POKHARA UNIVERSITY

Level: Bachelor
Programme: BE
Course: Engineering Mathematics I

Semester: Fall

Year : 2020
Full Marks: 100
Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) When a function f(x) is said to be continuous at a point. A function is defined as, $f(x) = \begin{cases} 2x+1 \text{ when } x<1 \\ 3 \text{ when } x=1 \\ x^2+2 \text{ when } x>1 \end{cases}$. Show that *f(x)* is continuous and differentiable at the given point. 8

OR

State Leibnitz theorem for successive derivative of the product of two functions. If $y = \sin^{-1}x$, show that

(i) $(1-x^2)\, y_2 - xy_1 = 0$

(ii) $(1-x^2)\, y_{n+2} - (2n+1)\, xy_{n+1} - n^2 y_n = 0.$

(iii) $(y_{n+2})_0 = (n^2 y_n)_0$

b) State and prove Lagrange's mean value theorem. Verify Langrange's Mean Value Theorem for the function $f(x) = x(x-1)(x-2)$ in $[0, \frac{1}{2}]$. 7

2. a) Define indeterminate forms. State L'Hospital rule and hence evaluate $\lim_{x \to 0} \frac{(1+x)^{1/x} - e}{x}$ 7

b) Define asymptotes and its types. Find the asymptotes of the curve $(x^2-y^2)^2-8(x^2+y^2)+8x-16=0.$ 8

OR

Find the altitude of the right circular cone of maximum value that can be inscribed in a sphere of radius a.

3. Integrate: (any three)

i) $\int \frac{1}{1+3e^x+2e^{2x}}\, dx$

ii) $\int_0^a \frac{dx}{x+\sqrt{a^2-x^2}}$

iii) $\int \frac{dx}{2+\cos x+\sin x}$

iv) $\int_0^1 \sqrt{x}\, dx$ (by summation method)

4. a) Find the area bounded by the curves $x + y^2 = 0$ and $x + 3y^2 = 0$.

OR

Find the volume of the solid generated by revolving the asteroid $x^{2/3} + y^{2/3} = a^{2/3}$ about the x- axis.

b) Use Trapezoidal and Simpson's rule with $n = 6$ to find the approximate area between the curve $y = \sin x$ ordinates $x = 0$, $x = \pi$ and x – axis and compare the result with exact value.

5. a) Define conic section and classify them with respect to eccentricity. Find center, foci, vertices, equation of directrix of the conic section $4x^2+y^2-16x+4y+16=0.$

b) Find the equation of plane through (1, 0 , –1) and (–1, 2 , 1) and parallel to the line of intersection of the planes $3x + y - 2z = 0$ and $4x - y + 3z = 0$.

6. a) Find the equation of the plane through the points (2,4,5) and perpendicular to the line $\frac{x-5}{1} = \frac{y-1}{3} = \frac{z}{4}$ (by vector method).

b) Define vector product of three vectors. Show that the vectors $\vec{a} \times (\vec{b} \times \vec{c}), \vec{b} \times (\vec{c} \times \vec{a})$, and $\vec{c} \times (\vec{a} \times \vec{b})$, are coplanar.

7. Attempt all the questions:

a) Find radius of curvature $y^2=4ax$ at (x,y)

b) Find the domain and range of function $f(x) = (\sqrt{x})^2$

c) Find the value of p, when the vectors $2\vec{i} - p\vec{j} + \vec{k}$, $5\vec{i} + \vec{j} + 2\vec{k}$ and $\vec{i} + 6\vec{k}$ are coplanar.

d) Evaluate improper integral $\int_0^\infty \frac{1}{x^2+9}\, dx$.

POKHARA UNIVERSITY

Level: Bachelor Semester: Fall Year : 2019
Programme: BE Full Marks: 100
Course: Engineering Mathematics I Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) State Leibnitz's theorem for successive derivative of product of two functions y = u,v If $y=\left(x+\sqrt{1+x^2}\right)^m$, show that $\left(1+x^2\right)y_{n+2}+(2n+1)xy_{n+1}+\left(n^2-m^2\right)y_n=0$ 8

OR

Show that the function $f(x)=\begin{cases} x & for \quad x<1 \\ 2-x & for \quad 1\le x\le 2. \\ x-\dfrac{x^2}{2} & for \quad x>2 \end{cases}$ L.H.D. R.H.D

is continuous at x =1 & x=2. Does f'(x) exists at these points.

b) State Rolle's theorem with its geometrical meaning. Also verify the theorem for the function $f(x)=(x-a)^m(x-b)^n$ 7

2. a) State L'Hospital rule. Prove that: $\lim_{x\to 0}(cotx)^{sin2x}=1$. 7

b) Find the asymptotes of given curve $x^2(x-y)^2-a^2(x^2+y^2)=0$ 8

OR

Find the total surface area of the right circular cylinder of greatest surface that can be inscribed in a given sphere of radius r.

3. Integrate (Any Three) 15

a) $\int\frac{dx}{4+5\sin x}$ b) $\int_0^a\frac{dx}{x+\sqrt{a^2-x^2}}$

b) $\int_1^2 \frac{dx}{(x+1)\sqrt{x^2-1}}$ 5

c) $\int_0^1 \frac{\log(1+x)dx}{1+x^2}$ 5

d) $\int_a^b sinx dx$ by using summation method

4. a) Find the area of the region in the first quadrant bounded by the line y=x, x=2 and the curve $y=1/x^2$ and the x- axis. 7

OR

Find the volume of the solid revolution of the triangular region bounded by 2x+3y=6, y=x and x=0 about the x- axis.

b) Find approximate area bounded by given curves $y = \sqrt{x} + 3$ from x = 1 to x = 4, by using Simpson's and Trapazoidal rule with n = 4. Compare these values with exact value. 8

5. a) Find by vector method the equation of the plane which passes through the points (1, 1, -1), (2, 0, 2) and (0, -2, 1). 8

b) What does scalar triple product give ? Also prove $\vec{a} \times (\vec{b} \times \vec{c}) = (\vec{a}.\vec{c})\vec{b} - (\vec{a}.\vec{b})\vec{c}$ 7

6. a) Define eccentricity of a conic section and classify conic sections. Find the condition that the line lx + my + n = 0 may be a tangent to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$. 8

b) Derive the equation of the ellipse in its standard form $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$. 7

7. Attempt all : 2.5 ×4

a) Find domain and range of the function $y = \sqrt{9-x}$.

b) Find radius of curvature of the curve $x= a(\theta+ \sin\theta)$, $y= a(1-\cos\theta)$ at $\theta = 0$.

c) What will be the equation of the curve $x^2 + y^2 - 10x - 12y + 36 = 0$ if the origin is shifted to (5, 6) ?

d) If $\vec{a} = \vec{c} + 2\vec{j} + \vec{k}$, $\vec{b} = \vec{i} + \vec{j} + \vec{k}$, find projection of $\vec{a}$ on $\vec{b}$.

Kabil Karki

A straight line is said to be an asymptote to a given curve if the perpendicular distance from point p(x,y) on the curve to st. line tends to zero when x or y or both tends to infinity.

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Programme: BE
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POKHARA UNIVERSITY

Level: Bachelor | Semester – Fall | Year : 2008
Programme: BE | | Full Marks: 100
Course: Engineering Mathematics I | | Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt all the questions.

29. a) If a function f (x) is derivable at a point x = c, Show that f(x) is continuous at x = c. By taking suitable example, show that the converse may not be true. 8

OR

State Leibnitz theorem for successive derivative of the product of two functions. If $y = (\sin^{-1} x)^2$, prove that $(1 - x^2)y_2 - xy_1 - 2 = 0$ and hence show that $(1 - x^2)y_{n+2} - (2n+1)xy_{n+1} - n^2y_n = 0$.

b) State and prove Lagrange's mean value theorem. Verify it, for $f(x) = e^x$ in [0, 1]. 7

30. a) A cylindrical tin can closed at both ends with given capacity has to be constructed. Show that the amount of tin required will be minimum when the height is equal to the diameter. 8

OR

Define asymptotes of a curve. Find the asymptotes of

$$y^3 + x^2y + 2xy^2 - y + 1 = 0$$

b) Evaluate $\lim_{x \to 0} (\cos x)^{\cot^2 x}$ 7

31. Evaluate *Any Three* 3×5

a) $\int \frac{\cos x\, dx}{\sqrt{2\sin^2 x + 3\sin x + 4}}$ $= \frac{1}{\sqrt{2}} \log\left(\sin x + \frac{3}{4} + \sqrt{\sin^2 x + \frac{3}{2}\sin x + 2}\right)$

b) $\int \frac{dx}{4 + 5\sin x}$

c) $\int_0^1 \frac{\log(1+x)\,dx}{1+x^2}$ $\Rightarrow \frac{\pi}{8}\log(2)$

let $x = \tan\theta$

d) Evaluate $\int_a e^{-x}\,dx$ by summation method.

32. a) Find the area inside the circle $x^2 + y^2 = 1$ and the outside the 7

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parabola $y^2 = 1 - x$. Also sketch the bounded region.

