

# University of Mumbai

Examination June 2021

Examinations Commencing from 15<sup>th</sup> June 2021 to 26<sup>th</sup> June 2021

Program: BE Electronics & Telecommunication Engineering

Curriculum Scheme: Rev 2012

Examination: TE Semester V

Course Code: ETC505 and Course Name: Integrated Circuits

Time: 2 Hours

Max. Marks: 80

<b>Q1.</b>	<b>Choose the correct option for following questions. All the Questions are compulsory and carry equal marks</b>
1.	Which circuit converts irregularly shaped waveforms to regular shaped waveforms?
Option A:	Schmitt trigger
Option B:	Voltage limiter
Option C:	Precision Rectifier
Option D:	Peak detector
2.	In a voltage to frequency converter
Option A:	The output voltage is proportional to input current.
Option B:	The output frequency is proportional to input voltage.
Option C:	The output voltage is proportional to input frequency.
Option D:	The output current is proportional to input voltage.
3.	An ideal operational amplifier has
Option A:	infinite output impedance
Option B:	zero input impedance
Option C:	infinite bandwidth
Option D:	Zero gain
4.	Which among the following is a non-linear application of op-amp?
Option A:	V to I converter
Option B:	V to F converter
Option C:	Precision rectifier
Option D:	Instrumentation amplifier
5.	Which one of the following is popular power audio amplifier IC
Option A:	NE 566
Option B:	7905
Option C:	IC 723
Option D:	LM 380
6.	An ideal second order active band reject filter has two cut off frequencies $f_L$ and $f_H$ where $f_L < f_H$
Option A:	It passes frequencies above $f_L$ and rejects frequencies below $f_H$
Option B:	It passes frequencies above $f_H$ and rejects frequencies below $f_L$
Option C:	It passes frequencies above $f_H$ and below $f_L$
Option D:	It rejects frequencies above $f_H$ and below $f_L$

7.	A monolithic timer IC which can be used as Astable and Monostable multivibrator is
Option A:	IC 565
Option B:	IC 566
Option C:	IC 555
Option D:	IC 723
8.	The input offset current is equals to
Option A:	difference between two base currents
Option B:	average of two base currents
Option C:	collector current divided by current gain
Option D:	base current divided by current gain
9.	Which is the universal Shift Register?
Option A:	74194
Option B:	7490
Option C:	7492
Option D:	7493
10.	For an ideal comparator, what should be the value of the response time?
Option A:	Zero
Option B:	Unity
Option C:	Infinite
Option D:	Unpredictable
11.	For a phase shift oscillator, the three RC cascaded networks in the feedback circuit have values of their resistances $R = 3.3 \text{ k}\Omega$ and capacitances $C = 0.1 \text{ }\mu\text{F}$ ,
Option A:	<b>Its frequency of oscillation is <math>\approx 1 \text{ kHz}</math></b>
Option B:	<b>Its frequency of oscillation is <math>\approx 3.030 \text{ kHz}</math></b>
Option C:	<b>Its frequency of oscillation is <math>\approx 3.3 \text{ kHz}</math></b>
Option D:	<b>Its frequency of oscillation is <math>\approx 200 \text{ Hz}</math></b>
12.	The basic difference between a series regulator and shunt regulator is
Option A:	The amount of current that can be handled
Option B:	The position of the control element
Option C:	The type of sample circuit
Option D:	The type of error detector
13.	An IC whose functional block diagram consists of VCO, Multiplier, Sine shaper and switches is
Option A:	IC 555
Option B:	IC 723
Option C:	XR 2206
Option D:	IC 741
14.	The common-mode voltage gain of an operational amplifier is
Option A:	Smaller than differential voltage gain
Option B:	Equal to differential voltage gain
Option C:	Greater than differential voltage gain

Option D:	Infinite
15.	An instrumentation amplifier using three op-amps is characterized by
Option A:	Variable voltage gain, low input impedance, high output impedance and high CMRR.
Option B:	Fixed voltage gain, low input impedance, low output impedance and low CMRR.
Option C:	Variable voltage gain, high input impedance, low output impedance and high CMRR.
Option D:	Fixed voltage gain, high input impedance, high output impedance and high CMRR.
16.	Voltage regulators keep a constant _____ output voltage when the input or load varies within limits.
Option A:	DC
Option B:	AC
Option C:	Ripple
Option D:	Zero
17.	A decade counter has _____ states.
Option A:	5
Option B:	10
Option C:	15
Option D:	20
18.	For an Op-amp having differential gain $A_v$ and common mode gain $A_c$ then CMRR is given by
Option A:	$A_v + A_c$
Option B:	$A_v / A_c$
Option C:	$1 + (A_v / A_c)$
Option D:	$A_c / A_v$
19.	A counter circuit is usually constructed of _____.
Option A:	A number of latches connected in cascade form
Option B:	A number of NAND gates connected in cascade form
Option C:	A number of flip-flops connected in cascade
Option D:	A number of NOR gates connected in cascade form
20.	All of the following are parts of a basic voltage regulator except
Option A:	Control element
Option B:	Sampling circuit
Option C:	Voltage follower
Option D:	Error detector

### Subjective/Descriptive questions

Q2	Solve any Four out of Six (5 marks each)
A	Discuss any five parameters of op-amp.
B	Draw a neat diagram of non-inverting Schmitt trigger and its voltage transfer characteristics.
C	Give any five features of IC 555.

D	Draw a neat circuit diagram of $RC$ phase shift oscillator using op-amp. Derive its frequency of oscillation.
E	Draw a neat circuit of Voltage to Current converter with floating load. Give its output expression.
F	Write short note on: IC 74181 Arithmetic Logic Unit
<b>Q3</b>	<b>Solve any Four out of Six (5 marks each)</b>
A	With the help of a neat circuit diagram explain any one application of PLL 565.
B	What is an instrumentation amplifier? Draw a neat circuit of an instrumentation amplifier using 3 op-amps.
C	Draw and explain the functional block diagram of IC 555
D	Explain Power amplifier LM 380.
E	Write short note on: Waveform generator XR 2206
F	Draw the internal structure of IC 7490 Decade Counter. Draw its timing diagrams

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Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	A
Q2.	B
Q3.	C
Q4	C
Q5	D
Q6	C
Q7	C
Q8.	A
Q9.	A
Q10.	A
Q11.	D
Q12.	B
Q13.	C
Q14.	A
Q15.	C
Q16.	A
Q17.	B
Q18.	B
Q19.	C
Q20.	C