(Pages : 3) **C – 4299**

Reg. No. : .....

Name : .....

Second Semester B.Sc. Degree Examination, July 2017
Career Related FDP Under CBCSS
Group 2 (a) : PHYSICS AND COMPUTER APPLICATIONS
Foundation Course – PC 1221
Introduction to Programming
(2014 Admission Onwards)

Time : 3 Hours Max. Marks : 80

SECTION – A

(Very short answer type)

One word to a maximum of **one sentence**. Answer **all** questions :

1. In C, the statements following main() are enclosed within _____
2. Each instruction in C program is terminated by _____
3. The C programs are converted into machine language using _____
4. What are the identifiers ?
5. What will be the output after the execution of following program ?

```
void main()
{
Int k = 8;
Printf("k = %d", k ++ – k ++);
}
```

6. A character array always ends with _____
7. An array is a collection of _____
8. When an array is passed to function, in real what gets passed ?
9. _____ header file is to be included for using string functions.
10. Recursion is a process in which a function calls _____ **(10×1=10 Marks)**

P.T.O.

SECTION – B

(Short answer)

Answer **any eight** questions. **Each** question carries **two** marks :

11. Write the rules for writing a C program.
12. What is the difference between an interpreter and compiler ?
13. List any three escape sequences with their uses.
14. Why the break statement is essential in switch statement ?
15. What are arrays ? How elements of array are stored ?
16. What do you mean by a variable and constant ?
17. What is dynamic initialization ?
18. Explain the methods for initialization of variables.
19. How do functions help to reduce the program size ?
20. Explain command line arguments.
21. What are pointers ? Why are they important ?
22. Write a program to display numbers of the series 1, 3, 9, 27, 81, ... n by using for loop. **(8×2=16 Marks)**

SECTION – C

(Short essay)

Answer **any six** questions. **Each** question carries **four** marks :

23. What is global pointer ? Explain with suitable example.
24. What are actual and formal arguments ?
25. Distinguish between static and external variables.
26. Explain the lifetime and visibility of a variable.
27. What is a structure in C ? How is a structure declared ?

28. What are the differences between union and structure ?

29. Distinguish between text mode and binary mode operation of a file.

30. Explain environment variables.

31. What is recursion ? Explain its advantages. **(6×4=24 Marks)**

SECTION – D

(Long essay)

Answer **any two** questions. **Each** question carries **15** marks :

32. Explain different datatypes supported in C.

33. Explain various operations with an array.

34. Write the definition of a function. Mention the types of function available in C.

35. Write a program to reverse the given number recursively. **(2×15=30 Marks)**

(Pages : 4) **C – 4268**

Reg. No. : .....

Name : .....

Second Semester B.Sc. Degree Examination, July 2017
(Career Related FDP under CBCSS)
Group 2(a) : PHYSICS AND COMPUTER APPLICATIONS
Complementary Course II/MM 1231.6 : Analytic Geometry, Integration, Differential Equations and Matrices
(2013 Admn. Onwards)

Time : 3 Hours Max. Marks : 80

SECTION – I

All the first ten questions are compulsory. They carry 1 mark each.

1. What is the eccentricity of a parabola ?
2. Write the standard equation of an ellipse and its foci.
3. If f is integrable on [a, b], what is the average value of f on [a, b] ?
4. Evaluate $\int_0^{\pi/3} 4 \sec\theta \tan\theta \, d\theta$.
5. If $\int_0^a f(x)\,dx = 6$, $a > 0$ and $f(x)$ is odd, what is the value of $\int_{-a}^a f(x)\,dx$?
6. Define exact differential equation.
7. Solve $\frac{dy}{dx} = -xy$.
8. Solve $\frac{dy}{dx} + y = 3$.
9. What is the rank of a matrix every element of which is unity ?
10. If the rank of a matrix is 3, what is the rank of its equivalent matrix ?

(10×1=10 Marks)

P.T.O.

SECTION – II

Answer **any 8** questions from among the questions **11** to **22**. These questions carry **2** marks **each**.

