ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ
"ವಿಟಿಯು ಅಧಿನಿಯಮ ೧೯೯೪"ರ ಅಡಿಯಲ್ಲಿ ಕರ್ನಾಟಕ ಸರ್ಕಾರದಿಂದ ಸ್ಥಾಪಿತವಾದ ರಾಜ್ಯ ವಿಶ್ವವಿದ್ಯಾಲಯ
"ಜ್ಞಾನ ಸಂಗಮ", ಬೆಳಗಾವಿ-೫೯೦೦೧೮, ಕರ್ನಾಟಕ, ಭಾರತ

Visvesvaraya Technological University
(State University of Government of Karnataka Established as per the VTU Act, 1994)
"Jnana Sangama" Belagavi-590018, Karnataka, India
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Dr. A. S. Deshpande B.E., M.Tech., Ph.D.
Registrar

Phone: (0831) 2498100
Fax: (0831) 2405467

Ref: VTU/BGM/BOS/A9/2021-22 / 5759

Date: 14 FEB 2022

CIRCULAR

Subject: Additional attempt for B.E./B.Tech. Lateral Entry students to clear only bridge courses (MATDIP301, 401) for award of degree regarding...

Reference:
1. AICTE/AB/SWR/CMRIT/2021, dated 08.11.2021
2. EC resolution 2.1.5. 163rd meeting, Dated: 04.01.2022,
3. VTU/BGM/OS-Aca/Max Dur-Cirs/2021-22/5365, dated 28.01.2022
4. Hon'ble Vice-Chancellor's approval dated: 01.02.2022
5. VTU/BGM/BOS/A9/2021-22/5640, dated 07.02.2022

With reference to the subject cited above, the syllabus copy, detailed syllabus and model question papers of MATDIP301, MATDIP401 are attached with this circular for the benefit of all the students concerned as per circular referred (3). The students are instructed to refer these details and prepare for the examination, However to help the students, learning assistance will be provided through online lectures by VTU's e-Learning centre.

A separate circular will be issued from e-learning section regarding the online lectures and also the Examination-related circular will be issued by Registrar (Evaluation).

Encl: As mentioned above

Sd/-
REGISTRAR

Copy to

1. The Hon'ble Vice-Chancellor through the secretary to VC for information
2. The Registrar (Evaluation), VTU Belagavi for information
3. The Finance Officer VTU Belagavi for information
4. The Director, ITI, SMU, CNC, VTU Belagavi for information and make arrangement to upload on VTU web portal
5. Dr. P. Sandhya, Special Officer, e-Learning centre, VTU Mysuru for needful
6. The Special Officer, Academic Section(BoS) for information

REGISTRAR

1 / 1

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

COMMON SYLLABUS FOR 2002/2006/2010 SCHEMES

Advanced Mathematics–I ***(A Bridge course for Lateral Entry students of III Semester B.E.)*** (Common to All Branches)			
Course Code	**MATDIP301**	Exam. Marks	**100**
Teaching Hours/Week (L:T:P:S)	**4:0:0**	Exam. Hours	**03**
Total Hours of Pedagogy	**40 Hours**		

1) Trigonometry:

Complex Numbers:Definitions, complex numbers as an ordered pair, real and imaginary parts, modulus and amplitude of a complex number, equality of a complex number, Addition, subtraction, multiplication & division of complex numbers, polar form, Argand Diagram, exponential form, expressing in the form$a \pm ib$, problems.

06 Hrs

2) Differential Calculus:

Differentiation of nth order of standard functions, Leibnitz theorem,(Statement only) with examples, polar curves, Taylor's series, Maclaurin's series of simple functions for single variable.

Partial Differentiation:

Definition, Euler theorem, total differentiation, Differentiation of composite and implicit functions. Jacobians-illustrative examples and problems.

14Hrs

3) Integral Calculus:

Reduction formula for functions $\sin^n x$, $\cos^n x$, $\sin^n x \cos^n x$. Double integrals, simple problems. Triple integrals, simple problems with standard limits. Beta and Gamma functions, properties, the relation between Beta & Gamma function, simple problems.

08Hrs

4) Differential Equations:

Solution of first order, first degree differential equations- Variable separable methods homogeneous equation, Bernoulli's and exact differential equations (without I.F.).Differential equations of second and higher orders with constant co-efficients.

12Hrs

Text Books:

1. **B.S.Grewal:** Higher Engineering Mathematics, Khanna Publishers, New Delhi, 43rd Ed.,2015.

2. **H.K. Dass:** Higher Engineering Mathematics, John Wiley and Sons, 10th Ed., 2016.

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VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

COMMON SYLLABUS FOR 2002/2006/2010 SCHEMES

Advanced Mathematics–II ***(A Bridge course for Lateral Entry students of IV Semester B.E.)*** (Common to All Branches)			
Course Code	**MATDIP401**	Exam. Marks	**100**
Teaching Hours/Week (L:T:P:S)	**4:0:0**	Exam. Hours	**03**
Total Hours of Pedagogy	**40 Hours**		

1) Solid Geometry:

Distance Formula (without proof), Division formula, Direction cosines and direction ratios. Planes and straight lines, the angle between the planes. **12Hrs**

2) Vectors:

Vector Algebra:

Vector addition, multiplication (Dot and Cross products), Triple products.

