Total No. of Pages 2 Roll No. ... ...

FOURTH SEMESTER **B.E. (COE/EC/EE)**

MID SEMESTER EXAMINATION *MARCH* 2005

COE/EC/EE-211 ELECTRONICS-II

Time: 1 Hour 30 Minutes *Max. Marks : 20*

Note : Attempt ***ALL*** questions.
Assume suitable missing data, if any.

1[a] Why do we use active loads in amplifiers? **2**

[b] For a common emitter stage use Miller's theorem to determine input and output capacitance. In hybrid π model current through C_μ branch may be neglected. **2**

[c] Is the dominant pole approximation valid for the given transfer function **1**

$$A_{V_H} = \frac{A_{V_O}(1+s/10^{18})}{(1+s/10^{8})(1+s/10^{16})}$$

if yes, determine ω_H.

2. For the circuit shown in figure-1 determine the overall voltage gain $\frac{V_O}{V_S}$, input impedance and output impedance. Both Q_1 and Q_2 have $\beta_F = 150$ and $r_\pi = 2.5$ K. **6**

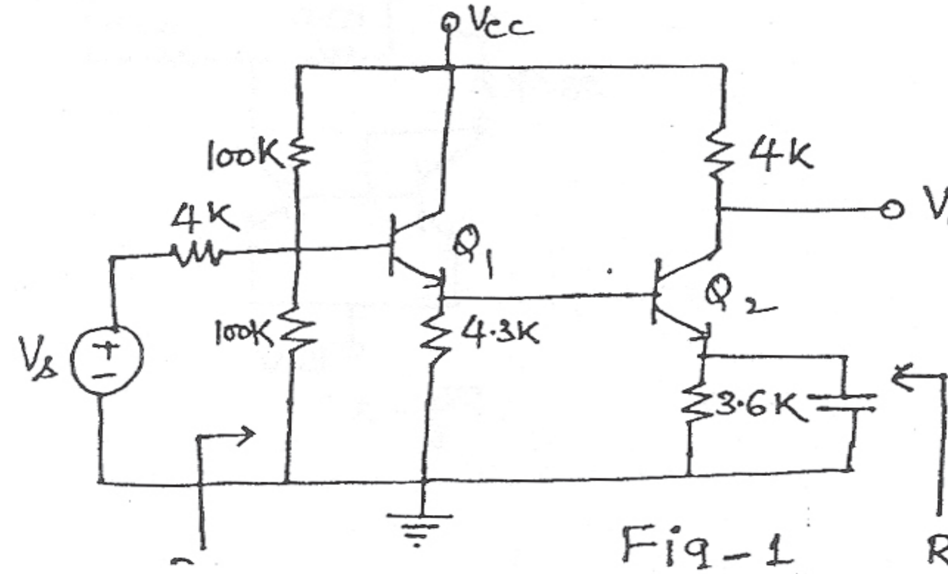


Fig-1

3 For a transistor biased at $I_{CQ} = 1mA$ $\beta_O = 160$; at f = 50 MH₂ $|\beta(jw)| = 8$. Determine f_T and f_β What is the value of C_π if $C_\mu = 1pF$. 4

4 For the circuit shown in Fig.2 $\beta_F = \beta_O = 100$, $C\mu = 2pF$, f_T = 400 MH_2. Calculate mid band gain (A_{V_o}) and upper 3dB frequency f_H. 5

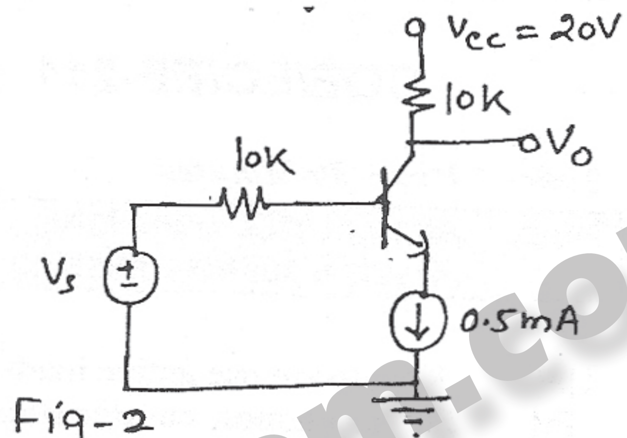


Fig-2

OR

For the circuit shown in Fig.3. Find the differential mode gain and common mode gain. Assume $r_\pi = 2K$ for both Q_1 and Q_2