11. Find the condition that the line $lx + my + n = o$ is a tangent to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$.

12. Find the gradient of the normal of the parabola $y^2 = 4ax$ at $(at^2, 2at)$.

13. Find the asymptotes of the hyperbola $3x^2 - 5xy - 2y^2 + 17x + y + 14 = 0$.

14. Evaluate $\int \frac{\sqrt{\tan x}}{\sin x \cos x} dx$.

15. Find the volume of the solid generated by revolving the curve $y^2 = x^3 + 5x$ between the ordinates $x = 2$ and $x = 4$ about the x – axis.

16. Evaluate $\int_0^1 \int_1^2 (x^2 + y^2)\, dxdy$.

17. Solve $xdy + ydx + \left(4\sqrt{1 - x^2y^2}\right) dx = 0$.

18. Show that $(2xy + y - \tan y)\, dx + (x^2 - x\tan^2 y + \sec^2 y + 2)\, dy = 0$ is exact and solve it.

19. Solve $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = 0$.

20. Reduce to the normal form $\begin{bmatrix} 1 & 2 & 1 \\ -1 & 0 & 2 \\ 2 & 1 & -3 \end{bmatrix}$.

21. Prove that a homogeneous system of linear equations is always consistent.

22. Find the eigen values of $\begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$. **(8×2=16 Marks)**

SECTION – III

Answer **any 6** questions from among the questions **23** to **31**. These questions carry **4** marks **each**.

23. Identify and sketch the curve $153x^2 - 192xy + 97y^2 - 30x - 40y - 200 = 0$.

24. If t_1, t_2, t_3 and t_4 are the parameters of the feet of the normals from a point P to the rectangular hyperbola $xy = c^2$, prove that $t_1t_2t_3t_4 = -1$.

25. Find the area of the loop of the curve $y^2(1 + x) = x^2(1 - x)$.

26. Find the length of the curve $y = \log\sec x$ between the points given by $x = 0$ and $x = \pi/4$.

27. Solve $\frac{dy}{dx} + x\sin 2y = x^3\cos^2 y$.

28. Solve $\frac{d^2y}{dx^2} + 3\frac{dy}{dx} - 10y = e^{2x}$.

29. Find the orthogonal trajectory of the family of parabolas $y = cx^2$.

30. Find the rank of the matrix by reducing it to the row reduced echelon form

$$A = \begin{bmatrix} 1 & 2 & 3 & 0 \\ 2 & 4 & 3 & 2 \\ 3 & 2 & 1 & 3 \\ 6 & 8 & 7 & 5 \end{bmatrix}.$$

31. Solve completely the system of equations

$x + 3y - 2z = 0$

$2x - y + 4z = 0$

$x - 11y + 14z = 0.$

(6×4=24 Marks)

SECTION – IV

Answer **any 2** questions from among the questions **32** to **35**. These questions carry **15** marks **each**.

32. a) Find the centre, eccentricity, foci and directrix of the hyperbola

$4x^2 - 9y^2 - 8x - 18y - 41 = 0.$

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

33. a) Evaluate $\iint_R (x^2 + y^2)\, dxdy$, where the region R is the area bounded by the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1.$

b) Find the surface area of the solid obtained by revolving the arc of the curve $y = \sin x$ from $x = 0$ to $x = \pi$ about the x – axis.

34. a) Solve $x^2 \frac{d^2y}{dx^2} + 2x \frac{dy}{dx} - 20y = x^4.$

b) The acceleration of a moving particle is proportional to the cube of the velocity and is negative. Find the velocity of the particle at time t, given that its critical velocity is v_0.

35. Find a basis of eigen vectors and diagonalize the matrix $\begin{bmatrix} -8 & 11 & 3 \\ 4 & -1 & 3 \\ -4 & 10 & 6 \end{bmatrix}$.

(2×15=30 Marks)

(Pages : 4) **C – 4265**

Reg. No. : .....

Name : .....

