SCHEME OF VALUATION

(Scoring indicators)

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Course Title : ELECTRONIC DEVICES & CIRCUITS	

Qst. No.	Scoring indicator	Split up score	Sub Total	Total
I	**PART A**			
1	The line joining between zero signal values of Ic and V_{CE}. Q point is the steady-state DC voltage or current at a specified terminal of an transistor with no input signal applied.	2	2	2
2	Radio receivers	1		
	Spectrum analyzer	1	2	2
3	Positive feedback : If the feedback voltage or current is in phase with the with input signal, it is called positive feedback.	1		
	Negative feedback: If the feedback voltage or current is180° out of phase with input signal, it is called Negative Feedback	1	2	2
4	When an ac voltage is applied, it may vibrates at the frequency of the applied voltage. If to vibrate, it generate an ac voltage. This property is known as piezo electric effect.	2	2	2
5	If the gate voltage is increased the depletion layers of both sides in FET is further increased. This causes decrease in drain current. The gate source voltage V_{GS} at which drain current I_D is cut off completely is called pinch off voltage.	2	2	2

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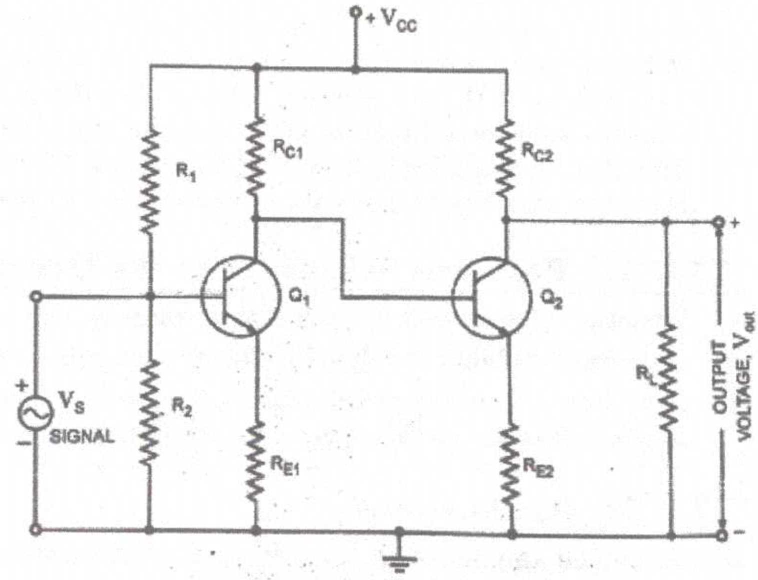
Qst. No.	**Scoring indicator**	**Split up score**	**Sub Total**	**Total**
II	**PART B**			
1		3		
	A two stage direct coupled transistor amplifier is as shown in figure. Here, no coupling element is being used to couple the signal from one stage to the other, instead the signal is being coupled directly. Due to direct coupling, both dc and ac voltages are coupled from first stage to the second stage. Therefore, the Q point of the second stage will change depending on the coupled signal. The low frequency response is better than that of an RC coupled amplifier. This is due to the absence of the coupling capacitors in the circuit.	3	6	6
2	The power transferred from the power amplifier to the load (loudspeaker) will be maximum only if the amplifier output impedance equals the load impedance R, otherwise lesser power will be transferred to the load RL.			

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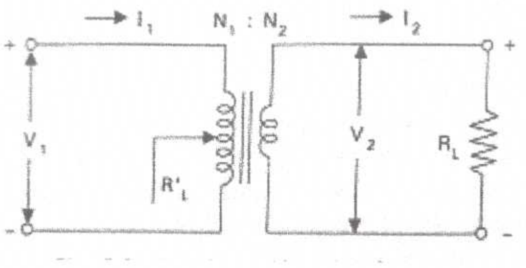
Qst. No.	**Scoring indicator**	**Split up score**	**Sub Total**	**Total**
		3		
	though the amplifier is capable of delivering more power and rest of power will be lost in the active device. Hence for transfer of maximum power from amplifier to the output device, matching of amplifier output impedance with the impedance of output device i.e., impedance matching is necessary. This is possible with the use of a transformer and the circuit $$\frac{R_L'}{R_L} = \frac{V_1/I_1}{V_2/I_2} = \frac{V_1}{V_2} \cdot \frac{I_2}{I_1} = \frac{N_1}{N_2} \cdot \frac{N_1}{N_2} = \left(\frac{N_1}{N_2}\right)^2$$ where $\frac{V_1}{V_2} = \frac{N_1}{N_2}$ and $\frac{I_2}{I_1} = \frac{N_1}{N_2}$	3		
	R_L is the resistance of load and R_L' is the effective resistance looking into the primary of transformer. This is the importance of impedance matching in power amplifiers.		6	6

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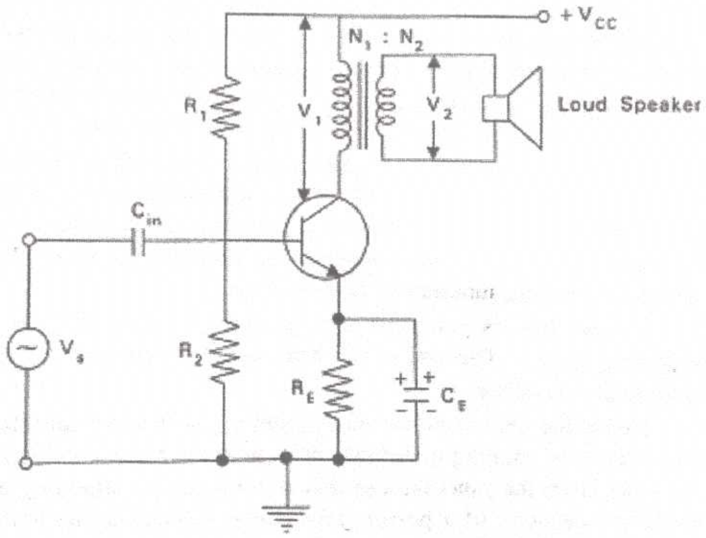
<table>
<tr><th>Qst. No.</th><th>Scoring indicator</th><th>Split up score</th><th>Sub Total</th><th>Total</th></tr>
<tr><td>3</td><td>


</td><td>3</td><td></td><td></td></tr>
<tr><td></td><td>Fig. shows the circuit of single ended class A power amplifier with transformer load. It is so called because it employs only one transistor and it is operated in class A mode. In case of resistor load the quiescent current flows through the collector resistive load and causes large wastage of D.C. power in it. This DC power dissipated in the load resistor does not contribute to the useful ac output power. Also, it is not advisable to pass the dc. through a voice coil of a loudspeaker. For these reasons, an arrangement using a suitable transformer for coupling the load (a loudspeaker).This arrangement also permits impedance matching. In the above circuit R1, and R2, provide potential divider biasing emitter resistor R_E provides stabilization. The capacitor C_E bypasses the resistor R_E. Capacitor Cin allows only ac. input signal to the base of the transistor.</td><td>3</td><td>6</td><td>6</td></tr>
</table>

