Mansoura University	Electronics & Comm. Engg. Dept.
Electronics Circuits 2 Term 1 Exam	Jan. 22, 2014
3rd year students	3 Hours
Prof. Sameh Rehan	page 1 of 4

Answer the following 25 MCQs in the MCQ answer sheet in the answer booklet:
(for each correct answer, you get 3 marks for a total of 75 Marks)
(for each wrong answer, you get -1 mark) & (You get zero for unanswered questions)

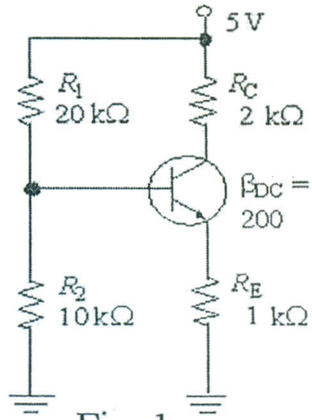

Fig. 1

Q1 When a BJT is in saturation, the
① base current cannot increase
② collector to emitter voltage is maximum
③ collector current does not change with an increase in base current
④ None of the above

Q2 In Fig. 1, the dc load line will intersect the y-axis at
① 1 mA ③ 1.67 mA
② 2.5 mA ④ 5 mA

Q3 If you Thevenize the input voltage divider, the Thevenin resistance is
① 6.67 kΩ ③ 20 kΩ
② 10 kΩ ④ 30 kΩ

Q4 A well-designed CC amplifier has
① current gain > 1 ③ both of the above
② voltage gain > 1 ④ none of the above

Q5 The efficiency of a class A output stage amplifier is
① close to 100% ③ about 50%
② around 75% ④ less than 25%

Q6 The conduction angle of the transistor of a class B output stage amplifier equals
① 90° ③ 180°
② between 90 & 180° ④ 270°

Q7 A class AB amplifier is designed to operate in the linear region
① for the whole input cycle ③ for exactly ½ of the input cycle
② for slightly more than ½ of the input cycle ④ for slightly less than ½ of the input cycle

Q8 Crossover distortion (dead-zone) is present in
① class A output stage amplifier ③ class AB output stage amplifier
② class B output stage amplifier ④ none of the above

Q9 The gain of the OP AMP shown in Fig. 2 is
① -10
② 1
③ 10
④ 11

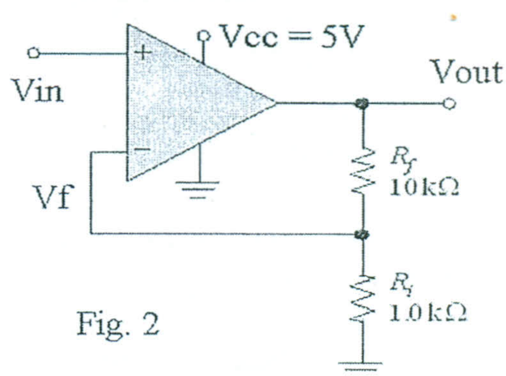

Fig. 2

Q10 For the OP AMP in Fig.2: If Vin = 1V, the approximate value of Vout is
① - 1V
② - 10V
③ 5V
④ 11V

Q11 The input impedance of a noninverting amplifier is
① nearly 0 ohms
② approximately equal to Ri
③ approximately equal to Rf
④ extremely large

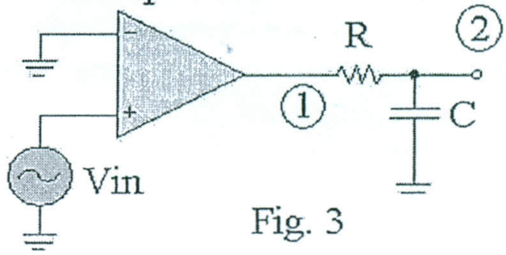

Fig. 3

Q12 In Fig. 3: the signal at node 1 is
① DC level
② square wave
③ triangle wave
④ series of +ve and -ve pulses

Q13 In Fig. 3: the signal at node 2 is
① DC level
② square wave
③ triangle wave
④ series of +ve and -ve pulses

Q14 Hysteresis is incorporated in a comparator by adding
① a capacitor in series with the input
② capacitors from the power supply to ground
③ a small resistor in series with the input
④ positive feedback

Q15 A comparator output can be limited (bounded) by
① reversing the power supply voltages
② decreasing the input resistance
③ putting a zener diode in a feedback path
④ connecting the inverting input to ground