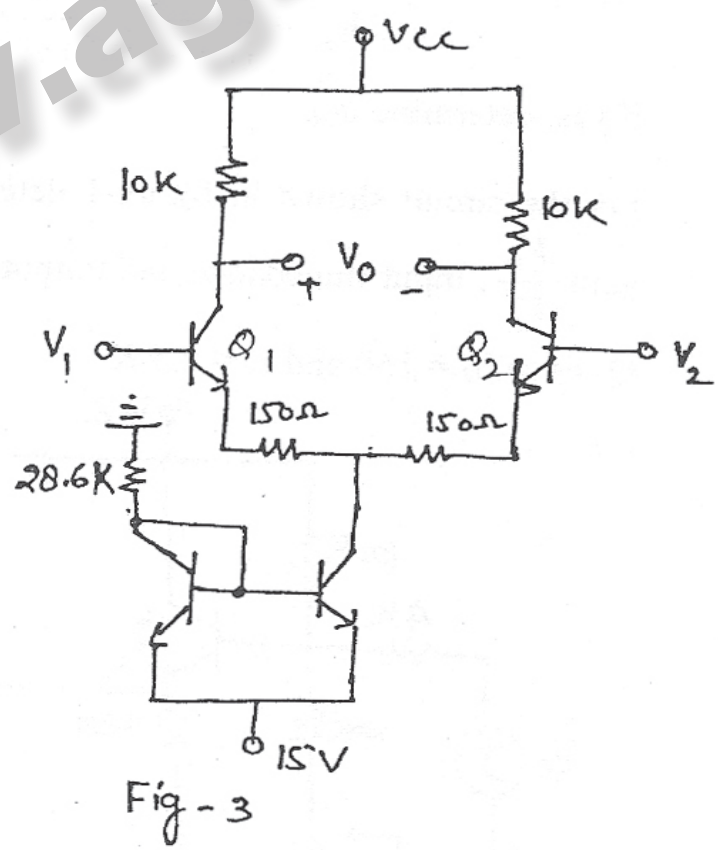


Fig-3

Total No. of Pages 2 *Roll No. ....*

FOURTH SEMESTER B.E. (EE/EC/COE)

MID SEMESTER EXAMINATION *MARCH* 2005

EE/EC/COE-212 ELECTROMAGNETICS

Time: 1 Hour 30 Minutes *Max. Marks : 20*

Note : Answer *ALL* questions.
Assume suitable missing data, if any.

1 Determine if the vectors $\left(\hat{a}_r - \sqrt{3}\hat{a}_\phi + 3\hat{a}_Z\right)$ at the point $\left(3, \frac{\pi}{3}, 5\right)$ in cylindrical co-ordinates is equal to the vector $3\hat{a}_r - \sqrt{3}\hat{a}_\theta - \hat{a}_\phi$ at the point $\left(1, \frac{\pi}{3}, \frac{\pi}{6}\right)$ in spherical co-ordinates. (4)

2 Verify Gauss's divergence theorem for the vector field
$\vec{A} = r^2 \cos^2\phi \,\hat{a}_r + z \sin\phi \,\hat{a}_\phi$
over any closed surface bounded by r =4, $0 \le z \le 1$. (4)

