

Name: _____

Index No.: _____ /

2920/103

STRUCTURED PROGRAMMING

November 2015

Time: 3 hours

Candidate's Signature: _____

Date: _____



THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOGY

MODULE I

STRUCTURED PROGRAMMING

3 hours

INSTRUCTIONS TO CANDIDATES

Write your name and index number in the spaces provided above.

Sign and write the date of examination in the spaces provided above.

*Answer any **FIVE** of the **EIGHT** questions in this paper in the spaces provided after each question.*

Candidates should answer the questions in English.

For Examiner's Use Only

Question	1	2	3	4	5	6	7	8	Total Score
Candidate's Score									

This paper consists of 16 printed pages.

Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

1. (a) Describe *compilation* as used in programming. (2 marks)

- (b) Differentiate between *iteration* and *recursion* as used in programming. (4 marks)

- (c) Peter, a student in a college, was presented with the following ten numeric values: 56, 49, 70, 83, 23, 45, 67, 76, 55 and 37. He was asked to create a data structure that would allow him to have access to each value directly.

- (i) Identify the most appropriate data structure that he would create. (1 mark)

- (ii) Using the data structure in (i), write a C program that would display the data. (5 marks)

- (d) (i) Describe **two** items that could be added to a user manual in order to assist in the access of details and information. (4 marks)

- (ii) Explain **two** importance of documenting all the stages during program development. (4 marks)

2. (a) Write operators *order of precedence* for evaluating mathematical expressions as used in Pascal programming. (3 marks)

- (b) (i) David wrote a program with the seven days of a week declared as enumerated type in Pascal programming. Write **two** statements that would be used to generate a message "IT'S A WEEKDAY" if the day is not Sunday or Saturday in the program. (4 marks)

- (ii) Differentiate between *PRED* and *SUCC* predefined functions as applied in Pascal programming. (4 marks)

[illegible]

- (c) Write a C program that could print all numbers that are divisible by 9 from 1 to 99. Use *for* loop. (5 marks)

This image shows a single sheet of white paper with horizontal blue lines, similar to standard notebook paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

- (d) A student was given a computer program code to study. Outline **four** characteristics that he may use to ascertain that the program is written using structured programming language. (4 marks)

1. The first part of the document is a title page. It contains the title of the document, the author's name, and the date of the document. The title is "The first part of the document is a title page. It contains the title of the document, the author's name, and the date of the document." The author's name is "The author's name is the name of the person who wrote the document." The date of the document is "The date of the document is the date when the document was written." The title page is the first page of the document and it is used to provide information about the document to the reader.

3. (a) State four characters that are used for data conversion specification in C program input and output functions. (2 marks)

Blank manuscript page with horizontal ruling lines.

- (b) Explain **two** uses of a RESET function as used in Pascal programming language. (4 marks)

[illegible]

- (c) An ICT company intends to develop a new program. The team leader is faced with a challenge over which programming language to use. Explain **three** factors that the leader should consider when making a decision. (6 marks)

This image shows a single sheet of white paper with horizontal blue ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

- (d) Figure 1 shows a decision tree that was used by a programmer in a company to compute the discount offered to customers. Use it to answer the question that follows.

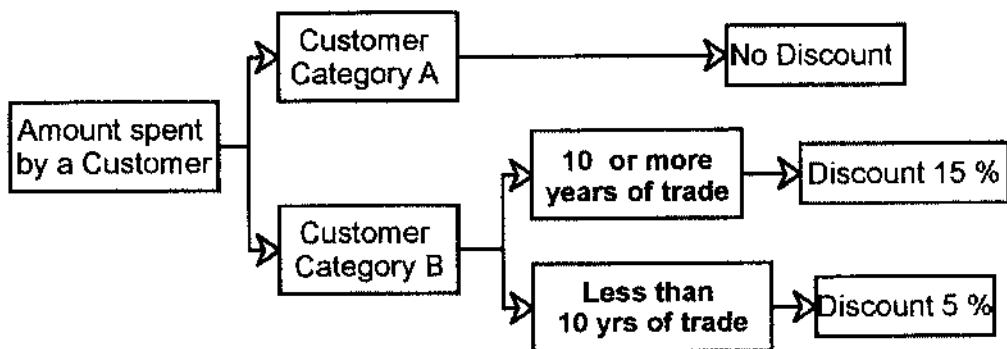


Figure 1

Write a Pascal program that prompts a user to enter the amount spent by the customer. The program then computes and displays the discount offered using the logic depicted in Figure 1. (8 marks)

Blank lined paper with horizontal ruling lines.

