Con. 3082–11.   (REVISED COURSE)   RK–2232

(3 Hours)   [Total Marks : 100

N.B.: 1) Question No. 1 is compulsory.
2) Out of remaining questions, attempt any four questions.
3) In all five questions to be attempted.
4) All questions carry equal marks.
5) Answer to each new question to be started on a fresh page.
6) Figures in brackets on the right hand side indicate full marks.

Q1. A) Explain generation of control signals for 8085 microprocessor   (5)

B) Show interfacing of an 8-key keyboard to the 8085 in I/O mapped I/O mode. Also write
program to check and store key pressed (Use tristate buffer)   (3+2)

C) Write instruction sequence in 8051 to reverse the bits in the accumulator. Bit 7 and bit 0
are swapped, bit 6 and bit 1 are swapped, etc.   (5)

D) Explain following assembler directives of ASM51
1. DBIT   2. DS   3. Extrn   4. Public   5. ORG   (5)

Q2. A) The LED of fig. shown below is to be made ON and OFF continuously. It should be ON for
one second and OFF for 1.5 seconds. Write a program in 8085 for this purpose. The clock
frequency of the system is 1 MHz.   (10)
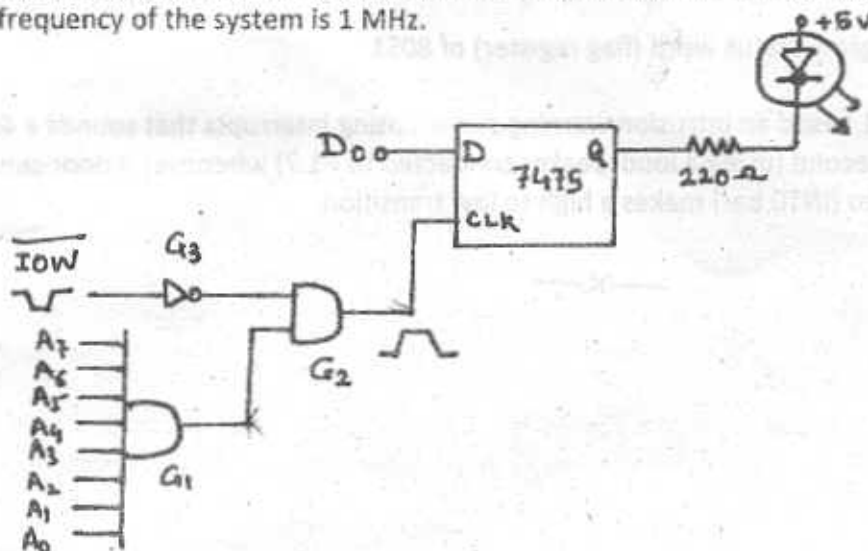
B) Explain interrupt structure of 8085 and interrupt related instructions.   (6+4)

[TURN OVER

Q3. A) Write a program in 8085 to generate a square wave of 100 Hz frequency on the SOD pin. Assume 1 MHz operating frequency (10)

B) Explain block diagram of 8155 with control word format and data transfer between 8085 and 8155 in handshaking mode (10)

Q4. A) Explain block diagram of 8255 with BSR and I/O modes to interface it with 8085 (10)

B) Explain timing diagram of Memory read/write and I/O read/write cycles of 8085 (10)

Q5. A) Explain how 8051 interrupt structure allows single step execution also explain implementation of single step operation (10)

B) Explain following pins of 8051
1. ALE/PROG   2. EA/Vpp   3. PSEN   4. RST   5. XTAL1 and XTAL2   (10)

Q6. A) Explain addressing modes of 8051 with examples (10)

B) Explain different Timer modes of operations for 8051 (10)

Q7. A) Explain register architecture of ARM processor (05)

B) Explain program status word (flag register) of 8051 (05)

C) Design 8031 based an intrusion warning system using interrupts that sounds a 400 Hz tone for 1 second (using a loudspeaker connected to P1.7) whenever a door sensor connected to (INT0 bar) makes a high to low transition. (10)

—x—

T.F. ETRX Ⅴ (REV)
Continuous Time Signal &
Systems

h31 : 1st half.11-PH(l)

Con. 3498-11.

