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Registration number:

ST. JOSEPH’S COLLEGE (AUTONOMOUS), BENGALURU-27

B.Sc. Electronics - I SEMESTER

SEMESTER EXAMINATION: OCTOBER 2021

(Examination conducted in March 2022)

 **EL 121 (NEP) - Basic Electronics**

 **Time- 3 hrs Max Marks-100**

This question paper contains **FIVE** printed pages and **THREE** parts

**Part A**

**Answer all the questions( Choose the correct answer) 1x20=20**

1.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ circuit is known as acceptor circuit.

a) N-type semiconductor

b) Parallel resonant circuit

c) Series resonant circuit

d) CE amplifier

 2.The component/s in an ac circuit where currents lags voltage by 900 is/are \_\_\_\_\_\_\_.

a) Capacitor

b) Inductor

c) RC

d) RL

3. An ideal voltage source has\_\_\_\_\_\_\_\_\_ resistance in series.

a) infinite

b) Zero

c) Small

d) Large

4. Limitations of super position theorem is\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

a) The process of simplification is too long

b) Only current sources cannot be used

c) Only voltage sources are used

d) It should have more than one voltage/current source

5. The charges in the depletion layer are\_\_\_\_\_\_\_.

a) Electrons only

b) Holes only

c) Mobile positive and negative ions

d) immobile positive and negative ions

6. The maximum circuit efficiency in a full wave rectifier is \_\_\_\_\_\_\_.

a) 50% b) 40.8% c) 81.2% d) 100%

7. In zener breakdown \_\_\_\_\_\_\_\_\_\_\_\_.

a) current remains constant and voltage varies

b) voltage remains constant and current varies

c) current and voltage varies

d) Current increases exponentially in the breakdown region

8. The current in the diode is \_\_\_\_\_.



 a) 0mA b) 1mA c) 2mA d) 3mA

 9. The base current in a transistor is 20µA and emitter current is 4mA, the β of the transistor

 is\_\_\_\_\_.

 a) 200 b) 199 c) 80 d)201

 10. The output frequency of bridge rectifier is equal to \_\_\_\_\_\_\_\_.

 a) fin b)2fin c)4fin d) 8fin

11. The energy gap of silicon semiconductor is \_\_\_\_\_\_\_\_\_\_\_.

 a) 0.7V b) 0.3V c) 1.12eV d)0.72eV

 12. Thermal runaway implies \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

a) Temperatures changes in a transistor

b) Depletion region ruptures

c) Transistor destroyed due to excessive heat

d) Base current changes drastically

 13.The input impedance of a CE amplifier is \_\_\_\_\_\_\_\_\_.

 a) low b) medium c) high d) very high

 14. ---------------- amplifier is also known as emitter follower.

a) CE b) CB c) CC d) CS

 15. The symbol represents \_\_\_\_\_\_\_ diode.



a) Tunnel b) Varactor c) Schottky d) Zener

 16. 11002 can be written in BCD code as\_\_\_\_\_\_\_\_\_\_.

a) 12 b) C c) 30 d) not possible.

17. The given circuit is \_\_\_\_\_\_\_\_\_\_\_\_\_ gate.



a) AND b) EXOR c) EXNOR d) NAND

18. The signed magnitude representation of -127 is \_\_\_\_\_\_\_\_\_\_\_.

a) 01111111 b) 11111111 c) 7F d) 100100111

19. The code where all successive numbers differ from their preceding number by single bit is \_\_\_\_\_\_\_\_\_\_

 a) Alphanumeric Code
 b) BCD
 c) Excess 3
 d) Gray

 20.The expression A+BC is the reduced form of \_\_\_\_\_\_\_\_\_.

a) AB+BC

 b) (A+B)(A+C)

 c) (A+C)B

 d) ( A+B)C

**Part-B**

**Answer any five questions 12x5=60**

21. a) Derive current divider rule for two resistors connected in parallel.

 b) Explain the principle of resonance in a series RLC circuit and derive its resonant

 frequency.

 c) Draw V-I characteristics of a silicon diode and explain with the help of necessary

 circuit diagrams. **(4+4+4)**

22. a) State and explain Thevenin’s theorem.

 b) State maximum power transfer theorem and derive the condition for maximum power

 transfer.

 c) Mention the principle involved in a LED. Draw a common anode configuration for a

 seven segment display. **(4+4+4)**

23. a) Explain the full wave bridge rectifier and derive its Vdc, Vrms and ripple factor.

 b) Draw a voltage quadrupler circuit and explain.

 c) Draw the output waveform between A&B for the diode combination given below



 (**6+4+2)**

 24. a) With the help of circuits explain the working of a Zener regulator. Derive the range of

 load values for the circuit.

 b) Obtain input and output characteristics for a transistor in CB mode. Mention how **α**

 can be obtained from the curves.

 **(6+6)**

 25. a) Draw a CE amplifier circuit and explain its working. With the help of re’ model derive

 its voltage gain.

 b) Derive the stability factor for a transistor. Discuss the stability of voltage divider bias

 after determining the Q-point values.

 **(6+6)**

 26. a) Explain with an example to convert a gray code number to its equivalent binary

 Number.

 b) State and prove De Morgan’s theorem.

 c) With a neat circuit, describe the working of a two input AND gate. Mention its truth

 table.

 **(4+4+4)**

 27. a) Discuss the working of a negative clamper circuit and draw the input and output

 Waveforms.

 b) NOR is an universal gate -justify.

 c) With the help of basic gates construct a two input EXOR gate and give its truth table.

 Write the truth table for a 3 input EXOR gate.

 **(4+4+4)**

**Part-C**

 **Answer any five questions 4x5=20**

 28. Determine the time taken by the capacitor to completely charge and time needed to

 charge up to 60% of its final value after closing the switch.



29. Determine the current in 10Ω resistor by applying super position theorem.



 30. Determine Vdc, Vrms and ripple factor for the given circuit.



 31. Determine the Vout and zener current in the circuit.



32. Draw the output for the given circuits given below;



 Fig (1) Fig (2)

33. Convert the following:

 (i) 56.25 into binary (ii) (1010010011)2 intoBCD

 (iii) 47 into Excess-3 code (iv) (1110111001)2 into Hexadecimal number

34. a) Add 125 and -60 using 2’s complement method.

 b) Simplify the following expression:



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