

Seat No.	
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**T.Y. B.Tech. (E & TC) (Part - IV) (CBCS) (Semester - II)**  
**Examination, March - 2023**  
**VIDEO ENGINEERING**  
**Sub. Code : 84862**

Day and Date : Monday, 26 - 06 - 2023

Total Marks : 70

Time : 10.30 a.m. to 01.00 p.m.

- Instructions :**
- 1) All questions are compulsory.
  - 2) Figure to the right indicates full marks.
  - 3) Assume suitable data if necessary.

**Q1) Solve the all questions. (Rewrite the statement by correct option) [14]**

- i) Interlace Scanning always takes place in direction of \_\_\_\_\_.
  - a) Left to right, top to bottom
  - b) Left to right, bottom to top
  - c) Right to left, top to bottom
  - d) None of the above
- ii) Brightness variations of the picture information are in which signal?
  - a) I
  - b) Q
  - c) Y
  - d) R-Y
- iii) Which of the following is NOT a common use of teleconferencing?
  - a) Audio conferencing
  - b) Computer conferencing
  - c) Virtual reality conferencing
  - d) Vidco conferencing
- iv) As prescribed by the technical standards for Cable Television operation and in order to be compatible for any value added services in the future, Trunk cable should have a minimum diameter of
  - a) 0.25 inch
  - b) 0.5 inch
  - c) 0.75 inch
  - d) 1.0 inch
- v) VSB modulation is preferred in TV because
  - a) it avoids phase distortion at low frequencies
  - b) it reduces the bandwidth requirement to half
  - c) it results in better reception
  - d) none of the above

- vi) The download frequency of C band transponder is
- |           |           |
|-----------|-----------|
| a) 6 GHz  | b) 4 GHz  |
| c) 14 GHz | d) 11 GHz |
- vii) If there are 625 lines per TV picture, then lines per field are
- |          |         |
|----------|---------|
| a) 1250  | b) 625  |
| c) 312.5 | d) 2500 |

**Q2) Solve any two:** [14]

- Draw and explain horizontal scan/sync pulses for three consecutive lines.
- Draw and explain complete block diagram of NTSC coder.
- Define :
  - Hue
  - Saturation
  - Luminance

**Q3) Solve any two:** [14]

- Describe interlace scanning in brief. How interlace scanning help to reduce bandwidth of video signal?
- Explain +ve and -ve modulation.
- Describe the working principle and construction of vidicon camera tube.

**Q4) Solve any two:** [14]

- Discuss HDTV standards and compatibility.
- Describe the construction and working of LED TV.
- Describe the working of LNBC with the help of block diagram.

**Q5) Solve any two:** [14]

- Explain in detail D2-MAC/Packet signals.
- Compare CATV and CCTV.
- Draw and describe DTH system.





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**T.Y. B.Tech. (E & TC) (CBCS) (Part-III)  
(Semester-V) Examination, March - 2023**

**INDUSTRIAL AUTOMATION**

**Sub. Code : 80811**

**Day and Date : Friday, 30 - 06 - 2023**

**Total Marks : 70**

**Time : 02.30 p.m. to 05.00 p.m.**

**Instructions : 1) All questions are compulsory.**

**2) Figures to the right indicate full marks.**

**Q1) Choose correct option.**

**[14]**

- a) Programming line known as \_\_\_\_\_ uses as ladder logic for PLC.  
i) Rung ii) Right  
iii) Logic iv) Wrong
- b) An OR function implementation is ladder logic.  
i) NC contact in series ii) NO contact in series  
iii) NO contacts in parallel iv) NC contact in parallel
- c) To protect PLC from any incoming surges from the field isolated device such as \_\_\_\_\_ is used.  
i) Optoisolator ii) Transducer  
iii) ADC iv) DAC
- d) The control in SCADA is  
i) On line control ii) Direct Control  
iii) Supervisory control iv) Automatic control
- e) DCS 's speed depends on the scan rate of I/Os.  
i) True  
ii) False

