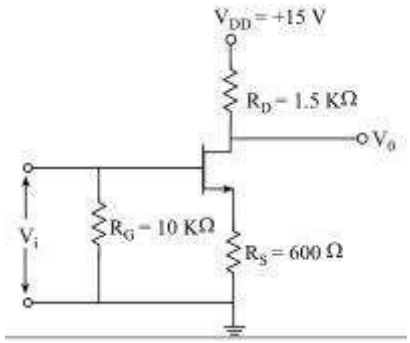
TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
(Sample Question)

Exam.	Regular (New Course)		
Level	BE	Full Marks	60
Programme	BEI, BCT	Pass Marks	24
Year / Part	I / II	Time	3 hrs.

Subject: - Electronics Device and Circuits (EX 151)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. Design BJT voltage divider bias circuit. Given: $\beta = 250$, $I_C = 2$ mA, and $V_{CC} = +16$ V. Use Firm biasing. [4]
2. Draw common emitter (CE) amplifier without by pass capacitor. Derive the expression of input resistance, output resistance and voltage gain. [5]
3. Derive the expression for small signal parameter $r\pi$ and re of BJT. [4]
4. Explain the working of n-channel JFET with characteristics curves and characteristic equation. [6]
5. Find I_D and V_{DS} of given circuit. |Given: $V_P = -4$V and $I_{DSS} = 10$ mA, [7]



6. Draw the circuit diagram of an RC phase shift oscillator and derive its frequency of oscillation. [4]
7. Draw the ckt diagram and explain working principle of square wave generator using op-amp. Derive its frequency of oscillation. [4]
8. Draw the circuit diagram of simple current mirror ckt. Explain why the output current is not exactly equal to reference current. [5]
9. Draw the circuit diagram and the characteristic curve of a transformer coupled class A amplifier and derive its general and maximum efficiency. [4]
10. Why Class B amplifier is refer as Push-Pull amplifier? Prove that the minimum efficiency of Class B amplifier is 50%. [5]
11. What is tank circuit? How can it be used as toned amplifier? [4]
12. Draw a series voltage regulator circuit with OP amplifier. Explain how it regulates the voltage. [2+2]
13. Design Dual power supply with ± 15 V using fixed IC voltage regulator. [4]

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TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2081 Ashwin

Exam.	Regular (New Course-2080 Batch)		
Level	BE	Full Marks	60
Programme	BEI, BCT	Pass Marks	24
Year / Part	I / II	Time	3 hrs.

Subject: - Electronics Device and Circuit (*EX 151*)

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- ✓ *Attempt **All** questions.*
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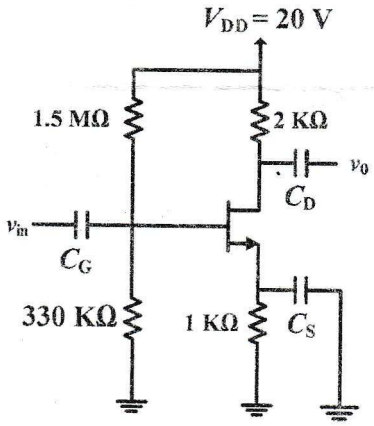
1. Design β independent type dc biased common emitter amplifier. Given parameters $V_{CC} = 20$ V, $I_C = 1.5$ mA and $\beta = 110$. Use stiff biasing method. [4]
2. Why is a common collector BJT amplifier also known as an emitter follower? Draw the small signal model of common collector amplifier circuit and derive expressions for input resistance, voltage gain, and current gain. [1+4]
3. Derive trans-conductance of BJT. [4]
4. Describe the construction and working principle of n channel enhancement-type MOSFET with the help of necessary diagrams and its drain characteristic curve. [7]
5. Find I_D and V_{DS} for the following circuit. Given data are $V_P = -5.5$ V, $I_{DSS} = 10$ mA. Assume all the capacitors are ideal and check whether the transistor is operating in the Pinch off region or not. [6]



