

Department of Mathematics
Government Engineering College, Nawada

Class: B. Tech. II Semester

Branch: CE

Course: Mathematics-II

Course Code: 101202

Session: 2019-20

Course Instructor: Dr. Rajnesh Kumar

ODE & PDE (Module 3)

Topic	Link
Introduction	https://www.youtube.com/watch?v=LompT8T-9y4#action=share https://www.youtube.com/watch?v=NBcGLLU90fM#action=share https://www.youtube.com/watch?v=KCjG3_cE51k#action=share https://www.youtube.com/watch?v=AN5nh7OR88#action=share https://www.youtube.com/watch?v=ES741wq3APA#action=share https://www.youtube.com/watch?v=Im242eBqaxw#action=share
EXACT, LINEAR AND BERNOULLI'S EQUATIONS	https://www.youtube.com/watch?v=FqqlcXMsum0#action=share https://www.youtube.com/watch?v=5sphfNn4YYM#action=share https://www.youtube.com/watch?v=-NR-dAJ4GCg#action=share https://www.youtube.com/watch?v=OCNoNmMdBuE#action=share https://www.youtube.com/watch?v=VyKDY4rCbGE#action=share https://www.youtube.com/watch?v=dtbLHtoh_M0#action=share https://www.youtube.com/watch?v=SxYI7EzLVDA#action=share https://www.youtube.com/watch?v=QC3z-NUkOce#action=share https://www.youtube.com/watch?v=De-yi95YILE#action=share
EULER'S EQUATIONS	https://www.youtube.com/watch?v=Bk9sT1BStlo#action=share https://www.youtube.com/watch?v=6r5jft8xrXM#action=share https://www.youtube.com/watch?v=Wx19LXs77mM#action=share https://www.youtube.com/watch?v=W92H9H9x9sU#action=share
EQUATIONS NOT OF FIRST DEGREE, EQUATIONS SOLVABLE FOR P, EQUATIONS SOLVABLE FOR Y, EQUATIONS SOLVABLE FOR X, CLAIRAUT'S TYPE	http://egyankosh.ac.in/bitstream/123456789/17999/1/Unit-4.pdf https://projecteuclid.org/download/pdf_1/euclid.chmm/1263313327

SECOND ORDER LINEAR DIFFERENTIAL EQUATIONS WITH VARIABLE COEFFICIENTS	https://www.youtube.com/watch?v=dPJY0i5qNzU#action=share
METHOD OF VARIATION OF PARAMETERS	https://www.youtube.com/watch?v=bIF7FUu9Vtk#action=share
CAUCHY-EULER EQUATION	https://www.youtube.com/watch?v=NvXF62IIIcY#action=share https://www.youtube.com/watch?v=b5io9_bJvEM#action=share
POWER SERIES SOLUTIONS	https://www.youtube.com/watch?v=Z-e5TFOhQiY#action=share https://www.youtube.com/watch?v=YpjL79cVKvE#action=share https://www.youtube.com/watch?v=GJe1nIaMII4#action=share https://www.youtube.com/watch?v=s-R4gRBPvAU#action=share https://www.youtube.com/watch?v=6x5db1maG6w#action=share https://www.youtube.com/watch?v=wYXK9F8NqMA#action=share https://www.youtube.com/watch?v=LfJIFV0ovQA#action=share https://www.youtube.com/watch?v=E9Mx1Ef_cD0#action=share https://www.youtube.com/watch?v=utSvQMSr3g8#action=share https://www.youtube.com/watch?v=YQcFBh6HQ9o#action=share https://www.youtube.com/watch?v=3mKFtZl6ZZs#action=share https://www.youtube.com/watch?v=2LdCV3qf-ZI#action=share https://www.youtube.com/watch?v=FOIHg93WtjY#action=share https://www.youtube.com/watch?v=KcTgFeyJ6h0#action=share
LEGENDRE POLYNOMIALS	https://www.youtube.com/watch?v=5c4KptxCS80#action=share https://www.youtube.com/watch?v=k5n698fUwuU#action=share https://www.youtube.com/watch?v=g2BifBEjmnM#action=share
BESSEL FUNCTIONS OF THE FIRST KIND AND THEIR PROPERTIES	https://www.youtube.com/watch?v=_UmpTFoKqxE#action=share https://www.youtube.com/watch?v=aK61gh-wUa4#action=share https://www.youtube.com/watch?v=8KIs9zzTS8c#action=share https://www.youtube.com/watch?v=MvZecjM4at8#action=share
FIRST ORDER PARTIAL DIFFERENTIAL EQUATIONS	https://www.youtube.com/watch?v=9oOfx-jNQos#action=share https://www.youtube.com/watch?v=W3HXK1Xe4nc#action=share https://nptel.ac.in/courses/111/103/111103021/
SOLUTIONS OF FIRST ORDER LINEAR AND NON- LINEAR PDES	https://www.youtube.com/watch?v=aoKYWLwFRh4#action=share https://www.youtube.com/watch?v=K8YYGFD-Yh8#action=share https://www.youtube.com/watch?v=fhA-oSGe9NY#action=share
SOLUTION TO HOMOGENOUS AND NON-HOMOGENOUS LINEAR PARTIAL DIFFERENTIAL EQUATIONS SECOND AND HIGHER ORDER BY	https://www.youtube.com/watch?v=thg0eUJKNEY#action=share https://www.youtube.com/watch?v=RnOm-xw_c#action=share https://www.youtube.com/watch?v=iKpCitSCnzY#action=share

