

Project network questions in WA external exams from 1997 to 2019

One slide per year, starting in 1997

1

1997 Discrete Maths

QUESTION 16 [11 marks]

The following table contains information for a project to convert an old tram into a restaurant:

Activity	Activity Description	Immediate Predecessor(s)	Time in weeks
A	Purchase old tram and remodel interior	–	9
B	Purchase equipment	–	2
C	Hire and train staff	I, M	4
D	Select & purchase site	A	4
E	Prepare site	D	3
F	Obtain liquor licence	D	6
G	Move tram on to site	E	2
H	Connect electricity & water	G, F	3
I	Decorate interior	H, B	2
J	Stock bar & kitchen	I, M	5
K	Advertise	G, F	3
M	Install equipment	G, F	4
N	Run special openings by invitation	J, K, C	2

(a) Complete the project network below to show the above information: [3]

2

1998 Discrete

QUESTION 16 [11 marks]

The Inner City Players have decided to put on a production of the play *Romeo and Juliet*. They estimate that the preparation and staging of the play will involve the following activities:

Activity	Activity Description	Immediate Predecessor(s)	Time in days
A	Book rehearsal rooms	–	1
B	Advertise for actors	A	7
C	Hold auditions	B	2
D	Book theatre	B	1
E	Hold rehearsals	C	20
F	Construct theatre set	D	4
G	Hire/make costumes	C	7
H	Advertise play	D	10
I	Design and print tickets	D	3
J	Collect props	D	7
K	Arrange sound and lighting	D	2
L	Hold dress rehearsal	E, F, G, J, K	1
M	Perform play	H, I, L	7
N	Remove set and clean theatre	M	1

(a) Complete the project network below to show the above information. [3]

Multiple Edges x3

3

QUESTION 10 [12 marks]

(a) A small two bedroom house is being built. The building supervisor has listed the following activities:

Activity	Task	Predecessor	Days
A	Clearing of block	–	1
B	Cement pad laid and initial plumbing	A	3
C	Brick laying of walls	B	10
D	Utilities connected to block	A	1
E	Roof added	C	4
F	Electrical	D, E	3
G	Plumbing remaining	E	2
H	Plastering	F, G	5
I	Painting	H	3
J	Cupboards	H	1
K	Tiling	J	3
L	Cleanup/Driveway	I, K	1

(i) Draw the project network.

Multiple Edges

1999 Discrete

Multiple Edges

The corresponding project network is shown in the diagram below. The number attached to each activity is the time in minutes required to complete it.

4

2000 Discrete

QUESTION 2 [7 marks]

A high school is planning a drama production. The drama teacher has used a project network to help her with the planning of the production.

(a) Use the above project network to complete the "Immediate Predecessors" column in the table below.

Activity	Immediate predecessors	Time (Days)
A	-	2
B	A	5
C	B	2
D	C	4
E	A	3
F	E	1
G	F	7
H	G	4
I	F	3
J	I	3
K	H, I	2
L	K	2
M	J, L	4

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2001 Discrete

QUESTION 12 [8 marks]

(a) In the space below complete the project network that satisfies the following conditions. [4]

Activity	Immediate Predecessors	Time (days)
A	-	2
B	A	3
C	B	2
D	C	4
E	A	1
F	E	2
G	B	3
H	F, G	4
I	D	2
J	D	7
K	H, I	1
L	F, G	3
M	K, L	2
N	M, J	2

6

2002 Discrete

QUESTION 19 [10 marks]

Fôme Cafe aims to serve you a hot cup of coffee **within one minute** of your order being placed.

The times [in seconds] for the various steps are shown:

Step	Time	
A	Grind new coffee	5
B	Remove old coffee	5
C	Heat cups	30
D	Load new coffee	5
E	Place saucers on counter	5
F	Place cups in coffee machine	5
G	Express the coffee into cups	20
H	Place cups on saucers	10
I	Heat milk and foam	25
J	Add milk and foam	25
K	Add sugar, spoon and biscuit	5

The diagram below indicates the procedure which is now used when making a cup of white coffee:

Multiple Edges

7

2003 Discrete

16. [10 marks]

When a damaged car is to be repaired at a repair shop the following tasks (listed with their completion times) must be performed:

Activity	Time for Completion	
A	List the damage	2 hours
B	Panel beating stage 1	10 hours
C	Panel beating stage 2	12 hours
D	Remove damaged parts	5 hours
E	Order new parts	0.5 hours
F	Delivery time	15 hours
G	Replaced damaged parts	14 hours
H	Paint the car	8 hours
I	Road test	1 hour
J	Prepare the account	0.5 hours

The activities are to be completed in the following order

Activities B, D and E each directly follow A.
 Activity C directly follows B.
 Activity F directly follows E.
 Activity G directly follows D and F.
 Activity H directly follows C and G.
 Activities I and J each directly follow H.

