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06EE62

Sixth Semester B.E. Degree Examination, December 2012
Switch Gear and Protection

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Explain the difference between isolating switch and load break switch. **(04 Marks)**

b. Define fuse. With neat sketch explain the construction and working of a high voltage liquid type fuse. **(10 Marks)**

c. Explain the cut-off characteristics and time-current characteristics of a fuse. **(06 Marks)**

2 a. What is resistance switching? Derive the expression for critical resistance interms of system inductance and capacitance, which gives no transient oscillation. **(08 Marks)**

b. Explain the phenomena, which is due to the interruption of low inductive currents. **(06 Marks)**

c. In a 220 kV system, the reactance and capacitance up to the location of circular breaker is 8Ω and 0.025 μf respectively. A resistance of 600 Ω is connected across the contacts of the circuit breaker.
Calculate the following:
i) Natural frequency of oscillation.
ii) Damped frequency of oscillation.
iii) Critical value of resistance which will give no transient oscillation.
iv) The value of resistance which will give damped frequency of oscillation, $1/4^{th}$ of the natural frequency of oscillation. **(06 Marks)**

3 a. With a neat figure, explain the construction and working of an axial flow air-blast circuit breaker. **(06 Marks)**

b. What are the advantages and disadvantages of :
i) Bulk oil circuit breaker.
ii) Minimum oil circuit breaker. **(06 Marks)**

c. Explain the properties of SF_6 gas. **(08 Marks)**

4 a. With a neat sketch, explain the construction and working of a vacuum circuit breaker. **(08 Marks)**

b. With the help of schematic diagram, explain the working of a short circuit test plant. **(07 Marks)**

c. With a neat circuit, explain any one type of synthetic testing of circuit breaker. **(05 Marks)**

PART – B

5 a. What is protective relay? Explain the primary and back up protection as applied to power system. **(06 Marks)**

b. Explain clearly the essential qualities of protective relay. **(08 Marks)**

c. With a neat sketch, explain the Buchholz relay. **(06 Marks)**

6 a. With a neat sketch, explain the working of induction type directional over current relay. **(08 Marks)**

b. Explain the working principle of an impedance relay. **(06 Marks)**

c. Explain with block diagram of micro process based over-current relay. **(06 Marks)**

7 a. Draw and explain the Merz-price protection of alternator start windings, state its advantages, [Y and Δ connected alternators]. **(10 Marks)**

b. A synchronous generator rated at 20kV protected by circulating current system having neural grounded through a resistance of 15Ω. The differential protection relay is set to operate when there is an out of balance current of 3A. The CT's have ratio of 1000/5 A, Determine:

i) The % of winding remains unprotected.

ii) The value of earth resistance to achieve 75% protection of winding. **(10 Marks)**

8 a. Describe the harmonic restraint relay use to protect the transformer. **(08 Marks)**

b. Explain single phasing in induction motors. How motor is protected from single phasing. **(08 Marks)**

c. List the various abnormal conditions against which large induction motor has to be protected. **(04 Marks)**

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06EE63

Sixth Semester B.E. Degree Examination, December 2012
Electrical Machine Design

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions atleast TWO questions from each part.***

PART – A

1 a. Explain briefly the classification of insulating materials according to maximum permissible temperature rise. Mention atleast 4 examples for each. **(06 Marks)**

b. A 150 KW, 230 V, 500 rpm. DC shunt motor has square field coil. Find the number of poles, main dimensions and air gap length. Assume average gap flux density = 0.85 Tesla, ampere conductors / cm = 290, ratio of width of pole body to pole pitch = 0.55, ratio of pole arc to pole pitch = 0.7, efficiency = 91% take mmf for air gap = 55% of armature mf, gap contraction factor = 1.15. **(14 Marks)**