Vector differentiation: Velocity, acceleration of a vector point function, gradient, divergence and curl. solenoidal and in rotational fields, simple and direct problems.

12Hrs

3) Laplace transforms:

Definitions, Laplace transforms of elementary functions. Derivatives and integrals. Inverse transforms. Applications of Laplace transforms to differential equations.

16Hrs

Text Books:

1. **B.S.Grewal:** Higher Engineering Mathematics, Khanna Publishers, New Delhi, 43rd Ed., 2015.

2. **H.K. Dass:** Higher Engineering Mathematics, John Wiley and Sons, 10th Ed., 2016.

QUESTION-WISE BLOWN-UP SYLLABUS

BRIDGE COURSE IN ADVANCED MATHEMATICS-I (MATDIP301)

(Common to 2002/2006/2010 Schemes and Common to all Branches)

Topics	Topics to be Covered with Article/ Page No. from Text Book-1	Hours
QUESTION No.1 (Trigonometry: Complex Numbers)		
Definitions, complex numbers as an ordered pair, real and imaginary parts, modulus and amplitude of a complex number, equality of a complex number, Addition, subtraction, multiplication & division of complex numbers, polar form, Argand Diagram, exponential form, expressing in the form $a \pm ib$ problems.	Discussion/exploration restricted to problems in Article No. 19.1(Page No. 639 to 640).	**6**
	Total	**06**
QUESTION No.2 (Differential Calculus)		
Differentiation of n^{th} order of standard functions, Leibnitz theorem (statement only) with examples.	Discussion/exploration restricted to problems in Article No. 4.1(2), 4.2 (Page No. 136 to 141).	**4**
QUESTION No.3 (Differential Calculus)		
Polar curves, Taylor's series, Maclauri's series of simple functions for single variable.	Discussion/exploration restricted to problems in Article No. 4.4(1), 4.7(1), 4.7(2),4.8(Page No. 147 to 150, 161 to 163).	**5**
QUESTION No.4 (Differential Calculus)		
Partial Differentiation : Definition, Euler theorem, total differentiation, differentitation of composite and implicit functions, Jacobians illustrative examples and problems.	Discussion/exploration restricted to problems in Article No. 5.4(1), 5.7(1) (Page No. 205 to 208, 215 to 218).	**5**
	Total	**14**
QUESTION No.5 (Integral Calculus)		
Reduction formula for functions $sin^n x$, $cos^n x$, $sin^n x cos^n x$. Double integral, simple problems.	Discussion/exploration restricted to problems in Article No. 6.2, 7.1 (Page No. 239 to 241, 274 to 276).	**4**
QUESTION No.6 (Integral Calculus)		
Double integral, simple problems & Triple integral simple problems with standard limits. β and γ functions, properties , relation between β and γ functions simple problems.	Discussion/exploration restricted to problems in Article No. 7.1 , 7.5, 7.14, 7.15(1), 7.15(3), 7.15(4), , 7.16 (Page No. 274 to 276 , 283 to 284 and 302 to 306).	**4**
	Total	**08**

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QUESTION No.7 (Differential Equations)		
Solution of first order, first degree differential equations- Variable separable methods homogeneous equation, Bernoulli's and exact differential equations (with out I.F.).	Discussion restricted to problems in Article No. 11.6, 11.11 (Pages No. 429 to 431, 440 to 441)	**6**
QUESTION No.8 (Differential Equations)		
Differential equations of second and higher orders with constant co-efficients.	Discussion restricted to problems in Article No. 13.1 to 13.4 (Page No. 471 to 474).	**6**
	Total	**12**
	Total Teaching Hours	**40**

Text Books:

1. **B.S.Grewal:** Higher Engineering Mathematics, Khanna Publishers, New Delhi, 43rd Ed., 2015.

2. **H.K. Dass:** Higher Engineering Mathematics, John Wiley and Sons, 10^{th} Ed., 2016.

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QUESTION-WISE BLOWN-UP SYLLABUS

BRIDGE COURSE IN ADVANCED MATHEMATICS-II (MATDIP401)

(Common to 2002/2006/2010 Schemes and Common to all Branches)

Topics	Topics to be covered with Article/ Page No. from Text Book-1	Hours
QUESTION No.1 (Solid Geometry)		
Distance Formula (without proof) , Division formula , Direction cosines Direction ratios. Planes.	Discussion/exploration restricted to problems in Article No. 3.2 (Page No.77, 78), 3.3(Page No.79), 3.5(viii)(Page No. 82), Examples: 3.8 to 3.11 of Text book No.1	**06**
QUESTION No.2 (Solid Geometry)		
Straight lines. Angle between the Planes.	Discussion/exploration restricted to problems in Article 3.11(Page No.97 to 101), Example 3.27 to 3.34 of Text book No.1	**06**
	Total	**12**
QUESTION No.3 (Vectors:Vector Algebra)		
Vector addition , multiplication (Dot and Cross product), Triple products.	Discussion/exploration restricted to problems in article 3.6 (Page No. 86 to 89) 3.8 to 3.9(Page No. 92 to 94), 3.10(Page No. 95 to 96) of Text book No.1	**05**
QUESTION No.4 (Vectors:Vector Differentiation)		
Differentiation Velocity, acceleration of a vector point function. Gradient Divergence and Curl. Solenoidal and irrational fields, simple and direct problems.	Discussion/exploration restricted to problems in article 8.1(Page No.315,316), 8.3(Page No. 319, 320), 8.6(Page No. 326, 327), 8.7 (Page No. 327, 328) of Text book No.1	**04**
QUESTION No.5 (Vectors:Vector Differentiation)		
Differentiation Velocity, acceleration of a vector point function. Divergence and Curl. Solenoidal and irrational fields, simple and direct problems.	Discussion/exploration restricted to problems in article 8.1(Page No. 315,316), 8.3(Page No. 319,320), 8.6(Page No. 326, 327), 8.7 (Page No. 327, 328) of Text book No.1	**03**
	Total	**12**

