S.E. EXTC sem IV old M-14

Sub:- AM IV

19/5/14

(OLD COURSE) QP Code : **MV-18807**

(3 Hours) [Total Marks :100

N.B. : (1) Question No. **1** is **compulsory.**
(2) **Solve** any **four** from the **remaining.**

1. (a) Evaluate $\iint_S \bar{F}.\hat{n}\,ds$ where $\bar{F}=x^3\,i+y^3\,j+z^3\,k$ and S is the surface of the sphere $x^2+y^2+z^2=16$. **5**

(b) Find the image of the circle $|z|=\lambda$. under the transformation $\omega=\sqrt{2}(1+i)z$. **5**

(c) Explain the classification of Quadratic form (value class) using Sylvester Law of Inertia. **5**

(d) Prove that $J_{\frac{-1}{2}}(x)=\sqrt{\frac{2}{\pi x}}\cos x$ **5**

2. (a) Find the eigen values and eigen vectors of **6**

A^2+3 adj A, where $A=\begin{bmatrix} 2 & -1 & -1 \\ -1 & 2 & -1 \\ -1 & -1 & 2 \end{bmatrix}$

(b) Show that $f(x)=\dfrac{x^2y^5(x+iy)}{x^4+y^{10}}, z\neq 0,$ **6**

$= \quad 0 \qquad , z\neq 0$

is not analytic at the origin although C-R equations are satisfied.

(c) Verify Greens Theorem for $\int_c (2x - y^3)\,dx - xy\,dy$ where C is the boundary of the annular region enclosed by the circles $x^2 + y^2 = 1$, and $x^2 + y^2 = 9$ **8**

3. (a) Define (i) Minimal polynomial of a matrix
(ii) Derogatory and Non - Derogatory matrix and hence show that **6**

$\begin{bmatrix} 5 & -6 & -6 \\ -1 & 4 & 2 \\ 3 & -6 & -4 \end{bmatrix}$ is derogatory.

(b) Evaluate by Cauchys integral formula $\oint \frac{\cos \pi z}{z^2 - 1}\,dz$ where C is the rectangle with vertices $\pm i, -2 \pm i$ **6**

(c) Verify Stokes Theorem for $\overline{F} = 2y(1-x)i + (x - x^2 - y^2)j + (x^2 + y^2 + z^2)k$. over the area of the triangle $x + y + z = 2$. **8**

4. (a) Verify Cayley - Hamilton Theorm and find A^{-2} for $A = \begin{bmatrix} 1 & 2 & 0 \\ 2 & -1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$ **6**

(b) Find all possible Laurent'z series expansion of the function $f(z) = \frac{7z-2}{z(z+1)(z-2)}$ about $z = -1$ indicating region of convergence. **6**

(c) Verify Gauss divergence theorem for $\overline{F} = x^2 i + zj + yz k$, over the cube bounded by $x = 0$, $x = 1$, $y = 0$, $y = 1$, $z = 0$, $z = 1$. **8**

5. (a) Find bilinear transformation that maps 1, i, -1 of z-plane onto, 0, 1, ∞ of w-plane. **6**

(b) Evaluate $\int_0^{2A} \frac{\cos 2\theta}{1 - 2a\cos\theta + a^2} d\theta, -1 < a < 1$ **6**

(c) If $\lambda_1, \lambda_2, \ldots \lambda_n \ldots$ are the positive roots of $J_2(x) = 0$ then show that **8**

$$x^2 = 2a \sum \frac{J_2(\lambda_n x)}{\lambda_n J_2(\lambda_n a)}, \quad 0 < x < a.$$

6. (a) Prove that $J_{-5/2}(x) = \sqrt{\frac{2}{\pi x}}\left[\frac{3}{2}\sin x + \frac{3 - x^2}{x^2}\cos x\right]$ **6**

(b) Find the sum of the residues of $f(z) = \frac{z}{(z-1)(z+2)^2}$ at its isolated singularities using Laurentz series expansion. **6**

(c) Reduce the quadratic form xy + yz + zx to a diagonal form through congruent transformation. Find the rank, index and signature. **8**

