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TRB – P.G. Asst. – MATHS TEST

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TRB – EXAM

TEST MATERIALS

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MATHS

Unit –I - X (Part – I)

(TEST)

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TRB - P.G.Asst. – Maths – Unit – II (2) - Real Analysis

Test No.10

1. A sub set K of a metric space X is said to be compact if
   A) Every open cover of K contains a countable sub cover
   B) Every open cover of K contains a finite sub cover
   C) Every open cover of K contains many countable sub cover
   D) Every open cover of K contains many finite sub cover
2. Suppose $K \subset Y \subset X$. Then K is compact relative to X iff
   A) K is compact relative to Y B) K is not compact in Y
   C) K is not compact in X D) None of these
3. Which one is incorrect?
   A) Compact subsets of metric spaces are closed
   B) Any subsets of compact sets are compact
   C) Closed subsets of compact sets are compact
   D) If F is closed and K is compact, then $F \cap K$ is compact
4. Every K- cell is …………..

A) Not closed B) Not bounded C) Not compact D) Compact

5. If $\{I_n\}$ is a sequence of intervals in R', such that $I_n \supset I_{n+1}$ (n= 1, 2, ….), then $\bigcap_{n=1}^{\infty} I_n$ is

A) Empty B) Not closed C) Non- empty D) None of these

6. Every bounded infinite subset of R^K has a limit point in R^K is known as

A) Heine- Borel Theorem B) Lindlof covering theorem

C) Weierstrass Theorem D) None of these

7. A sub set E of the real line R' is connected iff for $x \in E, y \in E$ and $x < \mathfrak{z} < y$,

A) $\mathfrak{z} \in E$ B) $\mathfrak{z} \notin E$ C) $\mathfrak{z} = E$ D) None of these

8. Which one is incorrect?

A) The sequence $s_n = 1 + (-1)^n/n$ converges to 1

B) The sequence $s_n = 1 + (-1)^n/n$ is bounded

C) The sequence $s_n = 1 + (-1)^n/n$ has infinite range D) None of these

9. Let $S_n = {(-1)^n}/{\left[1 + \left(\frac{1}{n}\right)\right]}$, then

A) $\lim_{n\to\infty} \sup s_n = 1$ B) $\lim_{n\to\infty} \inf s_n = -1$ C) Both of these D) None of these

10. In $\sum a_n$ converges, and if $\{b_n\}$ is monotonic and bounded, then $\sum a_n \ b_n$

A) Diverges B) Converges C) Oscillates D) Not converges

11. Define $f(x) = \begin{cases} x+2, & -3 < x < -2 \\ -x-2, & -2 \le x < 0 \\ x+2, & 0 \le x < 1 \end{cases}$ then f has

A) A simple discontinuous at x= 0 B) A discontinuity of second kind at x= 0

C) A removable discontinuous at x= 0 D) A jump discontinuous at x= 0

12. Inverse image of every open set under continuous map is…………

A) Open B) Closed C) not open D) None of these

13. The function f defined on IR by f(x) = $\begin{cases} x \text{ when } x \text{ is irrational} \\ -x \text{ when } x \text{ is rational} \end{cases}$,is…… at x= C

A) Continuous only B) Discontinuous C) Differentiable D) None of these

14. F(x) = $\begin{cases} \frac{x^3-8}{x^2-4}, & x \neq 2, x > 0 \\ 4, & x = 2, \end{cases}$ is……………..

A) Continuous B) Removable continuous

C) Removable discontinuous D) Not defined

15. Which one of the following is connected?

A) R ($(-\infty, \infty)$ B) Z C) Q D) R- Q

16. Continuous image of a compact metric space is……………

A) Connected B) Compact C) Not compact D) None of these

17. "Let F be an open covering of a closed and bounded set A in R^n. Then a finite sub collection of F also covers A" is called……………

A) Bolsano weierstrass theorem B) Lindelof covering theorem

C) Heine- Barel covering theorem D) Nested theorem

18. Image of a closed set is closed under

A) Closed map B) Open Map C) Both of these D) None of these

19. Which one of the following is compact?

A) [0, 1] B) (0, 1) C) R D) $(0, \infty)$

20. Which one is uniformly continuous in $(0, \infty)$?

A) x^2 B) Sin x C) Sin x^2 D) None of these

21. If $f(x) = x^2$ for all $x \in R$, f is…………

A) Not continuous on R B) Uniformly continuous on R

C) Not uniformly continuous on R D) None of these

22. The value of $\lim_{x \to \infty} x \sin \frac{1}{x}$ equal to…………....

A) 1 B) 0 C) – 1 D) $-\infty$

23. Any continuous function f defined on a closed interval [a, b] is……………..

A) Uniformly continuous B) Not uniformly continuous

C) Not continuous D) None of these

24. Let f: $R \to R$ and let D be the set of points of discontinuous of f in R. then D is of………………

A) Type F_σ B) not F_σ type C) Uncountable D) None of these

25. The collection C of open intervals of the form $(1/n, 2/n)$, n = 2, 3 … is an open covering of the open interval (0, 1), then.