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QUESTION No.6(Laplace Transforms)		
Definitions , Laplace transforms of elementary functions	Discussion/exploration restricted to problems in Article 21.1 to 21.3 (Page No726 to 729) of Text book No.1	**05**
QUESTION No.7(Laplace Transforms)		
Derivatives and Integrals, Inverse Laplace transforms	Shifting property by $e^{at}$and e^{-at}, Multiplication and division by t. Discussion/exploration restricted to problems in Article 21.4 (Page No. 728 to 730), 21.9(Page No. 736,737), 21.12(Page No. 740 to 743) of Text book No.1	**06**
QUESTION No.8(Inverse Laplace Transforms)		
Laplace/inverse Laplace transforms contd… Applications of Laplace transforms to differential equations.	Discussion/exploration restricted to problems in Article 21.12(Page No.740 to743), 21.14 (Page No.748,749), 21.15(Page No. 750 to 754) of Text book No.1	**05**
	Total	**16**

Text Books:

1. **B.S.Grewal:** Higher Engineering Mathematics, Khanna Publishers, New Delhi, 43rd Ed.,2015.

2. **H.K. Dass:** Higher Engineering Mathematics, John Wiley and Sons, 10th Ed., 2016.

Model Question Paper-I

USN | | | | | | | | | | |

MATDIP301

Third Semester B.E./B.Tech. Degree Examination

Advanced Mathematics–I

(Common to 2002/2006/2010 Schemes and Common to all Branches)

TIME: 3 Hours | **Max. Marks: 100**

Note: Answer any **FIVE** full questions.

			Marks
Q.1	a	Express the complex number $\frac{(1-i)(2-i)}{(3-i)}$ in the form $x + iy$.	06
	b	Find the modulus and amplitude of the complex number $\frac{(1+2i)}{(1-3i)}$.	06
	c	(i) Define a complex number. (ii) If $(3x - 2iy)(2 + i) = 10(1 + i)$, then find the values of x and y.	08
Q.2	a	Find the n^{th} derivatives of e^{ax}.	06
	b	Find the n^{th} derivatives of $sin4xsin3x$.	06
	c	If $y = tan^{-1}x$, prove that $(1 + x^2)y_{n+2} + 2(n + 1)xy_{n+1} + n(n + 1)y_n = 0$.	08
Q.3	a	Find the angle between the radius vector and the tangent to the curve $r = a(1 - cos\theta)$.	06
	b	Obtain the Maclaurin's series expansion of the function $sinx$ upto the term containing x^4.	06
	c	With usual notations, prove that $tan\ \phi = r\frac{d\theta}{dr}$.	08
Q.4	a	If $u = tan^{-1}\left(\frac{x^3+y^3}{x-y}\right)$, prove that $x\frac{\partial u}{dx} + y\frac{\partial u}{dy}$= sin2u.	06
	b	Find $\frac{\partial f}{dx}$ and $\frac{\partial f}{dy}$, when $f = log(x^2 + y^2)$.	06
	c	If $u = x + y,\ v = y + z,\ w = z + x$, find the value of $\frac{\partial(u,v,w)}{\partial(x,y,z)}$.	08
Q.5	a	Evaluate $\int_{x=1}^{x=2}\int_{y=3}^{y=4}(xy + e^y)$ dy dx.	06
	b	Evaluate $\int_0^{\frac{\pi}{6}} sin^6 3x\ dx$.	06
	c	Obtain the reduction formula for $\int cos^n x\ dx$.	08
Q.6	a	Evaluate $\iint_R (x^2 + x^2)dx\ dy$, where R is the tringle region bounded by the lines $y = 0,\ y = x$ and $x = 1$.	06
	b	Evaluate $\int_{x=0}^{x=2}\int_{y=0}^{y=3}\int_{z=0}^{z=1}(x + y + z)$ dz dy dx .	06
	c	With usual notations, prove that $\beta(m,n) = \frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$.	08

Q.7	a	Solve: $sec^2x\ tany\ dx + sec^2y\ tanx\ dy = 0.$	06
	b	Solve: $(5x^4 + 3x^2y^2 - 2xy^3)dx + (2x^3y - 3x^2y^2 - 5y^4)dy = 0.$	06
	c	Solve: $(x^2 + y)dx + (y^3 + x)dy = 0.$	08
Q.8	a	Solve: $(D^3 - 6D^2 + 11D - 6)y = 0,$ where $D = \frac{d}{dx}$	06
	b	Solve: $(D^2 + 10D + 25)y = 0,$ where $D = \frac{d}{dx}$	06
	c	Solve: $(D^3 + 1)y = 0,$ where $D = \frac{d}{dx}$	08

Model Question Paper-II

USN | | | | | | | | | | |

MATDIP301

Third Semester B.E./B.Tech. Degree Examination

Advanced Mathematics–I

(Common to 2002/2006/2010 Schemes and Common to all Branches)

TIME: 3 Hours | **Max. Marks: 100**

Note: Answer any **FIVE** full questions.