2 a. A 250 KW, 500 volts, 600 rpm, DC generator is built with an armature diameter of 75 cm and a core length of 30 cm. The lap connected armature has 720 conductors using the data obtained form this machine, determine the armature diameter, core length, number of armature slots, armature conductors and commutator segments for a 350 KW, 440 volts, 720 rpm 6 – pole DC generator. Assume a square pole face with ratio of the pole arc to pole pitch equal to 0.66. The full load efficiency is 0.91 and to internal voltage drop is 4 percent of the rated voltage. The diameter of commutator is 0.7 of the armature diameter. The pitch of the commutator segments should note be less than 4 mm. the voltage between adjacent segments should note exceed 15 volts at no load. **(12 Marks)**

b. During the design of armature of a 1000 KW, 500 V, 10 pole, 300 rpm, DC compound generator, following details are obtained : External diameter of armature = 140 cm ; Gross length of core = 35 cm ; Flux /pole = 0.105 wb ; Based on the above details, find out the following details regarding the field system design
i) axial length of the pole ii) width of the pole iii) height of the – pole iv) pole arc v) depth of eh yoke.
Assume permissible loss of the cooling surface = 700 W/m^2, Leakage factor for the pole = 1.2, flux density in the pole = 1.6 tesla Iron factor for the pole = 0.95, winding type = Lap connected, voltage drop = 10 V, ratio of field amp. turns to the armature amp. turns on full load = 1.2, depth of the winding = 5 cm, copper space factor for the field winding = 0.6, pole shoe thickness at the centre of the pole = 3.6 cm, ratio of pole arc to pitch of the pole = 0.68. Flux density in yoke = 1.5 times gross armature length. Axial length of pole = 1 cm less than gross length of armature. **(08 Marks)**

3 a. Derive the emf equation of a transformer then show that volts per turn = $K\sqrt{K.V.A}$. Also explain the factors to be taken into account while selecting the value of constant K. **(08 Marks)**

b. Determine the main dimensions of the core and number of turns and area of C.S. of the conductors of the primary and secondary of a 125 KVA, 6600/460V, 50 Hz, single phase core type distribution transformer, maximum flux density in the core = 1.2 wb $/m^2$, current density = 250 A/cm^2. Assume cruciform for the assembled core allowing 8% for the insulation between the laminations. Take yoke cross section as 15% greater than the core, window. Net cross section of copper is 0.225 times the net cross section of iron in the core, window space factor = 0.3. Draw a neat sketch to a suitable scale, show the values. **(12 Marks)**

4 a. Calculate the overall dimensions, number of turns and cross section of the conductors for a 200 KVA, 6600 /440 V, delta- star, 50 Hz, 3-phase core type transformer. Given the following data emf/turn = 10 volts maximum flux density in the core = 1.3 wb/m^2, current density = 2.5 A/mm^2, window space factor = 0.3, overall height = over all width, stacking factor = 0.9, use 3 – stepped core. Draw a sketch showing details. **(12 Marks)**

b. Design a suitable cooling tank with cooling tubes for a 500 KVA, 6600/ 400 V, 50 Hz, 3 – phase, oil immersed natural cooled transformer with the following data, temperature rise allowed for transformer tank is less than 60°C. Dimensions of the transformer are 100 cm high, 96 cm in length, width = 47 cm, total losses = 7KW, allowable temperature rise for tank walls = 35°C, cooling tube diameter = 5 cm, spaced 7.5 cm apart, length of cooling tubes = 90% of height of tank, take clearances i) along height = 14 cm ii) along width = 13 cm iii) along height = 40 cm. Determine the number of tubes required and draw a sketch showing their possible arrangement. **(08 Marks)**

PART – B

5 a. Write a brief note on choice of i) Air gap flux density and ii) specific electric loading. Bring out the advantages and disadvantages in the case of induction motor. **(06 Marks)**

b. Determine the man dimension, number of slots, are of C.S. of conductor, slot area of a 150 KW, 3 – phase, 50 Hz, 400V, 1400 rpm slip ring induction motor. Take flux density in the air gap = 0.5 Tesla, ampare conductor /cm = 300, efficiency as 90%, power factor = 0.9, stator current density = 3.5 A/mm^2, slot space factor = 0.4, the ratio of core length to pole pitch = 1.2, machine is delta connected, take slots \ pole \ phase = 4. **(14 Marks)**

