SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR
Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (DESCRIPTIVE)

Subject with Code : ENGINEERING MATHEMATICS-III(16HS612)
Course & Branch: B.Tech – AG **Year & Sem:** II-B.Tech& I-Sem **Regulation:** R16

UNIT –I
COMPLEX ANALYSIS-I

1. 1. A) Show that $w = \log z$ is analytic everywhere except at the origin and find $\frac{dw}{dz}$. [5M]

   B) If $f(z)$is the analytic function of z prove that $\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}\right)\log|f(z)|=0$. [5M]

2. A) Show that $u=\frac{x}{x^2+y^2}$ is Harmonic. [5M]

   B) Find the analytic function whose imaginary part is $e^x(x\sin y + y\cos y)$. [5M]

3. A) Determine p such that the function $f(z)=\frac{1}{2}\log(x^2+y^2)+i\tan^{-1}\left(\frac{px}{y}\right)$. [5M]

   B) Find all the values of k, such that $f(x)=e^x(\cos ky+i\sin ky)$. [5M]

4. A) If $f(z)=u+iv$ is an analytic function of z and if $u-v=e^x(\cos y-\sin y)$,
   Find $f(z)$in terms of z. [5M]

   B) Find an analytic function whose real part is $e^{-x}(x\sin y - y\cos y)$. [5M]

5. A) Show that $(z) = z + 2\bar{z}$ is not analytic anywhere in the complex plane. [5M]

   B) Show that $\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}=4\frac{\partial^2}{\partial z\partial \bar{z}}$. [5M]

6. A) Evaluate the line integral $\int_c (y-x-3x^2 i)dz$ where c consists of the line segments from $z=0$ to $z=i$ and the other from $z=i$ to $z=i+1$. [5M]

   B) Evaluate $\int_c \frac{\cos z-\sin z}{(z+i)^3}dz$ with $C:|z|=2$ using Cauchy's integral formula. [5M]

7. A) Evaluate $\int_c \frac{e^{2z}}{(z-1)(z-2)}dz$ where c is the circle $|z|=3$ using Cauchy's integral formula. [5M]

   B) Evaluate $\int_c \frac{dz}{z^3(z+4)}$ where c is the circle $|z|=2$ using Cauchy's integral formula. [5M]

8. Evaluate $\int_0^{1+3i}\left(x^2-iy\right)dz$ along the paths $(i)\ y=x$ $(ii)\ y=x^2$. [10M]

9. A) Evaluate using Cauchy's integral formula $\int_c \frac{\sin^6 z}{\left(z-\frac{\pi}{2}\right)^3}dz$ around the circle $c:|z|=1$. [5M]

B) Evaluate $\int_c \frac{\log\ dz}{(z-1)^3}$ where $c:|z-1|=\frac{1}{2}$ using Cauchy's integral formula. [5M]

10. Let C denote the boundary of the square whose sides lie along the lines $x=\pm2$, Where c is described in the positive sense, evaluate the integrals $(i)\int_c \frac{e^{-z}}{\left(z-\frac{\pi i}{2}\right)}dz$ $(ii)\int_c \frac{\cos z}{z\left(z^2+8\right)}dz$ [10M]

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UNIT-I

1) If $f(z) = z^2$ for all z then $f(z)$ is [ ]
A) Continuous at $z = i$ B) Not Continuous at $z = i$
C) Continuous at $z = 1$ D) None

2) If $z = x + iy$ then $\sin z =$ [ ]
A) $\sin x \cosh y - \cos x \sin hy$ **B)** $\sin x \cosh y + \mathrm{i} \cos x \sin hy$
C) $\sin x \cosh y + \cos x \sin hy$ D) $\sin x \cosh y - i \cos x \sin hy$

3) If $f(z) = |z|^2$ is [ ]
A) Analytic everywhere **B)** not analytic everywhere
C) Not differentiable at $z = 0$ D) None

4) Cauchy-Riemann equations are [ ]
A) $u_x = v_y$ & $u_y = -v_x$ B) $u_x = v_y$ & $u_y = v_x$
C) $u_x = v_x$ & $u_y = -v_x$ D) $u_x = -v_y$ & $u_y = -v_x$

5) The period of $\sin z$ is [ ]
A) 0 B) π C) $\frac{\pi}{2}$ **D)** 2π

6) Functions which satisfy Laplacian equations in a region R are called [ ]
A) analytic B) *not* analytic **C)** Harmonic D) *None*

7) An analytic function with constant modulus is a [ ]
A) constant function B) *function of x* C) *function of y* D) *None*

8) Imaginary part of $\cos z$ is [ ]
A) $\sin x \cosh y$ **B)** $-\sin x \sin hy$ C) $\sin hy \cosh y$ D) $\cos x \cosh y$

9) $\sin iz =$ [ ]
A) $-i\sin hy$ B) $\sin hy$ C) $i\cos hy$ **D)** $i\sin hy$

10) The value of k so that $x^2 + 2x + ky^2$ may be harmonic is [ ]
A) 0 **B)** -1 C) 2 D) *none*

11) If $w = \log z$ is analytic everywhere except at $z =$ [ ]
A) 0 B) 1 C) 2 D) 3

12) If $z = x + iy$ then $\cos z =$ [ ]
A) $\sin x \cosh y - \cos x \sin hy$ **B)** $\cos x \cosh y - \mathrm{i} \sin x \sin hy$
C) $\cos x \cosh y + \cos x \sin hy$ D) $\sin x \cosh y - i \cos x \sin hy$

13) The value of k so that $x^3 + 3kxy^2$ may be harmonic is [ ]
A) 0 **B)** -1 C) 2 D) *none*

14) If $f(z)$ is analytic function in a simply connected domain D&C is any simple Curve then $\int f(Z)dz =$ [ ]
A) 0 B) -1 C) 2 D) *none*

15) The curves $u(x,y) = C_1$ and $v(x,y) = C_2$ are orthogonal if $u + iv$ is [ ]
A) analytic B) *not* analytic C) Harmonic D) *None*

16) If $u + iv$ is analytic then $v - iu$ is [ ]
A) analytic B) *not* analytic C) Harmonic D) *None*

17) A harmonic function is that which is [ ]
A) Harmonic B) *not* analytic **C)** analytic D) *None*

18) An analytic function with constant imaginary part is [ ]
A) constant B) analytic C) Harmonic D) *None*

19) If $f(z)$ is analytic and equals $u(x,y) + iv(x,y)$ then $f^1(z) =$ [ ]
A) $u_x + iv_x$ **B)** $v_y - iv_x$ C) $v_y + iv_x$ D) *none*

20) $\cos iz =$ [ ]
A) $-isin\, hy$ B) $sin\, hy$ C) $icos\, hy$ **D)** $cos\, hy$

21) The period of $\sin z$ is [ ]
A) 0 B) π C) $\frac{\pi}{2}$ **D)** 2π

22) If $\underset{z \to z_0}{Lt} f(z)$ exists then that limit is__________ [ ]
A) Not unique **B)** Unique C) Twice D) *None*

23) Solution set of $\sin z = 0$ is [ ]
A) $z = 2n\pi$ B) $z = n\pi$ C) $z = (2n+1)\frac{\pi}{2}$ D) *None*

