Ph.D. Entrance Test Examination April-12 faculty : Technology ... Electronics Engineering.

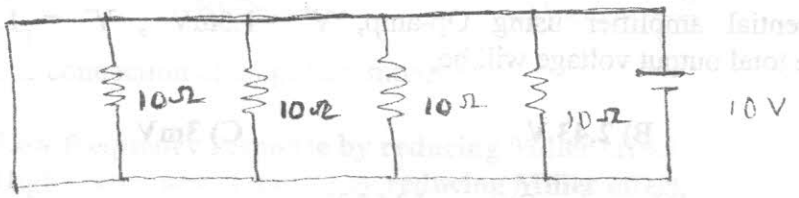
Con. 3215–12. KK–2651

28/04/12

(3 Hours) [Total Marks : 100

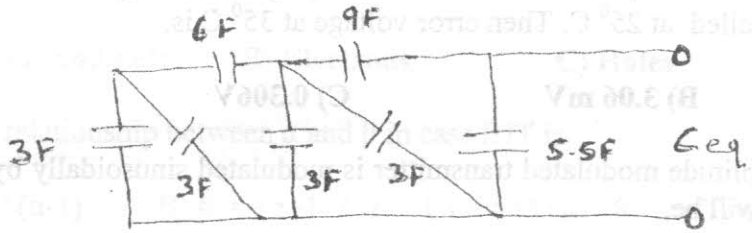
Section I (40 MCQs, 40 X 1 = 40 Marks)

Q1) In case following circuit current supplied by 10 V source is



A) Cannot say **B) Zero** **C) 4A** **D) Infinite**

Q2) In the following circuit C_{eq} is

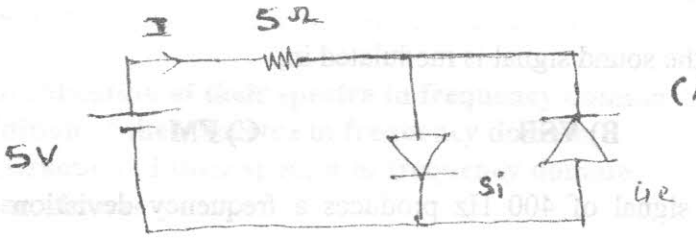


A) 10F **B) 9.5 F** **C) 5.4 F** **D) 5 F**

Q3) If V=20Sin (ωt-30^0) and I= 5Sin (ωt-60^0) then p.f. of the circuit is

A) 0.86 lead **B) 0.86 lag** **C) 0.5lead** **D) 0.5 lag**

Q4) In the circuit shown below current I is



(Assume diode forward resistance negligible)

A) 0.86 mA **B) 1A** **C) 860mA** **D)0.086mA**

Q5) In case of full wave rectifier with capacitor filter the ripple factor is given by

A) $\frac{1}{2\sqrt{3}\,R_L C}$ **B)** $\frac{1}{4\sqrt{2}\,R_L C}$ **C)** $\frac{1}{4\sqrt{3}\,R_L fC}$ **D)** $\frac{1}{2\sqrt{3}\,R_L C}$

[TURN OVER

Q6) In active region of CE amplifier (PNP transistor) the following statement is true

A) $V_{CC} = +15$ V, $V_{EE} = +15$ V
B) Base emitter junction forward biased and collector base junction reverse biased
C) $V_{CC} = +15$ V
D) Base emitter junction forward biased

Q7) For differential amplifier using Op-amp, $V^+ = 1.5$mV , $V^- = 1.3$mV, A_d=1200, CMRR=560, the total output voltage will be,

A) 0.24 V **B) 2.43 V** **C) 3mV** **D) 243mV**

Q8) For a inverting amplifier using Op-amp LM 307,

$\frac{\Delta V_{io}}{\Delta T} = 30\mu V / {}^0C$ Max. $\frac{\Delta I_{io}}{\Delta T} = 300\,pA/{}^0C$ Max. $V_{CC} = \pm 15$ V

