SM – 420

II Semester B.Sc. Examination, May/June 2018
(CBCS) (Fresh + Repeaters)
(2014-15 and Onwards)
ELECTRONICS – II
Electronics Circuits and Special Purpose Devices

Time : 3 Hours Max. Marks : 70

Instructions : *Answer **all** the questions from Part – **A**, **any five** questions from Part – **B** and **any four** questions from Part – **C**.*

Note : *It is required to answer **all** the questions of Part – **A** in **any one** page answering the **same** questions multiple times will **not** be considered for evaluation.*

PART – A

1. Answer **all** the subdivisions : **(15×1=15)**

i) An amplifier has a power gain of 100. Its gain in dB is
a) 10 dB b) 20 dB c) 30 dB d) 40 dB

ii) In an RC coupled amplifier, the voltage gain over mid-frequency range
a) Changes abruptly with frequency b) Is constant
c) Changes uniformly with frequency d) None of the above

iii) A JFET is a _____ driven device.
a) Current b) Voltage
c) Power d) Both current and voltage

iv) In a Class B power amplifier, the maximum efficiency is
a) 25% b) 78.5% c) 50.5% d) 100%

v) The size of a power transistor is made considerably large to
a) Provide easy handling b) Dissipate heat
c) Facilitate connections d) Make easy to use

vi) A tuned amplifier is _____ amplifier.
a) Narrowband b) Wideband
c) Direct coupled d) Impedance coupled

vii) Differential gain means
a) Amplifying the difference between inputs
b) Amplifying the sum of inputs
c) Attenuating the difference between inputs
d) Attenuating the sum of inputs

P.T.O.

viii) The tail current equals the
a) Difference between the two emitter currents
b) Sum of the two emitter currents
c) Collector current divided by current gain
d) Collector voltage divided by collector resistance

ix) Negative feedback in an amplifier
a) Reduces the voltage gain
b) Reduces the distortion
c) Both a) and b)
d) Increases the voltage gain

x) The Hartley oscillator uses
a) One inductor
b) Two inductors
c) Three inductors
d) Four inductors

xi) A multivibrator which consist of two quasi stable state is called
a) Bistable multivibrator
b) Monostable multivibrator
c) Tristable multivibrator
d) Astable multivibrator

xii) A MOSFET can be operated with
a) Negative gate voltage only
b) Positive gate voltage only
c) Positive as well as negative gate voltage
d) Zero voltage only

xiii) To turn on UJT, the forward bias on the emitter diode should be _____ the peak point voltage.
a) Less than
b) Equal to
c) More than
d) None of the above

xiv) A TRIAC is equivalent to two SCRs in
a) Parallel
b) Series
c) Inverse parallel
d) Series parallel

xv) For satellites the source of energy is
a) Solar cell
b) Fuel cells
c) Edison cells
d) Cryogenic storage

PART – B

Answer **any five** questions : **(5×7=35)**

2. a) With an equivalent circuit, derive an expression for voltage gain of a CE amplifier. Also write an expression for Z_{in} and Z_{out}.

b) Classify the amplifier based on different types of coupling. **(6+1)**

3. a) With a circuit diagram, explain the working of a common source JFET amplifier.

   b) Draw the circuit diagram of a Darlington amplifier and mention its characteristic features. **(4+3)**

4. a) What is crossover distortion ? How it can be minimized ?

   b) Explain the frequency response curve of a double tuned amplifier for critical and tight coupling. **(3+4)**

5. a) Derive an expression for Q-point of a dual input balanced output differential amplifier.

   b) What is a current mirror ? Mention its effect on differential gain. **(5+2)**

6. a) Mention the advantages of a negative feedback configuration over a positive feedback configuration.

   b) Derive an expression for the voltage gain of a voltage series negative feedback amplifier. **(2+5)**

7. a) What are damped and undamped oscillations ?

   b) Draw the equivalent circuit of a piezo electric crystal. With a circuit diagram, explain the working of a crystal oscillator. **(2+5)**

8. With a circuit diagram, explain the working of a SCR full wave rectifier and derive an expression for its average load voltage and current. **7**

9. a) Write the symbol of TRIAC and DIAC. Mention its applications.

   b) Draw the V-I characteristics curves of varactor diode and photo diode. **(3+4)**

PART – C

Answer **any four** questions : **(4×5=20)**

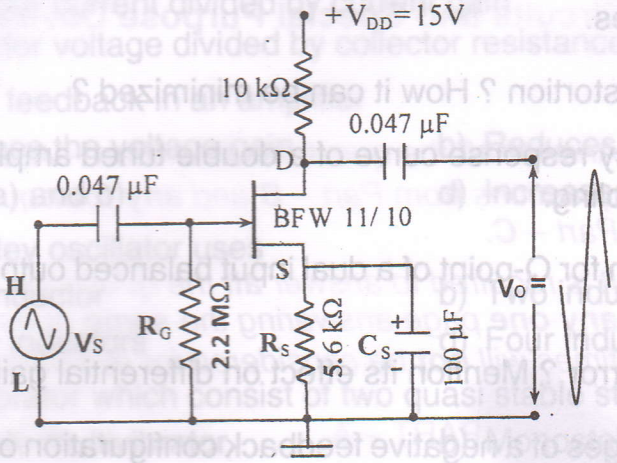
10. A three stage RC coupled amplifier produces an output voltage of 100V for the input voltage of 5 mV. The voltage gain of the first stage is 100 and the output voltage of the second stage is 20V. Calculate the :

    i) output voltage of first stage

    ii) voltage gain of second and third stage

    iii) express the overall voltage gain in dB.

11. Calculate the voltage gain of Common Source JFET amplifier shown in figure. Given, g_m = 4mS and r_d = 10 kΩ. Also, find the voltage gain, if 20 kΩ load resistance is connected across the output terminals.



12. In a dual input balanced output differential amplifier, I_E = 2mA, R_C = 1.8kΩ, R_E = 470Ω and β = 150. Calculate :
    i) Differential gain
    ii) Common mode gain
    iii) Input impedance
    iv) CMRR.

13. In a transistor Colpitt's oscillator, $C_1 = C_2$ = 0.1 µF and the inductance used in the tank circuit is 500 µH. Calculate the frequency of oscillations. If the value of inductance is doubled, calculate the frequency of oscillations.

14. The UJT has η = 0.65 and R_{BB} = 8kΩ. Calculate :
    i) R_{B1} and R_{B2}
    ii) Peak point voltage (V_P).

    If R_{BB} is changed to 4kΩ, calculate the same.

    Given V_{BB} = 10V and V_D = 0.7 V.

15. Each of the SCRs used in a full wave rectifier will fire at 100V for a gate current of 1mA. If the peak a.c. voltage across each SCR is 200 V, calculate the :
    i) Firing angle
    ii) Average output voltage
    iii) Average current for a load resistance of 220Ω and
    iv) Power output.