

mathematics

Internal exam (2020-23)

F.M. 15

Sem-II core paper-III

Time-1½ h.

Answer any three ques. but Q.N.O1 is compulsory.

① (a) Define bounded set.

(b) Define open set.

(c) Define greatest lower bound.

(d) Define derived set.

(e) Define close set.

② state & prove Bolzano-Weierstrass theorem.

③ Prove that a set is closed iff its complement is open.

④ Prove that the sequence

$$\sqrt{7}, \sqrt{7+\sqrt{7}}, \sqrt{7+\sqrt{7+\sqrt{7}}} \dots$$

tends to the positive roots of  $x^2 - x - 7 = 0$  as limit.

⑤ Test whether the series whose general term is

$$u_n = \sqrt{n^4+1} - \sqrt{n^4-1} \text{ is convergent or divergent.}$$

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# Mathematics

Internal Exam (2020-23)

F.M. - 15

Sem - II Core paper - IV

Time - 1½ h

Answer any three ques but Q.N. 2) is compulsory.

(1) solve:  $(x+y)dy - (x-y)dx = 0$

(b) solve:  $\frac{d^2y}{dx^2} - \frac{dy}{dx} - 2y = 0$

(c) solve  $\frac{d^2y}{dx^2} + \frac{dy}{dx} + y = 0$

(d) Define Laplace transform.

(e) Define singular solution.

(2) solve:  $y = p^2x + p$ .

(3) Prove that  $\int_{-1}^1 [P_n(x)]^2 dx = \frac{2}{2n+1}$  if  $m=n$

(4) solve:  $x^2 \frac{d^2y}{dx^2} - x \frac{dy}{dx} + y = 2 \log x$ .

(5) solve:  $(D^2 - 3D + 2)y = \cosh x$ .

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# Mathematics

Internal Exam - (2020-23)

Time  $1\frac{1}{2}$  h

Sem - II Paper - GE

FM-15

Answer any three ques. but Q. N. 07 is compulsory.

- ① (a) Define linear eqn with constant.  
(b) Define linear eqn of 1st order.  
(c) Define linear homogeneous equation.  
(d) Define Total Differential equation.  
(e) Solve:  $p^2 + q^2 = 1$

② Solve:  $(x+y)dy - (x-y)dx = 0$

③ Solve:  $\frac{d^2y}{dx^2} + \frac{dy}{dx} + y = 0$

④ Solve:

$$3x^2 dx + 3y^2 dy - (x^3 + y^3 + e^{2z}) dz = 0$$

⑤ Solve:  $\frac{d^4y}{dx^4} + m^4y = 0$

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