**P.T.O**

- f) Which of following display is not commonly used in DCS?
- |                       |                     |
|-----------------------|---------------------|
| i) Trend display      | ii) Graphic display |
| iii) Overview display | iv) CRT display     |
- g) Which of following are field devices in DCS?
- |                               |                        |
|-------------------------------|------------------------|
| i) Data logger, alarm control | ii) Actuators, sensors |
| iii) Graphic display          | iv) All of above       |

**Q2) Attempt any two:**

**[14]**

- Explain different types of processes.
- Write a note on IEC 61131-3 programming standard.
- Write a note on SCADA.

**Q3) Attempt any two:**

**[14]**

- Explain working of PLC.
- Explain PID instruction.
- Explain applications of SCADA.

**Q4) Attempt any two:**

**[14]**

- Explain popular buses used in DCS.
- Describe with block diagram hardware flow in DCS system.
- Explain display hierarchy used in DCS.

**Q5) Attempt any two:**

**[14]**

- Describe the low level and high level operator interface in DCS.
- List the** factors to be considered in selection of DCS.
- Explain important** features of DCS.



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**T.Y. B.Tech. (E & TC) (Part - III) (CBCS) (Semester - VI)**  
**Examination, March - 2023**  
**DIGITAL SIGNAL PROCESSING**  
**Sub. Code : 81646**

**Day and Date : Friday, 23 - 06 - 2023**

**Total Marks : 70**

**Time : 02.30 p.m. to 05.00 p.m.**

- Instructions :**
- 1) All questions are compulsory.
  - 2) Figures to the right indicate full marks.

**Q1) Choose correct option.**

**[7×2=14]**

- a) Decimation time FFT decimates.
  - i) DFT coefficients
  - ii) Input sequence
  - iii) Both sequence and DFT
  - iv) None
- b) The anti-symmetric condition with M even is not used in the design of which of the following linear-phase FIR filter?
  - i) Low pass
  - ii) High pass
  - iii) Band pass
  - iv) Band stop
- c) How many external frequencies are capable of being there at most in an error function of an ideal filter that is low pass?
  - i) L
  - ii) L + 3
  - iii) L + 2
  - iv) L + 1
- d) Which of the following form is used for the IIR filters?
  - i) Direct form - I
  - ii) Indirect form - I
  - iii) Direct form - III
  - iv) Direct form - IV
- e) IIR Filter design methods are based on different mapping functions used for mapping the following domains.
  - i) DFT to Z domain
  - ii) S domain to Z domain
  - iii) Z domain to S domain
  - iv) Z domain to DFT

**P.T.O.**

- f) If  $x(n) = \{1, 2, 3, 4, 5, 6\}$  output by down sampling by 2 will be
- |                             |                                  |
|-----------------------------|----------------------------------|
| i) $\{2, 4, 6, 8, 10, 12\}$ | ii) $\{0.5, 1, 1.5, 2, 2.5, 3\}$ |
| iii) $\{1, 3, 5\}$          | iv) None of the above            |
- g) If we need time and frequency information simultaneously.
- |                       |                     |
|-----------------------|---------------------|
| i) Filter can be used | ii) DFT can be used |
| iii) WT can be used   | iv) ZT can be used  |

Q2) Attempt any two questions.

[7×2=14]

- a) Find corresponding  $X(K)$  using DIT FFT for  
 $X[n] = \{0.35, 0.33, 0.64, 1.06, 0.35, -1.06, -1.35, -0.35\}$
- b) Using Fourier series method design an ideal high pass filter using with frequency response, for filter length 7.

$$H_d(e^{jw}) = 1 \quad \pi/4 \leq w \leq \pi$$

$$= 0 \quad |w| \leq \pi/4$$

- c) Design the second order low pass digital butterworth filter whose cut-off frequency is 1 kHz at sampling frequency  $10^4$  samples per second (apply BLT method).

