

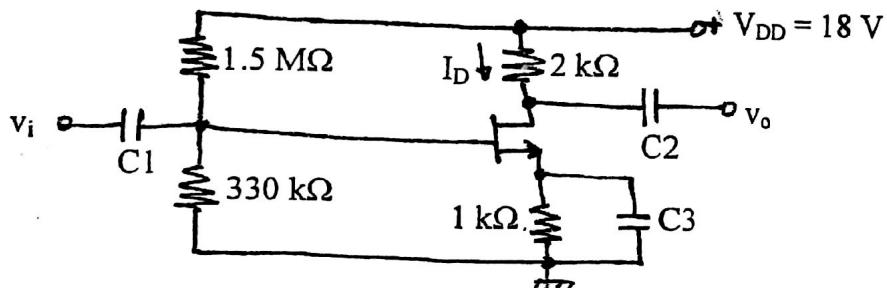
INSTITUTE OF ENGINEERING
Examination Control Division
2070 Ashad

Level	BE	Full Marks	80
Programme	BEL, BEX, BCT	Pass Marks	32
Year / Part	II / I	Time	3 hrs.

Subject: - Electronic Device and Circuits (EX501)

- ✓ 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. What is the significance of operating point in diode? Draw the dc load line with the help of diode circuit and its characteristics curve. [1+3]
 2. In the given circuit, the diode used has its $n = 1.74$ and it conducts 1mA at forward bias voltage of 0.7V. Find the current flow in the circuit. [6]
-
3. Design a voltage divider type dc biased common emitter amplifier to obtain β independent biasing. Use appropriate guidelines to support your design. Given parameters are: $V_{CC} = 12$ VDC, $I_C = 2$ mA and $\beta = 150$. Also determine its voltage gain. [6+2]
 4. Draw the small signal model for Common collector Amplifier and find its input resistance and voltage gain. [2+3+3]
 5. Find I_D and V_{DC} for the given circuit. Given data are: $V_P = -5.5$ V, $I_{DSS} = 12$ mA and assume all capacitors are ideal and check whether transistor is operating in pinch off region or not? [2+2+2+2]



6. Explain why self DC biasing MOSFET circuit is better than fixed DC biasing MOSFET circuit. [4]
7. Derive an expression to find the transconductance for JEET. [4]
8. Draw the circuit of class A series fed amplifier and its corresponding characteristic graph. And, find its general efficiency. [1+2+3]
9. Draw the circuit diagram of transformer coupled class B push-pull amplifier. And show that the maximum efficiency is $25\pi\%$. [2+4+2]
10. Define Barkhausen criteria for sinusoidal. Draw the circuit diagram of RC phase shift oscillator and derive its frequency of oscillation. [2+2+6]
11. Draw the circuit diagram of variable series voltage regulator with transistor as error amplifier. And find its voltage stability factor and explain how change in output voltage can be improved. [2+4+2]
12. Design a voltage regulator circuit using LM317 to obtain 16 VDC with the input 24 VDC. [4]
13. Draw the square wave generator circuit using operational amplifier. [2]

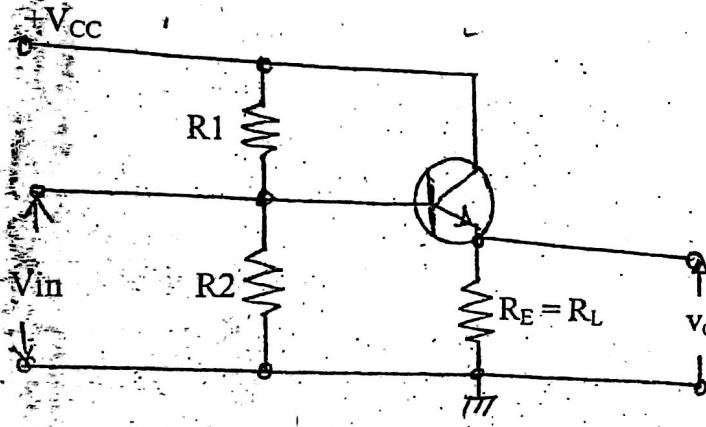
KIRAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2071 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEL, BEX, BCT	Pass Marks	32
Year / Part	II / I	Time	3 hrs.

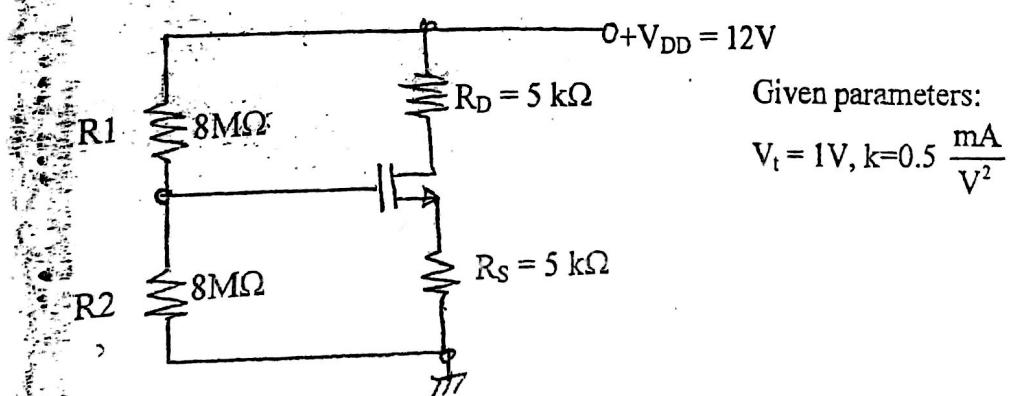
Subject: - Electronic Devices and Circuits (EX501)