3 A potential field is expressed by

$$V = \frac{50r^2 \cos \phi}{(z+1)} \ (V).$$

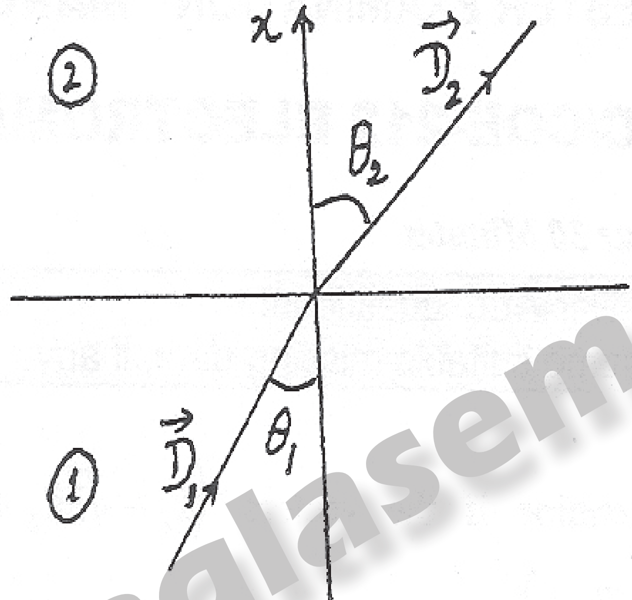
Given a point A (4m, 30°, 2m) in free space. Calculate:

[a] Potential at point A,
[b] Electric filed intensity at A,
[c] Volume charge density at A and
[d] Unit vector in the direction of potential gradient. (4)

4 A homogeneous dielectric $\epsilon_r = 2.5$ fills region 1 $(x \leq 0)$, while region $2(x \geq 0)$ is free space.

[a] If $\vec{D}_1 = 12\hat{a}_x - 10\hat{a}_y + 4\hat{a}_z \ \text{nC/m}^2$, find $\vec{D}_2$ and θ_2.

[b] If $E_2 = 12\ \text{Vm}^{-1}$ and $\theta_2 = 60°$, find E_1 and θ_1. (4)



5 A point charge Q is placed at a distance 'd' from the centre of a grounded conducting sphere of radius a (a<d). Applying the method of images, determine (a) the charge distribution induced on the surface of the sphere, and (b) the total charge induced on the sphere. (4)

Total No. of Pages 2 *Roll No. ………*

FOURTH SEMESTER B.E. (EC)

MID SEMESTER EXAMINATION MARCH 2005

EC-213 NETWORK ANALYSIS AND SYNTHESIS

Time: 1 Hour 30 Minutes *Max. Marks : 20*

Note : Answer ***ALL*** questions.
Assume suitable missing data, if any.

1[a] Show that $F(s) = \dfrac{s^3 - 1}{4s^3 - 3s^2 - 1}$ is a positive real function.

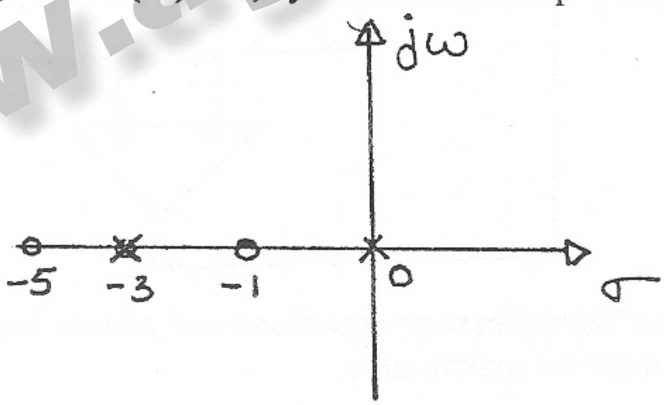
[b] The driving point impedance of a network is given by $Z(s) = \dfrac{s^3 + 4s}{s^2 + 2}$ realize the network.

[c] Determine the range of constant K for the Hurwitz polynomial $P(s) = s^4 + Ks^3 + s^2 + 2s + 1$

[d] Realize $Z(s) = \dfrac{s(s^2 + 2)(s^2 + 4)}{(s^2 + 1)(s^2 + 3)(s^2 + 5)}$ in Foster second form.