7. (a) Prove that $4\,J_n''(x) = J_{n-2}(x) - 2\,J_n(x) + J_{n+2}(x)$ **6**

(b) Is the matrix $A = \begin{bmatrix} 3 & -1 & 1 \\ -1 & 3 & -1 \\ 1 & -1 & 3 \end{bmatrix}$ is diagonalisable. If so, find the diagonal form & diagonalising Matrix. **6**

(c) Prove that $\bar{F} = (2xy + z)\,i + (x^2 + 2y\,z^3)\,j + (3y^2\,z^2 + x)\,k$ is irrotational. Find the scalar potential ϕ such that $\bar{F} = \text{grad}\ \phi$. and evaluate $\int_A^B \bar{F}.d\bar{r}$ along the straight line joining A(1, 2, 0) to B (2, 2,1) **8**

SE - EXTC - OLD
ADICA - sem - IV

23/5/14

(OLD COURSE) **QP Code : MV-18846**

(3 Hours) **[Total Marks : 100**

N.B. : (1) Question **No.1** is **compulsory**.
(2) Answer any **four** questions form remaining **six** questions
(3) Assume suitable data wherever necessary.
(4) Draw neat labelled diagram wherever necessary.

1. (a) Draw the block diagram of an OP-AMP and explain the function of each block. 5
(b) Explain log amplifire. 5
(c) Explain how switch debouncing is avoided using flip-flops. 5
(d) Give the features of function generator IC 2206. 5

2. (a) Explain basic requirement of instrumentation amplifier and find output voltage expression for Instrument amplifier using three OP-amp. 10
(b) Write VHDL code for 4 bit down counter. 10

3. (a) Design a second order KRC highpass filter with cut-off frequency Fo = 1KHZ and Q = 5 and draw circuit diagram. 10
(b) For 5 bit, R-2R ladder network with O = 0V 1 = 10V, Find :- 10
(i) Analog output due to LSB change.
(ii) Full scale output voltage.
(iii) Analog output for digital input 11000.

4. (a) Explain in detail various documentation standard of sequential circuits. Draw the internal structure of synchronous SRAM. 10
(b) Explain diagram of IC 8038 with internal block. Find expression for duty cycle of 8038 IC. 10

5. (a) Draw the block diagram of IC 565 PLL. Explain in detail FSK demodulation using PLL. 10
(b) Draw the block diagram of internal architecture of IC XC9500 family CPLD and explain. 10

6. (a) Design astable Multivibrator using 555 with output frequency 10KHZ and duty cycle 70%. 10
(b) Explain the operation of the sample and Hold circuit. Draw input and output waveforms. 10

7. Write short note on :- 20
(a) Non-inverting schmitt trigger
(b) Explain FPGA
(c) Differentiate between Moore and melay circuit
(d) Comparator circuit.