- ✓ 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. Draw graphs of IV characteristics of ordinary PN junction diode and zener diode. Draw ac equivalent model for PN junction diode and derive its dynamic resistance. [2+4]
2. A diode conducts 1mA at 20°C. If it is operated at 100°C, what will be its current? Given data are $\eta = 1.6$ and negative temperature coefficient value = -2.2 mV/°C. [4]
3. Design voltage divider bias (common emitter configuration) to get $I_{CQ} = 1.5$ mA. Assume power supply voltage $V_{CC} = 15$ V and beta of transistor is 110. [8]
4. Derive Expressions for A_i , R_{in} and R_{out} . [6]



5. Describe the operation of JFET in ohmic and active regions of operations with the help of graph and expressions. [8]
6. Find the value of I_D and V_{DS} in the given circuit. [6]



7. Draw the circuit diagram of class A series fed amplifier and its corresponding characteristic graph. And, find its general efficiency. [3+3]

8. Draw the circuit diagram of transformer coupled class B push-pull amplifier. And show that the maximum efficiency is $25\pi\%$. [2+4]
9. Draw the circuit diagram of Complementary-Symmetry class-AB amplifier. [3]
10. Draw voltage controlled oscillator circuit using IC 555 and derive expression for frequency of oscillation. [6]
11. Explain working principle of Wein bridge oscillator with necessary expressions. [6]
12. Design a dc volatge regulator for $V_o = 6V$ to 18 V. [4]
13. Draw the standard series DC voltage regulator circuit and find its voltage stability factor (S_v). [7]
14. Describe in brief the operation of BJT as a switch in cut off and saturation region. [4]

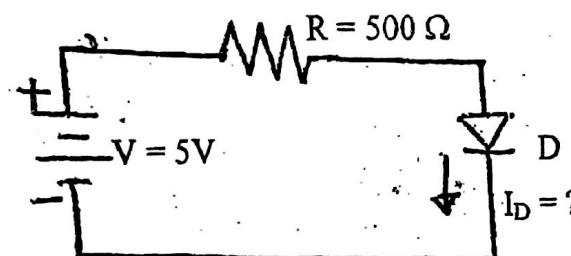
26 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2072 Kartik

Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BEL, BEX, BCT	Pass Marks	32
Year / Part	II / I	Time	3 hrs.

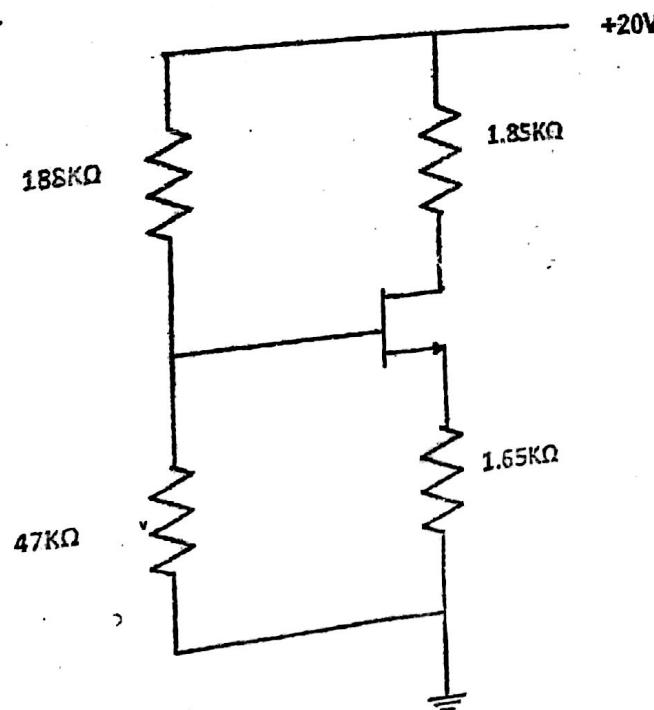
Subject: - Electronic Devices and Circuits (EX501)

- ✓ 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. In the given circuit, the diode used has its $n = 1.74$ and it conducts 1mA at forward bias voltage of 0.7V . Find the current flow in the circuit. [6]



2. Draw unregulated dc voltage power supply using bridge rectifier. [2]
3. Describe functions of BJT as amplifier with the help of transfer characteristics ($i_c - v_{BE}$ graph), and find expressions for g_m , r_π and r_o . Also show that $\beta = g_m r_\pi$ and $r_o = (\beta+1) r_o$. [6+2]
4. Draw common collector transistor amplifier circuit and find its input impedance, output impedance and voltage gain. [6]
5. Describe the construction and working principle of EMOSFET with the help of drain characteristics curve and mathematical expression. [6]
6. The n-channel JFET in the figure below has $I_{DSS} = 18\text{mA}$ and $V_P = -5\text{V}$. Determine the values of I_D and V_{DS} . [8]



- 1. Describe the operation of class B amplifier and find the maximum efficiency of the amplifier. [4+4]
- 2. Draw class A tuned amplifier and its corresponding graph. And find its resonant frequency (ω_0) and 3dB band width (B). [6]
- 3. Describe AMV circuit using IC 555 and state its frequency of oscillation. [6]
- 4. Draw phase shift oscillator circuit and write its frequency of oscillation (f_o). [5]
- 5. Why transistor series regulator has lower efficiency? Explain the operation of voltage regulator using band gap voltage reference. [2+4]
- 6. Design a (5-10)V variable dc voltage regulator using LM 317 IC. [5]
- 7. Write short notes on: (any two) [2x4]
 - a) Π -models of BJT and MOSFET
 - b) ac equivalent circuit of common source amplifier using MOSFET
 - c) BJT as switch

Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BEL, BEX, BCT	Pass Marks	32
Year / Part	II / I	Time	3 hrs.