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Qst. No.	Scoring indicator	Split up score	Sub Total	Total
4	1. **Gain stability :** The resultant gain of the amplifier can be made independent of transistor parameters or the supply voltage variations. $$A_f = \frac{A}{1+A\beta}$$ The product $A\beta$ is much greater than unity. Therefore the above expression becomes $$A_f = \frac{A}{A\beta} = \frac{1}{\beta}$$ So, the gain depends only upon feedback fraction β. As the feedback circuit is usually resistive network, it is unaffected by changes in temperature, transistor parameters and frequency. Hence, the gain of the amplifier is extremely stable. 2. **Reduces Distortion :** The negative feedback reduces the non-linear distortion in large signal amplifiers. It can be proved as follows. $$D_f = \frac{D}{1+A\beta}$$ From the above expression, it is vary clear that, a negative feedback reduces the distortion by a factor $1 + A\beta$. 3. **Reduces Noise :** The negative feedback reduces the noise by a factor $1 + A\beta$. 4. **Improves Frequency Response :** The voltage gain of the amplifier is independent of signal frequency because the feedback is usually obtained through resistive network. Hence, negative feedback improves the frequency response of the amplifier. 5. **Modifies the Input and Output Impedances :** The input and output impedances of the feedback amplifier get modified depending on the type of the feedback amplifier.	4×1.5	6	6

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<table>
<tr><td colspan="5">Revision : 2015   Course Code : 3044
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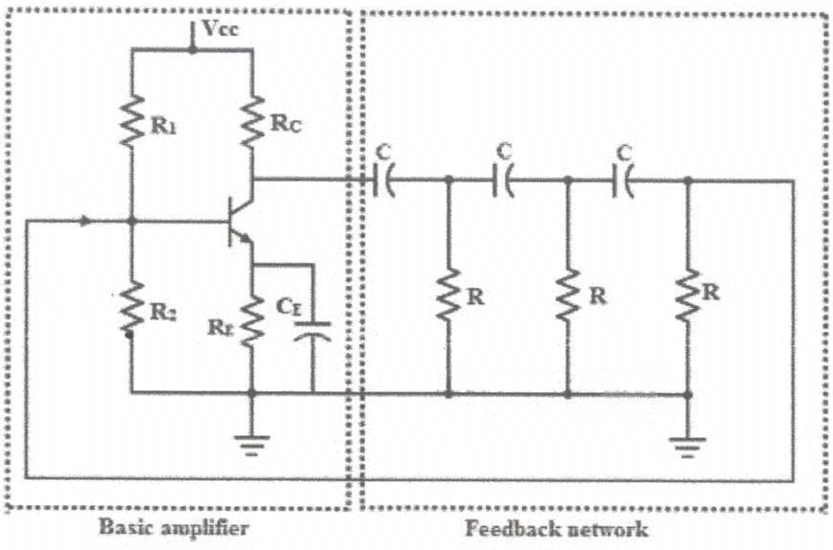
<tr><th>Qst. No.</th><th>Scoring indicator</th><th>Split up score</th><th>Sub Total</th><th>Total</th></tr>
<tr><td>5</td><td>
<table>
<tr><th>S.No.</th><th>BJT</th><th>FET</th></tr>
<tr><td>1.</td><td>In this conduction is due to both holes and electrons. Hence it is called a Bipolar Junction transistor.</td><td>Conduction is due to only one type of carriers. Holes in p-type and electrons in n-type. Hence, it is called a Unipolar Transistor.</td></tr>
<tr><td>2.</td><td>The device has low input impedance.</td><td>The device has high input impedance.</td></tr>
<tr><td>3.</td><td>BJT is a current controlled device.</td><td>FET is a voltage controlled device.</td></tr>
<tr><td>4.</td><td>Noise level is high.</td><td>Noise level is very small.</td></tr>
<tr><td>5.</td><td>Gain of BJT is characterized by current gain.</td><td>The gain is characterized as as transconductance.</td></tr>
</table>
</td><td>4×1.5</td><td>6</td><td>6</td></tr>
<tr><td>6</td><td>



</td><td>3</td><td></td><td></td></tr>
</table>

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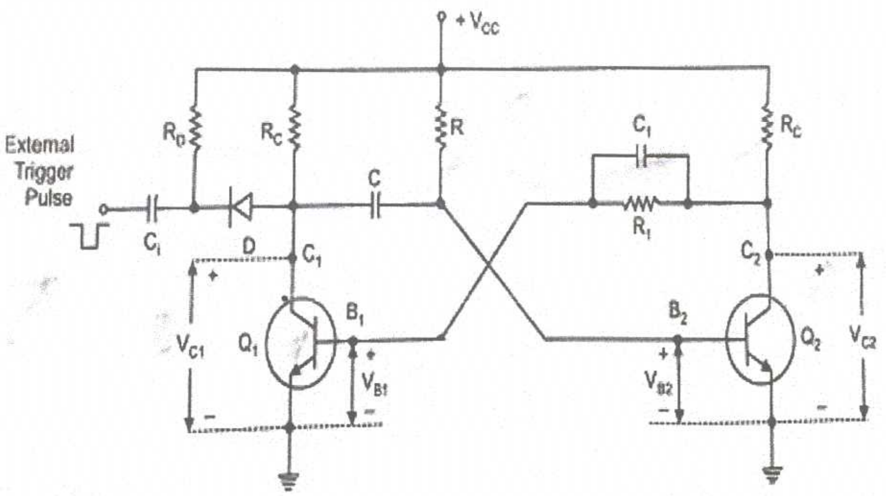
Qst. No.	**Scoring indicator**	**Split up score**	**Sub Total**	**Total**
7	In an RC Oscillator circuit the input is shifted 180° through the amplifier stage and 180°again through a phase shifting network stage giving us "180° + 180° = 360°" of phase shift which is effectively the same as 0° thereby giving us the required positive feedback. In other words, the phase shift of the feedback loop should be "0". An amplifier circuit either using a Bipolar Transistor or an Operational Amplifier, it will produce a phase-shift of 180° between its input and output. If a three-stage RC phase-shift network is connected between this input and output of the amplifier, each RC network produces 60° phase shift the total phase shift for regenerative feedback will become 3 x 60° + 180° = 360°	3	6	6
		3		

