ transducer.

(A) thermal (B) optical

(C) magnetic (D) acoustical

(16) Strain gauge with gauge factor 2, no strain resistance $120\,\Omega$ and it is subjected to stain of order 10^{-6}. The fractional change in resistance is ____.

(A) $240\,m\Omega$

(B) $240\,\Omega$

(C) $240\,\mu\Omega$

(D) Either (A) or (C)

(17) Strain gauge with gauge factor 2, and modulus of elasticity $21\times10^{12}\ N/m^2$, no strain resistance $120\,\Omega$ and it is subjected to stress of about $10.5\times10^{9}\ N/m^2$. Strain produced in gauge is ____.

(A) 50×10^{-4} (B) 5×10^{-4}

(C) 5×10^{-6} (D) 50×10^{-6}

(18) In multiplexer, when, ABCD = 1111, data will be transmitted to output ____.

(A) Y_0 (B) Y_1

(C) Y_2 (D) None of these

(19) For flip-flop, outputs Q and $\overline{Q}$ should be ____.

(A) In phase (B) Complementary

(C) Equal (D) Infinite

(20) If two extra input through AND gate as inverter is added to 1-bit memory elements, the circuit is called ____ flip-flop.

(A) D (B) J-K

(C) R-S (D) Clocked RS

2 (a) Answer any three : **6**

(1) Write the limitations of mechanical switches.

(2) What is multivibrator ? Draw its block diagram.

(3) Draw the symbols and I-V characteristics of DIAC and TRIAC.

(4) Write down the list of the methods of triggering SCR.

(5) What is thyristor ? Explain.

(6) Draw the circuit diagram of transistor astable multivibrator.

(b) Answer any three : **9**

(1) What is differentiating circuit ? Draw circuit diagram and prove the relation between output and input voltage.

(2) What is clipping circuit ? Explain biased clipper.

(3) Give the basic idea of the clamping circuit.

(4) Write applications of thyristor.

(5) Explain structure and operation of DIAC.

(6) Explain 'Off at dark' circuit.

(c) Answer any two : **10**

(1) Explain transistor free running multivibrator.

(2) Explain the I-V characteristic of an SCR.

(3) Explain integrating circuit.

(4) Explain working of an Automatic street light circuit using SCR and LDR.

3 (a) Answer any three : **6**

(1) What is an integrated circuit ?

(2) Classify ICs based on scale of integration.

(3) What is transducer ? Explain it.

(4) Explain working of electrical transducer.

(5) Draw logic diagram of basic RS flip-flop and realize the truth table.

(6) Draw logic diagram and give truth table of JK flip-flop.

(b) Answer the three : **9**

(1) What is an Op-Amp ? Explain.

(2) Explain OP-Amp as Adder.

(3) Write a note on thin film IC.

(4) Explain strain gauge.

(5) Discuss basic RS flip-flop.

(6) Discuss D-flip-flop.

(c) Answer any two : **10**

(1) Explain use of Op-Amp as inverting amplifier.

(2) Describe the fabrication of monolithic IC.

(3) Explain constructive and working of LVDT.

(4) Write a note on classification of transducer.

(5) Write a note on multiplexer and demultiplexer.