SRR & CVR GOVT. DEGREE COLLEGE (A) , VIJAYAWADA

REPORT ON

COACHING CLASS FOR APSET EXAM

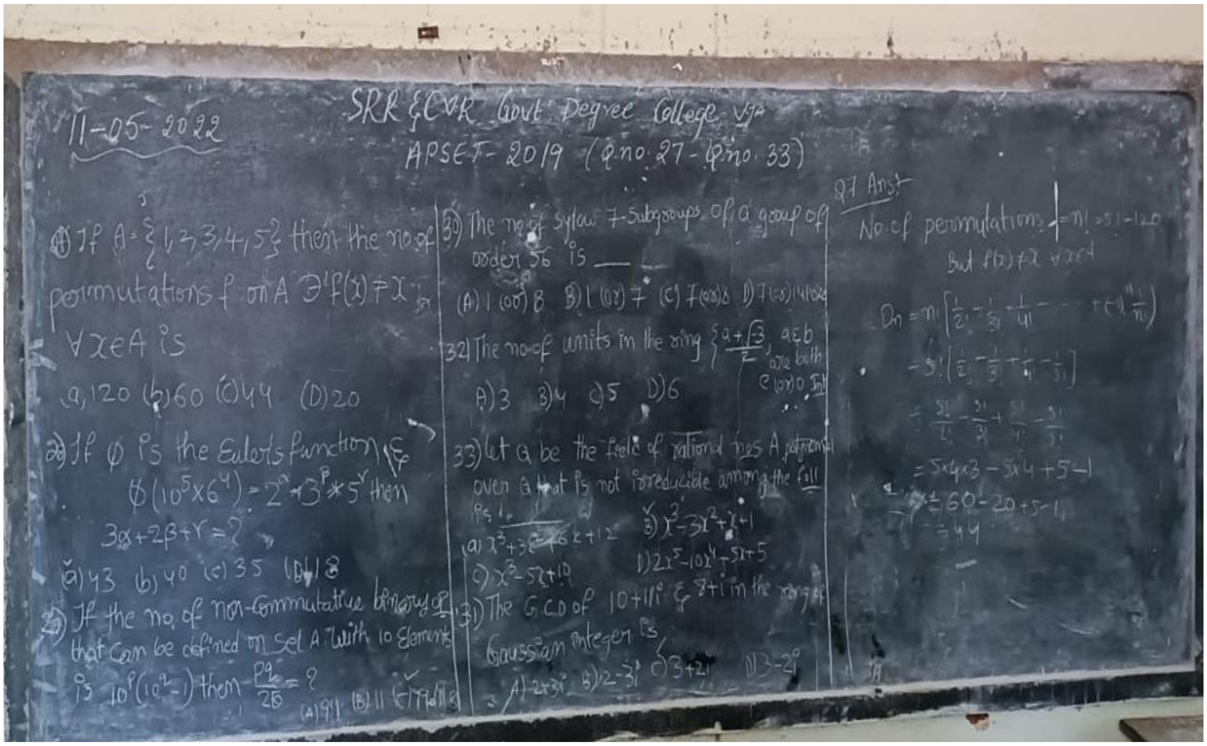
Coaching class for **APSET** exam has been organized by Sk.Parveen , Department of Mathematics in PG Block at SRR & CVR Government Degree College , Vijayawada .The class was commenced on 11-05-2022 from 10.00am to 1.00pm considering the need of today's students to compete and face the challenges of the modern world and to make them aware of the APSET exam.

