GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	:	**DIPLOMA IN EE/EC/IT/CM**
LEVEL NAME	:	**BASIC SCIENCE COURSES**
COURSE CODE	:	**MH203E**
COURSE TITLE	:	**APPLIED MATHEMATICS**
PREREQUISITE	:	**MH201E**
TEACHING SCHEME	:	**TH:04; TU: 01;PR: 00**(CLOCK HRs.)
TOTAL CREDITS	:	**05** (1 TH/TU CREDIT = 1 CLOCK HR, 1PR CREDIT = 2 CLOCK HRs)
TH. TEE EXAM.	:	**03 HRs**
PR. TEE EXAM	:	**NIL**
PT. EXAM	:	**01 HR**

❖ **RATIONALE:**

Mathematics is the backbone of Technical courses, Understanding of engineering concepts require logical approach and thinking. The course is extension of Engineering Mathematics of first semester and stepping into the prerequisites to learn Calculus and Numerical method. Applied Mathematics lay down the foundation to understand and express principles and laws involved in other Technological subjects.

❖ **COURSE OUTCOMES:**

After completing this course students will be able to–

1. Applymathematical term, concept, principles and different methods for studying engineering subjects.
2. Apply mathematical methods to solve technical problems.
3. Execute management plans with precision.
4. Use mathematical techniques necessary for daily practical problems.
5. Apply concept of extrema in finding maximum profit of production and minimum cost or material needed for production of an article.
6. Apply various numerical method to solve algebraic and simultaneous equations.

❖ **COURSE DETAILS:**

A. THEORY:

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
1. Functions andLimits	1. Identify various types of functions. 2. Define odd and even function. 3. Find value of any given function. 4. Find limits for all different functions.	1.1 Definition of function, value of a function. 1.2 Types of functions. 1.3 Concept of limit. 1.4 Algebra of limits. 1.5 Limits of algebraic functions. 1.6 Limits of trigonometric functions. 1.7 Limits of exponential & logarithmic functions.	10
2. Derivatives and Applications of derivative	1. State limit definition of derivative. 2. Perform all algebraic operations on derivatives. 3. Find slope, Equation of tangent and normal line of the given curve. 4. Solve examples of maxima and minima.	2.1 Definition of derivative, Notations. 2.2 Derivative of standard functions. 2.3 Rules for differentiation (without proof) 2.4 Derivative of composite functions. 2.5 Derivative of inverse trigonometric functions. 2.6 Derivative of implicit functions. 2.7 Logarithmic differentiation. 2.8 Derivative of parametric functions. 2.9 Second order differentiation. 2.10 Applications: Equation of tangent and normal; Maxima and minima.	16
3. Integration, Definite integration and Applications	1. State Integration byparts theorem. 2. Integrate functionusing different method. 3. Solve examples of definiteintegral using properties. 4. Determine Meanand R.M.S. values.	3.1 Definition of integration as anti-derivative. 3.2 Integration of standard functions. 3.3 Rules for integration. 3.4 Integration by substitution. 3.5 Integration of rational functions. 3.6 Integration by trigonometric transformation. 3.7 Integration by parts. 3.8 Integration by partial fraction. 3.9 Definition of definite integral. 3.10 Properties of definite integral. 3.11 Applications: Mean and R.M.S. values.	16
4. Differential equations	1. State order and degree of D.E. 2. Solve differential equations of first order and first degree. 3. Solve different engineering problems	4.1 Definition of differential equation. 4.2 Order and degree of differential equation. 4.3 Methods of solving differential equations of first order and first degree. 4.4 Variable separable method, reducible to variable separable. 4.5 Homogenous differential equation,	08

	using differential equations.	exact differential equation. 4.6 Linear and Bernoulli equations.	
5. Numerical methods	1. Identify the interval of root of algebraic equation. 2. Find the approximate root of algebraic equation. 3. Solve the system of simultaneousequations containing 3 unknowns.	5.1 Solution of algebraic equation. 5.1.1 Bisection method. 5.1.2 Regula-Falsi method. 5.1.3 Newton-Raphson method. 5.2 Solution of Simultaneousequations containing 3 unknowns. 5.2.1 Gauss elimination method. 5.2.2 Iterative methods: Gauss-Seidal& Jacobi's method.	14
		Total Hrs.	**64**

BLIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practical	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	Find value of any given function.	Functions and Limits	01
2	Find limits algebraic functions.		01
3	Find limits trigonometric, exponential functions.		01
4	Solve examples on derivative using algebraic operations.	Derivatives and Applications of derivative	01
5	Find dy/dx of implicit functions.		01
6	Find dy/dx of parametric functions and inverse trigonometric functions.		01
7	Find equation of tangent and normal and solve maxima and minima problems.		01
8	Solve examples using rules of integration and substitution method	Integration, Definite integration and Applications	01
9	Solve examples using integration by parts and partial method		01
10	Solve examples using integration by parts and partial fraction method.		01
11	Evaluate definite integral using properties.		01
12	Find area using integration		01
13	Solve D.E. using variable separable method and reducible to variable separable.	Differential equations	01
14	Solve homogenous,linear and Bernoulli D.E.		01
15	Find the approximate root of algebraic equation.	Numerical methods	01
16	Solve the system of simultaneous equations		01
		Total Hrs.	**16**