[e] An impedance function has the pole-zero pattern shown in Fig.1. If Z(-2) = 3, synthesize the impedance in Cauer form

(2x5=10)



2 Find the transfer function $H(s) = \frac{V_{01}(s)}{V_i(s)}$ for the circuit shown in Fig.2 (5)

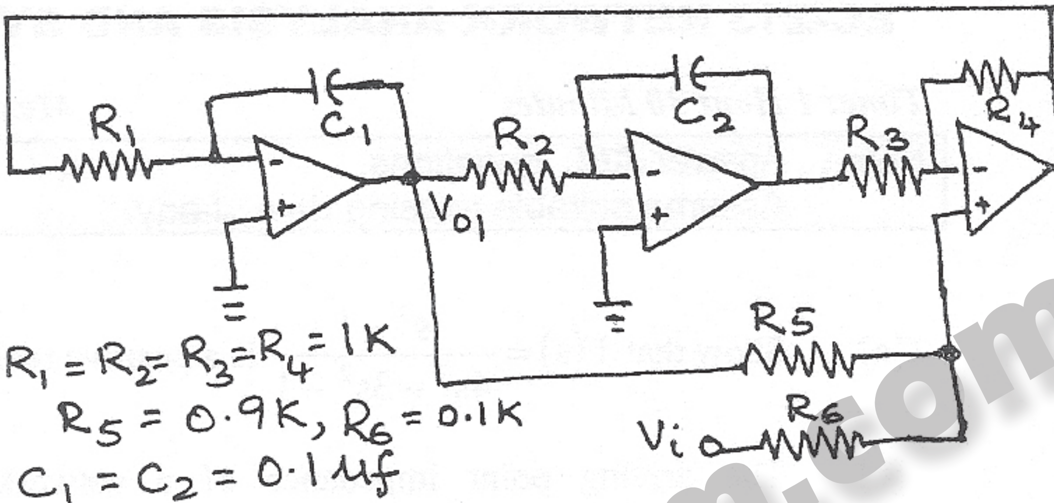
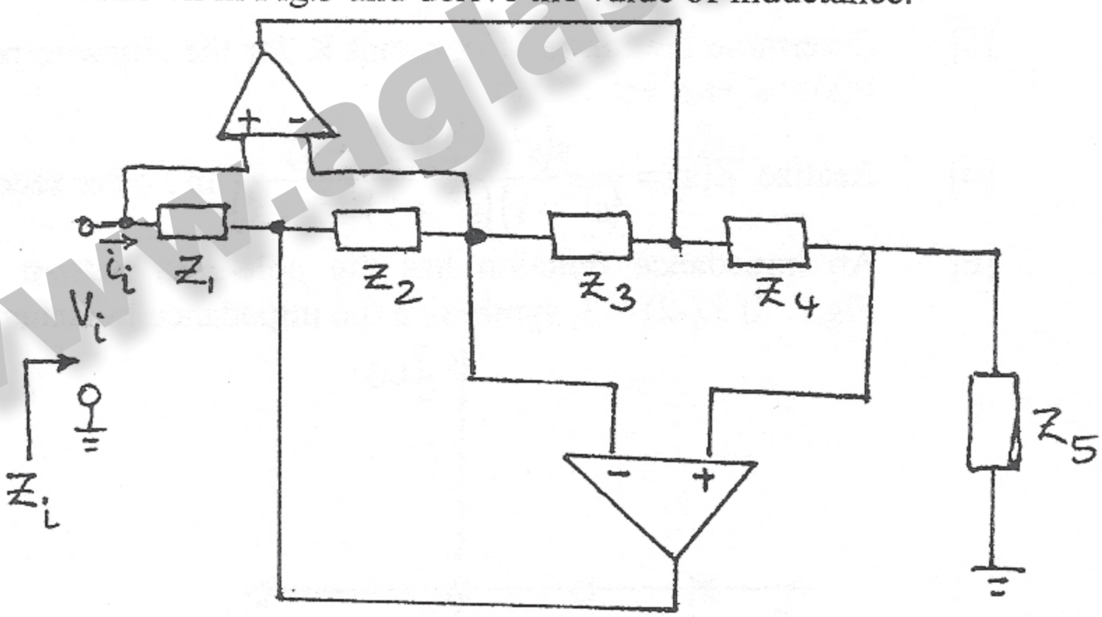


FIG. 2.