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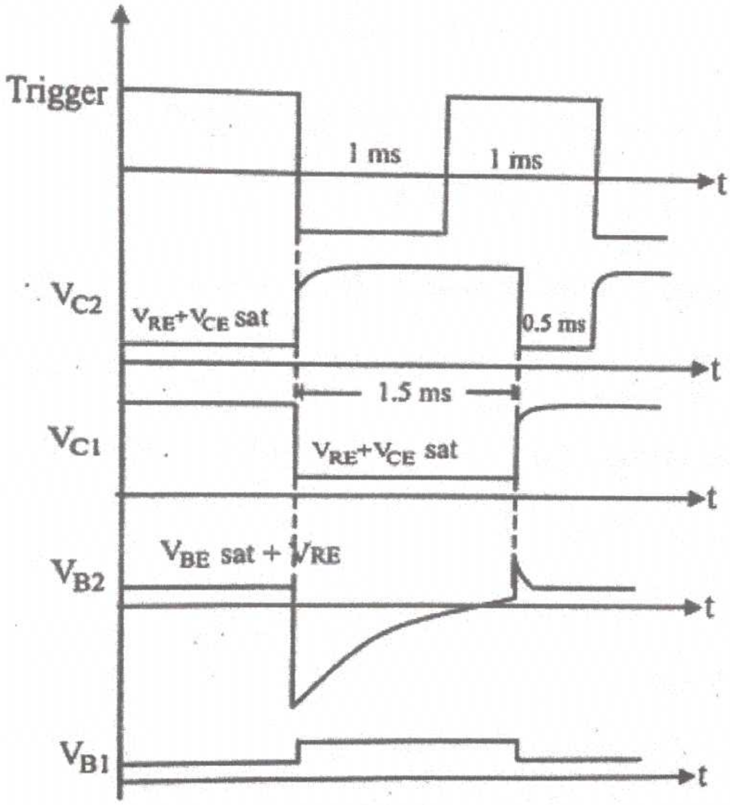
Qst. No.	**Scoring indicator**	**Split up score**	**Sub Total**	**Total**
		3	6	6
III a	**PART C** **UNIT-I** In this circuit, the primary of transformer is placed instead of Rc The secondary replaces a wire between the voltage divider network and base of second stage. Resistors R1, R2 and RE form the voltage divider bias and stabilization resistors. Capacitor C_E bypasses the Resistor RE The input signal is applied to the base of the first transistor through the capacitor.	3		

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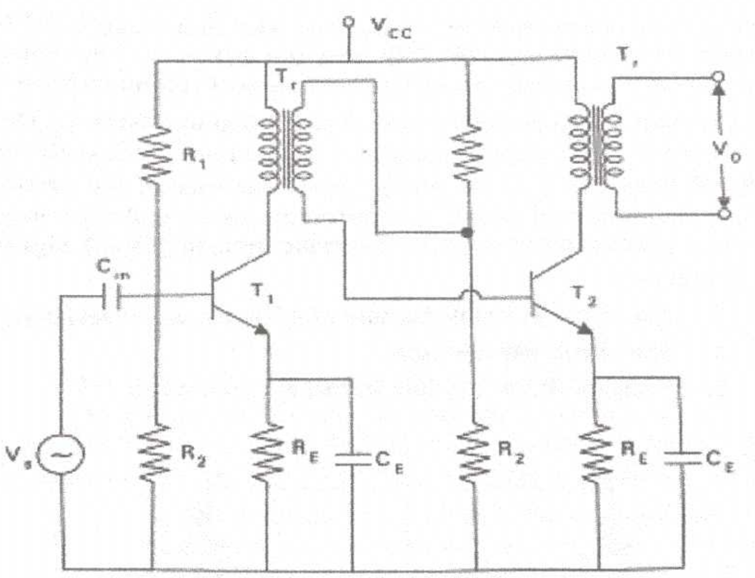
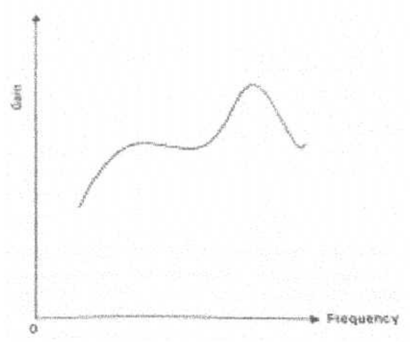
	The amplified current flows through the primary of transformer. The induced secondary voltage is applied to the base of the second transistor. Since the transformer is efficient in providing the DC. isolation, the biasing of second stage is not disturbed. In addition to DC. isolation, transformer provides the proper impedance matching The output is taken across the secondary of transformer. 	4		
	Frequency Response of Transformer Coupled Amplifier 	2		

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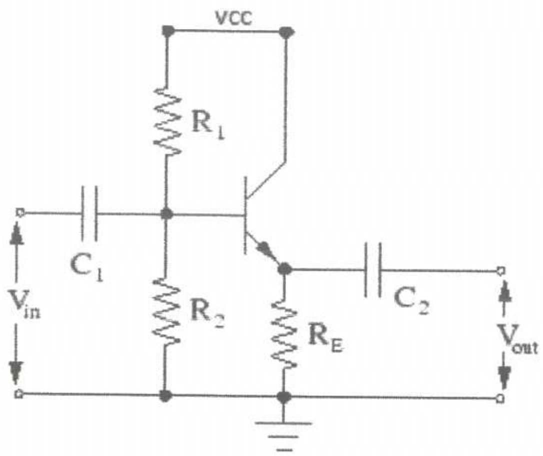
Qst. No.	**Scoring indicator**	**Split up score**	**Sub Total**	**Total**
	At low frequencies, the reactance of primary begins to fall, resulting in decreased gain. At high frequencies, the capacitance between turns of windings acts as a bypass capacitor to reduce the output voltage and hence gain. Hence, there will be disproportionate amplification of frequencies in a complete signal such as music, speech, etc. So, transformer coupled amplifier introduces frequency distortion.		9	
III b		3		
	The main difference between an emitter follower and con-ventional amplifier is the absence of collector load and emitter bypass capacitor. The emitter resistance RE itself acts as the load and the ac output voltage Vout is taken across it. The biasing is provided either by base resistor method or potential divider method. When input signal Vin is applied to the base, the resulting emitter current Ie, develops an output voltage Vout equal to $I_E R_E$ across the emitter resistance R_E. It may be noted that when the input signal voltage goes through its positive half cycle, the output voltage Vout is also seen to go through its positive half cycle.	3		