OR

Find the volume of the solid generated by revolving the region bounded between $x^2 = 4y$ and $y = |x|$, revolving about $y = -2$. 7

b) Find the approximate area by using Simpson's and trapezoidal rule for the region bounded by the curve $y = x^2$, the x-axis, $x = 0$ and $x = 2$, with $n = 4$ and compare with exact value. 8

33. a) Define scalar triple product and prove geometrically that scalar triple product represents the volume of the parallelopiped. Also prove that in a scalar triple product the position of dot and cross can be interchanged. 8

b) Find the equation of the plane through (3, 2, 1) and (1, 2, 3) which is perpendicular to the plane $4x - y + 2z = 7$. 7

34. a) Define conic section by their eccentricity and classify them. Derive standard equation of parabola $y^2 = 4ax$. 7

b) Find the condition, when the line $lx + my + n = 0$ touches the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$. Also find their point of contact. 8

35. Short questions: 5×2

a) Find the radius of curvature of $y = 4\sin x - \sin 2x$ at $x = \frac{\pi}{2}$

b) Find the foci of the hyperpola $9x^2 - 25y^2 = 225$

c) Find the length of the arc of the parabola $y^2 = 4x$ from (0, 0) to (1, 2)

d) Show that the vectors $\vec{a} = \vec{i} - \vec{j} + 2\vec{k}$, $\vec{b} = 4\vec{j} + 2\vec{k}$ and $= -10\vec{j} - 2\vec{j} + 4\vec{k}$ are orthogonal. $\vec{a}\cdot\vec{b} = \vec{b}\cdot\vec{c} = \vec{c}\cdot\vec{a} = 0$

e) What will be the equation of the curve $x^2 + y^2 - 10x - 12y + 36 = 0$ if the origin is shifted to (5, 6)?

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Level: Bachelor	Semester – Spring	Year : 2009
Programme: BE		Full Marks: 100
		Pass Marks : 45
Course: Engineering Mathematics I		Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

36. a) Show that the function 7

$$f(x) = \begin{cases} x & for \quad x < 1 \\ 2 - x & for \quad 1 \le x < 2 \\ -2 + 3x - x^2 & for \quad x \ge 2 \end{cases}$$

is continuous at $x = 1$ but not differentiable at $x = 1$.

OR

If $y = \sin^{-1} x$, show that

i. $(1 - x^2)\, y_2 - xy_1 = 0$

ii. $(1 - x^2)\, y_{n+2} - (2n + 1)\, xy_{n+1} - n^2 y_n = 0$

b) State and prove Lagrange's Mean value theorem. 8

Let $f(x) = (x-2)^{\frac{2}{3}}$ with x in [1, 4] can Lagrange's Mean value theorem be applied in this function ? If not why ?

37. a) An open tank of a given volume consists of a square base with vertical sides. Show that the expense of lining the tank with lead will be least if the height of the tank is half of the width. 8

OR

Define asymptotes of the curves with different types. Find asymptotes of $x^3 - y^3 = 3y(x + y)$.

b) Evaluate $\lim_{x \to e} (\log x)^{\frac{1}{1-\log x}}$ 7

38. Integrate:

a. $\int \frac{dx}{5 + 4\cos x}$ 5

b. $\int_0^a \frac{dx}{x+\sqrt{a^2-x^2}}$ 5

c. $\int_0^1 \frac{\log(1+x)dx}{1+x^2}$ 5

39. a) Find the area bounded by the line $x+y=2$, on the left by $x^2=y$ and below by x axis, by sketching neat diagram. 7

5/6

OR

Find the volume of the solid generated by revolving the region in first quadrant bounded above by $x^2=y$, below by x axis and on the right by the line x = 1, about the line x = -1. 8

b) Find approximate area bounded by given curves $y=\sqrt{x}$ from x = 1 to x = 4, by using Simpson's and Trapazoidal rule with n = 4. Compare these values with exact value.

40. a) Find by vector method the equation of the plane which passes through the points (1, 1, -1), (2, 0, 2) and (0, -2, 1). 8

b) What does scalar triple product give? Explain geometrically and prove that 7

$(\vec{b}\times\vec{c})\times(\vec{c}\times\vec{a})=|\vec{a}\ \vec{b}\ \vec{c}|\vec{c}$.

41. a) Define eccentricity of a conic section and classify conic sections. Find the condition that the line $lx+my+n=0$ may be a tangent to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$. 8

b) Derive the equation of the hyperbola in its standard form $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$. 7

42. Attempt all: 2x5

a) Find domain and range of the function $y=\sqrt{4-x}$.

b) Find radius of curvature of the curve $x=a\cos\theta$, $y=a\sin\theta$.

c) What will be the equation of the curve $x^2+y^2-10x-12y+36=0$ if the origin is shifted to (5, 6)?

d) If $\vec{a}=\vec{c}+2\vec{j}+\vec{k}$, $\vec{b}=\vec{i}+\vec{j}+\vec{k}$, find unit vector along $\vec{a}\times\vec{b}$.

e) If f(x) = tanx. Is Rolle's theorem applicable in [0, π]. Give reasons.

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Level: Bachelor | Semester – Fall | Year : 2009
Programme: BE | | Full Marks : 100
Course: Engineering Mathematics I | | Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. a. Define Continuity of a function at a point. Let f(x) 8

$$f(x)=\begin{cases}4-x^2 & for\ x<2\\ x-2 & for\ x\geq 2\end{cases}$$

Show that f(x) is continuous at x=2 but not differentiable at x=2.

OR

If $y=\sin^{-1}x$, show that

i) $(1-x^2)y_2-xy_1=0$

ii) $(1-x^2)y_{n+2}-(2n+1)xy_{n+1}-n^2y_n=0$

b. State and prove Cauchy Mean value theorem. Also verify Cauchy Mean value theorem for $f(x)=x$, $g(x)=x^2$; $x\in[-2,0]$ 7

2. a. Evaluate $\lim_{x\to 0}\left(\frac{\sin x}{x}\right)^{\frac{1}{x^2}}$ 7

b. A square piece of tin of side 18 cm is to be made into a box without lid, cutting a square from each corner and folding up the flaps to form the box. What should be the side of the square to be cut off so that the value of box is maximum possible? 8

OR

Find the radius of curvature at origin of the following curves.

$y^2-2xy-3x^2-4x^3-x^2y^2=0$

3. Integrate (any three) 15

i) $\int\frac{1}{4+5\sin x}dx$ ii) $\int_0^1 x^3dx$ (by the method of summation)

projection of $\vec{a}$ on $\vec{b}$ $=\frac{\vec{a}\cdot\vec{b}}{|\vec{b}|}$

$\vec{i}\times\vec{i}=\vec{j}\times\vec{j}=\vec{k}\times\vec{k}=0$

$\vec{i}\times\vec{j}$, $\vec{j}\times\vec{k}$

$\vec{k}$ $\vec{i}$

$\vec{i}\cdot\vec{i}=\vec{j}\cdot\vec{j}=\vec{k}\cdot\vec{k}=1$

$\vec{i}\cdot\vec{j}=0$

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iii) $\int_0^1 \frac{\log(1+x)dx}{1+x^2}$ iv) $\int \frac{x}{\sqrt{x^2+4x+5}}dx$

19/3

4. a. Find the area bounded by the curve on the left by the parabola $x=y^2$, on the right by the line y=x-2 and below by the x-axis. 7

OR

Find the volume of the solid generated by revolving the region bounded by $y=\sqrt{x}$ and the lines below by y = 1, x = 4 about the line y = 1. 8

b. Evaluate $\int_0^4 \frac{1}{x^2+1}dx$ by using Trapezoid Rule, Simpson's Rule and compare the result with the exact value taking n = 4.

5. a. Find the condition that the line y = mx+c may be a tangent to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$. 7

b. Derive standard equation of hyperbola in the form $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ 8

6. a. Find the equation of a plane through the points (1,2,3) and (3,2,1) and perpendicular to the plane 4x − y + 2z = 7. 7

b. Define vector triple product and show that $[\vec{b}\times\vec{c},\ \vec{c}\times\vec{a}\ \vec{a}\times\vec{b}]=[\vec{a}\vec{b}\vec{c}]^2$. 8

7. Attempt all the questions: 2×5

a. Find the domain and range of the function $f(x)=\sqrt{x^2-1}$.

b. Find vertical and horizontal asymptotes of $y(x-1)=(x^2-4)$.

c. Find the arc length of the curve $y=\frac{1}{3}(x^2+2)^{3/2}$

d. Find the focus and length of latus rectum of the parabola $x^2+8y-2x=7$.

e. Find the projection of the vector $3\vec{i}-\vec{j}+\vec{k}$ on the vector $2\vec{i}+\vec{j}-\vec{k}$

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Level: Bachelor Semester – Spring Year : 2010

Programme: BE Full Marks: 100

Course: Engineering Mathematics I Pass Marks: 45

Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

43 a) If $y=\sin(m\sin^{-1}x)$ show that 8

i) $(1-x^2)y_2-xy_1+m^2y=0$

ii) $(1-x^2)y_{n+2}-(2n+1)xy_{n+1}-(n^2-m^2)y_n=0$

OR 8

Examine the continuity and derivability at $x=0$ and $x=\frac{\pi}{2}$ of the function $f(x)$ defined as follows:

$$f(x)=\begin{cases}1 & when\ (-\infty,0)\\ 1+\sin x & when\ x\in[0,\pi/2)\\ 2+(x-\pi/2)^2 & when\ x\in[\pi/2,\infty)\end{cases}$$

b) State and prove Lagrange's Mean Value theorem. What is its geometrical meaning? 7

44 a) Evaluate : $\lim_{x\to 0}\left(\frac{1}{x^2}-\cot^2 x\right)$ 7

b) Prove that the greatest rectangle that can be inscribed in the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ is with area 2ab. 8