SE sem IV (old) EXTC 29/5/2014

EDC-II

(OLD COURSE) **QP Code : MV-18882**

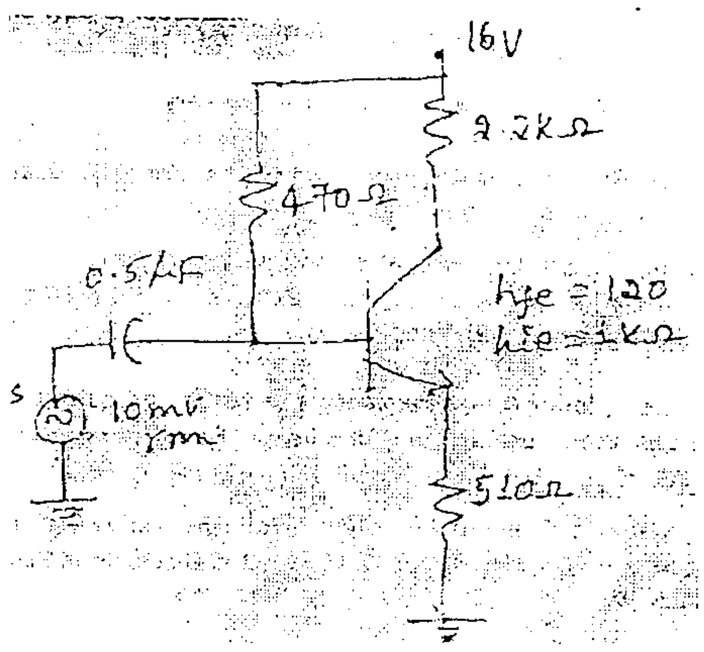
(3 Hours) [Total Marks :100

N.B. : (1) Question No.**1** and **2** are **compulsory.**
(2) **Attempt** any **three** questions from remaining **five** questions.
(3) **Figures** to the **right** indicate full marks.
(4) **Assume** suitable data wherever **necessary.**

1. Design a twostage RC coupled CE-CE amplifier for following parameters Av $\geq$ 2500, F $\leq$ 30Hz, Si $\leq$ 8, Vo=2.5 Volts Use BC 147A transistor. Obtain maximum undistorted output voltage. **20**

2. Design a two stage RC coupled CS-CS amplifier for following parameters Av $\geq$ 100, F_L=20 Hz, Ri=lMΩ, Vo= 3 Volts and I_{DQ} = 1.38 m A Use suitable transistor and V_{DD} Obtain maximum undistorted output voltage. **20**

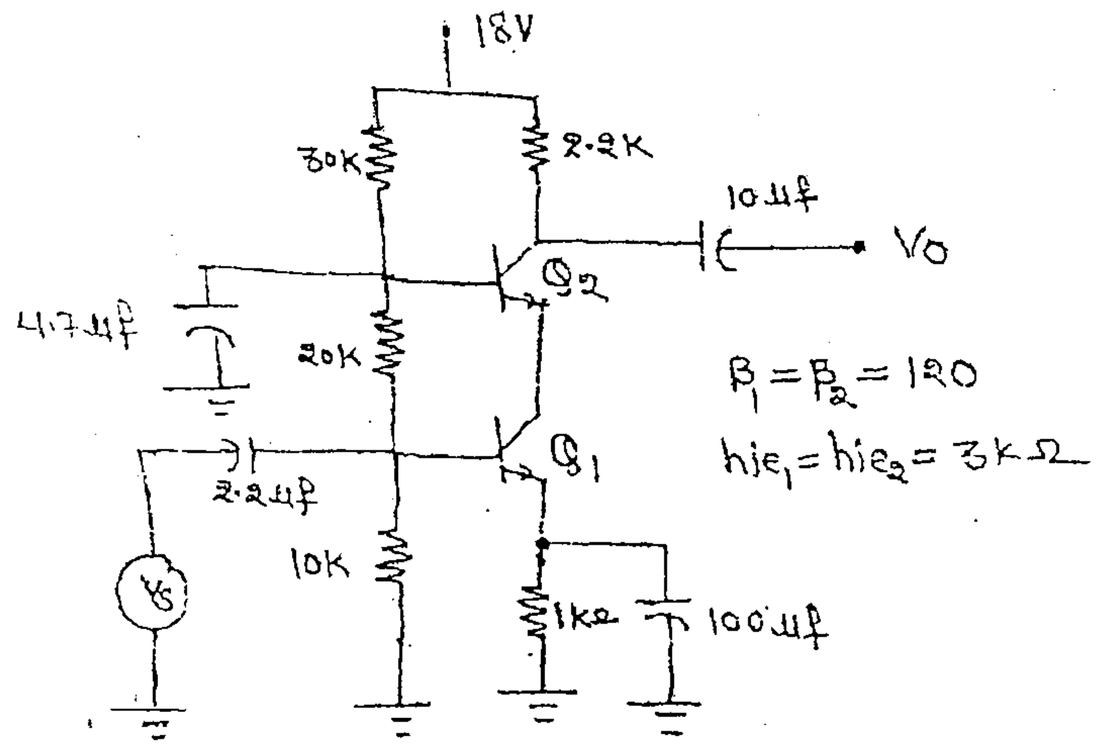
3. (a) Obtain Avf, Aif, Rif and Rof for the ciruit shown in the figure. If R=100KΩ, Rc = 10KΩ, R1 = 50KΩ. **10**