Multiple Edges

8

2004
Discrete

9. [11 marks]

TASK	Immediate predecessor(s)	Time (minutes)
A	-	8
B	-	7
C	A	11
D	A	10
E	B	13
F	B	8
G	C	6
H	D,E	7
I	F	8
J	G,H,I	8

(a) In the space below complete the project network which satisfies the above conditions. [4]

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5. [11 marks]

The installation of a new production facility can be described by the following list of activities.

2005
Discrete

Activity	Immediate Predecessors	Duration (days)
A : Write specifications	-	10
B : Call for tenders (subcontractors)	A	2
C : Construction of facility exterior	A	15
D : Receipt and evaluation of tenders	B	5
E : Contracts for subcontractors	D	5
F : Construction of facility interior	C	5
G : Selection of equipment	E	3
H : Electrical installation	C	2
I : Install equipment	F, G, H	3
J : Testing and evaluation of the system	I	2
K : Fine tuning of the system	J	1
L : Acceptance of the system	K	1

Multiple Edges

(a) Draw the project network.

[3]

10

3. [3 marks]

Draw a fully-labelled project network for the project described by the following list of activities.

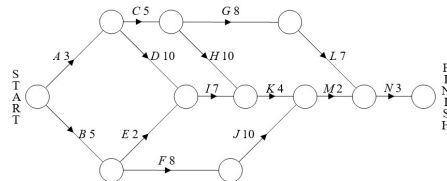
Activity	Immediate Predecessor(s)	Duration (days)
A	-	5
B	-	4
C	A	3
D	A	6
E	B	10
F	C	5
G	D	7
H	E	5
I	F, G	6
J	H	3
K	I, J	5
L	K	2

2006
Discrete

4. [8 marks]

The project network below displays a number of activities A, B, C, ..., N with the duration of each activity expressed in days.

Note: You do not need to find the critical path or minimal completion time

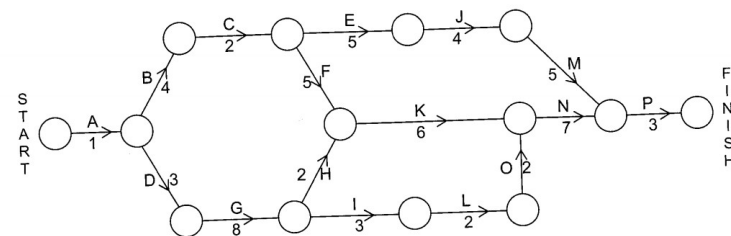


11

4. [8 marks]

The project network below displays a number of activities, A, B, C, ..., P, with the duration of each activity expressed in weeks.

2007
Discrete



(a) Write down the critical path. To obtain full marks, numbers must be added to the diagram above, showing that an appropriate method has been used. [2]

12

2008 Discrete 3. (9 marks)

The project network below displays a number of activities A, B, C, ..., P, with the duration of each activity expressed in days.

(a) Identify the critical path on the network diagram. To obtain full marks, numbers must be added to the diagram, showing that an appropriate method has been used. (3)

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2009 Last Discrete 8. (11 marks)

The project network for a processing operation is displayed below and involves a number of activities A, B, C, ..., Q, with the duration of each activity expressed in days.

(a) Write down the critical path. To obtain full marks, numbers must be added to the diagram above, showing that an appropriate method has been used. (3)

14

3AB Sample 2010

Question 4 (4 marks)

To assemble a computer desk from a kit requires various activities. These are shown in the following table, together with the number of minutes each activity takes and the order in which some of them must be done.

Activity	Duration (minutes)	Immediate predecessors
A: Assemble the drawer	40	—
B: Fix the legs to the desktop	20	—
C: Attach the drawer	20	A
D: Attach the printer shelf	20	B
E: Attach the scanner shelf	10	B
F: Attach the sockets	15	D, E
G: Wire up all of the fittings	30	C, F

(a) Complete the project network by labelling the other arcs. (1 mark)

Multiple Edges

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2010 3AB Maths

Question 7 (13 marks)

Activities A, B, C, ..., H are required to build a small extension to an existing house. The estimated completion times (weeks) for these activities are shown in the table below.

Activity	Completion time (weeks)	Predecessor(s)
A	2	—
B	3	—
C	4	B, A
D	4	B, A
E	8	C
F	6	D
G	2	E
H	3	F, G

Multiple Edges

16

2011 3AB

Question 19 (7 marks)

Sally wants to prepare and eat her breakfast in the minimum time. The activities involved, their immediate predecessors and the time taken to complete each activity is shown below.