Subject: - Electronic Devices and Circuits (EX501)

- ✓ 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. Describe with the help of loadline and IV characteristics of the diode, a simple circuit that uses pn junction diode in forward biased state. [5]
2. Design DC voltage regulator for 6V output. Given data are $V_Z = 6V$ at $I_Z = 20 \text{ mA}$, $I_{ZK} = 2 \text{ mA}$, $P_{ZMAX} = 500 \text{ mW}$ and $r_z = 20\Omega$. The nominal input voltage is $12v \pm 20\%$ DC. Find its voltage regulation factor and maximum current it can deliver to the load. [5]
3. Design Common Base Amplifier using β -independent dc biasing method. Use appropriate guideline to support your design. Given parameters are: $V_{CC} = 24\text{VDC}$, $I_C = 1 \text{ mA}$ and $\beta = 200$. Also find its voltage gain by using its ac equivalent circuit. [5+3]
4. Describe in brief the operation of BJT as switch in cut off and saturation region. [4]
5. Draw Ebers Moll model, low frequency Π -model and simple T - model for BJT. [2+1+1]
6. Describe the principle of operation of N-channel JEET with the help of drain and transfer characteristics graphs and mathematical expressions. [8]
7. An n-channel JEET has a pinch-off voltage of $-4.5V$ and $I_{DSS} = 9 \text{ mA}$. At what value of V_{GS} will I_{DS} be equal to 3 mA ? What is its g_m at this I_{DS} . [5]
8. Derive an expression to obtain transconductance of MOSFET. [3]
9. What is crossover distortion and how it can be eliminated? [4]
10. Draw a circuit diagram of tuned amplifier. Determine the range of frequency in which it gives maximum gain within -3dB range. [5]
11. Why the efficiency of class-A amplifier is low? Obtain the expression of the general efficiency of series fed class -A power amplifier circuit. [6]
12. Define Barkhausen Criteria for sinusoidal oscillation. Draw the circuit diagram of RC phase shift oscillator and derive its frequency of oscillation. [5]
13. Define the term multivibrator. Explain the operation of op-amp based astable multivibrator with the help of circuit diagram and waveform. [4]
14. Design a regulator circuit to obtain 16 VDC. Choose approximate values of the parameters. Input voltage is 25 VDC. [5]
15. Draw the series voltage regulator with current limiting element and explain how it works. [6]
16. Draw block diagram for IC voltage regulator. [3]

Examination Control Division

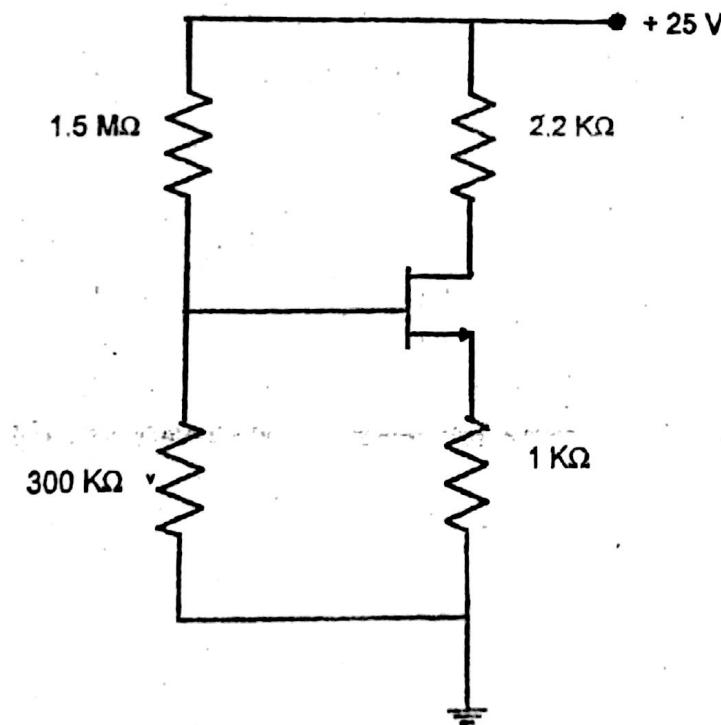
2070 Chaitra

Exam.	Regulation		
Level	BE	Full Marks	80
Programme	BEL,BEX,BCT	Pass Marks	32
Year / Part	II / I	Time	3 hrs.

Subject: - Electronic Devices and Circuits (EX501)

- ✓ 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. What is p-n junction diode? Explain the large signal models of p-n junction diode. [1+4]
2. Find the value of dynamic resistance if voltage in the diode is 650mv and I_{RS} is $10\text{pA} = (10 \times 10^{-12}\text{A})$ (Given $n = 2$ and $V_1 = 25\text{ mV}$) [5]
3. Why common collector amplifier is also called emitter follower? Draw the common collector transistor amplifier circuit and find its input impedance, output impedance and voltage gain. [8]
4. Draw and describe the Ebers Moll model for BJT. [4]
5. Describe in brief the operation of BJT as a switch in cut off and saturation region. [4]
6. Describe the construction and working principle of EMOSFET with help of drain characteristics curve and mathematical expressions. [8]
7. Find I_D and V_{DS} for the given circuit. The given data are $V_p = -4\text{V}$ and $I_{DSS} = 10\text{mA}$ [5]



