

Total No. of Printed Pages:4

S.E.(Electrical & Electronics) (Sem-III) (Revised Course 2016-2017) EXAMINATION MAY/JUNE 2019
Electronic Devices and Circuits

[Duration : Three Hours]

[Total Marks : 100]

Instructions :

1. Figures to the right indicate full marks.
2. Assume suitable data wherever necessary
3. Clearly state any assumptions made

PART -A

Answer any two questions from the following.

2 × 20 = 40

Q.1 20

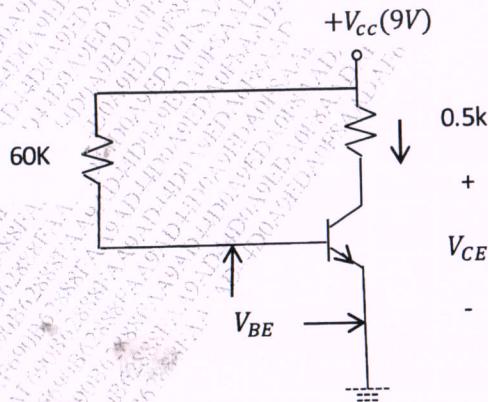
- List out 4 major differences between BJT and FET. 04
- Design an LC filter to limit the ripple to 1% given that $V_{DC} = 10V$ at a $I_L = 120mA$. 06
- Determine the critical inductance.
- Explain the construction, working and characteristics of UJT. 10

Q.2 20

- Draw the H parameter model for a transistor in common emitter configuration and derive the equations for the voltage gain and current gain. 08
- Design a single stage BJT amplifier to provide an output voltage of 1.5V and a gain of 100. Use $V_{cc} = 9V$ and $S = 10$. Determine the bypass and coupling capacitors. 10
- Explain transistor in Darlington Pair connection. 02

Q.3 20

- The fixed bias circuit shown in figure has $V_{BE} = 0.7$ and $\beta = 80$. Find the collector current, I_c and voltage V_{CE} . 06



- b) Explain DC amplifier, its characteristics and uses. **08**
- c) Explain 2 uses of photo transistors with neat circuit diagrams. **06**

PART – B

Answer any two questions from the following.

Q.4

2 × 20 = 40

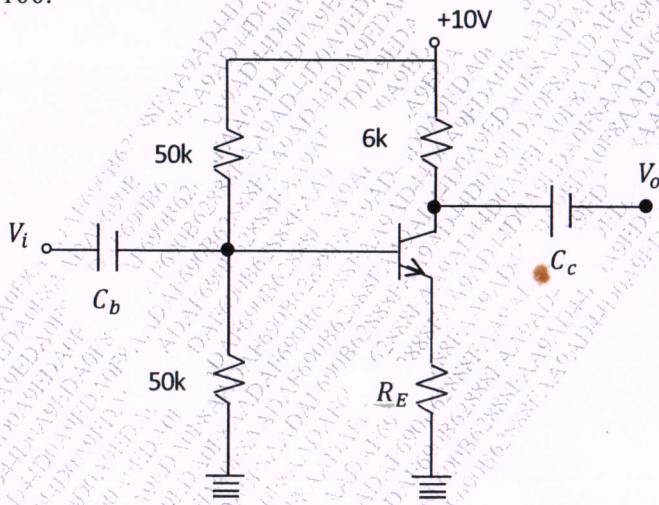
20

- a) Discuss the operation of Class B Power amplifier with a neat circuit diagram. State advantages and limitations of this amplifier. **08**
- b) Explain Barkhausens criteria. Also explain where it is applicable. **06**
- c) Explain the working of transistorized astable multivibrator. State its uses **06**

Q.5

20

- a) Common emitter (CE) amplifier shown in fig. has voltage gain of 200 when $R_E = 0$.
Stability is brought through negative feedback by adding resistor R_E . calculate the value of resistor R_E using feedback concepts so that voltage gain with feedback (A_{VF}) is equal to 100. **08**



- a) Explain advantages of series regulators over shunt regulators. **06**
- b) Write short note on Voltage multipliers. **06**

Q.6

20

- a) Derive the expression for the frequency of oscillations of RC Phase Shift Oscillator and hence design a oscillator to provide an frequency of oscillations of 10kHz. **10**
- b) Explain with neat circuit diagram and waveforms of Schmitt trigger circuit. **10**

PART-C

Answer any one questions from the following.

