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Government College of Engineering, Amravati

(An Autonomous Institute of Government of Maharashtra)

CT2 SHU-201ENGG MATHS-II MARKS-15 TIME- 1 HOURS:4:30-5:30 pm Date: 21/03/2017

ATTEMPT ANY FIVE

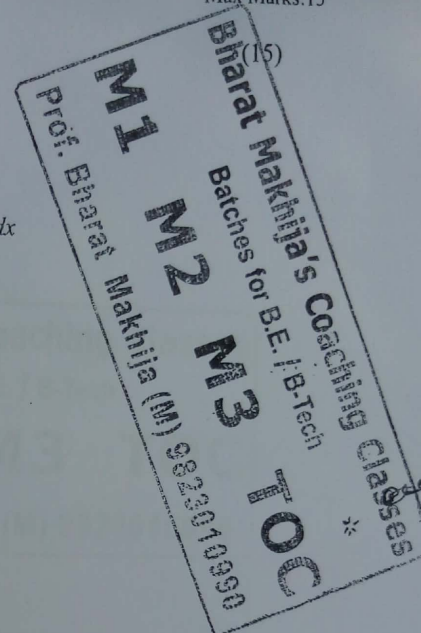
1. A constant electromotive force E volt is applied to a circuit containing a constant resistance R ohm in series and constant inductance L henries. If the initial current is zero, show that the current builds up to half its theoretical maximum in $(L \log 2)/R$ seconds.
2. Find the orthogonal trajectory of the family of $r^2 = c^2 \sin 2\theta$.
3. Solve $(x dx + 2x dy) + (2y dx + y dy) - (3 dx + 3 dy) = 0$ by using reducible to homogenous.
4. Solve $x \frac{dy}{dx} = y + \cos \frac{1}{x}$.
5. Solve $(\sin x \sin y - x e^y) dy = (e^y + \cos x \cos y) dx$.
6. Find the value of α so that $e^{\alpha x^2}$ is an integrating factor of $x(1 - y) dx - dy = 0$.

CLASS: B.TECH FIRST YEAR
Q.1 Attempt Any Five

Date: 18/10/2014

Max Marks: 15

- Trace the Curve $y^2(2a-x) = x^3$
- Evaluate $\int_0^2 x^4(8-x^3)^{-\frac{1}{3}} dx$ by using Beta function.
- Verify the rule of DUIS for the integral $\int_a^{a^2} \log ax dx$
- Show that $\int_0^1 \frac{x^{m-1} + x^{n-1}}{(1+x)^{m+n}} dx = \beta(m, n)$
- Prove that $\sqrt{m} \sqrt{m+1} + \frac{1}{2} = \frac{\sqrt{\pi}}{2^{2m-1}} \sqrt{2m}$
- Show that $\int_0^1 x^n (\log x)^n dx = \frac{(-1)^n n!}{(p+1)^{n+1}}$



GOVERNMENT COLLEGE OF ENGINEERING, AMRAVATI

CT-II SHU-201 ENGG.MATHS-II

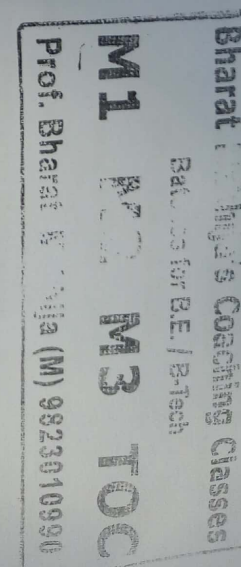
Max marks 15

TIME-1 HOUR

ATTEMPT ANY FIVE :-

(15)

- Solve $\frac{dy}{dx} = \frac{y+x-2}{y-x-4}$
- Solve $y(\log y) dx + (x - \log y) dy = 0$
- Solve $(\sin y + e^{\sin x}) dx + \tan x \cdot \cos y dy = 0$
- Solve $(y^2 e^{xy} + 4x^3) dx + (2xy e^{xy} - 3y^2) dy = 0$
- Show that the family of the curve $\frac{x^2}{\lambda} + \frac{y^2}{\lambda-a} = 1$ where λ is parameter, is self orthogonal.
- A resistance of 100 ohms, an inductance of 0.5 henry are connected in series with a battery of 20 volts. If the current is zero when $t = 0$, find the current in the circuit as a function of time.



A. ATTEMPT ANY FOUR

- Find the value of λ for which the differential equation $(xy^2 + \lambda x^2 y)dx + (x + y)x^2 dy = 0$ is exact. Solve the equation for this value of λ .
- Solve $\left\{y\left(1 + \frac{1}{x}\right) + \cos y\right\}dx + \{x + \log x - x \sin y\}dy = 0$.
- Define homogeneous equation and Linear differential equation.
- Solve $xy \log \frac{x}{y} dx + \left(y^2 - x^2 \log \frac{x}{y}\right) dy = 0$, given that $y(1) = e$.
- Solve $\frac{dy}{dx} + \frac{y}{x} \log y = \frac{y}{x^2} (\log y)^2$.

B. ATTEMPT ANY TWO

- Solve $\frac{dy}{dx} + \frac{2x+3y}{y+2} = 0$.
- When a resistance R ohms and a capacitance C Farads are connected with an emf E volts the current i amperes is given by $R \frac{di}{dt} + \frac{i}{C} = E$.
 $R = 1000$ ohms, $C = 50 \times 10^{-1}$ farads, $i = 10$ amperes and $t = 0$,
 current $t = 1$ sec and $E = 100 \sin 120\pi t$ volts.
- Find orthogonal trajectories for a given family of curves $\frac{x^2}{a^2 + \lambda} + \frac{y^2}{b^2 + \lambda} = 1$.
 λ is a parameter.

$$2h = -3k$$

$$= \frac{3 \times 2}{2}$$

$$h = 3$$

$$-2 \times 3 - 3 \times -2 = 6$$