AN EXCEL TEMPLATE FOR PROCESSING EXAMINATION RESULTS FOR HIGHER INSTITUTIONS IN NIGERIA

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ABSTRACT:
In this work, we designed, developed and implemented an examination result processing template for all the Postgraduate programmes in the Faculty of Science, Kaduna State University, Kaduna. The designed template when fed in with data computes and grades students appropriately. Its design was done using the "IF" and "OR" logical functions. It was deployed and tested for the performance in terms of accuracy and speed, and as attested by the end users, it is excellent.

Keywords: MS Excel, "IF", "OR", Template, Examination, Grade, GPA

INTRODUCTION

The MS Excel is a very fascinating and useful package. It gives a platform for various solutions to numerous life problems. It contains modules that are user-friendly and works perfectly well such that their performances have shown high degree of accuracy and precision. Modern spreadsheet software, such as MicrosoftExcel, can transform the use of statistics inbiology. Instead of being difficult to do and tointerpret, statistical tests become simple to doand much easier to interpret (Millar, 2001). MS Excel is the most commonly used spreadsheet, and has now grown into a more powerful softwarethat can be usedvirtually by all branches of science and engineering (El-Gebeily&Yushau,2007).

In this work, we explored the usage of the logical "IF" and "OR" statement contained in the function library of MS Excel. The function was used to develop and implement an operational package for the computation of the Postgraduate examinations results for Faculty of Science, Kaduna State University, Kaduna. We adopted the Nigerian Universities Commission's grading systems for all our computations.
The IF statement is a simple function in MS Excel that is one of the building blocks we need when we are working with large spreadsheets. The "IF" function is one of the most popular and useful functions in Excel, we use the "IF" function to ask MS Excel to test a condition and to return one value if the condition is met, and another value if the condition is not met. Similarly, the MS Excel "OR" function is a basic logical function that is used to compare two values or statements (Cheusheva, *2014*).

The two functions "IF" and "OR" were integrated to come up with the examination results processing template.

MATERIALS AND METHODS
The "IF" Function
The "IF" function is one of MS Excel's logical functions that evaluates a certain condition and returns the value specified if the condition is TRUE, and another value if the condition is FALSE.
The syntax for MS Excel **IF** is as follows (ibid):
IF(logical_test, [value_if_true], [value_if_false])
Specifically, the IF function has 3 arguments, but only the first one is obligatory, the other two are optional.

- ➢ **logical_test** - a value or logical expression that can be either TRUE or FALSE {Required}. In this argument, you can specify a text value, date, number, or any comparison operator.
- ➢ **value_if_true** - the value to return when the logical test evaluates to TRUE, i.e. if the condition is met {Optional}.
- ➢ **value_if_false** - the value to be returned if the logical test evaluates to FALSE, i.e. if the condition is not met {Optional}.

Though the last two parameters of the IF function are optional, the formula may produce unexpected results if we do not know the underlying logic beneath the hood.

(1)   If value_if_true is omitted: If the value_if_true argument is omitted in our MS Excel IF formula (i.e. there is only a comma following logical_test), the IF function returns zero (0) when the condition is met.

If we do not want our IF formula to display any value when the condition is met, enter double quotes ("") in the second parameter, like this: =IF(B1>10, "", "Bad"). Technically, in this case the formula returns an empty string, which is invisible to the user but perceivable to other MS Excel functions.

(2)   If value_if_false is omitted: Ifwe do not care what happens if the specified condition is not met, we can omit the third parameter in our MS Excel IF formulas, which will result in the following:

If the logical test evaluates to FALSE and the value_if_false parameter is omitted (there is just a closing bracket after the value_if_true argument), the IF function returns the logical value FALSE.

If we put a comma after the value_if_true argument, our IF function will returns 0, which doesn't make much sense either, the most reasonable approach is to put "" in the third argument, in this case we will have empty cells when the condition is not met.

(3)   Get the IF function to display logical values TRUE or FALSE: If we want our MS Excel IF formula to display the logical values TRUE and FALSE when the specified condition is met and not met, respectively, type TRUE in the value_if_true argument. The value_if_false parameter can be FALSE or omitted.

