

**Department of Mathematics**  
**Government Engineering College, Nawada**

**Class: B. Tech. II Semester**

**Branch: ME**

**Course: Mathematics-II**

**Course Code: 102202**

**Session: 2019-20**

**Course Instructor: Dr. Rajnesh Kumar**

**ORDINARY DIFFERENTIAL EQUATION (Module 2 & 3)**

<b>Topic</b>	<b>Link</b>
<b>Introduction</b>	<a href="https://www.youtube.com/watch?v=LompT8T-9y4#action=share">https://www.youtube.com/watch?v=LompT8T-9y4#action=share</a> <a href="https://www.youtube.com/watch?v=NBcGLLU90fM#action=share">https://www.youtube.com/watch?v=NBcGLLU90fM#action=share</a> <a href="https://www.youtube.com/watch?v=KCjG3_cE51k#action=share">https://www.youtube.com/watch?v=KCjG3_cE51k#action=share</a> <a href="https://www.youtube.com/watch?v=AN5nh7OR88#action=share">https://www.youtube.com/watch?v=AN5nh7OR88#action=share</a> <a href="https://www.youtube.com/watch?v=ES741wq3APA#action=share">https://www.youtube.com/watch?v=ES741wq3APA#action=share</a> <a href="https://www.youtube.com/watch?v=Im242eBqaxw#action=share">https://www.youtube.com/watch?v=Im242eBqaxw#action=share</a>
<b>EXACT, LINEAR AND BERNOULLI'S EQUATIONS</b>	<a href="https://www.youtube.com/watch?v=FqqlcXMsum0#action=share">https://www.youtube.com/watch?v=FqqlcXMsum0#action=share</a> <a href="https://www.youtube.com/watch?v=5sphfNn4YYM#action=share">https://www.youtube.com/watch?v=5sphfNn4YYM#action=share</a> <a href="https://www.youtube.com/watch?v=-NR-dAJ4GCg#action=share">https://www.youtube.com/watch?v=-NR-dAJ4GCg#action=share</a> <a href="https://www.youtube.com/watch?v=0CNoNmMdBuE#action=share">https://www.youtube.com/watch?v=0CNoNmMdBuE#action=share</a> <a href="https://www.youtube.com/watch?v=VyKDY4rCbGE#action=share">https://www.youtube.com/watch?v=VyKDY4rCbGE#action=share</a> <a href="https://www.youtube.com/watch?v=dtbLHtoh_M0#action=share">https://www.youtube.com/watch?v=dtbLHtoh_M0#action=share</a> <a href="https://www.youtube.com/watch?v=SxYI7EzLVDA#action=share">https://www.youtube.com/watch?v=SxYI7EzLVDA#action=share</a> <a href="https://www.youtube.com/watch?v=QC3z-NUkOce#action=share">https://www.youtube.com/watch?v=QC3z-NUkOce#action=share</a> <a href="https://www.youtube.com/watch?v=De-yi95YILE#action=share">https://www.youtube.com/watch?v=De-yi95YILE#action=share</a>
<b>EULER'S EQUATIONS</b>	<a href="https://www.youtube.com/watch?v=Bk9sT1BStlo#action=share">https://www.youtube.com/watch?v=Bk9sT1BStlo#action=share</a> <a href="https://www.youtube.com/watch?v=6r5jfT8xrXM#action=share">https://www.youtube.com/watch?v=6r5jfT8xrXM#action=share</a> <a href="https://www.youtube.com/watch?v=Wx19LXs77mM#action=share">https://www.youtube.com/watch?v=Wx19LXs77mM#action=share</a> <a href="https://www.youtube.com/watch?v=W92H9H9x9sU#action=share">https://www.youtube.com/watch?v=W92H9H9x9sU#action=share</a>
<b>EQUATIONS NOT OF FIRST DEGREE, EQUATIONS SOLVABLE FOR P, EQUATIONS SOLVABLE FOR Y, EQUATIONS SOLVABLE FOR X, CLAIRAUT'S TYPE</b>	<a href="http://egyankosh.ac.in/bitstream/123456789/17999/1/Unit-4.pdf">http://egyankosh.ac.in/bitstream/123456789/17999/1/Unit-4.pdf</a> <a href="https://projecteuclid.org/download/pdf_1/euclid.chmm/1263313327">https://projecteuclid.org/download/pdf_1/euclid.chmm/1263313327</a>

