

# University of Mumbai

## Examination 2020

Examinations Commencing from 7<sup>th</sup> January 2021 to 20<sup>th</sup> January 2021

Program: Electronics and Telecommunication Engineering

Curriculum Scheme: Rev2019

Examination: SE Semester III

Course Code: ECC302 and Course Name: Electronic Devices and Circuits

Time: 2 hour

Max. Marks: 80

Q1.	Choose the correct option for following questions. All the questions are compulsory and carry equal marks
1.	Internal transistor junction capacitances affect the high-frequency response of amplifiers by
Option A:	Reducing the amplifier's gain only
Option B:	Reducing the amplifier's gain and introducing phase shift as the signal frequency increases.
Option C:	Introducing phase shift as the signal frequency increases.
Option D:	Having no effect.
2.	_____ Frequencies are values of frequency at which the RC circuits reduce the voltage gain to 70.7% of its midrange value.
Option A:	Critical
Option B:	Maximum
Option C:	Normal
Option D:	Nominal
3.	Doubling the voltage gain of an amplifier causes a _____ dB _____.
Option A:	10, increase
Option B:	10, decrease
Option C:	6, increase
Option D:	6, decrease
4.	A certain amplifier has a bandwidth of 22.5 kHz with a lower cutoff frequency of 600 Hz. What is the value of higher cut off frequency ( $F_{c_u}$ )?
Option A:	21.9 kHz
Option B:	23.1 kHz
Option C:	600 Hz
Option D:	22.5 kHz

5.	Which of the following coupling method is not suitable for two or multistage cascade connection?
Option A:	Direct coupling
Option B:	R-C coupling
Option C:	Transformer coupling
Option D:	Inductance coupling
6.	The formula for closed loop voltage gain of amplifier with feedback using open loop voltage gain A and gain of feedback circuit B will be _____.
Option A:	$AF=A*B$
Option B:	$AF= -B/(1+AB)$
Option C:	$AF= A/(1+AB)$
Option D:	$AF= - A/(1+AB)$
7.	Negative feedback in an amplifier improves:
Option A:	Output SNR improvement & Reduces distortion
Option B:	Reduces output SNR
Option C:	Increases distortion
Option D:	Decreases distortion
8.	For a circuit to become an oscillator, the criteria of Barkhausen is
Option A:	Total loop gain $A\beta$ must be unity.
Option B:	Total phase shift around the loop must be zero or 360 degree
Option C:	Unity loop gain and 0 or 360 Phase shift both must satisfied
Option D:	only phase shift of 0 degree is required
9.	RC phase shift oscillators contain a minimum of _____ Phase shift network.
Option A:	2
Option B:	3
Option C:	4
Option D:	0
10.	An amplifier has an input signal voltage of 0.034 mV. The output voltage is 12.5 V. The voltage gain in dB is
Option A:	53.6 dB.

Option B:	231 dB.
Option C:	107.3 dB.
Option D:	111.3 dB
11.	Which of the following is not a type of LC oscillator?
Option A:	Crystal oscillator
Option B:	Hartley oscillator
Option C:	Clapp oscillator
Option D:	Colpitts oscillator
12.	For a Wien Bridge Oscillator given that $R_1=20k\Omega$ , $C_1=2nF$ , $R_2=20k\Omega$ , $C_2=2nF$ , find the approximate resonant frequency.
Option A:	25kHz
Option B:	15kHz
Option C:	8 kHz
Option D:	4 kHz
13.	The difference output of the differential amplifier is the amplification of _____.
Option A:	Difference between the voltages of input signals
Option B:	Difference between the output of each transistor
Option C:	Difference between the supply and the output of each transistor
Option D:	No difference is measured between outputs of the transistors
14.	If $A_{DM} = 1500$ and $A_{CM} = 0.15$ , the CMRR value in dB is _____.
Option A:	44 dB
Option B:	60 dB
Option C:	80 dB
Option D:	90 dB
15.	A current mirror can be used as an active load because it has
Option A:	Low dc resistance
Option B:	High ac resistance
Option C:	Low ac resistance
Option D:	High dc resistance

16.	The advantage of a cascode current mirror over a simple current mirror is
Option A:	Output resistance of cascode mirror is larger
Option B:	Cascode requires lesser area
Option C:	Cascode mirror gives more voltage value range
Option D:	Both lesser area and large voltage headroom.
17.	The maximum efficiency of resistance loaded class A power amplifier is
Option A:	75 %
Option B:	50 %
Option C:	40 %
Option D:	25 %
18.	What is the purpose of heat sink in power amplifier circuit?
Option A:	Provides extra temperature from the surrounding.
Option B:	Helps to dissipate the heat by transferring it to the surrounding.
Option C:	Used for providing extra mechanical support.
Option D:	Helps to reduce the miller effects in the transistors.
19.	Which of the device does not have the gate terminal?
Option A:	TRIAC
Option B:	FET
Option C:	SCR
Option D:	DIAC
20.	Which power amplifier has the highest collector efficiency?
Option A:	Class A
Option B:	Class B
Option C:	Class C
Option D:	Class AB push pull

### Option 3

<b>Q2.</b>	<b>20 marks</b>
A.	<b>Solve any Two</b> <span style="float: right;"><b>5 marks each</b></span>
i.	With a neat, labelled diagram, explain the Hartley oscillator.
ii.	What are the methods to overcome cross over distortion in Class B power amplifier?
iii.	What are the methods of cascading Multistage amplifier? Compare them.
B.	<b>Solve any One 10 mark each</b>
i.	<p>Calculate bandwidth for single stage CE amplifier, following parameters are available for the given circuit.</p> <p><math>\beta = 100, r_e = 30 \Omega, A_V = 1.</math></p>
ii.	Explain the working of silicon-controlled rectifier (SCR) using the two-transistor analogy with a neat, labelled diagram. Draw the structure / construction with V-I characteristics of SCR.

<b>Q3.</b>	<b>20 marks</b>
A.	<b>Solve any Two</b> <span style="float: right;"><b>5 marks each</b></span>
i.	Explain Miller effect and unity gain bandwidth product concept.
ii.	Draw MOSFET differential amplifier with active load.
iii.	Compare voltage series and current shunt feedback amplifiers.
B.	<b>Solve any One 10 mark each</b>
i.	Draw Class A transformer coupled amplifier & load line, derive the expressions for the maximum overall operating efficiency $\eta_{o(max)}$ & maximum

	collector conversion efficiency $\eta_{c(max)}$ .
ii.	Explain working of RC phase shift oscillator. Give expression for frequency of oscillations.