4. (a) Write the output of each of the following logical operators when executed using C programming language.

(i) !false (1 mark)

(ii) true && false (1 mark)

(iii) true || false (1 mark)

- (b) Given that $a=10$, $b=5$ and $c=2$ determine the values of x in each of the following statements as used in Pascal programming. Show your working:

(i) $x = 2 * a \bmod (b - 3) / \sqrt{c + 2}$ (2 marks)

(ii) $x = 2^c + \sqrt{a + 1} * c$ (2 marks)

- (c) Tom would like to use random file in his program:

(i) Outline **three** advantages of this file; (3 marks)

- (ii) Explain **two** limitations of this approach to file organization. (4 marks)

[illegible]

- (d) Jane, a programmer in a hospital was tasked to develop a program using Pascal programming language. The following data items are considered as input: *Patient name, patient age, gender F/M and amount paid.*

- (i) Identify the most appropriate data structure for this data. Justify your answer. (2 marks)

1. NAME _____ 2. ADDRESS _____ 3. CITY _____ 4. STATE _____ 5. ZIP _____ 6. PHONE _____ 7. DATE _____ 8. SIGNATURE _____ 9. PRINT NAME _____ 10. PRINT ADDRESS _____ 11. PRINT CITY _____ 12. PRINT STATE _____ 13. PRINT ZIP _____ 14. PRINT PHONE _____ 15. PRINT DATE _____ 16. PRINT SIGNATURE _____ 17. PRINT NAME _____ 18. PRINT ADDRESS _____ 19. PRINT CITY _____ 20. PRINT STATE _____ 21. PRINT ZIP _____ 22. PRINT PHONE _____ 23. PRINT DATE _____ 24. PRINT SIGNATURE _____ 25. PRINT NAME _____ 26. PRINT ADDRESS _____ 27. PRINT CITY _____ 28. PRINT STATE _____ 29. PRINT ZIP _____ 30. PRINT PHONE _____ 31. PRINT DATE _____ 32. PRINT SIGNATURE _____ 33. PRINT NAME _____ 34. PRINT ADDRESS _____ 35. PRINT CITY _____ 36. PRINT STATE _____ 37. PRINT ZIP _____ 38. PRINT PHONE _____ 39. PRINT DATE _____ 40. PRINT SIGNATURE _____ 41. PRINT NAME _____ 42. PRINT ADDRESS _____ 43. PRINT CITY _____ 44. PRINT STATE _____ 45. PRINT ZIP _____ 46. PRINT PHONE _____ 47. PRINT DATE _____ 48. PRINT SIGNATURE _____ 49. PRINT NAME _____ 50. PRINT ADDRESS _____ 51. PRINT CITY _____ 52. PRINT STATE _____ 53. PRINT ZIP _____ 54. PRINT PHONE _____ 55. PRINT DATE _____ 56. PRINT SIGNATURE _____ 57. PRINT NAME _____ 58. PRINT ADDRESS _____ 59. PRINT CITY _____ 60. PRINT STATE _____ 61. PRINT ZIP _____ 62. PRINT PHONE _____ 63. PRINT DATE _____ 64. PRINT SIGNATURE _____ 65. PRINT NAME _____ 66. PRINT ADDRESS _____ 67. PRINT CITY _____ 68. PRINT STATE _____ 69. PRINT ZIP _____ 70. PRINT PHONE _____ 71. PRINT DATE _____ 72. PRINT SIGNATURE _____ 73. PRINT NAME _____ 74. PRINT ADDRESS _____ 75. PRINT CITY _____ 76. PRINT STATE _____ 77. PRINT ZIP _____ 78. PRINT PHONE _____ 79. PRINT DATE _____ 80. PRINT SIGNATURE _____ 81. PRINT NAME _____ 82. PRINT ADDRESS _____ 83. PRINT CITY _____ 84. PRINT STATE _____ 85. PRINT ZIP _____ 86. PRINT PHONE _____ 87. PRINT DATE _____ 88. PRINT SIGNATURE _____ 89. PRINT NAME _____ 90. PRINT ADDRESS _____ 91. PRINT CITY _____ 92. PRINT