If we want our IF formula to return TRUE and FALSE as the **logical values** (Boolean) that other MS Excel formulas can

recognize, we make sure not to enclose them in double quotes. A visual indication of a Boolean is middle align in a cell.

If we want to "TRUE" and "FALSE" to be usual text values, enclose them in "double quotes". In this case, the returned values will be aligned left and formatted as General. No Excel formula will recognize such "TRUE" and "FALSE" text as logical values.

(4)   Get IF to perform a math operation and return a result: Instead of returning certain values, we can make our IF formula to test the specified condition, perform a corresponding math operation and return a value based on the result. We do this by using arithmetic operators or other MS Excel functions in the value_if_true and/or value_if_falsearguments.The use of the IF function with numeric values is based on using different comparison operators to express our conditions. Table 1 below shows list of logical operators illustrated with formula examples.

Table 1: List of Logical Operators with Formula Examples

Condition	Operator	Formula Example	Description
Greater than	>	=IF(A2>5, "OK",)	If the number in cell A2 is greater than 5, the formula returns "OK"; otherwise 0 is returned.
Less than	<	=IF(A2<5, "OK", "")	If the number in cell A2 is less than 5, the formula returns "OK"; an empty string otherwise.
Equal to	=	=IF(A2=5, "OK", "Wrong number")	If the number in cell A2 is equal to 5, the formula returns "OK"; otherwise the function displays "Wrong number".
Not equal to	<>	=IF(A2<>5, "Wrong number", "OK")	If the number in cell A2 is not equal to 5, the formula returns "Wrong number "; otherwise - "OK".
Greater than or equal to	>=	=IF(A2>=5, "OK", "Poor")	If the number in cell A2 is greater than or equal to 5, the formula returns "OK"; otherwise - "Poor".
Less than or equal to	<=	=IF(A2<=5, "OK", "")	If the number in cell A2 is less than or equal to 5, the formula returns "OK"; an empty string otherwise.

(Source:https://www.ablebits.com/)

The "OR" Function
Microsoft Excel provides 4 logical functions to work with the logical values. The functions are AND, OR, XOR and NOT. We use these functions when we want to carry out more than one comparison in our formula, or test multiple conditions instead of just one. As well as logical operators, MS Excel logical functions return either TRUE or FALSE when their arguments are evaluated.

Table 2: Short Summary of the logical functions "AND","OR","XOR","NOT"

Function	Description	Formula Example	Formula Description
AND	Returns TRUE if all of the arguments evaluate to TRUE.	=AND(A2>=10, B2<5)	The formula returns TRUE if a value in cell A2 is greater than or equal to 10, and a value in B2 is less than 5, FALSE otherwise.
OR	Returns TRUE if any argument evaluates to TRUE.	=OR(A2>=10, B2<5)	The formula returns TRUE if A2 is greater than or equal to 10 or B2 is less than 5, or both conditions are met. If neither of the conditions it met, the formula returns FALSE.
XOR	Returns a logical Exclusive Or of all arguments.	=XOR(A2>=10, B2<5)	The formula returns TRUE if either A2 is greater than or equal to 10 or B2 is less than 5. If neither of the conditions is met or both conditions are met, the formula returns FALSE.
NOT	Returns the reversed logical value of its argument. I.e. If the argument is FALSE, then TRUE is returned and vice versa.	=NOT(A2>=10)	The formula returns FALSE if a value in cell A1 is greater than or equal to 10; TRUE otherwise.

(Source:https://www.ablebits.com/)

The MS Excel OR function is a basic logical function that is used to compare two values or statements. The "OR" function returns TRUE if at least one of the arguments evaluates to TRUE, and returns FALSE if all arguments are FALSE. The "OR" function is available in all versions of Microsoft Excel 2013 - 2000.The syntax of the MS Excel "OR" function is:

OR(logical1, [logical2], ...)

The Model: Algorithm and Flow Chart of Our Model

Step 1 -   Set the total value of credit units registered, say tcur, to zero. That is, tcur = 0.

