2. Answer *any two* of the following questions: 5×2=10

নিম্নলিখিত *যে কোনো দুটি* প্রশ্নের উত্তর দাও ঃ

(a) Describe the beneficial and harmful role of bacteria with example. 2½+2½=5

উপকারী এবং অপকারী ব্যাকটিরিয়ার উদাহরণসহ ভূমিকা আলোচনা করো।

(b) Draw and lable the internal organization of apothecium of *Ascobolus*? Why is *Ascobolus* called coprophillous fungi? 4+1=5

অ্যাস্কোবোলাসের অ্যাপোথেসিয়ামের অন্তর্গঠনের চিহ্নিত চিত্র অঙ্কন করো। *অ্যাস্কোবোলাসকে* কেন কপ্রোফিলাস ছত্রাক বলা হয়?

(c) Describe the gametophytic structure of *Funaria* with suitable sketches. 5

ফিউনেরিয়ার লিঙ্গধর উদ্ভিদদেহের যথাযথ চিত্রসহ গঠনের বর্ণনা করো।

(d) Write down the bacterial characters of Cyanophyceae. What is heterocyst? State its functions. 2+1½+1½=5

সায়ানোফাইসি-র ব্যাকটেরিয়াল বৈশিষ্ট্যগুলি লেখো। হেটেরোসিস্ট কাকে বলে? এর কাজ কী?

3. Answer *any two* of the following questions: 10×2=20

নিম্নলিখিত *যে কোনো দুটি* প্রশ্নের উত্তর লেখো ঃ

(a) Describe with labelled sketches the structure of TMV. What are Lytic and Lysogenic cycle? 6+4=10

টি. এম. ভি.-র গঠন বর্ণনা করো যথাযথ লেবেলযুক্ত চিত্রসহ। লাইটিক এবং লাইসোজেনিক চক্র কাকে বলে?

(b) Describe with suitable sketches the different stages of life cycle of *Puccinia graminis*? What is polymorphic stage? 8+2=10

পাক্‌সিনিয়া গ্রামিনিস-এর জীবনচক্রের বিভিন্ন দশা যথাযথ চিত্রসহ বর্ণনা করো। পলিমরফিক দশা কাকে বলে?

(c) Compare the male cone of *Cycas* and *Pinus*. Mention two economic importances of *Cycas*. 8+2=10

সাইকাস এবং পাইনাসের পুং-কোনের তুলনা লেখো। সাইকাসের দুইটি অর্থনৈতিক গুরুত্ব লেখো।

(d) Describe the post-fertilization changes and the development of cystocarp in *Polysiphonia* and discuss its alternation of generation. 7+3=10

পলিসাইফোনিয়ার নিষেক-পরবর্তী জীবন দশা এবং সিস্টোকার্পের গঠন উন্নয়ন বর্ণনা করো। ইহার জনুক্রম আলোচনা করো।

B.A./B.Sc. 1st Semester (General) Examination, 2017 (CBCS)

Subject : Mathematics (General/Generic)

Paper : BMGICCIA/MATH-GEI

Time: 3 Hours **Full Marks: 60**

The figures in the right hand margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.
Notations and symbols have their usual meaning.

1. Answer *any ten* questions: 2×10=20

(a) Examine if $\lim_{x\to 1}\{x-[x]\}$ exists, where $[x]$ denotes the greatest integer, not greater than x, $x\in\mathbb{R}$.

(b) If $f:\mathbb{R}\to\mathbb{R}$ is defined by $f(x)=\begin{cases} x\sin\frac{1}{x}, & x\neq 0 \\ 0, & x=0 \end{cases}$, then using $\in-\delta$ definition examine the continuity of f at $x = 0$.

(c) If $y=e^{ax}\cos bx$, then find $\frac{dy}{dx}$ in the form of $Ae^{ax}\cos(Bx+C)$.

(d) Examine the validity of Euler's theorem on partial differentiation for the function $f(x,y)=\frac{x-y}{x+y}$.

(e) Find the equation of tangent at origin (0,0) to the curve :
$3x^3 + 7x^2y - 8y^3 + x^2 - 13xy + 2y^2 + 9x - 9y = 0$.

(f) Find the real asymptotes of the curve: $x^3 - y^3 + x + y + 1 = 0$.

(g) Examine the nature of the parametric curve $x=a\frac{1+t^2}{1-t^2}$, $y=\frac{2bt}{1-t^2}$.

