PENUGONDA,
Dt. 26-08-2008.

From:
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To
The Registrar,
Andhra University,
VISAKHAPATNAM

C.E

Respected Sir,

Legal Sec

These are the Recommended Problems for Practicals Paper-I for Ist Year B. Sc.,/B.A., students admitted current academic year 2008-'09.

28/8

Thanking You Sir,

Yours sincerely,

26-8-8

(CH. VENKATESWARA RAO)
Chairman
Board of Studies in
Mathematics (U.G.)

Encl:-1. One Set of Practical Problems (160) containing 11 Sheets

29/08/08

Recommended Problems for Practical

UNIT - A

1. Solve $y^2dx + (x^2-xy-y^2)dy = 0$ ($\frac{1}{mx + ny}$ is IF)
2. Solve $(x^2 - 3xy + 2y^2)dx + x(3x - 2y)\,dy = 0$ ($\frac{1}{mx + ny}$ is IF)
3. Solve $(x^2 y^2 + xy + 1)\,dx + (x^2 y^2 - xy + 1)x\,dx = 0$ ($\frac{1}{mx - ny}$ is IF)
4. Solve $(xy^2 - 3y)\,dx + (3x^2y + 7x)\,dy = 0$ ($\frac{1}{mx - ny}$ is IF)
5. Solve $(1 + y + x^2y)dx + (x + x^3)dy = 0$ ($e^{\int f(x)}$ is IF)
6. Solve $(4xy + 3y^2 - x)dx + (x^2 - 2xy)dy = 0$ ($e^{\int f(x)}$ is IF)
7. Solve $(y^4 + 2y)dx + (xy^3 + 2y^2 - 4x)dy = 0$ ($e^{\int g(y)}$ is IF)
8. Solve $(xy^3 + y)dx + 2(x^2y^2 + x + y^4)dy = 0$ ($e^{\int g(y)}$ is IF)
9. Solve $\frac{dx}{dy} = \frac{dy}{yz} = \frac{dz}{x(yz - 2x)}$ (Method of Grouping)
10. Solve $\frac{dx}{xz(z^2+xy)} = \frac{dy}{-yz(z^2 + xy)} = \frac{dz}{z^4}$ (Method of Grouping)
11. Solve $\frac{dx}{x(x + y)} = \frac{dy}{-y(x + y)} = \frac{dz}{-(x + y)(2x + 2y + z)}$ (Method of multiplies)
12. Solve $\frac{dx}{y^3x - 2x^4} = \frac{dy}{2y^4 - x^3y} = \frac{dz}{9z(x^3 - y^3)}$ (Method of multiplies)
13. Solve $x^2\left(\frac{dy}{dx}\right)^2 - 2xy\frac{dy}{dx} + 2y^2 - x^2 = 0$ (Solvable for p)
14. Solve $p^2 + 2py \cot x = y^2$ (Solvable for p)
15. Solve $y = 2px - p^2$ (Solvable for y)
16. Solve $y^2 \log y = xpy + p^2$ (Solvable for y)
17. Solve $yp^2 - 2xp - y = 0$ (Solvable for x)
18. Solve $p^2 - 4xyp - 8y^2 = 0$ (Solvable for x)
19. Solve $(py + x)(px - y) = 2P$ (Clairaut's)
20. Solve $y = px + \sqrt{a^2p^2 + b^2}$ (Clairaut's)

(P.T.O.)

21. Reduce the equation $xyp^2 - (x^2 + y^2 - 1)p + xy = 0$ to clairauts form by using the transformations $U = x^2$, $V = y^2$ and hense solve it.