24) If $z = x + iy$ then $\overline{\cos z} =$_____________ [ ]
A) $\cos \bar{z}$ B) $\sin z$ C) $\cos z$ D) None

25) Imaginary part of $\sin \bar{z} =$_____________ [ ]
A) $\sin x\, coshy$ B) $-\sin x \sin hy$ C) $\sin hy\, coshy$ **D)** $-\cos x \sinh y$

26) If $f(z) = z^3$ is [ ]
A) Analytic everywhere B) not analytic everywhere
C) Not differentiable at $z = 0$ D) None

27) Arg z is [ ]
A) Differential in every domain **B)** Not differential any where
C) Differential only at origin D) None

28) Polar form of Cauchy-Riemann equations are [ ]
A) $ru_r = v_\theta, rv_r = -u_\theta$ B) $ru_r = v_\theta, rv_r = u_\theta$
C) $ru_r = -v_\theta, rv_r = -u_\theta$ D) $ru_r = -v_\theta, rv_r = u_\theta$

29) If $f(z) = z^2\bar{z}$ is [ ]
A) Not differentiable at $z = 0$ B) not analytic everywhere
C) Analytic everywhere D) None

30) Real part of $\cos z$ is [ ]
A) $\sin x \cosh y$ B) $-\sin x \sin hy$ C) $\sin hy \cosh y$ **D)** $\cos x \cosh y$

31) The period of tanz is [ ]
A) 0 **B)** π C) $\frac{\pi}{2}$ D) 2π

32) If $f(z) = \operatorname{Re}(z)$ is [ ]
A) analytic B) *not* analytic **C)** not differentiable D) *None*

33) A point at which $f(z)$ fails to be analytic is called [ ]
A) Singular point of $f(z)$ B) null point of $f(z)$
C) Non-Singular point of $f(z)$ D) none

34) If $f(z) = \sinh z$ is [ ]
A) not analytic everywhere **B)** Analytic everywhere
C) Not differentiable at $z = 0$ D) None

35) The period of the function e^{iz} is [ ]
A) 0 B) π C) $\frac{\pi}{2}$ **D)** 2π

36) If $z = x + iy$ then $\overline{\sin z} =$ _____________ [ ]
A) $\sin z$ **B)** $\sin \bar{z}$ C) $\cos z$ D) None

37) Solution set of $\cos z = 0$ is [ ]
A) $z = 2n\pi$ B) $z = n\pi$ C) $z = (2n+1)\frac{\pi}{2}$ D) *None*

38) $\frac{x^2}{\sinh^2 \beta} + \frac{y^2}{\sinh^2 \beta} =$ [ ]
A) 1 B) -1 C) 0 D) 2

39) If $\sin(\alpha + i\beta) = x + iy$ then $\frac{x^2}{\sin^2 \alpha} + \frac{y^2}{\cos^2 \alpha} =$ [ ]
A) 1 B) -1 C) 0 D) 2

40) If $e^{\bar{z}} =$ ____________ [ ]
A) 1 B) $e^{\bar{z}}$ C) 0 D) e^{z}

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UNIT –II
COMPLEX ANALYSIS-II

1. A) Determine the poles of the function $f(z)=\frac{z^2}{(z-1)^2(z+2)}$ and the residues at each pole [5M]

   B) Find the residue of the function $f(z)=\frac{1}{(z^2+4)^2}$ where c is $|z-i|=2$. [5M]

2. A) Find the residues of $f(z)=\frac{z^2}{1-z^4}$ at these singular points which lie inside the circle $|z|=5$

   B) Find the residues of $f(z)=\frac{z^2}{z^2+a^2}$ at $|z|=ai$. [5M]

3. A) Determine the poles of the function $f(z)=\frac{z^2+1}{z^2-2z}$ and the residues at each pole. [5M]

   B) Determine the poles and residues of tan hz. [5M]

4. A) Evaluate $\int_{-\infty}^{\infty}\frac{\cos ax}{x^2+1}dx, a>o$. [5M]

   B) Find the residue of the function $f(z)=\frac{e^{2z}}{z(z-3)}$ where $C:|z|=2$. [5M]

5. Evaluate $\int_0^{\pi}\frac{1}{a+b\cos\theta}d\theta=,\frac{\pi}{\sqrt{a^2+b^2}}, a>b>0$. [10M]

6. Show that $\int_0^{\pi}\frac{\cos 2\theta}{1+2a\cos 2\theta+a^2}d\theta=,\frac{2\pi a^2}{1-a^2},(a^2<1)$ using residue theorem. [10M]

7. A) Find the bilinear transformation which maps the point's $(\infty, i, 0)$ in to the points$(0, i, \infty)$ [5M]

   B) Find the bilinear transformation that maps the point's $(0,1, i)$ in to the points $1+i, -i, 2-i$ in W-plane [5M]

8. A)By the transformation $w=z^2$, show that the circles $|z-a|=c$ (a, c being real) in the Z-plane corresponds to the limacons in the w-plane. [5M]

   B) Find the image of the region in the z-plane between the lines $y=0$ & $y=\frac{\pi}{2}$ under the transformation $w=e^z$. [5M]

9. A)Find the bilinear transformation which maps the points $(\infty, i, 0)$ in to the points $(-1, -1, 1)$ in w-plane. [5M]
   B) Find the bilinear transformation that maps the point's $(1, i, -1)$ in to the points $(2, i, -2)$ in w-plane [5M]
10. A) The image of the infinite strip bounded by $x=0$ & $x=\frac{\pi}{4}$ under the transformation $w = \cos z$
    B) Prove that the transformation $w = \sin z$ maps the families of lines $x = y = constant$ into two families of confocal central conics. [5M]

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UNIT-II
COMPLEX ANALYSIS-II

1) If $\underset{z\to a}{Lt}\, f(z)$ does not exist then $z = a$ is__________ sngularity [ ]
A) Pole B) Removable **C)** Isolated essential D) None

2) The function e^z has an isolated singularity at z= [ ]
A) 1 **B)** ∞ C) 0 D) None

3) The limit point of a sequence of poles of a function f(z) is [ ]
A) Pole B) Removable **C)** Isolated essential D) None

4) The value of $\int_c \frac{e^z}{(z-3)^2}dz,\ C:|z| = 2$ is [ ]
A) 1 **B)** 0 C) πi D) None

5) The pole of $f(z) = \frac{e^z}{(z)(z+3)}$ is [ ]
A) 1,3 B) $-1,0$ C) 2,3 **D)** $0,-3$

6) The pole of $f(z) = \frac{z}{(z-1)(z-3)}$ is [ ]
A) 1,3 B) $-1,0$ C) 2,3 D) $-1,-3$

7) The pole of $f(z) = \frac{z+1}{(z-0)(z-3)}$ is [ ]
A) 0,3 B) $-1,0$ C) 2,3 D) $0,-3$

8) The residue of $f(z) = \frac{1}{(z^2+4)^2}$ at the pole $z = 2i$ is [ ]
A) $-32i$ B) $32i$ **C)** $\frac{1}{32i}$ D) $\frac{-1}{32i}$