OR

Find the asymptotes of the curve $(x+y)^2(x+2y)+2(x+y)^2-x-9y+2=0$ 8

45 Integrate the followings: 3×5

a) $\int\frac{1}{1-\cos x+\sin x}dx$

b) $\int \frac{7x-9}{x^2-2x+35}dx$

c) $\int_0^1 \cot^{-1}(1-x-x^2)dx = \frac{\pi}{2} - \log 2$

46 a) Obtain the area bounded by the curves $y^2 = 4ax$ and $x^2 = 4ay$. 7

b) Find the volume of the solid in the region in the first quadrant bounded by the parabola $y = x^2$ below by the x-axis and on the right by the line $x = 1$ about the line $x = -1$. 8

OR

Use Trapezoidal and Simpson's rule with n = 4 to approximate the area between the curve $y = (2x+1)^2$ ordinates x = 1, x = 3 and x axis. Compare the result with exact value. 8

47 a) Define scalar and vector product of three vectors. Prove that the scalar triple product of three vectors represent the volume of parallelepiped. 2+6

b) Obtain the expression for $\vec{a} \times (\vec{b} \times \vec{c})$. 7

48

a) Find the equation of tangent to the ellipse $\frac{x^2}{4} + \frac{y^2}{9} = 1$, which is parallel to the line $x = y + 4$. 7

b) Define conic section and derive the standard equation of Hyperbola. 8

49 Attempt the following questions: 2×5

a) Find the radius of curvature at (s, ψ) for the curve $s = 8a \sin^2 \frac{\psi}{6}$.

b) Find the domain and range of function $y = (\sqrt{2x})^2$

c) What does the equation of straight lines $2x^2 + 3xy + 4y^2 = 0$ become when axes are turned through angle $\tan^{-1}2$.

d) Evaluate : $\int \frac{dx}{x + \sqrt{x}}$

e) Find the vector projection of $\vec{a}$ onto $\vec{b}$ if $\vec{a} = 3\vec{i} - \vec{j} + \vec{k}$ and $\vec{b} = 2\vec{i} + \vec{j} - 2\vec{k}$.

POKHARA UNIVERSITY

Level: Bachelor Semester – Fall Year : 2010
Programme: BE Full Marks : 100
Course: Engineering Mathematics I Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt all the questions.

1. a) Examine the continuity and differentiability of the function f(x) defined as follows: 8

$$f(x) = \begin{cases} 1 & when -\infty < x < 0 \\ 1 + \sin x & when\ 0 \le x < \pi/2 \\ 2 + (x - \pi/2)^2 & when\ \pi/2 \le x < \infty \end{cases}$$

OR

a) If $\log y = \tan^{-1} x$, show that

i) $(1+x^2)y_2 + (2x-1)y_1 = 0$

ii) $(1+x^2)y_{n+2} + (2nx + 2x - 1)xy_{n+1} + n(n+1)y_n =$ 7

b) State and prove Cauchy Mean value theorem. If f(x)=sin x in $[0, \pi]$, find the value of c prescribed by Rolle's theorem.

2. a) A cylindrical tin can closed at both ends with given capacity has to be constructed. Show that the amount of tin required will be minimum when the height is equal to the diameter. 8

b) Define asymptotes. Find the asymptote of the curve: $x^3 + 3x^2y - 4y^3 - x + y + 3 = 0$ 7

OR

State and prove L-hospital's rule. Also evaluate: $\lim_{x \to 1} x^{\left(\frac{1}{1-x}\right)}$

3. Evaluate any three: 3x5

a) $\int \frac{x+1}{x^2-5x+6}dx$ b) $\int_0^{\pi/2}\frac{\sin x\,dx}{4+5\sin x}$

c) $\int_0^1 \frac{\log(1+x)dx}{1+x^2}$ d) $\int_0^{\pi/4}\sin^2 x\,dx$

4. a) Find the area between the curves $x+y=2$ and $y=x^2$ 7

OR

Find the volume of solid generated by revolving the region enclosed by the triangle with vertices (1, 0), (2, 1) and (1, 1) about the y-axis. 8

b) Find the approximate area using Simpson's and trapezoidal rule for the region bounded by curve $y^2=4x$, $x=4$ and $x=9$ with x-axis. Compare with exact value.

5 a) Define vector product of four vectors. Show that the vectors 7

$(\vec{a}x\vec{b})x(\vec{c}x\vec{d})+(\vec{a}x\vec{c})x(\vec{d}x\vec{b})+(\vec{a}x\vec{d})x(\vec{b}x\vec{c})$ is parallel to the vector $\vec{a}$. 8

b) Find the equation of the plane through (3,2,1), (-1,1,-2) and (3,-4,1)

6. a) Find the condition that the line y = mx + c will be tangent to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ 7

b) Obtain the vertices, coordinates of foci, directrix, and eccentricity of the following hyperbola $x^2-4y^2-4x=0$ 8

7. Attempt all the questions 5x2

a) Find the domain and range of the function y= 2 cos x

b) Evaluate $\int\frac{1}{x}\log x\,dx$

dom = $(-\infty,\infty)$

Ran = $[-1,1]$

c) Find the radius of curvature at (1, 1) of $y = x^2$

d) Find vertex, line of symmetry and focus of $y^2=16x$

e) If $\overrightarrow{OA}=4\vec{i}+3\vec{j}+\vec{k}$, $\overrightarrow{OB}=2\vec{i}-\vec{j}+2\vec{k}$, find projection of $\overrightarrow{OA}$ $\overrightarrow{OB}$

$\sin^{-1}x$

$d=[-1,1]$

$R=[-\pi/2,\pi/2]$

$\cos^{-1}x$

$d=[-1,1]$

$R[0,\pi]$

POKHARA UNIVERSITY

Level: Bachelor Semester – Fall Year

Programme: BE Full Marks

Course: Engineering Mathematics I Pass Marks

Time

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

50. d) If $y=\log(x+\sqrt{a^2+x^2})$ prove that $(a^2+x^2)y_{n+2}+(2n+1)xy_{n+1}+n^2y_n=0$.

OR

Examine the continuity and derivability at x = 0 and $x=\frac{\pi}{2}$ of the function f(x) defined as follows:

$$f(x)=\begin{cases}1 & when\ (-\infty,0)\\ 1+\sin x & when\ x\in\left[0,\pi/2\right)\\ 2+\left(x-\pi/2\right)^2 & when\ x\in\left[\pi/2,\infty\right)\end{cases}$$

e) State and prove Langrange's Mean Value theorem. What is its geometrical meaning?

51. a) State L. Hospital's theorem. Evaluate $\lim x\to 0\left(\frac{\sin x}{x}\right)^{\frac{1}{x^2}}$

b) The strength of beam varies jointly as its breadth and square of the depth. Find the dimension of the strongest beam that can be cut from a circular wooden log of radius a. 8

OR

Find the asymptotes of the curve $x^2(x-y)^2-a^2(x^2+y^2)=0$.

8

52. Integrate any three of the following 3x5

a) $\int\frac{1}{\sqrt{e^{2x}-1}}dx$

b) $\int\frac{1}{5+13\sin x}dx$

c) $\int_0^{\pi/4} \log(1+\tan\theta)\,d\theta$

d) $\int_0^{\pi} \frac{x\sin x}{1+\cos^2 x}\,dx$

53\.

a) Show that the area of astroid $x^{\frac{2}{3}}+y^{\frac{2}{3}}=a^{\frac{2}{3}}$ is $\frac{3}{8}\pi a^2$. 7

b) Obtain the volume of the solid in the first quadrant bounded above by the curve $y=x^2$, below by x-axis and on the right by the line $x=1$ about the line $x=-2$. 8

OR

Approximate the integral $\int_1^2 \frac{1}{x^2}dx$ with n=4, using Trapezoidal and Simpson's rule and compare the result with exact value. 8

54\.

a) Find by vector method the equation of plane through the points (2, 4, 5), (1, 5, 7), and (-1, 6, 8). 8

b) Define Vector Triple Product and show that the vectors $\bar{a}\times(\bar{b}\times\bar{c}),\ \bar{b}\times(\bar{c}\times\bar{a})$ and $\bar{c}\times(\bar{a}\times\bar{b})$ are coplanar. 7

55\.

a) Obtain the vertices, centre, coordinates of foci, eccentricity of the following ellipse: $9x^2+4y^2+36x-8y+4=0$. 7

b) Show that the line lx + my + n = 0 touches the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ if $a^2l^2-b^2m^2=n^2$. 8

56\. Answer the following questions: 2×5

a) Find the radius of curvature at (r,θ) for $r=ae^{\theta\cot\alpha}$

b) Find the domain and range of the function y=3+sinx

c) Find the vector projection of $\bar{a}$ onto $\bar{b}$ if $\bar{a}=3\bar{i}-\bar{j}+\bar{k}$ and $\bar{b}=2\bar{i}+\bar{j}-2\bar{k}$

d) What will be the arc length of the curve $y=x^2,\ -1\le x\le 2$

e) Find equation of tangent at $(2, \frac{1}{4})$ on the parabola $y^2=16x$

POKHARA UNIVERSITY

Level: Bachelor | Semester – Fall | Year: 2012
Programme: BE | Full Marks: 100
Course: Engineering Mathematics I | Pass Marks: 45
Time: 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

57\.

i) State and prove the Cauchy's Mean Value theorem. Does the theorem applicable to the functions f(x) = x and g(x) = x^2-2x in the interval [0, 2]? Why? 7

ii) State Leibnitz's theorem for successive derivative of product of two functions y = u.v If $y=\sin(m\sin^{-1}x)$ show that 8

i. $(1-x^2)y_2-xy_1+m^2y=0$

ii. $(1-x^2)y_{n+2}-(2n+1)xy_{n+1}-(n^2-m^2)y_n=0$

OR

Show that the function f defined as follows is continuous at x = 1 and x = 2. 8

$$f(x)=\begin{cases} x & \text{for } x<1\\ 2-x & \text{for } 1\le x\le 2\\ -2+3x-x^2 & \text{for } x>2\end{cases}$$

Also show that f is derivable at x = 2 but not at x = 1.