8. Derive an expression to obtain the transconductance of JFFT. [3]
9. What is the maximum efficiency of class B amplifier? State the condition when it occurs. [4]
10. When are tuned amplifiers used? Draw class A tuned amplifier circuit and find its 3db bandwidth. [2+5]

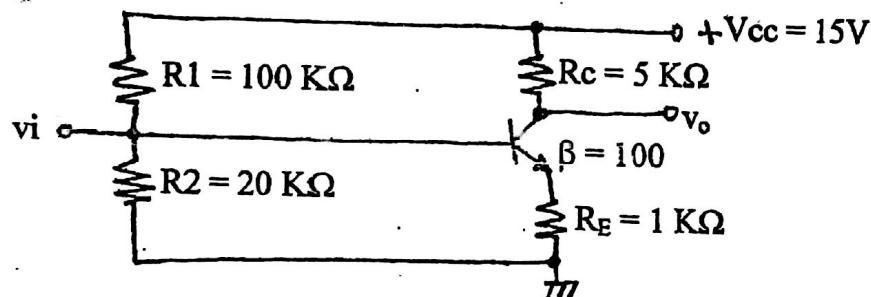
11. Draw the circuit diagram of Complementary-Symmetry Class-AB amplifier. Using Darlington pair transistors. [3]
12. Write the applications of tuned LC oscillators. Draw the Colpitt's oscillator circuit and derive the expression for frequency of oscillation. [6]
13. Draw AMV circuit using IC 555 or BJT. [4]
14. State Barkhausen Criteria for sine wave oscillator. [2]
15. Design a (10-25) V variable dc series voltage regulator using LM 317 IC. [5]
16. Draw the circuit of current limiting circuit in dc voltage regulator. [2]
17. Find voltage stability factor of series dc voltage regulator. [5]

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEL, BEX, BCT	Pass Marks	32
Year / Part	II / I	Time	3 hrs.

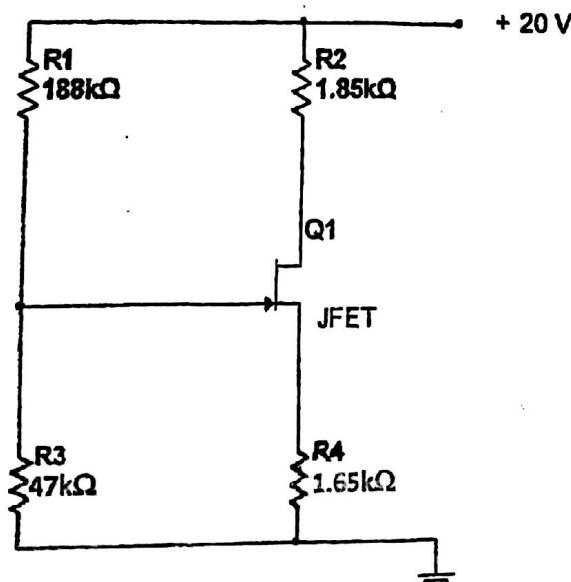
Subject: - Electronic Device and Circuits (EX501)

- ✓ 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. Draw full wave bridge rectifier circuit with 5 ohm load resistor connected at its output. If input ac voltage is 10V, calculate the power dissipation in the load resistor (Assume diodes operate at forward voltage of 0.7V). [4]
2. Explain the small signal model of PN junction diode and derive the expression for AC or dynamic resistance. [2+4]
3. Draw the ac equivalent circuit for given circuit and find its input and output resistances. Assume $\beta = 100$ for the BJT. [8]



4. Define transconductance (g_m). Derive g_m for BJT. [2+4]
5. Describe in brief the operation of BJT as a switch. [4]
6. Describe with necessary graphs and expressions the principle of operation of N-channel JFET. [6]
7. The n-channel JFET in the figure below has $I_{DSS} = 18 \text{ mA}$ and $V_P = -5V$. Determine the values of I_D and V_{DS} . [8]



8. State the difference between BJT and FET. [4]
9. Determine the general efficiency of Transformer Coupled Class-A power Amplifier. [6]
10. Draw the circuit diagram of Complementary-Symmetry Class-AB Amplifier. [2]
11. Calculate the efficiency of transformer coupled push pull Power Amplifier for a supply voltage of 20V and output of (i) $V_P = 20V$ (ii) $V_P = 16V$. [3+3]
12. Draw Wien Bridge Oscillator circuit and derive the expression for frequency of Oscillation and gain of the amplifier circuit. [2+3+3]
13. Draw standard series dc voltage regulator and find its voltage stability factor (S_v). [6]
14. Design a 4.2 V to 12 V variable dc voltage regulator using IC LM317. [4]
15. Draw the circuit diagram of square wave generator. [2]

Exam. Level	BE	Regular / Back Full Marks	80
Programme	BEL, BEX, BCT	Pass Marks	32
Year / Part	H/I	Time	3 hrs.