COMPLIMENTARY FUNCTION AND PARTICULAR INTEGRAL METHOD	
FLAWS, VIBRATIONS AND DIFFUSIONS	https://nptel.ac.in/courses/111/103/111103021/
SECOND-ORDER LINEAR EQUATIONS AND THEIR CLASSIFICATION	https://www.youtube.com/watch?v=rwX7TZTADTg#action=share
INITIAL AND BOUNDARY CONDITIONS (WITH AN INFORMAL DESCRIPTION OF WELL-POSED PROBLEMS),	https://www.youtube.com/watch?v=lqHOWOAZHDY#action=share https://www.youtube.com/watch?v=4rxuScaj2Ss#action=share
D'ALEMBERT'S SOLUTION OF THE WAVE EQUATION	https://www.youtube.com/watch?v=CnrAivf9I6o#action=share https://www.youtube.com/watch?v=dK5j1ie_awk#action=share https://www.youtube.com/watch?v=xomCgflcAMQ#action=share https://www.youtube.com/watch?v=btz_ljN7VsU#action=share
DUHAMEL'S PRINCIPLE FOR ONE DIMENSIONAL WAVE EQUATION	https://www.youtube.com/watch?v=_AJTkhwR04A#action=share https://nptel.ac.in/courses/111/107/111107063/
SEPARATION OF VARIABLES METHOD TO SIMPLE PROBLEMS IN CARTESIAN COORDINATES.	https://www.youtube.com/watch?v=deiM9aTyPJO#action=share https://nptel.ac.in/courses/111/103/111103021/ https://nptel.ac.in/courses/111/107/111107063/
THE LAPLACIAN IN PLANE, CYLINDRICAL AND SPHERICAL POLAR COORDINATES	https://www.youtube.com/watch?v=GkgodugVnAo#action=share https://www.youtube.com/watch?v=a12SG0sd4ik#action=share https://www.youtube.com/watch?v=OA6YAAAnKleM#action=share https://www.youtube.com/watch?v=oxmTLRNftHU#action=share https://www.youtube.com/watch?v=AfCohyn1A2I#action=share
ONE DIMENSIONAL DIFFUSION EQUATION AND ITS SOLUTION BY SEPARATION OF VARIABLES	https://www.youtube.com/watch?v=9GU5_91YtYg#action=share https://www.youtube.com/watch?v=EfA2D4DXAQ0#action=share https://www.youtube.com/watch?v=ARgf2NH0E8M#action=share https://www.youtube.com/watch?v=nPaYAXmqRpo#action=share https://www.youtube.com/watch?v=MaGu8DnruVs#action=share https://www.youtube.com/watch?v=2pHsBT0RTY8#action=share
BOUNDARY-VALUE PROBLEMS: SOLUTION OF BOUNDARY-VALUE PROBLEMS FOR VARIOUS LINEAR	https://www.youtube.com/watch?v=8EthOwjyV0w#action=share https://www.youtube.com/watch?v=g_qDnz_JGbs#action=share https://www.youtube.com/watch?v=jdeTcLwk1V8#action=share https://www.youtube.com/watch?v=vHoT1PvD0Jc#action=share https://www.youtube.com/watch?v=5OTw6sBAYB8#action=share https://www.youtube.com/watch?v=mvA73zv2JjY#action=share