58\.

a) Evaluate $\lim_{x\to 0}\left(\frac{\sin x}{x}\right)^{\frac{1}{x^2}}$ 7

b) The strength of a beam varies jointly as it's breadth and square of the depth. Find the dimension of the strongest beam that can be cut from a circular wooden log of radius a. 8

OR

Find the asymptotes of the curve $y^3+x^2y+2xy^2-y+1=0$. 8

59\. Integrate any THREE of the following: 15

a) $\int\frac{e^{2x}+1}{e^{2x}-1}dx$

b) $\int\frac{dx}{4+5\sin x}$

c) $\int_0^a \frac{\sqrt{x}}{\sqrt{x}+\sqrt{a-x}}dx$

$\int\frac{e^x+e^{-x}}{e^x-e^{-x}}$ $J=e^x-e^{-x}$

d) $\int_1^3 (x^2 - x)\, dx$

e) $\int_0^{\frac{\pi}{2}} \sin^4 x \cos^2 x\, dx$

60. a) Find the area included between the curve $x^2 = 4y$ and the line $x = 4y - 2$. 7

b) Find the reduction formula for $\int \cos^n x\, dx$ and then evaluate $\int \cos^7 x\, dx$ 8

OR

Approximate the integral $\int_1^3 \frac{1}{1+x}\, dx$ with $n = 4$, using Trapezoidal and Simpson's rule. 8

61. a) Define vector triple product. If $a = i - 2j - 3k$, $b = 2i + j - k$ & $c = i + 3j - 2k$ find $(a \times b) \times c$. Also verify that $a \times (b \times c) = (a \cdot c)b - (a \cdot b)c$. 7

b) Find a set of reciprocal vector of $\vec{b} = \vec{i} - \vec{j} - \vec{2k}$, $\vec{c} = \vec{i} + \vec{2j} + \vec{2k}$, $\vec{a} = 2\vec{i} + 3\vec{j} - \vec{k}$ 8

62. a) Define eccentricity of a conic section, and derive the equation of a hyperbola in its standard form. $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ 8

b) Find the condition for the line $y = mx + c$ to be tangent to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$. 7

63. Attempt all the questions:

a) Evaluate $\int_1^{\infty} \frac{x\, dx}{(1+x^2)^2}$ 2

b) Find the radius of curvature of curve $y^2 = 4x$ at $(0, 0)$. 2

c) Integrate $\int x \sin^2 x\, dx$ 2

d) Find the center, vertices and foci of the ellipse $x^2 + 10x + 25y^2 = 0$.

e) Evaluate $\int \log x\, dx$

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POKHARA UNIVERSITY

Level: Bachelor Semester: Fall Year : 2013
Programme: BE Full Marks: 100
Course: Thermal Science Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt all the questions.

1. a) What is thermodynamic propery? Enumerate its salient features and explain its types with example. 7
   b) A mass of gas is compressed in a quasi-static process from 80kPa, 0.1 m^3 to 0.4 MPa, 0.03 m^3. Assuming that the pressure and volume are related by pv^n=constant, find the work done by the gas system. 8
2. a) Write the similarities and differences between heat and work. 7
   b) A vessel having a volume of 0.4 m^3 contains 2 kg of a liquid water and water vapor mixture in equilibrium at a pressure of 600 kPa. Calculate: 8
      i. The volume and mass of liquid
      ii. The volume and mass of vapor.
3. a) Derive a general energy equation of 1st law of Thermodynamics for an open system using control volume approach. 7
   b) A steam turbine receives steam from two boilers. One flow is 5 kg/s at 3 MPa, 700°C and the other flow is 15 kg/s at 800 Kpa, 500°C. The exit state is 10 Kpa, with a quality of 96%. Find the total power output of the adiabatic turbine. 8

a) Derive the expression for change in entropy of an ideal gas for an isothermal process. 8
b) State the statements of second law of Thermodynamics. 7
a) Derive an expression for the efficiency of an ideal Brayton Cycle. 7
b) An air-standard Diesel cycle has a compression ratio of 18 and the heat transfer to the working fluid per cycle is 1800 KJ/kg. At the beginning of the compression process the pressure is 100 KPa and the temperature is 15°C. Determine the pressure and temperature at the 8

POKHARA UNIVERSITY

Level: Bachelor Semester: Fall Year : 2013
Programme: BE Full Marks: 100
Course: Engineering Mathematics I Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt all the questions.

1. a) Define continuity and differentiability of a function. Show that the function $f(x)$ defined by

$$f(x)=\begin{cases}-x & when\ \ x\le 0\\ x & when\ \ 0<x<1\\ 2-x & when\ \ x\ge 1\end{cases}$$

Is continuous at x=0 and x=1, but is not derivable at x=1.

OR

State Leibnitz and prove theorem. If $y=e^{x^2}$, show that

$$y_{n+1}-2xy_n-2ny_{n-1}=0$$

   b) State and prove Lagrange's Mean Value theorem. If f'(x) is positive in $[a,b]$ show that f(x) is increasing in $[a,b]$

2. a) Show that $\lim\limits_{x\to 0}\left(\frac{\sin x}{x}\right)^{\frac{1}{x^2}}=e^{-\frac{1}{6}}$

OR

Find the total surface area of the right circular cylinder of greatest surface that can be inscribed in a given sphere of radius r.

   b) Find all the asymptotes of $y^3+x^2y+2xy^2-y+1=0$

3. Integrate the followings:(Any three)

   i. $\int\frac{x+5}{(x+1)(x+2)^2}\,dx$

ii. $\int \sqrt{\frac{a+x}{x}}\,dx$

iii. $\int_0^{\pi/4} \log(1+\tan x)dx$

iv. $\int_a^b e^{mx}dx$ (by summation method)

(a) Find the area of the region of the circle $x^2+y^2=4$ cut off by the line $x-2y=-2$ in the first two quadrants. 7

OR

Find the volume of the solid in the region bounded by the curves $x=y^2$, $x=0$, $y=-1$, $y=1$ revolved about y-axis.

(b) Evaluate $\int_1^5 (2x^2+1)dx$ using Simson's and Trapezoidal rule with $n=4$ and compare it with the exact value. 8

(c) Obtain the vertices, coordinates of foci, directrix, and eccentricity of the following hyperbola $x^2-4y^2-4x=0$ 8

(a) Find the equation of tangent to the ellipse $\frac{x^2}{4}+\frac{y^2}{9}=1$, which is parallel to the line $x=y+4$ 7

(b) Using vector method obtain the equation of plane passing through the Point (4,1,3) and perpendicular to the line $\frac{x-1}{2}=\frac{y+1}{3}=\frac{z}{4}$ 8

(c) If $(\bar{a}\times\bar{b})\times\bar{c}=\bar{a}\times(\bar{b}\times\bar{c})$ Prove that $\bar{a}$ and $\bar{c}$ are collinear. 7

Attempt all questions: 4×2

a) Find the radius of curvature of $y=x^2+4$ at (0, 4) 5

b) Integrate: $\int_{-1}^{1}\frac{dx}{x^3}$ if exists.

c) Show that $\int_0^{\frac{\pi}{2}}\frac{\sin\theta\, d\theta}{\sin\theta+\cos\theta}=\frac{\pi}{4}$

d) Find the volume of a parallelepiped whose concurrent edges are represented by $\vec{i}+\vec{j}+\vec{k}, \vec{i}-\vec{j}+\vec{k}$ and $\vec{i}+2\vec{j}-\vec{k}$.

$\vec{a} = \lambda\vec{c}$

end of each process of the cycle and the efficiency. Given $C_{p\,air}$=1.005kJ/KgK.

OR

An engine working on Otto cycle is supplied with air at 0.1 MPa, 35°C. The compression ratio is 8. Heat supplied is 2100 kJ/kg. Calculate the maximum pressure and temperature of the cycle, the cycle efficiency and the mean effective pressure.

6. a) Deduce an expression for the conduction heat transfer rate along radial outward direction in case of a hollow cylinder.

b) The temperature of the inside and the outside surface of a brickwork of a furnace have been noted to be 650°C and 250°C. Make calculations for the percentage decrease in heat loss if the thickness of the brick work is increased by 100 percent. The ambient temperature is 30°C. Assume that the thermal conductivity of the brickwork and the convective heat transfer coefficient remain the same before and after the increase in thickness.

7. Write short notes on any two:

a) Stefan-Boltzmann's law

b) Zeroth law of thermodynamics

c) Refrigeration Cycle

POKHARA UNIVERSITY

Level: Bachelor	Semester: Fall	Year : 2014
Programme: BE		Full Marks: 100
Course: Engineering Mathematics I		Pass Marks: 45
		Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt all the questions.