Step 2 -   Set the total value of credit units earned, say tcue, to zero, i.e.tcue = 0

Step 3 -   Set the total grade points, say tgp, to zero, i.e. tgp = 0.

Step 4 -   Set remark to be an empty string, i.e. remark = ""
Get result for 1st course

Step 5 -   Input score, say s
Next, test the score entered to determine whether the course has been registered, registered but was absent or registered but was present by the student.

Step 6 -   If (s = "x") then
Course not registered by student
Set the grade to be blank, i.e.
grade = ""
tcur = tcur + 0

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Else
Course registered by student
If (s = "-") then
Student wasabsentfor the course, thus cue=0 and gp=0
Set grade to ABS, i.e. grade = "ABS"
tcur = tcur + cu
remark = remark + ccode
Else if (s <50) then
Student failed the course, thus cue=0 and gp=0
Set grade to F, i.e. grade = "F"
tcur = tcur + cu
remark = remark + ccode
Else
Student passed the course
tcur = tcur + cu
tcue = tcue + cu
If (s >= 70) then
Setthe value of grade to A, i.e. grade = "A"
gp = cu * 5
Else if (s>=60) then
Setthe value of grade to B, i.e. grade = "B"
gp = cu * 4
Else
Setthe value of grade to C, i.e. grade = "C"
gp = cu * 3
End if
tgp = tgp + gp
End if
End if
Get results for next course and repeat the steps 5 and 6 above. Repeat same for all courses available for the programme, after which the correct gpa will be computed as shown on the next step 7.
Step 7   gpa = tgp/tcur
Step 8 -   cgpa = gpa
Next, test to find out whether the student has passed all his/her registered courses. The value "Passed" will be displayed under remarks if he/she has passed all registered courses otherwise the courses failed will be displayed as remarks.
Step 9 -   If (remark = "") then remark = "Passed"
Step 10 -   Finally display results for each student as requested such as the tcur, tcue, tcp, gpa, remarks/carryover for current, previous and cumulative.

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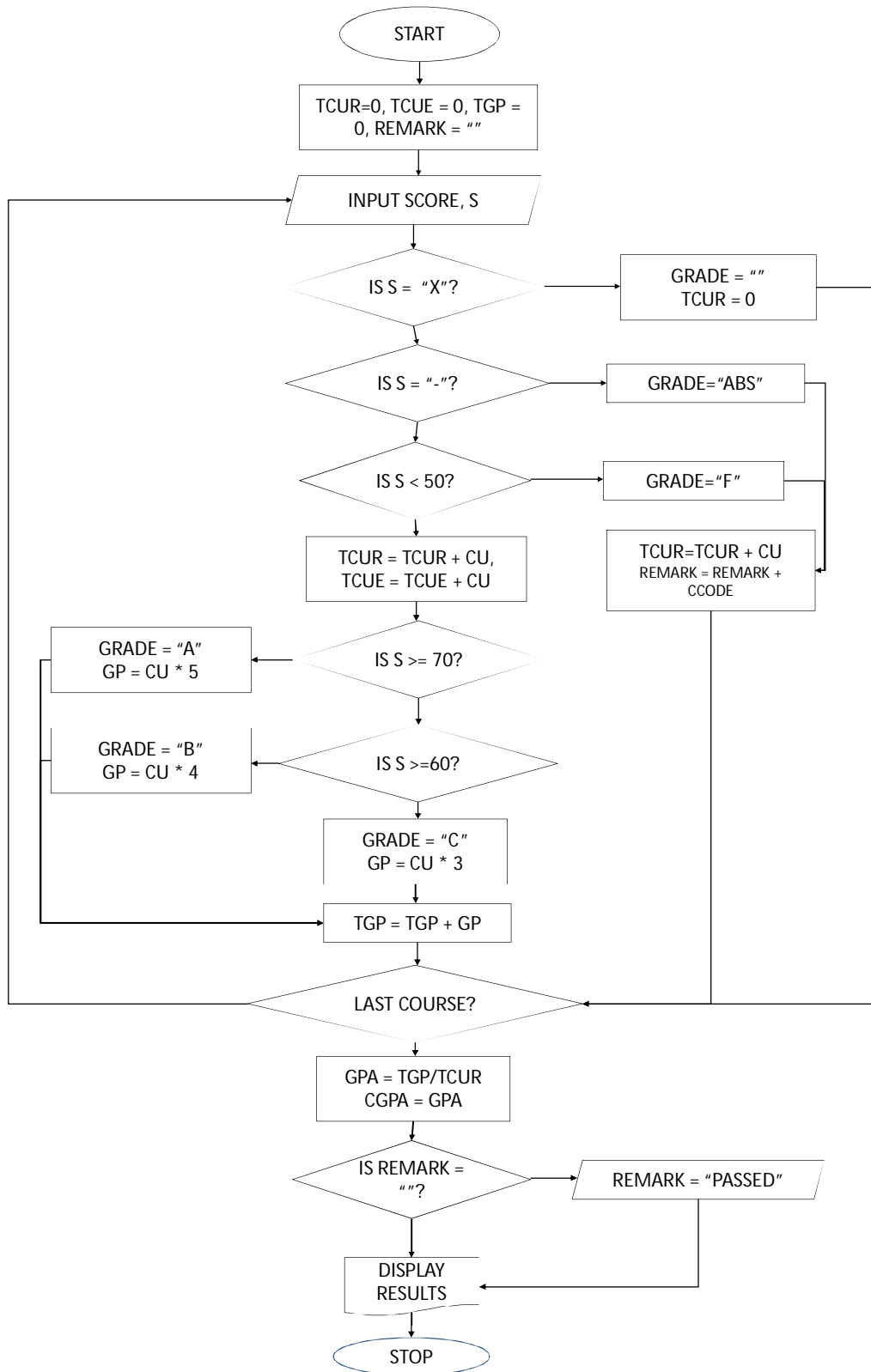
Fig.1: Flow Chart of the PG Examination Results Template