(b) Derive the expression for output frequency and gain for Wien bridge oscillator **10**

4. (a) Design a class B power Amplifier with the following specifications. Output power = 10 watts. RL = 8Ω, V_{CC}= 12 V. Calculate the overall efficiency at the full load. **10**

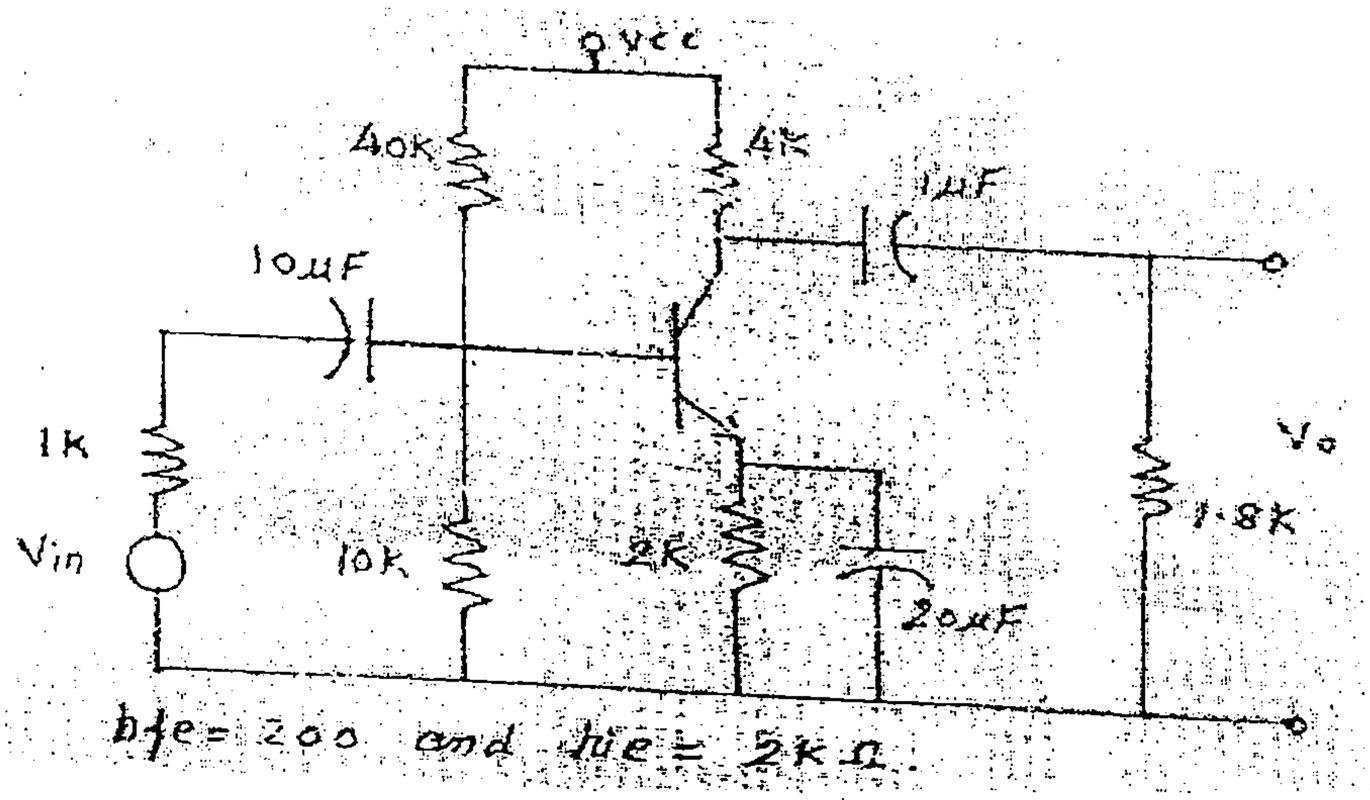
(b) Determine Q point and derive the expression for voltage gain for cascode amplifier shown in figure. 10



