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VI Semester B.B.A.4 (CBCS) Degree Examination, October - 2023

PLACEMENT AND TRAINING

Paper : SEC - 4

(Regular)

Time : 2 Hours **Maximum Marks : 40**

Instructions to Candidates :

Write All question numbers correctly.

SECTION - A

I. Answer any **Five** sub questions of the following. Each question carries **2** marks.**(5×2=10)**

1. a) What is Induction?

   b) What is Placement?

   c) What is Training?

   d) What is Training Period?

   e) What is T-Group training?

   f) What is Apprenticeship Training?

   g) What is Simulation?

SECTION - B

II. Answer any **Two** sub questions of the following. Each question carries **5** marks. **(2×5=10)**

2. Explain the process of Induction.
3. Why is training important.
4. Explain the different types of on the -Job Training Method.

SECTION - C

III. Answer any **Two** sub questions of the following. Each question carries **10** marks.**(2×10=20)**

5. What is the purpose of conducting an induction programme in the organisation.
6. Explain the different types of off the Job training in an organisation.
7. What is the responsibility for training with respect to:

   i) Top management

   ii) Training Managers

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VI Semester B.Sc. 5 Degree Examination, October - 2023

MATHEMATICS

Complex Analysis And Ring Theory

Paper : I

(w.e.f. 2022-23)

(Regular)

Time : 3 Hours **Maximum Marks : 80**

Instructions to Candidates :

1) Question paper has 3 parts. Namely A,B and C.
2) Answer all parts.

PART - A

Answer any TEN of the followings. **(10×2=20)**

1. a) Prove that an analytic function with constant imaginary part is constant.

b) Show that $f(z) = z(\operatorname{Im} z)$ is not analytic

c) Define 'Harmonic Conjugate'.

d) Evaluate $\int_C \frac{dz}{z-1}$ around the circle $|z-1| = 3$.

e) State 'Laurent's theorem'.

f) Prove that the poles of an analytic function are isolated.

g) Find the residue of $f(z) = \frac{e^z}{z(z-1)^2}$ at z=0.

h) Define :

i) Simple pole

ii) Removable singularity

i) State 'Jorden's lemma'.

j) State 'Cauchy's inequality'.

k) Define a Sub ring and give an example.

l) In a ring $(R,+,\bullet)$ prove that $a.0 = 0 \forall a \in R$ and 0 is the identity element w.r.t +.

P.T.O.

PART - B

Answer any FOUR of the followings. **(4×5=20)**

2. State and prove necessary condition for a function $f(z)$ to be analytic.

3. Prove that $3x^2y+2x^2-y^3-2y^2$ is harmonic.Find the harmonic conjugate.

4. State and prove Cauchy's integral formula.

5. If $z=a$ is a pole of order m of $f(z)$ then prove that

$$\operatorname{Res}\{f(z):a\}=\lim_{z\to a}\left\{\frac{1}{(m-1)!}\frac{d^{m-1}}{dz^{m-1}}\left[(z-a)^m f(z)\right]\right\}$$

6. Using contour integration, prove that $\int_0^{2\pi}\frac{d\theta}{s+3\cos\theta}=\frac{\pi}{2}$

7. Show that the set $z(\sqrt{2})=\{a+b\sqrt{2}:a,b\in z\}$ is a ring w.r.t usual addition and multiplication.

PART - C

Answer any FOUR of the followings. **(4×10=40)**

8. a) If $f(z)=u+iv$ is an analytic function of $z=x+iy$ and ψ is any function of z with derivatives of first and second order exists, then prove that

$$\left[\frac{\partial\psi}{\partial x}\right]^2+\left[\frac{\partial\psi}{\partial y}\right]^2=\left\{\left[\frac{\partial\psi}{\partial u}\right]^2+\left[\frac{\partial\psi}{\partial v}\right]^2\right\}|f'(z)|^2$$

   b) If $f(z)=u+iv$ is analytic and $u-v=(x-y)(x^2+4xy+y^2)$ find $f(z)$ in terms of z.

9. a) State and prove 'Liouville's theorem'.

   b) Let $f(z)$ be analytic in a region between two closed contours C_1 and C_2, then prove that $\oint_{C_1} f(z)\,dz=\oint_{C_2} f(z)dz$

10. a) State and Prove 'Taylor's theorem'.

   b) Expand $f(z)=\frac{4z+3}{(z+2)(z+3)}$ by Laurent's series for

   i) $2<|z|<3$

   ii) $|z|>3$

11. a) State and Prove 'Cauchy's residue theorem'.

b) Prove by Contour integration that $\int_0^\infty \frac{dx}{(x^2+1)^3} = \frac{3\pi}{16}$

12. a) Define homomorphism of two rings. If $f : R \to R'$ is a homomorphism from the ring R into R', then prove that

i) $f(0) = 0'$ where 0 and $0'$ are the zeros of R and R'

ii) $f(-a) = -f(a)\ \forall\, a \in R$.

b) If $G = \{0,1,2,3,4\}$ then prove that G is an integral domain w.r.t addition and multiplication modulo S.