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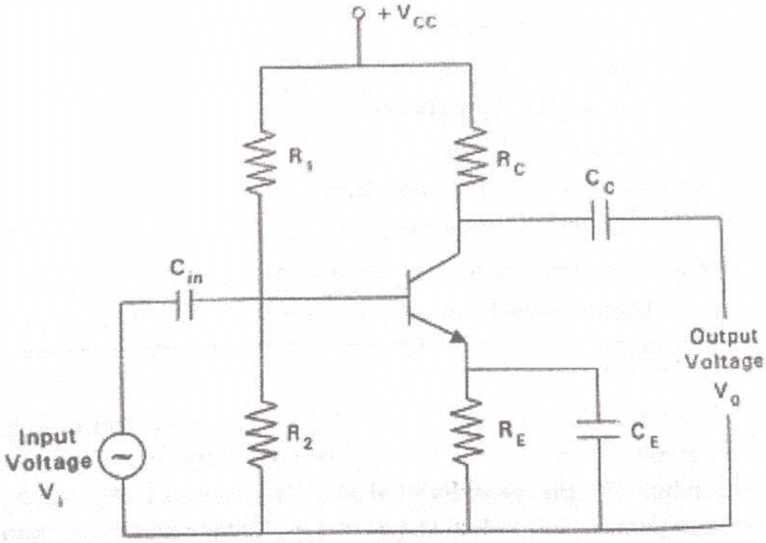
IV a	Hence the output voltage is in phase with the input signal voltage i.e. the output voltage (emitter voltage) just follows the input voltage and hence the name emitter follower.		6	15
		4		
	Resistors, R1, R2, & Re These resistors form the biasing and stabilization circuit. Capacitor Cin : Input capacitor Cin allows only ac input signal to flow but isolates the signal source from R2. If it isnot used, the signal source resistance will come across R2 and thus change the bias. Emitter capacitor C_E An emitter bypass capacitor C_E, is used in shunt with RE to provide a low reactance path to the amplified ac. signal	2		

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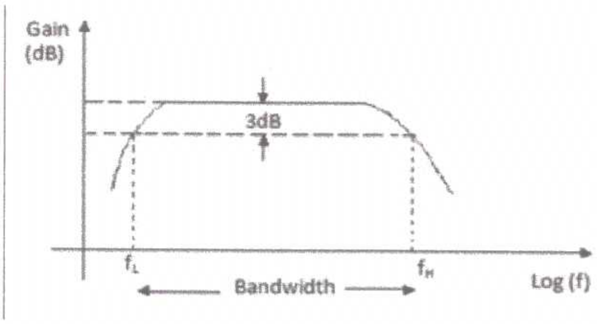
	If it is not used or open circuited, then amplified ac. signal flowing through R_E will cause a voltage drop across it, thereby reducing the output voltage.			
	Coupling capacitor Cc: It couples one stage of amplifier to the next stage. The coupling capacitor Cc isolates the dc. of one stage from the next stage, but allows the passage of ac signal.			
		3		
	At low frequencies (< 50 Hz), the reactance of coupling capacitor Cc is quite high and so, very small signal will pass from one stage to the next stage. The reactance of C_E is also high at low frequencies which cannot shunt the emitter resistance effectively. Due to these two factors, the voltage gain falls at low frequencies.			
	At high frequencies 20 kHz) the reactance of Cc is very small and it acts as short circuit. This increases the loading effect of next stage and voltage gain reduces. Also, the capacitive reactance of base emitter junction is low at high frequencies that increases the base current. So value of β reduces. Due to these two reasons, voltage gain falls at high frequencies. At mid frequencies (50 Hz to 20 kHz), the voltage gain of the amplifier is constant.		9	

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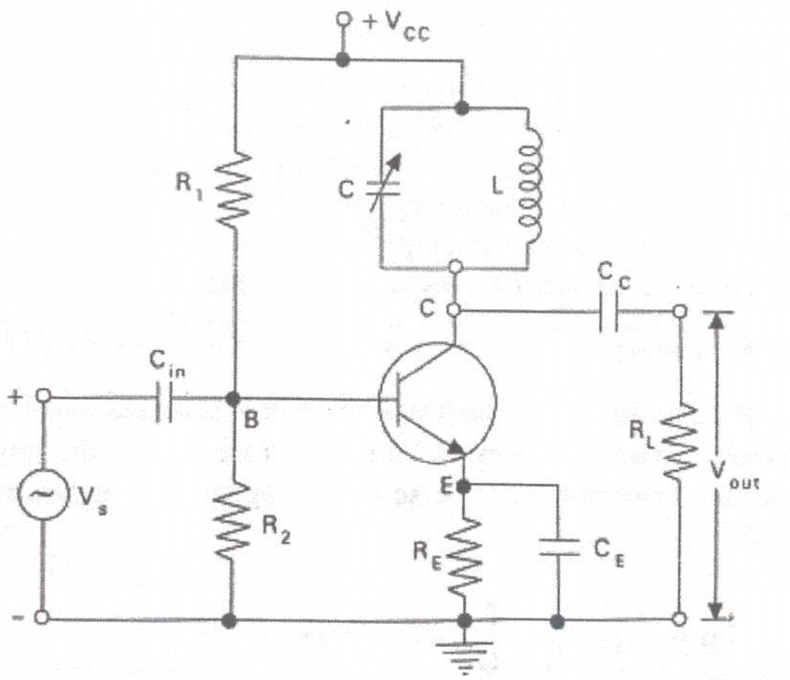
Qst. No.	**Scoring indicator**	**Split up score**	**Sub Total**	**Total**
IV b	Voltage gain: The **Voltage Gain** of the common emitter amplifier is equal to the ratio of the output voltage to the amplifiers input voltage. $Av = V_{out} / V_{in}$	2		
	Input impedance: It is the ratio of input voltage to input current $Zi = V_{in} / I_{in}$	2		
	Current gain: it is the ratio of output current to input current. $Ai = I_{out} / I_{in}$	2	6	15
	UNIT – II			
V a	Single tuned amplifier 	4		

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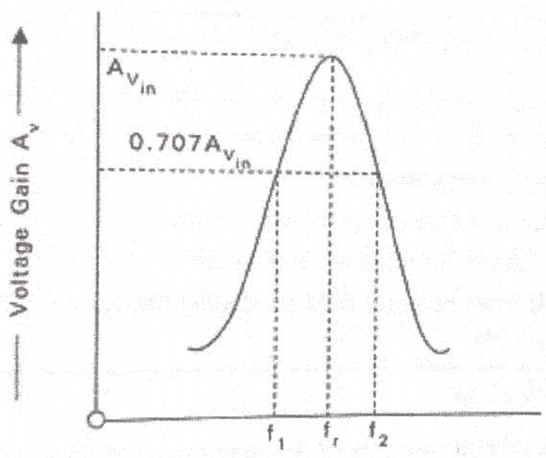
Qst. No.	Scoring indicator	Split up score	Sub Total	Total
	R1, R2 and R_E form the biasing and stabilization circuits. C_E is the bypass capacitor. A parallel tuned LC circuit connected in the collector circuit, the impedance of which depends upon the frequency, acts as a collector load. Capacitor C is generally variable so that the resonant frequency of the circuit may be varied. Inductor L can also be made variable. If the input signal has the same frequency as the resonant frequency of LC circuit, Large amplification will be obtained. The high frequency signal to be amplified is applied between base and emitter. The resonant frequency of parallel LC circuit is made equal to the frequency of input signal by varying C (or L). Now the tuned circuit will offer very high impedance to the signal frequency and thus large output will appear across it.	3		
	Frequency Response Curve 	2		

