THE PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY
DEPARTMENT OF CIVIL ENGINEERING – THIRD YEAR DEGREE
FIRST SEMESTER EXAMINATION - 2022

CE 312 – CONSTRUCTION ENGINEERING

DATE: WEDNESDAY, 1 June 2022
ROOM: C001/ C004/5
TIME: 8:20 A.M.
DURATION: 3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Check that there are 4 different pages of this Examination Paper including cover page.
2. You have ten (10) minutes to read this Examination Paper.
3. This paper contains 5 questions. You are only allowed to answer any 4.
4. Write your name, student number and course on the front page of the answer booklet.
5. All answers must be written on the ANSWER SHEET provided. No other written material will be accepted.
6. Mobile phones, notes and notebooks are NOT allowed.

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DO NOT WRITE UNTIL YOU ARE TOLD TO START

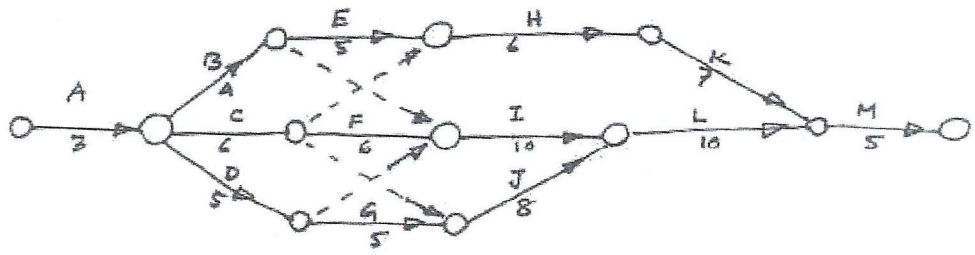
Question One: Project Planning

1. Clearly state and discuss the three stages of Project planning. (6mrks)
2. The following documents are applicable in Construction projects. Briefly describe each of them? (4mrks)
   I. Bill of Quantities.
   II. Conditions of Contract.

Question Two: Project Scheduling

1. Briefly discuss the following project scheduling techniques. (4mrks)
   I. Gantt or Bar Chart.
   II. Network scheduling.

2. Consider the network below. (6mrks)



   I. Draw Critical Path on the Network diagram.
   II. Calculate EST, LST, TF

Question Three: Line of Balance

1. Briefly discuss the Line of Balance technique. (2mrks)
2. Prepare a line of balance schedule for 15 houses based on a rate of build of three houses per week with five 8 hours per day and a minimum buffer of 4 days. The table below shows the operation together with the estimated man hours and optimum number of men for each operation. (8mrks)

Operations	Manhours	Optimum # of Men per operation
Substructure	180	6
Brickwork	320	4
Joiner 1st fix	200	4
Tilers	60	2
Glazing	40	2
Joiner 2nd fix	120	3
Electrician	80	2
Plumber	100	2
Painter	40	3

Question Four: Construction Risk and Constraints

1. State and discuss five ways contractors can reduce workplace accidents during construction phase. (5mrks)
2. Briefly discuss the importance of Triple constraints during Projects execution. (5mrks)

Question Five: Resource Allocation and Optimization

1. Clearly differentiate the techniques of resources optimization in Construction projects. (3mrks)
2. Consider a project with activities shown below. The preceding activity and the duration of the activities are given. The number of compressors required by each activity is also listed. The organization only has 6 compressors available with them. (7mrks)

Activity	Predecessors	Duration (days)	No of days compressors needed
A	-	3	6
B	A	2	1
C	B	5	5
D	B	4	2
E	C	9	4
F	C, D	2	4
G	E, F	1	6