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06EC71

Seventh Semester B.E. Degree Examination, Dec.09/Jan.10
Computer Communication Networks

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions.
choosing at least two full questions from each part.

PART-A

- 1 a. Show the layer representation in the TCP/IP model and the OSI model and explain. (10 Marks)
- b. Give a brief overview of SS7 signaling. (05 Marks)
- c. Match the following functions to the appropriate layers in the OSI model.
 - i) Dividing the transmitted bit stream into frames.
 - ii) Determining the route to be used through the subnet.
 - iii) Reliable process to process message delivery.
 - iv) Format and code conversion services.
 - v) Accessing the World Wide Web. (05 Marks)
- 2 a. Explain the selective repeat sliding window protocol with necessary figures. (10 Marks)
- b. A channel has a bit rate of 4 kbps and a propagation delay of 20 msec. For what range of frame sizes does stop and wait protocol give an efficiency of at least 50%. (06 Marks)
- c. Perform bit stuffing on the given bit stream 011011111011111101111111010. Assume flag as 01111110. (04 Marks)
- 3 a. Explain CSMA and show the behaviour of the three persistence methods of CSMA. Compare the vulnerable times in CSMA and CSMA/CD. (10 Marks)
- b. 10,000 stations are competing for the use of a single slotted ALOHA channel. The average station makes 18 requests/hour. A slot is 125 μ sec. What is the approximate total channel load? (05 Marks)
- c. In a CDMA system the four chip sequences are :

A = (-1 -1 -1 +1 +1 -1 +1 +1)

B = (-1 -1 +1 +1 +1 +1 +1 -1)

C = (-1 +1 -1 +1 +1 +1 -1 -1)

D = (-1 +1 -1 -1 -1 +1 -1) in bipolar form.

If the received sequence is (-1 +1 -3 +3 +1 -1 -1 +1) what is the data transmitted by the four stations. (05 Marks)
- 4 a. Give the format for the IEEE 802.3 frame for Ethernet. What are the minimum and maximum frame lengths? (07 Marks)
- b. Identify if the following 802.3 MAC addresses are unicast, multicast or broadcast.
 - i) 47 : 20 : 1B : 2E : 08 : EE
 - ii) EE : FF : 10 : 01 : 11 : 00
 - iii) FF : FF : FF : FF : FF : FF. (03 Marks)
- c. What are the hidden and exposed station problems in wireless Lan's. Give solutions for each. (10 Marks)

PART-B

- 5 a. Explain each of the following in brief.
 - i) passive Hub
 - ii) repeater
 - iii) bridge
 - iv) router
 - v) gateway. (10 Marks)
- b. Give the IPV4 datagram format and explain its fields. (10 Marks)

Important Note: 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. 2. Any revealing of identification, appeal to evaluator and/or Equations written eg, 42+8=50, will be treated as malpractice.

- 6 a. What are the differences between classful addressing and classless addressing in IPV4. (10 Marks)
- b. An ISP is granted a block of addresses starting with 190.100.0.0/16. The ISP needs to distribute these addresses to the group of customers as follows :
- First group has 64 customers, each needs 256 addresses
 - Second group has 128 customers, each needs 128 addresses
 - Third group has 128 customers, each needs 64 addresses. Design the subblocks and find out how many addresses are still available after these allocations. (10 Marks)

- 7 a. Explain the distance vector routing for the following example.

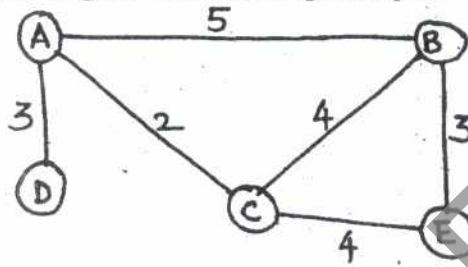


Fig. Q7(a)

- (10 Marks)
- b. Compare multicasting with multiple unicasting. Differentiate between source based tree and group shared tree approach used in multicast routing. (10 Marks)
- 8 a. Describe a TCP connection and explain a TCP connection establishment using three way handshaking. (10 Marks)
- b. Explain recursive resolution and iterative resolution in name address resolution. (10 Marks)