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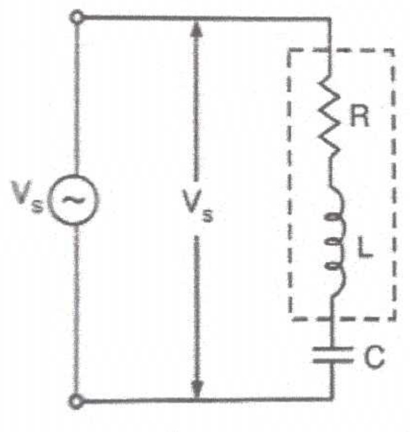
<tr><th>Qst. No.</th><th>Scoring indicator</th><th>Split up score</th><th>Sub Total</th><th>Total</th></tr>
<tr><td>V b</td><td>The voltage gain is maximum at resonant frequency fr. On both sides of the resonant frequency, the impedance of the tuned circuit decreases, so the voltage gain. The bandwidth is given as F2-F1
<table>
<tr><th>Voltage amplifier</th><th>Power amplifier</th></tr>
<tr><td>The amplitude of input A.C signal is small.</td><td>Amplitude of input A.C signal is large.</td></tr>
<tr><td>The collector current is low, about 1 mA.</td><td>Collector current is very high above greater than 100mA.</td></tr>
<tr><td>RC coupling is used in voltage amplifier</td><td>Transformer coupling is used.</td></tr>
<tr><td>The transistor used has thin base to handle low current.</td><td>The transistor used has thick base to handle large current.</td></tr>
<tr><td>The A.C power output is low.</td><td>The A.C power output is high.</td></tr>
</table></td><td>4×1.5</td><td>9
6</td><td>15</td></tr>
<tr><td>VI a</td><td>

series resonance circuit</td><td>2</td><td></td><td></td></tr>
</table>

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Qst. No.	**Scoring indicator**	**Split up score**	**Sub Total**	**Total**
	It consists of a resistance R an Inductance L and a capacitance C connected in series. If for some frequency of applied voltage, XL=XC in magnitude, then (i) Net reactance is zero ie. x=0 (ii) Impedance of the circuit, Z=R (ii) Current flowing through the circuit is maximum and inphase with the applied voltage. Magnitude of current will be equal to V/R (iv) Voltage drop across the inductance is equal to the voltage drop across capacitance and is maximum. (v) The power factor is unity When this condition exists, the circuit is said to be in Resonance and the frequency at which it occurs is known as Resonant Frequency Since in this resonance, the voltage is maximum, so it is called the voltage resonance. The series resonance is called an acceptor circuit because such a circuit accepts currents at one particular frequency but rejects currents of other frequencies **Expression for Resonant Frequency of Series Tuned Circuit :** If Resonant frequency is denoted by f_r, then $X_L = WL = 2\pi f_r L$ and $X_C = \frac{1}{WC} = \frac{1}{2\pi f_r C}$ Since for Resonance, $X_L = X_C$ $\therefore \quad 2\pi f_r L = \frac{1}{2\pi f_r C}$ or $\quad f_r = \frac{1}{2\pi\sqrt{LC}}$	2		

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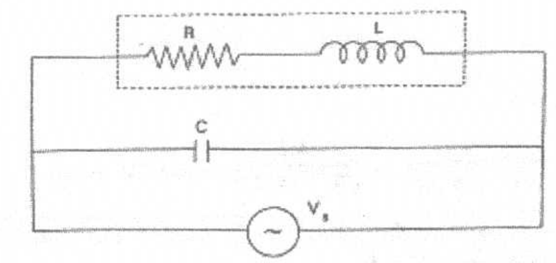
Qst. No.	Scoring indicator	Split up score	Sub Total	Total
	Parallel Resonant Circuit  In this Inductive Reactance and a Capacitive Reactance are connected in parallel, It is also called rejector circuit. In practice some resistance R is always present with the inductor. Such a circuit is said to be in electrical resonance when the reactive or watts components of line current becomes zero. The frequency at which this happens is known as Resonant Frequency	2		
	Expression for Resonant Frequency of Parallel Tuned Circuit : Circuit will be in resonance if reactive component of R-L branch current is equal to reactive component of capacitive branch. i.e. $\frac{V}{\sqrt{R^2+(W_rL)^2}} \times \frac{W_rL}{\sqrt{R^2+(W_rL)^2}} = W_r CV$ or $\frac{L}{R^2+(W_rL)^2} = C$ or $W_r = \frac{1}{\sqrt{LC}}\sqrt{1-\frac{CR^2}{L}} = \sqrt{\frac{1}{LC}-\frac{R^2}{L^2}}$ Resonant frequency, $f_r = \frac{W_r}{2\pi}$ $f_r = \frac{1}{2\pi}\sqrt{\frac{1}{LC}-\frac{R^2}{L^2}}$ If resistance of the inductive coil is negligible, then $f_r = \frac{1}{2\pi}\sqrt{\frac{1}{LC}}$	2	8	

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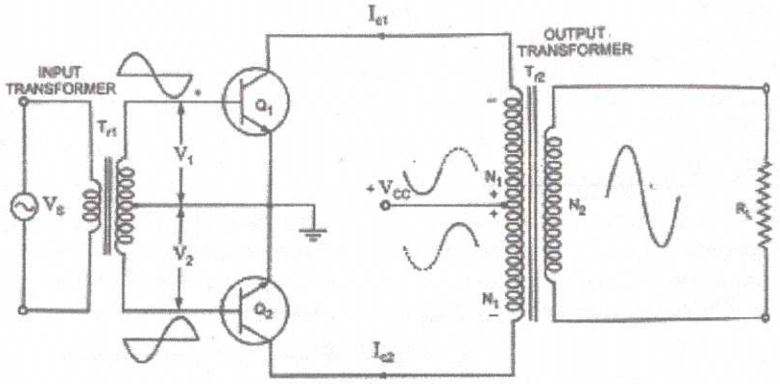
Qst. No.	Scoring indicator	Split up score	Sub Total	Total
VI b	 *Class B Push-Pull Amplifier*	4		
	When the input signal is applied, the centre-tapped secondary of the input transformer develops two signals which are identical but in phase opposition. The transistors, Q1 and Q2 are driven by these two sign going positive, V2 is going negative, so that transistor Q is being biased further off when transistor Q1 is being biased on. As the collector current in Q1 increased, it produces a half sine wave voltage across the upper half primary of the output transformer. When the positive half cycle of the input signal to Q1begins to go negative, the signal at Q2 base is commencing to go positive. Thus, as Q1 becomes biased off again, Q2is biased on and a half cycle of voltage waveform is generated across the lower primary winding of output transformer. The effect of the two-half cycles in separate halves of the primary of output transformer is to produce a magnetic flux in the transformer core, which flows first in one direction and then in the opposite direction. This flux links with the secondary of the output transformer and generates a complete sine-wave output, which is passed on to the load	3	7	15

