

19.8.2019

ST. JOSEPH'S COLLEGE(AUTONOMOUS), BANGALORE-27
B.Sc. MATHEMATICS –III SEMESTER
MID-SEMESTER TEST-AUGUST 2019
MT 318 – MATHEMATICS III

Answer any SIX of the following

(6x5=30 marks)

- 1) a) Prove that If g is a group element of order n , then g^{-1} is also of order n .
b) Compute the order of 48 in Z_{50} . (4m+1m)
 - 2) Let a be an element of a group G such that $|a|=n$.
Show that $a^i = a^j$ if and only if $n|i-j$. (5m)
 - 3) a) Suppose a group contains elements a and b such that $|a|=4$ and $|b|=2$ and $a^3b = ba$. Find $|ab|$
b) Compute all the left cosets of $\{0,2,4\}$ in Z_6 . (3m+2m)
 - 4) a) State and Prove Lagrange's Theorem for groups.
b) If $aH \neq bH$, then show that $aH \cap bH = \phi$. (4m+1m)
 - 5) Solve $(D^3 - 7D - 6)y = (x+1)e^x$ (5m)
 - 6) Solve the simultaneous LDE $\frac{dx}{dt} - 2x + y = 0$ and $\frac{dy}{dt} - 2x + 4y = 0$ (5m)
 - 7) Solve the D.E
 $xy'' + (1-x)y' - y = e^x$, given that e^x is part of the complementary function. (5m)
 - 8) Solve $x^2 \frac{d^2y}{dx^2} - 2x(1+x) \frac{dy}{dx} + 2(1+x)y = x^3$ by using Reduction to Normal form. (5m)
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