$R_1 = 1K\Omega$ $R_F = 100K\Omega$ $R_L = 10K\Omega$

Assume Op-amp is nulled at 25^0 C. Then error voltage at 35^0 C is,

A) 30.6mV **B) 3.06 mV** **C) 0.306V** **D) Cannot say**

Q9) If a 100 kW amplitude modulated transmitter is modulated sinusoidally by 50% then total RF power delivered will be,

A) 112.5 kW **B) 11.25kW** **C) 112.5 W** **D) 121.5 kW**

Q10) In FM wave the sidebands are spaced at intervals equal to,

A) Twice the modulating frequency
B) Half the modulating frequency
C) Equal to the modulating frequency
D) Cannot say

11) In TV broadcast the sound signal is modulated in,

A) SSB **B) VSB** **C) FM** **D) AM**

Q12) If modulating signal of 400 Hz produces a frequency deviation of 2 KHz then the modulating index is

A) 4 **B) 5** **C) 8** **D) 5.5**

Q13) Intrinsic impedance of free space is,

A) 50Ω **B) 733 Ω** **C)73Ω** **D) 377 Ω**

Q14) Velocity of electromagnetic wave in dielectric medium($\varepsilon_r = 4$) is

A) $3x10^6$ m/s **B) 1.5 $x10^6$ m/s** **C) $6x10^6$ m/s** **D)$0.75x10^6$ m/s**

Q15) Consider two instruction sets

Set I

ADD 35

Set II

LOAD R1, 35
ADD R1

Which instruction set is faster?

A) Set I **B) Set II** **C) Both will take same time** **D) Cannot say**

Q16) In case of Intel 8080 microprocessor the XRA A instruction

A) Clears the accumulator
B) Does EX-OR operation of accumulator
C) Sets all flags
D) Resets all flags

Q17) In case of Intel 8080 microprocessor the ORA M instruction

A) Sets all flags
B) XORs the memory location address by H and L with accumulator
C) Resets all flags
D) ORs accumulator with memory location addressed by register H and L

Q18) For BJT CE amplifier terminated graph is as shown then the h parameter matrix will be

A) $\begin{bmatrix} e_1 \\ i_2 \end{bmatrix} = \begin{bmatrix} h_{11} & h_{12} \\ h_{21} & h_{22} \end{bmatrix} \begin{bmatrix} i_1 \\ e_2 \end{bmatrix}$

B) $\begin{bmatrix} e_1 \\ i_1 \end{bmatrix} = \begin{bmatrix} h_{11} & h_{12} \\ h_{21} & h_{22} \end{bmatrix} \begin{bmatrix} i_2 \\ e_2 \end{bmatrix}$

C) $\begin{bmatrix} e_1 \\ e_2 \end{bmatrix} = \begin{bmatrix} h_{11} & h_{12} \\ h_{21} & h_{22} \end{bmatrix} \begin{bmatrix} i_1 \\ i_2 \end{bmatrix}$

D) $\begin{bmatrix} i_1 \\ i_2 \end{bmatrix} = \begin{bmatrix} h_{11} & h_{12} \\ h_{21} & h_{22} \end{bmatrix} \begin{bmatrix} e_1 \\ e_2 \end{bmatrix}$

Q19) For a network graph of 'b' branches and 'n' nodes the no of tree branches and chords are,

A) b_t = n-1 and b_c = b-n
B) b_t =1+n and b_c = b-1
C) Cannot say
D) b_t =n-1 and b_c = b-n+1

Q20) The four bridge arms impedances in case of AC bridge are Z_1 ,Z_2 ,Z_3 , and Z_4 then at balance,

A) $Z_1 Z_4 = Z_2 Z_3$
B) $Z_1 Z_4 = Z_2 Z_3$ and $\angle\theta_1 + \angle\theta_4 = \angle\theta_2 + \angle\theta_3$
C) $Z_1 Z_2 = Z_3 Z_4$ and $\angle\theta_1 + \angle\theta_2 = \angle\theta_3 + \angle\theta_4$
D) $Z_1 Z_4 = Z_2 Z_3$ and $\angle\theta_1 - \angle\theta_4 = \angle\theta_2 - \angle\theta_3$