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Seventh Semester B.E. Degree Examination, Dec.09/Jan.10
Optical Fibre Communication

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1 a. What are the advantages, applications and disadvantages of optical fibre as compared to copper cables? (08 Marks)
- b. Derive the numerical aperture of a step index fiber (SIF) from Snell's law. (06 Marks)
- c. A multimode SIF has V number of 75, NA = 0.3, R.I. of core is 1.458 and operates at 820nm. Find core radius, R.I. of cladding, fractional change in R.I. and number of modes gets propagated. (06 Marks)
- 2 a. A 30 km long fiber at 1300 nm has an attenuation of 0.8 dB/km. If 200 μ w power is launched into the fiber, find the output power in dBm and in watts. (06 Marks)
- b. Briefly explain, different mechanisms which cause absorption losses in optical fibers. (06 Marks)
- c. Derive an expression for pulse spreading and dispersion, which is a function of wavelength, using time delay. (08 Marks)
- 3 a. Draw the diagram of a typical GaAlAs double hetero structure LED, along with energy band diagram and refractive index profile and explain. (08 Marks)
- b. Sketch and explain the Fabry-Perot resonator cavity of laser. (06 Marks)
- c. A photodiode has a quantum efficiency of 65%, when photons of energy 1.5×10^{-19} Joules are incident upon it.
 - i) At what wavelength is the photodiode operating?
 - ii) Calculate the incident optical power required, to obtain a photocurrent of 2.5μ A. (06 Marks)
- 4 a. A silica multimode step index fiber has a core refractive index of 1.46. Determine the optical loss in decibels due to Fresnel reflection at a fiber joint with:
 - i) A small air gap, ii) an index matching epoxy which has a refractive index of 1.40.
 It may be assumed that the fiber axes and end faces are perfectly aligned at the joint. (06 Marks)
- b. Explain different types of fiber splicing techniques. (06 Marks)
- c. Briefly describe the principle of operation of the following:
 - i) Expanded beam connectors
 - ii) Fiber fused biconical taper coupler. (08 Marks)

PART – B

- 5 a. With a schematic diagram, explain the working of an optical receiver. (06 Marks)
- b. What are the noise sources and disturbances that arise in optical pulse detection mechanism? Explain. (08 Marks)
- c. Write a note on Burst-mode receivers. (06 Marks)

- 6 a. Explain multichannel A.M. technique employed in broadband analog applications. (05 Marks)
b. What is RF-over-fiber technique? Explain. (05 Marks)
c. What is rise time budget analysis? Derive an expression for the total system rise time budget in terms of transmitter fiber and receiver rise time. (10 Marks)
- 7 a. What is WDM? How is it implemented? (05 Marks)
b. Explain the design and operation of a polarization independent isolator. (05 Marks)
c. Explain the importance of the following active components used in WDM based on MEMS.
i) Variable optical attenuators
ii) Tunable optical filters. (10 Marks)
- 8 a. What are the applications of optical amplifiers? (04 Marks)
b. An EDFA is pumping 28mw of pump power at 970nm. If the gain at 1570 nm is 30 dB, determine maximum input and output signal power and also determine power conversion efficiency. (06 Marks)
c. Describe
i) SONET/SDH frame formats
ii) SONET/SDH Rings (10 Marks)

Seventh Semester B.E. Degree Examination, Dec.09/Jan.10
Power Electronics

Time: 3 hrs.