Subject: - Electronic Devices and Circuits

- ✓ 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.
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1. Draw graphs of IV characteristics of ordinary PN junction diode and zener diode. Draw ac equivalent model for PN junction diode and derive its ac resistance. [7]

2. Define and explain reverse break down effect. [3]

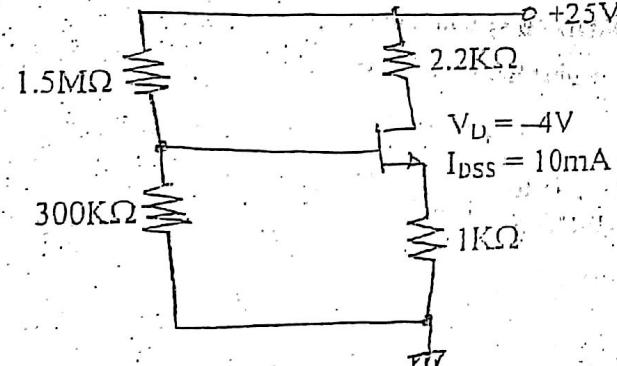
3. Design β -independent type dc-biased common collector amplifier, and find its current gain and input resistance. Given parameters are: $V_{CC} = 20V$, $I_C = 2mA$, $\beta = 100$ and use firm biasing method. [8]

4. Derive an expression to find output resistance for emitter unbypassed common emitter amplifier circuit. [5]

5. Draw Ebers Moll model and ac equivalent T-model for BJT. [4]

6. Describe the principle of operation of EMOSFET with the help of IV characteristic curves and algebraic expressions. Also show its ac equivalent circuit model. [7]

7. Find I_D and V_{DS} for the given circuit. [5]



8. Derive an expression to find the transconductance for JFET. [2]

9. Draw standard series dc voltage regulator circuit and find its voltage stability factor (S_v). [6]

10. Draw a voltage regulator circuit using IC LM317. [3]

11. Draw a circuit diagram for Bandgap reference voltage source. [3]

12. Define cross over distortion in class B amplifier. Draw quasi-complementary symmetry class AB amplifier. And explain how crossover distortion is eliminated in class AB amplifier. [7]

13. What is the maximum efficiency of class B amplifier? State the condition when it occurs. [4]

14. Why heat sink is necessary in power transistor? Explain with the help of thermal Ohm's law or thermal resistance method. [4]

15. State Barkhausen criteria and explain the principle of oscillation. [4]

16. Draw Wien Bridge Oscillator circuit and write the expression for frequency of oscillation. [6]

17. Draw crystal oscillator circuit. [4]

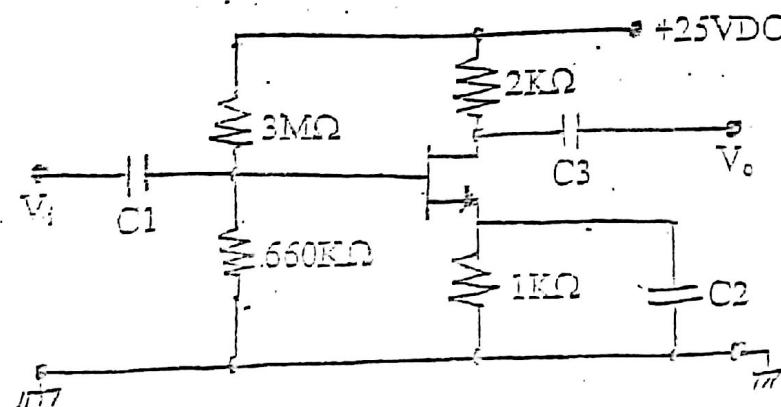
Exam.	RF	Regular/Back
Level	FULL MARKS	80
Programme	BEL, BEX, BCT	Pass Marks
Year / Part	II / I	Time 3 hrs.

Subject: - Electronic Devices

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
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1. a) Show proper IV characteristics of zener diode with the help of experimental circuit diagram. [2]
- b) Design dc voltage regulator for 6V output. [4+2+2]
- Given data: $V_z = 6V$ at $I_z = 20mA$, $I_{z_k} = 2mA$, $P_{z \max} = 500mW$ and $r_z = 20\Omega$. The nominal input voltage is 12V DC $\pm 20\%$. And, find its voltage regulation factor and maximum current it can deliver to the load.
- c) Prove that $V_{D2} - V_{D1} = 2.3 nV_T \log \frac{I_{D2}}{I_{D1}}$. [2]
2. a) Design common base amplifier using β -independent dc biasing method. [5]
- Given data: $V_{CC} = 24V$ DC, $I_C = 1mA$ and $\beta = 200$
- b) Find its voltage gain approximately by using its ac equivalent circuit. [4]
- c) Describe the method of finding output resistance of common emitter amplifier with the help of its equivalent circuit diagram. [4]
3. a) Draw simple T-model and BJT. [1]
- b) Draw h-model and low frequency π -model of BJT both operating in common emitter amplifier configuration and compare their parameters. [1+1+4]
4. Describe the principle of operation of EMOSFET with the help of $I_D V_{DS}$ characteristics. Find expressions when it operates in ohmic region and also in pinch off region of operations. [5+2+2]
5. a) Find the value of I_D and V_{DS} in the given circuit diagram. [4]

Given data: $I_{DSS} = 10mA$, $V_{GS(OFF)} = -4V$. Capacitors are ideal.