PDES IN VARIOUS GEOMETRIES	
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COMPLEX VARIABLES (Module 4)

Topic	Link
DIFFERENTIATION	http://home.iitk.ac.in/~psraj/mth102/lecture_notes/comp2.pdf https://math.mit.edu/~jorloff/18.04/notes/topic2.pdf https://www.youtube.com/watch?v=03i5j3DHuYKU#action=share https://www.youtube.com/watch?v=iWu8uyUJmMk#action=share https://www.youtube.com/watch?v=oVTNm1FZRxA#action=share
CAUCHY-RIEMANN EQUATIONS	https://www.youtube.com/watch?v=yV_v6zxADgY#action=share https://www.youtube.com/watch?v=-R1x3y9P2bE#action=share
ANALYTIC FUNCTIONS	https://www.youtube.com/watch?v=znvskofPNXc#action=share https://www.youtube.com/watch?v=rooMFBHoF5E#action=share https://www.youtube.com/watch?v=mnQsuaz6yycs#action=share
HARMONIC FUNCTIONS, FINDING HARMONIC CONJUGATE	https://www.youtube.com/watch?v=yfruyHKBT18#action=share https://www.youtube.com/watch?v=2ZBcbFhrfOg#action=share
ELEMENTARY ANALYTIC FUNCTIONS (EXPONENTIAL, TRIGONOMETRIC, LOGARITHM) AND THEIR PROPERTIES	https://www.youtube.com/watch?v=V2Kw6ry0viA#action=share
CONFORMAL MAPPINGS	http://www.iitg.ac.in/pratyooash/lecture20.pdf
MOBIUS TRANSFORMATIONS AND THEIR PROPERTIES	https://www.youtube.com/watch?v=gKip4DvMB-U#action=share https://www.youtube.com/watch?v=8YyVJcedZtU#action=share https://www.youtube.com/watch?v=F1L8uH_dOBg#action=share http://www.iitg.ac.in/jitumath/Lecture%2021.pdf
CONTOUR INTEGRALS	http://www.iitg.ac.in/pratyooash/lecture20.pdf http://home.iitk.ac.in/~psraj/mth102/lecture_notes/comp6.pdf https://home.iitm.ac.in/jaikrishnan/MA5360/files/3--complex-integration.pdf https://www.youtube.com/watch?v=jfZQ7Y7dpm0#action=share
CAUCHY-GOURSAT THEOREM (WITHOUT PROOF)	https://www.youtube.com/watch?v=bkzKVsiEjxk#action=share
CAUCHY INTEGRAL FORMULA (WITHOUT PROOF)	https://www.youtube.com/watch?v=Jd_t8jUJfA#action=share https://www.youtube.com/watch?v=D6xj6vy69_M#action=share https://www.youtube.com/watch?v=TsdBptF-0ww#action=share https://www.youtube.com/watch?v=dofss6KT4iI#action=share https://www.youtube.com/watch?v=YUHSGjgku0c#action=share