3 Simulate a floating inductor using general impedance converter shown in Fig.3 and derive the value of inductance.



Derive the necessary equations and obtain the results by finding transmission matrix also. (5)

Total No. of Pages 2 *Roll No. ... ...*

FOURTH SEMESTER B.E. (COE/EC)

MID SEMESTER EXAMINATION *MARCH* 2005

COE/EC-214 DIGITAL CIRCUITS & SYSTEM-I

Time: 1 Hour 30 Minutes *Max. Marks : 20*

Note : Attempt any *TWO* questions.
All questions carry equal marks i.e., Ten each
Assume suitable missing data, if any.

1[a] Compute X from the following equation :

$$(2.325)_8 + (1001001.011)_2 + (X)_{10} = (92C)_{16}$$ 3

[b] In a new number system X and Y are successive digits such that

$$(XY)_r = (25)_{10} \; and \; (YX)_n = (19)_{10}$$

Find X, Y for r = 8 and n = 16 3

[c] Given the logic function

$$f = ABC + B\overline{C}D + \overline{A}BC$$

(i) make the truth table

(ii) Simplify using K-map

(iii) Realize f using NAND gates 4

2[a] Draw a neat diagram of a master–slave flip-flop with nine NAND gates. 2

[b] What is the race around problem normally accounted in J-K flip-flop built-in with four NAND gates. 2

[c] Describe the operation of master-slave J-K flip-flop and explain the behaviour of master-slave flip-flop with respect to different timings of the clock pulse. Also explain, how does in the master slave flip-flop the race around problems are eliminated. 6

3[a] Define prime implecants of a switching function. Give an example of cyclic prime implecant case. **2+1**

[b] Simplify the following switching function by Karnaugh's map method and at first finding the set of all the prime implecants

$f(w, x, y, z) = (0, 1, 2, 8, 9, 10, 11, 12, 13, 14, 15)$ **7**

Total No. of Pages 2 *Roll No. ... ...*

FOURTH SEMESTER B.E. (EC)

MID SEMESTER EXAMINATION *MARCH* 2005

EC-215 ELECTRICAL MACHINES-II

Time: 1 Hour 30 Minutes *Max. Marks : 20*

Note : Attempt any *FOUR* questions.
Assume suitable missing data, if any.

1[a] When a 3 phase supply is given to a 3-phase winding, a rotating magnetic field of constant magnitude will be produced. Justify the above statement. 3

[b] Define slip. Why cannot an induction motor run at synchronous speed? 2

2. A 10 kW, 400 V, 4-pole delta connected squirrel cage induction motor gave the following test results:

No load test :	400 V, 8A, 250 watts
Blocked rotor test;	90V, 35A, 1350 watts.

The d.c. resistance of stator winding per phase measured immediately after the blocked-rotor test is 0.6Ω. Calculate the rotational losses and the equivalent circuit parameters. 5

3. A 10 kW, 400V, 3-phase, 4-pole, 50 Hz delta connected induction motor is running at no load with a line current of 8A and an input power of 660 watts. At full load, the line current is 18 A and the input power is 11.20 kW. Stator effective resistance per phase is 1.2Ω and friction, windage loss is 420 watts. For negligible rotor ohmic losses at no load, calculate,

[a] stator core loss;

[b] total rotor losses at full load;

[c] total rotor ohmic losses at full load

[d]	full load speed	
[e]	internal torque, shaft torque and motor efficiency.	5
4[a]	What are the effects of space harmonics on 3-phase induction motor performances?	2
[b]	Explain the phenomenon of cogging and crawling in a 3-phase induction motor.	3
5[a]	Discuss briefly the various methods of speed control of 3-phase induction motors.	3
[b]	Explain the method of speed control of 3-phase induction motor by varying the supply frequency.	2