			Marks
Q.1	a	Find the modulus and amplitude of the complex number $\frac{4+2i}{2-3i}$.	06
	b	Express the complex number $\frac{(1+i)(2+i)}{(3+i)}$ in the form $a+ib$.	06
	c	Express $\sqrt{3}+i$ in polar form and hence find the modulus and amplitude.	08
Q.2	a	Find the n^{th} derivatives of $sin(ax+b)$.	06
	b	Find the n^{th} derivatives of $sin^2 5x$.	06
	c	If $y = cos(mlogx)$, prove that $x^2y_{n+2} + (2n+1)xy_{n+1} + (m^2+n^2)y_n = 0$.	08
Q.3	a	Find the angle between the radius vector and the tangent to the curve $r = a(1+cos\theta)$.	06
	b	Obtain the Maclaurin's series expansion of the function $cosx$ upto the term containing x^4.	06
	c	With usual notations, prove that $(i)\ p = r\ sin\phi\ \ (ii)\ \frac{1}{p^2} = \frac{1}{r^2} + \frac{1}{r^4}\left(\frac{dr}{d\theta}\right)^2$.	08
Q.4	a	If $u = tan^{-1}\left(\frac{x^3+y^3}{x-y}\right)$, prove that $x\frac{\partial u}{dx} + y\frac{\partial u}{dy} = -\frac{1}{4}sin2u$.	06
	b	If $u = log(x^3+y^3+z^3-3xyz)$, prove that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = \frac{3}{x+y+z}$.	06
	c	If $u = x^2 - y^2,\ v = y^2,$ find the value of $\frac{\partial(u,v)}{\partial(x,y)}$.	08
Q.5	a	Evaluate $\int_{x=0}^{x=1}\int_{y=x}^{y=\sqrt{x}} xy$ dy dx.	06
	b	Evaluate $\int_0^{\pi} sin^2\left(\frac{x}{2}\right)\ dx$.	06
	c	Obtain the reduction formula for $\int sin^n x\ dx$, where n is positive integer.	08
Q.6	a	Evaluate $\iint_R xy\ dx\ dy$, where R is the area bounded by the circle $x^2+y^2=1$ in the first quadrant.	06
	b	Evaluate $\int_{x=0}^{x=1}\int_{y=0}^{y=1}\int_{z=0}^{z=1}(x+y+z)$ dz dy dx .	06
	c	Define Gamma function and prove that $\Gamma(n+1) = n\Gamma(n)$.	08

Q.7	a	Solve: $\frac{dy}{dx} = e^{-2y}(e^{3x} + x^2)$.	06
	b	Solve: $(y^3 - 3x^2y)dx + (3xy^2 - x^3)dy = 0$.	06
	c	Solve: $\left(y\left(1 + \frac{1}{x}\right) + cosy\right)dx + (x + logx - xsiny)\,dy = 0$.	08
Q.8	a	Solve: $(D^3 - 4D^2 + 5D - 2)y = 0$, where $D = \frac{d}{dx}$	06
	b	Solve: $(D^2 - 2D + 1)y = 0$, where $D = \frac{d}{dx}$	06
	c	Solve: $(D^3 - 2D^2 + 4D - 8)y = 0$, where $D = \frac{d}{dx}$	08

Model Question Paper-III

USN | | | | | | | | | | |

MATDIP301

Third Semester B.E./B.Tech. Degree Examination

Advanced Mathematics–I

(Common to 2002/2006/2010 Schemes and Common to all Branches)

TIME: 3 Hours **Max. Marks: 100**

Note: Answer any **FIVE** full questions.

			Marks
Q.1	a	Express the complex number $\frac{3+i}{(4-2i)(1+i)}$ in the form $a+ib$.	06
	b	Find the modulus and amplitude of the complex number $\frac{(2-3i)(2+i)}{1+i}$.	06
	c	(i) Define Complex number. (ii) If $(x+iy)(i-4)=8+15i$, then find the values of x and y.	08
Q.2	a	Find the n^{th} derivative of $\cos(ax+b)$.	06
	b	Find the n^{th} derivatives of $cos^2 3x$.	06
	c	If $y=\sin^{-1}x$, then prove that $(1-x^2)y_{n+2}-(2n+1)xy_{n+1}-n^2y_n=0$.	08
Q.3	a	Find the angle between the radius vector and the tangent for the curve $r^2=a^2\sin 2\theta$.	06
	b	Obtain the Maclaurin's series expansion of e^x, up to the term containing x^4.	06
	c	With usual notations, prove that $tan\,\phi = r\frac{d\theta}{dr}$.	08
Q.4	a	Find $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$, when $f=\log(x^2+y^2)$.	06
	b	If $u=\frac{x^2+y^2}{\sqrt{x+y}}$, then show that $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}=\frac{3}{2}u$.	06
	c	If $u=x-xy, v=xy,$ then find $\frac{\partial(u,v)}{\partial(x,y)}$.	08
Q.5	a	Evaluate $\int_{y=0}^{y=1}\int_{x=0}^{x=6} xy\ dx\,dy$.	06
	b	Evaluate $\int_0^{\pi}\cos^5\left(\frac{x}{2}\right)dx$.	06
	c	Obtain the reduction formula for $\int \sin^n x\ dx$, where n is positive integer.	08
Q.6	a	Evaluate $\int_{x=0}^{x=2}\int_{y=1}^{y=3}\int_{z=1}^{z=2} xy^2z\ dz\,dy\,dx$.	06
	b	Find the value of $\iint_R(x^2y+xy^2)\ dx\,dy$ taken over the region R enclosed by the curves $y=x$ and $y=x^2$.	06
	c	(i) Define Gamma function. (ii) Prove that $\Gamma\left(\frac{1}{2}\right)=\sqrt{\pi}$.	08