1 × 20 = 20

Q.7

20

- a) Design a voltage divider bias circuit to bias a BJT at the centre of load line given that $V_{cc} = 9V$ and $R_c = 4.7 k\Omega$. And stabilization factor = 10 **08**
- b) Discuss the working of a positive clipper with neat circuit diagram and waveforms. **07**
- c) Write short note on Miller sweep circuit. **05**

Q.8

20

- a) Explain the constructional details and applications of Optocoupler. **08**
- b) An amplifier has a voltage gain of 100 and a bandwidth of 150kHz. Determine
 - i) The new bandwidth and gain if 5% negative feedback is introduced? **08**
 - ii) Gain BW product before and after the feedback
 - iii) The amount of feedback if the bandwidth is to be restricted to 1 MHz
- c) Explain line and load regulation with appropriate equations. **04**

Data sheet

Transistor	$P_d(m ax)@ 25^\circ C$ Watt s	$I_c(max)@25^\circ C$ Amps	$V_{CE(sat)}$ (D.C.)	$V_{CE(max)}$ (m ax)	$T_j(max)^\circ C$		j_{CO}/W	$h_{FE}(D.C.)$						$h_{FE}(A.C.)$						$h_{ie}k \Omega$	$h_{re}\mu$	$h_o \mu S$	Derate Above $25^\circ C$ W/C	
								Min	Typ	M_{ax}	M_{in}	Typ	M_{ax}											
2N2222A	0.5	0.15	0.3	40	175	50	-	100	150	300	75	-	-	375	1.2	400	200	-	5					
BC547	0.5	0.1	0.2	45	150	-	-	240	330	500	-	-	-	-	4.5	150	300	-						
BC557(PNP)	0.5	-0.2	-0.2	45	150	23	-	125	-	800	-	-	-	-	-	-	-	-	-					
TIP41	65	6	1.5	10	150	2	-	15	-	75	-	-	-	-	-	-	-	-	-					
2N3055	115.5	15	1.1	70	200	1.5	20	50	70	15	50	120	-	-	-	-	-	-	-	0.7				
ECN055	50	5	1	55	200	3.5	25	50	100	25	75	125	-	-	-	-	-	-	-	0.6				
ECN149	30	4	1	40	150	4	30	50	110	33	60	115	0.2	-	-	-	-	-	-	0.3				
ECN100	5	0.7	0.6	65	200	35	50	90	200	50	90	250	0.5	-	-	-	-	-	-	0.05				
BC147A	0.25	0.1	0.2	50	125	0.4	$^\circ C/mW$	115	180	220	125	220	260	2.7	150	18								
BC147B	0.25	0.1	0.2	50	125	0.4	$^\circ C/m$	200	290	450	240	330	500	4.5	200	300								

2N525(PNP)	0.225	0.5	0.2	-	100	-	35	-	65	-	45	-	1.4

FET(N-ch)	V _{DS(max)} (V)	V _{GS(max)} (V)	P _{d(max)} @25°C mW	T _{j(max)} °C	I _{DSSmA}	g _{mo} μΩ	-V _p	r _{d KΩ}	Derate Above 25°C W/C
2N3822	50	50	300	175	2	3000	6	50	0.002
BFW11	30	30	300	200	7	5600	2.5	50	

UJT	P _{d(max)} @25°C mW	I _{E(max)} @25°C (mA)	I _{p(peak pulse current max)} (mA)	I _s (mA)	-I _{EO} (μA)	V _{BZ} E/V	η	R _{BB} KΩ				
2N2646	300	50	5	4	2	30	0.56	0.63	0.75	4.7	7	9.1