Q3) Attempt any two:

[7×2=14]

- a) Find response of FIR filter for  $h(n) = \{-1, 1\}$  and  $x(n) = \{1, -1, 2, -2, 3, -3, 4, -4\}$  using overlap save method.
- b) Explain Gibbs phenomenon. Explain windowing method of filter design.
- c) Analog filter has a transfer function  $s = 10/(s^2 + 7s + 10)$ . Design a digital filter equivalent to this using impulse invariant method for  $T = 1$  sec.

Q4) Attempt any two:

[7×2=14]

- a) Realize  $H(z) = (1 + 3z^{-1} + 2z^{-2}) / (1 + 5z^{-1} + 2z^{-2} + 3z^{-3})$  in Direct form I.
- b) What do you mean by decimation by factor D. Explain with example.
- c) Explain mother wavelet.

[7×2=14]

Q5) Attempt any two:

- a) Explain with block diagram the architecture of DSP TMS320C67XX processor.
- b) Draw diagram for 3/5 sampling rate conversion.
- c) State applications of wavelet transform.

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**T.Y. B.Tech. (E & TC) (CBCS) (Part-II)**  
**(Semester - VI) Examination, March - 2023**  
**POWER ELECTRONICS**  
**Sub. Code : 81648**

Day and Date : Tuesday, 27 - 06 - 2023

Total Marks : 70

Time : 10.30 a.m. to 01.00 p.m.

- Instructions :
- 1) All Questions are compulsory.
  - 2) Assume suitable data wherever necessary.
  - 3) Figures to the right indicate full marks.

Q1) Attempt the following.

[14]

- i) The value of anode current required to maintain the conduction of an SCR even though the gate signal is removed is called as the
  - i) Latching current
  - ii) Holding current
  - iii) Switching current
  - iv) All of these
- ii) Choose correct statement about induction heating.
  - i) Change in frequency affects the depth of penetration of heat.
  - ii) Change in voltage affects the depth of penetration of heat and the rate of heating.
  - iii) Change in frequency affects the depth of penetration of heat and the rate of heating.
  - iv) Change in voltage affects the depth of penetration of heat.
- iii) In a step-up chopper circuit, if  $V_s$  is the source voltage and  $\alpha$  is duty cycle, then the output voltage is
  - i)  $V_s / (1 + \alpha)$
  - ii)  $V_s (1 + \alpha)$
  - iii)  $V_s (1 - \alpha)$
  - iv)  $V_s / (1 - \alpha)$

P.T.O.

- iv) A single-phase symmetrical semi-converter employs
  - i) one SCR and one diode in each leg.
  - ii) two SCRs and two diode in each leg.
  - iii) two SCRs in each leg.
  - iv) two diodes in each leg.
- v) \_\_\_\_\_ loads are suitable for integral cycle control.
  - i) Lighting
  - ii) Heating
  - iii) Motor
  - iv) Pump
- vi) Inverter converts
  - i) DC to AC
  - ii) AC to DC
  - iii) DC to DC
  - iv) AC to AC
- vii) The latching current of an SCR is 12 mA. Its holding current will be
  - i) 4 mA
  - ii) 12 mA
  - iii) 50 mA
  - iv) 8 mA

Q2) Attempt any two of the following.

[14]

- a) Describe the following terms.
  - i) Forward break over voltage
  - ii) Latching current
  - iii) Holding current
- b) What are the performance parameters of converters? Explain in detail.
- c) Explain the different methods of commutation and describe any one of it.

Q3) Attempt any two of the following.

[14]

- a) Describe different methods of Gate triggering. Explain R-C gate triggering circuit of SCR.
- b) Draw and explain the characteristics of GTO.
- c) A single phase semi converter operated from 230V at 50 Hz, if  $\alpha = \pi/4$ . Find out
  - i) average o/p voltage
  - ii) RMS output voltage
  - iii) Form Factor
  - iv) Ripple Factor

Q4) Attempt any two of the following.