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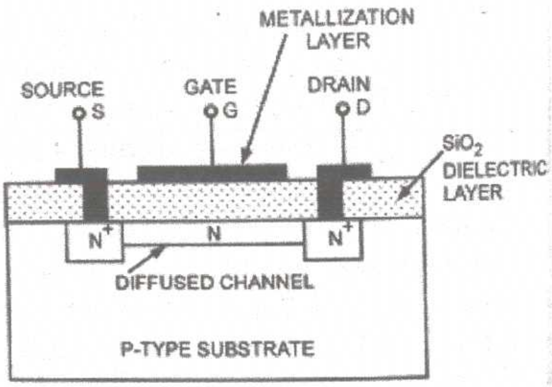
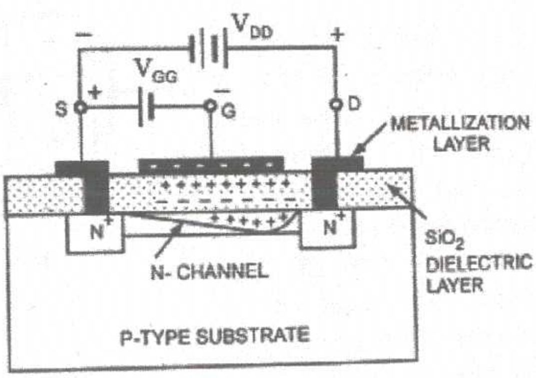
Qst. No.	Scoring indicator	Split up score	Sub Total	Total
	<u>UNIT-III</u>			
VII a	 ***N-Channel DE-MOSFET Structure*** It consists of a highly doped P-type substrate into which two blocks of heavily doped N-type material are diffused forming the source and drain. An N-channel is formed by diffusion between the source and drain. Now a thin layer of SiO2 dielectric is grown over the entire surface and holes are cut through the SiO2 (silicon-dioxide) layer to make contact with the N-type blocks (Source and Drain). Metal is deposited through the holes to provide drain and source terminals, and on the surface area between drain and source, a metal plate is deposited.	2		
		2		

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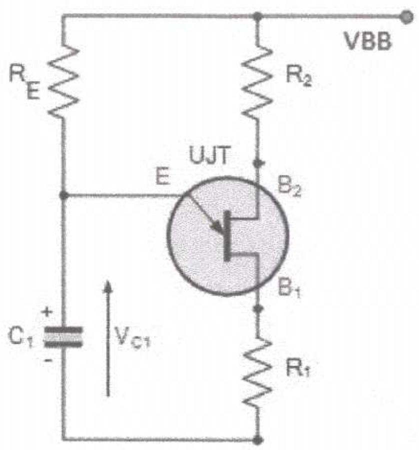
VII b	When the drain is made + ve with respect to source, a drain current will flow, even with zero gate potential and the MOSFET is said to be operating in E-mode. In this mode of operation gate attracts the -ve charge carriers from the P-substrate to the N channel and thus reduces the channel resistance and increases the drain current. The more positive the gate is made, the more drain current flows. On the other hand when the gate is made - ve with respect to the substrate, the gate repells some of the e charge carriers out of the N-channel. There fore, increases the channel resistance and reduces the drain current. The more - ve the gate the less the drain current.	4	8	
		3		
	The circuit consists of UJT and a capacitor C which is charged through resistor R_E. when interbase voltage VBB is switched on. During the charging period, the voltage across the capacitor increases exponentially until it attains the peak-point voltage V_P.When the capacitor voltage attainsvoltage Vp, the UJT switches on and the capacitor C rapidly discharges via B1,. The resulting current through the external resistor R develops a volt-age spike.	3		

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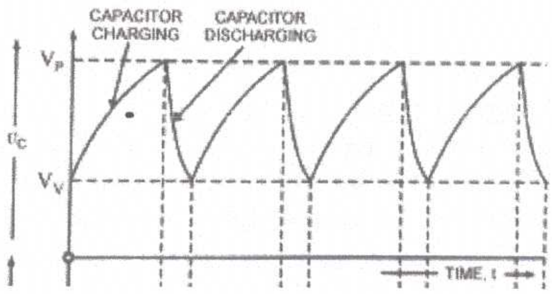
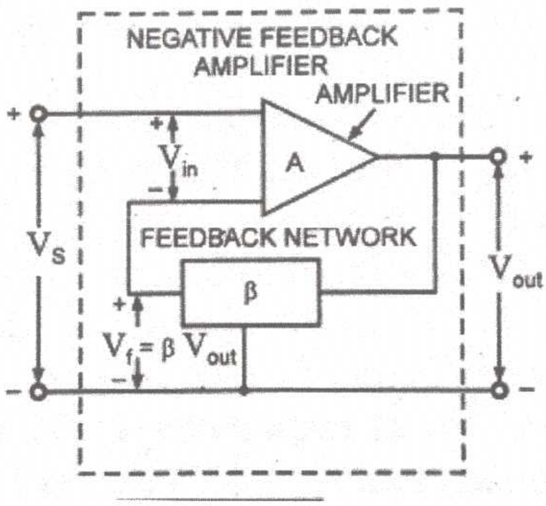
VIII a	The capacitor voltage drops to reaches the value Vv. The device then cuts-off and the capacitor commences charging again. The cycle is repeated continually generating a sawtooth waveform across capacitor C.  	1 2	7	15

SCHEME OF VALUATION

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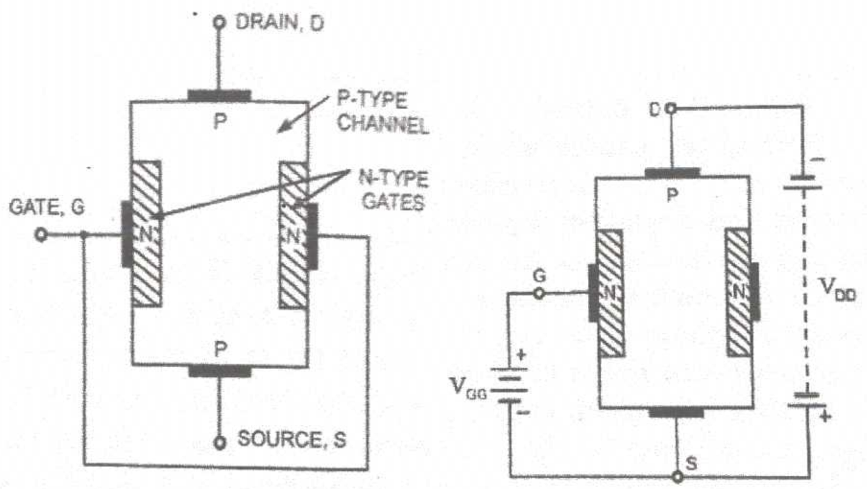
Qst. No.	Scoring indicator	Split up score	Sub Total	Total
	Voltage gain A = Vout / Vin $V_{in} = V_s + V_f = V_s + \beta V_{out}$ in case of positive feedback and $V_{in} = V_s - V_f = V_s - \beta V_{out}$ in case of negative feedback *i.e.* $V_{in} = V_s \pm \beta V_{out}$ depending on whether the feedback voltage is in phase with or in phase opposition to the input signal voltage. Consider a negative feedback case. The actual input voltage to the amplifier is the signal voltage V_s less feedback voltage V_f (βV_{out}). *i.e.* Actual input voltage to amplifier, $V_{in} = V_s - \beta V_{out}$ The output voltage V_{out} must be equal to the input voltage ($V_s - \beta V_{out}$) multiplied by amplifier gain A. So Output voltage, $V_{out} = A(V_s - \beta V_{out})$ or $(1 + \beta A) V_{out} = A V_s$ or $\frac{V_{out}}{V_s} = \frac{A}{1+\beta A}$ But $\frac{V_{out}}{V_s}$ is called the voltage gain of the amplifier with feedback, A_f. This is also referred to as *closed-loop gain*. Thus voltage gain with negative feedback, $A_f = \frac{V_{out}}{V_s} = \frac{A}{1+\beta A}$ Similarly voltage gain with positive feedback, $A_f = \frac{A}{1-\beta A}$ The term βA is called the *feedback factor* whereas β is known as the *feedback ratio* and $(1 \pm \beta A)$ is known as *loop gain*.	6	8	
VIII b	 *(b) P-Channel JFET*	2+2		