STATE _____ 93. PRINT ZIP _____ 94. PRINT PHONE _____ 95. PRINT DATE _____ 96. PRINT SIGNATURE _____ 97. PRINT NAME _____ 98. PRINT ADDRESS _____ 99. PRINT CITY _____ 100. PRINT STATE _____ 101. PRINT ZIP _____ 102. PRINT PHONE _____ 103. PRINT DATE _____ 104. PRINT SIGNATURE _____ 105. PRINT NAME _____ 106. PRINT ADDRESS _____ 107. PRINT CITY _____ 108. PRINT STATE _____ 109. PRINT ZIP _____ 110. PRINT PHONE _____ 111. PRINT DATE _____ 112. PRINT SIGNATURE _____ 113. PRINT NAME _____ 114. PRINT ADDRESS _____ 115. PRINT CITY _____ 116. PRINT STATE _____ 117. PRINT ZIP _____ 118. PRINT PHONE _____ 119. PRINT DATE _____ 120. PRINT SIGNATURE _____ 121. PRINT NAME _____ 122. PRINT ADDRESS _____ 123. PRINT CITY _____ 124. PRINT STATE _____ 125. PRINT ZIP _____ 126. PRINT PHONE _____ 127. PRINT DATE _____ 128. PRINT SIGNATURE _____ 129. PRINT NAME _____ 130. PRINT ADDRESS _____ 131. PRINT CITY _____ 132. PRINT STATE _____ 133. PRINT ZIP _____ 134. PRINT PHONE _____ 135. PRINT DATE _____ 136. PRINT SIGNATURE _____ 137. PRINT NAME _____ 138. PRINT ADDRESS _____ 139. PRINT CITY _____ 140. PRINT STATE _____ 141. PRINT ZIP _____ 142. PRINT PHONE _____ 143. PRINT DATE _____ 144. PRINT SIGNATURE _____ 145. PRINT NAME _____ 146. PRINT ADDRESS _____ 147. PRINT CITY _____ 148. PRINT STATE _____ 149. PRINT ZIP _____ 150. PRINT PHONE _____ 151. PRINT DATE _____ 152. PRINT SIGNATURE _____ 153. PRINT NAME _____ 154. PRINT ADDRESS _____ 155. PRINT CITY _____ 156. PRINT STATE _____ 157. PRINT ZIP _____ 158. PRINT PHONE _____ 159. PRINT DATE _____ 160. PRINT SIGNATURE _____ 161. PRINT NAME _____ 162. PRINT ADDRESS _____ 163. PRINT CITY _____ 164. PRINT STATE _____ 165. PRINT ZIP _____ 166. PRINT PHONE _____ 167. PRINT DATE _____ 168. PRINT SIGNATURE _____ 169. PRINT NAME _____ 170. PRINT ADDRESS _____ 171. PRINT CITY _____ 172. PRINT STATE _____ 173. PRINT ZIP _____ 174. PRINT PHONE _____ 175. PRINT DATE _____ 176. PRINT SIGNATURE _____ 177. PRINT NAME _____ 178. PRINT ADDRESS _____ 179. PRINT CITY _____ 180. PRINT STATE _____ 181. PRINT ZIP _____ 182. PRINT PHONE _____ 183. PRINT DATE _____ 184. PRINT SIGNATURE _____ 185. PRINT NAME _____ 186. PRINT ADDRESS _____ 187. PRINT CITY _____ 188. PRINT STATE _____ 189. PRINT ZIP _____ 190. PRINT PHONE _____ 191. PRINT DATE _____ 192. PRINT SIGNATURE _____ 193. PRINT NAME _____ 194. PRINT ADDRESS _____ 195. PRINT CITY _____ 196. PRINT STATE _____ 197. PRINT ZIP _____ 198. PRINT PHONE _____ 199. PRINT DATE _____ 200. PRINT SIGNATURE _____ 201. PRINT NAME _____ 202. PRINT ADDRESS _____ 203. PRINT CITY _____ 204. PRINT STATE _____ 205. PRINT ZIP _____ 206. PRINT PHONE _____ 207. PRINT DATE _____ 208. PRINT SIGNATURE _____ 209. PRINT NAME _____ 210. PRINT ADDRESS _____ 211. PRINT CITY _____ 212. PRINT STATE _____ 213. PRINT ZIP _____ 214. PRINT PHONE _____ 215. PRINT DATE _____ 216. PRINT SIGNATURE _____ 217. PRINT NAME _____ 218. PRINT ADDRESS _____ 	
--	--

- (ii) Write segment codes in Pascal programming language to read data in the structure identified in (i). (4 marks)

[illegible]

5. (a) Explain the function of *default* statement in a C programming language. (2 marks)

- (b) With the aid of a flowchart, describe the REPEAT...UNTIL loop as used in Pascal programming. (4 marks)

- (c) (i) Outline **four** characteristics of assembly programming language. (4 marks)

- (ii) Explain **three** reasons for developing a computer program. (6 marks)

- (d) The following is a program written by a student using C programming language. The program could not run due to errors.

```
#include(stadio.h>
void main()
{
float i,j;
printf("input two integers');
fscanf("%d %f",&i,j);
Printf("\n addition=%d subtraction=%d\n" i+j, i-j);
}
```

Identify **eight** errors in the program.

(4 marks)

6. (a) Outline **two** similarities between a procedure and a function as used in programming. (2 marks)

- (b) Explain **three** typical errors that are likely to occur during file I/O operations in a program. (6 marks)

- _____
- _____
- _____
- _____
- _____

-
- This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There is no handwriting or other markings on the paper.

- _____
- _____
- _____
- _____
- _____

7. (a) Patrick, a programmer, developed a program for his client. Outline four ways that he could make the program easy to read and understandable. (4 marks)

[illegible]

- (b) Maria decided to use a compiler rather than an interpreter during program translation. Outline **four** reasons that could have led her to make this decision. (4 marks)

1	NAME	DATE
2	ADDRESS	
3	CITY	
4	STATE	
5	ZIP	
6	TELEPHONE	
7	AGE	
8	SEX	
9	RELIGION	
10	EDUCATION	
11	OCCUPATION	
12	INCOME	
13	PROPERTY	
14	VEHICLE	
15	OTHER	

- (c) A student is to develop a program that would prompt a user to enter two integers. The program should then compute the difference between the two integers. The program displays the results when it is positive, otherwise it displays the message “Negative Result”.
Write the pseudocode that the student would use to design this program. (5 marks)

[illegible]

(d) James, an ICT student, was given a program to write using Pascal programming language.

- (i) Outline the order in which he would declare the categories of variables in the program. (3 marks)

- (ii) Outline **four** rules that he should observe when composing the *identifiers* in the program. (4 marks)

8. (a) Cynthia tested a program and she encountered an error when she entered a zero value as input for a mathematical expression.

- (i) Describe the type of error that occurred. (2 marks)

- (ii) State the possible consequence when the error occurs. (1 mark)

- (b) Outline **two** functions of technical documentation in programming. (4 marks)

- (c) Outline the procedure that would be followed before performing each of the following in data structures:
- (i) Adding an element in a stack; (3 marks)
- (ii) Removing an element from a queue. (3 marks)
- (d) The interest accrued I for a principal amount P after period of time T at the rate R is given by the formula $I = P \times R \times T$.
Write a Pascal program that prompts a user to enter the principal amount in the main program and then pass this value to a procedure named *compute*. The procedure calculates the interest at a rate of 12% per annum for a period of 5 years. The procedure then returns the interest to main program for output. (7 marks)