

**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.

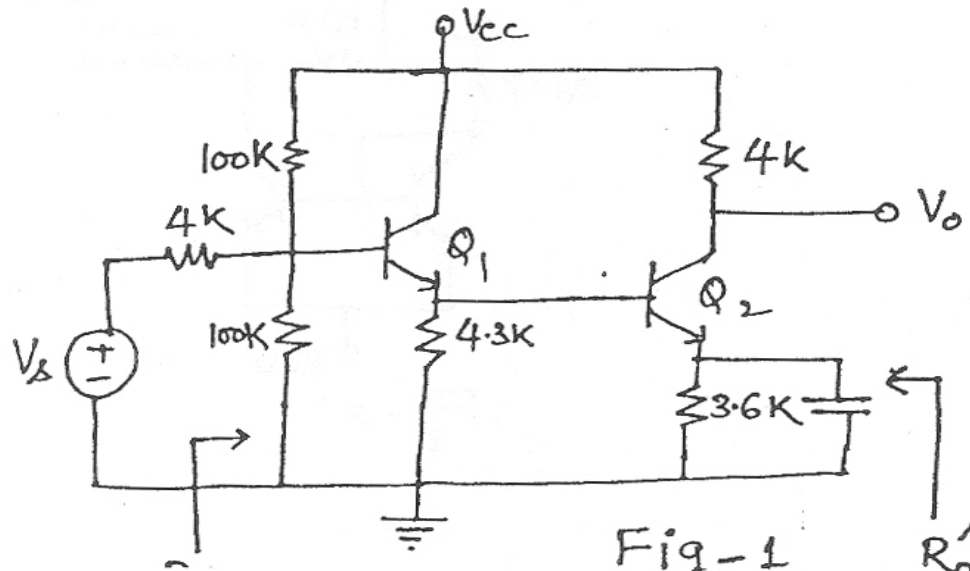
Assume suitable missing data, if any.

- 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  $\pi$  model current through  $C_\mu$  branch may be neglected. 2
- [c] Is the dominant pole approximation valid for the given transfer function 1

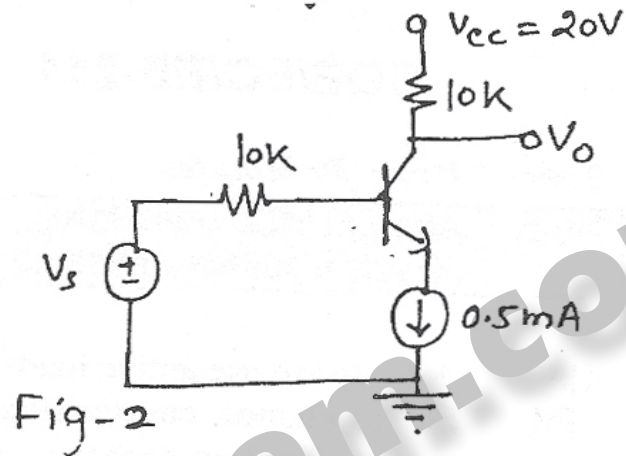
$$A_{V_H} = \frac{A_{V_C} (1 + s/10^{18})}{(1 + s/10^8) (1 + s/10^{16})}$$

if yes, determine  $\omega_H$ .

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  $r_\pi = 2.5 \text{ K}$ . 6

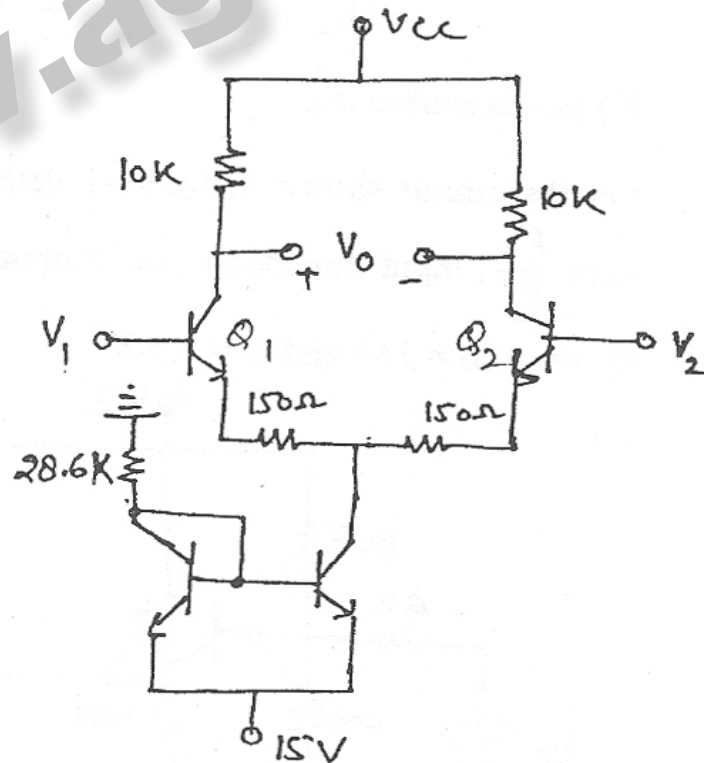


- 3 For a transistor biased at  $I_{CQ} = 1\text{mA}$   $\beta_0 = 160$ ; at  $f = 50\text{ MHz}$   $|\beta(j\omega)| = 8$ . Determine  $f_T$  and  $f_\beta$ . What is the value of  $C_\pi$  if  $C_\mu = 1\text{pF}$ . 4
- 4 For the circuit shown in Fig.2  $\beta_F = \beta_0 = 100$ ,  $C_\mu = 2\text{pF}$ ,  $f_T = 400\text{ MHz}$ . Calculate mid band gain ( $A_{V_o}$ ) and upper 3dB frequency  $f_H$ . 5