[14]

- a) What are the techniques for harmonic reduction in inverter. Explain any one in detail.
- b) State and explain control techniques of chopper.
- c) Explain Non-drive applications using induction heating with circuit diagram.

Q5) Attempt any two of the following.

[14]

- a) Explain Switched mode power supply (SMPS) with circuit diagram.
- b) Explain the single phase half-Bridge Inverter with RL load.
- c) Explain the MORGAN chopper along with the waveform and circuit diagram.

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**T.Y. B.Tech. (E & TC) (Part - II) (CBCS) (Semester - IV)**  
**Examination, March - 2023**  
**ELECTROMAGNETIC ENGINEERING**  
**Sub. Code : 80808**

Day and Date : Monday, 26 - 06 - 2023

Total Marks : 70

Time : 02.30 p.m. to 05.00 p.m.

- Instructions :
- 1) All questions are compulsory.
  - 2) Figures to the right indicates full marks.
  - 3) Assume suitable data if necessary.

**Q1) Solve the all questions. (Rewrite the statement by correct option) [14]**

- i) According to Biot-Savart's law, which parameter is inversely proportional to the differential magnetic field intensity (dH)?
  - a) Current
  - b) Magnitude of differential length
  - c) Sine of angle between filament and line connecting differential length to point
  - d) Square of the distance from differential element to point
- ii) The divergence of the vector  $y\hat{i} + z\hat{j} + x\hat{k}$ 
  - a) -1
  - b) 0
  - c) 1
  - d) 3
- iii) Maxwell's second equation of static field is a point form of \_\_\_\_\_.
  - a) Ampere's circuital law
  - b) Gauss's law
  - c) Lenz law
  - d) Biot Savart law
- iv) Which among the following is not a boundary condition between the conductor and the dielectric ( $\epsilon = \epsilon_0 \epsilon_r$ )?
  - a)  $E_t = 0$
  - b)  $D_t = 1$
  - c)  $D_N = \rho_s$
  - d)  $E_N = \rho_s / \epsilon_0 \epsilon_r$

P.T.O.

- v) The Gauss Divergence theorem converts.
- Line to surface integral
  - Line to volume integral
  - Surface to line integral
  - Surface to volume integral
- vi) Which of the following laws do not form a Maxwell equation?
- Faraday's law
  - Planck's law
  - Gauss's law
  - Ampere's law
- vii) Find the force between 2C and -1C separated by a distance 1m in air (in newton).
- $18 \times 10^6$
  - $-18 \times 10^6$
  - $18 \times 10^{-6}$
  - $-18 \times 10^{-6}$

Q2) Solve any two:

[14]

- State and prove Divergence theorem.
- Find the volume charge density  $\zeta_v$  at the point (1, 2, 3) in the free space given  $V = (50 \times 2yz + 22y^2) \text{ v}$
- Derive the expression for Electric field intensity at a point due infinite sheet charge?

Q3) Solve any two:

[14]

- Transform in cylindrical coordinates, the point with Cartesian coordinates are  $x = 3, y = 4, z = 5$ .
- Explain potential Gradient and relation between E and V.
- The Uniform line charge density  $4\text{nC/m}$  lies in the  $x = 0$  plane at  $y = 4\text{m}$  and  $y = -4\text{m}$  find E at (4, 0, 12).

Q4) Solve any two:

[14]

- Derive and Explain wave equation for electric and magnetic field for lossless media.
- Write a note on :
  - VSWR
  - Characteristics Impedance
  - Reflection Coefficient
- A transmission line has  $R = 4.11 \Omega/\text{KM}$ ,  $L = 0.00337 \text{ H/KM}$ ,  $G = 0.29 \mu\text{ mho/KM}$ ,  $C = 0.00945 \mu\text{F/KM}$ . Determine input impedance, characteristics impedance and propagation constant of 20 km long line terminated in a load  $100 + j 100 \Omega$  at a frequency 1 kHz.