- b) Draw its ac equivalent circuit. [2]

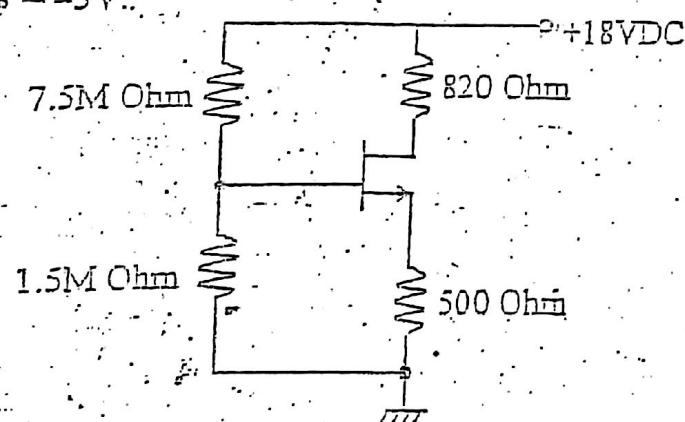
6. a) Describe the operations of BJT and CMOS as switching circuits suitable for logic gates applications. [3+3]
- b) Draw circuit diagrams: [2+2]
- i) Two input TTL NAND gate circuit
 - ii) Two input CMOS NOR gate circuit
7. a) State six important properties of ideal opamp. [3]
- b) Draw circuit diagrams of the followings using ideal opamp. [4]
- i) Summing amplifier
 - ii) Peak detector
 - iii) Integrator amplifier
 - iv) Voltage follower
8. Derive voltage gain of noninverting amplifier using nonideal opamp with finite open loop voltage gain of A_0 . [4]
9. Write short notes: (any three) [4x3]
- a) Ebers Moll Model of BJT
 - b) Transconductance of JFET
 - c) AC equivalent circuit for common collector amplifier
 - d) Zener and avalanche breakdown effects
 - e) Two input NMOS NOR gate

Exam.	Regular / Back		
Level	BE	Full Marks	80
Programme	BEL, BEX, BCT	Pass Marks	32
Year / Part	II/I	Time	3 hrs.

Subject: - Electronic Devices

- ✓ 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. Describe a simple circuit that uses PN junction diode in forward biased state. Use i-v characteristics of the diode and load line to deduce ac resistance and Q-point. [7]
2. A diode for which $n = 1$, conducts 1 mA at 0.7V. For which current is its voltage drop equal to 0.9V? [6]
3. Design a voltage divider type dc biased common emitter amplifier circuit to obtain β -independent biasing. Use appropriate guideline and firm biasing to suit your design. Given parameters are : $V_{cc} = 24$ VDC, $I_{CQ} = 2$ mA and $\beta = 200$. [7]
4. From the circuit designed in question no. 3 without using emitter bypass capacitor, estimate its input resistance and voltage gain. [6]
5. Draw hybrid π -model and T-model of BJT. Define all the parameters of the models. [6]
6. Find h-parameters of h-model of two port network in terms of hybrid π -parameters of BJT when wired in the configuration of basic common emitter amplifier circuit. [7]
7. Describe the construction and working principle of a N-channel JFET with the help of drain current - drain voltage and transfer characteristics. Deduce the expressions to determine drain current and transconductance of the JFET. [7]
8. Find the value of drain current in the given circuit. Parameters given are: $I_{DSS} = 18$ mA, $V_P = -5$ V. [6]



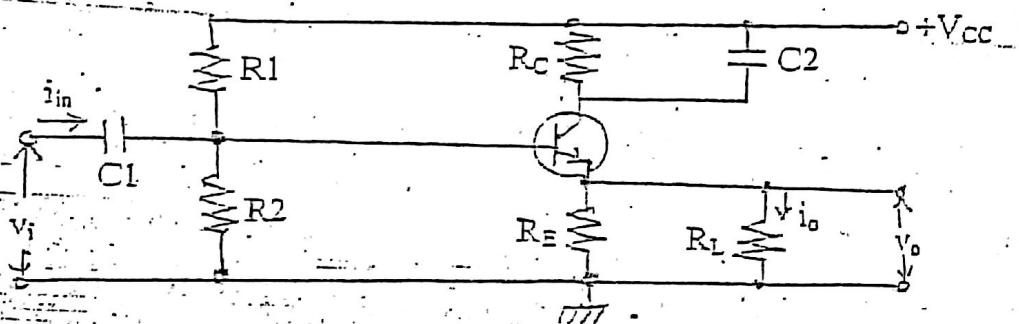
9. State five important properties of an ideal operational amplifier. Using ideal opamps, describe following circuits with necessary mathematical derivations. [8]
 - a) Summing amp.
 - b) Integrator
 - c) Voltage follower
10. Describe with the help of basic circuit diagram and its characteristics curve, the operation of BJT as switching element. [5]
11. Write short notes on any three: [5x3]
 - a) Zener and avalanche effects
 - b) Ebers-Moll model of BJT
 - c) Power supply using bridge rectifier circuit
 - d) Common collector amplifier

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Programme	B.E., B.E., B.C.T	Pass Marks	52
Year / Part	II/I	Time	3 hrs.

Subject - Electronic Devices | Electronics de

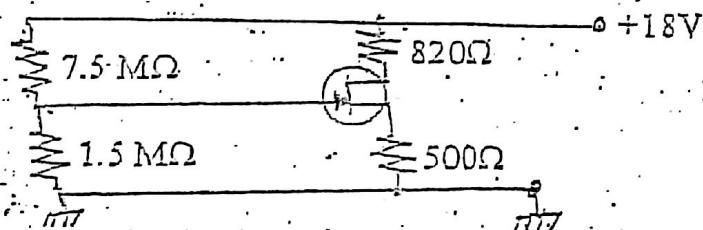
- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
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1. Derive expression for dynamic resistance with the help of circuit diagram. And also show that the diode voltage changes by $2.3 \ln V_T$ for a decade change in current. [6]
2. Draw circuit diagram of full wave bridge rectifier with smoothing capacitor. And, deduce its output voltage fluctuation. [6]
3. Find h-parameters of h-model of two port network in terms of hybrid π -parameters of BJT, both operating in common emitter amplifier configuration. [6]
4. Derive current gain of the following circuit. [6]



Assume capacitors are ideal.