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The Nigerian Universities Commission (NUC) Grade System

The NUC is the regulatory agency for University education in Nigeria. The grading system as highlighted in the Benchmark Minimum Academic Standards (BMAS) for Postgraduate programmes in Nigeria (NUC, 2011) is as stated below.

a) The minimum pass mark in any course shall be 50%.

b) Grading of courses shall be done by a combination of percentage marks and letter grades translated into a graduated system of Grade Point Equivalents (GPE). For the purpose of determining a student's standing at the end of every semester, the Grade Point Average (GPA) system shall be used. The GPA is computed by dividing the total number of credit points (TCP) by the total number of units (TNU) for all the courses taken in the semester. The credit point for a course is computed by multiplying the number of units for the course by the Grade Point Equivalent of the marks scored in the course.

c) Each course shall be graded out of a maximum of 100 marks and assigned appropriate Grade Point Equivalent as in the following table 3:

Table3: Grade Placement for Examination Raw Scores

Credit Units	% Scores	Letter Grades	Grade Points (GP)
Vary according to contact hours assigned to each course per week per semester, and according to load carried by students.	70 – 100 60 - 69 50 - 59 0 – 49	A B C F	5 4 3 0

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RESULTS

Arbitrary marks were inputted to generate tables 4A, 4B, 5A and 5B; the template was actually tested with live data without encountering any problem.