Q.7	a	Solve: $\frac{dy}{dx} = \frac{\cos^2 y}{\cos^2 x}$.	06
	b	Solve: $(2xy + y - \tan y)\, dx + (x^2 - x\tan^2 y + \sec^2 y)\, dy = 0.$	06
	c	Solve: $(y^3 - 3x^2y)dx + (3xy^2 - x^3)dy = 0.$	08
Q.8	a	Solve: $\frac{d^3y}{dx^3} + 6\frac{d^2y}{dx^2} + 11\frac{dy}{dx} + 6y = 0.$	06
	b	Solve: $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 9y = 0.$	06
	c	Solve: $\frac{d^3y}{dx^3} + \frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 4y = 0.$	08

Model Question Paper-IV

USN | | | | | | | | | | |

MATDIP301

Third Semester B.E./B.Tech. Degree Examination

Advanced Mathematics–I

(Common to 2002/2006/2010 Schemes and Common to all Branches)

TIME: 3 Hours | **Max. Marks: 100**

Note: Answer any **FIVE** full questions.

			Marks
Q.1	a	Find the modulus and amplitude of the complex number $\frac{(1+i)^2}{3+i}$.	06
	b	Express the complex number $\frac{(3+i)(1-3i)}{2+i}$ in the form $(x+iy)$.	06
	c	i) Define complex number. ii) If $(x+iy)(2-3i)=(4+i)$, find the real values x and y.	08
Q.2	a	Find the n^{th} derivative of $\frac{1}{ax+b}$.	06
	b	Find the n^{th} derivative of $cos^2 5x$.	06
	c	If $y = e^{m\sin^{-1}x}$, then prove that $(1-x^2)y_{n+2} - (2n+1)x\,y_{n+1} - (n^2+m^2)y_n = 0$.	08
Q.3	a	Find the angle between the radius vector and the tangent for the curve $r = a(1+\cos\theta)$ at $\theta = \frac{\pi}{3}$.	06
	b	Obtain the Maclaurin's series expansion of the function e^{ax} up to the term containing x^4.	06
	c	With usual notations, prove that $(i)\ p = r\,sin\phi\ \ (ii)\ \frac{1}{p^2} = \frac{1}{r^2} + \frac{1}{r^4}\left(\frac{dr}{d\theta}\right)^2$.	08
Q.4	a	If $u = e^x x\cos y$, then find $\frac{\partial^2 u}{\partial x \partial y}$.	06
	b	If $u = \cos^{-1}\left(\frac{x+y}{\sqrt{x}+\sqrt{y}}\right)$, then show that $x\frac{\partial u}{\partial y} + y\frac{\partial u}{\partial y} = -\frac{1}{2}\cot u$.	06
	c	If $u = x^2 - 2y,\ v = x + y$, then find $\frac{\partial(u,v)}{\partial(x,y)}$.	08
Q.5	a	Evaluate $\int_{y=1}^{y=2}\int_{x=1}^{x=3} xy^2\,dx\,dy$.	06
	b	Evaluate $\int_0^{2\pi} sin^7\left(\frac{x}{4}\right)dx$.	06
	c	Obtain the reduction formula formula for $\int cos^n x\,dx$, where *n* is positive integer.	08
Q.6	a	Evaluate $\iint_R xy\,dx\,dy$, where $R\ is$ the region in positive quadrant for which $x + y \le 1$.	06
	b	Evaluate $\int_{z=-1}^{z=1}\int_{y=-2}^{y=2}\int_{x=-3}^{x=3} dx\,dy\,dz$.	06
	c	i) Define Beta function. ii) Prove that $\beta(m,n) = \beta(n,m)$.	08

Q.7	a	Solve: $x\frac{dy}{dx} = (1+x)(1+y)$.	06
	b	Solve: $ye^{xy}\,dx + (xe^{xy} + 2y)\,dy = 0$.	06
	c	Solve: $(2x + y + 1)\,dx + (x + 2y + 1)\,dy = 0$.	08
Q.8	a	Solve: $(D^3 - 2D + 4D - 8)y = 0$.	06
	b	Solve: $(D^2 + 6D + 9)y = 0$.	06
	c	Solve: $(D^3 - 7D - 6)y = 0$.	08

Model Question Paper-I

USN | | | | | | | | | | |

MATDIP401

Fourth Semester B.E./B.Tech. Degree Examination

Advanced Mathematics–II

(Common to 2002/2006/2010 Schemes and Common to all Branches)

TIME: 3 Hours | **Max. Marks: 100**

Note: Answer any **FIVE** full questions.