SECOND ORDER LINEAR DIFFERENTIAL EQUATIONS WITH VARIABLE COEFFICIENTS	<a href="https://www.youtube.com/watch?v=dPJY0i5qNzU#action=share">https://www.youtube.com/watch?v=dPJY0i5qNzU#action=share</a>
METHOD OF VARIATION OF PARAMETERS	<a href="https://www.youtube.com/watch?v=blF7FUu9Vtk#action=share">https://www.youtube.com/watch?v=blF7FUu9Vtk#action=share</a>
CAUCHY-EULER EQUATION	<a href="https://www.youtube.com/watch?v=NvXF62IilCY#action=share">https://www.youtube.com/watch?v=NvXF62IilCY#action=share</a> <a href="https://www.youtube.com/watch?v=b5io9_bJvEM#action=share">https://www.youtube.com/watch?v=b5io9_bJvEM#action=share</a>
POWER SERIES SOLUTIONS	<a href="https://www.youtube.com/watch?v=Z-e5TFOhQiY#action=share">https://www.youtube.com/watch?v=Z-e5TFOhQiY#action=share</a> <a href="https://www.youtube.com/watch?v=YpjL79cVKvE#action=share">https://www.youtube.com/watch?v=YpjL79cVKvE#action=share</a> <a href="https://www.youtube.com/watch?v=GJe1nIaMII4#action=share">https://www.youtube.com/watch?v=GJe1nIaMII4#action=share</a> <a href="https://www.youtube.com/watch?v=s-R4gRBPvAU#action=share">https://www.youtube.com/watch?v=s-R4gRBPvAU#action=share</a> <a href="https://www.youtube.com/watch?v=6x5db1maG6w#action=share">https://www.youtube.com/watch?v=6x5db1maG6w#action=share</a> <a href="https://www.youtube.com/watch?v=wYXK9F8NqMA#action=share">https://www.youtube.com/watch?v=wYXK9F8NqMA#action=share</a> <a href="https://www.youtube.com/watch?v=LfJIFV0ovQA#action=share">https://www.youtube.com/watch?v=LfJIFV0ovQA#action=share</a> <a href="https://www.youtube.com/watch?v=E9Mx1Ef_cD0#action=share">https://www.youtube.com/watch?v=E9Mx1Ef_cD0#action=share</a> <a href="https://www.youtube.com/watch?v=utSvQMSr3g8#action=share">https://www.youtube.com/watch?v=utSvQMSr3g8#action=share</a> <a href="https://www.youtube.com/watch?v=YQcFBh6HQ9o#action=share">https://www.youtube.com/watch?v=YQcFBh6HQ9o#action=share</a> <a href="https://www.youtube.com/watch?v=3mKFtZl6ZZs#action=share">https://www.youtube.com/watch?v=3mKFtZl6ZZs#action=share</a> <a href="https://www.youtube.com/watch?v=2LdCV3qf-ZI#action=share">https://www.youtube.com/watch?v=2LdCV3qf-ZI#action=share</a> <a href="https://www.youtube.com/watch?v=FOIHg93WtjY#action=share">https://www.youtube.com/watch?v=FOIHg93WtjY#action=share</a> <a href="https://www.youtube.com/watch?v=KcTgFeyJ6h0#action=share">https://www.youtube.com/watch?v=KcTgFeyJ6h0#action=share</a>
LEGENDRE POLYNOMIALS	<a href="https://www.youtube.com/watch?v=5c4KptxCS80#action=share">https://www.youtube.com/watch?v=5c4KptxCS80#action=share</a> <a href="https://www.youtube.com/watch?v=k5n698fUwuU#action=share">https://www.youtube.com/watch?v=k5n698fUwuU#action=share</a> <a href="https://www.youtube.com/watch?v=g2BifBEjmnM#action=share">https://www.youtube.com/watch?v=g2BifBEjmnM#action=share</a>
BESSEL FUNCTIONS OF THE FIRST KIND AND THEIR PROPERTIES	<a href="https://www.youtube.com/watch?v=_UmpTFoKqxE#action=share">https://www.youtube.com/watch?v=_UmpTFoKqxE#action=share</a> <a href="https://www.youtube.com/watch?v=aK61gh-wUa4#action=share">https://www.youtube.com/watch?v=aK61gh-wUa4#action=share</a> <a href="https://www.youtube.com/watch?v=8KIs9zzTS8c#action=share">https://www.youtube.com/watch?v=8KIs9zzTS8c#action=share</a> <a href="https://www.youtube.com/watch?v=MvZecjM4at8#action=share">https://www.youtube.com/watch?v=MvZecjM4at8#action=share</a>