Table 4A: First Semester Students' Results by Courses Registered

KADUNA STATE UNIVERSITY

DEPARTMENT OF BIOLOGICAL SCIENCES, FACULTY OF SCIENCE

Master of Science in Biology First Semester 2014/2015 Academic Session Results

			FIRST SEMESTER																							
			SCI801		BIO801		BIO803		BIO805		BIO807		BIO809		BIO811		BIO813		BIO815		ENV805		FSH801		FSH807		
SN	REGISTRATION NO.	NAME	MARK	GRADE	MARK	GRADE	MARK	GRADE	MARK	GRADE	MARK	GRADE	MARK	GRADE	MARK	GRADE	MARK	GRADE	MARK	GRADE	MARK	GRADE	MARK	GRADE	MARK	GRADE	Remark
1	KASU/MSC/BOP/14/1001	STUDENT'S NAME NO 1	50	C	50	C	50	C	50	C	50	C	50	C	50	C	50	C	50	C	50	C	20	F	20	F	FSH807,
2	KASU/MSC/BOP/14/1002	STUDENT'S NAME NO 2	50	C	50	C	50	C	50	C	50	C	50	C	50	C	50	C	50	C	50	C	80	A	90	A	Passed
3	KASU/MSC/BOP/14/1003	STUDENT'S NAME NO 3	70	A	70	A	80	A	90	A	X		67	B	50	C	x		x		78	A	56	C	43	F	FSH807,
4	KASU/MSC/BOP/14/1004	STUDENT'S NAME NO 4	60	B	48	F	53	C	35	F	50	C	57	C	69	B	X		70	A	X		54	C	13	F	BIO801, BIO805, FSH807,
5	KASU/MSC/BOP/14/1005	STUDENT'S NAME NO 5	60	B	60	B	60	B	60	B	60	B	60	B	60	B	60	B	60	B	X		X		X		Passed
6	KASU/MSC/BOP/14/1006	STUDENT'S NAME NO 6	90	A	85	A	75	A	X		78	A	X		88	A	79	A	X		72	A	77	A	70	A	Passed

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Table 4B: Results Computation from Table 4A.

S/NO	REGISTRATION NO.	NAME	CURRENT				PREVIOUS				CUMMULATIVE				REMARKS/CARRY OVER
			TCUR	TCUE	TCP	GPA	TCUR	TCUE	TCP	GPA	TCUR	TCUE	TCP	GPA	
1	KASU/MSC/BOP/14/1001	STUDENT'S NAME NO 1	36	33	99	2.75	0	0	0	0.00	36	33	99	2.75	FSH807,
2	KASU/MSC/BOP/14/1002	STUDENT'S NAME NO 2	36	36	120	3.33	0	0	0	0.00	36	36	120	3.33	Passed
3	KASU/MSC/BOP/14/1003	STUDENT'S NAME NO 3	27	24	105	3.89	0	0	0	0.00	27	24	105	3.89	FSH807,
4	KASU/MSC/BOP/14/1004	STUDENT'S NAME NO 4	30	21	75	2.50	0	0	0	0.00	30	21	75	2.50	BIO801, BIO805, FSH807,
5	KASU/MSC/BOP/14/1005	STUDENT'S NAME NO 5	27	27	108	4.00	0	0	0	0.00	27	27	108	4.00	Passed
6	KASU/MSC/BOP/14/1006	STUDENT'S NAME NO 6	27	27	135	5.00	0	0	0	0.00	27	27	135	5.00	Passed

Table 5A: Second Semester Students' Results by Courses Registered

KADUNA STATE UNIVERSITY

DEPARTMENT OF BIOLOGICAL SCIENCES

Master of Science in Biology Second Semester 2014/2015 Academic Session Results

S/N	REG. NO.	NAME	SCI 801 MARK	SCI 801 GRADE	BIO 801 MARK	BIO 801 GRADE	BIO 803 MARK	BIO 803 GRADE	BIO 805 MARK	BIO 805 GRADE	BIO 807 MARK	BIO 807 GRADE	BIO 809 MARK	BIO 809 GRADE	BIO 811 MARK	BIO 811 GRADE	BIO 813 MARK	BIO 813 GRADE	BIO 815 MARK	BIO 815 GRADE	ENV 805 MARK	ENV 805 GRADE	FSH 801 MARK	FSH 801 GRADE	FSH 807 MARK	FSH 807 GRADE	SCI 802 MARK	SCI 802 GRADE	BIO 802 MARK	BIO 802 GRADE	BIO 892 MARK	BIO 892 GRADE	BIO 804 MARK	BIO 804 GRADE	BIO 824 MARK	BIO 824 GRADE	ENV 826 MARK	ENV 826 GRADE	FSH 828 MARK	FSH 828 GRADE	FSH 830 MARK	FSH 830 GRADE	FSH 832 MARK	FSH 832 GRADE	Remark
																													FIRST SEMESTER												**SECOND SEMESTER**															
1	KASU/MSC/BOP/14/1001	STUDENT'S NAME NO 1	50	C	50	C	50	C	50	C	50	C	50	C	50	C	50	C	50	C	50	C	57	C	20	F	50	C	65	B	71	A	65	B	60	B	87	A	76	A	72	A	1	ABS	FSH807, FSH832,
2	KASU/MSC/BOP/14/1002	STUDENT'S NAME NO 2	50	C	50	C	50	C	50	C	50	C	50	C	50	C	50	C	50	C	50	C	80	A	90	A	50	C	50	C	50	C	50	C	50	C	50	C	50	C		X		X	Passed

