डून विश्वविद्यालय
DOON UNIVERSITY
2005

Department of Mathematics, SOPS, Doon University, Dehradun
Mid-Semester Examination March 2018
Integrated M.Sc. (Mathematics) Generic-IV (Fourth Semester)
Course Title & Course Code: Numerical Methods, MAG-253

Time Allowed 2 Hours   *Maximum Marks: 30*

Note: Attempt All Questions from Sections A & B. Attempt any four from Section C.

Section A

Q.1. Answer in brief (20-40 words):   (0.6 mark each)

(i)   Write the two major advantages of applying numerical methods.

(ii)   Write the relation between shift operator E and differential operator D.

(iii)   Write the second order forward difference for y_0.

(iv)   Write the value of A_n in Newton's Forward difference interpolation formula.

(v)   Write the factorial notation of $x^{(n)}$.

(vi)   Write the relation between forward difference Δ and backward difference operator ∇.

(vii)   Define interpolation and interpolating polynomial.

(viii) Name two methods applied when the argument values are at unequal intervals.

(ix)   Write the basic difference between secant method and false-position method.

(x)   What are algebraic and transcendental equations?

Section B   (2 marks each)

Q.1. Estimate $f(7.5)$ using Newton-Gregory Backward difference interpolation formula.

x	1	2	3	4	5	6	7	8
$f(x)$	1	8	27	64	125	216	343	512

Q.2. Compute f(0.3) for the data, using Newton's divided difference or Lagrange's interpolation:

x	0	1	3	4	7
$f(x)$	1	3	49	129	813

Q.3. Show that $\frac{\Delta^2}{E}\sin(x+h) + \frac{\Delta^2\sin(x+h)}{E\sin(x+h)} = 2(\cos h - 1)[\sin(x+h)+1]$.

Q.4. Find by Sterling's formula, the value of *f(x)* at *x = 0.05*:

x	0.00	0.02	0.04	0.06	0.08
f(x)	0.00000	0.02256	0.04511	0.06762	0.09007

Q.5. Evaluate $y(1.7475)$ from the following table by the above methods.

x	1.72	1.73	1.74	1.75	1.76	1.77	1.78
f(x)	.179066	.177284	.175520	.173774	.172044	.170333	0.168638

Section C   (3.5 marks each)

Q.1. Using Bisection method, find the root of $x^4 + 2x^2 - x - 1 = 0$, lying between [0,1], up to seven iterations.

Q.2. Find the root of $x^3 - 9x + 1 = 0$, using False-position method.

Q.3. Derive the formula for Newton-Raphson method graphically. Write its major advantage and disadvantage.

Q.4. Find the root of $logx = cos\ x$, using fixed point iteration.

Q.5. Find the roots of $x^3 - 7x^2 + 14x - 8 = 0$, using Graeffe's root-squaring method.

****