6 a. A 15 KW, 400 V, 3 – phase, 50 Hz, 6 – pole induction motor has a diameter of 30 cms and length of the core is 12 cm. The number of stator slot = 72 with conductors per slot = 20. The stator is delta connected calculate the magnetizing current per phase if the length of the air gap is 0.55 mm. The gap contraction factor is 1.2, the mmf for iron parts is 30% that for air gap. Coil span = 11 slots, find the no load current and the power factor if the windage and friction losses are 250 watts and iron losses are 850 watts, winding phase spread = 60°. **(12 Marks)**

b. For a 5H.P, 400 V, 3 – phase, 50 Hz, 4 – pole squirrel cage induction motor to be started by a start – delta starter, find length of the air gap, number fo rotor slots, rotor bars and end ring currents, copper loss in bars and end rings, rotor end ring current density = 5A/mm^2,end ring mean dia = 7.5 cm. Take stator core diameter = 10.5 cm, stator core length = 12.5 cm, number of stator slots = 36, conductors per slot = 104, efficiency = 0.8 and power factor = 0.83, rotor bar length = 10.5 cm, rotor bar current density = 5A/mm^2, receptivity of copper = 0.021 $\Omega m \times mm^2$. **(08 Marks)**

7 a. What are the advantages of arranging stator core in packets of an alternator? **(02 Marks)**

b. With a neat curve write a brief note on SCR and explain the significance of SCR. **(04 Marks)**

c. For the preliminary design of a 1250 KVA, 3.3 KV 50HZ, 300 rpm, 3 – phase, star connected salient pole alternator. Determine the dimension of the stator slot. Also sketch the slot showing the arrangement of conductors and insulation details. Assume specific magnetic loading = 0.58 Tesla, specific electric loading = 330 AC/cm, core length = 1.1 (pole pitch), field form factor = 0.66 stacking factor = 0.96, current density = 4A/mm^2, maximum flux density in the teeth is limited to 1.8 Tesla, winding type = full pitched with 60° phase spread slots /pole/ phase = 3, slot loading should note exceed 1500 A, number of ventilating ducts = 4, width of ventilating ducts = 1 cm. **(14 Marks)**

8 a. Determine the main dimension of a 75000 KVA, 13.8 KV, 50 Hz, 62.5 rpm, 3 – phase star connected alternator. Also find the number of stator slots, conductors / slot, area of the conductor and work out the winding details. The peripheral speed should be about 40 m/sec. Assume a flux density = 0.65 wb/m^2, Ampare conductor/ cm = 400, current density = 4 A/mm^2, winding type = full pitched with 60° phase spread, slots /pole /phase = 3, slot loading should not exceed 1570 A. **(10 Marks)**

b. Design a field winding for a low speed salient pole alternator with the following data number of poles = 16, exciter voltage = 110 volts, maximum mmf/ coil = 18 KA, full loading mmf / coil = 12 KA, permissible losses /m^2 of the cooling surface (inner and outer) is 1200 watts. The field coil is rectangular with circular corners. The internal diameter of the coil is 30 × 18 cm with corners of 4 cm radius. Total height of the coil is 18 cm. Assume a voltage drop of 15% in the field regulator, depth of field coil = 4 cm, specific resistivity of copper = 0.021 Ω /m.mm^2, calculate i) voltage per coil ii) length of the mean turn iii) area of CS of field coil iv) number of turns in field coil v) resistance of the field coil vi) copper loss per coil vii) total field copper loss. **(10 Marks)**

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06EE64

Sixth Semester B.E. Degree Examination, December 2012
Digital Signal Processing

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions atleast TWO questions from each part.***

PART – A

1 a. Compute 8 point DFT of the sequence x(n) = {1, 1, 1, 1} and give its magnitude and phase plot. **(10 Marks)**

b. Find N point DFT of $x(n) = a^n$ for $0 \le n < N - 1$. **(06 Marks)**

c. Obtain the circular convolution of $x_1(n) = \{1, 2, 3, 4\}$ with $x_2(n) = \{1, 1, 2, 2\}$. **(04 Marks)**