[14]

Q5) Solve any two:

- State and Explain Stoke's theorem.
- A lossless transmission line of  $50\Omega$  is terminated in  $25 + j50, \Omega$ . Find using Smith chart
  - VSWR
  - Reflection Coefficient
- Explain Smith chart and its applications.



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**T.Y. B.Tech. (E & TC) (Part - III) (CBCS) (Semester - V)**  
**Examination, March - 2023**

**SIGNALS AND SYSTEM**

**Sub. Code : 80807**

**Day and Date : Friday, 23 - 06 - 2023**

**Total Marks : 70**

**Time : 02.30 p.m. to 05.00 p.m.**

- Instructions :**
- 1) All questions are compulsory.
  - 2) Figures to the right indicate full marks.
  - 3) Assume suitable data wherever necessary.

**Q1) Choose correct option.**

**[7×2=14]**

- i) Which among the following operations is not involved with the linear convolution of discrete time signal?
  - a) Folding Operation
  - b) Shifting Operation
  - c) Multiplication Operation
  - d) Integration Operation
- ii) A system represented by equation  $y(t) = tx(t)$  is \_\_\_\_\_.
  - a) linear system
  - b) non-linear system
  - c) neither linear nor non-linear system
  - d) None of these
- iii) A signal  $x(t)$  can be transformed to  $x(at)$  by using which of the below operation.
  - a) time reversal
  - b) time shifting
  - c) time scaling
  - d) all of the above
- iv) The distributive property of convolution is \_\_\_\_\_.
  - a)  $x(t)*h(t)=h(t)*x(t)$
  - b)  $x(t)*[h_1(t)*h_2(t)] = [x(t)*h_1(t)]*h_2(t)$
  - c)  $x(t)*[h_1(t)+h_2(t)] = [x(t)*h_1(t)] + [x(t)*h_2(t)]$
  - d) None of the above

**P.T.O.**

v) The Fourier transform of a unit step function is given as

- a)  $F(j\omega) = 1/j\omega$       b)  $F(j\omega) = j\omega$   
 c)  $F(j\omega) = j/\omega$       d)  $F(j\omega) = \omega/j$

vi) What is DTFT of sequence give  $x(n) = a^n u(n)$

- a)  $\frac{1}{1 - ae^{-j\omega}}$       b)  $\frac{1}{1 - ae^{j\omega}}$   
 c)  $\frac{1}{1 + ae^{j\omega}}$       d)  $\frac{1}{1 + ae^{-j\omega}}$

vii) What is the z-transform of the following finite duration signal?

$$x(n) = \{2, 4, 5, 7, 0, 1\}$$

↑

- a)  $2 + 4z + 5z^2 + 7z^3 + z^4$       b)  $2 + 4z + 5z^2 + 7z^3 + z^5$   
 c)  $2 + 4z^{-1} + 5z^{-2} + 7z^{-3} + z^{-5}$       d)  $2z^2 + 4z + 5 + 7z^{-1} + z^{-3}$

Q2) Solve any two:

a) Sketch the discrete signal and evaluate odd and even signal

$$x(n) = \begin{cases} 1 & \text{for } 0 \leq t \leq 2 \\ 1/2 & \text{for } -3 \leq t \leq -1 \\ 0 & \text{elsewhere} \end{cases}$$

b) Find convolution of two sequences.

$$\begin{aligned} X[n] &= 1 \quad \text{for } 0 \leq n \leq 4 \\ &= 0 \quad \text{Elsewhere} \end{aligned} \quad \begin{aligned} Y[n] &= (2)^n \quad \text{for } 0 \leq n \leq 6 \\ &= 0 \quad \text{Elsewhere} \end{aligned}$$

c) Explain limitations for Fourier transform.