Q16 When an instrumentation amplifier uses guarding, the shield is driven by a
① low-impedance differential source
② low-impedance common-mode source
③ high-impedance differential source
④ high-impedance common-mode source

Q17 A typical instrumentation amplifier has
① high CMRR
② unity gain
③ low input impedance
④ all of the above

Q18 An application where an isolation amplifier is particularly useful is when
① the input signal has very large dynamic range
② control of the freq. response is necessary
③ voltages could present a hazard
④ all of the above

Q19 The filter in Fig. 4 is a
① low-pass filter
② high-pass filter
③ band-pass filter
④ notch filter

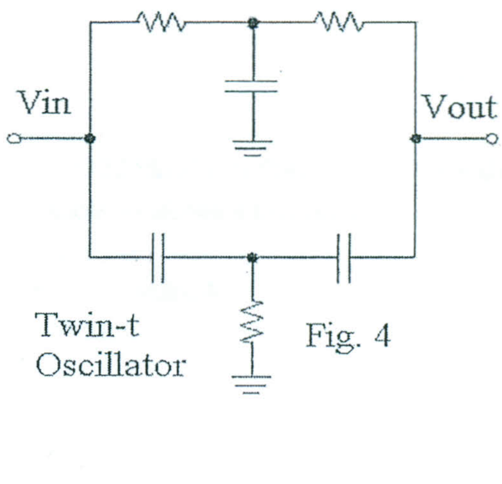

Fig. 4

Q20 An example of an LC feedback oscillator is a
① Colpitts oscillator
② Wien-bridge oscillator
③ phase-shift oscillator
④ relaxation oscillator

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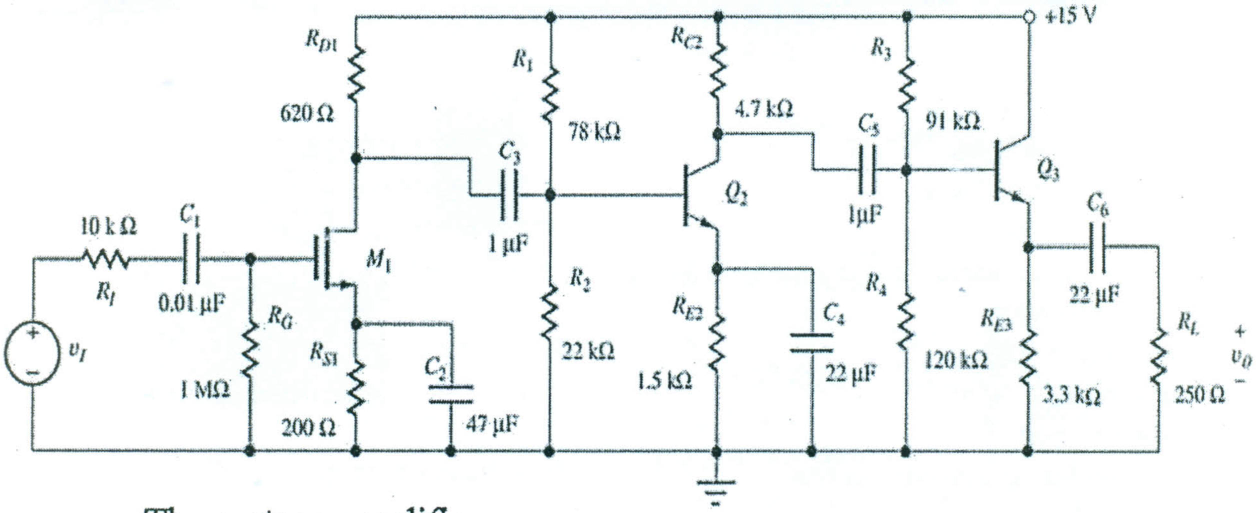

