# Model Question Paper-I

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

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

## Advanced Mathematics-I

(Common to 2002/2006/2010/2015/2017/2018 Schemes and Common to all Branches)

**TIME: 03 Hours** **Max. Marks: 100**

Note: 01. Answer any **FIVE** full questions.
02. Mathematics formulae handbook is allowed.

| | | Questions | Marks |
|---|---|---|---|
| Q.01 | a | Find the modulus and amplitude of the complex number $\frac{1+2i}{1-3i}$. | 06 |
| | b | Express the complex number $\frac{2+i}{3-i}$ in the form $x+iy$. | 06 |
| | c | Define complex number & find the value of x and y, if $x+iy=(1+i)(4-3i)$. | 08 |
| Q.02 | a | Simplify the complex numbers in $x+iy$ form i) $-6i(2-3i)$, ii) $(10-7i)-(9+5i)$ | 06 |
| | b | Express the complex number $\frac{1}{3+2i}$ in the form $x+iy$. | 06 |
| | c | Find the modulus and amplitude of the complex number $1+i\sqrt{3}$. | 08 |
| Q.03 | a | Find the n$^{th}$ order derivative of $sin(ax+b)$. | 06 |
| | b | With usual notation prove that $tan\emptyset = r\frac{d\theta}{dr}$, where $\emptyset$ is the angle between the radius vector and the tangent. | 06 |
| | c | Find the angle between the radius vector and the tangent for the polar curve $r=a(1-cos\theta)$. | 08 |
| Q.04 | a | Find the angle of intersection for the polar curves $r=2sin\theta$, $r=sin\theta+cos\theta$. | 06 |
| | b | Obtain the Maclaurin's series expansion for the function $cosx$. | 06 |
| | c | Find the n$^{th}$ order derivative of $e^{ax}$. | 08 |
| Q.05 | a | If $u=x^3-3xy^2+x+e^xcosy+1$, then show that $\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}=0$. | 06 |
| | b | If $u=x-xy$ and $v=xy$, then find the value of $\frac{\partial(u,v)}{\partial(x,y)}$. | 06 |
| | c | If $u=f\left(\frac{x}{y},\frac{y}{z},\frac{z}{x}\right)$, then prove that $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}+z\frac{\partial u}{\partial z}=0$. | 08 |

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|---|---|---|---|
| Q.06 | a | If $u = f(x-y, y-z, z-x)$, then show that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$. | 06 |
| | b | Find $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$, when $f = \log(x^2 + y^2)$. | 06 |
| | c | If $x = rcos\theta$ and $y = rsin\theta$, then find the value of $\frac{\partial(x,y)}{\partial(r,\theta)}$. | 08 |
| Q.07 | a | Obtain the reduction formula for $\int sin^n x\, dx$, where n is positive integer. | 06 |
| | b | Evaluate $\int_0^1 \int_x^{\sqrt{x}} xy\, dy\, dx$. | 06 |
| | c | Evaluate $\int_0^{\pi/2} sin^4 x\, dx$ by using reduction formula. | 08 |
| Q.08 | a | Evaluate $\int_1^1 \int_1^3 xy^2\, dx\, dy$. | 06 |
| | b | Define Gamma function and find the value of $\Gamma(6)$. | 06 |
| | c | Derive the relationship between Beta & Gamma functions, $\beta(m,n) = \frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$. | 08 |

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# Model Question Paper-II

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

## Advanced Mathematics-I

(Common to 2002/2006/2010/2015/2018 Schemes and Common to all Branches)

**TIME: 03 Hours** **Max. Marks: 100**

Note: 01. Answer any **FIVE** full questions.
02. Mathematics formulae handbook is allowed.

| Questions | | | Marks |
|---|---|---|---|
| Q.01 | a | Find the modulus and amplitude of the complex number $7-5i$. | 06 |
| | b | Express the complex number $\frac{1+i}{1-i}$ in the form $x+iy$. | 06 |
| | c | Define complex numbers and find the value of x and y, if $(x-iy)(3+5i)=-6+24i$. | 08 |
| Q.02 | a | Simplify the complex numbers in $x+iy$ form i) $(5-2i)+(7+3i)$, ii) $(10-7i)-(9+5i)$ | 06 |
| | b | Express the complex number $\frac{1}{3+2i}$ in the form $x+iy$. | 06 |
| | c | Find the modulus and amplitude of the complex number $1+i\sqrt{3}$. | 08 |
| Q.03 | a | Find the n$^{th}$ order derivative of $cos(ax+b)$. | 06 |
| | b | Obtain the Maclaurin's series expansion of the function $sinx$. | 06 |
| | c | Find the angle between the radius vector and the tangent for the polar curve $r=a(1-cos\theta)$. | 08 |
| Q.04 | a | Find the n$^{th}$ order derivative of $e^{ax}$. | 06 |
| | b | Find the angle between the radius vector and the tangent for the polar curve $r^2cos2\theta=a^2$. | 06 |
| | c | Find the angle of intersection for the polar curves $r=a(1+cos\theta)$, $r=b(1-cos\theta)$. | 08 |
| Q.05 | a | If $u=log\left(\frac{x^2+y^2}{x+y}\right)$, then show that $xu_x+yu_y=1$. | 06 |
| | b | If $u=x+y$, $v=y+z$, $w=z+x$, then find the value of $\frac{\partial(u,v,w)}{\partial(x,y,z)}$. | 06 |
| | c | If $u=f(x-y,y-z,z-x)$, then show that $\frac{\partial u}{\partial x}+\frac{\partial u}{\partial y}+\frac{\partial u}{\partial z}=0$. | 08 |
| Q.06 | a | Find $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$, when $f=\log(x^2+y^2)$. | 06 |
| | b | If $u=x^2-2y$ and $v=xy$, then find the value of $\frac{\partial(u,v)}{\partial(x,y)}$. | 06 |

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|---|---|---|---|
| | c | If $u = f\left(\frac{x}{y}, \frac{y}{z}, \frac{z}{x}\right)$, then prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z} = 0$. | 08 |
| Q.07 | a | Obtain the reduction formula for $\int cos^n x\, dx$, where n is positive integer. | 06 |
| | b | Evaluate $\int_0^1 \int_0^6 xy\, dx\, dy$. | 06 |
| | c | Define Gamma function and find the value of $\Gamma(6)$. | 08 |
| Q.08 | a | Evaluate $\int_1^1 \int_1^3 xy^2\, dx\, dy$. | 06 |
| | b | Evaluate $\int_{-1}^1 \int_{-2}^2 \int_{-3}^3 dx\, dy\, dz$. | 06 |
| | c | Prove that $\Gamma(1/2) = \sqrt{\pi}$. | 08 |

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