2 a. Consider the sequence $x(n) = 4\delta(n) + 3\delta(n-1) + 2\delta(n-2) + \delta(n-3)$. Compute 6 point DFT of the sequence x(n). Also determine the finite length sequence y(n), that has a 6 point DFT $Y(k) = W_6^{4k} X(k)$. **(06 Marks)**

b. An FIR digital filter has an unit impulse response h(n) = {2, 2, 1}. Determine the output sequence y(n) in response to an input sequence x(n) = {3, 0, -2, 0, 2, 1, 0, -2, -1, 0}. Use OVERLAP SAVE FAST CONVOLUTION technique. **(10 Marks)**

c. Determine 1DFT of a 4 point sequence x(k) = {4, -j2, 0, j2}, using DFT. **(04 Marks)**

3 a. Determine the 8 point DFT of sequence x(n) = {1, 1, 1, 1, 0, 0, 0, 0}, using DIT – FFT algorithm. **(10 Marks)**

b. Compute 1DFT of the sequence
x(k) = {0, 2 – j4.8284, 0, 2 + j0.8284, 0, 2 – j0.8284, 0, 2 + j4.8284}, using DIF – FFT algorithm. **(10 Marks)**

4 a. Realize a linear phase FIR filter having impulse response
$h(n) = \delta(n) + \frac{1}{2}\delta(n-1) - \frac{1}{4}\delta(n-2) + \frac{1}{2}\delta(n-3) + \delta(n-4)$. **(06 Marks)**

b. Give the direct form II realization of
$$H(z) = \frac{8z^3 - 4z^2 + 11z - 2}{(z - \frac{1}{4})(z^2 - z + \frac{1}{2})}.$$ **(06 Marks)**

c. Realize $H(z) = \dfrac{(z-1)(z+1)(z-2)z}{(z - \frac{1}{2} + j\frac{1}{2})(z - \frac{1}{2} - j\frac{1}{2})(z - j/4)(z + j/4)}$ in parallel form. **(08 Marks)**

PART – B

5 a. Explain the frequency transformation technique to transform a normalized low pass filter to lowpass, band pass and band reject filters. **(08 Marks)**

b. Design a lowpass Chebyshev filter to satisfy the following specifications :
i) Acceptable pass band ripple of 2 dB at a cut off frequency of 40 rad /sec
ii) Stop band ripple of 20 dB or more at 52 rad/ sec. **(12 Marks)**

6 a. Explain BILINEAR TRANSFORMATION. **(08 Marks)**

b. A digital low pass filter is required to meet the following specifications :

i) $20 \log_{10} | H(w) | w = 0.2\pi \geq - 1.9328$ dB

ii) $20 \log_{10} | H(w) | w = 0.6\pi \leq - 13.9794$ dB

Filter must have maximally flat frequency response. Find H(z), using impulse invariant transformation. **(12 Marks)**

7 a. A low pass FIR filter is to be designed with the following desired frequency transformation methods.

$$H_d(e^{jw}) = \begin{cases} e^{-j2w}, & -\pi/4 \leq w \leq \pi/4 \\ 0, & \pi/4 < |w| \leq \pi \end{cases}$$

Determine the filter co-efficient $h_d(n)$if the window co-efficient are defined as

$$w(n) = \begin{cases} 1, & 0 \leq n \leq 4 \\ 0, & \text{otherwise} \end{cases}$$

Also determine the frequency response $H(e^{jw})$ of the designed filter. **(12 Marks)**

b. Explain the design procedure of FIR filters, using windows concept. **(08 Marks)**

8 a. Compare IIR filters with FIR filters. **(06 Marks)**

b. Compare Harvard and modified Harvard architecture. **(06 Marks)**

c. Explain the architecture of TMS 320 C5X DSP processor. **(08 Marks)**

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06EE65

Sixth Semester B.E. Degree Examination, December 2012
Electrical Drawing and CAD

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions atleast TWO questions from each part.***

PART – A

1 a. Draw a neat diagram showing the schematic arrangements of nuclear plant. **(08 Marks)**

b. Draw the single line diagram of a 66/11 KV substation with following details.
66 KV incoming line – 2 numbers
Line OCB's 66 KV – 2 numbers
Step down transformer 66 KV/ 11- KV – 2 numbers
Bus coupler for H.T side only
Feeders 11KV radiating from L.T bus- 4 numbers
L.T circuit breakers for feeders - 4 numbers
Duplicate bus bar for H.T and L.T to be provided
Position of lighting arresters, CT's and PT's are to be indicated. **(12 Marks)**