Three-stage amplifier

AC equivalent circuit

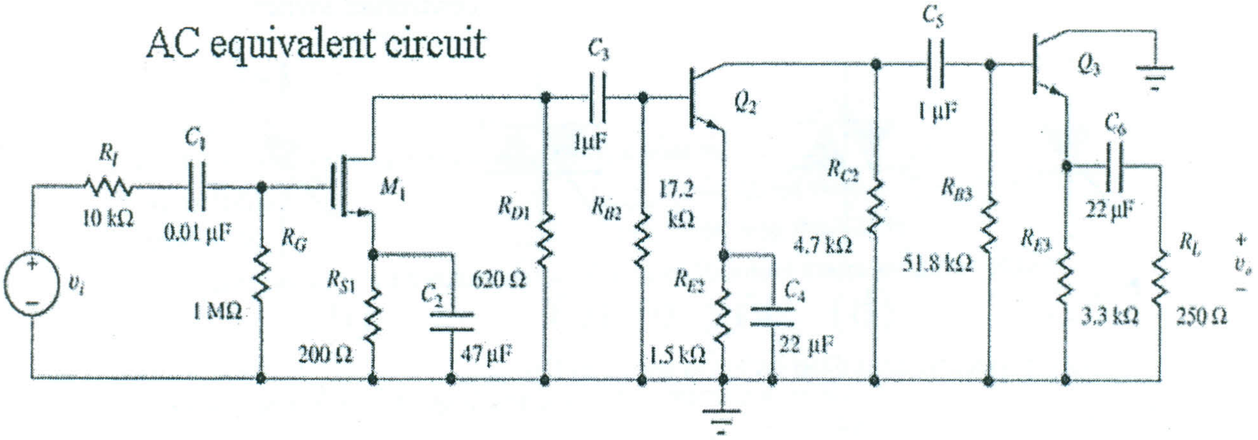

TABLE 17.3
Transistor Parameters

	g_m	r_π	r_o	β_o	C_{GS}/C_π	C_{GD}/C_μ	r_x
M_1	10 mS	∞	12.2 kΩ	∞	5 pF	1 pF	0 Ω
Q_2	67.8 mS	2.39 kΩ	54.2 kΩ	150	39 pF	1 pF	250 Ω
Q_3	79.6 mS	1.00 kΩ	34.4 kΩ	80	50 pF	1 pF	250 Ω

TABLE 14.19
Q-Points

	Q-POINT VALUES
M_1	(5.00 mA, 10.9 V)
Q_2	(1.57 mA, 5.09 V)
Q_3	(1.99 mA, 8.36 V)

the lower-cutoff frequency for a network having n coupling and bypass capacitors can be estimated from

$$\omega_L \cong \sum_{i=1}^{n} \frac{1}{R_{iS}C_i} \qquad (17.33)$$

in which R_{iS} represents the resistance at the terminals of the ith capacitor C_i with all the other capacitors replaced by short circuits. The product $R_{iS}C_i$ represents the short-circuit time constant associated with capacitor C_i.

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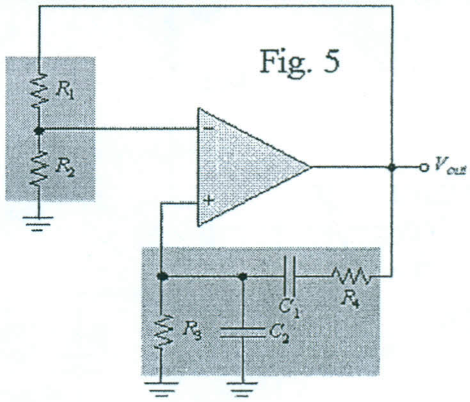

Fig. 5

Q21 Fig. 5 is
① Wien-Bridge Oscillator
② Phase-shift oscillator
③ Relaxation Oscillator
④ Hartley Oscillator

Q22 In a crystal oscillator, the crystal acts like a
① band-pass filter
② resonant circuit
③ notch filter
④ power source

Q23 A bidirectional thyristor is the
① 4-layer diode
② SCR
③ triac
④ silicon-controlled switch

(a) (b) Fig. 6 (c) (d)

Q24 The symbol for a silicon-controlled switch is shown in Fig.
① 6 (a)
② 6 (b)
③ 6 (c)
④ 6 (d)

Q25 A programmable unijunction transistor (PUT) is programmed by choosing the
① RC time constant
② gate resistors
③ power supply voltage
④ cathode resistor

Answer the following question: (25 Marks)

R1 Using the Short-Circuit Time-Constant (SCTC) method:
For the multi-stage amplifier stage shown in the following figure
a- Calculate R1S, R2S, R3S, R4S, R5S, and R6S in Ohms (12 Marks)
b- Then estimate the lower cutoff frequency of the three-stage amplifier, ω_L (3 Marks)
c- .Repeat (a) for the same circuit after removing capacitors C2 and C4 (10 Marks)