5. (a) Explain the operation of transistorized ASTABLE multivibrator with appropriate waveforms. 10

(b) Explain the various types of negative feedback and derive expression for Rif and Roffor Voltage series and Current shunt feedback network. 10

6. (a) Obtain the lower cut-off frequency of the amplifier shown 10



(b) Derive the expression gain, input resistance and output resistance for balanced input balanced output Diff-amp. 10

7. Attempt any 4 out-of 5 20
   (a) Compare small signal and large signal amplifier
   (b) Hartley oscillator circuit
   (c) Heat sink in power amplifier
   (d) Schmitt trigger using BJT
   (e) Types of coupling in multi-stage networks.

Transistor type	Pdmax @ 25°C Watts	Icmax @ 25°C Amps	$V_{CE}^{(sat)}$ volts d.c.	V_{CBO} volts d.c.	V_{CEO} (Sus) volts d.c.	V_{CER} (Sus) volts d.c.	V_{CEX} volts d.c.	V_{EBO} volts d.c.	T_j max °C	D.C. current gain min	typ.	max.	Small - Signal h_{fe} min.	typ.	max.	V_{BE} max.	θ_{j-c} °C/W	Derate above 25°C W/°C
2N 3055	115·5	15·0	1·1	100	60	70	90	7	200	20	50	70	15	50	120	1·8	1·5	0·7
ECN 055	50·0	5·0	1·0	60	50	55	60	5	200	25	50	100	25	75	125	1·5	3·5	0·4
ECN 149	30·0	4·0	1·0	50	40	—	—	8	150	30	50	110	33	60	115	1·2	4·0	0·3
ECN 100	5·0	0·7	0·6	70	60	65	—	6	200	50	90	280	50	90	280	0·9	35	0·03
BC147A	0·25	0·1	0·25	50	45	50	—	6	125	115	180	220	125	220	260	0·9	—	—
2N 525(PNP)	0·225	0·5	0·25	25	30	—	—	—	100	35	—	65	—	45	—	—	—	—
BC147B	0·25	0·1	0·25	50	45	50	—	6	125	200	290	450	240	330	500	0·9	—	—

Transistor type	hie	hoe	hre	θjc
BC 147A	2·7 K Ω	18μ ℧	1·5 × 10^{-4}	0·4°C/mw
2N 525 (PNP)	1·4 K Ω	25μ ℧	3·2 × 10^{-4}	—
BC 147B	4·5 K Ω	30μ ℧	2 × 10^{-4}	0·4°C/mw
ECN 100	500 Ω	—	—	—
ECN 149	250 Ω	—	—	—
ECN 055	100 Ω	—	—	—
2N 3055	25 Ω	—	—	—

BFW 11—JFET MUTUAL CHARACTERISTICS

−Vgs volts	0·0	0·2	0·4	0·6	0·8	1·0	1·2	1·6	2·0	2·4	2·5	3·0	3·5	4·0
Ids max. mA	10	9·0	8·3	7·6	6·8	6·1	5·4	4·2	3·1	2·2	2·0	1·1	0·5	0·0
Ids typ. mA	7·0	6·0	5·4	4·6	4·0	3·3	2·7	1·7	0·8	0·2	0·0	0·0	0·0	0·0
Ids min. mA	4·0	3·0	2·2	1·6	1·0	0·5	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0

N-Channel *JFET*

Type	V_{DS} max. Volts	V_{DG} max. Volts	V_{GS} max. Volts	P_d max. @25°C	T_j max.	I_{DSS}	g_{fs} (typical)	$-V_p$ Volts	r_d	Derate above 25°C	θ_{j-a}
2N3822	50	50	50	300 mW	175°C	2 mA	3000 μ ℧	6	50 KΩ	2 mW/°C	0·59°C/mW
BFW 11 (typical)	30	30	30	300 mW	200°C	7 mA	5600 μ ℧	2·5	50 KΩ	—	0·59° C/mW

EDC - II (old)