Max. Marks:100

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

PART – A

1.
 - a. Explain the control characteristics of SCR and GTO with circuit diagrams and wave forms of control signal and output voltage. (08 Marks)
 - b. Explain in brief the different types of power electronic converter circuits and mention the type of input supply given and its related output in each case. Also indicate two applications in each case. (10 Marks)
 - c. What is secondary break down? (02 Marks)
2.
 - a. Compare an SCR with BJT. (06 Marks)
 - b. For the switching circuit shown in Fig. Q2(b) calculate :
 - i) The forced β of transistor
 - ii) The minimum ODF if the manufacturer specified β is 10
 - iii) The power loss P_T of the transistor. (06 Marks)

$$V_{CC} = 100V; V_B = 5V; R_B = 0.8 \Omega; R_C = 12\Omega; V_{CE(sat)} = 1.0 V; V_{BE(sat)} = 1.5 V.$$

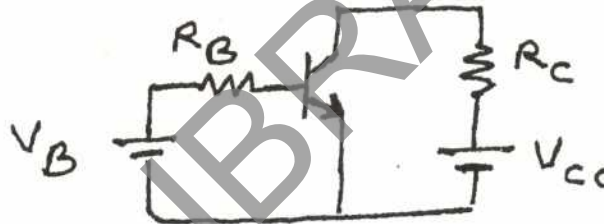


Fig. Q2(b)

- c. What is the need for isolation of gate drive circuits? Discuss the different methods of providing isolation of gate drive circuits from power circuit. (08 Marks)
3.
 - a. Explain the turn on mechanism of a thyristor using two transistor analogy and derive an expression for the anode current in terms of transistor parameters. (08 Marks)
 - b. In the thyristor circuit shown in Fig. Q3(b) the thyristor has a latching current of 20 mA and is fired by a gate pulse of width 50 μ s. Show that without the resistance R, the thyristor will fail to remain ON. Also find the maximum value of 'R' to ensure firing. (06 Marks)

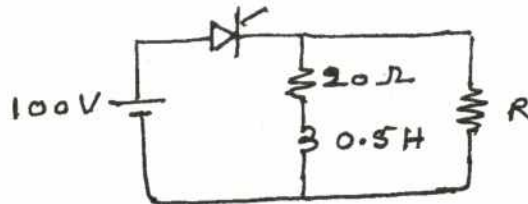


Fig. Q3(b)

- c. With relevant circuit diagram and wave forms, explain the UJT relaxation oscillator. (06 Marks)
4.
 - a. With a neat circuit diagram and wave forms explain the working of a single phase fully controlled converter with inductive load and continuous load current, also derive the expressions or average output voltage and rms output voltage. (12 Marks)
 - b. Give the comparison between circulating and non circulating current modes dual converter. (05 Marks)
 - c. What is the use of free wheeling diode in a converter circuit? (03 Marks)

PART – B

- 5 a. Explain the operation of impulse commutation with the relevant circuit diagram and waveforms. (08 Marks)
- b. The commutation circuit for SCR by resonating load is shown in Fig. Q5(b). Verify whether the SCR will be self commutated or not. If the SCR is self commutated, calculate the voltage of the capacitor at the time of commutation. (Assume the initial conditions $V_C(0^-) = I(0^-) = 0$). (08 Marks)

$$\begin{aligned} V &= 100 \text{ V} \\ R &= 10 \Omega \\ L &= 10 \text{ mH} \\ C &= 10 \mu\text{F} \end{aligned}$$

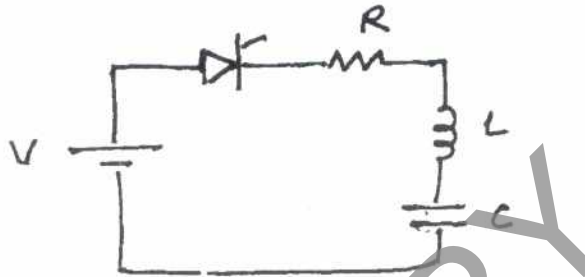


Fig. Q5(b)