RK-2238

(3 Hours) [Total Marks : 100]

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

1. (a) Show that the product of two even signals or odd signals is an even signal and product of an even and odd signal is odd signal. **5**

   (b) $x_1(t)$ and $x_2(t)$ are two periodic signals with fundamental periods T_1 and T_2 respectively. Under what conditions the sum $x_1(t) + x_2(t) = x(t)$ is periodic and what is fundamental periodic if x(t) is periodic ? **5**

   (c) Evaluate— **5**

   $$\int_{-2}^{4}\left(2+t^2\right)\delta(t-1)\,dt + \int_{-1}^{1} t^2\,\delta(t+4)\,dt$$

   (d) What is condition for system to be stable in time domain. If $h(t) = e^{-t}u(t)$ find its Laplace transform. Is system stable in Laplace domain. **5**

2. (a) State and prove time differentiation property of Fourier transform. **5**

   (b) Convolve the following signals in time domain (Do not use transform) **10**
   $$x_1(t) = x_2(t) = u(t + 0\cdot 5) - u(t - 0\cdot 5).$$

   (c) Find initial and final value of— **5**

   $$X(s) = \frac{2s+3}{s^2 + 5s + 1}$$

3. (a) Obtain state variable model of a continuous time LTI system described by the differential equation— **10**

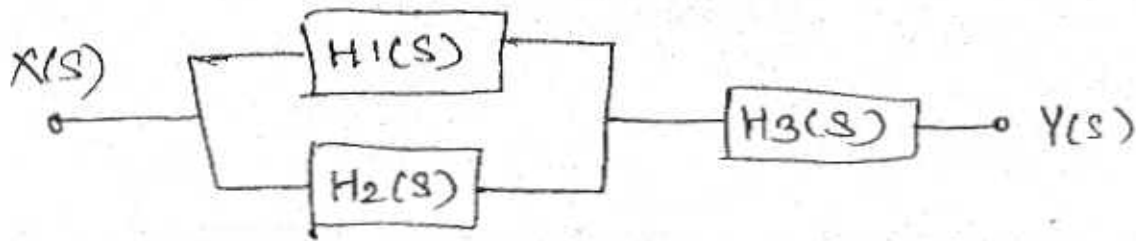 $$\frac{2d^2y}{dt^2} + \frac{3dy}{dt} + 6y(t) = 2x(t)$$

   (b) If $\cos 2t \leftrightarrow X(s)$ determine time domain signal that corresponds to following transform domain signals. Use properties only and clearly state them **10**
   (i) $SX(s) - 1$ (ii) $X(2s)$ (iii) $X(s + 1)$ (iv) $s^{-1}X(s)$.

4. (a) Find Laplace transform of following signal— **10**
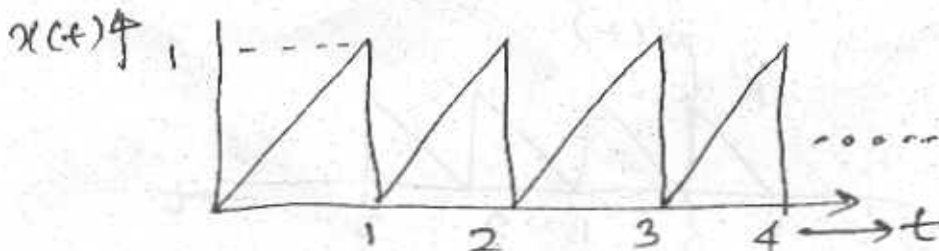
(b) Find impulse response of overall system—
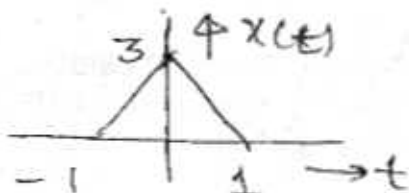
10

$$H_1(s) = \frac{4}{s+2}, \quad H_2(s) = \frac{-3}{s+1}, \quad H_3(s) = \frac{s+2}{s-2}$$
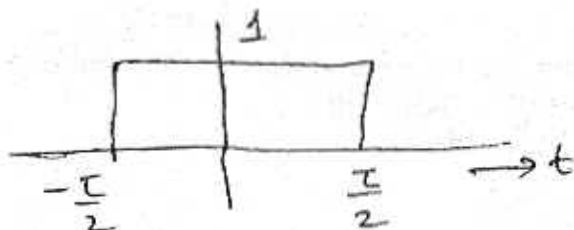
5. (a) Find mean and variance of a random variable X having Uniform distribution in   10
       internal [a, b].