	Activity	Immediate predecessors	Time taken (minutes)
F	Fill kettle	-	0.5
P	Put tea bag in cup	-	0.5
W	Boil water	F	10
G	Toast crumpets	-	7
D	Pour out cereal	-	0.5
O	Fetch and pour milk	D	0.5
M	Make tea	P, W	0.5
B	Butter crumpets	G	0.5
E	Eat cereal	O	3
T	Eat crumpets	E, B	5
C	Drink tea	M, T	3

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2012 3AB

Question 4 (7 marks)

A small airline running a shuttle service between the city and a large rural town wishes to minimise the time taken to 'turn the aircraft around' (the turnaround time) at each destination in order to maximise the number of flights each day. The table below lists all activities that must be carried out each time the aircraft lands in order for it to be ready for the next take-off.

	Activity	Time (minutes)
A	Engage gate	5
B	Passengers disembark	5
C	Service cabin	5
D	Passengers board	10
E	Unload cargo	12
F	Load cargo	12
G	Service toilets	10
H	Disengage gate	1
J	Push aircraft from gate position	3

Multiple Edges

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2013 3AB

Question 13 (6 marks)

The times for tasks A to G shown in the project network below are in days.

(a) Determine the critical path and the minimum completion time. (2 marks)

19

2014 3AB

Question 5 (9 marks)

(a) The project network below consists of 13 tasks, from task A to task M, with completion times in hours.

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2015 Last 3AB

Question 9 (10 marks)

A family decides to add a games room to their house. Details of this project are given in the table below.

Activity	Time (days)	Immediate Predecessor(s)
A	3	-
B	4	A
C	5	B
D	2	C
E	3	C
F	3	C
G	1	F
H	2	F
I	2	D, E, G

(a) Complete the project network below. (2 marks)

Multiple Edges

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Apps Sample 2016

Question 3 (4 marks)

Activities 'A', 'B', 'C' 'H' are required to build a small extension to an existing house. The estimated completion times (in weeks) for these activities are shown in the table below.

Activity	Completion time (weeks)	Predecessor(s)
A	2	-
B	3	-
C	4	B, A
D	4	B, A
E	8	C
F	6	D
G	2	E
H	3	F, G

(a) Complete the project network by labelling the arcs. (1 mark)

Solution

Multiple Edges

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Question 2 (7 marks)

A project consists of 11 activities, P to Z. The project network representing the scheduling of these activities is shown below. The times are in days.

2016 Applications

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2017 APPS

Question 11 (11 marks)

The following table, consisting of 11 activities, contains information for a project in a small manufacturing company.

Activity	Immediate Predecessors	Time (hours)
A	-	4
B	-	5
C	A	14
D	A	7
E	-	7
F	-	5
G	B, C	7
H	D	6
J	E, F	9
K	H, J	10
L	G, K	6

(a) Complete the project network below. (3 marks)

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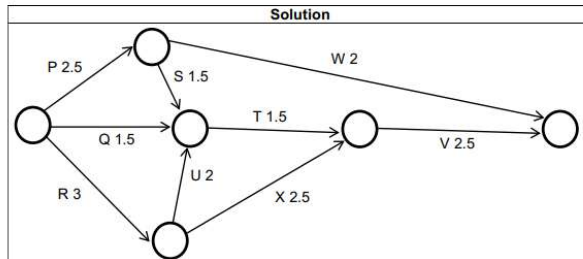
2018
APPS

Question 6 (11 marks)

Yana has booked three gardeners to landscape her garden. The table below shows the required activities, together with the times taken (in hours) and the immediate predecessors for each activity.

Activity	P	Q	R	S	T	U	V	W	X
Time (hours)	2.5	1.5	3	1.5	1.5	2	2.5	2	2.5
Immediate Predecessors	-	-	-	P	S, Q, U	R	T, X	P	R

(a) Complete the network diagram below, showing all tasks and durations. (3 marks)



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2019
APPS

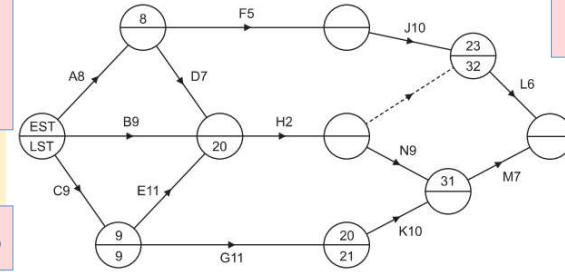
Question 5 (11 marks)

The network below represents a construction project. The number on each edge gives the time, in hours, to complete the activity. Each activity requires one worker.

First split vertices for EST and LFT

Mistaken use of LST?

First dummy edge



(a) Complete the precedence table below. (2 marks)

Activity	A	B	C	D	E	F	G	H	J	K	L	M	N
Time (hours)	8	9	9	7	11	5	11	2	10	10	6	7	9
Immediate predecessor	-	-	-	A	C	A	C	B, D, E					

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