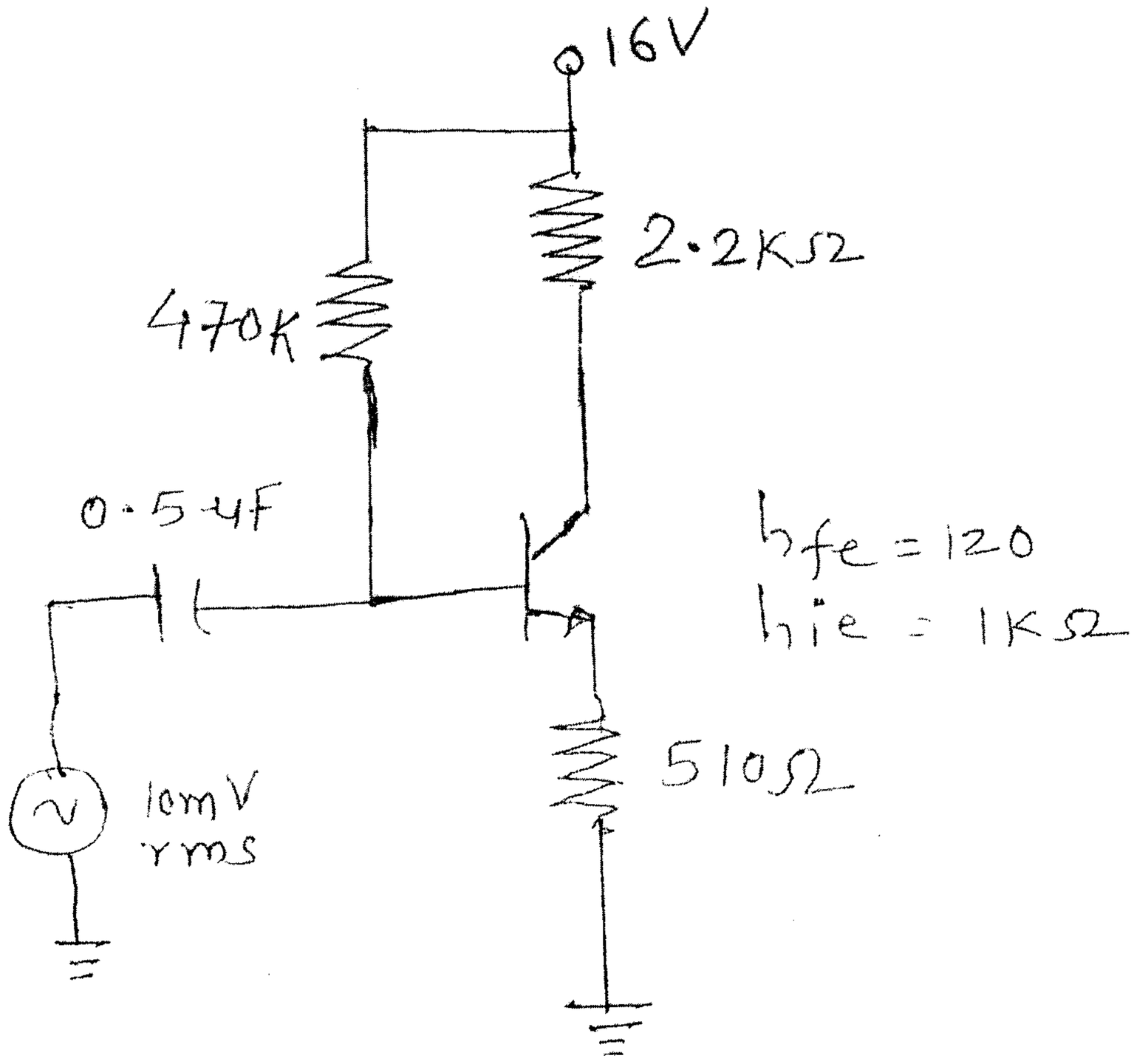
Course : S.E. (SEM -IV)(OLD)(CBSGS)(PROG-696-725)

Q.P Code : MV-18882

Correction :

407

Q No. 3 (a) CORRECT DIAGRAM



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SE sem III IV (OTR) PCE

(EXTC)

4/6/2014

(OLD COURSE)

QP Code : MV-18922

(3 Hours) **[Total Marks : 100**

N.B.: (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions out of remaining **six** questions.
(3) Assume **suitable** data if **required**.