   (b) A triangular pulse x(t) is as given below–   10

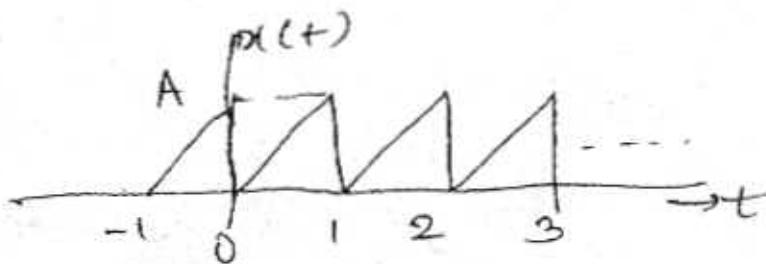   Sketch X(3t) ;   X(–2t – 1) ; $X\left(\dfrac{t}{2}\right)$ u(t) ; and X(t + 1) + u(t – 1).

6. (a) Find magnitude and phase spectrum of gate function using Fourier transform.   10

   (b) Determine the 1 ms pulse response of system described by–   10

       $$\ddot{y}(t) + 3\dot{y}(t) - 8y(t) = x(t)$$
       with x(t) $= 2e^{-2(t - 1)}$

7. (a) Obtain Canonical form of system –   5
       $\dot{X} = A x (t) + B u(t)$ with

       $$A = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 2 & 3 \\ 0 & 1 & 0 \end{bmatrix}, \quad B = \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}$$

   (b) Obtain Trigonometric and Exponential Fourier series expansion of signal shown   15
       below–

T.E. (ETRX) sem. V
Digital Communication and coding
Techniques.

P4-Exam-May-11-173

Con. 3539-11.   RK-2235

(3 Hours)   [Total Marks : 100

N.B. : (1) Question No. **1** is **compulsory**.
       (2) Attempt any **four** questions from remaining questions.
       (3) Assume **suitable** data wherever **necessary**.

1. (a) How many bits are required to represent 26 letters of English alphabet in binary code.   5

    (b) Justify : In a DPSK receiver, the bit errors tend to occur in pairs.   5

    (c) Define processing gain and Jamming margin with reference to CDMA. Write   5
the formula giving maximum number of customers who can share a given bandwidth
in CDMA.

    (d) PDF of a continuous random variable is given below :—   5
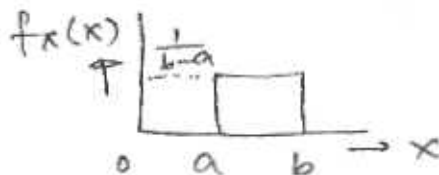
Find its CDF and Plot it.

2. (a) Explain the following terms :—   10
       (i) Hamming bound (ii) Free distance (iii) Code rate (iv) Coding gain
       (v) Systematic Codes.

    (b) What is eye pattern ? Explain how raised cosine spectrum reduces ISI.   10

3. (a) Explain Lempel Ziv coding.   10

    (b) The convolutional encoder has single shift register with two stages are three   10
modules-2 adders and output multiplexer. The following generator sequences
are combined by multiplexer to produce the encoder output.
       $g_1 = 101$ $g_2 = 110$ $g_3 = 111$.
Draw the block diagram of the encoder and determine encoded sequence for
message sequence 10011.

4. (a) Prove that the maximum signal to noise ratio of integrate and dump filter receiver 10
is given as $\rho_{max} = \dfrac{2E}{No}$; when the input signal $x(t)$ is rectangular pulses of
amplitude $\pm A$ and duration 'T'.

