

CS/B.TECH/EE/EEE/ICE/ODD SEM/SEM-3/EC(EE)-
301/2016-17



**MAULANA ABUL KALAM AZAD UNIVERSITY OF
TECHNOLOGY, WEST BENGAL**

Paper Code : EC(EE)-301

ANALOG ELECTRONIC CIRCUITS

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own
words as far as practicable.*

GROUP – A

(Multiple Choice Type Questions)

Choose the correct alternatives for any *ten* of the
following : $10 \times 1 = 10$

- i) The output of an integrator having square wave as input is
- a) Triangular b) Ramp
c) Spike d) Parabolic.
- ii) CE amplifier is used as
- a) radio frequency amplifier
b) audio frequency amplifier
c) tuned amplifier
d) microwave amplifier.

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- iii) The maximum efficiency of transformer coupled class A power amplifier is
- a) 25% b) 50%
c) 79% d) 100%.
- iv) Power amplifier handles signal which is
- a) Small b) Very small
c) Large d) None of these.
- v) A V-I converter is a/an
- a) transconductance amplifier
b) transresistance amplifier
c) current amplifier
d) operational amplifier.
- vi) To improve the efficiency of the amplifier we have to
- a) reduce the power dissipation rating
b) reduce supply voltage
c) reduce the load power
d) reduce unwanted power loss.

- vii) An instrumentation amplifier
- a) is a differential amplifier
 - b) has a gain less than 1
 - c) has very high output impedance
 - d) has low CMRR.
- viii) A class B push-pull power amplifier has an a.c. output of 10 watts. The d.c. power from the power supply under ideal condition is
- a) 10 watts b) 15 watts
 - c) 12.75 watts d) 20 watts.
- ix) Which of the following oscillators is used for the generation of high frequencies ?
- a) R-C phase shift b) Wien-bridge
 - c) Blocking oscillator d) L-C oscillator.
- x) The Schmitt Trigger is also known as
- a) squaring circuit
 - b) blocking oscillator
 - c) sweep circuit
 - d) astable multivibrator.

- xi) If three cascaded stages of amplifiers have gains 10, 20, 30, the overall gain will be
- a) 200 b) 400
 - c) 6000 d) 1200.
- xii) For PLL
- a) capture range is less than lock range
 - b) capture range is greater than lock range
 - c) capture range is equal to lock range
 - d) no relation with them.

GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. What are the criteria of an ideal instrumentation amplifier ? What are its applications ? Draw the circuit diagram of an instrumentation amplifier. 1 + 1 + 3
3. Draw the *h*-parameter equivalent circuit of low frequency CE mode transistor amplifier and hence calculate the current gain in terms of *h*-parameters.
4. Explain the working principle of Monostable Multivibrator using 555 timer with proper diagram. Find the expression for the pulse width. 3 + 2

5. What is the ripple factor ? How can it be removed from the output of a rectifier ? Explain with suitable diagram.

2 + 3

6. Explain the difference between constant current bias and current mirror.

GROUP - C**(Long Answer Type Questions)**Answer any *three* of the following. 3 × 15 = 45

7. Describe the function of an OP-AMP as —

- (i) Logarithmic amplifier
- (ii) Integrator
- (iii) Voltage comparator
- (iv) Current to voltage converter
- (v) Schmitt trigger.

5 × 3

8. a) What are the advantages of push-pull amplifier ? Why is the push-pull circuit called so ?
- b) Draw and explain the circuit of a class A power amplifier.
- c) What is cross-over distortion ? How is it eliminated ?

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- d) An astable multivibrator using 555 timer, has $R_A = 6.8 \text{ K}$, $R_B = 3.3 \text{ K}$ and $C = 0.1 \text{ } \mu\text{F}$.

Calculate —

- (i) T_{HIGH}
- (ii) T_{LOW}
- (iii) free running frequency
- (iv) duty cycle.

2 + 6 + 3 + 4

9. a) Draw the circuit diagram of a two stage RC coupled CE transistor amplifier. Show how the magnitude and phase angle of its voltage gain vary with frequency.
- b) The mid-band gain of an RC coupled amplifier is 120. At frequencies of 100 Hz and 100 kHz, the gain falls to 60. Determine the lower and upper half power frequencies.
- c) Give the circuit of a Colpitts oscillator and explain its action. What is the approximate frequency of oscillation ?
10. a) Draw and explain a circuit which uses a diode to compensate for changes
- (i) in V_{BE}
 - (ii) in I_{CO} .

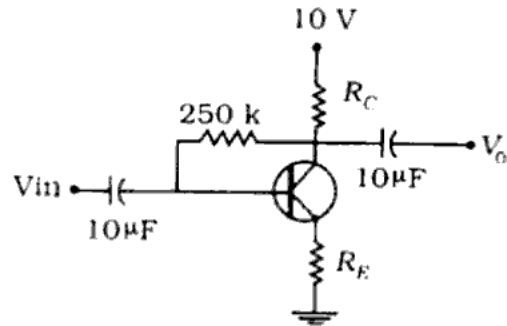
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- b) Quiescent levels of the network in the figure are given below as :

$I_{CQ} = 1.1 \text{ mA}$ and $V_{CEQ} = 3.7 \text{ V}$, when $V_{CC} = 10 \text{ V}$.

$R_B = 250 \text{ K}$ and transistor parameters are $\beta = 90$ and $V_{BE} = 0.7 \text{ V}$ and at room temperature. Find R_C and R_E .



- c) Explain the consequences of Thermal run-away.

6 + 5 + 4

11. Write short notes on any *three* of the following : 3 × 5

- Phase Locked Loop
- Astable Multivibrator
- Colpitts Oscillator
- High frequency model of a transistor
- Precision rectifier.