NETAJI SUBHAS OPEN UNIVERSITY

স্নাতকোত্তর পাঠক্রম **(P. G.)**

অনুশীলন পত্র **(Assignment) :** জুন, ২০২০/ ডিসেম্বর, ২০২০ **(June-2020/Dec.-2020)**

MATHEMATICS

Paper - 4A : Numerical Analysis

পূর্ণমান : ৫০ **QUESTION PAPER CUM ANSWER BOOKLET** মানের গুরুত্ব : ২০%

(Full Marks : 50) (Weightage of Marks : 20%)

পরিমিত ও যথাযথ উত্তরের জন্য বিশেষ মূল্য দেওয়া হবে। অশুদ্ধ বানান, অপরিচ্ছন্নতা এবং অপরিষ্কার হস্তাক্ষরের ক্ষেত্রে নম্বর কেটে নেওয়া হবে। উপান্তে প্রশ্নের মূল্যমান সূচিত আছে।

Special credit will be given for precise and correct answer. Marks will be deducted for spelling mistakes, untidiness and illegible handwriting. The figures in the margin indicate full marks.

Name (in Block Letter) : .....

Enrolment No. | | | | | | | | | | | | |

Study Centre Name : ..... Code : .....

To be filled by the Candidate	Serial No. of question answered														**TOTAL**
For Evaluator's only	Marks awarded														

Q.P. Code : **PA/4/IVA**

PG-Sc.-AP-17103

Signature of Evaluator with Date

NETAJI SUBHAS OPEN UNIVERSITY

স্নাতকোত্তর পাঠক্রম **(P. G.)**

STUDENT'S COPY

অনুশীলন পত্র **(Assignment) :** জুন, ২০২০/ ডিসেম্বর, ২০২০ **(June-2020/Dec.-2020)**

MATHEMATICS

Paper - 4A : Numerical Analysis

Name (in Block Letter) : .....

Enrolment No. | | | | | | | | | | | | |

Study Centre Name : ..... Code : .....

Q.P. Code : **PA/4/IVA**

PG-Sc.-AP-17103

Received Answer Booklet
Signature with seal by the Study-Centre

জরুরি নির্দেশ / Important Instruction

আগামী শিক্ষাবর্ষান্ত পরীক্ষায় **(T.E. Exam.)** নতুন ব্যবস্থা অর্থাৎ প্রশ্নসহ উত্তর পুস্তিকা **(QPAB)** প্রবর্তন করা হবে। এই নতুন ব্যবস্থার সঙ্গে পরীক্ষার্থীদের অভ্যস্ত করার জন্য বর্তমান অনুশীলন পত্রে নির্দেশ অনুযায়ী প্রতিটি প্রশ্নের উত্তর নির্দিষ্ট স্থানেই দিতে হবে।

New system *i.e.* Question Paper Cum Answer Booklet (QPAB) will be introduced in the coming Term End Examination. To get the candidates acquainted with the new system, assignment answer is to be given in the specified space according to the instructions.

Detail schedule for submission of assignment for the PG Term End Examination June-2020/Dec.-2020

1.	Date of Publication	: 20/06/2020
2.	Last date of Submission of answer script by the student to the study centre	: 19/07/2020
3.	Last date of Submission of marks by the examiner to the study centre	: 16/08/2020
4.	Date of evaluated answer scripts distribution by the study centre to the students (Students are advised to check their assignment marks on the evaluated answer scripts and marks lists in the study centre notice board. If there is any mismatch / any other problems of marks obtained and marks in the list, the students should report to their study centre Co-ordinator on spot for correction. The study centre is advised to send the corrected marks, if any, to the COE office within five days. No changed / correction of assignment marks will be accepted after the said five days.)	: 23/08/2020
5.	Last date of submission of marks by the study centre to the Department of C.O.E. on or before	: 31/08/2020

এখানে কিছু লিখবেন না

Do Not Write Anything Here

Answer Question No. 1 and any *four* from the rest.

1. Answer any *five* questions : 2 × 5 = 10

a) Define degree of precision of a mechanical quadrature formula.

b) What are ill-conditioned systems ? Give suitable examples.

c) Find the condition number of $f(x)=\sqrt{x+1}-\sqrt{x}$ and test whether the function is ill-conditioned or not.

d) If $T_n(x)=\cos(n\cos^{-1}x)$ represents nth degree Chebyshev polynomial, then show that $T_{n+1}=2xT_n(x)-T_{n-1}(x)$, $(n\geq 1)$.

e) Is $y_{n+3}=y_{n+1}+2hf(x_n,y_n)$ a multistep method ? Justify.

f) Show geometrically that when $|\phi'(x)|>1$ near the root $r=\alpha$, the iteration process $x_n=\phi(x_{n-1})$ diverges.

g) How is the least eigen pair of a non-singular matrix A determined by the power method ?

h) Use appropriate formula for computing roots of the following equation :

$x^2-100\cdot 001x+1=0$

First Answer :

Second Answer :

Third Answer :

Fourth Answer :

Fifth Answer :

2. Describe a finite difference scheme for finding numerical solution of a second order ordinary differential equation with prescribed boundary conditions. 10

3. Describe briefly Bairstow's method for finding quadratic factor of a real polynomial of degree $n(\geq 3)$. 10

4. State Gauss Quadrature problem and obtain the Gauss-Legendre solution of it.

5. Obtain an explicit finite difference scheme for solving the parabolic equation

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2},\ 0 < x < 1,\ t > 0$$

$$u(x,0) = f(x),\ 0 \leq x \leq 1$$

$$u(0,t) = 0 = u(1,t),\ t > 0\ .$$

Under what condition the scheme is absolutely stable ? 10

6. Describe cubic spline. Describe briefly the method of construction of cubic spline function. What are end point conditions of natural cubic spline ? 10

7. Given a set of $(n+1)$ points (x_i, y_i) of two variables x and y (i = 0, 1, 2, ..., n). Obtain the least-square straight line $y = a + bx$ to fit into the given data. Apply this method to the following set of points (0, 1·0), (1, 2·9), (2, 4·8), (3, 6·7), (4, 8·6) and obtain the least-square straight line. 10

First Answer :

Second Answer :

Third Answer :

Fourth Answer :