(b) What is minimum in MSK ? Why is MSK called shaped QPSK ? 10

5. (a) Find all code vectors for a (6, 3) block code if generator matrix is – 10

$$G = \begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 1 \\ 0 & 1 & 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 & 1 & 0 \end{bmatrix}$$

(b) The PDF of Gaussian distribution is given as $f(x) = \dfrac{1}{\sigma\sqrt{2\pi}} e^{-(x-m)^2/2\sigma^2}$ 10

Prove that mean is m and variance is σ^2.

6. (a) Compare the following :– 10
    (i) Offset QPSK with Non offset QPSK
    (ii) 16PSK with 16 QASK.

(b) Explain significance of Shanon Hartley Law. 5

(c) Describe principal steps involved in the direct spreading method for CDMA. 5

7. Write short notes on :– 20
    (a) Viterbi algorithm   (c) BPSK reception
    (b) Duobinary Schemes   (d) Optimum receiver.

39 ws April-11

Con. 3288-11.

RK–2229

(3 Hours)

[Total Marks : 100

N.B. : (1) Question No. **1** is **compulsory**.

    (2) Attempt any **four** from question Nos. **2** to **7**.

    (3) Assume **suitable** data if **necessary**.

1. (a) Explain Cartesian, cylindrical and spherical co-ordinate systems with equations and neat diagrams.   10

    (b) A point in Cartesian system is given by $P(1, 2, 3)$. Express it in cylindrical and spherical co-ordinates.   5

    (c) If a potential function is given by $V = x^2 yz + A y^3 z$ 5

      (i) Find A so that Laplace's equation is satisfied.

      (ii) Using the value of A determine the electric field at $(2, 1, -1)$.

2. (a) State and explain Maxwell's equations in differential and integral form for static and time varying fields.   12

    (b) $\overline{B} = 2 \sin(wt - \beta x) \overline{ax} + 2y \cos(wt - \beta x) \overline{ay}$. Assume $\rho v = 0, \sigma = 0, J = 0, \epsilon r = 1, \mu r = 1$;   8

    Applying Maxwell's equations find the electric field $\overline{E}$.

3. (a) Derive the wave equation for free space and for a conducting medium.   8

    (b) Derive the uniform plane wave equation.   6

    (c) For a medium in which a wave with a frequency $f = 0.3$ GHz is propagating, determine the propagation constant and intrinsic impedance of the medium when $\sigma = 0, \epsilon r = 9, \mu = \mu_0$.   6

4. (a) State and prove the Poynting theorm. Explain the integrals involved in the statement.   10

    (b) In free space $\overline{H} = 0.2 \cos(wt - \beta x) \overline{az}$ A / m. Find the total power passing through –   10

      (i) A square plate of side 10 cm on plane $x + z = 1$.

      (ii) A circular disc of radius 5 cm.

5. (a) Derive the expressions for the reflection and transmission coefficients for a parallel polarised plane wave incident on a perfect dielectric at oblique incidence.   12

    (b) Derive the boundary conditions for the normal and tangential components of magetic field.   8

6. (a) Derive an expression for the input impedance of a two wire transmission line starting **12** from the general voltage and current equations of a transmission line. For open and short circuited transmission lines find the expression for the input impedance.

   (b) A transmission line is lossless and 25 m long. It is terminated in a load of **8** $Z_L = 40 + j\,30\ \Omega$ at a frequency of 10 MHz. The inductance and capacitance of the line are $L = 300\ n\,H/m$, $C = 40\ pF/m$. Find the input impedance at the source and at the midpoint of the line.

7. (a) Explain the following methods to eliminate EMI with equations – **12**
      (i) Shielding (ii) Grounding (iii) Bending (iv) Filtering.

   (b) Find the rediation resistance of a Hertzian dipole of length **4**

   $$\lambda/40,\ \lambda/60,\ \lambda/80$$

   (c) Find the directivity of a half wave dipole. **4**

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119 : 1st half.11-PH(I)

Con. 3441-11.   RK-2242

(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 and state it **clearly**.
         (4) **Figures** to the **right** indicate **full** marks.