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VI Semester B.Sc. 5 Degree Examination, October - 2023

MATHEMATICS (SEC)

Graph Theory

(Regular / Repeater)

Time : 2 Hours **Maximum Marks : 40**

Instructions to Candidates :

Answer All questions.

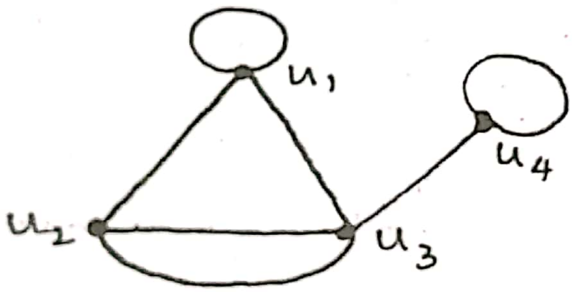
Answer any **Five** of the following. **(5×2=10)**

1. a) Define simple graph and pseudo graph.

b) Define a regular graph and draw a regular graph of degree 4.

c) Prove that in a (p,q) graph, $\sum_{i=1}^{p} \deg(vi) = 2q$

d) Write the degree sequence for the following graph .



e) Define a bipartite graph. Draw a complete bipartite graph $K_{4,3}$

f) Define a spanning and induced sub-graphs.

g) Define a work and a trail.

[P.T.O.

Answer any **Six** of the following. **(6×5=30)**

2. Prove that in a graph, there exists even number of vertices with odd degrees.

3. Let G be a (p,q) graph all of whose points have degree K or K+1. If G has t>0 points of degree K, then show that $t = P(K+1) - 2q$.

4. Show that in any group of two or more people, there are always two with exactly the same number of friends inside the group.

5. A graph G with P points and $\delta \geq \frac{p-1}{2}$ is connected.

6. Prove that a graph G with at least two points, is bipartite iff all its cycles are even.

7. Prove that in a connected graph, any two longest paths have a point in common.

8. Define isomorphism of graphs. Prove that isomorphism preserves the degree of vertices.

9. Define a cubic graph. Show that every cubic graph has even numbers of vertices.

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VI Semester B.Sc. Degree Examination, October - 2023

PHYSICS

Solid State Physics, Nuclear Physics. Energy Society Electronics and Special Materials

Paper - I

(Repeaters)

Time : 3 Hours | Maximum Marks : 80

Instructions to Candidates :
1. *Calculators are allowed to solve the problems.*
2. *Write necessary intermediate steps.*

PART - I

Answer any TEN of the following questions. (10×2=20)

1. a) What is lattice?
   b) What is primitive cell?
   c) Define energy gap.
   d) What is Meissner effect.
   e) What are magic numbers.
   f) Mention Geiger - Nuttal law.
   g) What is Zenith angle.
   h) Write the truth table of NOR gate.
   i) Mention any two applications of conducting polymers.
   j) Find the lattice constant of NaCl when incident X-ray beam has wavelength of 1.15AV and glancing angle of 11.8° in the first order spectrum.
   k) If the solar altitude angle at a place is $45^{\circ}20'$ calculate the value of zenith angle.
   l) Convert binary $(1101)_2$ to decimal.

PART - II

Answer any FOUR of the following questions. (4×5=20)

2. Describe Nacl crystal structure.
3. Write a short note on super - conductivity.

[P.T.O.

4. Mention the advantages of renewable energy sources.

5. A cyclotron with magnetic field $B = 1.5$ weber/meter ^{2} is used to accelerate proton. Calculate the frequency of the oscillator connected across the dees.

6. The electrical and thermal conductivity of silver at 303 K are 6.2×10^7 SI units and 425 SI units respectively. Calculate Lorentz number.

7. Prove the Boolean expression

$$(A+B+C)(A+B) = A+B.$$

PART - III

Answer any **FOUR** of the following questions. **(4×10=40)**

8. Give the Einstein's theory of specific heat of solids and mention its limitations.

9. Derive an expression for electrical and thermal conductivity on the basis of free electron theory.

10. Describe construction and working of a G.M. counter.

11. Describe the construction and working of a Angstrom's pyrheliometer.

12. State and prove Demorgan's first and second laws with circuit and truth tables.