15U509 (Pages: 3) Name: ……...

Reg. No…….

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, OCTOBER 2017

(CUCBCSS-UG)

Physics- Core Course

CC15U PH5 B09 - ELECTRONICS (ANALOG & DIGITAL)

(2015 Admission Regular)

Time: Three Hours Maximum: 80 Marks

Section A

Answer ***all*** questions. Each question carries 1 mark.

1. A properly doped crystal diode which has a sharp breakdown voltage is known as _____.
2. In a transistor if $\beta = 100$ and base current is 10 μA, then I_E is _____ .
3. Draw the logic circuit whose Boolean equation is Y =
4. Draw the diagram of edge triggered JK flip flop.
5. Binary equivalent of the Hexadecimal number $6B_{16}$ is _____.

Write True or False

6. In amplitude modulation, bandwidth is equal to the signal frequency.
7. The output and input voltages of an emitter follower have a phase difference of 180^0
8. In full wave rectification, the output frequency is double that of the a.c. supply frequency.
9. In a transistor, of the three regions: collector, base and emitter, collector is heavily doped.
10. In CE amplifier if the value of I_C current increases, the value of V_{CE} decreases.

(10 x 1 = 10 marks)

Section B

Answer ***all*** questions. Each question carries 2 marks.

11. What is a capacitor input filter?
12. What are the effects of negative feedback on the amplifier output ?
13. Why the transistor biasing is necessary in amplifier circuit? Name the different methods.
14. Define amplitude modulation and Frequency modulation.
15. Define pinch off voltage .
16. Explain intrinsic stand-off ratio

Turn Over

17. State and prove De-Morgan's theorems.

(7 x 2 = 14 marks)

Section C

Answer any ***five*** questions .Each question carries 4 marks.

18. Define stability factor and derive the expression for it in CE configuration. .
19. Draw d.c. load line on the output characteristics of a transistor ? What is its importance?
20. Explain with diagram the working of a simple transistor AM modulator.
21. Write down any four difference between JFET and Bipolar Junction Transistor (BJT)
22. Explain the operation of a summing amplifier.
23. An Op-Amp can be used as an integrator. Explain
24. Explain pairs, quads and octets with examples.

(5 x 4 = 20 marks)

Section D

Answer any ***four*** questions Each question carries 4 marks.

25. A transistor employs a 5 kΩ load and $V_{CC} = 16V$. What is the maximum input signal if $\beta = 100$? Given $V_{knee} = 1V$ and a change of 1V in V_{BE} causes a change of 5mA in collector current.
26. A 1 pF capacitor is available. Calculate the inductor values in a Hartley oscillator so that f = 1 MHz and $m_v = 0.2$.
27. When negative voltage feedback is applied to an amplifier of gain 100, the overall gain falls to 50. (i) Calculate the fraction of the output voltage fedback. (ii) If this fraction is maintained, calculate the value of the amplifier gain required if the overall stage gain is to be 75.
28. Only for the following input combinations 0011, 0111, 1001 the outputs are high. Find the simplified Boolean equation. Verify this using Karnaugh map.
29. A transistor uses potential divider method of biasing. $R_1 = 50\ k\Omega$, $R_2 = 10\ k\Omega$ and $R_E = 1k\Omega$. If $V_{CC} = 12$ V, find : (i) the value of I_C ; given $V_{BE} = 0.1V$ (ii) the value of I_C ; given $V_{BE} = 0.3V$.

30. A frequency modulated voltage wave is given by the equation : $e = 12 \cos (6 \times 10^8 t + 5 \sin 1250\ t)$ Find (i) carrier frequency (ii) signal frequency (iii) maximum frequency deviation (iv) power dissipated by the FM wave in 12 Ω resistor.
31. A two-stage amplifier has first-stage voltage gain of 20 and second stage Voltage gain of 400. Find the total decibel gain.

(4 x 4 = 16 marks)

Section E

Answer any ***two*** questions. Each question carries 10 marks.

32. Draw the circuit diagram of a bridge rectifier and explain its operation. Derive the expression for its rectification efficiency and ripple factor.
33. Explain the principle and working of phase shift oscillator and Colpitts oscillator. What is the frequency of oscillation. Give the advantages and disadvantages of the phase shift oscillator.
34. Explain with diagram the CE characteristics of a transistor amplifier. Derive the expressions for input and output resistances, current gain and voltage gain of the CE transistor amplifier.
35. i) Explain the general rule for representing positional numbers in any system.
    ii) Describe the representation of floating point numbers and how -75.25 is represented in a 4 byte register using two's complement notation.

(2 x 10 = 20 marks)