1. (a) Find V_N, V_P and V_o.   5
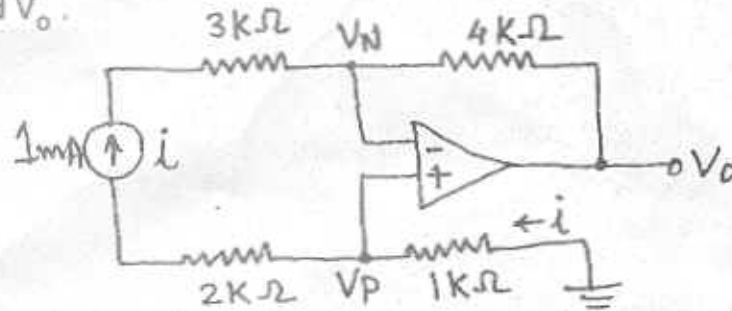
    (b) Draw basic differentiator circuit and derive an expression for output voltage. Explain   5
        why this circuit is sensitive to high frequency noise.
    (c) What is roll of rate of first order filter ?   5
    (d) Draw circuit diagram for peak detector and explain working.   5

2. (a) Derive the expression for "Q" and cutoff frequency for second order Low pass   10
        KRC filter.
    (b) Draw neat functional diagram of PLL IC 565 and explain the following terms   10
        alongwith the working of this PLL :—
        (i)   Free running frequency
        (ii) Capture range,   10
        (iii) Lock range.

3. (a) Draw simplified Op-amp circuit diagram and explain the following stages alongwith   10
        the working of this circuit :—
        (i)   Input stage,
        (ii) Second stage
        (iii) Output stage.
    (b) Draw the circuit diagram of three Op-amp instrumentation amplifier. Get an   10
        expression for the output. State its characteristics.

4. (a) Design the non-inverting Schmitt trigger for getting a hysteresis width of 6 V. Assume   5
        the saturation voltages to be $\pm$ 12 V.
    (b) Draw the circuit diagram of Schmitt trigger using 555 timer and explain its operation.   5
    (c) Explain in detail about phase shift oscillator.   10

5. (a) Design a 0·5 A current source using IC 7805. Assume $R_L = 10\ \Omega$.   10
    (b) What are the different types of Digital to analog converters ? Explain one of the   10
        technique in detail.

6. (a) Design a monostable 555 timer circuit to produce an output pulse 10 sec. wide.   5
        Draw the circuit diagram.
    (b) Explain how a missing pulse can be detected using IC 555.   5
    (c) Draw and explain the circuit diagram to generate square and triangular waveform   10
        using Op-amp.

7. Write notes on (any **two**):—   20
        (a) State variable filters.
        (b) Voltage to Frequency converters.
        (c) Current feedback amplifier.
        (d) Analog switches.

20/8/2011

41 : 1st half-11(d)-JP

Con. 3613-11.

TE (mechanical, Electrical feed", ETRX, CMPN, Instrumentation, Biomedical, Automobile, EXTC, IT & Marine)
SEM V

E.V.S.

RK-2043

(2 Hours)

[Total Marks : 50]

N.B. (1) Question No. **1** is **compulsory**.
    (2) Solve any **four** question Nos. **2** to **7**.

1. Write short notes on any <u>four</u> of the following: 10

    a) Effects of mining on environment
    b) Primary and secondary ecological succession
    c) Bio-geographical classification of India
    d) Disaster management
    e) Water conflicts in India
    f) Value Education.

2. a) What is meant by environment? Enumerate and discuss its various components.   5
    b) What is the need for public awareness and participation in the environmental   5
       education?

3. a) How will you classify natural resources? Explain major reasons for their depletion.   5
    b) Discuss the productive and the aesthetic value of Nature.   5

4. a) What is an ecosystem? With the help of suitable models explain the energy flow in   5
       an ecosystem.
    b) Explain the term 'biodiversity'? Point out the major threats to biodiversity.   5

5. a) How industrial, domestic, agricultural and other wastes affect the fertility of the soil?   5
       Discuss the measures to check it.
    b) What is meant by watershed management? Critically discuss the objectives and   5
       practices of watershed management.

6. a) What are the major issues associated with resettlement and rehabilitation of the   5
       people who get displaced by major developmental projects?
    b) Discuss the role of Information Technology in environmental management and   5
       human health.

7. a) What is meant by sustainable development?   5
    b) Elucidate the importance of justice in relationship of human being with the   5
       Nature.