5. Describe the construction and principle of operation of JFET with the help of $I_D V_{DS}$ characteristics and transfer characteristics. [7]
6. Find I_D and V_{DS} of the given circuit. Given data are : $I_{DSS} = 18 \text{ mA}$, $V_P = -5V$, $V_{DD} = +18V$. [8]



7. Describe the construction and principle of operation of MOSFET with the help of $I_D V_{DS}$ characteristics. [6]
8. Describe with the help of circuit diagram and IV characteristics the operation of BJT NOT-gate and CMOS NOT gate circuits. [12]
9. Draw circuit diagrams of TTL 2 input NOR-gate and NMOS 2 input NAND-gate circuits. [4]
10. State six important properties of ideal opamp. [4]
11. Deduce mathematical expressions for the following circuits. [9]
 - Summing circuit
 - Differentiator and
 - Non inverting amplifier
12. A diode for which $n = 2$ conducts 1 mA at $0.7V$. For what current is its voltage drop equal to $0.8V$. [5]

Level	B.E.	Full Marks	80
Programme	BEL, BEX, BCT	Pass Marks	32
Year / Part	II / II	Time	3 hrs.

Subject: - Electronic Circuit Design

- ✓ 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. Write an expression for voltage gain of common emitter amplifier circuit with emitter resistance bypassed and give the two reasons to connect bypass capacitor in the circuit. [2+4]
2. State why the use of resistance and capacitor are minimized to IC fabrication. Why the performance of a current mirror in IC form will be better than in discrete component form. [2+4]
3. What are the two essential conditions for a current mirror circuit to work? Give the two reasons for the output current I_{out} of a simple current mirror not being exactly equal to a reference current I_{ref} . [2+4]
4. Draw clearly the differential amplifier with active load. Show that its voltage gain is doubled in compare to the differential amplifier with passive load (R_C). [2+4]
5. The dual input, balanced output differential amplifier is biased by a constant current source with $I_C = I_{CQ} = 0.988 \text{ mA}$, $R_{C1} = R_{C2} = 2.2 \text{ k}\Omega$, and $r_o = 25.3 \Omega$. Determine the output voltage (v_{out}) in if $v_{in1} = 50 \text{ mV}$ peak to peak at 1 KHz and $v_{in2} = 20 \text{ mV}$ peak to peak at 1 KHz. What is the maximum peak to peak input voltage without clipping at the output? [2+4]
6. Derive the expression to reduce the effect of input offset current in an Op-amp. [6]
7. Determine the maximum amplitude of an input sinusoidal wave with signal frequency 10KHz, if it is to be amplified by an Op-amp circuit having the voltage gain of 100 and Slew Rate is equal to 0.8 V/ μ sec, without distortion at the output. [6]
8. Determine the value and power rating of a resistor used in designing the 9 volt output Zener voltage regulator circuit powered by 12 volt automobile battery and its voltage can vary from 12 volt to 13.6 volt. Given the $P_{Zmax} = 1 \text{ watt}$, and Radio requires $P_{Lmax} = 0.5 \text{ watt}$ of power at full volume. [6]
9. Define the regulated power supply! Determine the voltage stability (input regulation) factor of variable series voltage regulator circuit with transistor Q_2 as error amplifier circuit. [2+6]
10. A class B push pull amplifier is providing a 20 volt peak signal to a 16Ω (speaker) and power supply of $V_{cc} = 30 \text{ volt}$. Determine the input power, output power, and circuit efficiency. [6]
11. How does the crossover distortion occur in class B push pull amplifier? What will you do to eliminate crossover distortion? [2+4]
12. Draw a circuit diagram of RC sinusoidal oscillator and explain its working principle. [2+4]
13. Explain the working principle of square wave generator circuit and determine its oscillation frequency. [2+4]

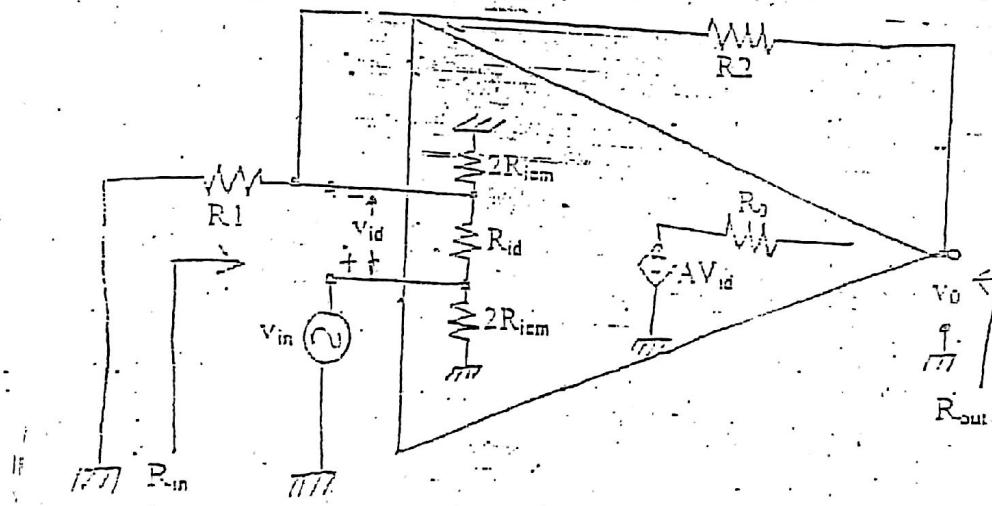
Exam. No.	Regular / Back
Level 5 th SEM	BE
Programme	PBEL, BEZ, BCT
Year / Part	II / II

Full Marks	80
Pass Marks	32
Time	3 hrs.