(h) If $y=\sin\left(m\sin^{-1}x\right)$, then show that $\left(1-x^2\right)y_2-xy_1+m^2y=0$.

(i) Evaluate: $\lim_{x\to\frac{\pi}{2}}\frac{\tan 5x}{\tan x}$

(j) If $f(x) = 3+2x$ for $-\frac{3}{2}<x\leq 0$

$= 3-2x$ for $0<x<\frac{3}{2}$, does $f'(0)$ exist? Support your answer.

Please Turn Over

(k) Does Rolle's theorem hold for $f(x)=1-|x-1|$ in $0\le x\le 2$? Justify your answer.

(l) Find the maximum value of $f(x) = 2x^3 - 6x^2$ in [1, 3].

(m) Find the radius of curvature at the origin of the curve $y - x = x^3 + 2xy + y^2$.

(n) Find the angle of intersection of the curves $y = x^2$ and $y^2 = x$ at (1, 1).

(o) State Cauchy's Mean Value Theorem.

2. Answer *any four* questions: 5×4=20

(a) Show that $\frac{x}{1+x}<\log(1+x)<x$, for all $x>0$.

(b) Prove that the curves $\frac{x^2}{a}+\frac{y^2}{b}=1$ and $\frac{x^2}{a'}+\frac{y^2}{b'}=1$ will cut orthogonally if $a-a'=b-b'$.

(c) Find the asymptotes of the curve: $x^3 + x^2y - xy^2 - y^3 + 2xy + 2y^2 - 3x + y + 13 = 0$.

(d) State and prove Lagrange's Mean Value Theorem. 1+4=5

(e) If $u=\cos^{-1}\left(\frac{x+y}{\sqrt{x}+\sqrt{y}}\right)$, apply Euler's theorem to prove that $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}+\frac{1}{2}\cot u=0$.

(f) Expand $\cos x$ in ascending powers of x with remainder in Cauchy's form after n terms.

3. Answer *any two* questions: 10×2=20

(a) (i) If $\frac{1}{y^m}+y^{-\frac{1}{m}}=2x$, then show that $\left(x^2-1\right)y_{n+2}+(2n+1)xy_{n+1}+\left(n^2-m^2\right)y_n=0$. 5

(ii) State and prove Euler's theorem for a homogeneous function of two variables. 1+4=5

(b) (i) If $lx + my = 1$ touches the curve $(ax)^n+(by)^n=1$, show that $\left(\frac{l}{a}\right)^{\frac{n}{n-1}}+\left(\frac{m}{b}\right)^{\frac{n}{n-1}}=1$. 5

(ii) If $lx + my = 1$ is a normal to the parabola $y^2 = 4ax$, then show that $al^3 + 2alm^2 = m^2$. 5

(c) (i) Find the radius of curvature at the point (α,β) on the curve $y=a\log\sec\left(\frac{x}{a}\right)$. 5

(ii) State Rolle's theorem and give its geometrical interpretation. 2+3=5

(d) (i) Show that the largest rectangle with a given perimeter is a square. 5

(ii) Trace the curve $(x+3)(x^2+y^2)=4$ and discuss its properties. 5

B.Sc. 1st Semester (General) Examination, 2017 (CBCS)

Subject : Computer Science

Paper : CC-I/ GE-I

Time: 2 Hours **Full Marks: 40**

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

1. Answer *any five* questions: 2×5=10

(a) What is the role of reserved word 'finally' in Python Programming?

(b) How to convert integer to character in Python?

(c) Define Python list and Python tuple.

(d) What are the different needs of function? Give suitable example.

(e) What are the packages in Python?

(f) What do you understand by the "import" statement in Python?

(g) What do you understand by "slicing"?

(h) What is flowchart?

2. Answer *any two* of the followings: 5×2=10

(a) Discuss the memory hierarchy in brief in context of fundamental computer architecture.

(b) Write a program in Python to find all such numbers which are divisible by 7 but are not multiple of 5, between 2000 and 3000.

(c) Define a function that accepts an integer no. as input. Test whether the inputted number is even or odd using Python.

(d) Define a class with example using Python.

3. Answer *any two* questions from the followings: 10×2=20

(a) (i) Briefly discuss the generations of computer.

(ii) Draw a flowchart to calculate and display the GCD of two integers. 5+5=10

(b) (i) Define a function that can accept two string as input and print the string with maximum length in the console using Python.