9) The residue of $f(z) = \frac{z^2}{z^4-1}$ at the pole $z = 1$ is [ ]
A) -4 B) $4i$ **C)** $\frac{1}{4}$ D) $\frac{-1}{4}$

10) A pole of order 1 is called [ ]
A) Simple B) Not simple C) Isolated D) None

11) If $\underset{z\to a}{Lt}\, f(z) = \infty$ then $z = a$ exists is__________ [ ]
A) Pole B) Removable C) Isolated D) None

12) If $\underset{z\to a}{Lt}\, f(z)$ exists finitely then $z = a$ is__________ sngularity [ ]
A) Pole **B)** Removable C) Isolated D) None

13) The value of $\int_c \frac{dz}{z+2} dz,\ C:|z|=1$ is [ ]

A) 1 **B)** 0 C) πi D) None

14) The pole of $f(z)=\frac{e^z}{(z+4)(z+1)}$ is [ ]

A) 0,-4 B) 0,4 C) 1,-4 **D)** -4,-1

15) The residue of $f(z)=\frac{e^z}{(z+4)z}$ at the pole z=0 is [ ]

A) $\frac{1}{4}$ B) 4 C) $-\frac{1}{4}$ D) -4

16) If $f(z)$ has a simple pole at $z=a$ then $\operatorname{Res}_{z=a} f(z)=$ [ ]

A) 0 B) $\underset{z\to a}{Lt}(z+a)f(z)$ **C)** $\underset{z\to a}{Lt}(z-a)f(z)$ D) None

17) Is cross ration of four points invariant under the transformation is [ ]

A) Bilinear B) Inverse Bilinear C) conformal D) None

18) The image of the line $y=c$ under the mapping $w=\sin z$ is [ ]

A) Parabola **B)** ellipse C) Hyperbola D) None

19) The cross ratio of the four points z_1, z_2, z_3, z_4 is [ ]

A) $\frac{(z_1-z_2)(z_3-z_4)}{(z_2-z_3)(z_4-z_1)}$ B) $\frac{(z_1z_2)(z_3z_4)}{(z_2-z_3)(z_4-z_1)}$ C) $\frac{(z_2-z_3)(z_4-z_1)}{(z_1-z_2)(z_3-z_4)}$ D) None

20) The bilinear transformation maps inverse points of a circle into [ ]

A) Inverse points B) constant C) singular point D) None

21) The image of the line $y=c$ under the mapping $w=\cos z$ is [ ]

A) Parabola **B)** ellipse C) Hyperbola D) None

22) The type of singularity of the function $\frac{1}{1-e^z}$ at $z=2\pi i$ is_______ [ ]

A) Simple pole B) Not simple pole **C)** Isolated essential D) None

23) At $z=0$ $f(z)=\frac{\sin z}{z}$ has a singularity at which is called_______ [ ]

A) Simple pole B) Not simple pole
C) Isolated essential **D)** Removable

24) The residue of $f(z)=\frac{e^z}{(z-1)z}$ at the pole z=0 is [ ]

A) 1 **B)** -1 C) 0 D) None

25) The image of the line $x=k$ under the mapping $w=\sin z$ is [ ]

A) Parabola B) ellipse **C)** Hyperbola D) None

26) The pole of $f(z)=\frac{z}{(z+4)^2(z-1)}$ is [ ]

A) 0,-4 B) 0,4 **C)** 1,-4 D) -4,-1

27) Under the transformation $w = z^2$ is conformal everywhere except at_____ [ ]
A) Entire w-plane B) Origin C) Infinite strip D) None

28) The type of singularity of the function $\sin\frac{1}{1-z}$ at $z=1$ is_______ [ ]
A) Simple pole **B)** Isolated essential **C)** Not simple pole D) None

29) $f(z)=\frac{\sin z}{z}$ has a singularity at $z=0$ which is called_______ [ ]
A) Simple pole B) Not simple pole
C) Isolated essential **D)** Removable

30) The image of the line $x=k$ under the mapping $w=\cos z$ is [ ]
A) Parabola B) ellipse **C)** Hyperbola D) None

31) The pole of $f(z)=\frac{z}{(z+4)(z+1)}$ is [ ]
A) 0,-4 B) 0,4 C) 1,-4 **D)** -4,-1

32) If $f(z)$ has a simple pole at $z=-a$ then $\operatorname{Res}_{z=-a} f(z)=$ [ ]
A) 0 **B)** $\underset{z\to -a}{Lt}(z+a)f(z)$ C) $\underset{z\to -a}{Lt}(z-a)f(z)$ D) None

33) If $f(z)$ has a simple pole at $z=-2$ then $\operatorname{Res}_{z=-2} f(z)=$ [ ]
A) 0 **B)** $\underset{z\to -2}{Lt}(z+2)f(z)$ C) $\underset{z\to -2}{Lt}(z-2)f(z)$ D) None

34) The value of $\int_c \frac{dz}{z-5}dz,\ C:|z|=1$ is [ ]
A) 1 B) πi **C)** 0 D) None

35) The residue of $f(z)=\frac{z^2}{z^2+a^2}$ at the pole $z=ia$ is [ ]
A) $\frac{ia}{3}$ B) $-\frac{ia}{3}$ C) $\frac{a}{3}$ **D)** $\frac{ia}{2}$

36) The pole of $f(z)=\frac{z}{z^2+1}$ is [ ]
A) $\pm i$ B) 0,i C) ± 1 D) None

37) The pole of $\int_c \frac{z^2+2z-2}{z(z-4)(z-1)}dz$ is [ ]
A) 0,4,-1 B) 0,-4,1 **C)** 0,4,1 D) 0,-4,-1

38) The bilinear transformation $w=\frac{az+b}{cz+d}$ is conformal if [ ]
A) $ad-bc\neq 0$ B) $ad-bc=0$ C) $ab-cd=0$ D) $ab-cd\neq 0$

39) The pole of $f(z)=\frac{z}{z^2+4}$ is [ ]
A) $\pm 2i$ B) 0,2i C) ± 2 D) None

40) If $ad-bc=0$ then $\frac{b}{a}=\frac{d}{c}$ then every point of z-plane is a [ ]
A) Inverse points **B)** Critical points C) singular point D) None

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UNIT –III

1. Find a positive root of $x^3 - x - 1 = 0$ correct to two decimal places by bisection method.
2. Find out the square root of 25 given $x_0 = 2.0$, $x_0 = 7.0$ using bisection method. [10M]
3. Find out the root of the equation $x\log_{10}(x) = 1.2$ using false position method. [10M]
4. Find the root of the equation $xe^x = 2$ using Regula-falsi method. [10M]
5. Find a real root of the equation $xe^x - \cos x = 0$ using Newton- Raphson method. [10M]
6. Using Newton-Raphson Method
   A) Find square root of 10. B)Find cube root of 27. [10M]
7. From the following table values of x and $y = tanx$ interpolate values of y when $x = 0.12$ *and* $x = 0.28$ [10M]

x	0.10	0.15	0.20	0.25	0.30
y	0.1003	0.1511	0.2027	0.2553	0.3093

8. A) Using Newtons forward interpolation formula., and the given table of value

x	1.1	1.3	1.5	1.7	1.9
f(x)	0.21	0.69	1.25	1.89	2.61

   Obtain the value of f(x) when x=1.4 [5M]