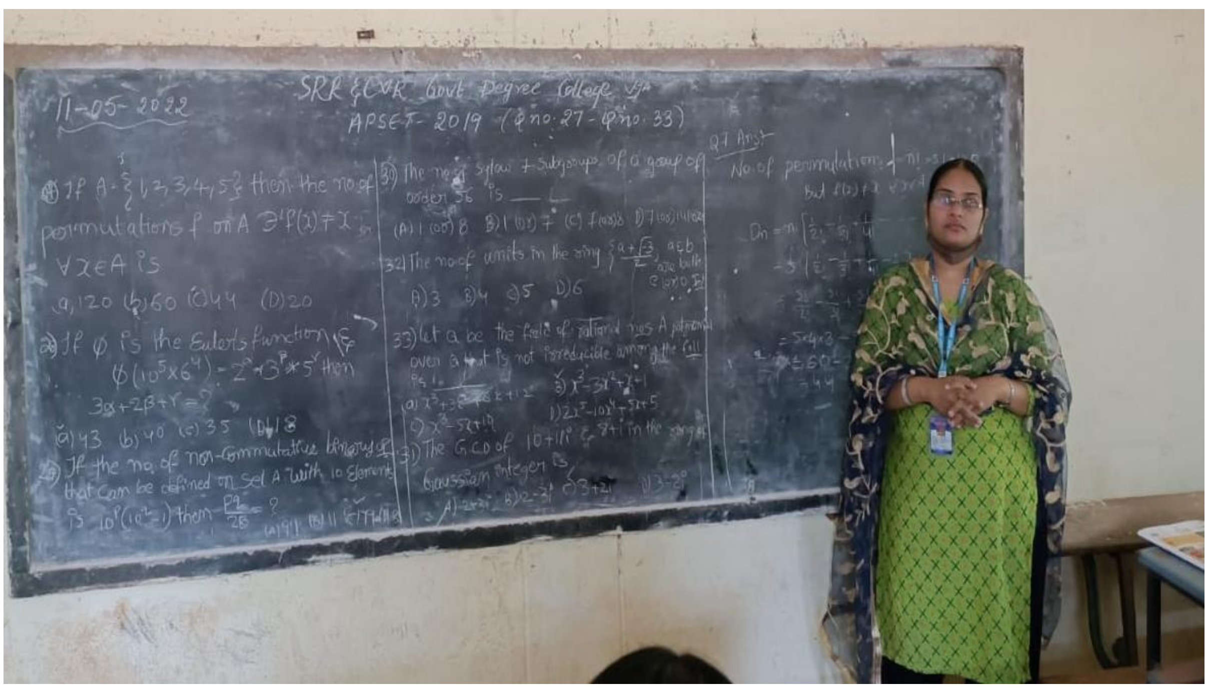
PG Department of Mathematics organized this class to build among students a sense of awareness, provide guidance, necessary sites, and other Information about various competitive examinations. During this session ,18 students of M.Sc. Mathematics got the benefit of this Program. In this session, Questions from Previous APSET papers were explained. This coaching class develops IQ, logical and analytical thinking of the students and help them to build a strong foundation for their Career.

This session is conducted to enhance the capability of students who are willing and interested to prepare for competitive examinations. Competitive exams also help out in choosing a career as students start identifying their areas of interest while getting a deeper knowledge of subjects. Early exposure to learning and competition builds confidence and sharpens skills which raise their level from other students on the same platform. Competitive exams will enhance the skill of understanding the application of concepts, which is required in a broader context when the students appear for exams like UGC NET , APSET etc.

OUTCOME OF THE SESSION :

The students are motivated for prospective career in government and corporate sector. The students are able to attempt any competitive exam as they are provided with the syllabus of the exam, review and weightage given to each subject. They have look into previous year's questions and create a study plan. They are asked to remember concepts in a short way. They develop the habit of taking notes so as to revise easily. The students are trained to think positively and are encouraged to attempt mock tests.





Coaching class by Sk.Parveen , Lecturer in Mathematics


SRR & CVR Govt Degree College, Vja
APSET-2019 (Q.no. 27 - Q.no. 33)

SRR & CVR Govt. Degree College, Vja

The following Students attended for Coaching given in APSET Previous papers.

1.	Ch. kishan	II M.Sc. Maths.	ch. kishan
2.	A. Sivaji	II M.Sc Maths.	A.Sivaji
3.	P. Sai	II MSC maths	P.Sai
4.	SK. Sameera	II M.Sc (Maths)	SK. Sameera
5.	J. SBhavani	II M.Sc (maths)	J. SBhavani
6.	L. Hema	II M. SC maths	L. Hema.
7.	N. Anusha	II M.Sc Maths	N. Anusha.
8.	D. Saidurga	II M.Sc-Maths	D. Sai Durga.
9.	B-Sowmya	II. M.Sc(Maths)	B-Sowmya.
10.	Dhanalakshmi	II M.Sc. (Maths)	E. Dhana Laxmi
11.	ch. Pavani	I M.sc. (Maths)	ch Pavani
12.	V. Subhashini	I M.sc (Maths)	V. Subhashini
13.	T. MOUNIKA	I M.Sc (Maths)	T. Mounika.

Following Problems explained

1. If $A = \{1, 2, 3, 4, 5\}$ then the no. of permutations f on A, such that $f(x) \neq x \;\; \forall x \in A$, is

A) 120 B) 60 C) 44 d) 20

Explanation:-

→ Permutation nothing but a function, mapping from $S \to S$

No. of permutation $= n! = 5! = 120$

But $f(x) \neq x \;\; \forall x \in A$

Derangements: If n things are arranged in a row, then the number of ways in which they can be deranged, so that none of them occupies its original place is

$$D_n = n!\left(\frac{1}{2!} - \frac{1}{3!} + \cdots + (-1)^n \frac{1}{n!}\right)$$

$$D_5 = 5!\left(\frac{1}{2!} - \frac{1}{3!} + \frac{1}{4!} - \frac{1}{5!}\right)$$

$$= \frac{5!}{2!} - \frac{5!}{3!} + \frac{5!}{4!} - \frac{5!}{5!}$$

$$= 5 \times 4 \times 3 - 5 \times 4 + 5 - 1$$

$$= 60 - 20 + 5 - 1$$

$$\boxed{D_5 = 44}$$

(2) If ϕ is the Euler's function and $\phi(10^5 \times 6^4) = 2^\alpha * 3^\beta * 5^\gamma$, then