Solve $2px = 2\tan y + p^3 \cos^2 y$ (solvable for x)

22. ~~Solve $(1+y^2) + (x - e^{\tan^{-1} y})\frac{dy}{dx} = 0$ (linear)~~

Solve $y = 2xp + x^2 p^4$ (solvable for y)

23. ~~Solve $(1+x+xy^2)\frac{dy}{dx} + (y+y^3) = 0$ (linear)~~

24. Solve $x \cos x \frac{dy}{dx} + (x \sin x + \cos x) = 1$ (Linear)

25. Solve $\frac{dy}{dx} + \frac{y}{(1-x^2)^{3/2}} = \frac{x + \sqrt{1-x^2}}{(1-x^2)^2}$ (Linear)

26. Solve $x \frac{dy}{dx} + y = y^2 \log x$ (Bernoulli)

27. Solve $(x+1)\frac{dy}{dx} + 1 = e^{x-y}$ (Bernoulli)

also find the solution for which $y(o) = 0$

28. Solve $(x^2 + 3x + 2)\frac{dy}{dx} + (2x - 1)y = (xy + 2y)^2$ (Bernoulli)

29. Find the Orthogonal Trajectories of the Family of Curves $y = \frac{1}{\log c_1 x}$ Where c_1 is the Parameter.

30. Find the Orthogonal Trajectories of the Family of curves $x^{2/3} + y^{2/3} = a^{2/3}$ Where C_1 is the Parameter.

UNIT - II

31 Solve $[D^2 - (a+b)D + ab]y = e^{ax} + e^{bx}$

32. Solve $[D^2 - 4D + 3]\, y = \text{Sin } 3x$; $\text{Cos } 2x$

33. Solve $[D^2 + a^2]\, y = \text{Tan } ax$

34. Solve $(D^2 + 3D - 4)y = x^2 - 2x$

35. Solve $(D^2 - 4D + 4)y = x^2 + e^x + \text{Cos}2x$

36. Solve $(D^2 - 6D + 13)y = 8e^{3x}$, $\text{Sin } 2x$

37. Solve $(x^2D^2 - 2xD - 4)y = x^4 \log x$ (Homogeneous linear)

38. Solve $[(3x+2)^2 D^2 + 3(3x+2)D - 36]y = 3x^2 + 4x + 1$ (legenders)

39. Solve $(x^2D^2 + 3xD + 1)y = \frac{1}{(1-x)^2}$ (legenders)

Solve the D.E. by the method of undetermined coefficients

40. Solve $(D^2 + 2D + 5)\, y = 12e^x - 3\, \text{Sin } 2x$ (Rule I)

41. Solve $(D^2 - 2D + 3)y = x^3 + \text{Sin } x$ (Rule I)

42. Solve $(D^2 - 3D + 2)y = 2x^2 + 3e^{2x}$ (Rule II)

43. Solve $(D^2 - 3D + 2)y = x^2e^x + \text{Sin } x$ (Rule II)

44. Solve $(D^2 + 10D + 25)y = 14\, e^{-5x}$ (Rule III)

45 Solve $(D^2 + 4D + 4)y = 3x\, e^{-2x}$ (Rule III)

46. By changing the dependent variable of I derivative
$x\, y'' + 2(x+1)\, y' + (x+2)y = (x-2)\, e^{2x}$

47. Solve $y'' - 4xy' + 4x^2y = e^{x^2}$ (Normal form)

48. Solve $y'' - 4xy + (4x^2 - 1)y = -3e^{x^2}\, \text{Sin } 2x$ (Normal form)

49. Solve $(\text{Sin}x - \text{Cos } x)\, y'' - (x\, \text{Sin } x)y' - y\, \text{Sin}x = 0$
given that $y = \text{Sin } x$ is a solution