### COMPLEX VARIABLES (Module 4 & 5)

Topic	Link
DIFFERENTIATION	<a href="http://home.iitk.ac.in/~psraj/mth102/lecture_notes/comp2.pdf">http://home.iitk.ac.in/~psraj/mth102/lecture_notes/comp2.pdf</a> <a href="https://math.mit.edu/~jorloff/18.04/notes/topic2.pdf">https://math.mit.edu/~jorloff/18.04/notes/topic2.pdf</a> <a href="https://www.youtube.com/watch?v=03i5j3DHyKU#action=share">https://www.youtube.com/watch?v=03i5j3DHyKU#action=share</a> <a href="https://www.youtube.com/watch?v=iWu8uyUJmMk#action=share">https://www.youtube.com/watch?v=iWu8uyUJmMk#action=share</a> <a href="https://www.youtube.com/watch?v=oVTNm1FZRxA#action=share">https://www.youtube.com/watch?v=oVTNm1FZRxA#action=share</a>
CAUCHY-RIEMANN EQUATIONS	<a href="https://www.youtube.com/watch?v=yV_v6zxADgY#action=share">https://www.youtube.com/watch?v=yV_v6zxADgY#action=share</a> <a href="https://www.youtube.com/watch?v=-R1x3y9P2bE#action=share">https://www.youtube.com/watch?v=-R1x3y9P2bE#action=share</a>
ANALYTIC FUNCTIONS	<a href="https://www.youtube.com/watch?v=znvskofPNXc#action=share">https://www.youtube.com/watch?v=znvskofPNXc#action=share</a> <a href="https://www.youtube.com/watch?v=rooMFBHoF5E#action=share">https://www.youtube.com/watch?v=rooMFBHoF5E#action=share</a> <a href="https://www.youtube.com/watch?v=mnQsuaz6yycs#action=share">https://www.youtube.com/watch?v=mnQsuaz6yycs#action=share</a>
HARMONIC	<a href="https://www.youtube.com/watch?v=yfruyHKBTl8#action=share">https://www.youtube.com/watch?v=yfruyHKBTl8#action=share</a>

FUNCTIONS, FINDING HARMONIC CONJUGATE	<a href="https://www.youtube.com/watch?v=2ZBcbFhrfOg#action=share">https://www.youtube.com/watch?v=2ZBcbFhrfOg#action=share</a>
ELEMENTARY ANALYTIC FUNCTIONS (EXPONENTIAL, TRIGONOMETRIC, LOGARITHM) AND THEIR PROPERTIES	<a href="https://www.youtube.com/watch?v=V2Kw6ry0viA#action=share">https://www.youtube.com/watch?v=V2Kw6ry0viA#action=share</a>
CONFORMAL MAPPINGS	<a href="http://www.iitg.ac.in/pratyooash/lecture20.pdf">http://www.iitg.ac.in/pratyooash/lecture20.pdf</a>
MOBIUS TRANSFORMATIONS AND THEIR PROPERTIES	<a href="https://www.youtube.com/watch?v=gKip4DvMB-U#action=share">https://www.youtube.com/watch?v=gKip4DvMB-U#action=share</a> <a href="https://www.youtube.com/watch?v=8YyVJcedZtU#action=share">https://www.youtube.com/watch?v=8YyVJcedZtU#action=share</a> <a href="https://www.youtube.com/watch?v=F1L8uH_dOBg#action=share">https://www.youtube.com/watch?v=F1L8uH_dOBg#action=share</a> <a href="http://www.iitg.ac.in/jitumath/Lecture%2021.pdf">http://www.iitg.ac.in/jitumath/Lecture%2021.pdf</a>
CONTOUR INTEGRALS	<a href="http://www.iitg.ac.in/pratyooash/lecture20.pdf">http://www.iitg.ac.in/pratyooash/lecture20.pdf</a> <a href="http://home.iitk.ac.in/~psraj/mth102/lecture_notes/comp6.pdf">http://home.iitk.ac.in/~psraj/mth102/lecture_notes/comp6.pdf</a> <a href="https://home.iitm.ac.in/jaikrishnan/MA5360/files/3--complex-integration.pdf">https://home.iitm.ac.in/jaikrishnan/MA5360/files/3--complex-integration.pdf</a> <a href="https://www.youtube.com/watch?v=jfZQ7Y7dpm0#action=share">https://www.youtube.com/watch?v=jfZQ7Y7dpm0#action=share</a>
CAUCHY-GOURSAT THEOREM (WITHOUT PROOF)	<a href="https://www.youtube.com/watch?v=bkzKVsiEjxk#action=share">https://www.youtube.com/watch?v=bkzKVsiEjxk#action=share</a>
CAUCHY INTEGRAL FORMULA (WITHOUT PROOF)	<a href="https://www.youtube.com/watch?v=Jd_t8jUJJfA#action=share">https://www.youtube.com/watch?v=Jd_t8jUJJfA#action=share</a> <a href="https://www.youtube.com/watch?v=D6xj6vy69_M#action=share">https://www.youtube.com/watch?v=D6xj6vy69_M#action=share</a> <a href="https://www.youtube.com/watch?v=TsdBptF-0ww#action=share">https://www.youtube.com/watch?v=TsdBptF-0ww#action=share</a> <a href="https://www.youtube.com/watch?v=dofss6KT4iI#action=share">https://www.youtube.com/watch?v=dofss6KT4iI#action=share</a> <a href="https://www.youtube.com/watch?v=YUHSGjgku0c#action=share">https://www.youtube.com/watch?v=YUHSGjgku0c#action=share</a>
LIOUVILLE'S THEOREM	<a href="http://content.inflibnet.ac.in/data-server/eacharya-documents/55dabe0ae41301ad652caf1f_INFIEP_212/555/ET/212-555-ET-V1-S1_18.pdf">http://content.inflibnet.ac.in/data-server/eacharya-documents/55dabe0ae41301ad652caf1f_INFIEP_212/555/ET/212-555-ET-V1-S1_18.pdf</a> <a href="https://www.youtube.com/watch?v=t25LFa7HAGM#action=share">https://www.youtube.com/watch?v=t25LFa7HAGM#action=share</a>
MAXIMUM- MODULUS THEOREM(WITHOUT PROOF)	<a href="http://www.iitg.ac.in/pratyooash/lecture15.pdf">http://www.iitg.ac.in/pratyooash/lecture15.pdf</a>
TAYLOR'S SERIES	<a href="https://www.youtube.com/watch?v=5nIH09HmrA#action=share">https://www.youtube.com/watch?v=5nIH09HmrA#action=share</a> <a href="https://www.youtube.com/watch?v=uxN4ajeE1Ho#action=share">https://www.youtube.com/watch?v=uxN4ajeE1Ho#action=share</a> <a href="https://www.youtube.com/watch?v=E6AoBI84_BA#action=share">https://www.youtube.com/watch?v=E6AoBI84_BA#action=share</a>
ZEROS OF ANALYTIC FUNCTIONS SINGULARITIES	<a href="https://www.youtube.com/watch?v=rbE6EuQLZbY#action=share">https://www.youtube.com/watch?v=rbE6EuQLZbY#action=share</a> <a href="https://www.youtube.com/watch?v=z0Hmr38CBhE#action=share">https://www.youtube.com/watch?v=z0Hmr38CBhE#action=share</a> <a href="https://www.youtube.com/watch?v=uliv9TzeD6o#action=share">https://www.youtube.com/watch?v=uliv9TzeD6o#action=share</a> <a href="https://www.youtube.com/watch?v=u3rcx2YZ3eE#action=share">https://www.youtube.com/watch?v=u3rcx2YZ3eE#action=share</a>
LAURENT'S SERIES	<a href="https://www.youtube.com/watch?v=YRH004zASt8#action=share">https://www.youtube.com/watch?v=YRH004zASt8#action=share</a> <a href="https://www.youtube.com/watch?v=7NQUNjxDLlg#action=share">https://www.youtube.com/watch?v=7NQUNjxDLlg#action=share</a> <a href="https://www.youtube.com/watch?v=QC6zxeUh-3U#action=share">https://www.youtube.com/watch?v=QC6zxeUh-3U#action=share</a>
RESIDUES	<a href="https://www.youtube.com/watch?v=abMxwtfdPqs#action=share">https://www.youtube.com/watch?v=abMxwtfdPqs#action=share</a>