❖ **SPECIFICATION TABLE FOR THEORY PAPER:**

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		R	**U**	**A**	
01	Functions and Limits	04(00)	08(08)	00(00)	12(08)
02	Derivatives and Applications of derivative	04(00)	08(04)	06(06)	18(10)
03	Integration, Definite integration and Applications	02(00)	08(08)	06(00)	16(08)
04	Differential equations	00(04)	08(00)	00(00)	08(04)
05	Numerical methods	04(00)	12(04)	00(06)	16(10)
	Total	14(04)	44(24)	12 (12)	70 (40)

R – Remember U – Understand A – Analyze / Apply

❖ **QUESTION PAPER PROFILE FOR THEORY PAPER:**

Q. No	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			option
	T	**L**	**M**	**T**	**L**	**M**	**T**	**L**	**M**	**T**	**L**	**M**	**T**	**L**	**M**	**T**	**L**	**M**	
01	1	R	2	1	R	2	2	R	2	2	R	2	3	R	2	4	R	2	5/7
	4	R	2																
02	1	U	4	1	U	4	2	U	4	1	U	4	1	U	4				3/5
03	2	U	4	3	U	4	3	U	4	2	U	4	3	U	4				3/5
04	4	U	4	4	U	4	5	R	4	3	U	4	5	U	4				3/5
05	2	A	6	3	A	6	2	A	6										2/3
06	5	U	6	5	U	6	5	A	6										2/3

T= Unit/Topic Number L= Level of Question M= Marks

R-Remember U-Understand A-Analyze/ Apply

❖ **ASSESSMENT AND EVALUATION SCHEME:**

		What	To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	**CA (Continuous Assessment)**	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	20	--	Test Answer Sheets	1, 2, 3, 4,5,6
		Assignments		Continuous	10	--	Assignment Book / Sheet	1, 2, 3, 4,5,6
	TEE (Term End Examination)	End Exam	Students	End Of the Course	**70**	**28**	Theory Answer Sheets	1, 2, 3, 4,5,6
				Total	**100**	**40**		
Direct Assessment Practical	**CA (Continuous Assesssment)**	Skill Assessment	Students	Continuous	--	--	--	--
		Journal Writing		Continuous	--	--	--	--
				TOTAL	--	--	--	--
	TEE (Term End Examination)	End Exam	Students	End Of the Course	--	--	--	--
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form			1, 2, 3, 4,5,6
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
	NIL	

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes (COs)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	3	3	2	-	-	-	2	3	-	3	-	-
2	3	3	2	3	-	-	2	3	-	3	-	-
3	3	3	2	3	-	-	2	3	-	3	-	-
4	3	3	2	3	-	-	2	3	-	3	-	-
5	3	3	2	-	-	-	2	3	-	3	-	-
6	3	3	2	3	-	-	2	3	-	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Engineering Mathematics-1	P N Wartikar, Pune VidyarthiGrihaPrakashan	4567155742
2.	Calculus of one variable	IA Maron, Publisher: Arihant, 5th edition 2015	9352030559
3.	Engineering Mathematics	S.S .Shastry, Prentice Hall Of India, 4th edition 2008	9788120336162
4.	Engineering Mathematics	D.T.Gaikawad, S Chand Publication, 1st edition 2010	8121933560
5.	Higher Engineering Mathematics	B S Grewal, Publisher: S Chand, 43rd edition 2014	9788174091955

❖ **E-REFERENCES:**
- **http://www-math.mit.edu/~djk/calculus_beginners/, assessed on 3rdMarch, 2016**

- **https://en.wikibooks.org/wiki/Calculus, assessed on 3rdMarch, 2016**

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Mr. M. Sayyed	I/C HOD, MathsDeptt.	Govt. Polytechnic Nagpur
2.	Mr. T. Khobragade	Lecturer	Govt. Polytechnic Nagpur
3.	Mr. R. Dewalkar	Lecturer	Govt. Polytechnic Nagpur
4.	Dr. K. C. Deshmukh	Professor	R. T. M. Nagpur University
5.	Dr. P. B. Bahatkar	Professor	Y. C. C. E. Nagpur
6	Mr. Nasir Khan	Lecturer	Anjuman Polytechnic Nagpur

_____   _____

(Member Secretary PBOS)   **(Chairman PBOS)**