- c. State the conditions under which a load carrying thyristor can be successfully commutated. (04 Marks)
- 6 a. Draw the circuit diagram of a single phase AC voltage controller and explain the principle of ON-OFF control, with the help of relevant wave forms. Derive the expression for rms output voltage in terms of rms supply voltage and duty cycle of the operation of the controller. (10 Marks)
- b. An AC voltage controller has a resistive load of 10Ω and rms input voltage 230 V , 50 Hz . The thyristor switch is ON for 25 cycles and OFF for 75 cycles. Determine
i) rms output voltage ii) input power factor. (06 Marks)
- c. Distinguish between ON-OFF control and phase control of AC voltage controller. (04 Marks)
- 7 a. Explain the principle of operation of a step up chopper with suitable circuit diagram and waveforms. Derive the expression for average output voltage of step up chopper. (10 Marks)
- b. Explain how the choppers are classified with reference to load voltage and load current. (06 Marks)
- c. A DC chopper has a resistive load of 20Ω and input voltage 220 V . When the chopper is ON its voltage drop is 1.5 V and chopping frequency is 10 KHz . If the duty cycle is 80% determine the average output voltage and rms output voltage. (04 Marks)
- 8 a. Explain the operation of single phase full bridge inverter with necessary circuit diagram and waveforms. Derive the expression for its rms value of output voltage. (10 Marks)
- b. Explain the performance parameters of inverters. (06 Marks)
- c. A single phase full bridge inverter has a resistive load of 2.4Ω and the DC input voltage of 48 V . Determine
i) rms output voltage at the fundamental frequency
ii) output power. (04 Marks)

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Seventh Semester B.E. Degree Examination, Dec.09-Jan.10
DSP Algorithms and Architecture

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, choosing atleast TWO questions from each part.

PART – A

- 1 a. Explain the decimation and interpolation process, with an example. (06 Marks)
 b. The sequence $x(n) = [0, 3, 6, 9]$ is interpolated using interpolation sequence $b_k = [\frac{1}{3}, \frac{2}{3}, 1, \frac{2}{3}, \frac{1}{3}]$ and the interpolation factor of 3. Find the interpolated sequence $y(m)$. (06 Marks)
 c. Describe the basic features that should be provided in the DSP architecture to be used to implement the N^{th} order FIR filter,

$$Y(n) = \sum_{i=0}^{N-1} h(i)x(n-i) ; n = 0, 1, 2, \dots$$

Where $x(n)$ denotes the input sample, $y(n)$ the output sample and $h(i)$ denotes i^{th} filter coefficient. (08 Marks)

- 2 a. Explain Baugh – Wooley multiplier for signed numbers. Show the multiplication operation for 4×4 signed multiplication. (06 Marks)
 b. What is meant by circular addressing mode? Write pointer updating algorithm for the circular addressing mode and show different cases that encounter during the updating process of the pointer. (06 Marks)
 c. Explain implementation of 8 – tap FIR filter, i) pipelined using eight MAC units and ii) parallel using two MAC units. Draw block diagrams. (08 Marks)
- 3 a. Compare architectural features of TMS320C25 and DSP56000 fixed point digital signal processors. (06 Marks)
 b. Write an explanatory note on direct addressing mode of TMS320C54XX processors. Give example. (06 Marks)
 c. Describe the operation of the following instructions of TMS320C54XX processors.
 i) $\text{MPY } *AR2, *AR4 + 0, B$ ii) $\text{MAC } *AR5 +, \#1234h, A$
 iii) $\text{STH } A, 1, *AR2$ iv) $\text{SSBX } \text{SXM}$. (08 Marks)
- 4 a. Explain the following assembler directives of TMS320C54XX processors. (06 Marks)
 i) .mmregs ii) .global iii) .include 'xx' iv) .data v) .end vi) .bss
 b. Describe Host Port interface and explain its signals. (06 Marks)
 c. Write an assembly language program of TMS320C54XX processors to compute the sum of three product terms given by the equation, $Y(n) = h_0 x(n) + h_1 x(n-1) + h_2 x(n-2)$ with usual notations. Find $y(n)$ for signed 16 bit data samples and 16 bit constants. (08 Marks)

PART – B

- 5 a. Determine the value of each of the following 16-bit numbers represented using the given Q – notations : i) 4400h as a Q0 number ii) 4400h as a Q7 number
 iii) 0.3125 as a Q15 number iv) -0.3125 as a Q15 number. (06 Marks)

