DEPARTMENT OF MATHEMATICS
INTERNAL ASSESSMENT 2020

QUESTIONS FOR MATH-H-CC-T-03

Answer any one: $1 \times 10 = 10$

Q1. Show that between any two real numbers, there are infinitely many real numbers.

Q2. Does the series convergent or divergent

$$\sum_{n=1}^{\infty} \frac{n! \, (n+1)!}{(3n)!}$$

QUESTIONS FOR MATH-H-CC-T-04

Answer any two: $2 \times 5 = 10$

1. Solve power series solution of the differential equation

$$\frac{d^2y}{dx^2} - 2x\frac{dy}{dx} + y = 0$$

2. Solve by the method of undetermined coefficients

$$\frac{d^2y}{dx^2} + 3\frac{dy}{dx} - 10y = -130cosx + 16e^{2x}$$

3. Show that if n is positive integer then

$$\frac{1}{(D-\propto)^n} e^{\propto x} = \frac{x^n}{n!} e^{\propto x} \text{ where } D \equiv \frac{d}{dx}$$

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

QUESTIONS FOR MATH-H-CC-T-08

Answer any one: $1 \times 10 = 10$

Q1. State the necessary and sufficient condition of integrability. Show that the function $f: [a, b] \rightarrow \mathbb{R}$, which is continuous on [a,b], is also Riemann integrable on [a,b].

Q2. Let $f(x)$ be periodic function with the period 4 and
$$f(x) = x \text{ in } 0 < x < 2.$$
Expand $f(x) = x$ in the Fourier series in the half range $0 < x < 2$. Hence deduce that
$$\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \cdots . \, to \, \infty = \frac{\pi^2}{8}$$

QUESTIONS FOR MATH-H-CC-T-09

Answer any one: $1 \times 10 = 10$

Q1. *Find* $\dfrac{\partial^2 f}{\partial x \partial y}$ *and* $\dfrac{\partial^2 f}{\partial y \partial x}$ *at the point* $(0,0)$ *where* $f(x,y) = \dfrac{xy}{\sqrt{x^2+y^2}}$.

Q2. Prove that

$$\nabla \cdot (\vec{f} \times \vec{g}) = \vec{g} \cdot (\nabla \times \vec{f}) - \vec{f} \cdot (\nabla \times \vec{g})$$

QUESTIONS FOR MATH-H-CC-T-10

Answer any one: $1 \times 10 = 10$

Q1. Prove that a ring $(R,+,.)$ is a skew field if and only if each of the equations $a.x = b$ and $y.a = b$ has a unique solution in R, where $a, b \in R$ and $a \neq 0$.
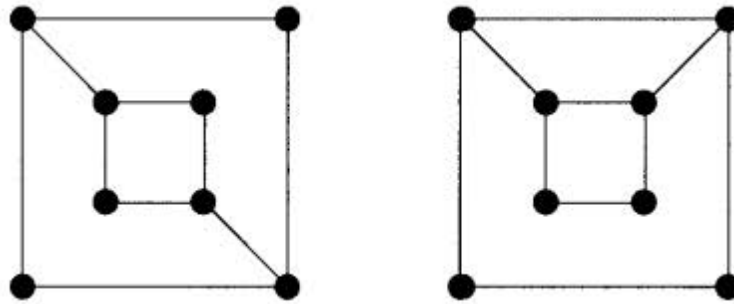
Q2. Prove that a field is an integral domain but a finite integral domain is a field.
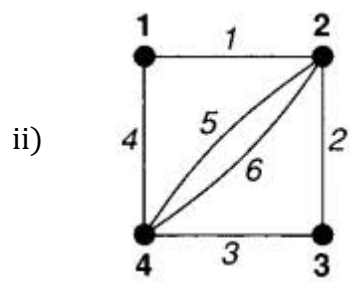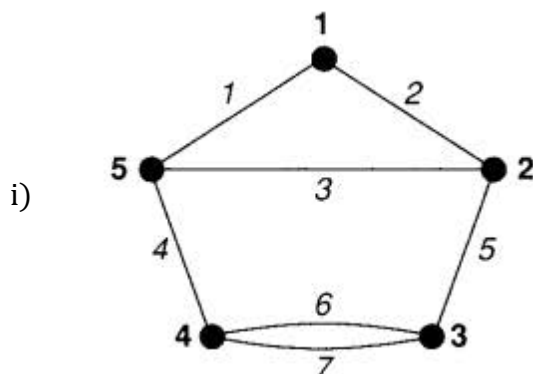
QUESTIONS FOR MATH-H-SEC-T-02/ G-SEC-T-02

Answer any one: $1 \times 10 = 10$

Q1. Explain why the following graphs are not isomorphic.

Q2. Find the Adjacency and incidence matrix of the following graphs:

i)   ii)

QUESTIONS FOR MATH H-GE-T-02/H-GE-T-04/G-CC-T-02

Answer any one: $1 \times 10 = 10$

Q1. Find an integrating factor of the differential equation
$$x(4ydx + 2xdy) + y^3(3ydx + 5xdy) = 0$$
and then solve it.

Q2. Solve the differential equation
$$p(p + y) = x(x + y), \text{ where } p = \frac{dy}{dx}.$$

QUESTIONS FOR MATH-G-CC-T-04

Answer any one: $1 \times 10 = 10$

Q1. State and prove Lagrange's Theorem.

Q2. Prove that every subgroup of a cyclic group is cyclic.

ALL ASSAINGMENTS MUST BE SUBMITTED TO THE FOLLOWING E-MAIL ID:
nvcmath2020@gmail.com

ALL ASSAINGMENT SHOULD BE SUBMITTED IN PDF FORMAT SEPARATELY.

THE SUBJECT OF THE SUBMISSION MAIL MUST BE IN THE FOLLOWING FORMAT:

NAME-SEMESTER-PAPER CODE-COLLEGE ROLL-UNIVERSITY REG. NO.