Q3) Solve any two:

a) Sketch the following signal.

$$x(t) = r(t) - r(t-2) - u(t-4) - u(t-5)$$

b) What is mean by system? Explain classification of system.

c) State and prove the convolution theorem for Fourier Transforms.

Q4) Solve any two:

[14]

a) Find DTFT of following.

$$x(n) = u(n-3) - u(n-5)$$

b) Explain properties of Z transform.

c) Develop direct form I realization of difference equation

$$y(n) = b_0 x(n) + b_1 x(n-1) + b_2 x(n-2) + b_3 x(n-3) - a_1 y(n-1) - a_2 y(n-2) - a_3 y(n-3)$$

Q5) Solve any two:

[14]

a) Find IDFT of following

$$X[K] = \{4, 1 - 2j, 1, 1 + 2j\}$$

b) Find Z transform of following

i)  $x(n) = a^{|n|} \quad |a| < 1$

ii)  $x(n) = \left(\frac{1}{2}\right)^n u(-n)$

c) Develop direct form II realization of following function

$$H(Z) = \frac{0.28z^2 + 0.319z + 0.04}{0.5z^3 + 0.3z^2 + 0.17z - 0.2}$$

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**T.Y. B.Tech. (Electronics and Telecommunication Engg.)  
(CBCS) (Part-II) (Semester - VI)**

**Examination, March - 2023**

**MICROPROCESSOR AND MICROCONTROLLERS**

**Sub. Code : 81647**

**Day and Date : Sunday, 02 - 07- 2023**

**Total Marks : 70**

**Time : 10.30 a.m. to 01.00 p.m.**

- Instructions :**
- 1) All Questions are compulsory.
  - 2) Figures to the right indicate full marks.
  - 3) Assume suitable data wherever necessary.

**Q1) Choose one correct answer and rewrite the complete statement. [14]**

- i) There are \_\_\_\_\_ general purpose registers in 8085 processor.
- a) 5
  - b) 6
  - c) 9
  - d) 8
- ii) PSW in 8085 is combination of \_\_\_\_\_.
- a) Accumulator and Flag Register
  - b) Accumulator and B Register
  - c) PC and SP
  - d) Flag register only
- iii) Crystal connected to 8051 is of \_\_\_\_\_.
- a) 11.0592 KHz
  - b) 11.0592 MHz
  - c) 12 MHz
  - d) 3 MHz
- iv) Auto reload mode is allowed in which mode of the timer?
- a) Mode 0
  - b) Mode 1
  - c) Mode 2
  - d) Mode 3

**P.T.O.**

- v) The bit which is used to double the Baud rate in serial communication of 8051 is \_\_\_\_\_ .
- a) REN                      b) SMOD  
c) RI                        d) SM0 and SM1
- vi) 8 bit DAC has \_\_\_\_\_
- a) 8 Bit input              b) 8 Bit Output  
c) 8 Bit input and output      d) None of above
- vii) To perform ORING operation following operator is used in Embedded C.
- a) A | B                      b) A & B  
c) A ^ B                     d) A ^^B

**Q2) Solve any Two of the following.**

[14]

- Explain De-multiplexing of Address/Data bus in 8085.
- Differentiate between Memory mapped I/O and I/O Mapped I/O.
- Explain Reset circuit and oscillator circuit of 8051.

**Q3) Solve any Two of the following.**

[14]

- Draw and Explain Internal Architecture of 8085.
- Interface 4Kx8 RAM to 8085 using 4KX8 RAM Ic. Find address map also.
- Explain various Bit Manipulations (Boolean Instructions) Instructions with examples in 8051.

**Q4) Solve any Two of the following.**

[14]

- Explain Interrupt Enable (IE) and Interrupt Priority (IP) registers in detail.
- Draw the interfacing diagram of a stepper motor to 8051. Also write an assembly language program to rotate the motor anti-clockwise in full-stepping mode.
- Write an embedded C program to generate a square wave of 1 KHz on pin P1.0 of 8051 using Timer 0.