- b. Write an assembly language program for TMS320C54XX processors to multiply two Q15 numbers to produce Q15 number result. (06 Marks)
- c. What is an interpolation filter? Explain the implementation of digital interpolation using FIR filter and polyphase subfilter. (08 Marks)
- 6 a. Determine the following for a 128 – point FFT computation : i) number of stages
ii) number of butterflies in each stage iii) number of butterflies needed for the entire computation iv) number of butterflies that need no twiddle factors v) number of butterflies that require real twiddle factors vi) number of butterflies that require complex twiddle factors. (06 Marks)
- b. Explain, how scaling prevents overflow conditions in the butterfly computation. (06 Marks)
- c. With the help of implementation structure, explain the FFT algorithm for DIT- FFT computation on TMS 320C54XX processors. Use $\frac{1}{4}$ as scale factor for all butterflies. (08 Marks)
- 7 a. Design a data memory system with address range 000800h – 000FFFh for a C5416 processor using $2K \times 8$ SRAM memory chips. (06 Marks)
- b. Explain an interface between an A/D converter and the TMS320C54XX processor in the programmed I/O mode. (06 Marks)
- c. Describe DMA with respect to TMS320C54XX processors. (08 Marks)
- 8 a. Explain PCM3002 CODEC, with the help of a neat block diagram. (06 Marks)
- b. Explain DSP – based biotelemetry receiver system, with the help of a block schematic diagram. (06 Marks)
- c. With the help of a block diagram, explain the image compression and reconstruction using JPEG encoder and decoder. (08 Marks)

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Seventh Semester B.E. Degree Examination, Dec.09/Jan.10
Image Processing

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1 a. What is digital image processing? Explain the fundamental steps in digital image processing. (10 Marks)
- b. How is image formed in an eye? Explain the importance of brightness adaptation and discrimination in image processing. (10 Marks)
- 2 a. Explain the concept of sampling and quantization of an image. (08 Marks)
- b. Explain :
i) False contouring ii) Checkerboard pattern (06 Marks)
- c. How is image acquired using a single sensor? Discuss. (06 Marks)
- 3 a. Explain any four properties of two-dimensional Fourier transforms. (08 Marks)
- b. Define two-dimensional unitary transform. Check whether the unitary DFT matrix is unitary or not for $N = 4$. (06 Marks)
- c. For the 2×2 transform A and the image U

$$A = \frac{1}{1} \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix} \quad \text{and} \quad U = \begin{bmatrix} 1 & 2 \\ 8 & 4 \end{bmatrix}$$
Calculate the transformed image V and the basis images. (06 Marks)
- 4 a. Construct Haar transform matrix for $N = 2$. (12 Marks)
- b. Explain the importance of discrete cosine transform, with its properties. (08 Marks)

PART – B

- 5 a. What is the importance of image enhancement in image processing? Explain in brief any two point processing techniques implemented in image processing. (10 Marks)
- b. Highlight the importance of histograms in image processing and develop a procedure to perform histogram equalization. (10 Marks)
- 6 a. Explain the basic concept of spatial filtering in image enhancement and hence explain the importance of smoothing filters and median filters. (10 Marks)
- b. Explain with block diagram, homomorphic filters in image enhancement. (10 Marks)
- 7 a. Explain the importance of image restoration process in image processing. Explain any four important noise probability density functions. (10 Marks)
- b. Discuss the importance of adaptive filters in image restoration system. Highlight the working of adaptive median filters. (10 Marks)
- 8 a. Write short notes on:
i) Wiener filtering ii) Inverse filtering (10 Marks)
- b. Write the steps involved in converting colours from RGB to HSI and vice-versa. (06 Marks)
- c. Explain pseudocolor image processing, in brief. (04 Marks)

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Seventh Semester B.E. Degree Examination, Dec.09/Jan.10
Real Time Systems

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer any FIVE full questions, selecting at least TWO questions from each part.
2. Missing data or figures may be suitably assumed.