	<a href="https://www.youtube.com/watch?v=ie9hvxq_I54#action=share">https://www.youtube.com/watch?v=ie9hvxq_I54#action=share</a> <a href="https://www.youtube.com/watch?v=2PogHK-zxuY#action=share">https://www.youtube.com/watch?v=2PogHK-zxuY#action=share</a>
CAUCHY RESIDUE THEOREM (WITHOUT PROOF)	<a href="https://www.youtube.com/watch?v=QaN9Qlr7CIU#action=share">https://www.youtube.com/watch?v=QaN9Qlr7CIU#action=share</a> <a href="https://www.youtube.com/watch?v=hsBfQMEQb-A#action=share">https://www.youtube.com/watch?v=hsBfQMEQb-A#action=share</a>
EVALUATION OF DEFINITE INTEGRAL INVOLVING SINE AND COSINE	<a href="https://www.youtube.com/watch?v=CL2JTQ4bqgA#action=share">https://www.youtube.com/watch?v=CL2JTQ4bqgA#action=share</a> <a href="https://www.youtube.com/watch?v=CHMWgFLU9Lw#action=share">https://www.youtube.com/watch?v=CHMWgFLU9Lw#action=share</a>
EVALUATION OF CERTAIN IMPROPER INTEGRALS USING THE BROMWICH CONTOUR	<a href="https://www.youtube.com/watch?v=XniOIQxLMOM#action=share">https://www.youtube.com/watch?v=XniOIQxLMOM#action=share</a> <a href="https://www.youtube.com/watch?v=YStKY2YVg4c#action=share">https://www.youtube.com/watch?v=YStKY2YVg4c#action=share</a> <a href="https://www.youtube.com/watch?v=-8TMDq1Yp8w#action=share">https://www.youtube.com/watch?v=-8TMDq1Yp8w#action=share</a>