Q21) In case period measurement instrument if f_c is crystal frequency and f_x is frequency of unknown input signal then number of pulses counted equals

A) $N_p = \frac{f_c}{f_x}$ B) $N_p = \frac{1}{f_c}$ C) $N_p = \frac{f_x}{f_c}$ D) $N_p = \frac{1}{f_x}$

Q22) For a 230 V/ 60 W Bulb, the resistance of the filament is

A) $(60)^2 / 230$ B) $(230)^2 / 40$ C) $(230)^2 / 60$ D) $(60) / 230$

Q23) If Potential function $V=2(x+1)^2(y+2)^2(z+3)^2$ Volts in the free space, then the potential at point P (2,-1, 4) is

A) 8.82 V B) 88.2 V C) 882 V D) 882mV

Q24) A field is said to be conservative if,

A) Curl of field vector is finite
B) Curl of field vector is infinite
C) Curl of field vector is zero
d) Divergence of vector is zero

Q25) If infinite long conductor carries a current 'I' then magnetic field intensity at radial distance 'r' is given by

A) $\bar{H} = \frac{I}{2\prod r}\bar{a}_r$ B) $\bar{H} = \frac{I\mu_0}{2\prod r}\bar{a}_r$ C) $\bar{H} = \frac{I}{2\prod r}\bar{a}_\phi$ D) $\bar{H} = \frac{I}{2\prod \mu_0 r}\bar{a}_\phi$

Q26) A transmission line has $Z_0 = (50+j0.01)\ \Omega$ and $Z_L = (73 - j42.5)\ \Omega$. The standing wave ratio is,

A) 2.21 B) 22.1 C) 2.12 D) 1.22

Q27) In case rectangular wave guide component of wavelength λ in the direction normal and parallel to reflecting plane are,

A) $\lambda_n = \lambda \cos\theta$ $\lambda_p = \lambda \sin\theta$
A) $\lambda_n = \lambda \sin\theta$ $\lambda_p = \lambda \cos\theta$
A) $\lambda_n = \lambda / \cos\theta$ $\lambda_p = \lambda / \sin\theta$
A) $\lambda_n = \lambda / \sin\theta$ $\lambda_p = \lambda / \cos\theta$

Q28) In case of JFET amplifier voltage gain is given by,

A) $A_V = -g_m R_D$ B) $A_V = -g_m I_D R_D$ C) $A_V = g_m R_D$ D) $A_V = (-g_m R_D) / V_{DS}$

Q29) If I_0 is intensity of radiation normal to the device surface then total power emitted by LED will be proportional to,

A) I_0^2 B) $I_0^2 \cos\theta$ C) I_0 D) ΠI_0^2

Q30) Total number of free space modes (N) accepted by optical fiber is given by,

A) $V^2/2$ **B) V /2** **C) $V^2/\sqrt{2}$** **A) 2V**

Q31) Which of the following is correct Maxwell's equation for the time varying field?

A) $\nabla x \bar{E} = \frac{\partial B}{\partial t}$ **B)** $\nabla x \bar{E} = 0$ **C)** $\nabla x \bar{E} = \frac{\partial^2 B}{\partial t^2}$ **D)** $\nabla x \bar{E} = -\frac{\partial B}{\partial t}$

Q32) Cascode connection of amplifier improves

A) Low frequency response by reducing Miller effect
B) High frequency response by reducing Miller effect
C) Mid frequency response
D) None of these

Q33) Diffusion current in case of p-n junction diode is composed of,

A) Electrons and holes **B) Electrons** **C) Holes** **D)None of these**

Q34) The relationship between α and β in case BJT is

A) $\beta = \alpha/(\alpha-1)$ **B)** $\beta = (\alpha+1)/\alpha$ **C)** $\alpha = (1+\beta)/\beta$ **D)** $\alpha = (\beta)/(\beta+1)$