   B) Evaluate $f(10)$ given $f(x) = 168,192,336$at$x = 1,7,15$ respectively, use Lagrange Interpolation. [5M]
9. A) Use Newton's Backward interpolation formula to find $f(32)$ given$f(25) = 0.2707, f(30) = 0.3027\ f(35) = 0.3386, f(40) = 0.3794$ [5M]
   B) Find the unique polynomial $P(X)$ of degree 2 or less such that $P(1) = 1\ P(3) = 27, P4 = 64$ using Lagrange's interpolation formula. [5M]
10. A) Using Lagrange's interpolation formula, find the parabola passing through the points (0,1),(1,3) and (3,55) [5M]
    B) For x=0,1,2,3,4 ; $f(X) = 1,14,15,5,6$ find $f(3)$ using forward difference table. [5M]

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UNIT-III

1) Example of a transcendental equation [ ]
   A. $f(x)=x\log x-1.2=0$ B. $f(x)=x^3-x-1=0$
   C. $f(x)=x^2+x-7=0$ D. None
2) If first two approximation x_0 and x_1 are roots of $x^3-9x+1=0$ are 0 and 1 by Bisection method then x_2 is [ ]
   A.1.5 B. 2.5 **C.** 0.5 D. 3.5
3) Example of a algebraic equation [ ]
   A. $f(x)=x\log x-1.2=0$ **B.** $f(x)=x^3-x-1=0$
   C. $f(x)=x^2\tan x+1=0$ D. None
4) In case of Bisection method, the convergence is [ ]
   A. linear B. 3 **C.** very slow D. quadratic
5) Bisection method is used for [ ]
   A. Solution of algebraic or transcendental equation B. Integration of a function
   C. Differential of a function D. Solution of a function
6) For ------------ method of solution of equations of the form f(x) =0 approximation x_0 is to be very close to the root and $f(x_n)\neq 0$ [ ]
   A. Bolzano B. Newton-Raphson C.Secent D. Chord
7) If the two roots are 1 &2 of $x^3-x-4=0$ by Bisection method then x_1 is [ ]
   A.1.5 B. 2.5 C. 0.5 D. 3.5
8) Example of a transcendental equation [ ]
   A. $f(x)=c_1e^x+c_2e^{-x}=0$ B. $f(x)=x^2+x-7=0$ C. $f(x)=x^2+5x-7=0$ D. None
9) If first two approximation x_0 and x_1 are roots of $2x-\log_{10}^{x}=7$ are 3.5 and 4 by Bisection method then x_2 is [ ]
   A. 1.75 B. 2.75 **C.** 3.75 D. 4.75
10) If first two approximation x_0 and x_1 are roots of $x^3-9x+1=0$ are 0 and 1 by Bisection method then x_2 is [ ]
    A.1.5 B. 2.5 C. 0.5 D. 3.5
11) If first two approximation x_0 and x_1 are roots of $x^3-x-4=0$ are 1 and 2 by Bisection method then x_2 is [ ]
    A.1.5 B. 2.5 C. 0.5 D. 3.5

12) The order of convergence in Newton-Raphson method is [ ]
A. 1 B. 3 C. 0 D.2

13) The Newton-Raphson method fails when [ ]
A. $f^1(x)$ is negative B. $f^1(x)$ is zero C. $f^1(x)$ is too large D. Never fails

14) In case of Bisection method, the convergence is [ ]
A. linear B. 3 C. very slow D. quadratic

15) Under the conditions that f(A) and f(B) have opposite signs and a<b, the first approximation of one of the roots f(x)=0, by Regula-Falsi method is given by [ ]
A. $x_1 = \frac{af(a) - bf(b)}{f(a) - f(b)}$ B. $x_1 = \frac{af(b) - bf(a)}{f(b) - f(a)}$
C. $x_1 = \frac{af(a) + bf(b)}{f(a) + f(b)}$ D. $x_1 = \frac{af(b) - bf(a)}{f(b) + f(a)}$

16) For ----------- method of solution of equations of the form f(x) =0 approximation x_0 is to be very close to the root and $f(x_n) \neq 0$ [ ]
A. Bolzano B. Newton-Raphson C.Secent D. Chord

17) In the bisection method of solution of an equation of the form f(x) = 0 the convergence of the sequence $\langle x_n \rangle$ of midpoints to a root of f(x) = 0 in an interval (a,B) where f(A)f(B)<0 is [ ]
A. Assured and very fast B. Not assured but very fast
C. Assured but very slow D. Independent on the sequence of point

18) Newton-Raphson method is used for [ ]
A. Solution of algebraic or transcendental equation B. Integration of a function
C. Differential of a function D. Solution of a function

19) In the method of False position for solution of an equation of the form f(x) = 0 the convergence of the sequence $\langle x_n \rangle$ iterates to a root of f(x) = 0 is [ ]
A. Assured and very fast B. Not assured but very fast
C. Assured but slow D. Independent on the sequence of point

20) 12. In Newton –Raphson method we approximate the graph of f by suitable [ ]
A. Chords B.Tangents C. Secants D. Parallel

21) Newton's iterative formula for finding a root of f(x) = 0 is [ ]
A. $x_{n+1} = x_n + \frac{f(x_n)}{f''(x_n)}$ B. $x_{n+1} = x_n - \frac{f(x_n)}{f''(x_n)}$
C. $x_{n+1} = x_n + \frac{f(x_n)}{f'(x_n)}$ D. $x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$

22) Newton-Raphson method is also called [ ]
A. Method of tangent B. Method of false position
C. Method of chord D. Method of secants

23) Among the method of solution of equation of the form f(x) = 0 the one which is used commonly for its simplicity and great speed is ---method [ ]
A. Secant B. Regula falsi C. Newton – Rasphson D. Bolzano

24) The Regula Falsi method is related to ________ at a point of the curve [ ]
A. Chord B. Ordinate C. Abscissa D. Tangent

25) The Newton – Raphson method is related to ________ at a point of the curve [ ]
A. Chord B. Ordinate C. Abscissa D. Tangent

26) Newton's iterative formula for finding the square root of a positive number N is [ ]

A. $x_{i+1} = \frac{1}{2}\left(x_i - \frac{N}{x_i}\right)$ B. $x_{i+1} = \frac{1}{2}\left(x_i + \frac{N}{x_i}\right)$

C. $x_{i+1} = \left(x_i - \frac{N}{x_i}\right)$ D. $x_{i+1} = 2\left(x_i + \frac{N}{x_i}\right)$

27) Newton's iterative formula for finding the reciprocal of a number N is [ ]

A. $x_{n+1} = \left(x_n - \frac{N}{x_n^2}\right)$ B. $x_{n+1} = x_n\left(2 - \frac{N}{x_n}\right)$

C. $x_{n+1} = x_n(2 - Nx_n)$ D. $x_{n+1} = x_n(2 + Nx_n)$

28) Regula- falsi method is used for [ ]
A. Solution of algebraic or transcendental equation B. Integration of a function
C. Differential of a function D. Solution of a function