6. State Barkhausen criterion for sinusoidal oscillation. Draw the circuit diagram of Colpitts oscillator and write its frequency of oscillation. [4]
7. Derive frequency of oscillation of 555 timer Astable Multivibrator. [4]
8. Draw a Widlar Current Source. Derive an expression for an output resistance of Widlar Current Source. [5]
9. Calculate the efficiency of a transformer coupled Class A amplifier for a supply of 12 V DC and output of $V_P = 12$ V and 6 V. [4]
10. Draw the circuit diagram and the characteristic curve of a transformer coupled class B push-pull amplifier and derive its general efficiency. [5]
11. Draw the circuit diagram of class A tuned amplifier with its frequency response. Derive its 3dB bandwidth. [4]
12. Design variable DC voltage regulator using LM 317 to get (10-20) volts output. [4]
13. Explain the working principle of a series transistor voltage regulator with improved performance and derive an expression for the voltage stability. [2+2]

TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2082 Baishakh

Exam.	Back (New Course)		
Level	BE	Full Marks	60
Programme	BEI, BCT	Pass Marks	24
Year / Part	I / II	Time	3 hrs.

Subject: - Electronic Device and Circuit (*EX 151*)

- ✓ *Candidates are required to give their answers in their own words as far as practicable.*
- ✓ *Attempt **All** questions.*
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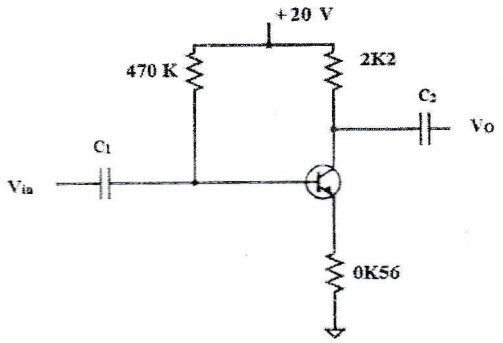
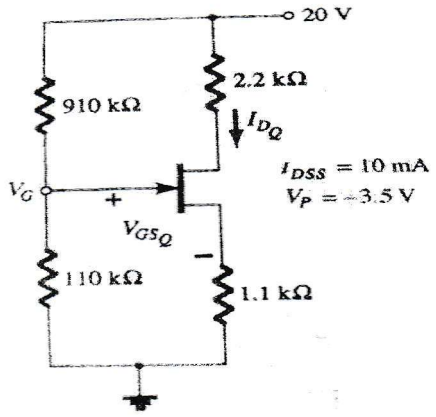
1. Design a β-independent voltage divider bias circuit using the appropriate guidelines for the given parameters: $V_{CC} = 12$ V, $I_E = 1$ mA, and $\beta = 100$. [4]
2. Determine input resistance, voltage gain and output resistance of given common emitter BJT Amplifier. $\beta = 120$ and $r_O = 40$ kΩ. [5]



3. Explain the operation principle of a BJT as a switch with the necessary diagrams. [4]
4. Describe the construction and working principle of n-channel depletion type MOSFET with the help of characteristics curve and mathematical expressions. [7]
5. For the given JFET voltage divider configuration, determine I_{DQ}, V_{GSQ}, V_{DS} and transconductance gm. [6]



6. Draw circuit diagram of LC Hartley oscillator. Derive its frequency of oscillation. [4]
7. Derive the expression of bandwidth of class A tuned amplifier. [4]
8. Show that the voltage gain of the differential amplifier with active load is twice that with passive load. [5]
9. Derive general efficiency of series fed class A amplifier. [4]

10. For a class B amplifier using a supply of V_{CC} = 30 V and driving a load of 16 Ω, determine the maximum input power, maximum output power and maximum power dissipation at transistors. [5]

11. Derive frequency of oscillation of 555 timer Astable Multivibrator [4]

12. Draw series voltage regulator with current limiting circuit and explain how this protection circuit works. Design a voltage regulator to give output voltage from 5 V to 15 V using LM317. [4+4]

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