Subject: - Electronic Circuits - DENTCE

- 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.

- Draw a circuit diagram of emitter unbypassed common emitter amplifier. And find its input and output resistances. [7]
- Draw a basic circuit diagram to study the $i_D - V_{DS}$ characteristics of a N-channel JFET. Also show the border line between triode and pinch off regions. [6]
- Draw circuit diagram of a Widlar current source which supplies $10\mu A$ from a reference source current of $1mA$ and $0.7V$ of bias. [5]
- Draw a differential amplifier which uses active load. And find its output voltage if the differential input voltage is " v_{id} ". [6]
- Derive equations to find the input and output resistances (R_{in} and R_{out}) of the given circuit diagram. [9]



- Draw block diagram of an operational amplifier and describe each block. [7]
- Draw standard dc series regulator circuit. And derive an expression to determine its voltage stability factor. [5]
- Draw a regulator circuit diagram to obtain $16VDC$. Choose appropriate values of the parameters. Input voltage is $25VDC$. [5]
- Describe the features of audio power amplifier with its basic application circuit or its internal block diagram. [6]
- Draw a circuit diagram of class-A tuned amplifier. And determine the range of frequency in which it gives maximum gain within $-3dB$ range. [8]
- Draw a circuit diagram of a square wave or sine wave generator. And derive an equation to determine its frequency of oscillation. [4]
- Draw circuit diagram of a triangular wave generator. [4]

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Examination Control Division
2064 Poush

Exam.	Regular/Back		
Level	BE	Full Marks	80
Programme	BEL, BEX, BCT	Pass Marks	32
Year / Part	II / II	Time	3 hrs.

Subject: - Electronics Circuit Device

- ✓ 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. Draw the small signal model of the P-N junction diode and derive the expression to find the small signal incremental resistance of the diode. [1+4]
2. Draw basic circuit diagram to study the $I_D - V_{DS}$ characteristics of N-channel JFET. And show different regions of operations. [4]
3. Draw circuit diagram of widlar current source and find its output resistance. [2+5]
4. Draw block diagram of an operational amplifier and describe each block. [2+5]
5. Derive the expression to reduce the effect of input offset current in a practical Op-amp. [5]
6. The inverting Op-amp with $R_f = 330K\Omega$ and $R_i = 10K\Omega$ has a slew rate of $0.5V/\mu s$ with input signal equal to $0.1\sin(200000t)$. Determine whether the output will be distorted due to slew rate limitation, if so find a remedy. [6]
7. Determine the output resistance of an amplifier that uses practical operational amplifier IC. [4]
8. Draw circuit diagram of class AB push pull amplifier with darlington pair output stage. [4]
9. Draw series voltage regulator with current limiting circuit and explain how this protection circuit works. [3+2]
10. Design a regulator circuit to obtain 16VDC with input voltage of 25VDC. [5]
11. Determine general efficiency of class-A power amplifier. What is the crossover distortion and how it can be eliminated? [5+3]
12. Draw the circuit diagram of class-A tuned amplifier. And determine the range of frequency in which it gives maximum gain within -3dB range. [3+5]
13. Draw a circuit diagram of RC sinusoidal oscillator. Derive the frequency of oscillation of this circuit. [4+5]
14. Draw the circuit diagram of square wave generator. [3]

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2065 Chaitra ✓

Exam.	Regular/Back		
Level	BE	Full Marks	80
Programme	BEL, BEX, BCT	Pass Marks	32
Year / Part	II / II	Time	3 hrs.

Subject: - Electronic ~~Instrument~~ Device

- ✓ 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. Compare the working principle of BJT with JFET. Explain the static characteristics of JFET. [3+3]

2. Consider a current mirror with a nominal current transfer ratio of unity. Let the transistors have $I_S = 10^{15} \text{ A}$, $\beta = 100$ and $V_A = 100\text{V}$. For $I_{REF} = 1 \text{ mA}$, find L_o when $V_o = 5\text{V}$. Also find the output resistance. [4+4]

3. Why differential amplifier is extremely popular in IC design technology? Derive the expression for small signal differential input resistance (r_{id}) and give a few advantages of differential amplifier over single ended amplifier. [3+5]

4. Find the bandwidths and the circuit where $GBP = 2 \text{ MHz}$, slew rate = $1.2 \text{ V}/\mu\text{s}$, closed loop gain = 100 and input signal of 120 mV . [8]

5. Discuss the method and minimizing the effect of input offset current in an op-amp when you design and what compensation mechanism you will apply when you start circuit design with an opamp that has mismatched input offset currents. [6]

6. How can series transistor zener diode voltage regulator produces constant output voltage? What are its disadvantages? Draw the circuit diagram to explain the concept. [4+2]

7. For a bridge rectifier circuit, forward resistance (r_f) is constant at 1Ω and infinite reverse resistance. The alternating supply voltage is 240V r.m.s. and load resistance is 480Ω . Calculate (i) mean load current and (ii) power dissipated in each diode. [6]

8. Draw the circuit of complementary symmetry class B push-pull amplifier. Explain its working principle. What is crossover distortion and how it can be minimized? [10]

9. Calculate the efficiency of a transformer coupled Class-A amplifier for a supply of 12V and outputs of (i) $V(P) = 12\text{V}$ and (ii) $V(P) = 6\text{V}$. [3+3]

10. Draw the circuit of Wien Bridge Oscillator and derive the expression for frequency of oscillation and the condition for sustained oscillation. [10]

11. Draw and explain the principle of voltage to frequency converter. [6]