

**Code: DC61/DC110**  
**Subject: OPERATING SYSTEMS & SYSTEMS SOFTWARE**

**DiplETE – CS (Current & New Scheme)**

Time: 3 Hours

JUNE 2016

Max. Marks: 100

*PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.*

**NOTE: There are 9 Questions in all.**

- Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.
- The answer sheet for the Q.1 will be collected by the invigilator after 45 minutes of the commencement of the examination.
- Out of the remaining EIGHT Questions answer any FIVE Questions, selecting at least TWO questions from each Part. Each question carries 16 marks.
- Any required data not explicitly given, may be suitably assumed and stated.

**Q.1 Choose the correct or the best alternative in the following: (2×10)**

- a. Which of the following is not a language processor?  
 (A) Language translator (B) Preprocessor  
 (C) Language exporter (D) language migrator
- b. If the Disk head is located initially at 32, find the number of disk moves required with FCFS if the disk queue of I/O block requests are 98,37,14,124,65,67.  
 (A) 310 (B) 324  
 (C) 315 (D) 321
- c. Process cooperation in a Readers-and-Writers problem requires that the  
 (A) Writers always call two procedures  
 (B) Writers perform a Test-and-Set  
 (C) Readers always call two procedures  
 (D) Readers perform a Test-and-Set
- d. Bottom up parsing involves  
 (A) Shift reduce (B) Handle Pruning  
 (C) Operator Check (D) Both (A) and (B)
- e. Which of the following statement is not true in the context of memory allocation?  
 (A) Determine the amount of memory required to represent the value of a data item  
 (B) Use an appropriate memory allocation model to implement the lifetimes and scope of data items  
 (C) Determine appropriate memory mappings to access the values in a non-scalar data item.  
 (D) none of these
- f. If Round Robin is used with a time quantum of 1 second, the turnaround time for Job 2 will be

Job Number	CPU Time
1	1 hour
2	1 second
3	1 second

- (A) 1 second (B) 2 seconds  
 (C) 1 hour (D) 1 hour, 1 second

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- g. ....is the ability of multiple process to co-ordinate their activities by exchange of information  
 (A) Synchronization (B) Mutual Exclusion  
 (C) Dead lock (D) Starvation
- h. Which amongst the following is a valid page replacement policy?  
 (A) RU policy (Recurrently used)  
 (B) LRU policy (Least Recently Used)  
 (C) only (A)  
 (D) Both (A) and (B)
- i. Pool based allocation of memory achieves better usage. Memory can be preempted from inactive programs and used to accommodate active programs. This is called  
 (A) Preemption (B) Swapping  
 (C) Spooling (D) Scheduling
- j. What is the task of the PASS II in a two-pass assembler?  
 (A) separate the symbol, mnemonic opcode and operand fields.  
 (B) build the symbol table.  
 (C) construct intermediate code.  
 (D) synthesize the target program

**PART A**

Answer at least TWO questions. Each question carries 16 marks.

- Q.2** a. Identify the main functions of an operating systems and describe them briefly. Why is it called resource manager? (4)
- b. Discuss in brief about the functions of the multiprocessing supervisor. (4)
- c. Discuss the various reasons for high overheads of switching between processes. Explain, how it can be avoided using threads? (8)
- Q.3** a. Differentiate between preemptive and non-preemptive scheduling. State why strict non-preemptive scheduling is unlikely to be used in a computer centre? (6)
- b. Describe, in detail, Deadlock Detection Algorithm. (6)
- c. Define deadlock. Explain the conditions necessary for deadlock to occur. (4)
- Q.4** a. Define Critical Section. Also discuss the properties of critical section implementation. (6)
- b. Explain the use of a lock variable in semaphore implementation. (4)
- c. Discuss the different approaches used for non contiguous disk space allocation. (6)

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- Q.5** a. Discuss the two approaches used for merging free areas. (8)
- b. Consider a page reference string and its reference-time string for a program as given below:  
 page reference string: 1,1,2,1,1,1,3,1,3,...  
 reference time string:  $t_0, t_1, t_2, t_3, t_4, t_5, t_6, t_7, t_8, \dots$   
 Here page 1 was referenced at the logical time instants  $t_0, t_1, t_3, t_4, t_5$  and  $t_7$ .  
 Discuss and describe the performance of First-in-first-out (FIFO) page replacement policy and Least Recently Used (LRU) page replacement policy, when  $\text{alloc} = 2$ , where  $\text{alloc}$  refers to the number of page blocks i.e amount of memory available. (8)

**PART B**

Answer at least TWO questions. Each question carries 16 marks.

- Q.6** a. Discuss in detail, the classification of Grammars on the basis of productions used in them. Also discuss the characteristics and limitations of each type of the grammar. (8)
- b. Define hash function. Explain the different approaches used for collision handling in a hash table. (2+6)
- Q.7** a. Construct a parser table for an LL(1) parser for the given grammar  
 $E ::= T E'$   
 $E' ::= + T E' \mid \epsilon$   
 $T ::= V T'$   
 $T' ::= * V T' \mid \epsilon$   
 $V ::= \langle id \rangle$  (6)
- b. What do you understand by macro expansion? Write an algorithm to outline macro-expansion using macro-expansion counter. (6)
- c. Briefly explain the terms translated, linked and load time addresses. (4)
- Q.8** a. Define and describe the steps followed to design an assembler. (7)
- b. Explain the following assembler directives:  
 (i) ORIGIN  
 (ii) EQU  
 (iii) LTORG (3×3=9)
- Q.9** a. Differentiate between static and dynamic memory allocation methods. (6)
- b. Discuss briefly about the major issues involved in code generation for expressions. (4)
- c. Differentiate between call-by-value and call-by-reference parameter passing mechanisms. (6)