NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY FACULTY OF INDUSTRIAL TECHNOLOGY BACHELOR OF ENGINEERING (HONS) DEGREE Examination MAY 2011 TEE 1211 **Analogue Electronics Duration of Examination 3 Hours** Instructions to Candidates: 1. Answer any five questions only. 2. All questions carry equal marks. 3. Show all your steps clearly in any calculation. 4. Start the answers for each question on a fresh page. . **Question 1** (4 marks) Find the current I_1 in the circuit in fig 1. (a) 8 ohms I_1 **D**1 D2 12 Volts 2 ohms 4 ohms Fig 1







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Question 3

For the circuit of an amplifier shown in fig 5, $C_1 = C_2 = 1$ microfarad, $V_{CC} = 30$ Volts $C_3 = 0,1$ microfarad, $R_1 = 68$ kilo Ohms, $R_2 = 6,8$ kilo Ohms, $R_3 = 10$ kilo-Ohms

 $R_4 = 1,5$ kilo-Omhs, $R_5 = 8,2$ kilo –Ohms and beta for T_1 is 150.For the amplifier calculate the following values using $\dot{r_e} = 50 \text{mV/I}_E$.

(i)	The input resistance of the amplifier r_{in} .	(8 marks)
(ii)	The load resistance of the amplifier r_L .	(3marks)
(iii)	The voltage gain of the amplifier.	(3 marks)
(iv)	The power gain of the amplifier.	(4 marks)
(v)	Convert the power gain to decibels	(2 marks)



Fig 5



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Question 7

For the circuit shown in fig 8, h_{fe} for $Q_1 = 80$, $r_{e1} = 19.7$ ohms and h_{fe2} for $Q_2 = 100$ and $re_2 = 24.53$ ohms, determine (i) the input resistance of the amplifier (3marks) (ii) the output resistance of the amplifier (3 marks) (iii) the voltage gain of the two sage amplifier (6 marks) (vi) the current gain of the amplifier. (4 marks) (v) the power gain of the amplifier. (4 marks)



Fig 8

Question 8

(a) Draw the circuit of a transistor Colpits oscillator, write the expression that will determine the frequency of oscillation. (7 marks)
(b) Draw the circuit of a transistor RC phase shift oscillator. Briefly describe the oscillator in terms of reason of choice components

.determining the output frequency.

(6 marks)

(c) For a Hartely oscillator $L_1=0.4$ mH, $L_2=0.002$ mH and $C_1=0.002$ μ F. (2 marks)

(d) Draw the circuit of the oscillator and determine the frequency of oscillation and the minimum gain of the circuit required for oscillation. (5 marks)