			Marks
Q.1	a	Show that the points A (1,-1,-5), B (3, 1, 3) and C (9, 1,-3) are the vertices of an equilateral triangle.	06
	b	Find the angle between the lines AB and CD where A=(2,3,-1), B=(3,5,-3), C=(1,2,3) and D=(3,5,7)	06
	c	If l, m, n are the direction cosines of a line then prove that $l^2 + m^2 + n^2 = 1$	08
Q.2	a	Find the equation of the plane which passes through the points (3,-3, 1) and parallel to the plane $2x + 3y + 5z + 6 = 0$.	06
	b	Find the equation of the plane passing through the points (1,2,3) (0,1,4) and (0,0,1).	06
	c	Find the angle between the planes $x - y + z - 6 = 0$ and $2x + 3y + z + 5 = 0$.	08
Q.3	a	Find $\vec{a}.\vec{b}$ where $\vec{a} = 3\hat{\imath} + 2\hat{\jmath} - \hat{k}$ and $\vec{b} = \hat{\imath} + 7\hat{\jmath} - \left(\frac{3}{2}\right)\hat{k}$.	06
	b	Find the sine of the angle between $\vec{a} = 2\hat{\imath} - 2\hat{\jmath} + \hat{k}$ and $\vec{b} = \hat{\imath} - 2\hat{\jmath} + 2\hat{k}$.	06
	c	Prove that $[\vec{a} + \vec{b},\ \vec{b}+\vec{c}, \vec{c} + \vec{a}]=2[\vec{a}, \vec{b}, \vec{c}]$.	08
Q.4	a	Find the velocity and acceleration of a particle moves along the curve $\vec{r} = e^{-2t}\hat{\imath} + 2cos5t\hat{\jmath} + 5sin2t\hat{k}$ at any time 't'.	06
	b	If $\vec{F} = (ax + 3y + 4z)\hat{\imath} + (x - 2y + 3z)\hat{\jmath} + (3x + 2y - z)\hat{k}$ is solenoidal, find 'a'.	06
	c	Find Curl $\vec{A}$ where $\vec{A} = xy\hat{\imath} + y^2z\hat{\jmath} + z^2y\hat{k}$.	08
Q.5	a	A particle moves along the curve $\vec{r} = cos2t\hat{\imath} + sin2t\hat{\jmath} + t\hat{k}$. Find its velocity and acceleration.	06
	b	If $\vec{F} = (3x^2y - z)\hat{\imath} + (xz^3 + y^3)\hat{\jmath} - 2x^3z^2\hat{k}$, then find div$\vec{F}$.	06
	c	Find the constants a, b, c such that the vector $\vec{F} = (x + y + az)\hat{\imath} + (x + cy + 2z)\hat{\jmath} + (bx + 2y - z)\hat{k}$ is irrotational.	08
Q.6	a	Find the Laplace transform of $5\sin2t + 3\cos4t$.	06
	b	Find the Laplace transform of $2 + 5t^3 + 4e^{-3t}$.	06
	c	Find the Laplace transform of i) $\cosh2t + 1$ ii) $\sinh3t + e^{2t}$.	08

Q.7	a	Find the Laplace transform of $e^{-3t}cos4t$.	06
	b	Find the Laplace transform of tcosat.	06
	c	Find the inverse Laplace transform of $\frac{5s+1}{s^2+16}$	08
Q.8	a	Apply Convolution theorem, evaluate $L^{-1}\left[\frac{s^2}{(s^2+a^2)(s^2+b^2)}\right]$.	06
	b	Solve: $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = e^{3x}, y(0) = 1,\ y'(0) = 0$, by using Laplace transform method.	06
	c	Find the inverse Laplace transform of $\frac{1}{(s+1)(s-2)}$.	08

Model Question Paper-II

USN | | | | | | | | | | |

MATDIP401

Fourth Semester B.E./B.Tech. Degree Examination

Advanced Mathematics–II

(Common to 2002/2006/2010 Schemes and Common to all Branches)

TIME: 3 Hours | **Max. Marks: 100**

Note: Answer any **FIVE** full questions.