$3\alpha + 2\beta + \gamma = ?$

✓a) 43 (b) 40 (c) 35 (d) 18

Explanation:-

Euler's ϕ function:- A mapping $\phi: N \to N$ defined by $\phi(n) = \{x \in N / 1 \le x \le n$ & $\gcd(x, n) = 1\}$

$\rightarrow \phi(P) = P-1$, where P is prime.

$$\phi(p^n) = p^n - p^{n-1} = p^n\left[1 - \frac{1}{p}\right]$$

$$\rightarrow \phi(10^5 \times 6^4) = \phi(2^5 . 5^5 . 3^4 . 2^4)$$

$$= \phi(2^9 . 5^5 . 3^4)$$

$$= 2^9\left(1-\frac{1}{2}\right) 5^5\left(1-\frac{1}{5}\right) 3^4\left(1-\frac{1}{3}\right)$$

$$= 2^{11} . 3^3 . 5^4$$

$$= 2^\alpha . 3^\beta . 5^\gamma$$

Here $\alpha = 11$, $\beta = 3$, $\gamma = 4$

$$3\alpha + 2\beta + \gamma = 3(11) + 2(3) + 4$$

$$= 43$$

(3)

(3) If the number of non-Commutative binary operations that can be defined on a set A with 10 elements is $10^p(10^q-1)$ then

$$\frac{pq}{25} = ?$$

(A) 9 (B) 11 (C) 99 D) 81

Explanation:-

→ The number of binary operations on $A = n^{n^2}$

→ The number of Commutative binary operations on $A = n^{n(n+1)/2}$

[∵ Here set A Contain 'n' elements]

Here $n=10$

So

no. of non- Commutative binary operations

= The number of binary operations − the no. of Commutative b. operations

$= n^{n^2} - n^{n(n+1)/2}$

$= 10^{10^2} - 10^{10(10+1)/2}$

$= 10^{100} - 10^{55}$

$= 10^{55}[10^{45}-1] = 10^p[10^q-1]$

Here $p = 55,\ q = 45$

$$\frac{pq}{25} = \frac{55 \times 45}{25} = 99$$

(4) The number of sylow 7- subgroups of a group of order 56 is ____ (4)

✓ (A) 1 (or) 8 B) 1 (or) 7 C) 7 (or) 8 D) 7 (or) 14 (or) 28

→ sylow's P-Subgroups:-

let G be a finite group & let p be a prime $p^m / o(G)$, $p^{m+1} \not| \, o(G)$, $m \geq 0$ then any subgroup of G of order 'p^m' is called a sylow p- subgroup of G.

→ sylow's third theorem:-

let G be a finite group and p be a prime then the no. of sylow p- subgroups of G are denoted by n_p and is given by

$$n_p = 1+kp \ni 1+kp / o(G) \text{ for } k \geq 0$$

$$o(G) = 56 = 4 \times 14 = 4 \times 2 \times 7$$
$$= 2^3 \times 7$$

If $k=0$ then $1+kp = 1+0.7 = 1$

$1/56$ (1 divides 56)

If $k=1$ then $1+1.7 = 8$

$8/56$ (8 divides 56)

∴ Ans 1 (or) 8

(5) The G.C.D of $10+11i$ & $8+i$ in the ring of Gaussian integers is (5)

A) $2+3i$ B) $2-3i$ ✓C) $3+2i$ D) $3-2i$

Explanation:-

$$\frac{10+11i}{8+i} = \frac{10+11i}{8+i} \cdot \frac{8-i}{8-i}$$

$$= \frac{80+88i-10i+11}{64+1}$$

$$= \frac{91+78i}{65} = \frac{91}{65} + i\,\frac{78}{65}$$

$$= \frac{7}{5} + \frac{6}{5}i$$

$$= \left(1+\frac{2}{5}\right) + \left(1+\frac{1}{5}\right)i$$

$$= (1+i) + \left(\frac{2}{5}+\frac{1}{5}i\right)$$

$$\Rightarrow 10+11i = (1+i)(8+i) + \underline{(8+i)\left(\frac{2}{5}+\frac{1}{5}i\right)}$$

$$(8+i)\left(\frac{2}{5}+\frac{1}{5}i\right) = \frac{16}{5} + \frac{8}{5}i + \frac{2}{5}i + \frac{i^2}{5}$$