OR

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



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  $(\hat{a}_r - \sqrt{3}\hat{a}_\phi + 3\hat{a}_z)$  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  $r=4, 0 \leq z \leq 1$ . (4)

- 3 A potential field is expressed by

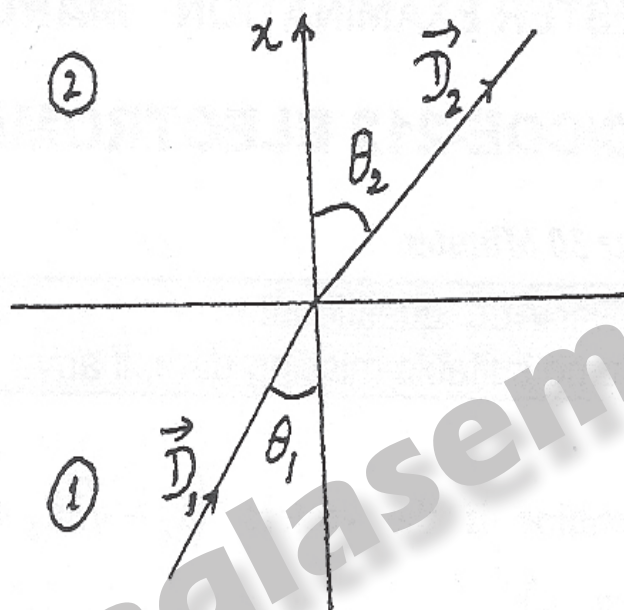
$$V = \frac{50r^2 \cos \phi}{(z+1)} \text{ (V)}.$$

Given a point A (4m,  $30^\circ$ , 2m) in free space. Calculate:

- [a] Potential at point A,
- [b] Electric field 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  $\vec{D}_1 = 12\hat{a}_x - 10\hat{a}_y + 4\hat{a}_z$  nC/m<sup>2</sup>, find  $\vec{D}_2$  and  $\theta_2$ .
- [b] If  $E_2 = 12$  Vm<sup>-1</sup> and  $\theta_2 = 60^\circ$ , find  $E_1$  and  $\theta_1$ . (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)

## FOURTH SEMESTER

**B.E. (COE)**

**MID SEMESTER EXAMINATION MARCH 2005**

### **COE-213 DATA STRUCTURES**

*Time: 1 Hour 30 Minutes*

*Max. Marks : 20*

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

- 1 Write an algorithm that uses stack to test for balanced pairs. The input strings, all consisting of a single line less than 80 characters long, will include four types of brackets :  
{ }, [ ], < >, ( )  
(5)
- 2 Write an algorithm that reads text from standard input, buffers it in a queue until the end of a sentence is reached (indicated by a word ending with '.' ), and then writes out the complete sentence to standard output. Your algorithm should continue to read sentences and write them out again until the input file is closed.  
(5)
- 3 For each of the following cases, indicate whether it would best be represented by a directed graph, an undirected graph, or either :
  - [a] Vertices : Countries on a map. Edges : adjacent borders
  - [b] Vertices : Countries Edges : major export markets.
  - [c] Vertices : devices in a computer network. Edges : "connectivity"
  - [d] Vertices : variables in a computer program. Edges : "Uses" relations (we say variable x uses variable y if y appears on the right hand side of an expression with x on the left, e.g, x =y)
  - [e] Vertices : football teams. Edges : games during a season.  
(5)
- 4 Write a program for finding the height of the tree.  
(5)



**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 :

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

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

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

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

[c] Given the logic function

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

(i) make the truth table

(ii) Simplify using K-map

(iii) Realize  $f$  using NAND gates 42[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 implicants of a switching function. Give an example of cyclic prime implicant case. 2+1

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

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

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## FOURTH SEMESTER

B.E. (COE)

MID SEMESTER EXAMINATION **MARCH** 2005

### COE-215 PRINCIPLES OF COMMUNICATION ENGINEERING

Time: 1 Hour 30 Minutes

Max. Marks : 20

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

1. For an AM DSBFC transmitter with an unmodulated carrier power  $P_C = 100$  W that is modulated simultaneously by three modulating signals with coefficient of modulation  $m_1 = 0.2$ ,  $m_2 = 0.4$  and  $m_3 = 0.5$ 
  - [a] Determine total coefficient of modulation
  - [b] Upper and lower sideband power
  - [c] Total transmitted power 1+1+1
2. Explain the working of balanced modulator circuit for generation of double side band suppressed carrier. 3
3. Canadian regulations state that for FM broadcast the maximum deviation allowed is 75 kHz and maximum modulation frequency allowed is 15 kHz. Calculate the maximum band width requirements. Explain how frequency modulated signal can be converted into phase modulated signal. 3
4. State and prove sampling theorem. 3
5. Explain time division multiplexing with the help of block diagram. 3
6. What are the advantages of flat top sampling over natural sampling? Explain aperture effect and explain how can we correct this distortion. 5