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(Scoring indicators)

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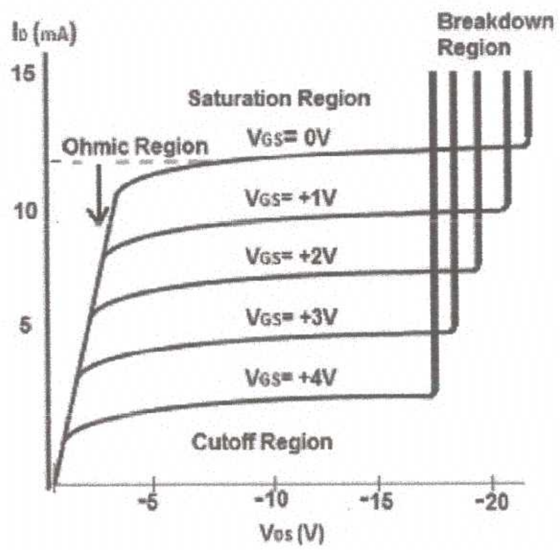
Qst. No.	**Scoring indicator**	**Split up score**	**Sub Total**	**Total**
	It consists of rectangular silicon bar. If the bar is made up of p-type material, it is p-channel FET. At the centre of the bar on both sides, some portion is filled with opposite type of material. For turning ON P-channel JFET, negative voltage can be applied across the drain terminal of the transistor w.r.t source terminal such that the drain terminal must be appropriately more negative than the source terminal. Thus, the current flow is allowed through the drain to source channel. If the voltage at the gate terminal, V_{GG} is 0V, then there will be maximum current at the drain terminal and the P-channel JFET is said to be in ON condition. For turning OFF the P-channel JFET, the negative bias voltage can be turned off or positive voltage can be applied to the gate terminal. If the gate terminal is given positive voltage, then the drain currents starts reducing (until cutoff) and thus the P-channel JFET is said to be in OFF condition.	2		
		1	7	15

SCHEME OF VALUATION

(Scoring indicators)

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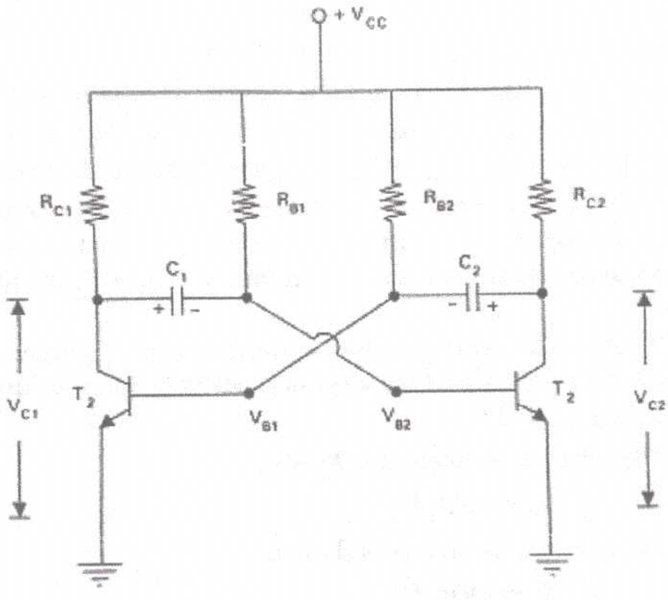
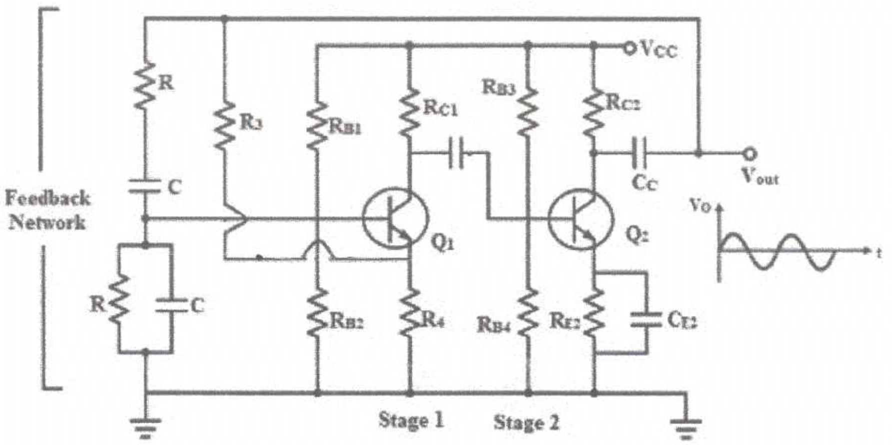
Qst. No.	Scoring indicator	Split up score	Sub Total	Total
IX a		4		
	Resistors RC1and RC2, are the collector circuit resistor,Capacitors C1, C2 are the coupling capacitors. Capacitor C1, connects the output of transistor T1to the input base terminal of transistor T2 Resistors RB1and RB2, provide the ON state base currents to the transistors T1 and T2. Because of circuit variations, one transistor will conduct heavily than the other. Assume that T1 starts conducting before T2 does. Its collector current rises rapidly. This causes its collector voltage to decrease. The resulting negative signal is fed to the base of T2 through C1 and drives it towards cutoff. As a result, the collector voltage of T2 rises towards Vcc. The increase in the collector voltage of T2 through C2 is fed to the base of T1 It causes T1 to go into saturation. This happens so quickly that C1 does not get a chance to discharge and the decreased voltage at the collector of T1 appears across RB1.	4		

SCHEME OF VALUATION

(Scoring indicators)

<table>
<tr><td colspan="5">Revision : 2015   Course Code : 3044
Course Title : ELECTRONIC DEVICES & CIRCUITS</td></tr>
<tr><th>Qst. No.</th><th>Scoring indicator</th><th>Split up score</th><th>Sub Total</th><th>Total</th></tr>
<tr><td>IX
b</td><td>Capacitor C1 now begins to discharge. This decreases the reverse bias on the base of T2. Finally the base-emitter junction of T2 becomes forward biased and T2 begins to conduct. Its collector becomes less positive. This negative going voltage signal is fed to the base of T1 through C2. It drives the T1 towards cut-off. This process continues rapidly until T1 is cutoff and T2 go into saturation. T1 remains cutoff until C2 discharges through RB2, enough to decrease the reverse bias on the base of T1. The cycle then repeats itself.