$$= \frac{15}{5} + \frac{10}{5}i = 3+2i$$

$$\Rightarrow 10+11i = (1+i)(8+i) + (3+2i)$$

$$= (1+i)\,b + r$$

where $b = 8+i$, $r = 3+2i$

If $\gamma = x + iy$ then

$d(\gamma) = x^2 + y^2$

$d(\gamma) \le d(b)$

$\Rightarrow d(2+3i) \le d(8+i)$

$\Rightarrow 13 \le 64+1$ (saties fied)

$$\frac{b}{\gamma} = \frac{8+i}{3+2i} = \frac{8+i}{3+2i} \cdot \frac{3-2i}{3-2i}$$

$$= \frac{24-16i+3i+2}{9+4}$$

$$= \frac{26}{13} - \frac{13}{13}i$$

$$= 2-i \quad [\text{remainder} = 0]$$

$(8+i) = (2-i)(3+2i)$

Gcd is $(3+2i)$

(6) The no. of units in the ring $\left\{\frac{a+b\sqrt{-3}}{2} ; a \& b\right.$ both even (or) both odd integers$\left.\right\}$ is

A) 3 B) 4 C) 5 D) 6

Explanation:-

Gaussian integers

$Z[i] = \{a+ib \mid a,b \in Z\}$ [$\because \pm 1, \pm i$ are four units]

$D = \sqrt{-1} = \sqrt{i^2} = i$

$\gamma = a+ib$

$Norm(\gamma) = N(\gamma) = a^2+b^2 = \gamma\bar{\gamma}$ [$\bar{\gamma} = \gamma$ Conjugate]

If $a=1, b=1$ then

$Z\left[\frac{1+\sqrt{-3}}{2}\right]$

$D = \sqrt{-3}$, $\gamma = a+b\left(\frac{1+\sqrt{3}}{2}\right)$

$N(\gamma) = \gamma\bar{\gamma} = \left[a+b\left(\frac{1+\sqrt{3}}{2}\right)\right]\left(a+b\left[\frac{1-\sqrt{3}}{2}\right]\right)$

$= \left(a+\frac{b}{2}+\frac{b}{2}\sqrt{-3}\right)\left(a+\frac{b}{2}-\frac{b}{2}\sqrt{-3}\right)$

$= \left(a+\frac{b}{2}\right)^2 - \left(\frac{b}{2}\sqrt{-3}\right)^2$

$= a^2+\frac{2ab}{2}+\frac{b^2}{4} - \frac{b^2}{4}(-3)$

$= a^2+ab+\frac{b^2}{4}+\frac{3b^2}{4}$

$= a^2+ab+b^2$

$N(\gamma) = 1$

$\therefore\ a^2 + ab + b^2 = 1$

$\gamma = 1, -1, \omega, -\omega, -\omega^2, \omega^2$

7) Let Q be the field of rational numbers. A polynomial over Q that is not irreducible among the following is

a) $x^3+3x^2+6x+12$ ✓B) x^3-3x^2+x+1

c) $x^3-5x+10$ D) $2x^5-10x^4+5x+5$

Explanation:-

Eisenstein criterion:-

Let $f(x) = a_0 + a_1 x + \cdots + a_n x^n \in Z[x]$,

$n \geq 1$, If there is a prime $p \ni$

$p^2 \nmid a_0$, $p | a_0$, $p | a_1$, $\cdots$ $p | a_{n-1}$ & $p \nmid a_n$

then $f(x)$ is irreducible over Q.

Verification:-

a) $p=3$; $3^2 \nmid 12$, $3 | 12$ $3|6$, $3|3$, $3 \nmid 1$

b) $p=3$; $9 \nmid 1$ $3 \nmid 1$ = [$p | a_0$ but here $p \nmid a_0$]

c) $p=5$; $5^2 \nmid 10$, $5|10$, $5|-5$, $5 \nmid 1$

d) $p=5$; $5|5$, $5|5$, $5|-10$, $5|25$

3) The degree of splitting field of the polynomial $\{x^{24}-1\}$ over the field of rational numbers is

A) 4 B) 8 (C) 12 D) 24

$n = 24$

$\phi(n) = \phi(24) = \phi(2^3 \times 3)$

$= 2^3(1-1/2)\, 3(1-1/3)$

$= 2^3 \cdot \frac{1}{2} \cdot 3 \cdot \frac{2}{3}$

$= 2^3$

$= 8$

$\phi(24) = 8$

Euler's ϕ function: A mapping $\phi : N \to N$ defined by $\phi(n) = \{x \in N / 1 \le x \le n \ \& \ \gcd(x,n) = 1\}$

$\phi(P) = P-1$, where P is prime

$\phi(p^n) = p^n - p^{n-1} = p^n\left[1 - \frac{1}{P}\right]$