Second Semester B.Sc. Degree Examination, July 2017
(Career Related FDP Under CBCSS)
Group 2(a) Chemistry And Industrial Chemistry
Complementary Course II / MM 1231.7
ANALYTIC GEOMETRY, INTEGRATION, DIFFERENTIAL EQUATIONS AND THEORY OF EQUATIONS
(2013 Admn. Onwards)

Time : 3 Hours Max. Marks : 80

SECTION – I

All the **first ten** questions are **compulsory**. They carry **1** mark **each.**

1. Find the vertex and focus of the parabola $y^2 = 12x$.

2. Fill in the blanks :

   Using the discriminant test the quadratic curve $Ax^2 + Bxy + Cy^2 + Dx + Ey + F = 0$ is a parabola if

3. Evaluate $\int \frac{t^2 - 2t^4}{t^4} dt$

4. If f is a smooth on [a,b], give the formula to find the length of the curve y = f(x) from x = a to x = b.

5. Evaluate $\int_0^1 \int_0^1 dx\,dy$.

6. A curve is defined by the condition that at each of its points (x,y), its slope is equal to sixteen times the abscissa of the point. Express this in terms of a differential equation.

P.T.O.

7. Solve the differential equation $10y\,y' + 3x = 0$.

8. Find the auxiliary equation of the following Euler – Cauchy equation :
$x^2 y'' - 3x y' + 4y = 0$.

9. If $\alpha_1, \alpha_2, \ldots$ are the roots of the equation $a_0x^n + a_1x^{n-1} + \ldots + a_{n-1}x + a_n = 0$, then give the roots of the following equation $a_nx^n + a_{n-1}x^{n-1} + \ldots + a_1x + a_0 = 0$.

10. If $\alpha, \beta, \gamma, \ldots$ are the roots of $f(x) = 0$, then give the roots of the equation $f(x/k) = 0$.

SECTION – II

Answer **any 8** questions from among the questions **11** to **22**. These questions carry **2** marks **each**.

11. State reflection property of parabolas.

12. Give the equations for rotating Coordinate axes.

13. Find the directrix of the parabola $r = \dfrac{25}{10 + 10\cos\theta}$

14. Solve the initial-value problem $\dfrac{dy}{dx} = x, y(0) = -\dfrac{1}{2}$

15. Find the area of the surface generated by revolving about the x-axis, the portion in the first and second quadrants of the circle $x^2 + y^2 = a^2$.

16. Show that if f is continuous on [a,b], $a \neq b$ and if $\int_a^b f(x)dx = 0$, then $f(x) = 0$ at least once in [a,b].

17. Solve the initial value problem : $a\dfrac{dy}{dx} = b - ky;\ y(0) = 0$.

18. Solve the linear differential equation $y' - y = e^{2x}$.

19. Solve the nonhomogeneous equation $y'' - y' - 2y = 10\cos x$.

20. If α, β, γ are the roots of $x^3 - x - 1 = 0$, find the equation whose roots are $\frac{1+\alpha}{1-\alpha}, \frac{1+\beta}{1-\beta}, \frac{1+\gamma}{1-\gamma}$.

21. Solve $6x^5 + 11x^4 - 33x^2 + 11x + 6 = 0$.

22. Using Ferrari's method, solve $x^4 - 2x^3 - 12x^2 + 10x + 3 = 0$.

SECTION – III

Answer **any 6** questions from among the questions **23** to **31**. These questions carry **4** marks **each**.

23. Describe the graph of the equation $y^2 - 8x - 6y - 23 = 0$.

24. Sketch the graph of $r = \frac{2}{1-\cos\theta}$ in polar coordinates.

25. Find the area of the surface generated by revolving the arc of the catenary $y = c\cosh\frac{x}{c}$ from $x = 0$ to $x = c$ about the x-axis.

26. The region between the curve $y = \sqrt{x}$, $0 \le x \le 4$ and the x-axis is revolved about the x-axis to generate a solid. Find its volume.