50. Solve $(x D^2 - D - 4x^3)\, y = x^5\ (x>0)$ (Changing the independent variable)

51 Solve $(x D^2 - D - 4x^3)y = 8\, x^3\, \text{Sin } x^2$ (Changing the independent variable)

52. Solve $(D^2 - 3D + 2)y = \text{Cos}\,(e^{-x})$ by using the method of variation of parameters

53. Solve $(D^2 + a^2)\,y = \operatorname{Sec} ax$ by using the method of variation of parameters

54. Solve $(D - 1)x + (D - 1)y = 0$, $(2D + 2)\,x + (2D - 2)y = t$, where $D = \frac{d}{dt}$

55. Solve $(D + 3)x + (D + 1)y = e^{t}$ $(D+1)x + (D - 1)y = t$, where $D = \frac{d}{dt}$

56. Solve $3(3D + 1)\,x + 4y = t$, $Dx + Dy = t - 1$ (Triangular system)

57. Solve $(D + 1)\,x + (D + 1)\,y = 1$, $D^2x - Dy = t - 1$

58. Solve $\frac{dy}{dx} + y = z + e^x$, $\frac{dz}{dx} + z = y + e^x$

59. Solve $(3x+2)^2 \frac{d^2y}{dx^2} + 3x(3x+2)\frac{dy}{dx} - 36y = 3x^2+4x+1$

60. Verify the System $Dx - Dy = e^t$, $3Dx - 3Dy = 3e^t$ is degenerate and find the Number of Solutions it has.

UNIT-C

1. Find the bisecting plane of the acute angle between the planes $3x-2y+6z+2=0$, $-2x+y-2z-2=0$.

2. Find the equation of the plane through the line of the intersection of the planes $x-3y+2z=0$ and $3x-y-2z-5=0$ and passing through $(1,1,1)$

3. Find the equation of the plane through the line of intersection of the planes $x+y+z=1$ and $2x+3y-z=-4$ and is parallel to X-axis

4. Find the equation of the planes bisecting the angles between the planes $x+2y+2z=19$, $4x-3y+12z+3=0$ and specify the one which bisects the acute angle.

5. Find the equation of the planes bisecting the angles between the planes $3x-6y+2z+5=0$, $4x-12y+3z-3=0$ and specify the one, which bisects the obtuse angle.

6. Find the equations of planes that bisect the angles between the planes $2x-y-2z+3=0$, $3x-2y+6z+8=0$ and specify the plane which contains the origin.

7. Find the equations of planes that bisect the angles between the planes $x-2y+2z+1=0$, $2x+3y-6z-1=0$ and specify the plane which contains the origin.

8. Show that the origin lies in the acute angle between the planes $x+2y+2z=9$, $4x-3y+12z+13=0$

9. Find length and equation of S.D. between the lines $\frac{x-3}{3}=\frac{y-8}{-1}=\frac{z-3}{1}$, $\frac{x+3}{-3}=\frac{y+7}{2}=\frac{z-6}{4}$ also find the equations and points in which the S.D. meets the given lines

10. Find length and equation of S.D. between the lines $\frac{x-3}{1}=\frac{y-5}{-2}=\frac{z-7}{1}$, $\frac{x+1}{7}=\frac{y+1}{-6}=\frac{z+1}{1}$ also find the equations and points in which the S.D. meets the given lines

11. Find the length and equation of line of S.D. between the lines $\frac{x}{1}=\frac{y}{2}=\frac{z}{1}$, x+y+2z-3=0,2x+3y+3z-4=0

12. Show the equation to the plane containing the line $\frac{y}{b}+\frac{z}{c}=1, x=0$ and parallel to the line $\frac{x}{a}-\frac{z}{c}=1, y=0$ is $\frac{x}{a}-\frac{y}{b}-\frac{z}{c}+1=0$ and if "2d" is S.D. prove that $\frac{1}{d^2}=\frac{1}{a^2}+\frac{1}{b^2}+\frac{1}{c^2}$

13. Find the length and equation of line of S.D. between the lines 3x-9y+5z=0=x+y-z, 6x+8y+3z-10=0=x+2y+2z-3

14. Find the length and equation of line of S.D. between the lines $\frac{x-8}{3}=\frac{y+9}{-16}=\frac{z-10}{7}$, $\frac{x-15}{3}=\frac{y-29}{8}=\frac{z-5}{-5}$

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15. Find the length and equation of line of S.D. between the lines $5x-y-z=0=x-2y+z+3$ and $7x-4y-2z=0=x-y+z-3$

16. Find the length and equation of line of S.D. between the lines $\frac{x}{4}=\frac{y+1}{3}=\frac{z-2}{2}$, $5x-2y-3z+6=0=x-3y+2z-3$

17. Find the equation of the sphere passing, through the circle $x^2+y^2+z^2+2x+3y+6=0, x-2y+4z-9=0$ and through the center of the sphere $x^2+y^2+z^2-2x+4y-6z+5=0$.