PART – A

- 1 a. Define:
 - i) Real time system ; ii) Clock based system
 - iii) Event based system ; iv) Interactive system. (08 Marks)
- b. Differentiate :
 - i) Real time and non real time programming; ii) Hard and soft real time with examples. (06 Marks)
- c. Why real time programming is more difficult to verify than non real time programming? (02 Marks)
- d. Draw the block diagram of a generalized computer control system. (04 Marks)
- 2 a. List the advantages and disadvantages of DDC? (04 Marks)
- b. Explain briefly: i) Preprogrammed adaptive control ; ii) Self tuning adaptive control ; iii) Model reference adaptive control. (06 Marks)
- c. Compare batch processing and continuous processing. (04 Marks)
- d. Write a note on distributive system. (06 Marks)
- 3 a. Why is memory protection important in real time system? What methods can be used to provide memory protection? (04 Marks)
- b. Define: i) Asynchronous and synchronous transmission technique ; ii) Interrupt response vector ; iii) Polling. (06 Marks)
- c. Explain process related interface, with suitable examples. (10 Marks)
- 4 a. How do strong data typing contribute to the security of programming language? (06 Marks)
- b. Explain the approaches of application oriented software. (08 Marks)
- c. What is cutlass and what are the major requirements of cutlass? (06 Marks)

PART – B

- 5 a. Explain: i) Task chaining and swapping ; ii) Task overlaying. (07 Marks)
- b. Explain the task management system, with states of tasks. (07 Marks)
- c. Explain the scheduling policies. (06 Marks)
- 6 a. What is code sharing? Explain the serially reusable and reentrant code. (07 Marks)
- b. Explain the mutual exclusion using binary semaphore. (07 Marks)
- c. List the minimum set of operation that RTOS kernel need to support, with examples. (06 Marks)
- 7 a. Explain foreground and background systems, with flowchart. (10 Marks)
- b. How data will be shared with common memory? (05 Marks)
- c. Differentiate pool and channel. (05 Marks)
- 8 a. Explain Yourdon methodology. (05 Marks)
- b. Explain with relevant diagrams the Ward and Mellor method. (07 Marks)
- c. Write about the environmental model, with context diagram for drying oven. (08 Marks)

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06EC767

Seventh Semester B.E. Degree Examination, Dec.09-Jan.10
Human Resource Management

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each Part.

PART – A

- 1 a. Define HRM. What are its objectives and functions? (08 Marks)
b. Explain the terms : i) Strategic HRM ii) SWOT analysis. (06 Marks)
c. Bring out the differences between HRM and PM. (06 Marks)
- 2 a. List out the techniques of employee demand forecasting. Explain any one method. (08 Marks)
b. Explain the terms : i) Job description ii) Aptitude test (06 Marks)
c. Define recruitment. List out the internal and external factors governing the recruitment. (06 Marks)
- 3 a. Explain in brief, the steps involved in the selection procedure. (08 Marks)
b. "Selection is virtually a kind of elimination process". Comment. (06 Marks)
c. Explain the terms : i) Reference check ii) Stress interview. (06 Marks)
- 4 a. Explain why employee training is important. (06 Marks)
b. What is performance appraisal? What are its objectives? (06 Marks)
c. Discuss the internal and external factors influencing the employee remuneration. (08 Marks)

PART – B

- 5 a. Bring out the salient features of the incentive schemes, followed in industries. (06 Marks)
b. In a particular job, standard output is 100 units. Rate per unit is 1 Re. Under the Taylor's differential piece – rate system, calculate the earnings for an output of i) 120 units
ii) 90 units. (06 Marks)
c. Define fringe benefits. Bring out their importance. (08 Marks)
- 6 a. Define the term labour welfare. Bringout the arguments for and against labour welfare. (08 Marks)
b. Outline the role of a HR specialist in providing a safe and healthy environment for employees. (06 Marks)
c. Why is work stress caused? How can it be eliminated? (06 Marks)
- 7 a. Write a note on the trends in the trade union movement. (06 Marks)
b. Discuss the role of a HR manager in industrial relations. (06 Marks)
c. Give any one case study to illustrate unitary approach for industrial relations. (08 Marks)
- 8 a. Define the term ethics. Why is ethics important? (08 Marks)
b. Write a note on 'HR' professional as a change agent. (06 Marks)
c. Differentiate IHRM from domestic HRM. (06 Marks)

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