[14]

**Q5) Solve any Two of the following.**

- Draw and Explain TCON SFR in 8051. Write instruction to start Timer 0.
- Draw the interfacing diagram of a stepper motor to 8051. Also write an assembly language program to rotate the motor anti-clockwise in full-stepping mode.
- Write an embedded C program to transmit 'A' using serial communication of 8051 with baud rate of 9600H, SMOD = 0 and crystal frequency 12 MHz.



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**T.Y.B.Tech. (E & TC) (Semester - VI) Examination, March - 2023**

**ANTENNA AND WAVE PROPAGATION**

**Sub. Code : 81649**

**Day and Date : Saturday, 01 - 07 - 2023**

**Total Marks : 70**

**Time : 10.30 a.m. to 01.00 p.m.**

**Instructions :**

- 1) Attempt all questions.
- 2) Use of non-programmable calculator is allowed.

**Q1) Solve the following MCQs. [14]**

- i) Under which conditions of charge does the radiation occur through wire antenna?
  - a) For a charge with no motion
  - b) For a charge moving with uniform velocity with straight & infinite wire
  - c) For a charge oscillating in time motion
  - d) All of the above
- ii) Which antennas are renowned as patch antennas especially adopted for space craft applications?
  - a) Aperture
  - b) Microstrip
  - c) Array
  - d) Lens
- iii) Which antenna radiating region/s has/have independent nature of angular field distribution over the distance from the antenna?
  - a) Reactive near-field region
  - b) Fresnel region
  - c) Fraunhofer region
  - d) All of the above
- iv) Steradian is a measurement unit of
  - a) Point angle
  - b) Linear angle
  - c) Plane angle
  - d) Solid angle

**P.T.O.**



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- v) After a target has been acquired, the best scanning system for tracking is
- nodding
  - spiral
  - conical
  - helical
- vi) Which mode of propagation is adopted in HF antennas?
- Ionospheric
  - Ground wave
  - Tropospheric
  - All of the above
- vii) The biggest disadvantage of CW Doppler radar is that
- it does not give the target velocity
  - it does not give the target range
  - a transponder is required at the target
  - it does not give the target position

Q2) Answer any two:

[2×7=14]

- Derive expression for following antenna parameters
  - Beam solid angle
  - Directivity
- Derive formulae for null directions for arrays of n-isotropic point sources of equal amplitude and spacing.
- What is required aperture area for optimum rectangular horn antenna operating at 2GHz with 16dBi gain?

Q3) Answer any two:

[2×7=14]

- With neat diagram, explain absolute gain measurement using
  - Two antenna method
  - Three antenna method
- Draw and explain normalised field pattern and normalised power pattern of antenna.
- A radio link has 15 W transmitter connected to antenna of  $2.5 \text{ m}^2$  effective aperture at 5 GHz. The receiving antenna has effective aperture of  $0.5 \text{ m}^2$  and is located at 15km line of sight distance from transmitting antenna. Assuming loss-less matched antenna, find power delivered to load.

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[2×7=14]

Q4) Answer any two:

- Explain Heuristic approach for potential functions and electromagnetic fields.
- Explain antenna scanning and tracking methods.
- A broadcast transmitter supplies 100KW to an antenna that radiates 50% of this power. The antenna has directional characteristics such that field strength without ground loss is given by  $E_0 = 300 \times 1.28 \times (PKW)^{1/2} \text{ mv/m}$  at 1 KM.  
Find field strength of ground wave at 100KM for following types of earth conditions for  $F = 500\text{KHz}$ 
  - Sea water earth:-  $\epsilon_r = 81, \delta = 45 \times 10^{-3} \text{ mho/cm}$
  - Industrial area:-  $\epsilon_r = 5, \delta = 10^{-5} \text{ mho/cm}$

Q5) Answer any two:

[2×7=14]