18. Find the equation of the sphere which passes through the circle $x^2+y^2+z^2=5, x+2y+3z=3$ and touching the plane $4x+3y=15$.

19. Find the equation of the sphere which has the circle $x^2+y^2+z^2-x+z-2=0, x+2y-z-4=0$ as the great circle.

20. Find the equation of the sphere with center on the plane $4x-5y-z-3=0$ and passing through the circle $x^2+y^2+z^2-2x-3y+4z+8=0$, $x^2+y^2+z^2+4x+5y-6z+2=0$

21. Show that the two circles $x^2+y^2+z^2-y+2z=0, x-y+z-2=0$; $x^2+y^2+z^2+x-3y+z-5=0, 2x-y+4z-1=0$ lies on the same sphere and find its equation

22. Find the radius and center of the circle of intersection of the sphere $x^2+y^2+z^2-2x-4z=11$ and the plane $x+2y+2z=15$

23 If r_1,r_2 are the radii of two orthogonal spheres then the radius of their common circle is $\frac{r_1r_2}{\sqrt{r_1^2+r_2^2}}$

24. Find the equation of the sphere which passes through the plane $3x+2y-z+2=0$ at (1, -2,1) and cuts orthogonal to the sphere $x^2+y^2+z^2-4x+6y+4=0$

25. Find the equation of the sphere intersecting the spheres $x^2+y^2+z^2+x-3z-2=0$, $x^2+y^2+z^2+1/2\ x+3/2\ y+2=0$ orthogonal and passing through the points (0,3,0), (-2, -1, -4)

26. Prove that every sphere through the circle $x^2+y^2+z^2-2ax+r^2=0, z=0$ intersects orthogonal every circle sphere through the circle $x^2+z^2=r^2$, $y=0$.

27. Find the equation of the sphere cutting the sphere $x^2+y^2+z^2-4x+6y+4=0$ orthogonally and touching the plane $3x+2y-z+2=0$ at (1, -2,1)

UNIT-D

28. Find the equation of the cone with the vertex at origin and passing through the circle given by $x^2+y^2+z^2+x-2y+3z-4=0$, $x^2+y^2+z^2+2x-3y+4z-5=0$.

29. Find the equation of the right circular cone whose vertex at P (2, -3,5), axis PQ that makes equal angles and semi vertical angle is 30°.

30. Find the equation of the right circular cone whose vertex at P (2, -3,5), axis PQ which makes equal angle with axes and which passes through A (1, -2,3)

31. Prove that $33x^2+13y^2-95z^2-144yz-96zx-48xy=0$ represents a right circular cone whose axis is the line $3x=2y=z$. Find its vertical angle.

32. Find the angles between the lines of section of the planes $3x+y+5z=0$ and cone $6yz-2zx+5xy=0$

33. Find the equation of the lines in which the plane $2x+y-z=0$ cuts the cone $4x^2-y^2+z^2=0$

34. Find the angle between the lines given by $x+y+z=0$, $\frac{yz}{b-c}+\frac{zx}{c-a}+\frac{xy}{a-b}=0$

35. Prove that the cones $ax^2+by^2+cz^2=0$ and $\frac{x^2}{a}+\frac{y^2}{b}+\frac{z^2}{c}=0$ are reciprocals.

36. Prove that perpendicular drawn form the origin to tangent planes to the cone $3x^2+4y^2+5z^2+2yz+4zx+6xy=0$ lies on the cone $19x^2+11y^2+3z^2+6yz-10zx-26xy=0$

37. Prove that if a right circular cone has three mutually perpendicular generators then semi vertical angel is $\text{Tan}^{-1}\sqrt{2}$