			Marks
Q.1	a	Find the angle between any two diagonals of a cube.	06
	b	Prove that the points A (3,-2, 4), B (1, 1, 1) and C (-1, 4,-2) are collinear.	06
	c	If (l_1, m_1, n_1) and (l_2, m_2, n_2) are the direction cosines of the given two lines and θ be the angle between them, then show that $cos\theta = l_1l_2 + m_1m_2 + n_1n_2$.	08
Q.2	a	Find the equations to the two planes which bisect the angles between the planes $3x - 4y + 5z = 3, 5x + 3y - 4z = 9$.	06
	b	Find the equation of the plane which passes through the points A (0, 1, 1), B (1, 1, 2) and C (-1, 2,-2).	06
	c	Derive the equation of the plane in the intercept form $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$.	08
Q.3	a	If $\vec{a} = 2\hat{\imath} + 3\hat{\jmath} - \hat{k}, \vec{b} = \hat{\imath} - 2\hat{\jmath} + \hat{k}$ and $\vec{c} = 3\hat{\imath} - \hat{\jmath} + 2\hat{k}$ Find $2\vec{a} + 3\vec{b} - 2\vec{c}$.	06
	b	If $\vec{a} = (3, -1,4)$, $\vec{b} = (1,2,3)$ and $\vec{c} = (4,2, -1)$, find $\vec{a} \times (\vec{b} \times \vec{c})$.	06
	c	Find the angle between the vectors $\vec{a} = 5\hat{\imath} - \hat{\jmath} + \hat{k}$ and $\vec{b} = 2\hat{\imath} - 3\hat{\jmath} + 6\hat{k}$.	08
Q.4	a	A particle moves along the curve $\vec{r} = (1 - t^3)\hat{\imath} + (1 + t^2)\hat{\jmath} + (2t - 5)\hat{k}$. Determine its velocity and acceleration.	06
	b	Find the divergence $\vec{F} = (3x^2\mathrm{y} - \mathrm{z})\hat{\imath} + (xz^3 - y^4)\hat{\jmath} - (2x^3z^2)\hat{k}$.	06
	c	Find the curl $\vec{F}$ *where* $\vec{F} = (x + y + 1)\hat{\imath} + \hat{\jmath} - (x + y)\hat{k}$.	08
Q.5	a	If $\vec{r} = x\hat{\imath} + y\hat{\jmath} + z\hat{k}$, show that $curl\ \vec{r} = 0$.	06
	b	Show that the vector field $\vec{F} = (3x + 3y + 4z)\hat{\imath} + (\mathrm{x} - 2\mathrm{y} + 3\mathrm{z})\hat{\jmath} + (3x + 2y - z)\hat{k}$ is solenoidal.	06
	c	A particle moves along the curve $\vec{r} = cos2t\hat{\imath} + sin2t\hat{\jmath} + t\hat{k}$. Find its velocity and acceleration.	08
Q.6	a	Prove that $L[t^n] = \frac{n!}{s^{n+1}}$.	06
	b	Find the Laplace transform of $cos^2 2t$.	06
	c	Find the Laplace transform of i) $cos3t + e^{2t}$ ii)$sin4t + t^3$	08

Q.7	a	Find the Laplace transform of $e^{2t}cost$.	06
	b	Find the Laplace transform of $tsinat$.	06
	c	Find the inverse Laplace transform of $\frac{s^2-3s+4}{s^3}$.	08
Q.8	a	Solve: $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = 4e^{2x}, y(0) = -3,\ y'(0) = 5$, by using Laplace transform method.	06
	b	Find $L^{-1}\left[\frac{s}{(s^2+a^2)^2}\right]$ by using convolution theorem.	06
	c	Find the inverse Laplace transform of $\frac{1}{(s+1)(s+2)}$.	08

Model Question Paper-III

USN | | | | | | | | | | |

MATDIP401

Fourth Semester B.E./B.Tech. Degree Examination

Advanced Mathematics–II

(Common to 2002/2006/2010 Schemes and Common to all Branches)

TIME: 3 Hours | **Max. Marks: 100**

Note: Answer any **FIVE** full questions.

			Marks
Q.1	a	Show that the points A(-4,9,6), B(-1,6,6) and C(0,7,10) form a right angle isosceles triangle.	06
	b	Find the angle between the lines where direction cosines are given by the equations $l + 3m + 5n = 0$and $5lm - 2mn + 6nl = 0$.	06
	c	If a line makes angles $\alpha, \beta, \gamma, \delta$ with four diagonals of a cube, show that $cos^2\alpha + cos^2\beta + cos^2\gamma + cos^2\delta = \frac{4}{3}$.	08
Q.2	a	Find the equation of the plane passing through (2,-2, 1) and parallel to the plane $2x + 3y - z = 5$.	06
	b	Find the angle between the planes $2x + 4y - 6z = 1$ and $3x + 6y + 5z + 4 = 0$.	06
	c	Show that points (2,2,0), (4,5,1), (3,9,4) and (0,-1,-1) are coplanar.	08
Q.3	a	Find the unit normal to both the vectors $4\hat{\imath} - \hat{\jmath} + 3\hat{k}$ and$-2\hat{\imath} + \hat{\jmath} - 2\hat{k}$.	06
	b	Find the angle between the vectors $\vec{a} = 5\hat{\imath} - \hat{\jmath} + \hat{k}$ and$\vec{b} = 2\hat{\imath} - 3\hat{\jmath} + 6\hat{k}$.	06
	c	Prove that$\vec{a} \times (\vec{b} \times \vec{c}) = (\vec{a}.\vec{c})\vec{b} - (\vec{a}.\vec{b})\vec{c}$.	08
Q.4	a	If a particle moves on a circular helix given $x = cos3t, y = sin3t, z = -t$, find its velocity and acceleration.	06
	b	If $\vec{F} = x^2yz\hat{\imath} + xy^2z\hat{\jmath} + xyz^2\hat{k}$, find curl $\vec{F}$.	06
	c	Show that the vector field $\vec{F} = (x + 3y)\hat{\imath} + (y - 2z)\hat{\jmath} + (x - 2z)\hat{k}$ is solenoidal.	08
Q.5	a	A particle moves along the curve$x = 2t^2, y = t^2 - 4t, z = 3t - 5$. Find its velocity and acceleration.	06
	b	Find the value of the constant 'a' such that $\vec{A} = y(ax^2 + z)\hat{\imath} + x(y^2 - z^2)\hat{\jmath} + 2xy(z - xy)\hat{k}$ is solenoidal.	06
	c	Show that the vector field $\vec{V} = (siny + z)\hat{\imath} + (xcosy - z)\hat{\jmath} + (x - y)\hat{k}$ is irrotational.	08
Q.6	a	Find the Laplace transform of $sin^3 2t$.	06
	b	Find the Laplace transform of $costcos2tcos3t$.	06
	c	Find the Laplace transform of i)$sin6t + t^2$ ii)$cos5t + e^{-4t}$.	08

