

Q.P. Code : 11224

Second Semester B.Sc. Degree Examination, May/June 2019

(CBCS Scheme)

Electronics

**Paper II — ELECTRONICS CIRCUITS AND SPECIAL
PURPOSE DEVICES**

Time : 3 Hours]

[Max. Marks : 70

Instructions to Candidates :

1. Answers **ALL** the questions from Part A and **FIVE** questions from Part B and any **FOUR** questions from Part C.
2. It is required to answer all the questions of Part A in one page. Answering the same question multiple times will not be considered for evaluation.

PART - A

1. Answer the multiple choice : **(15 × 1 = 15)**
 - (i) The phase difference between output and input voltages of a CE amplifier is
 - (a) 180 deg
 - (b) 0
 - (c) 90
 - (d) 360
 - (ii) Loading effect is present in
 - (a) Transformer coupled amplifier
 - (b) Resistor capacitor coupled amplifier
 - (c) Direct coupled amplifier
 - (d) Tuned amplifier
 - (iii) In Common Collector amplifier output is obtained between
 - (a) Base and collector
 - (b) Collector and ground
 - (c) Base and ground
 - (d) Emitter and ground

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- (iv) Efficiency of a transformer coupled class A power amplifier is
- (a) 25% (b) 50%
(c) 78.5% (d) > 90%
- (v) A tuned circuit has a resonant frequency of 1 MHz. To get a Q factor 50, bandwidth must be equal to
- (a) 10 kHz (b) 20 kHz
(c) 50 kHz (d) 20 Hz
- (vi) In class B power amplifier the operating point of the transistor is
- (a) at the centre of the load line
(b) at the cut off point
(c) in the saturation region
(d) Beyond the cutoff point
- (vii) A differential Amplifier has two inputs and the output is measured between both the collectors then the configuration is referred to as
- (a) Dual input balanced output
(b) Single input unbalanced output
(c) Single input balanced output
(d) Dual input unbalanced output
- (viii) Differential gain means
- (a) Amplifying the sum of inputs
(b) Amplifying the difference between inputs
(c) Attenuating the difference between inputs
(d) Attenuating the sum of inputs
- (ix) If $A_d = 3500$ and $A_{cm} = 0.35$ for a differential amplifier, the CMRR is
- (a) 10,000 (b) 1225
(c) 1000 (d) 100

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- (x) When negative feedback is used in an amplifier is lower and upper cutoff frequencies
- (a) will be increased
 - (b) will be decreased
 - (c) decreased and increased respectively
 - (d) increased and decreased respectively
- (xi) Crystal oscillators are superior to tuned LC oscillators mainly because of their
- (a) size of crystal
 - (b) high value of Q factor
 - (c) frequency stability
 - (d) both (b) and (c)
- (xii) A monostable multivibrator has
- (a) two stable states
 - (b) one stable state
 - (c) no stable states
 - (d) only stable states
- (xiii) Varactor diode is a semiconductor diode in which the _____ can be varied as a function of reverse voltage of the diode.
- (a) Junction resistance
 - (b) Junction capacitance
 - (c) Junction impedance
 - (d) None of the above
- (xiv) A photodiode is a _____ PN junction.
- (a) lightly doped
 - (b) forward biased
 - (c) reverse biased
 - (d) heavily doped
- (xv) Solar cell converts
- (a) Sound energy into electrical energy
 - (b) Electrical energy into mechanical energy
 - (c) Light energy into electrical energy
 - (d) Light energy into mechanical energy

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PART - B

Answer any **FIVE** of the following :

(5 × 7 = 35)

2. (a) Draw the frequency response curve of CE amplifier. Explain. 10.
- (b) Draw the circuit diagram of a swamped amplifier. **(5 + 2)**
3. (a) What is a Darlington amplifier and list its characteristic features?
- (b) Why is a common collector amplifier called an emitter follower? Mention its uses. **(4 + 3)**
4. (a) With a circuit diagram explain the working of single tuned amplifier.
- (b) Draw the frequency responses of a double tuned amplifier for different coupling. **(4 + 3)**
5. (a) Draw the circuit diagram of dual input balanced output differential amplifier and derive the expressions for Q point.
- (b) What is the effect of current mirror on CMRR of the differential amplifier? **(6 + 1)**
6. (a) State the Barkhausen conditions for sustained Oscillations?
- (b) Derive the expression for closed loop gain of a voltage series negative feedback amplifier. **(2 + 5)**
7. Explain the operation of an Astable multivibrator with a circuit diagram. Why is it called a free running multivibrator?
8. (a) Explain the working of enhancement type MOSFET.
- (b) Draw the symbol & VI characteristics of a Tunnel diode. Mention its applications. **(4 + 3)**
9. Draw and explain the working of UJT relaxation oscillator and write the expression for its output frequency. **(7)**

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PART - C

Answer any **FOUR** of the following :

(4 × 5 = 20)

- 7 = 35)
- (5 + 2)
- tion its
(4 + 3)
- different
(4 + 3)
- ferential
- ifier?
(6 + 1)
- negative
(2 + 5)
- Why is
- tion its
(4 + 3)
- rite the
(7)
10. Three amplifier stages are working in cascade with 0.05 V peak to peak input providing 150 V peak to peak output. If the voltage gain of the first stage is 20 and input to the third stage is 15 V peak to peak, determine :
- (a) The overall voltage gain
- (b) Voltage gain of the 2nd and 3rd stages
- (c) Input voltage of the 2nd stage.
11. A transistor rated for a maximum collector dissipation of 100 mW operates a single ended class A output stage from a 10 V supply. Calculate the approximate value of
- (a) Maximum undistorted ac output power
- (b) The quiescent current
- (c) Turns ratio of the output transformer
- if the load resistance is 16 Ω. Assume overall and collector efficiency = 0.5.
12. In a dual input balanced output differential amplifier $I_B = 1 \text{ mA}$, $R_C = 2.2 \text{ k } \Omega$, $R_E = 4.7 \text{ k } \Omega$ and $\beta = 200$. Calculate :
- (a) Differential gain
- (b) Common mode gain and
- (c) CMRR
13. In a transistor Colpitt's oscillator, $C_1 = C_2 = 0.1 \text{ } \mu\text{F}$ and the inductance used in the tank circuit is 1000 μH . Calculate the frequency of oscillations. If the value of inductance is halved, calculate the frequency of oscillations.
14. Two identical SCRs are employed in a full wave centre tap rectifier. Both the SCRs have forward breakover voltage 200 V for a gate current of 1 mA. If the peak ac voltage across each SCR is 500 V, Calculate :
- (a) Firing angle
- (b) Average output voltage
- (c) Average current

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15. Identify the type of seven segment display. Which are the inputs segments to be activated to display

- (a) 0 (b) 2 (c) 5 and (d) 8