) Define continuity and differentiability of a function. Show that differentiability of a function f(x)=a, implies continuity but converse may not be always true. 7

OR

If $\log y = tan^{-1}x$, show that

i. $(1+x^2)y_2 + (2x-1)y_1 = 0$

ii. $(1+x^2)y_{n+2} + (2nx + 2x - 1)y_{n+1} + n(n+1)y_n = 0$

) State and prove Rolle's theorem. Is Rolle's theorem applicable to the function $f(x) = tanx$ in the interval? $(0, \pi)$ 8

Define indeterminate forms. State L Hopital rule and using it, show that $\lim_{x\to 0}\left(\frac{\sin x}{x}\right)^{1/x} = 1.$ 8

Find the altitude of the right circular cylinder of maximum volume that can be inscribed in a given right circular cone of height h. 7

OR

Define the asymptotes of a curve and classify them. Find the asympotes of the curve :

$x^4 - y^4 + 3x^2y + 3xy^2 + xy = 0$

grate Any Three 3×5

a) $\int \frac{dx}{4-5\,Sin^2x}$

b) $\int_a^b x^m\,dx$ (by summation method)

c) $\int \frac{e^x\,dx}{e^x - 3e^{-x}+2}$

d) $\int_0^{\frac{\pi}{4}} \log(1+\tan x)dx$

4. a) Find the area bounded by $x^2 = 4y$ and $y = |x|$. 7

OR

Find the volume of the solid in the region in first quadrant bounded by the parabola $y = x^2$, the $y-$axis and the line y=1 revolving about the line x = 3/2.

b) Use Trapezoidal and Simpson's rule with n = 6 to approximate the area between the curve $y = (2x+1)^2$ ordinates x = 1, x = 4 and x axis. Compare the result with exact value. 8

5. a) Define vector triple product. If $\vec{a} = \vec{i} - 2\vec{j} - 3\vec{k}$, $\vec{b} = 2\vec{i} + \vec{j} - \vec{k}$ and $\vec{c} = \vec{i} + 3\vec{j} - 2\vec{k}$ find $(\vec{a}\times\vec{b})\times\vec{c}$. Also verify that $\vec{a}\times(\vec{b}\times\vec{c}) = (\vec{a}.\vec{c})\vec{b} - (\vec{a}.\vec{b})\vec{c}$. 8

b) Find the equation of the plane through the point (2,4,5) and perpendicular to the line x=5+t, y=1+3t, z=4t. 7

6. a) Define eccentricity of a conic section, and derive the equation of a hyperbola in its standard form. 8

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$$

b) Find the condition that the line lx+my+n=0 touches the parabola y^2=4ax. Find the point of contact. 7

7. Answer the followings: 4×2.5

a) Find the radius of curvature of the curve $y^2 = 4ax$ at (x,y).

b) Integrate $\int x\sin^2 x\, dx$

c) Evaluate improper integral $\int_0^\infty \frac{1}{x^2+9}dx$

d) If $\vec{a} = \vec{i} + 2\vec{j} + \vec{k}$, $\vec{b} = \vec{i} + \vec{j} + \vec{k}$, find unit vector along $\vec{a}\times\vec{b}$.

POKHARA UNIVERSITY

Level: Bachelor Semester: Spring Year : 2014
Programme: BE Full Marks: 100
Course: Engineering Mathematics I Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt all the questions.

1. a) Define continuity and differentiability of a function. Show that the function: 8

$$f(x) = \begin{cases} x^2+2 & \text{for } x \le 1 \\ 3x & \text{for } x > 1 \end{cases}$$

is continuous at x=1 but not differentiable at x=1

OR

If $y = (x^2-1)^n$ show that;

i. $(x^2-1)y_2+2(1-n)xy_1-2ny=0$

ii. $(x^2-1)y_{n+2}+2xy_{n+1}-n(n+1)y_n=0$

b) State and prove that Lagrange's Mean value Theorem with its geometrical interpretation. 7

2. a) State the L 'Hospital Rules and evaluate the limit: 7

$$\lim_{x\to 0}\left(\frac{1}{x^2}-\frac{1}{\sin^2 x}\right)$$

b) Define the asymptotes of a curve and classify them. Find the asymptotes of the curve 8

$$x^2(x-y)^2 - a^2(x^2+y^2) = 0$$

OR

Find the altitude of the right circuler cone of maximum value that can be inscribed in a sphere of radius a.

3. Integrate (Any three) 3×5

a) $\int \frac{dx}{2-3\sin 2x}$

b) $\int_a^b e^{mx}dx$ (by summation method)

c) $\int \frac{x^3 dx}{(x-2)(x-3)}$

d) $\int_0^1 cot^{-1}(1-x-x^2)dx$

4. a) Find the area inside the circle $x^2 + y^2 = 1$ and outside the para $y^2 = 1 - x$. Also sketch the region.

OR

Find the volume of the solid in the region in the first quadrant bounded above by the curve $y = x^2$, below by the x – axis and on t right by the line $x = 1$ about the line $x = -1$.

b) Find approximate value of $\int_1^2 \frac{1}{x} dx$ using Trapezoidal and simpson' rule with $n = 10$ and then compare the results with the exact value the integral.

5. a) Define eccentricity of a conic section and derive the equation ellipse in its standard form.

b) Find the equation of the tangents to the parabola $y^2 = 7x$ whic perpendicular to the line $4x + y = 0$. Also, find the point of contact

6. a) Define scalar and vector triple product vectors. Show that $(\vec{a} \times \vec{b}) \times \vec{c} = \vec{a} \times (\vec{b} \times \vec{c})$ if the vectors $\vec{a}$ and $\vec{c}$ are collinear.

b) Find the equation of the plane through (3,2,1) and (1,2,3) whic perpendicular to the plane 4x-y+2z=7.

7. Write short notes on:

a) Find the arc length of the curve $y = x^{3/2} from\ x = 0\ to\ x = 2$

b) Evaluate the improper integral. $\int_0^\infty \frac{dx}{1+x^2}$.

c) Find the radius of curvature at (s, Ψ) $for\ the\ curve\ s = 8a\ sin^2 \frac{\Psi}{6}$

d) If $\vec{a} = 2\vec{i} + \vec{j} - \vec{k}$ and $\vec{b} = \vec{i} + 2\vec{j} + \vec{k}$, find a unit vec perpendicular to both $\vec{a}$ and $\vec{b}$.

POKHARA UNIVERSITY

Level: Bachelor | Semester: Spring | Year : 2014
Programme: BE | | Full Marks: 100
Course: Engineering Mathematics I | | Pass Marks: 45
| | | Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt all the questions.

1. a) Define continuity and differentiability of a function. Show that the function: 8

$$f(x) = x^2+2 \quad \text{for} \quad x \le 1$$
$$= 3x \quad \text{for} \quad x > 1$$

is continuous at x=1 but not differentiable at x=1

OR

If $y = (x^2-1)^n$ show that;

i. $(x^2-1)y_2 + 2(1-n)xy_1 - 2ny = 0$

ii. $(x^2-1)y_{n+2} + 2xy_{n+1} - n(n+1)y_n = 0$

b) State and prove that Lagrange's Mean value Theorem with its geometrical interpretation. 7

2. a) State the L'Hospital Rules and evaluate the limit: 7

$$\lim_{x\to 0}\left(\frac{1}{x^2} - \frac{1}{\sin^2 x}\right)$$

b) Define the asymptotes of a curve and classify them. Find the asymptotes of the curve 8

$$x^2(a-y)^2 - a^2(x^2+y^2) = 0$$

OR

Find the altitude of the right circular cone of maximum value that can be inscribed in a sphere of radius a.

3. Integrate (Any three) 3×5

a) $\int \frac{dx}{2-3\sin 2x}$

b) $\int_a^b e^{mx}\,dx$ (by summation method)

c) $\int \frac{x^3\,dx}{(x-2)(x-3)}$

d) $\int_0^1 \cot^{-1}(1-x-x^2)\,dx$

4. a) Find the area inside the circle $x^2+y^2=1$ and outside the parabola $y^2 = 1-x$. Also sketch the region.

OR

Find the volume of the solid in the region in the first quadrant bounded above by the curve $y = x^2$, below by the x – axis and on the right by the line x = 1 about the line x = -1.

b) Find approximate value of $\int_1^2 \frac{1}{x}dx$ using Trapezoidal and simpson's rule with n = 10 and then compare the results with the exact value of the integral.

5. a) Define eccentricity of a conic section and derive the equation of ellipse in its standard form.

b) Find the equation of the tangents to the parabola $y^2 = 7x$ which perpendicular to the line $4x+y=0$. Also, find the point of contact.

6. a) Define scalar and vector triple product vectors. Show that $(\vec{a}\times\vec{b})\times\vec{c} = \vec{a}\times(\vec{b}\times\vec{c})$ if the vectors $\vec{a}$ and $\vec{c}$ are collinear.

b) Find the equation of the plane through (3,2,1) and (1,2,3) which perpendicular to the plane 4x-y+2z=7.

7. Write short notes on:

a) Find the arc length of the curve $y = x^{3/2}$ from $x = 0$ to $x = 2$

b) Evaluate the improper integral. $\int_0^\infty \frac{dx}{1+x^2}$.

c) Find the radius of curvature at (s,Ψ) for the curve $s = 8a\sin^2\frac{\Psi}{6}$

d) If $\vec{a} = 2\vec{i}+\vec{j}-\vec{k}$ and $\vec{b} = \vec{i}+2\vec{j}+\vec{k}$, find a unit vector perpendicular to both $\vec{a}$ and $\vec{b}$.

POKHARA UNIVERSITY

Level: Bachelor   Semester: Spring   Year : 2013
Programme: BE   Full Marks: 100
Course: Engineering Mathematic I   Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt all the questions.