LIOUVILLE'S THEOREM	http://content.inflibnet.ac.in/data-server/eacharya-documents/55dabe0ae41301ad652caf1f_INFIEP_212/555/ET/212-555-ET-V1-S1_18.pdf https://www.youtube.com/watch?v=t25LFa7HAGM#action=share
MAXIMUM-MODULUS THEOREM(WITHOUT PROOF)	http://www.iitg.ac.in/pratyooash/lecture15.pdf
TAYLOR'S SERIES	https://www.youtube.com/watch?v=5nIHi09HmrA#action=share https://www.youtube.com/watch?v=uxN4ajeE1Ho#action=share https://www.youtube.com/watch?v=E6AoBI84_BA#action=share
ZEROS OF ANALYTIC FUNCTIONS, SINGULARITIES	https://www.youtube.com/watch?v=rbE6EuQLZbY#action=share https://www.youtube.com/watch?v=z0Hmr38CBhE#action=share https://www.youtube.com/watch?v=uliv9TzeD6o#action=share https://www.youtube.com/watch?v=u3rcx2YZ3eE#action=share
LAURENT'S SERIES	https://www.youtube.com/watch?v=YRH004zASt8#action=share https://www.youtube.com/watch?v=7NQUNjxDLIg#action=share https://www.youtube.com/watch?v=QC6zxeUh-3U#action=share
RESIDUES	https://www.youtube.com/watch?v=abMxwtfPqs#action=share https://www.youtube.com/watch?v=ie9hvxq_I54#action=share https://www.youtube.com/watch?v=2PogHK-zxuY#action=share
CAUCHY RESIDUE THEOREM (WITHOUT PROOF)	https://www.youtube.com/watch?v=QaN9Qlr7CIU#action=share https://www.youtube.com/watch?v=hsBfQMEQb-A#action=share
EVALUATION OF DEFINITE INTEGRAL INVOLVING SINE AND COSINE	https://www.youtube.com/watch?v=CL2JTQ4bqgA#action=share https://www.youtube.com/watch?v=CHMWgFLU9Lw#action=share
EVALUATION OF CERTAIN IMPROPER INTEGRALS USING THE BROMWICH CONTOUR	https://www.youtube.com/watch?v=XniOIQxLMOM#action=share https://www.youtube.com/watch?v=YStKY2YVg4c#action=share https://www.youtube.com/watch?v=-8TMDq1Yp8w#action=share

NUMERICAL METHODS (Module 5)

Topic	Link
SOLUTION OF POLYNOMIAL AND TRANSCENDENTAL EQUATIONS	http://egyankosh.ac.in/bitstream/123456789/10560/1/Unit-2.pdf https://www.youtube.com/watch?v=88ys5ZlolsG#action=share https://www.youtube.com/watch?v=oYsb4rW2GUU#action=share
BISECTION METHOD	https://www.youtube.com/watch?v=WbmLBRbp0zA#action=share https://www.youtube.com/watch?v=3FhE9De2_o#action=share https://www.youtube.com/watch?v=nHb5e-SvU6Q#action=share https://www.youtube.com/watch?v=XcPIQzWZ_1g#action=share
NEWTON-RAPHSON METHOD	https://www.youtube.com/watch?v=ZcbFQz_Kwog#action=share https://www.youtube.com/watch?v=b74LVxOazIQ#action=share https://www.youtube.com/watch?v=f_EqOpgRwRM#action=share