The figure below shows the transistorized Wien bridge oscillator which uses two stage common emitter transistor amplifier. Each amplifier stage introduces a phase shift of 180 degrees and hence a total 360 degrees phase shift is introduced which is nothing but a zero phase shift condition. The feedback bridge consists of RC series elements, RC parallel elements, R3 and R4 resistances.</td><td>4</td><td>8</td><td></td></tr>
</table>

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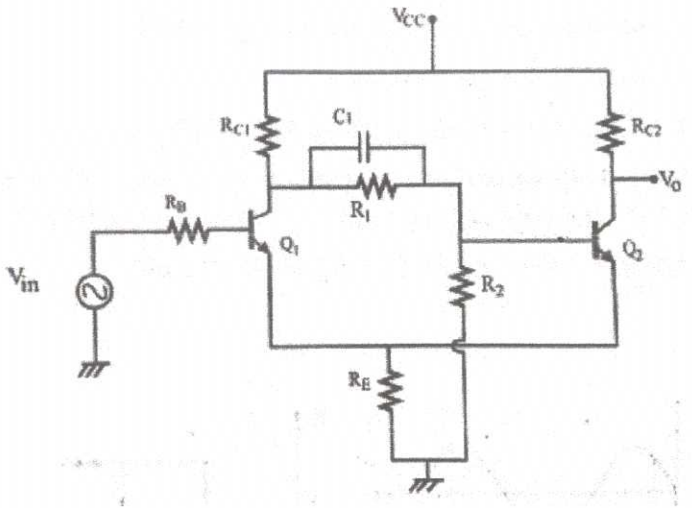
Qst. No.	**Scoring indicator**	**Split up score**	**Sub Total**	**Total**
X a	When the DC source is applied to the circuit, a noise signal is at the base of the transistor T1 is generated due to the movement of charge carriers through transistor and other circuit components. This voltage is amplified with gain A and produce output voltage 180 degrees out of phase with input voltage. This output voltage is applied as input to second transistor at base terminal of T2. This voltage is multiplied with gain of the T2. The amplified output of the transistor T2 is 180 degrees out of phase with the output of the T1. This output is feedback to the transistor T1 through the coupling capacitor C. So the oscillations are produced at wide range of frequencies by this positive feedback when Barkhausen conditions are satisfied.	3	7	15
		4		

SCHEME OF VALUATION

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Course Title : **ELECTRONIC DEVICES & CIRCUITS**				
Qst. No.	**Scoring indicator**	**Split up score**	**Sub Total**	**Total**
	The Schmitt trigger is an emítter coupled bistable multivibrator with its cross-coupling is removed. It is a comparator that is used to convert a periodical random analog wave to a square wave having the same frequency of the analog wave. Due to this, Schmitt trigger is called a squaring circuit. Consider the circuit diagram for Schmitt trigger shown in figure. Output of this circuit goes to high level when the amplitude of the input signal goes above a predetermined level called upper threshold point (UTP, also called upper tripping point). Output of this circuit goes to low level when the amplitude of the input signal goes below a predetermined level called lower threshold point (LTP, also called lower tripping point). The Schmitt trigger compares the input analog waveform with respect to the preset values of UTP and LTP. Hence Schmitt trigger is known as a two level comparator. Without any input signal, transistor Q1 stays in cut off state and Q2 in saturation state. Current Ie2 flows through the common emitter resistor Re causing a potential drop equal to I_{E2RE}. Now the minimum voltage required to make Q1 ON ìs equal to $V_{BE1} + I_{ERE}$. This point is known as upper triggering point or UTP. When the input amplitude increases and reaches UTP, Q1 turns ON. Subsequently Q2 turns off and the output rises to Vcc. Now, current IE2 becomes zero and Ie1 starts flowing through RE. The minimum voltage required to hold the transistor Q1 ON ¡s equal to V_{BE}cut in+I_{E1RE}.When the amplitude of the input sine wave becomes less than this Q1 turns off, in turn Q2 turns on and the output voltage drops. The value of the inputvoltage at which the transistor Q2 turns ON is called lower triggering point or LTP	4	8	

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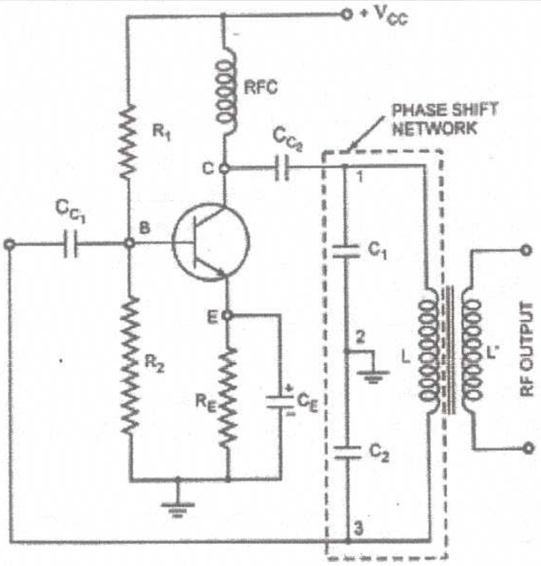
Qst. No.	Scoring indicator	Split up score	Sub Total	Total
X b		4		
	It basically consists of a single stage inverting amplifier and an L-C phase shift network The two series capacitor C1&C2 form the potential divider used for providing the feedback voltage the voltage developed across capacitor C2 provides the regenerative feedback required for sustained oscillations. Parallel combination of RE and CE along with resistors R1 and R2 provides the stabilized self bias. The collector supply voltage Vcc is applied to the collector through a radio-frequency choke (RFC) which permits an easy flow of direct current but at the same time it offers very high impedance to the high frequency currents. The presence of coupling capacitor Cc2 in the output circuit does not permit the DC currents to go to the tank circuit . The radio-frequency energy developed across RFC is capacitively coupled to the tank circuit through the capacitor Cc.	3		

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Qst. No.	Scoring indicator	Split up score	Sub Total	Total
	The output of the phase-shift L-C network is coupled from the junction of L and C2 to the amplifier input at base through coupling capacitor Cc, which blocks dc but provides path to ac. Transistor itself produces a phase shift of 180° and another phase shift of 180° is provided by the capacitive feedback. Thus a total phase shift of 360° is obtained.		7	15