29) The cube root of 24 by Newton's formula taking $x_0 = 3$ is__________ [ ]
A.1.889 B.2.889 C.5.889 D.4.889

30) The square root of 35 by Newton's formula taking $x_0 = 6$ is__________ [ ]
A.7.916 B.5.916 C.6.916 D.4.916

31) If first two approximation x_0 and x_1 are roots of $xe^x = 2$ are 0 and 1 by Regula-falsi method then x_2 is [ ]
A. 0.13575 B. 0.33575 C. 0.73575 D. 0.53575

32) If first two approximation x_0 and x_1 are roots of $x^3 - x - 4 = 0$ are 1 and 2 by Regula-falsi method then x_2 is [ ]
A.4.666 B. 2.666 C. 3.666 D. 1.666

33) Newton's iterative formula for finding the pth root of a positive number N is [ ]

A. $x_{n+1} = \frac{1}{p}\left((p-1)x_n + \frac{N}{x_n^{p-1}}\right)$ B. $x_{n+1} = \frac{1}{p}\left((p-1)x_n - \frac{N}{x_n^{p-1}}\right)$

C. $x_{n+1} = p\left((p-1)x_n - \frac{N}{x_n^{p-1}}\right)$ D. $x_{n+1} = \left((p-1)x_n - \frac{N}{x_n^{p-1}}\right)$

34) The general iteration formula of the Regula Falsi method is [ ]

A. $x_{n+1} = x_n + \frac{x_n - x_{n-1}}{f(x_n) - f(x_{n-1})} f(x_n)$ B. $x_{n+1} = x_n + \frac{x_n + x_{n-1}}{f(x_n) - f(x_{n-1})} f(x_n)$

C. $x_{n+1} = x_n - \frac{x_n - x_{n-1}}{f(x_n) - f(x_{n-1})} f(x_n)$ D. $x_{n+1} = x_n - \frac{x_n - x_{n-1}}{f(x_n) + f(x_{n-1})} f(x_n)$

35) If first approximation root of $x^3 - 5x + 3 = 0$ is $x_0 = 0.64$ then x_1 by Newton-Raphson method is [ ]

A.4.6565 B. 2.6565 C. 3.6565 D. 0.6565

36) Newton's iterative formula to find the value of $\sqrt{N}$ is [ ]

A. $x_{n+1} = \frac{1}{2}\left(x_n + \frac{N}{x_n}\right)$ B. $x_{n+1} = \frac{1}{2}\left(x_n - \frac{N}{x_n}\right)$

C. $x_{n+1} = \left(x_n - \frac{N}{x_n}\right)$ D. $x_{n+1} = 2\left(x_n - \frac{N}{x_n}\right)$

37) If first approximation root of $x^2 - 10 = 0$ is $x_0 = 3.8$ then x_1 by Newton-Raphson method is [ ]

A.0.215 B. 1.215 C. 2.215 D. 3.215

38) Newton's iterative formula to find the value of $\sqrt[3]{N}$ is [ ]

A. $x_{n+1} = \frac{1}{3}\left(2x_n + \frac{N}{x_n^2}\right)$ B. $x_{n+1} = \frac{1}{3}\left(2x_n - \frac{N}{x_n^2}\right)$

C. $x_{n+1} = \left(2x_n - \frac{N}{x_n^2}\right)$ D. $x_{n+1} = 3\left(2x_n + \frac{N}{x_n^2}\right)$

39) 36. If first two approximation x_0 and x_1 are roots of $2x - \log_{10}^{x} = 7$ are 3.5 and 4 by Regula- Falsi method then x_2 is [ ]

A. 1.7888 B. 2.7888 C. 3.7888 D. 4.7888

40) If first approximation root of $\cos x - x^2 - x = 0$ is $x_0 = 0.5$ then x_1 by Newton-Raphson method is [ ]

A.0.5514 B. 1.5514 C. 2.5514 D. 3.3314

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QUESTION BANK (DESCRIPTIVE)

Subject with Code : ENGINEERING MATHEMATICS-III(16HS612)
Course & Branch: B.Tech – AG **Year & Sem:** II-B.Tech& I-Sem **Regulation:** R16

UNIT –IV

1. Fit the curve $y = ae^{bx}$ to the following data. [10M]

X	0	1	2	3	4	5	6	7	8
Y	20	30	52	77	135	211	326	550	1052

2. A)Fit the exponential curve of the form $y = ab^x$ for the data [5M]

X	1	2	3	4
Y	7	11	17	27

B) Fit a straight line y=a+bx from the following data [5M]

X	0	1	2	3	4
Y	1	1.8	3.3	4.5	6.3

3. Fit a second degree polynomial to the following data by the method of **least squares** [10M]

X	0	1	2	3	4
Y	1	1.8	1.3	2.5	6.3

B) Fit a straight line y=ax+b from the following data [5M]

X	6	7	7	8	8	8	9	9	10
Y	5	5	4	5	4	3	4	3	3

4. A) Fit a Power curve to the following data [5M]

X	1	2	3	4	5	6
Y	2.98	4.26	5.21	6.10	6.80	7.50

B) Fit a second degree polynomial to the following data by the method of **least squares** [5M]

X	0	1	2	3	4
Y	1	5	10	22	38

5. A) Fit the curve of the form $y = ae^{bx}$ [5M]

X	77	100	185	239	285
Y	2.4	3.4	7.0	11.1	19.6

B) Fit the curve of the form $y = ab^x$ for [5M]

X	2	3	4	5	6
Y	8.3	15.4	33.1	65.2	127.4

6. A) Using Simpson's $\frac{3}{8}$ rule, evaluate $\int_0^6 \frac{1}{1+x^2}dx$ [5M]

B) Evaluate $\int_0^1 \sqrt{1+x^3}\,dx$ taking h =0.1 using Trapizoidal rule [5M]

7. Dividing the range into 10 equal parts ,find the value of $\int_0^{\pi/2} \sin x\,dx$ using Simpson's $\frac{1}{3}$ rule.

8. Evaluate $\int_0^1 \frac{1}{1+x}dx$ [10M]

i) By trapezoidal rule and Simpson's $\frac{1}{3}$ rule.

ii) Using Simpson's $\frac{3}{8}$ rule and compare the result with actual value.

