6. a. With neat labeled diagram, describe the setup and process of Ion Milling in detail. $7+3=10$

  b. List the advantages and disadvantages of Ion Milling.

7. For the CE transistor amplifier circuit given in the figure below, $V_{CC} =20$ V, $R_C=20$ KΩ, $R_L = 2$ MΩ, $R_1= 10$ KΩ, $R_2 = 10$ KΩ, $\beta = 100$. Find the r_e model and (i) R_{in} (ii) r_L (iii) A_i (iv) A_v (v) A_p & G_p 10

8. Derive the relation of frequency of oscillation and the feedback attenuation required for sustained oscillations for a Colpitt's oscillator.   10

$= = *** = =$

[4]

REV-00
MSE/05/10

2018/06

M.Sc. ELECTRONICS
SECOND SEMESTER
IC TECHNOLOGY & ANALOG ELECTRONIC CIRCUITS
MSE - 203
(Use Separate Answer Scripts for Objective & Descriptive)

Duration : 3 hrs.   Full Marks : 70
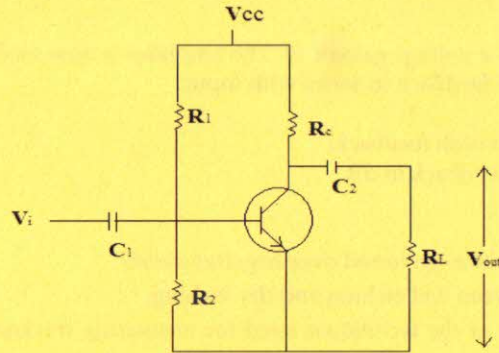
(**PART-A : Objective**)

Time : 20 min.   Marks : 20

Choose the correct answer from the following: $1 \times 20=20$

1. An amplifier has a power gain of 200. What is its gain in dB?
    a. 14 dB   b.23 dB   c. 22 dB   d. 17 dB

2. What are the types of MOSFET devices available?
    a. P-type enhancement type MOSFET   b. N-type enhancement type MOSFET
    c. Depletion type MOSFET   d. All of the mentioned

3. Which is the most striking feature in monolithic integrated circuit transistor?
    a. Collector contact is present at the bottom of IC
    b. Collector contact is present at the top of IC
    c. Collector contact is absent
    d. Collector contact is present on one of the sides of IC

4. Which of the following is used to obtain silicon crystal structure while fabricating Integrating Circuits?
    a. Oxidation   b. Epitaxial growth
    c. Photolithography   d. Silicon wafer preparations

5. Why oxidation process is required?
    a. To protect against contamination
    b. To use it for fabrication various components
    c. To prevent diffusion of impurities
    d. All of the mentioned

6. Where does the operating point of a Class A power amplifier lie?
    a. At the middle of ac load line
    b. Approximately at collector cut-off on both the dc and ac load lines
    c. Inside the collector cut-off region on ac load line
    d. At the middle of dc load line

7. The active components of the IC's are formed in
    a. Substrate   b. Sio2 layer
    c. Epitaxial layer   d. None of these

8. Ultraviolet radiation is used in IC fabrication for
    a. Diffusion   b. Masking
    c. Isolation   d. Etching

[1]   P.T.O.

9. The Barkhausen criterion for sustained oscillations is given by
   a. $A\beta = 1$
   b. $|A\beta| \geq 1$
   c. $|A\beta| < 1$
   d. $\angle A\beta = 180°$

10. Which of the following configuration is used for audio signal amplification
    a. Common base configuration
    b. Common emitter configuration
    c. Common collector configuration
    d. All configurations are equally suited

11. Which of the following amplifier class have highest linearity and lowest distortion?
    a. Class A
    b. Class B
    c. Class C
    d. Class B push-pull

12. Which of the following class have a theoretical efficiency of 78.5%?
    a. Class A
    b. Class C
    c. Class B
    d. Class D

13. Oscillators are used to _____ AC voltage.
    a. Prevent
    b. Generate
    c. Amplify
    d. Rectify

14. Negative resistance are incorporated in oscillator for
    a. Sustained oscillation
    b. Damped oscillation
    c. Biasing the oscillator
    d. Increasing amplitude of oscillation

15. In an oscillator if phase of feedback is same as that of oscillation waveform then feedback is called
    a. Positive feedback
    b. Negative feedback
    c. Cannot be predicted
    d. Either positive or negative depending upon frequency

16. Oscillation can be classified as damped and sustained on the basis of varying
    a. Input power
    b. Frequency
    c. Amplitude
    d. Noise margin

17. Amplifier gain for RC phase shift oscillation, to obey Barkhausen's criteria should be minimum of
    a. 43
    b. 4
    c. 10
    d. 29

18. If L1 and L2 are the inductances used in Hartley oscillator the effective inductance in the equation of frequency calculation is equal to (Without considering mutual index)
    a. $(L1 \times L2)/(L1+L2)$
    b. $L2^2/(L1+L2)$
    c. $L1+L2$
    d. $L1-L2$

19. The parameter h_{ie} stands for input impedance in
    a. CB arrangement with output shorted
    b. CC arrangement with output shorted
    c. CE arrangement with output shorted
    d. None of the above

20. In an RC phase shift oscillator, the minimum number of RC networks to be connected in cascade will be
    a. 1
    b. 2
    c. 3
    d. 4

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PART-B : Descriptive

Time : 2 hrs. 40 min.   Marks : 50

[Answer question no. 1 & any four (4) from the rest]

1. Define an integrated circuit. What are the basic processes involved in fabricating ICs?   10

2. a. Derive the general expression for transfer gain with negative feedback.   5+5=10

   b. An amplifier has a voltage gain of 10. The amplifier is now modified to provide a 40% feedback in series with input.
   Calculate
      i. voltage gain with feedback;
      ii. amount of feedback in dB;
      iii. Loop gain.

3. a. Why positive resist is preferred over negative resist?   2+3+5
   b. Distinguish between wet etching and dry etching.   =10
   c. Explain any one of the techniques used for measuring thickness of thin film.

4. a. Describe the operation of complementary symmetry push-pull Class B amplifier with suitable diagram.   5+5 =10

   b. Show that the maximum efficiency of Class A power amplifier is 25%

5. a. A CE transistor amplifier is characterized by h_{ie}=4 KΩ, h_{re}= 4X 10^{-4}, h_{fe}=100 and h_{oe}= 4X10^{-6} A/V. If load resistance is 8 KΩ and source resistance is 200 Ω, determine Z_{in}, Z_{out}, A_v and A_i.   5+5=10

   b. Determine the h-parameters of the circuit: