NATIONAL OPEN UNIVERSITY OF NIGERIA
PLOT 91, CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESSWAY, JABI-ABUJA
FACULTY OF SCIENCES
DEPARTMENT OF COMPUTER SCIENCE
B. SC. COMPUTER SCIENCE PROGRAMME
2024_1 EXAMINATION

COURSE CODE: CIT 315	COURSE TITLE: OPERATING SYSTEMS
COURSE UNIT: 3	TIME: 2 HOURS 45 MINUTES
INSTRUCTION(S): ANSWER QUESTION ONE (1) AND ANY OTHER THREE (3) QUESTIONS	

Question One

(a) Given five (5) processes with Allocation, Max and Available resources (A, B, C, D) of multiple instances as seen in the table below:

Process ID	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P_0	2	0	0	1	4	2	1	2	3	3	2	1
P_1	3	1	2	1	5	2	5	2				
P_2	2	1	0	3	2	3	1	6				
P_3	1	3	1	2	1	4	2	4				
P_4	1	4	3	2	3	6	6	5				

    (i)   Find the Need Matrix. [3 Marks]

    (ii)   Is the system in a safe state? If yes, find safe sequence. [3 Marks]

    (iii)   If request from P_1 arrives for (1, 1, 0, 0), can the request be immediately granted?

(b) Discuss Process States. [5 Marks]

(c) Write an elaborate note the two scheduling schemes. [6 Marks]

(d) i. Describe software interrupt. [3 Marks]

    ii. Highlight five uses of interrupt. [5 Marks]

Question Two

(a) Explain the first fit, best fit, worst fit, and next fit memory allocation methods. [6 Marks]

(b) How is address translation performed in a paged memory system? [3Marks]

(c) i. Describe the memory segmentation technique. [3Marks]

    ii. What are the differences between paging and segmentation? [3 Marks]

Question Three

(a) Explain the concept of cache hit and cache miss. [5Marks]

(b) i. What are the main responsibilities of an interrupt handler? [3Marks]

SECURITIES	X	Y	Z
Standard deviation (%)	5	15	14
Correlation coefficient (%)	80	40	60
Proportion of amount invested (%)	30	30	40

The expected return on shares in general and on the basis of past return and inflationary expectation was estimated to be 20%. It is expected that the risk premium will be about 5%. The risk of the market as measured by its standard deviation is 8%. All the three securities lie on the Securities Market Line (SML).

You are required to prepare the following computations for a discussion with your client, as a prelude to your advice:

(i)   The expected portfolio return

(ii) The risk of the portfolio   **(15 marks)**

Question Three
CASE STUDY

Bamisoro Nigeria Limited is a fast growing profitable company. The company is based in Lagos and has just won a contract to supply gas to the State's Electricity Board. In this regard, the company planned to commission a 35-kilometre pipeline at a cost of ₦260m to enable it execute the contract. The pipeline, when installed, will carry the gas to an agreed location under the control of the State Electricity Board.

With all these arrangements in place, it is expected that the sales of the company will increase from the present ₦360m to about ₦1,100m.

The anticipated revenue from sales to the State's Electricity Board is expected to be ₦120m per annum.

Apart from this contract, the pipeline could also be used to transport Liquefied Natural Gas (LNG) to other willing customers in the suburb. The sales from this source are put at ₦80m per annum.

The management of Bamisoro Nigeria Limited considers the useful life of the pipeline to be 20 years. The financial manager estimates a profit to sales ratio of 20% per annum for the first 12 years and 17% per annum for the remaining life of the project.

The project is not likely to have any salvage value.

Bamisoro Nigeria Limited is located in a remote area hence would enjoy exemption from tax.

The company's cost of capital is 15%.

(a) You are required to distinguish between mutually exclusive investment and independent investment.

(b) Why is investment decision important to organizations and what techniques can be used to ensure that optimal investments are undertaken by firms?

(c) What is the project's payback period?

(d) Advise Bamisoro Nigeria Limited giving reasons as to the acceptability of the project based on the payback criterion.

(e) Compute the project's NPV and IRR.   **(15 marks)**