9. A) Compute $\int_0^4 e^x dx$ by Simpson's $\frac{1}{3}$ rule with 10 subdivisions. [5M]

B) .Find $\int_3^7 x^2 \log x\,dx$, using Trapezoidal rule and Simpson's rule by 10 sub divisions. [5M]

10. A) Evaluate approximately,by Trapizoidal rule, $\int_0^1 (4x-3x^2)dx$ by taking n=10. [5M]

B) Evaluate $\int_0^1 e^{-x^2} dx$ taking h = 0.25 using Simpson's $\frac{1}{3}$ rule [5M]

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QUESTION BANK (DESCRIPTIVE)

Subject with Code : ENGINEERING MATHEMATICS-III(16HS612)
Course & Branch: B.Tech – AG **Year & Sem:** II-B.Tech& I-Sem **Regulation:** R16

UNIT –IV

1. The $(n+1)^{th}$ order difference of a polynomial of n^{th} degree is__________ [ ]
   A) Polynomial of n^{th} degree B) polynomial of first degree C) constant **D)** Zero
2. The n^{th} order difference of a polynomial of n^{th} degree is__________ [ ]
   A) Polynomial of $(n-1)^{th}$ degree **B)** constant C) polynomial of first degree D)None
3. While evaluating a definite integral by Trapezoidal rule, the accuracy can be increased by taking ____number of subintervals. [ ]
   A) Larger B)smaller C) Medium D)None
4. In Simpson's 3/8 rule the number of subintervals should be ____________ [ ]
   A) Even B) Odd C) Multiples of 8 **D)** Multiples of 3
5. . In Simpson's 1/3 rule the number of subintervals should be ____________ [ ]
   A) Even B) Multiples of 3 C) Odd D) None
6. The following formula is used for unequal intervals of x values [ ]
   A) Newton's forward **B)**Langrange's C) Newton's backward D)None
7. The principle of least squares states that [ ]
   A) Sum of residuals is minimum B) Sum of residuals is maximum
   C) Sum of squares of the residuals is minimum D) None
8. If $y = a_1 + a_2 x$ the second normal equation by least square method is_ [ ]
   A) $\sum y = na_1 + a_2 \sum x$ **B)** $\sum xy = a_1 \sum x + a_2 \sum x^2$ C) $\sum xy = na_1 + a_2 \sum x$ D) None
9. If y=6.077,Y= ln(y) then Y=……… [ ]
   A) 0.8045 **B)** 1.8045 C) 2.8045 D) 3.8045
10. If y=4.077,Y= ln(y) then Y=……… [ ]
    A) 1.040 **B)** 1.405 C) 0.4059 D) None
11. If y=8.3,Y= logy then Y=……… [ ]
    A) 0.9191 B) 9.191 C) 0.0919 D) None
12. If $y = a + bx$ the first normal equation by least square method is____ [ ]
    A) $\sum y = na + b\sum x$ B) $y = a\sum x^2 + b\sum x^3$ C) $\sum y = na + b$ D) None
13. If $y = a + bx + cx^2$ the second normal equation by least square method is____ [ ]
    A) $\sum xy = a\sum x + b\sum x^2 + c\sum x^3$ B) $\sum y = a\sum x + b\sum x^2 + c\sum x^3$
    C) $\sum xy = na + b\sum x + c\sum x^2$ D) $\sum xy^2 = a\sum x + b\sum x^2 + c\sum x^3$

14. If $y = ax^2 + bx + c$ the third normal equation by least square method is____ [ ]

A) $\sum xy = a\sum x + b\sum x^2 + c\sum x^3$ B) $\sum y = a\sum x^2 + b\sum x + nc$

C) $\sum y = na + b\sum x + c\sum x^2$ D) $\sum xy^2 = a\sum x + b\sum x^2 + c\sum x^3$

15. In Simpson's $\frac{1}{3}$ rule state that $\int_a^b f(x)\,dx =$ [ ]

A) $\frac{h}{2}[(y_0 + y_n) + 2(y_1 + y_2 + \dots\dots\dots + y_{n-1})]$ B) $\frac{h}{3}[(y_0 + y_n) + 2(y_1 + y_2 + \dots\dots\dots + y_{n-1})]$

C) $\frac{h}{3}[(y_0 + y_n) + 2(y_2 + y_4 + \dots\dots) + 4(y_1 + y_3 + \dots)]$ D) None

16. The value of $\int_0^1 1/(1+x)\,dx$ by Simpson's 1/3 rule(take n=4) is [ ]

A) 0.6931 B) 0.5 C) -0.6931 D) None

17. If $y = ax^2 + bx + c$ the second normal equation by least square method is____ [ ]

A) $\sum xy = a\sum x^3 + b\sum x^2 + c\sum x$ B) $\sum y = a\sum x + b\sum x^2 + c\sum x^3$

C) $\sum xy^2 = na + b\sum x + c\sum x^2$ D) $\sum xy^2 = a\sum x + b\sum x^2 + c\sum x^3$

18. If $\sum x_i = 15, \sum y_i = 30, \sum x_i y_i = 110, \sum x_i^2 = 55, n = 4$ and $y = a_0 + a_1 x$ Then $a_0 =$ [ ]

A) 2.2 B) 1.52 C) 1.2 **D)** 0

19. If $y = a_0 x^2 + a_1 x + a_2$ the second normal equation by least square method is____ [ ]

A) $\sum xy = a_0\sum x^3 + a_1\sum x^2 + a_2\sum x$ B) $\sum x^2 y = a_0\sum x^4 + a_1\sum x^3 + a_2\sum x^2$

C) $\sum y = a_0\sum x^3 + a_1\sum x^2 + a_2\sum x$ D) $\sum xy = a_0\sum x^3 + a_1\sum x^2 + na_2$

20. If $\sum x_i = 15, \sum y_i = 30, \sum x_i y_i = 110, \sum x_i^2 = 55, n = 5$ and $y = a_0 + a_1 x$ Then $a_0 =$ [ ]

A) 2.2 B) 1.52 C) 1.2 **D)** 0

21. The Exponential curve is ……………….. [ ]

A) $y = ax^b$ B) $y = -ax^b$ **C)** $y = ae^{bx}$ D) None

22. The power curve is ……………….. [ ]

A) $y = ax^b$ B) $y = ab^x$ C) $y = -ax^b$ D) None

23. If $y = a + bx$ the second normal equation by least square method is____ [ ]

A) $\sum y = na + b\sum x$ B) $y = a\sum x^2 + b\sum x^3$ **C)** $\sum xy = a\sum x + b\sum x^2$ D) None

24. If $y = a + bx$ the first normal equation by least square method is____ [ ]

A) $\sum y = na + b\sum x$ B) $y = a\sum x^2 + b\sum x^3$ C) $\sum y = na + b$ D) None

25. In Simpson's 3/8 rule the number of subintervals should be _________ [ ]

A) Even B) Odd **C)** Multiples of 3 D) None

26. By Trapezoidal rule, $\int_a^b f(x)dx =$ [ ]

A) $\frac{h}{2}[(y_0 + y_n) + 2(y_1 + y_2 + ... + y_{n-1})]$ B) $\frac{h}{2}[(y_0 + y_n) - 2(y_1 + y_2 + ... + y_{n-1})]$

C) $\frac{h}{2}[(y_0 - y_n) + 2(y_1 + y_2 + ... + y_{n-1})]$ D) $\frac{h}{2}[(y_0 - y_n) - 2(y_1 + y_2 + ... + y_{n-1})]$

27. In Simpson's $\frac{1}{3}$ rule state that $\int_a^b f(x)\mathrm{d}x =$ [ ]

A) $\frac{h}{3}[(y_0 + y_n) + 2(y_2 + y_4 + ...) + 4(y_1 + y_3 + ...)]$ B) $\frac{h}{3}[(y_0 + y_n) + 2(y_1 + y_2 + ... + y_{n-1})]$

C) $\frac{h}{2}[(y_0 + y_n) + 2(y_1 + y_2 + ... + y_{n-1})]$ D) None

28. In the general quadrature formula n=3 gives [ ]
A) Trapezoidal rule B) Simpson's $\frac{1}{3}$ rule **C)** Simpson's $\frac{3}{8}$ rule D) Weddle's rule