Q35) In case of R-C series circuit when excited by DC source the current is,

A) Minimum at t=0 when switch is closed
B) Maximum at t=0 when switch is closed
C) $I = (V/R)(1-e^{t/RC})$
D) Cannot say

Q36Convolution of two functions in time domain is equivalent to

A) Multiplication of their spectra in frequency domain
B) Addition of their spectra in frequency domain
C) Subtraction of their spectra in frequency domain
D) None of these

Q37) In case of ideal amplifier (noiseless) the noise figure is,

A) Zero **B) Infinite** **C) Unity** **D) cannot say**

Q38) For single phase full wave controlled rectifier with resistive load, the average load voltage is,

A) $\frac{\sqrt{3}E}{\Pi}(1+Cos\alpha)$ **B)** $\frac{\sqrt{2}E}{\Pi}(Cos\alpha)$ **C)** $\frac{2E}{\Pi}(1+Cos\alpha)$ **D)** $\frac{\sqrt{2}E}{\Pi}(1+Cos\alpha)$

Q39) Synchronous speed of three phase Induction Motor is given by,

A) $\frac{120P}{f}$ B) $\frac{120f}{P}$ C) $\frac{60P}{f}$ A) $\frac{f}{120P}$

Q40) For Wien Bridge oscillator the resonant frequency at balance is given by

A) $\frac{1}{\prod RC}$ B) $\frac{1}{RC}$ C) $\frac{0.159}{RC}$ D) $\frac{1}{2\prod\sqrt{RC}}$

Section II (Solve any three: 3x10=30 Marks)

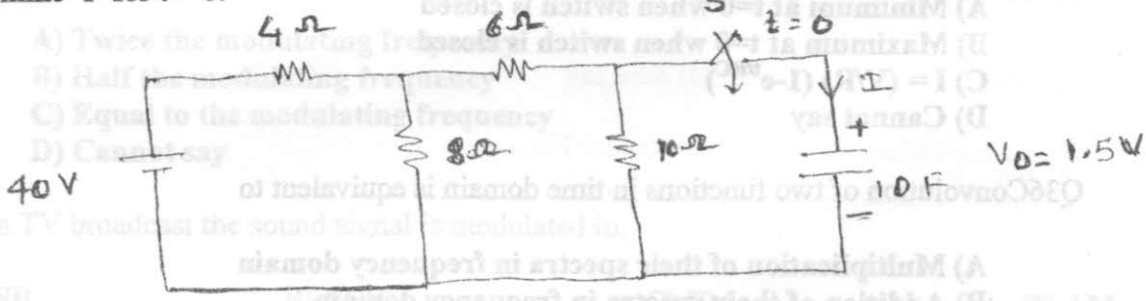
Q1) Draw circuit diagram of Wien Bridge and hence derive condition for Balance Bridge. Comment on its frequency sensitivity

Q2) Derive electromagnetic wave equation for free space. Also define basic parameters of the electromagnetic wave.

Q3) Draw circuit diagram of CE amplifier with voltage divider bias. Write equations for DC analysis. Draw small signal equivalent circuit and hence enumerate equations for A_v, Z_i, and Z_o

Q4) Explain in brief direct memory access (DMA) I/O method in case of microprocessors and compare it to interrupt driven systems.

Q5) In the circuit shown below the switch 'S' is closed at t=0 with initial conditions as shown. Determine 'I' for t > 0.



Section III (Solve any two: 15x2=30 Marks)

Q1) With suitable example explain concept of SOP and POS in case of digital circuit design.

Q2) Draw block diagram of SSB transmitter and explain in brief.

Q3) Draw circuit diagram of Three Phase Bridge full Inverter with star connected resistive load. Draw waveforms for line and phase voltages and hence explain in brief 120^0 mode.

Q4) Draw block typical optical fiber transmitter and receiver system and explain in brief.