Q.7	a	Find the Laplace transform of $tcosat$.	06
	b	Find the Laplace transform of $e^{-2t}sin4t$.	06
	c	Find the inverse Laplace transform of $\frac{1}{s+2}+\frac{3}{2s+5}-\frac{4}{3s-2}$.	08
Q.8	a	Solve: $\frac{d^2y}{dx^2}-2\frac{dy}{dx}+y=e^x, y(0)=2,\ y'(0)=-1$, by using Laplace transform method.	06
	b	Find $L^{-1}\left[\frac{1}{(s+1)(s^2+1)}\right]$ by using convolution theorem.	06
	c	Find the inverse Laplace transform of $\frac{3s+1}{(s+1)(s+2)}$.	08

Model Question Paper-IV

USN | | | | | | | | | | |

MATDIP401

Fourth Semester B.E./B.Tech. Degree Examination

Advanced Mathematics–II

(Common to 2002/2006/2010 Schemes and Common to all Branches)

TIME: 3 Hours | **Max. Marks: 100**

Note: Answer any **FIVE** full questions.

			Marks
Q.1	a	Find the distance between the points A(1,1,1) and B(2,3,5)	06
	b	Find the angle between the lines whose direction cosines are proportional to (1,2,4) and (-2,1,5).	06
	c	If $cos\alpha, cos\beta, cos\gamma$ are the direction cosines of a line, then prove that $sin^2\alpha + sin^2\beta + sin^2\gamma = 2$.	08
Q.2	a	Find the equation of the plane which passes through the points (3,-3, 1) and is perpendicular to the planes $7x + y + 2z = 6$ and $3x + 5y - 6z = 8$.	06
	b	Find the angle between the planes $2x - y + z = 0$ and $x + y + 2z = 3$.	06
	c	Find the value of λ so the points (1,4,2) (2, λ,3) (-1,0,1) and (1,1,1) are co-planar	08
Q.3	a	Find $\vec{a}.(\vec{b} \times \vec{c})$ and $\vec{b} \times (\vec{a} \times \vec{c})$ where $\vec{a} = \hat{\imath} + \hat{\jmath} - \hat{k}, \vec{b} = 2\hat{\imath} - \hat{\jmath} + 2\hat{k}, \vec{c} = 3\hat{\imath} - \hat{\jmath} - \hat{k}$	06
	b	Find the constant 'a' so that the vectors $2\hat{\imath} - \hat{\jmath} + \hat{k}$, $\hat{\imath} + 2\hat{\jmath} - 3\hat{k}$ and $3\hat{\imath} + a\hat{\jmath} + 5\hat{k}$ are co-planar.	06
	c	Prove that [a×b ,b×c, c×a]=$[abc]^2$.	08
Q.4	a	A particle moves along the curve $x = 1 - t^3$ $y = 1 + t^2$ and $z = 2t - 5$. Determine its velocity and acceleration.	06
	b	If $\vec{F} = (3xz - 3yz)\hat{\imath} + (3y^2 - 3xz)\hat{\jmath} + (3z^3 - 3xy)\hat{k}$, find div$\vec{F}$.	06
	c	If $\vec{F} = (4xy - z^3)\hat{\imath} + x^2\hat{\jmath} - 3xz^2\hat{k}$, prove that $\vec{F}$ is irrotational.	08
Q.5	a	A particle moves along the curve $x = t^3 + 1, y = t^2, z = 2t + 5$ where t is the time. Find its velocity and acceleration.	06
	b	Find the divergence of the vector $\vec{V} = xyz\hat{\imath} + 3x^2y\hat{\jmath} + (xz^2 - y^2z\hat{k})$	06
	c	A vector field is given by $\vec{A} = (x^2 + xy^2)\hat{\imath} + (y^2 + x^2y)\hat{\jmath}$, show that the field $\vec{A}$ is irrotational.	08
Q.6	a	Find the Laplace transform of $sin^2 3t$.	06
	b	Find the Laplace transform of $sint\ sin2t\ sin3t$.	06
	c	Find the Laplace transform of i) $sin4t + e^{-3t}$ ii)$cosh2t + 2$	08
Q.7	a	Find the Laplace transform of $tsint$.	06
	b	Find the Laplace transform of $e^{-2t}[2cos5t - sin5t]$.	06
	c	Find the inverse Laplace transform of $\frac{3s+7}{(s-1)(s+3)}$.	08

Q.8	a	Solve: $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 3y = e^{-x}$, $y(0) = y'(0) = 1$, by using Laplace transform method.	06
	b	Find $L^{-1}\left[\frac{1}{s(s^2+a^2)}\right]$, by using convolution theorem.	06
	c	Find the inverse Laplace transform of $\frac{2s+1}{(s-2)(s-3)}$.	08