M.Sc. II Semester Degree Examination,
September/October - 2022
PHYSICS
SEC 2 : Model Based Design of Physical Devices/Systems

Time : 1 Hour   Maximum Marks : 30

Note : *(i)*   *Answer* **all** *questions.*

         (ii)   *Each question carries* **one** *mark.*

1. Which of the following statements are true with regard to the forward biased pn junction ?
   (a) the charge in the depletion layer is reduced
   (b) the electric field across the junction is reduced
   (c) the voltage across the junction is reduced
   (d) the electric field across the junction is increased

   (A) (a) and (d)   (B) (b) and (d)   (C) (a), (b) and (c) (D) (a), (b) and (d)

2. Which of the following statements are true with regard to the Transistor ?
   (a) transistor is a current/voltage controlled device
   (b) usually emitter is forward biased and collector is reverse biased
   (c) it acts like a switch
   (d) it offers 180° phase shift for AC signals at each junctions

   (A) (a) and (d)   (B) (b) and (d)   (C) (a), (b) and (c) (D) (a), (c) and (d)

3. Which of the following statement/s does not belong with respect to the ideal characteristics of the Op Amp ?
   (a) it has low input and high output impedance
   (b) it has high input and zero output impedance
   (c) it has infinite voltage gain
   (d) the gain is independent of the frequency

   (A) (a) only (B) (b) only (C) both (a) and (c)   (D) both (b) and (d)

4. Which of the following statement/s are true with regard to the virtual ground in op amp ?
(a) a node where the voltage is almost equal to the ground voltage
(b) the differential input voltage between terminals is zero
(c) a node which is directly connected to the ground in the circuit.
(d) a node where the voltage is infinite compared to the ground voltage

(A) (a) and (b)   (B) (b) and (c)   (C) (c) and (a)   (D) (c) and (d)

5. Which of the following statements are true with reference a rectifier ?
(a) Generates pulsating DC component from AC in one direction
(b) Generates sine, square and triangular waveforms
(c) Power regulating device
(d) Power generator

(A) (a) and (b) only   (B) (b) and (c) only
(C) (c) and (d) only   (D) (a), (b) and (c)

6. In a positive half wave rectifier :
(A) The electrons and holes move freely during the complete AC wave
(B) The electrons and holes move freely during positive half of the input AC wave
(C) The electrons and holes move freely during negative half of the input AC wave
(D) The electrons and holes accumulated near the depletion layer and hence rectify complete AC wave

7. Which of the following statement/s are true with regard to the construction and working of Full wave rectifier ?
(a) It consists of two or four diode with bridge to obtain the rectified output for complete input AC
(b) The rectification efficiency is approximately 81.1%
(c) The rectification efficiency is approximately 40.6%
(d) The load current flows in both half cycles of AC voltage and in the same direction through the load resistance

(A) (a), (b) and (c)   (B) (a) and (c)
(C) (a), (b) and (d)   (D) (a), (c) and (d)

8. The role of capacitor in the filter is to _____.

    (A) Allow DC components to the ground

    (B) Allow AC components to the ground

    (C) Block AC components to the ground

    (D) Block both AC & DC components & acts like a ground

9. Clippers are used :

    (A) to increase the output voltage above the reference voltage level

    (B) to maintain output voltage to the reference voltage level

    (C) to maintain the output level always to ground voltage level

    (D) to amplify the input signals

10. Clampers are used as :

    (A) Voltage Multipliers   (B) Voltage limiters

    (C) Used to produce distortions (D) Cutoff the input voltage signals

11. Virtual science lab offers :

    (A) web-based learning platform

    (B) simulated learning environment

    (C) interactive learning environment

    (D) All the above

12. What does Matlab stands for ?

    (A) Maths laboratory   (B) Matrix Laboratory

    (C) Mathworks   (D) All the above

13. What symbol precedes all commands in Matlab ?

    (A) "   (B) %   (C) //   (D) None

14. This Matlab command clears all date and variables stored in memory

    (A) cls   (B) clear   (C) delete   (D) All the above

15. What is the return type of angles function in MATLAB ?

    (A) Degree   (B) Radians

    (C) depend on argument   (D) Both

16. What is the output of a=[1 0 2]; b=[3 0 7]; c=a*b;
(A)   [2 0 21]   (B)   [3 0 14]   (C)   [14 0 3]   (D)   [7 0 3]

17. Command to create a plot of 2θ on x-axis and intensity on y-axis.
(A)   plot(2θ, intensity)   (B)   plot(x y)
(C)   plot(2θ; intensity)   (D)   plot(2θ,y)

18. Command to plot heavy line in the graph :
(A)   plot(y;"Line";5)   (B)   plot(y:"Line":5)
(C)   plot(y,"LineWidth",5)   (D)   plot(y,5)

19. What are the two kinds of errors in MATLAB programs ?
(A)   Logic, runtime   (B)   Syntax, runtime
(C)   Syntax, Logic   (D)   All the above

20. How many design steps are available for the design of rotor ?
(A)   5   (B)   6   (C)   7   (D)   8

21. What is the main motive while choosing the number of rotor slots ?
(A)   increasing the efficiency   (B)   decreasing the losses
(C)   no noise is produced   (D)   high output is produced

22. What among the following are considered for the selection of number of rotor slots ?
(A)   magnetic locking   (B)   Cusps
(C)   magnetic locking or cusps   (D)   magnetic locking and cusps

23. What will be the value of 4 + 3 % 5 Python expression ?
(A)   7   (B)   2   (C)   4   (D)   1

24. Who developed Python Programming Language ?
(A)   Wick van Rossum   (B)   Rasmus Lerdorf
(C)   Guido van Rossum   (D)   Niene Stom

25. Which type of Programming does Python support ?
(A)   object-oriented programming (B)   structured programming
(C)   functional programming   (D)   all of the mentioned

26. What is the correct operator for power (xy) in python ?

(A)   x^y   (B)   x**y   (C)   x^^y   (D)   None

27. Conversion of PC into CRO using ExpEyes gives the accuracy of :

(A)   24 bits   (B)   26 bits   (C)   212 bits   (D)   214 bits

28. If vibrations of a string are to be increased by a factor 2, tension in the string must be made :

(A)   Half   (B)   Twice   (C)   Four times   (D)   Eight times

29. What will happen if the rate of evaporation is equal to the rate of condensation in the water ?

(A)   solid-liquid equilibrium   (B)   liquid-vapor equilibrium

(C)   solid-vapor equilibrium   (D)   melting

30. Alpha energy Spectrometer consists of :

(A)   Detector   (B)   Preamplifier

(C)   Shaping Amplifier   (D)   All the above

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