- Explain reflection and refraction of wave by ionosphere.
- Derive relation between rotation of plane of polarisation and electron density
- A low power, short range radar is having overall noise figure of 4.77dB. If antenna diameter is 1 m, the IF bandwidth is 500 KHz, the operating frequency is 8 GHz and radar set is capable of detecting Targets of  $5\text{-m}^2$  cross sectional area at maximum distance of 12 KM. Calculate peak transmitted pulse power

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**T.Y. B.Tech. (E & TC) (CBCS) (Semester - VII)**  
**Examination, March - 2023**  
**MOBILE TECHNOLOGY (Open Elective - II)**  
**Sub. Code : 81651**

Day and Date : Wednesday, 05 - 07 - 2023

Total Marks : 70

Time : 10.30 a.m. to 01.00 p.m.

- Instructions :
- 1) All questions are compulsory.
  - 2) Figures to the right indicate full marks.

**Q1) Select the correct option and rewrite complete sentence. [14]**

- a) TDMA allocates a single time per frame to different users.
  - i) True
  - ii) False
- b) The increased capacity of SDMA due to \_\_\_\_\_.
  - i) focused signal transmitted narrow transmission beams
  - ii) smart antennas pointing towards mobile stations
  - iii) use of different frequencies at same time slot
  - iv) both (i) and (ii) are correct
- c) All users in CDMA system use \_\_\_\_\_ carrier frequency.
  - i) Different
  - ii) Two
  - iii) Ten
  - iv) Same
- d) Capacity of a cellular system is directly proportional to \_\_\_\_\_.
  - i) Number of cells
  - ii) Number of times a cluster is replicated
  - iii) Number of base stations
  - iv) Number of users
- e) The mechanism behind electromagnetic wave propagation cannot be attributed to \_\_\_\_\_.
  - i) Reflection
  - ii) Diffraction
  - iii) Scattering
  - iv) Sectoring

P.T.O.



- f) Propagation model that characterize rapid fluctuations in signal is called \_\_\_\_\_.
- Hata model
  - Fading model
  - Large scale propagation model
  - Okumura model
- g) Which of the following is the forward control channel that is used to broadcast information?
- BCCH
  - CCCH
  - DCCH
  - TCH
- h) GPRS network is part of \_\_\_\_\_ in GSM network.
- BTS
  - BSS
  - NSS
  - VLR
- i) Which of the communication modes support two way traffic but in only once direction of a time?
- Simplex
  - Half-duplex
  - Three-quarter's duplex
  - Full duplex
- j) MAHO stands for \_\_\_\_\_.
- MSC assisted handoff
  - Mobile assisted handoff
  - Machine assisted handoff
  - Man assisted handoff
- k) What is the interface between BSC and SGSN in a GPRS network structure?
- Ga
  - Gb
  - Gc
  - Gd
- l) Which of these is not part of the characteristics of 4G?
- Software Dependency
  - Fully converged services
  - Diverse user Devices
  - Multirate Management
- m) The main advantages of 5G network they will have \_\_\_\_\_.
- Greater bandwidth
  - Higher download speed
  - Higher upload speed
  - All above
- n) 5G has 1,000x bandwidth per unit area.
- True
  - False
  - Can be true or false
  - Cannot say

Q2) Attempt any two of the following.

[14]

- Differentiate between circuit switched data services and packet switched data services on cellular networks.
- Explain packet switching technique in detail.
- Differentiate between TDMA, FDMA, SDMA and CDMA.

Q3) Attempt any two of the following.

[14]

- What is signal propagation? Explain shadowing, reflection, refraction, scattering and diffraction.
- Explain the concept of frequency reuse in detail.
- Draw the diagram and explain the architecture of GSM.

Q4) Attempt any two of the following.

[14]

- Explain in detail the handover procedure in GSM.
- Write a short note on security in GSM.
- Explain distance vector routing protocol.

Q5) Attempt any two of the following.

[14]

- Explain path vector routing protocol.
- Explain LTE frame structure in detail.
- Compare 4G and 5G Technology.