38. Find the equation of the cone whose vertex is (α,β,γ) and base $y^2=4ax, z=0$

39. The section of a cone whose vertex is P and guiding curve, the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$, $z=0$ by the plane $x=0$ is a rectangular hyperbola show that the locus of P is $\frac{x^2}{a^2}+\frac{y^2+z^2}{b^2}=1$

40. Find the equation of the cone formed by rotating the line $2x+3y=6, z=0$ about Y-axis

41. Find the equation of the cone whose vertex is (1,2,3) and the guiding curve of the circle is $x^2+y^2+z^2=4, x+y+z=1$

42. Obtain the condition of the general equation of the 2nd degree representing a cone.

43. If $\frac{x}{1}=\frac{y}{2}=\frac{z}{3}$ represents one of a set of three mutually perpendicular generators of the cone $5yz-8zx-3xy=0$.Find the equations of the other two

44. Show that the angle between the lines given by $x+y+z=1$, $ayz+bzx+cxy=0$ is $\pi/2$ if $a+b+c=0$ but $\pi/3$ if $\frac{1}{a}+\frac{1}{b}+\frac{1}{c}=0$

45. Find the vertex of the cone $7x^2+2y^2+2z^2-10xz+10xy+26x-2y+2z-17=0$

46. Show that the locus of a point from which the three mutually perpendicular tangent lines can be drawn to the cone $ax^2+by^2+cz^2=1$ is a $(b+c)x^2+b(c+a)y^2+c(a+b)z^2=a+b+c$

47. Find the equation of the cone with vertex (1,1,2) and guiding curve is $x^2+y^2=4, z=2$

48. Show that the locus of a point from which the three mutually perpendicular lines be drawn to meet the curve $x^2+y^2=1, z=0$ is $x^2+y^2+2z^2=1$

49. If $\frac{x}{1}=\frac{y}{-1}=\frac{z}{2}$ is one of the three mutually perpendicular generators of the cone $16yz-33zx-25xy=0$, find the other two

50. Find the cone which contains the three coordinate axes and the three lines $\frac{x}{1}=\frac{y}{-2}=\frac{z}{3}; \frac{x}{-1}=\frac{y}{1}=\frac{z}{1}; \frac{x}{5}=\frac{y}{4}=\frac{z}{1}$

51. Find the equation of right circular cone with its vertex at (2,3,1), axis parallel to the line $\frac{x}{-1}=\frac{y}{2}=\frac{z}{1}$ and one of its generators have dr's 1, -1,1

52. Find the equation of the cone which touches the three co-ordinate planes and the planes $x+2y+3z=0, 2x+3y+4z=0$

53. Find the condition that the lines of the intersection of the plane $lx+my+nz=0$ and the cone $fyz+gzx+hxy=0$, $ax^2+by^2+cz^2=0$ should be coincident

54. Prove that the cones $ayx+bzx+cxy=0$ and $\sqrt{ax}+\sqrt{by}+\sqrt{cz}=0$ are reciprocal

55. Find the equation of the cone whose vertex at origin and which passes through the curve given by $ax^2+by^2+cz^2=1$, $\alpha x^2+\beta y^2=2z$

56. Find the enveloping cone of the sphere $x^2+y^2+z^2-2x+4z-1=0$ with its vertex at $(1,1,1)$.

57. Find the equation of the right circular cylinder of radius 2 whose axis passes through the point $(1,2,3)$ and has direction cosines proportional to $(2,-3,6)$.

58. Find equation of the enveloping cylinder of the sphere $x^2+y^2+z^2-2x+4y-1=0$, having its generators parallel to the line $x=y=z$.

59. Find the equation of the right circular cylinder whose axis is $\frac{x-1}{2}=\frac{y-2}{1}=\frac{z-3}{2}$ and radius is 2

60. Find the equation of the right circular cylinder whose guiding curve is the circle through the points $(1,0,0)$, $(0,1,0)$, $(0,0,1)$

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26/8/08
Chairman B.O.S