29. The value of $\int_1^2 1/x\,\mathrm{d}x$ by Trapezoidal rule(take n=4) is [ ]
A) 0.6931 B) 0.5 C) -0.6931 D) None

30. The value of $\int_0^1 \frac{dx}{1+x^2}$ by Simpson's $\frac{1}{3}$ rule (take n=4) is [ ]
A) 0.6854 **B)** 0.7854 C) 0.8854 D) 0.9854

31. The value of $\int_0^1 1/(1+x)\,\mathrm{d}x$ by Simpson's 1/3 rule(take n=4) is [ ]
A) 0.6931 B) 0.5 C) -0.6931 D) None

32. The value of $\int_0^1 x^3 dx$ by Trapezoidal rule (take n=4) is [ ]
A) 0.25 B) 1.25 C) 2.25 D) 3.25

33. Equation of the straight is [ ]
A) $y = ax - b$ B) $y = a - bx$ **C)** $y = a + bx$ D) $y = a + bx^2$

34. If $y = ax^b$ the first normal equation is $\sum \log y =$ _____ (n=No.of points given) [ ]
A) $na + b\sum x$ B) $n\log a + b\sum x$ C) $a\sum x + b\sum \log x$ **D)** $n\log a + b\sum \log x$

35. In Simpson's $\frac{3}{8}$ rule state that $\int_a^b f(x)\mathrm{d}x =$ [ ]

A) $\frac{3h}{8}[(y_0 + y_n) + 3(y_1 + y_2 + y_4 .... + y_{n-1}) + 2(y_3 + y_6 + y_9 .... + y_n)$

B) $\frac{h}{3}[(y_0 + y_n) + 2(y_2 + y_4 + ...) + 4(y_1 + y_3 + ...)]$

C) $\frac{h}{3}[(y_0 + y_n) + 2(y_2 + y_4 + ...) + 4(y_1 + y_3 + ...)]$ D) None

36. If y=9.3,Y= logy then Y=……… [ ]
   A) 0.9685 B) 0.9685 C) 0.9685 D) 0.9685

37. 7. In simpson's $\frac{1}{3}$ rule the number of sub intervals should be [ ]
   A) even B)odd C)multiple of 3 D) None

38. In simpson's $\frac{1}{3}$ rule the number of ordinates should be ` [ ]
   A) Even B) odd C) multiple of 3 D) None

39. In simpson's $\frac{3}{8}$ rule the number of sub intervals should be [ ]
   A) Even B) odd C) multiple of 3 D) None

40. The value of $\int_0^1 1/(1+x)$ dx by simpson's 1/3 rule(take n=4) is [ ]
   A) 0.693 B) 0.589 C) 0.456 D) 56

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QUESTION BANK (DESCRIPTIVE)

Subject with Code : ENGINEERING MATHEMATICS-III(16HS612)
Course & Branch: B.Tech – AG **Year & Sem:** II-B.Tech& I-Sem **Regulation:** R16

UNIT –V

1. a) Tabulate y (0.1), y (0.2), and y (0.3) using Taylor's series method given that $y^1 = y^2 + x$ and y(0) = 1 [5M]

   B) Find the value of y for x=0.4 by Picard's method given that $\frac{dy}{dx}$ = x^2+y^2, y(0)=0 [5M]

2. Using Taylor's series method find an approximate value of y at x = 0.2 for the D.E $y^1 - 2y = 3e^x$, y(0) = 0. Compare the numerical solution obtained with exact solution.[10M]

3. A)Solve $y^1 = x + y$, given y (1)=0 find y(1.1) and y(1.2) by Taylor's series method [5M]

   B) Obtain y(0.1) given $y^1 = \frac{y - x}{y + x}$,y(0)=1 by Picard's method . [5M]

4. A) Given that $\frac{dy}{dx}$ =1+xy and y (0) =1 compute y(0.1),y(0.2) using Picard's method [5M]

   B) Solve by Euler's method $\frac{dy}{dx} = \frac{2y}{x}$ given y(1) =2 and find y(2). [5M]

5. A)Using Runge-Kutta method of second order, compute y(2.5) from $y^1 = \frac{y + x}{x}$ y(2)=2, taking h=0.25 [5M]

   B) Solve numerically using Euler's method $y' = y^2 + x$, y(0)=1. Find y(0.1) and y(0.2) [5M]

6. A)Using Euler's method, solve numerically the equation y^1=x+y , y(0)=1 [5M]

   B) Solve y^1= y-x^2 , y (0) =1 by Picard's method up to the fourth approximation. Hence find the value of y (0.1), y (0.2). [5M]

7. A) Use Runge- kutta method to evaluate y(0.1) and y(0.2) given that y^1=x+y , y(0)=1 [5M]

   B) Solve numerically using Euler's method $y' = y^2 + x^2, y(0) = 1.$ Find y(0.1)and y(0.2) [5M]

8. A)Using R-K method of 4th order , solve $\frac{dy}{dx}=\frac{y^2-x^2}{y^2+x^2}$, y(0)=1 Find y(0.2) and y(0.4) [6M]

B)Obtain Picard's second approximate solution of the initial value problem

$$\frac{dy}{dx}=\frac{x^2}{y^2+1}, y(0)=0$$ [4M]

9. Using R-K method of 4th order find y(0.1),y(0.2) and y(0.3) given that $\frac{dy}{dx}=1+xy, y(0)=2$

10. A)Find y(0.1) and y(0.2) using R-K 4th order formula given that $y^1=x^2-y$ and y(0)=1 [5M]

B) Using Taylor's series method, solve the equation $\frac{dy}{dx}=x^2+y^2$ for x = 0.4 given that y = 0 when x = 0. [5M]

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QUESTION BANK (DESCRIPTIVE)

Subject with Code : ENGINEERING MATHEMATICS-III(16HS612)
Course & Branch: B.Tech – AG **Year & Sem:** II-B.Tech& I-Sem **Regulation:** R16

UNIT –V

1) Successive approximations are used in [ ]
   A) Milne's method **B)** Picard's method C) Taylor series method D) none
2) Which of the following in a step by step method: [ ]
   A) Taylor's series B) Adam's bashforth C)Picard's D) none
3) Runge-kutta method is self starting method: [ ]
   A) true B) false C) we can't say D) none
4) The second order Runga-kutta formula is [ ]
   A) Euler's method B) Newton's method
   C) Modified Euler's method D) none
5) Euler's nth term formula is [ ]
   A) $y_n = y_{n-1} + hf(x_{n-1}, y_{n-1})$ B) $y_{n+1} = y_{n-1} + hf(x_{n-1}, y_{n-1})$
   C) $y_n = y_n + hf(x_n, y_{n-1})$ D) none
6) Which of the following is best for solving initial value problems. [ ]
   A) Euler's method B) Modified Euler's method
   C) Taylor's series method **D)** Runge-kutta method of order 4
7) To obtain reasonable accuracy value in Euler's method, we have to h value is [ ]
   A) Small B) large C) 0 D) none
8) If' 'n' conditions are specified at the initial point, then it is called [ ]
   A) Initial value problem B) final value problem
   C) Boundary value problem D) None
9) If 'n' conditions are specified at two or more points, then it is called [ ]
   A) Initial value problem B) final value problem
   C) Boundary value problem D) None
10) The first order Runga-kutta formula is [ ]
   A) Euler's method B) Newton's method
   C) Modified Euler's method D) None
11) The second order Runge-Kutta formula is y_1 =__________ [ ]
   A) $y_0 + (k_1 + k_2)$ B) $y_0 - (k_1 + k_2)$ **C)** $y_0 + \frac{1}{2}(k_1 + k_2)$ D) $y_0 - \frac{1}{2}(k_1 + k_2)$
12) The n^{th} difference of a n^{th} degree polynomial is _______________ [ ]
   A) Constant B) Zero C) one D) None
13) Successive approximations used in ___________method [ ]
   A) Euler's B) Taylor's **C)** Picard's D) R-K
14) The taylor's for f(x) =log (1+x) is …… [ ]
   A) $x - \frac{x^2}{2} + \frac{x^3}{3} - \ldots\ldots.$ B) $x + \frac{x^3}{3} - \ldots\ldots.$ C) Both a and b D) None