1. Answer the following :— **20**
   (a) What is Quantization ? Explain types of quantization.
   (b) AM is the waste of power and bandwidth. Justify the statement.
   (c) Explain why FM is more immune to noise.
   (d) Explain double spotting in radio receivers.

2. (a) State advantages of SSB over DSB. Explain any one method to generate SSB. **10**
   (b) Explain the following with reference to radio receivers :— **10**
      (i) Sensitivity (ii) Fidelity.
      (iii) Selectivity (iv) Dynamic Range.

3. (a) Derive Mathematical expression for FM wave and its modulation index. **10**
   (b) One input to a conventional AM modulator is a 500 kHz carrier with amplitude of 20Vp. The second input is a 10 kHz modulating signal that is of sufficient amplitude to cause a change in output wave of $\pm$ 7·5 Vp. Determine : **10**
      (i) Upper and lower sideband frequencies.
      (ii) Modulation co-efficient and percentage modulation.
      (iii) Expression of modulated wave.
      (iv) Draw output spectrum.
      (v) Sketch output envelope.

4. (a) Explain Indirect method of FM generation. **10**
   (b) With the help of neat circuit diagram explain the generation and detection of Pulse Position Modulation (PPM) signal. **10**

5. (a) What are the drawbacks of delta modulation ? How adaptive delta modulation solve these problem ? **10**
   (b) State and prove sampling theorem for low pass signal. **10**

6. (a) Draw the following data waveforms for the bit stream 11010010 : **10**
      (i) Unipolar NRZ (iv) Bipolar RZ-AMI
      (ii) Bipolar RZ (v) Unipolar RZ
      (iii) Bipolar NRZ
   (b) Draw the block diagram of Pulse code modulation and explain each block. **10**

7. Explain the following (any **four**) :— **20**
   (a) Automatic Gain Control
   (b) Pre-emphasis and De-emphasis
   (c) Squetch circuit
   (d) Comparison of Narrowband and Wideband FM
   (e) Adjacent channel and co-channel Interference.

S.E (EXTC) Sem IV 'old'
EWDT

16 June 2014

(OLD COURSE) QP Code : **MV-18993**

(3 Hours) **[Total Marks : 100**

N.B. (1) Question no. **1** is **compulsory.**
(2) Attempt any **four** questions from remaining **six** questions.
(3) **Assume** suitable **data** if **necessary.**

1. (a) State Gauss's law, what is a Gaussian surface ? **5**
(b) State Ampere's law. What do you mean by Amperian path ? **4**
(c) State and explain Faraday's law. **5**
(d) Derive Laplace's and Poisson's equation. **6**

2. (a) Derive expression for electric field intensity due to infinite surface with charge density ρ_s coul / m^2. **10**
(b) Find out capacitance of a co-axial cable. **10**

3. (a) Four like charges of 40 μC each are located at 4 corners of a square. The diagonal of the square measures 12 m. Find the force on a 200 μC charge located at 5 m above the centre of the square. **10**
(b) A circular loop conductor carrying current of 1 Amp is placed in x-y plane centred at origin. Find expression for magentic field intensity at any point P on z-axis. **10**

4. (a) In free space, $V = 6\,xy^2z + 8$. At point P (1, 2, – 5) find $\vec{E}$ and volume charge density. **10**
(b) Explain parallel and perpendicular polarization. **10**

5. (a) Derive expression for magnetic field intensity due to an infinite current carring conductor, using Ampere's law. **10**
(b) State Maxwell's equations in point form and intergral from for both time varying and static fields. **10**

6. (a) Derive the solution of a uniform plane wave equation for conducting medium. **10**
(b) State Polynting's Theorem. Explain significance of each term. **10**

7. Write short notes on any **two** : **20**
(a) Method of images
(b) Electric field of a dipole
(c) Scalar and vector magentic potential.