Examine the continuity and differentiability at x = 0 of the function f(x) defined as follows $f(x) = 3 + 2x$ for $\frac{-3}{2} < x \le 0$ — 8

$= 3 - 2x$ for $0 < x < \frac{3}{2}$

OR

If $y = (x^2 - 1)^n$ show that

i. $(x^2 - 1)y_2 - 2(1 - n)xy_1 - 2ny = 0$

ii. $(x^2 - 1)y_{n+2} + 2xy_{n+1} - n(n+1)y_n = 0$

State and prove Rolle's theorem. — 7

Show that $\lim_{x \to 0}\left(1 + \frac{1}{x^2}\right)^x = 1$. — 7

OR

Find the total surface area of the right circular cylinder of greatest surface that can be inscribed in a given sphere of radius r.

Find all the asymptotes of the curve $y^3 - 3axy + x^3 = 0$. — 8

Find approximate values of $\int_1^3 (2x+1)^2\, dx$, using Simpson's and Trapezoidal rules with n = 4. Also compare the results with exact value. — 8

OR

Find reduction formula for $\int \sec^n x\, dx$ and use it to evaluate $\int \sec^3 x\, dx$

b) The area bounded by $y = x^2$, below by x-axis and on the right by the line x = 1 is revolved about the line x = -1. Find the volume of the solid thus generated. — 7

4. Integrate following integrals: (Any three) — 3×5

i. $\int \frac{dx}{1 - \cos x + \sin x}$

ii. $\int_0^{\pi} \frac{x \sin x\, dx}{1 + \cos^2 x}$

iii. $\int_0^1 x^{3/2}(1-x)^{3/2} dx$ $\to \frac{1}{m}\left[e^{mb} - e^{ma}\right]$

iv. $\int_a^b e^{mx} dx$ [By using summation method].

5. a) Define vector product of three vectors; Show that: $\vec{a} \times (\vec{b} \times \vec{c}) = (\vec{a}.\vec{c})\vec{b} - (\vec{a}.\vec{c})\vec{c}$ — 8

OR

Define improper integral. Evaluate the improper integral $\int_0^2 \frac{dx}{(1-x)^2}$.

b) Find the equation of the plane passes through (2,4,5), (1,5,7) and (-1,6,8) by vector method. — 7

6. a) Find the condition, when the line lx+my+n= touches the parabola $y^2 = 4ax$. Find the point of contact. — 8

b) Find center, foci, vertices of the conic section: $4x^2 + y^2 - 16x + 4y + 16 = 0$. Also sketch the conic section. — 7

7. Solve the following *(Any Two)* — 2×

a) Find the radius of curvature of $y = 4x^4 - 3x^3 + 18x^2$ at (0, 0).

b) Evaluate $\int_0^1 \log x\, dx$

c) If $\vec{a}, \vec{b}, \vec{c}$ are coplanar then show that $(\vec{b} \times \vec{c}) \times (\vec{c} \times \vec{a}) = 0$

d) Find the equation of a conic section with focus at (2,0), directrix x=4 and eccentricity e=1.

POKHARA UNIVERSITY

Level: Bachelor | Semester: Spring | Year : 2015
Programme: BE | Full Marks: 100
Course: Engineering Mathematics I | Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt all the questions.

1. a) If a function f(x) is defined by 7

$f(x) = x-2$ for ≥ 2
$= 4-x^2$ for $x<2$

Show that it is continuous at x=2 but not differentiate at x=2.

OR

If, $y = \sin^{-1}x$, show that

i. $(1-x^2)y_2 - xy_1 = 0$
ii. $(1-x^2)y_{n+2} - (2n+1)\,xy_{n+1} - n^2y_n = 0$

b) State L 'Hopital Rule for indetermianteform. 8

Evaluate $\lim_{x\to 0}\left(\frac{\tan x}{x}\right)^{1/x}$.

2. a) An oil tank is to be made in the form of a right circular cylinder to contain one quart of oil. What dimension of the can will require the least amount of materials. 7

OR

Find the asymptotes of the curve:
$x^2(x-y)^2 - a^2(x^2+y^2) = 0$

b) State and prove that Lagrange's Mean value theorem. What is its geometrical meaning? 8

3. Integrate any THREE of the following: 3×5

a) $\int \frac{x^2}{(x-2)(x-3)}dx$

b) $\int_0^{\frac{\pi}{2}} \sin^4 x \cos^2 x\, dx$.

c) $\int_0^1 x^3 dx$ (by summation method)

d) $\int \frac{dx}{4+5\sin x}$

4. a) Find the reduction formula for $\int \cos^n x\, dx$ and then evaluate $\int \cos^7 x\, dx$

OR

Approximate the integral $\int_1^4 \frac{1}{1+x}dx$ with n = 4, using Trapezoidal and Simpson's rule.

b) Find the area of the region in the first quadrant that is bounded above by $y = \sqrt{x}$ and below by the x-axis and the line $y = x-2$.

5. a) Find by vector method the equation of the plane through the points (2,4,5), (1,5,7) and (-1,6,8).

b) Define vector triple product. If $a = i - 2j - 3k$, $b = 2i + j - k$ & $c = i + 3j - 2k$ find $(a \times b) \times c$.

Also verify that $a \times (b \times c) = (a \cdot c)\, b - (a \cdot b)\, c$.

6. a) Define eccentricity of a conic section, and derive the equation of a hyperbola in its standard form. $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$

b) Find the condition for the line $y = mx + c$ to be tangent to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$.

7. Write short notes on:

a). Find the radius of curvature of curve $y^2 = 4x$ at (0, 0).

b) Find center and vertices of theconicsection $x^2 - y^2 - 2x + 4y = 4$

c) Evaluate: $\int \frac{dx}{x+\sqrt{x}}$

d) Let two functions f:R→R and g:R→R defined as $f(x) = x+2$, $g(x) = 3x^2$, $x \in R$. Find fog(x) and gof(x).

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POKHARA UNIVERSITY

Level: Bachelor　　Semester: Fall　　Year : 2015
Programme: BE　　Full Marks: 100
Course: Engineering Mathematics I　　Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt all the questions.

1. a) Examine the continuity and differentiability at x =2 of the function f(x) defined as follows $f(x) = 2-x$ for $0 < x < 2$
$= -2+3x-x^2$ for $2 \le x < 4$ 8

OR

If $y = \sin^{-1} x$ show that
i. $(1-x^2)y_2 - xy_1 = 0$
ii. $(1-x^2)y_{n+2} - (2n+1)xy_{n+1} - n^2y_n = 0$

b) State Lagrange's Mean Value theorem. Is Lagrange's mean value theorem applicable to the function $f(x) = |x|$ in the interval $[-1,1]$? Give reasons. 7

2. a) Find the asymptotes of the curve
$x^3 - 2y^3 + 2x^2y - xy^2 + xy - y^2 + 1 = 0$ 8

OR

A cylindrical tin can closed at both ends with given capacity has to be constructed. Show that the amount of tin required will be minimum when the height is equal to the diameter. 7

b) Evaluate : $\lim_{x\to 0}\left(\frac{\tan x}{x}\right)^{\frac{1}{x^2}}$

3. Integrate (Any three) 3×5

a) $\int \frac{dx}{5+4\cos x}$

b) $\int_0^{\pi} \frac{x \sin x}{1+\cos^2 x} dx$

c) $\int \frac{x^3}{(x-2)(x-3)}$

d) $\int_0^{\infty} e^{-x^2} dx$

4. a) Find the volume of the solid generated by revolving the region between the parabola $x = y^2 + 1$ and the line x=3 about the line x=3. 7

b) Using Trapezoidal and Simpson's rule, estimate the integral $\int_0^4 \frac{1}{x^2+4} dx$ with n=4 subintervals. 8

5. a) Find the volume of a tetrahedron whose one vertex is at the origin and the other three vertices are (3,2,1), (2,3,-1) and (-1,2,3). 7

b) Find the equation of plane passing through (2, 4, 5), (1, 5, 7) and (-1, 6, 8). 8

6. a) Find the condition that the line lx + my + n =0, may touch to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ 7

b) Define conic section and derive the standard equation of Ellipse. 8

7. Do the followings: 4×2.5

a) Evaluate $\int_1^e x \log x dx$

b) Find the radius of curvature of $y = x^2+4$ at (0, 4).

c) Evaluate $\int \frac{x}{(x-3)(x+1)} dx$

d) Find the scalar projection of $\bar{a} = i - 2\bar{j} + \bar{k}$ on $\bar{b} = \bar{i} + 2\bar{j} - \bar{k}$.

POKHARA UNIVERSITY

Level: Bachelor	Semester: Fall	Year : 2016
Programme: BE		Full Marks: 100
Course: Engineering Mathematics I		Pass Marks: 45
		Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Prove that the continuity of a function at a point is the necessary but not the sufficient condition for the existence of the derivative of the function at that point. 8

OR

State Leibnitz theorem. If $y=e^{x^2}$, show that $y_{n+1}-2xy_n-2ny_{n-1}=0$

b) State and prove Cauchy's mean value theorem. 7

2.

a) Evaluate $\lim_{x\to 0}\left(\frac{Sinx}{x}\right)^{1/x^2}$ 7

b) An open tank of a given volume with a square base and vertical sides has to be constructed. Show that the amount of tin required will be minimum when the height of the tank is half the side of the square base. 8

OR

Find the asymptotes of the curve $x^2(x-y)^2-a^2(x^2+y^2)=0$.

3. Integrate any three of the following 3×5

a) $\int\frac{e^x(1+\sin x)}{1+\cos x}dx$

b) $\int\frac{1}{5-13\sin x}dx$

c) $\int_0^{\pi/4}\log(1+\tan\theta)d\theta$

d) $\int_0^{\infty}\frac{xdx}{(1+x^2)^2}dx$

4. a) Find the area of the region of the circle $x^2+y^2=4$ cut off by the line $x-2y=-2$ in the first two quadrants.