		2																																									
3	KASU/MSC/BOP/14/1003	STUDENT'S NAME NO 3	70		70	A	80	A	90	A	x		67	B	50	C	x		x		78	A	56	C	43	F	70	A	49	F	67	B	82	A	50	C	54	C	67	B	X	X	FSH807, BIO802
4	KASU/MSC/BOP/14/1004	STUDENT'S NAME NO 4	60	B	48	F	53	C	35	F	50	C	57	C	69	B	X		70	A	X		54	C	13	F	40	F	54	C	56	C	78	A	X	55	C	X	77	A	98	A	BIO801, BIO805, FSH807, SCI802
5	KASU/MSC/BOP/14/1005	STUDENT'S NAME NO 5	60	B	60	B	60	B	60	B	60	B	60	B	60	B	60	B	X	X	X		60	B	65	B	62	B	63	B	X		61	B	X		62	B	X	Passed
6	KASU/MSC/BOP/14/1006	STUDENT'S NAME NO 6	90	A	85	A	75	A	X	78	A	X	88	A	79	A	X	72	A	77	A	70	A	85	A	72	A	76	A	80	A	70	A	X	72	A	X	86	A	Passed

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Table 5B: Results Computation from Table 5A.

			CURRENT				PREVIOUS				CUMMULATIVE				
KADUNA STATE UNIVERSITY															
DEPARTMENT OF BIOLOGICAL SCIENCES															
Master of Science in Biology Second Semester 2014/2015 Academic Session Results															
S/N	**REGISTRATION NO.**	**NAME**	**TCUR**	**TCUE**	**TCP**	**GPA**	**TCUR**	**TCUE**	**TCP**	**GPA**	**TCUR**	**TCUE**	**TCP**	**GPA**	**REMARKS/C ARRY OVER**
1	KASU/MSC/BOP/14/100 1	STUDENT'S NAME NO 1	30	27	120	4.00	36	33	99	2.75	66	60	219	3.32	Fail
2	KASU/MSC/BOP/14/100 2	STUDENT'S NAME NO 2	24	24	72	3.00	36	36	120	3.33	60	60	192	3.20	Merit
3	KASU/MSC/BOP/14/100 3	STUDENT'S NAME NO 3	24	21	84	3.50	27	24	105	3.89	51	45	189	3.71	Fail
4	KASU/MSC/BOP/14/100 4	STUDENT'S NAME NO 4	24	21	81	3.38	30	21	75	2.50	54	42	156	2.89	Fail
5	KASU/MSC/BOP/14/100 5	STUDENT'S NAME NO 5	21	21	84	4.00	27	27	108	4.00	48	48	192	4.00	Credit
6	KASU/MSC/BOP/14/100 6	STUDENT'S NAME NO 6	24	24	120	5.00	27	27	135	5.00	51	51	255	5.00	Distinction

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DISCUSSION
The major components of the templates, which are (a) grading of the student's score; (b) computations of the credit units registered/credit units earned/credit points/grade point average/diploma or degree classification, were adequately captured and implemented as could be seen from results in tables 4A, 4B, 5A and 5B.All the computations were done in accordance with Table3.

The template was deployed and used for the computation of the first semester (2014/2015 session) examination results in all the Post Graduate programmes in the Faculty of Science, Kaduna State University; and it performed perfectly well.

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