27. Find the orthogonal trajectories of the family of curves $x^2 + y^2 = c^2$.

28. Solve the differential equation $(2x - 4y + 5)\,y' + x - 2y + 3 = 0$.

29. Solve the nonhomogeneous equation $y'' - 3y' + 2y = 4x + e^{3x}$.

30. If q, r, s are positive, show that the equation $f(x) = x^4 + qx^2 + rx - s = 0$ has one positive, one negative and two imaginary roots.

31. If α, β, γ are the roots of $2x^3 + 3x^2 - x - 1 = 0$, find the equation whose roots are $2\alpha + 3, 2\beta + 3, 2\gamma + 3$.

SECTION – IV

Answer **any 2** questions from among the questions **32** to **35**. These questions carry **15** marks **each**.

32. i) Find a quadratic equation to represent the curve $2x^2 + \sqrt{3}xy + y^2 - 10 = 0$ and without containing xy term.

    ii) Find the new coordinate of the point (2,4) if the coordinate axes are rotated through an angle of $\theta = 30°$.

33. i) Find the area between $y = \sec^2 x$ and $y = \sin x$ from 0 to $\pi / 4$.

    ii) Use cylindrical shells to find the volume of the solid generated when the region R under $y = x^2$ over the interval [0,2] is revolved about the x-axis.

34. i) Find the general solution of $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 25y = 0$.

    ii) Solve $x^2y'' - 4xy' + 6y = 21x^{-4}$ by the method of variation of parameters.

35. Solve the cubic $x^3 - 9x + 28 = 0$ by Cardan's method.

(Pages : 3) **C – 4319**

Reg. No. : .....

Name : .....

Second Semester B.Sc. Degree Examination, July 2017
(Career Related First Degree Programme under CBCSS)
Group 2(a) : Physics and Computer Applications
Core Course – I /PC 1241 – ENVIRONMENTAL STUDIES
(2015 Admission Onwards)

Time : 3 Hours Max. Marks : 80

SECTION – A

(Very Short Answer Type)

I. Answer **all** questions. **One** word or **one** sentence. Mark **1 each**.

1) What is a natural resource ?

2) What is the focal theme of the World Environmental Day 2016 ?

3) What is pollution ?

4) Define environment.

5) Name any two renewable sources of energy.

6) Define an ecosystem.

7) What is a thermal pollution ?

8) Give two biodiversity hot spots in India.

9) What is an endangered species ?

10) Define food chain. **(10×1=10 Marks)**

P.T.O.

SECTION – B
(Short Answer Type)

II. Answer **any 8** questions. Marks **2 each.**

11) What is environmental ethics ?

12) What is soil pollution ?

13) What is an ecological pyramid ?

14) What is green house effect ?

15) What is an ecological succession ?

16) What is Climate Change ?

17) What is meant by sustainable development ?

18) Differentiate primary pollutant and secondary pollutant.

19) Discuss the three R's of Waste management.

20) What is an ozone layer and why the ozone layer is depleting ?

21) What is population explosion and what are its effects ?

22) What is rain water harvesting ? **(8×2=16 Marks)**

SECTION – C
(Short Essay Type not to exceed 120 words)

III. Answer **any 6** questions. Marks **4 each** .

23) What is a natural disaster ? Discuss about any three natural disasters.

24) Name fours segments of environment and explain them in brief.

25) Explain the terms producers consumer and decomposers.

26) Differentiate between degradable and non- degradable pollutants.

27) Describe the biogeographically classification of India.

28) What are the causes and effects of air pollution ?

29) Explain briefly the environmental problems of Kerala.

30) What is meant by biodiversity conservation ? Describe insitu and ex-situ conservation of biodiversity.

31) Describe the various renewable and non-renewable resources. **(6×4=24 Marks)**

SECTION – D
(Long Essay Type)

IV. Answer **any 2** questions. Marks **15 each** .

32) Write an essay on the environmental problems of Kerala.

33) Write an essay on the different types, structure and functions of aquatic ecosystems .

34) What is water pollution ? Describe the causes and effects of water pollution.

35) Write an essay on the environmental protection acts and rules in India.

(2×15=30 Marks)