BOARD OF TECHNICAL EXAMINATIONS, GOA STATE

(1003) Engg. Mathematics II

Semester	Theory	Test	Total	TW	PR	Gr Total
	75	25	100	–	–	100

Lectures per week (hrs): 5
Practicals per week (hrs): **NIL**
Course Credits 4

Theory Marks: **100**
(One paper 3 hrs)
Prog. Ass. Marks: **25**

RATIONALE: The course is designed to give the student an essential knowledge of the Binomial theorem and to solve equations using determinants and matrices. The various techniques of integration and the use of integration in practical applications using different equations have also been incorporated.

COURSE CONTENTS	Hrs.	Mks.
1. DETERMINANTS:		
1.1 Determinants of the second order and third order (no properties) 1.2 Solutions of equations in two or three variables using Cramer's Rule	3	5
2. BINOMIAL THEOREM:		
2.1 Binomial Theorem for a rational index 2.2 General term, middle term (s)	5	10
3. MENSURATION:		
3.1 Volume and surface area of: i) Prism ii) Pyramid iii) frustrum of a pyramid iv) Frustrum of a sphere v) frustrum of a cone. 3.2 Area and volume by Simpson's Rule	10	15
4. INTEGRAL CALCUS:		
4.1 Definition and standard forms. 4.2 Integration of algebraic sum and difference of functions 4.3 Integration by:(i) Method of substitution, (ii) Using trigonometric Transformations, 4.4 Integration by parts (Integrals of the form $\int x \sin x\,dx$, $\int x \cos x\,dx$, $\int x e^x\,dx$, $\int x^n \log x\,dx$ $\int \sin^{-1} x\,dx$, $\int \cos^{-1} x\,dx$, $\int \tan^{-1} x\,dx$, $\int \text{cosec}^{-1} x\,dx$, $\int \sec^{-1} x\,dx$, $\int \cot^{-1} x\,dx$)	15	20
5. DEFINITE INTEGRALS		
5.1 Definition of definite integral 5.2 Properties of definite integral(without proof)	10	15

(i) $\int_a^b f(x)\,dx = -\int_b^a f(x)\,dx$ (ii) $\int_a^b f(x)\,dx = \int_a^c f(x)\,dx + \int_c^b f(x)\,dx$

(iii) $\int_a^b f(x)\,dx = \int_b^a f(a+b-x)\,dx$ (iv) $\int_0^a f(x)\,dx = \int_0^a f(a-x)\,dx$

5.3 Application to Areas and Volumes of Revolution

6. DIFFERENTIAL EQUATIONS 10 15

6.1 Definition, order and degree of a differential equation

6.2 Solution of a differential equation of

(i) First order and first degree by the variable separable type only.

(ii)Second order differential equation of the type $\frac{d^2y}{dx^2} = f(x)$ only.

6.3 Applications of differential equation in engineering problems (simple questions to be asked.)

7. MATRICES: 7 5

7.1 Definition of a matrix

7.2 Addition, subtraction & multiplication of matrices

7.3 Inverse of a matrix using the adjoint only

7.4 Application of matrices in solving simultaneous equations in two or three variables (Adjoint Method)

(For Civil Engg/Civil Engg (Const Tech.)/Mechanical Engg/Mechanical Engg(Heat Power)/Mech. Engg (Mat Handling)/Automobile Engg/Production Engg/Refrigeration & Air-conditioning/Shipbuilding Engg/Fabrication Engg/Mining Engg/Food Technology)

8. STATISTICS 20 15

8.1 Measures of Central Tendency for grouped and ungrouped data
(a) Mean, (b) Median, (c) Mode

8.2 Measures of Dispersion for grouped and ungrouped data
(a) Range, (b) Mean Deviation, (c) Standard deviation
(d) Variance (e) Coefficient of variation.

OR

(For Electrical, Electronics, Electronics & Communication, Instrumentation, Medical electronics, Computer, electronics (spl with Marine Electronics) only

8. COMPLEX NUMBERS 20 15

8.1 Definitions

8.2 Argand's Diagram

8.3 Polar form of a complex number

8.4 Addition, subtraction and multiplication of a complex number

8.5 Exponential & circular functions.

8.6 De Moivres theorem, roots of a complex number

8.7 Hyperbolic functions.

Total	80	100

77/c

Instructions to Paper-Setters/Model Question Paper:-

I) The question paper will consist of 5 questions

ii) Question I will carry 20 marks and is compulsory. This should cover the entire syllabus. This can be of one of the following types.

a) 10 questions from the entire syllabus carrying 2 marks each

b) part (A) 4 questions of 3 marks each and part (B) 4 question of 2 marks each

(c) Part (A) 4 questions of 3 marks each and part (B) 2 questions of 4 marks each

(iii) Question II to question V will have sub – 5 questions of 5 marks each (can be two questions of 2 and 3 marks each) and the student will be required to attempt any 4 sub – questions. The pattern of the questions from II to V should be as follows.

Q (II)
i) 1.1, 1.2----------5 marks
ii) 2.1 ----------5 marks
iii) 2.2----- ----------5 marks
iv) 3.1----------5 marks
v) 3.1----------5 marks

Q (III)
i) 3.2----------5 marks
ii) 4.2, 4.3(i) ----------5 marks
iii) 4.3(ii) ----------5 marks
iv) 4.3(ii) ----------5 marks
v) 4.4----------5 marks

Q(IV)
i) 5.2 ----------5 marks
ii) 5.3 ----------5 marks
iii) 5.3 ----------5 marks
iv) 6.2(i) ---------- 5 marks
v) 6.2(ii) ----------5 marks

Q(V)(For CE/ME/AE/PE/RA/SB/FT/FTEE)
i) 6.3 ----------5 marks
ii) 7.3, 7.4----------5 marks
iii) 8.1----------5 marks
iv) 8.2----------5 marks
v) 8.2----------5 marks

Q(V) (For EE/IE/IS/Medi Ele)
i) 6.3 ----------5 marks
ii) 7.3, 7.4----------5 marks
iii) 8.4, 8.5----------5 marks
iv) 8.6----------5 marks
v) 8.7----------5 marks

Reference Books:- i) Mathematics for Polytechnic students by S. P. Deashpande Vol. I
ii) Mathematics for Polytechnic students by S. P. Deashpande Vol. II
iii) Mathematics for Polytechnic students by T.T.T.I. Vol. I, II (Bhopal)
iv) Mathematics for Polytechnic by Manjit Singh.