

CS/B.Tech/ECE/Odd/Sem-3rd/EC-304/2015-16



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

EC-304

ANALOG ELECTRONIC CIRCUITS

Time Allotted: 3 Hours

Full Marks: 70

The questions are of equal value.

The figures in the margin indicate full marks.

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

All symbols are of usual significance.

GROUP A

(Multiple Choice Type Questions)

1. Answer any *ten* questions.

10×1 = 10

(i) In a cascode amplifier

- (A) Common Emitter amplifier followed by a Common Emitter amplifier
- (B) Common Emitter amplifier followed by a Common Base amplifier
- (C) Common Base amplifier followed by a Common Emitter amplifier
- (D) Common Base amplifier followed by a Common Base amplifier

(ii) The expression of closed loop gain (A_f) for positive feedback amplifier is

- (A) $\frac{A}{1 + A\beta}$
- (B) $\frac{A}{1 - A\beta}$
- (C) $\frac{1}{1 + A\beta}$
- (D) $\frac{1}{1 - A\beta}$

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(iii) For a BJT, it is given that $h_{fe} = 100$. Then the value of current gain of an emitter follower is

- (A) near to 1
- (B) 10
- (C) 100
- (D) 101

(iv) Which circuit is also known as a regenerative comparator?

- (A) Schmitt trigger
- (B) Multivibrator
- (C) Integrator
- (D) Differentiator

(v) A I to V converter is a

- (A) transconductance amplifier
- (B) transresistance amplifier
- (C) current amplifier
- (D) none of these

(vi) In ideal transistor circuits, the stabilization factor $S = \left(\frac{\partial I_c}{\partial I_{co}} \right)$ is

- (A) < 1
- (B) > 1
- (C) $= 1$
- (D) $>> 1$

(vii) In a small signal CE amplifier circuit, a coupling capacitor is used to

- (A) control frequency
- (B) prevent DC mixing with the output
- (C) limit bandwidth
- (D) none of these

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(viii) Which one of the following oscillator is used for the generation of high frequencies?

- (A) R-C phase shift oscillator
- (B) L-C oscillator
- (C) Wien bridge oscillator
- (D) None of these

(ix) What is the input resistance of voltage series feedback?

- (A) $R_{if} = R_i(1 + \beta A_v)$
- (B) $R_{if} = \frac{R_i}{(1 + \beta A_v)}$
- (C) $R_{if} = R_i(1 + \beta G_m)$
- (D) none of these

(x) Which of the following power amplifier has less distortion?

- (A) Class A
- (B) Class B
- (C) Class AB
- (D) Class C

(xi) The output voltage of IC 7915 is

- (A) 15 V
- (B) - 15 V
- (C) 5 V
- (D) - 5 V

(xii) The net phase-shift of Wien-Bridge oscillator around the loop is

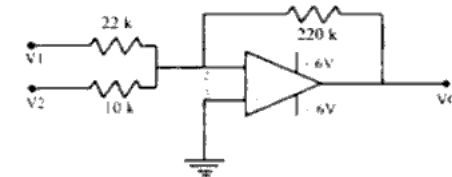
- (A) 90°
- (B) 180°
- (C) 270°
- (D) 360° or zero

GROUP B
(Short Answer Type Questions)

Answer any *three* questions.

3×5 = 15

2. If an amplifier has a bandwidth of 200 KHz and voltage gain of 80, what will be the new bandwidth and gain if 5% of negative feedback is introduced? 5
3. Draw the h-parameter equivalent circuit of small signal transistor amplifier in CE mode and hence calculate the current gain in terms of h parameters. 3+2
4. Draw the circuit of a Wien-Bridge oscillator and explain its operation. 5
5. Calculate the output voltage of the circuit shown below where $V_1 = 350$ mV and $V_2 = 200$ mV. 5



6. What is VCO? What are the basic differences between VCO and fixed frequency oscillator? 2+3

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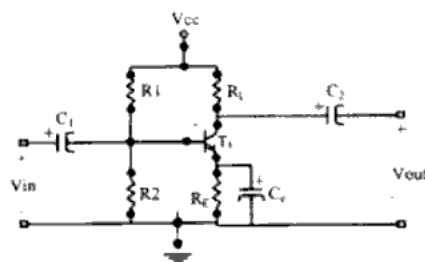
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GROUP C
(Long Answer Type Questions)

Answer any *three* questions.

3×15 = 45

7.



- Which biasing technique is used in the above circuit? Explain physically how this biasing technique provides a good stability against temperature. 1+4
- Derive an expression for the stability factor $S = \left(\frac{\partial I_C}{\partial I_{CO}} \right)$ for the above circuit. 5
- In the above circuit if the value of $R_1 = 25 \text{ k}\Omega$, $R_2 = 5 \text{ k}\Omega$, $R_C = 1 \text{ k}\Omega$ and $R_E = 100 \Omega$ respectively, then calculate the base current and hence collector current. It is given that $\beta = 50$ and the transistor is made by silicon. 5

- Explain the operation of the following circuits using op-amp. 5+5+5
 - Precision rectifier
 - Integrator
 - Schmitt Trigger.

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Turn Over

- Explain the operation of a transformer coupled class A power amplifier. 5+2+(3+5)
 - In which respect class B push-pull amplifier is better than a class A amplifier?
 - What is Crossover distortion in a class B amplifier? How it can be overcome?

- What is voltage regulator? Classify its different types. 1+1
 - Explain the operation of Shunt Voltage Regulator with neat diagram. 5
 - Describe the working principle of π -filter with neat diagram and find its ripple factor. 5+3

- Explain the function of the internal blocks of IC555 timer. 7
 - Explain the operation of an Astable Multivibrator using IC555 timer. 8

- Write short notes on any *three* of the following: 3×5
 - V to I converter
 - PLL
 - Hartley Oscillator
 - Current Mirror
 - Tuned Amplifier
 - Compensation Techniques

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