OR

Find the volume of the solid in the region bounded by the parabola $y=x^2$ and the line $y=2x$ in the first quadrant about y-axis.

b) Find the approximate area using Simpson's and Trapezoidal rules for the area bounded by curve $y=x^2+4$, the x-axis and the lines x=1 and x=4 (using n=6) and compare these results with exact values.

5. a) Define eccentricity of a conic section, and derive the equation of a hyperbola in its standard form.

$$\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$$

b) Find the centre, vertices, foci and equation of directrix of the ellipse $25x^2+9y^2-100x+54y-44=0$.

6. a) Find by vector method the equation of plane perpendicular to 4x-y+z=0 and passing through (3,2,1)and(1,2,3).

b) Define scalar triple product. Give its geometrical interpretation. If the vectors $2\vec{i}-\vec{j}+2\vec{k}$, $5\vec{i}+\lambda\vec{j}+2\vec{k}$ and $\vec{i}+6\vec{k}$ are coplanar, Find the value of λ. 8

7. Attempt all 4×2

a) $\int\tan^{-1}xdx$

b) Find all horizontal and vertical asymptotes of $y=\frac{x^2-4}{x^2-1}$

c) Find the eccentricity foci and vertices of the hyperbola $9(x-2)^2-4(y+3)^2=36$

d) Evaluate $\int_0^{\frac{\pi}{2}}\sin^4 x\cos^4 x dx$.

POKHARA UNIVERSITY

Level: Bachelor | Semester: Fall | Year : 2017
Programme: BE | Full Marks: 100
Course: Engineering Mathematics I | Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt all the questions.

1. a) Examine the continuity and derivability at $x=0$ and $x=\frac{\pi}{2}$ of the function $f(x)=\begin{cases}1 & when\ (-\infty,0)\\ 1+\sin x & when\ x\in\left[0,\pi/2\right)\\ 2+(x-\pi/2)^2 & when\ x\in\left[\pi/2,\infty\right)\end{cases}$ 8

OR

State Leibnitz theorem for successive derivative of the product of two functions. If $y=\sin^{-1}x$ then show that

i. $(1-x^2)y_2-xy_1=0$

ii. $(1-x^2)y_{n+2}-(2n+1)xy_{n+1}-n^2y_n=0.$

b) State and prove Rolle's Theorem. Verify the theorem for the function $f(x)=\log\left(\frac{x^2+ab}{(a+b)x}\right)$ in $[a,b]$ where $0<a<b$. 7

2. a) A cone is inscribed in a sphere of radius r, prove that it's volume as well as its curved surface is greatest when the altitude is $\frac{4r}{3}$. 8

OR

Find the asymptote to the curve $y^2x^2-3yx^2-5xy^2+2x^2+6y^2-x-3y+2=0$.

b) Show that $\lim_{x\to\infty}\left(x-x^2 ln\left(1+\frac{1}{x}\right)\right)=\frac{1}{2}$. 7

(6)

3. Evaluate *Any Three* 3×5

a) $\int\frac{\cos x\,dx}{\sqrt{2\sin^2 x+3\sin x+4}}$

b) $\int\frac{2\sin x+3\cos x}{3\sin x+4c\cos x}dx$

c) $\int_0^1\frac{\log(1+x)\,dx}{1+x^2}$

d) Evaluate $\int_a^b e^{-x}dx$ by summation method.

$e^{-b}-e^{-a}$

4. a) Find the volume of the solid generated by revolving the region in the first quadrant bounded by the parabola $y=x^2$, below by the x-axis and on the right by the line x=2 about y-axis. 7

b) Find approximate values of $\int_2^5(x^2+1)dx$ using Simpson's and Trapezoidal rules with $n=6$. Also compare the results with exact value. 8

5. a) Find the plane through A(1,1,1)and perpendicular to the line of intersection of the planes $2x+y+3z=5$ and $3x+2y+z=7$. 8

b) Prove that the four points having position vectors $-i+2j-4k$, $2i-j+3k$, $6i+2j-k$ and $-12i-j-3k$ are coplanar. 7

6. a) Define conic section by their eccentricity and classify them. Derive standard equation of parabola $y^2=4ax$. 8

b) Find the condition that the line $y=mx+c$ may be tangent to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$. 7

7. Attempt all 4×2.5

a) Find the vertical asymptotes to the curve $x^2+xy+4y+3=0$

b) Find the radius of curvature at the origin of the curve $x^3+y^3=3axy$

c) Evaluate $\int x^5e^x dx$

d) Transform to parallel axis through the point $(3,-4)$ the equation $x^2-y^2+2x-3y=0$.

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POKHARA UNIVERSITY

Level: Bachelor Semester: Spring Year : 2018
Programme: BE Full Marks: 100
Course: Engineering Mathematics I Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt all the questions.

a) Show that the function $f(x)$ defined by 8

$$f(x) = \begin{cases} -x \text{ when } x \leq o \\ x \text{ when } 0 < x < 1 \\ 2 - x \text{ when } x \geq 1 \end{cases}$$

is continuous at $x = 0$ *and* $x = 1$, but is not differentiable at $x = 1$.

OR

If $y=\sqrt{\frac{1+x}{1-x}}$ prove that

(i) $(1-x)y^2 = 1+x$

(ii) $(1-x^2)y_n - \{2(n-1)x+1\}y_{n-1} - (n-1)y_{n-2} = 0$

) State and prove that Cauchy's Mean Value theorem. Is the theorem applicable to the functions $f(x)= x$ and $g(x)= x^2-2x$ in the interval [0,2]? Why? 7

) Evaluate: $\lim_{x \to 0} \left(\frac{1}{x^2}\right)^{\tan x}$ 7

) A cone is inscribed in a sphere of radius r, prove that it's volume as well as its curved surface is greatest when the altitude is $\frac{4r}{3}$ 8

OR

Find the asymptote to the curve $x^3 + 3x^2y - 4y^3 - x + y + 3 = 0$

3. Integrate (Any Three): 3×5

a. $\int \frac{(x+2)}{\sqrt{4x-x^2}}dx$

b. $\int \frac{1}{1-\cos x+\sin x}dx$

c. Prove: $\int_0^1 \cot^{-1}(1-x-x^2)dx = \frac{\pi}{2} - \log 2$

d. $\int_0^1 \sqrt{x}dx$ by summation method.

4. a) Find the volume of the solid generated by revolving the region bounded by $y = \sqrt{x}$ and the lines y=1,x=4 about the line y=1. 7

b) Approximate the area by using Trapezoidal and Simpson's rule to the integral $\int_1^4 \frac{1}{1+x}dx, n = 6$. Also compare with exact. 8

5. a) Define hyperbola. Derive the standard equation of hyperbola. 7

b) Find the condition that the line $y = mx + c$ may touch the curve $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$. Also find the point of contact. 8

6. a) Define scalar and vector product of three vectors. Prove that the scalar triple product of three vectors represent the volume of parallelepiped. What conclusion can be drawn if $\vec{a}.(\vec{b}\times\vec{c}) = 0$? 7

b) Show that the vectors $\vec{a} \times (\vec{b} \times \vec{c}), \vec{b} \times (\vec{c} \times \vec{a})$ *and* $\vec{c} \times (\vec{a} \times \vec{b})$ are coplanar. 8

7. Attempt all the questions: 2.5×4

a) Find the radius of curvature at (s,ψ) *for the curve* $s = 8a\sin^2\frac{\psi}{6}$

b) Find centre, vertices and foci of the ellipse: $x^2+10x+25y^2=0$

c) Find the volume of a parallelepiped whose concurrent edges are represented by $\vec{i}+\vec{j}+\vec{k},\ 2\vec{i}+\vec{j}-2\vec{k}$ *and* $3\vec{i}+2\vec{j}-\vec{k}$.

d) $\int x^3 \log x\, dx$.

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POKHARA UNIVERSITY

Level: Bachelor Semester – Fall Year : 2008
Programme: BE Full Marks: 100
Course: Programming in C Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt all the questions.

23 g) Discuss briefly about the history of computing and computers. 7

h) State the characteristics of a good algorithm. Flowchart is a pictorial representation of an algorithm, justify the statement with suitable example. 8

24 a) Explain with examples the decision control mechanisms and loop control mechanisms available in C? 7

b) Write a program that asks a user for a number and finds out if the number is present in the 2D array given below. 8

```
int arr [3] [3] = { {6, 37, 33},
                    {12, 11, 13},
                    {14, 85, 96}
                  };
```

25 a) Given the code below write the output of the program. 8

```
#include<stdio.h>
#include<conio.h>
void main ( )
{
int x, y, z;
x = 3 ; y = 4 ; z = 5;
clrscr ( ) ;
printf ( "Given x = %d, y = %d, and z = %d, \n", x, y, z) ;
x = + + x + y;
printf ( " x = x + y assigns %d to x; \n", x) ;
x = 6 ;
x + = y ;
printf ( " x + = y assigns %d to x ; \n", x) ;
x = 2;
z = z * x + y + +;
printf ( " z = z * x + y assigns %d to z;\n", z) ;
z = 10 ;
z = z * (x + y) ;
printf ( " z = z * (x + y) assigns %d to z ; \n", z) ;
z = 10 ;
z * = x + y ;
printf ( " z * = x + y assigns %d to z ; \n", z) ;
z = 10 ;
Z * = x + y ;
printf ( " z * = x + y assigns %d to z ; \n", z) ;
getch ( ) ;
}
```

b) Trace the output of the following program 7

```
#include <conio.h>
#include <stdio.h>
Void main ( )
{
    int x = 0, i = 0;
    for (i = 1; i < 10; ++i)
        { if ( i % 2 = = 1 )
              x + = i;
        else
              {
              x --;
              printf ("%d", x);
              break;
              }
    printf ("\nx = %d", x);
    getch ( );
}
```

26 a) Write a program to input a square matrix and print the menu: 9

MENU

i. Sum of diagonal elements from left
ii. Find maximum element
iii. Sum of All Elements
iv. Exit from Program

and perform tasks as per users choice.