2 Draw the detailed drilling of each part of 500 KVA, 6600/400V single phase power transformer, with the following data. Show full assembled plan and elevation

Dimension of the core : core construction is cruciform
Diameter = 33 cms
Width of the largest stamping = 33 cms
Width of the smallest stamping = 17.5 cms
Height of the core = 43 cms
Center – to – center distance between cores = 49 cms
Core laminations are used by means of two end plates 3mm thick by a bolt of dia 1.2 cm

Yoke :
Yoke height = 25 cms
Yoke length = 77 cms
Total height of the transformer = 9.3 cm

Winding :
L.V winding total turns = 22
No. of turns per limb = 11
Inside dia of L. V winding = 33.75 cm
Out side dia of L.V winding = 38.35 cm
Total height of the core occupied by the L.V. winding = 36.2 cm

H.T winding : Two layers
Inside dia of H.T I st layer = 41.5 cm
Outside dia of H.T I st layer = 43.3 cm
Inside dia of H.T II nd layer = 45 cms
Outside dia of H.T II nd layer = 46.8 cm. **(20 Marks)**

3 Draw the sectional end and sectional elevation of the pole core made of laminated sheet steel with a pole shoe. The pole core is fixed with the yoke by means of hexagonal headed set screws,
Width of the pole = 19.6 cm
Height of the pole with shoe = 27.54 cm
Thickness of the Yoke = 8 cm
Length of the pole = 35.6 cm
Air gap length = 0.5 cms
Radius of the armature = 38.25 cm
Bolt dia = 2.54 cm
Other missing data may be assumed. **(20 Marks)**

4 Draw the half sectional end view (with top half in section) of a 6 poles alternator with following dimension. Show clearly the method of fixing the pole with rotor spider and stator core with the frame
Air gap dia of stator = 39.72 cm
Outer dia of stator = 56.61 cm
Outer dia of rotor = 38.48 cm
Coil winding in 3 steps of width = 4.89 cm 3.47 cm and 1.53 cm each of 2.56 cm in height
width of the pole = 7.68 cm
Height of the pole = 7.68 cm with shoe
Pole arc = 15 cm
Number of poles = 6
Stator slots = 6.4 × 1.7 (width × breadth)
Missing data may be suitably assumed. **(20 Marks)**

PART – B

5 Design and draw a duplex winding diagram of a DC machine with 32 conductors and 4 poles. Show the direction of induced emf, sequence diagram, and brush position. **(10 Marks)** **(10 Marks)**

6 Design and draw 4 pole wave winding (progressive) for an armature with 34 conductors accommodated 17 slots, show position of brush, direction of current. **(20 Marks)**

7 Develop the winding of an induction motor of 5HP, 440 V, 3 phase 1440 rpm, 4 poles and 2 slots/ pole/ phase. Winding is double layer full pitched lap winding. Also show winding in delta connected. **(20 Marks)**

8 a. Explain the following commands, with examples :
i) OFFset ii) ARRAY iii) SNAP iv) TRIM v) MIRROR. **(10 Marks)**

b. Explain the step – by – step procedure to draw a simplex lap winding of 30 conductors, 4 pole using Auto cad. **(10 Marks)**

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06EE663

Sixth Semester B.E. Degree Examination, December 2012
Electronic Instrumentation

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. State and explain three types of systematic errors, in measurement giving examples of each. **(10 Marks)**

b. The following table gives the set of 10 measurements that were recorded in the laboratory. Calculate the precision of the 6^{th} measurement. **(04 Marks)**

Measurement number	1	2	3	4	5	6	7	8	9	10
Measurement value of x_n	98	101	102	97	101	100	103	98	106	99

c. With neat circuit diagram, explain the working of transistor voltmeter (TVM). **(06 Marks)**