	https://www.youtube.com/watch?v=pdTxSwCJVYs#action=share https://www.youtube.com/watch?v=ie4Aj3rEpNQ#action=share
REGULA-FALSI METHOD	https://www.youtube.com/watch?v=6nXaFWVL7SU#action=share https://www.youtube.com/watch?v=he8w9-GLnCS#action=share https://www.youtube.com/watch?v=Xgffy7UTfh0#action=share https://www.youtube.com/watch?v=Tj1sPw73R1U#action=share
FINITE DIFFERENCES, RELATION BETWEEN OPERATORS	https://www.youtube.com/watch?v=uYIr6rICX4c#action=share
INTERPOLATION USING NEWTON'S FORWARD AND BACKWARD DIFFERENCE FORMULAE	https://www.youtube.com/watch?v=5WuwBpMJXKQ#action=share https://www.youtube.com/watch?v=Xb9Ypn77LBo#action=share https://www.youtube.com/watch?v=GLSdCEwP2LI#action=share https://www.youtube.com/watch?v=A1voit-xBN0#action=share https://www.youtube.com/watch?v=Lp2MdAvk2MY#action=share https://www.youtube.com/watch?v=nhfCY43iAP0#action=share https://www.youtube.com/watch?v=zvqXMA8OKYA#action=share https://www.youtube.com/watch?v=B6SxZ1g0dHU#action=share
INTERPOLATION WITH UNEQUAL INTERVALS: NEWTON'S DIVIDED DIFFERENCE	https://www.youtube.com/watch?v=DnfC0IUuUe4#action=share https://www.youtube.com/watch?v=2pr9PMKXsIw#action=share https://www.youtube.com/watch?v=_7BWFgJNNkA#action=share
LAGRANGE'S FORMULAE	https://www.youtube.com/watch?v=IabG-Icfe5M#action=share
NUMERICAL DIFFERENTIATION	https://www.youtube.com/watch?v=bnUsBhPLekE#action=share https://www.youtube.com/watch?v=YFxFeKwjBOQ#action=share https://www.youtube.com/watch?v=syQjMQ9fY1A#action=share https://www.youtube.com/watch?v=tmx2vVaBYNE#action=share
NUMERICAL INTEGRATION	https://www.youtube.com/watch?v=csgvZol6Wfw#action=share
TRAPEZOIDAL RULE	https://www.youtube.com/watch?v=UzZsOaLAdT4#action=share
SIMPSON'S $1/3^{\text{RD}}$ AND $3/8$ RULES	https://www.youtube.com/watch?v=p1U0zRz-BE#action=share https://www.youtube.com/watch?v=1eo9t36M2iI#action=share
ORDINARY DIFFERENTIAL EQUATIONS	https://www.youtube.com/watch?v=j5h-rFoiBgI#action=share https://www.youtube.com/watch?v=3rWEcy21sIg#action=share https://www.youtube.com/watch?v=Pq1Wb4sNSds#action=share https://www.youtube.com/watch?v=NihKCpjx2_0#action=share
TAYLOR'S SERIES	https://www.youtube.com/watch?v=Atv3IsQsak8#action=share https://www.youtube.com/watch?v=Y7VWyyZ6B0g#action=share
EULER AND MODIFIED EULER'S METHODS	https://www.youtube.com/watch?v=ht1Bo1PI3Vc#action=share
RUNGE-KUTTA METHOD	https://www.youtube.com/watch?v=bXrcpyREWM4#action=share
MILNE'S AND ADAM'S	https://www.youtube.com/watch?v=aLS27UG_Eyo#action=share

PREDICATOR-CORRECTOR METHODS	
PARTIAL DIFFERENTIAL EQUATIONS	https://www.youtube.com/watch?v=2vYX1V8pXtw#action=share
FINITE DIFFERENCE SOLUTION TWO DIMENSIONAL LAPLACE EQUATION AND POISSON EQUATION	https://www.youtube.com/watch?v=vWiaOcTnOwo#action=share https://www.youtube.com/watch?v=d_snLGgfZZM#action=share https://www.youtube.com/watch?v=QxcMnQqe1ow#action=share https://www.youtube.com/watch?v=fLrNQQm9sfA#action=share https://www.math.ubc.ca/~peirce/M257_316_2012_Lecture_8.pdf http://www.iitg.ac.in/gtm/files/chap2.pdf http://www.egyankosh.ac.in/bitstream/123456789/12560/1/Unit-11.pdf
IMPLICIT AND EXPLICIT METHODS FOR ONE DIMENSIONAL HEAT EQUATION (BENDER-SCHMIDT AND CRANK-NICHOLSON METHODS),	https://www.youtube.com/watch?v=P5wAP5c4YxE#action=share https://www.youtube.com/watch?v=YnMWAAa35Sh4#action=share https://www.youtube.com/watch?v=NyTsklFe3YU#action=share https://www.youtube.com/watch?v=IoILPEndTy4#action=share
FINITE DIFFERENCE EXPLICIT METHOD FOR WAVE EQUATION	http://www.iitg.ac.in/gtm/files/chap2.pdf http://www.egyankosh.ac.in/bitstream/123456789/12560/1/Unit-11.pdf