C-progr

b) Explain with examples how the functions strcmp, strncpy and strlen can be used for string processing. 6

27 a) What does storage classes tells about variables? Write a program to calculate the sum of given series, up to the term given by user 8

$$Y=\frac{1}{2}-\frac{2}{x^2}+\frac{3}{x^3}-\ldots$$

b) Differentiate "Call by value" and "Call by reference" while calling a function with examples. 7

28 a) What is the difference between a structure and a union? When would you use a nested structure? 3+2

b) Write a program to read information of 10 students in 4 subjects, store in a file and print the result: 10

Pearson College

Name	C	BEE	MTH	CT	Total
John	88	78	98	87	--
Beecky	78	65	45	23	--
-------	----	----	----	----	----

29 Write short notes on *(Any Two)* 2×5

a) Preprocessor directives

b) Recursion

c) Reasons for flow chartings

d) Dynamic memory allocation

POKHARA UNIVERSITY

Level: Bachelor Semester – Fall Year : 2009

Programme: BE Full Marks : 100

Course: Programming in C Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. c. Differentiate between Analog and Digital computers. Also draw a block diagram of digital computer. 8

f. What is an Algorithm and Flowchart? Write an algorithm and draw a flow chart to count positive and negative number in n given numbers. 7

2. a. Write the structure of for loop show how it works with an appropriate example. Compare continue and break statements. 8

b. What do you mean by local and global variable? Give example of each. List out the different types of logical operators in C. 7

3. Determine the output of the following programs:

a. 5

```
void main ()
{
    int m = 100, n = 50;
    printf("%d\n",10+m++);
    printf("%d\n",10+n++);
    printf ("%d\n", 10+--n);
}
```

b. 5

```
void main ()
{
    char string [ ] = "HELLO WORLD";
    int m;
    for (m = 0; string [m] != '\0'; m++)
    {
        if(m%2)==0)
            printf ("%c",
string [m];
    }
}
```

5

c. void test(int*a);

```
void main()
{
    int x=50;
    test(&x);
}
void test(int*a)
{
    *a=*a+50;
```

4\. a. Discuss in detail the differences between "conventional array declaration" and "declaring arrays using pointers". Justify your answer with examples. 7

b. Print the following pattern using a C program. Take the string as an input from the user. Write a generic program to accept string of any length. 8

Example pattern

If the user input is NEPAL than the output should be as follows:

```
1 N
2 E E
3 P P P
4 A A A A
5 L L L L L
```

5\. a. What is nested structure? Give example of a nested structure. How a nested structure component is accessed? 5

b. Differentiate between macro and function with the help of examples. 5

c. What do you mean by pre-processor directive? Write about the file inclusion directive. 5

6\. a. Write a program to read long Integer number, count the digit and print it. 5

b. What are file opening modes? Create a structure for the following data: 10

ID	Name	Address	Salary	Date of joining		
				dd	mm	yy

And write program to input 100 employee, save in emp.dat file of employee who have the address 'pokhara'.

OR

What is a FILE pointer? Write a program to create a structure for customers in a Shop of the following data:

CID, CName, Address, TelNo, Balance

Read 100 customers from a file customer.dat and display the information of the customers who has the balance is greater than Rs 1000

7\. Write short notes on (Any Two): 5 × 2

a. Switch statement

b. Auto and static variables

c. Escape key sequences

d. Format specifiers

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POKHARA UNIVERSITY

Level: Bachelor　　Semester – Fall　　Year : 2010
Programme: BE　　Full Marks : 100
　　Pass Mark : 45
Course: Programming in C　　Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt all the questions.

1. a) What is a programming language? Differentiate between high level language and low level programming language. 8

   b) Define algorithm, flow chart and pseudo-code with example. Write an algorithm and draw a flow chart to find the largest among three numbers. 7

2. a) What are constant and variable? List the different types of operator used in C. Explain any four of them. 8

   b) What are different types of decision control mechanism used in C? Explain entry control and exit control loop with example. 7

3. What will be the output after executing the following codes

   a) 4

```
#include<stdio.h>
void main()
{
        int x=10,y=20,z,k;

        z=++y/x--;
        y+=10;
        x+=20;
        y--;
        X++;
        z*=15
        k=(x==y? (x+y):z);
```



```
printf("x=%d\ny=%d\nz=%d\nk=%d",x,y,z,k);
}
```

   b)

```
#include<stdio.h>
void main()
{
        int i,j;
        char str[]="POINTER";
        clrscr();
        for(i=0;str[i]!='\0';i++)
        {
            for(j=0;j<=i;j++)
                printf("%c",str[j]);
            printf("\n");
        }
}
```

   c) 6

```
#include<stdio.h>
void disp(int*n);
void main()
{
    int i;
    int marks []={15,16, 17, 18, 19, 20, 21, 22, 23, 24};
        disp(marks);
}
void disp(int*n)
{
        int j, sum=0,
        for(j=0;j<10;j++)
```

```
        {
        if(*n%3==0)
            {
                printf("%d\t",*n);
                sum+=*n;
            }
        n++;
    }
    printf("\n Sum=%d", sum);
}
```

4\. a) What is recursive function? Write a program to calculate nth Fibonacci term using recursive function. 8

b) Write a program to read matrix elements and calculate transpose of 4x5 matrix and print. 7

5\. a) Write a program to sort n numbers in an array. 7

b) Explain call by value and call by reference with examples. 8

6\. a) Write a program to open a new file. Read name, address and telephone number of 10 persons from the user and then write to a file. Display only the records of persons whose address is Kathmandu. 8

b) What is pointer? Write a program to print reverse elements of an array using dynamic memory allocation. 7

7\. Differentiate between: (Any Two) 5x2

a) Macros and Functions

b) Structure and Union

c) Digital and Analog computer

POKHARA UNIVERSITY

Level: Bachelor	Semester – Fall	Year : 2011
Programme: BE		Full Marks: 100
Course: Programming in C		Pass Marks: 45
		Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

a) Write an algorithm for finding greatest number among 'n' numbers. 7

b) What is an operator? List all operators available in C. Describe three of them. 8

a) Why second generation of computer is better than first generation. Differentiate between third generation and forth generation of computer. 8

b) What are the steps involving during the programming? Explain. 7

a) Find out the output: 3

```
main ()
{
    int i = 5, j = 4, k = 9;
    i = (i + k)/3+k%(j+i) + j * k% i/2;
    printf ("%d", i);
}
```

4

b)
```
main ( )
{
    int x = 16,y = 18, z;
}
    y + = x ++;
    z = ++x + y++ ;
    x = x + y + z --;
    printf (" \n x = %d\ny = %d\nz = %d", x,y,z);
}
```
8

c)
```
main ( )
{
    int i,j,k;
    for (i = 1; i <=3; i + +)
        for (j = 1; j<=3; j + +)
            for (k = 1; k< =3; k + +)
                printf ( "\n %d%d%d; i, j, k);
```

a) What do you mean by selective and repetitive statement? Why do we need break and continue statement. 7

b) Write a program to find the terms in the given series till the term value is less than 250. 8

$(1^2+2^2)/3, (2^2+3^2)/4, (3^2+4^2)/5$,......................

a) Give different ways of initialization of arrays. Give the classification of arrays. 5

b) What is a function? Categorize it in terms of arguments and return value. 5

c) Write a C program to find the maximum element in an array of N elements. 5

OR

a) What do you mean by dynamic memory allocation? Explain about memory leak. 7

b) Write a program to read N numbers dynamically and sort it using function. 8

a) What is structure? Explain its components. How can you access the members of a structure? 7

b) What is the significance of FILE Pointer? Create a structure called Goods that stores Number, price, and PurchaseDate and Qty. Write a program to store the information of 100 Goods into the file called Goods.dat. 8

Write short notes on any two: 2×5

a) Pre- processor directives

b) String handling functions

c) Union

d) Dynamic Memory Allocation

POKHARA UNIVERSITY

Level: Bachelor Semester – Fall Year : 2012

Programme: BE Full Marks: 100

Course: Programming In C Pass Marks: 45

Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

c) What is programming language? Describe Low Level Language (LLL) and High Level Language (HLL) with examples. 7

OR

Explain briefly the various generations of computers with example. 8

f) Define Algorithm and Flowchart. Draw a Flowchart to read 3 numbers from the user and find the smallest one.

a) Define the terms operators, variable and constant with example. Explain the necessary rules to define the variables name in C programming. 7

b) What will be the output after executing the following Codes (assume necessary header files): 4+4

i)
```
void main()
{
    int x=10,y=20,z=5,i;
    i=x*(++y+z++)%3+y/x*2-5;
    x+=z;
    y-=z;
    x--;
    z+=10;
    z--;
    printf("x=%d\ny=%d\nz=%d",x,y,z);
    printf("\ni=%d",i);
}
```

ii)
```
void main()
{
```