2 a. With circuit diagram, explain the working of series type OHMMETER. Explain the calibration of the series type ohmmeter. **(10 Marks)**

b. Explain with the help of a neat circuit diagram, the working of dual slope integrating type D.V.M. **(10 Marks)**

3 a. With the block diagram, explain the features of digital tachometer. **(06 Marks)**

b. Explain with block diagram on what principle does a digital capacitance meter operate. **(07 Marks)**

c. With block diagram, explain how can measurements of parameters to be obtained using microprocessors? **(07 Marks)**

4 a. With the neat sketch, explain the working of galvanometer type recorders. **(10 Marks)**

b. With a block diagram, explain the working of X-Y recorders. What are the applications of the above? **(10 Marks)**

PART – B

5 a. Draw the block diagram of a function generator and explain the method of producing sine waves. **(10 Marks)**

b. What are the requirements of a pulse with block diagram, explain the working of square and pulse generator. **(10 Marks)**

6 a. Explain the working principle of field strength meter with neat circuit diagram. **(08 Marks)**

b. On what principle does the R-X meter operate? **(08 Marks)**

c. Calculate the value of the self capacitance when the following measurements are performed $f_1 = 2MHz$ and $c_1 = 500$ pf, $f_2 = 6MHz$ and $c_2 = 50$ pf. **(04 Marks)**

7 a. With neat sketch, explain the construction and working of LVDT. What are the advantages and disadvantages of the above? **(12 Marks)**

b. With neat sketch, explain the working of pressure inductive transducer. **(08 Marks)**

8 a. What are the classifications of displays in the digital electronic field? **(06 Marks)**

b. Draw the structure of an LED and explain its operation. What are the conditions to be satisfied by the device for emission of visible light? **(08 Marks)**

c. With block diagram, explain the working of dot matrix display. **(06 Marks)**

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06EE837

Eighth Semester B.E. Degree Examination, June/July 2011
Data Communication and Networking

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions selecting at least TWO questions from each part.***

PART – A

1 a. With diagram explain physical topology of a network. **(08 Marks)**
b. With diagram, explain five components of data communication system. **(08 Marks)**
c. Explain protocols and standards. **(04 Marks)**

2 a. With diagram, explain the Open System Interconnection model. **(08 Marks)**
b. Encode the data 01001100011 in the following formats i) NRZ-L ii) NRZI iii) Bipolar-AMI iv) Pseudo ternary v) Manchester vi) Differential Manchester **(08 Marks)**
c. If a periodic signal is decomposed into five sine waves with frequencies of 100, 300, 500, 700 and 900 Hz what is the bandwidth? Draw the spectrum assuming all components have maximum amplitude of 10V. **(04 Marks)**

3 a. With diagram, explain i) serial transmission ii) parallel transmission **(08 Marks)**
b. Explain the steps involved in block coding. **(08 Marks)**
c. A signal has four data levels with a pulse duration of 1msec. Calculate the pulse rate and its bit rate. **(04 Marks)**

4 a. Give the comparison of Bit and Baud rate. **(08 Marks)**
b. Explain i) TDM ii) WDM **(08 Marks)**
c. Explain bit padding **(04 Marks)**

PART – B

5 a. Explain omni directional and unidirectional antennas. **(08 Marks)**
b. Explain CSMA|CD operation. **(08 Marks)**
c. Explain wireless LAN configuration. **(04 Marks)**

6 a. Find CRC for a frame (message) 1010001101 and $G(x) = x^5 + x^4 + x^2 + 1$. **(08 Marks)**
b. Explain the operation of Sliding window protocol with relevant diagrams. **(08 Marks)**
c. Discuss the various issues that are to be considered while designing data link layer. **(04 Marks)**

7 a. Explain i) Leaky Bucket Algorithm.
ii) Token Bucket Algorithm. **(08 Marks)**
b. Explain the principle of Internetworking. **(08 Marks)**
c. Give IP_{v6} Header format. **(04 Marks)**

8 a. Explain TCP Services and features. **(08 Marks)**
b. Explain Connectionless versus connection oriented service in transport layer. **(08 Marks)**
c. Explain UDP operation. **(04 Marks)**

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