15) Solve $y^1 = x + y, y(0) = 1$, find $y_1 = y(0.1)$ by using Euler's method [ ]
A) 1.1 B) 1.26 C) 2.1 D) 1.86

16) The R-K method is a ……………….. method [ ]
A) Picard's method B) Euler's method
C) Milne's method **D)** self- starting method

17) Using Euler's method $y^1 = \frac{y-x}{y+x}$, y(0)=1 and h=0.02give y_1=……. [ ]
A) 0.02 B) 1.02 C) 2.02 D) 3.02

18) Using Euler's method $y^1 = \frac{y-x}{y+x}$, y(0)=1 then the picard's method the value of $y^1(x)$ =……… [ ]
A) 1 +2log(1+x) **B)** 1-x+2log(1+x) C) x+2log(1+x) D) None

19) If $\frac{dy}{dx}$ = x-y and y(0)=1 then by picard's method the value of $y^1(1)$ is … [ ]
A) 0.905 B) 1.905 C) 2.905 D) None

20) Euler's first approximation formula is [ ]
A) $y_1 = y_1 + hf(x_1, y_1)$ B) $y_1 = y_1 + hf(x_0, y_0)$
C) $y_1 = y_0 + hf(x_0, y_0)$ D) $y_0 = y_0 + hf(x_0, y_0)$

21) Second order R-K Method formula is [ ]
A) $y_1 = y_0 + \frac{1}{2}(k_1 + k_2)$ B) $y_1 = y_0 + \frac{1}{4}(k_1 + 4k_2 + k_3)$
C) $y_1 = y_0 + \frac{1}{6}(k_1 + k_2)$ D) $y_1 = y_1 + \frac{1}{2}(k_1 + k_2)$

22) The integrating factor of $\frac{dy}{dx} - y = x$ [ ]
A) e^{2x} B) e^{-2x} C) e^{x} **D)** e^{-x}

23) The second order Runge-Kutta formula is y_1 =__________ [ ]
A) y_0 +(k_1 + k_2) B) y_0 - (k_1 + k_2) **C)** $y_0 + \frac{1}{2}(k_1 + k_2)$ D) $y_0 - \frac{1}{2}(k_1 + k_2)$

24) Using Euler's method $y^1 = \frac{y-x}{y+x}$,y(0)=1 and h=0.02give y_1=……. [ ]
A) 0.02 **B)**1.02 C)2.02 D) 3.02

25) Runge-kutta method is self starting method: [ ]
A) False B) we can't say **C)** True D) None

26) The integrating factor of $\frac{dy}{dx} + y = x$ [ ]
A) e^{2x} B) e^{-2x} **C)** e^{x} D) e^{-x}

27) Using Euler's method $y^1 = \frac{y-x}{y+x}$,y(0)=1 and h=0.02give y_1=……. [ ]
A) 0.02 **B)**1.02 C)2.02 D) 3.02

28) If $\frac{dy}{dx}$ = x-y and y(0)=1 then by Picard's method the value of $y^1(1)$ is … [ ]
A) 0.905 B) -0.905 C) 1.905 D) None

29) If $y' = -y, y(0) = 1$ by Euler's method the value of $y(0.1)$is [ ]
A) 0.9 B) 0.1 C) -1 D) -0.9

30) If $\frac{dy}{dx} = 1 + xy, y(0) = 1$ then by Picard's method the value of $y^1(x)$ is… [ ]
A) $1 + x + \frac{x^2}{2}$ B) $1 - x - \frac{x^2}{2}$ C) $1 + \frac{x^2}{2}$ D) $x + \frac{x^2}{2}$

31) The integrating factor of $\frac{dy}{dx}+\frac{y}{x}=x$ [ ]

A) x^2 B) $\log x$ **C)** x D) e^{-x}

32) If $\frac{dy}{dx}=\frac{y^2-x^2}{y^2+x^2}, y(0)=1$,and h=0.2 then the value of k_1 in 4^{th} order R-K method is

A) 0 B)0.1 **C)**0.2 D) 0.3 [ ]

33) Using Euler's method $y^1= \frac{y-x}{y+x}$,y(0)=1 and h=0.01 give y_1=……. [ ]

A) 0.01 **B)** 1.01 C) 2.01 D) 3.01

34) If $\frac{dy}{dx}=y-x^2, y(0)=1$, then by Picard's method the value of $y^1(x)$ is…. [ ]

A) $1-x+\frac{x^2}{2}$ **B)** $1+x-\frac{x^3}{3}$ C) $1-x-\frac{x^3}{3}$ D) $-1+x+\frac{x^2}{2}$

35) The integrating factor of $\frac{dy}{dx}-\frac{y}{x}=x$ [ ]

A) x^2 **B)** $-x$ C) x D) e^{-x}

36) The Third order R-K formula is ……………….. [ ]

A) $y_1=y_0+\frac{1}{6}(k_1+k_2+k_3)$ B) $y_1=y_0+\frac{1}{6}(k_1-4k_2+k_3)$

C) $y_1=y_0+\frac{1}{6}(k_1+4k_2+k_3)$ D) $y_1=y_0+\frac{1}{6}(k_1+k_2+4k_3)$

37) Using Euler's method $y^1= \frac{y-x}{y+x}$,y(0)=1 and h=0.04give y_1=……. [ ]

A) 0.04 **B)**1.04 C)2.04 D) 3.04

38) If $\frac{dy}{dx}$ = x-y and y(0)=1 then by Picard's method the value of $y^1(0.2)$ is … [ ]

A) 0.72 B) -0.72 C) 0.82 D) None

39) If $y'=-y, y(0)=0$ by Euler's method the value of $y(0.1)$is [ ]

A) 0.9 B) 0.1 C) -1 **D)** 0

40) If $\frac{dy}{dx}=x+y, y(0)=1$, then by Picard's method the value of $y^1(x)$ is…. [ ]

A) $1-x+\frac{x^2}{2}$ B) $1+x-\frac{x^2}{2}$ **C)** $1+x+\frac{x^2}{2}$ **D)** $-1+x+\frac{x^2}{2}$

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