PROGRAM	:	NATIONAL DIPLOMA *MINERAL SURVEYING*
SUBJECT	:	**MINERAL SURVEY 111**
CODE	:	**MSY 3111**
DATE	:	SUMMER EXAMINATION 21 NOVEMBER 2016
DURATION	:	(X & Y PAPER) 08:00 - 16:30
WEITHT	:	40:60
FULL MARKS	:	100
TOTAL MARKS	:	100
EXAMINER	:	MR D.N.WILSON
MODERATOR	:	MR D. RAE
NUMBER OF PAGES	:	5 PAGES
INSTRUCTIONS	:	ANY CALCULATORS ARE PERMITTED (STUDENTS ARE ALLOWED MORE THAN ONE CALCULATOR).
	:	STUDENTS ARE ALLOWED ANY REFERENCE MATERIAL (THIS IS AN OPEN BOOK EXAM).
	:	STUDENTS MAY USE THE COMPUTERS PROVIDED
	:	ALL ANSWERS MUST BE WRITTEN IN THE EXAMINATION SCRIPT – STEPS SHOULD BE SHOWN WHERE NECESSARY (WITH SKETCHES)
REQUIREMENTS	:	SUFFICIENT SPACE FOR REFERENCE MATERIAL

INSTRUCTIONS TO STUDENTS:

1.   ANSWER ALL THE QUESTIONS.

QUESTION 1

The following leveling traverses were carried out to determine the final elevations of four new leveling benchmarks (P), (Q), (R) and (S).

Given :

Line	Level traverse Number	Vertical Difference	Number of set-ups
[A] to (P)	1	+ 4,783 6 m	8
[A] to (R)	2	+ 2,402 5 m	4
[B] to (R)	3	- 1,003 2 m	6
[C] to (P)	4	- 1,519 3 m	15
[C] to (Q)	5	+ 3,674 1 m	28
[C] to (S)	6	+ 1,689 6 m	17
[C] to (R)	7	- 3,911 3 m	9
[D] to (R)	8	- 4,326 4 m	32
[D] to (S)	9	+ 1,274 5 m	14
[E] to (Q)	10	+ 1,390 3 m	22
[E] to (S)	11	- 0,591 4 m	7
(P) to (Q)	12	+ 5,202 1 m	18
(Q) to (S)	13	- 1,980 9 m	36
(S) to (R)	14	- 5,603 1 m	12
(R) to (P)	15	+ 2,382 4 m	16

Benchmark Number	Final Elevation
[A]	- 356,407 3 m
[B]	- 353,009 3 m
[C]	- 350,103 4 m
[D]	- 349,685 2 m
[E]	- 347,818 9 m

Calculate :

1.1   the final elevations of points (P), (Q), (R) and (S) by using a suitable least square adjustment method.

[20]

QUESTION 2

The following co-ordinates are known on two systems of co-ordinates.

The following **readings** (observations – un-orientated) were taken at an unknown point [P] in order to determine the Final co-ordinates of the unknown point [P].

	Set-up @ point [P] (before any adjustments)			
	Direct	Transit	Direct	Transit
R/O [D]	290°09'33"	110°09'44"	290°09'49"	110°09'46"
[B]	319°25'34"	139°25'28"	319°25'22"	139°25'26"
[F]	343°54'23"	163°54'27"	343°54'32"	163°54'29"
[G]	107°01'13"	287°01'19"	107°01'15"	287°01'17"
[E]	199°11'53"	19°11'52"	199°11'55"	19°11'57"
[C]	204°44'16"	24°44'22"	204°44'28"	24°44'19"
R/O [D]	290°10'13"	110°10'09"	290°10'02"	110°10'18"

Given :

	L.O. 29 ° E	
Point	Y (m)	X (m)
[B]	+ 84 513,476	+ 2 881 312,687
[C]	+ 82 995,607	+ 2 882 953,843
[D]	+ 83 926,298	+ 2 882 078,420
[E]	+ 82 959,324	+ 2 882 399,932
[F]	+ 85 287,934	+ 2 879 376,853
[G]	+ 78 877,417	+ 2 881 422,414

Calculate:

2.1   The provisional co-ordinates for point [P] by using the known points [C], [F] and [G]

2.2   The final co-ordinates of point [P] on L.O. 29° East by using a suitable least square adjustment method. **ALL the observed points** must be used in the calculation.

All the necessary corrections must be applied to obtain any marks for this question.

[40]

QUESTION 3

The following co-ordinates are known on two L.O. Systems of co-ordinates.

L.O. 27° East		Point	L.O. 29° East	
Y (m)	X (m)			
-99 808,780	+ 2 901 766,250	[613]	+ 100 057,780	+ 2 901 768,170
-98 134,180	+ 2 903 259,800	[603]		

Calculate
   3.1 the co-ordinates of point [603] on L.O. 29°East.

[20]

QUESTION 4

Goldfields		Point	L.O. 29 ° E	
Y (m)	X (m)		Y (m)	X (m)
+ 20 000,032	- 9 999,987	[B]	+ 84 513,489	+ 2 881 312,708
+ 18 347,549	- 11 505,944	[C]	+ 82 995,618	+ 2 882 953,865
+ 19 229,978	- 10 581,604	[D]	+ 83 926,287	+ 2 882 078,403
+ 18 901,302	- 11 546,267	[E]	+ 82 959,324	+ 2 882 399,932
+ 21 941,806	- 9 239,718	[F]	+ 85 287,905	+ 2 879 376,834
+ 15 984,529	- 12 751,076	[X]		

Calculate
   4.1 the co-ordinates of point [X] on L.O. 29° East.

[20]

TOTAL : 100