A) Finite sub collection covers (0, 1) B) Finite sub collection does not covers (0, 1)

C) Both of these (A) and (B) D) None of these

26. Which one of the following is true?

A) The continuous image of a compact set is compact only

B) The continuous image of a connected set is connected only

C) Both of these (A) and (B)

D) None of these

27. Let S = $\{(x, y) \in R^2 : x^2 - y = 0.3\}$ then

A) S is connected but not compact B) S is not connected and but compact

C) S is not connected but compact D) S is connected and compact

28. Let f be an open covering of A, then

A) There exists a countable Sub collection of f which covers A

B) There exists Uncountable such collection of f which covers A

C) Both of these D) None of these

29. If T:x → x is defined as Tx = x^2 where x = [0,1/3], then T is ……….. on [0, 1/3]

A) a contraction B) not contraction C) not continuous D) None of these

30. "If T is a contraction on the complete metric space M, then T has precisely one fixed point" is called

A) Nested interval theorem B) Contor's intersection theorem

C) Picard fixed point theorem D) None of these

31. If $\{Q_1, Q_2, ...\}$ is a countable collection of non – empty self in R^n such that $Q_{k+1} \le Q_k$ and each set Q_k is closed and bounded then

A) $\bigcap_{k=1}^{\infty} Q_k$ is open B) $\bigcap_{k=1}^{\infty} Q_k$ is closed

C) $\bigcap_{k=1}^{\infty} Q_k = \{ \}$ D) $\bigcap_{k=1}^{\infty} Q_k \neq \{ \}$ and $\bigcap_{k=1}^{\infty} Q_k$ is closed

32. The sequence $\left\{\frac{1}{n}\right\}$ is ………………

A) bounded and convergent B) bounded and diver gents

C) unbounded and convergent D) unbounded and diver gents

33. A sequence diverges to +∞ iff

A) $\overline{\lim}\, x_n = \underline{\lim}\, x_n = +\infty$ B) $\underline{\lim}\ x_1 \le +\infty$

C) $\overline{\lim}\ x_n \le +\infty$ D) $\underline{\lim}\, x_n = \lim x_n < +\infty$

34. Statement (I): Every convergent sequence is bound.

Statement (II): Every bounded sequence is convergent then

A) I is true, II is false B) I is false, II is true C) I and II are true D) I and II are false

35. Which one of the following is not true?

A) Every Cauchy sequence is Convergent

B) Every convergent sequence is a Cauchy sequence

C) A bounded sequence has Convergent Subsequence

D) Every Cauchy sequence is bounded

36. Continuity on the set A implies uniform continuity on A if

A) A is finite B) A is bounded C) A is closed D) A is compact

37. $\underset{n\to\infty}{Lt}\left(1+\frac{1}{n}\right)^{n}$ is

A) n! B) $n/2$ C) e D) None

38. Every bounded sequence has

A) exactly one limit point B) More than one limit point
C) At least one limit point D) No limit point

39. Consider the following statements

I. there is no function which is continuous at each rational and discontinuous at each irrational

II. there is no fn. Which is discontinuous at each rational & continuous at each irrational

Of the statements:

A) I alone is true B) II alone is true C) Both I & II are true D) I & II are false

40. If A = [1,2], B= [3,4] then AUB is

A) Connected B) not connected C) not bounded D) None

41. Every closed and bounded subspace of the real line is

A) Connected B) Compact C) Disconnected D) None

42. Connected subset of Rd is

A) Totally bounded B) Complete C) Compact D) finite set

43. If $\{a_n\}$ be a real valued sequence and $\sigma_n = (a_1 + a_2 + \ldots\ldots + a_n)/n$ then

A) $\lim_{n\to\infty} inf\, a_n \le \lim_{n\to\infty} inf\ \sigma_n \le \lim_{n\to\infty} \sup \sigma_n \le \lim_{n\to\infty} Sup\, a_n$

B) $\lim_{n\to\infty} inf\, a_n \le \lim_{n\to\infty} inf\ \sigma_n \le \lim_{n\to\infty} \sup a_n \le \lim_{n\to\infty} Sup\, \sigma_n$

C) $\lim_{n\to\infty} inf\, a_n \le \lim_{n\to\infty} sup\ a_n \le \lim_{n\to\infty} \inf \sigma_n \le \lim_{n\to\infty} Sup\, \sigma_n$

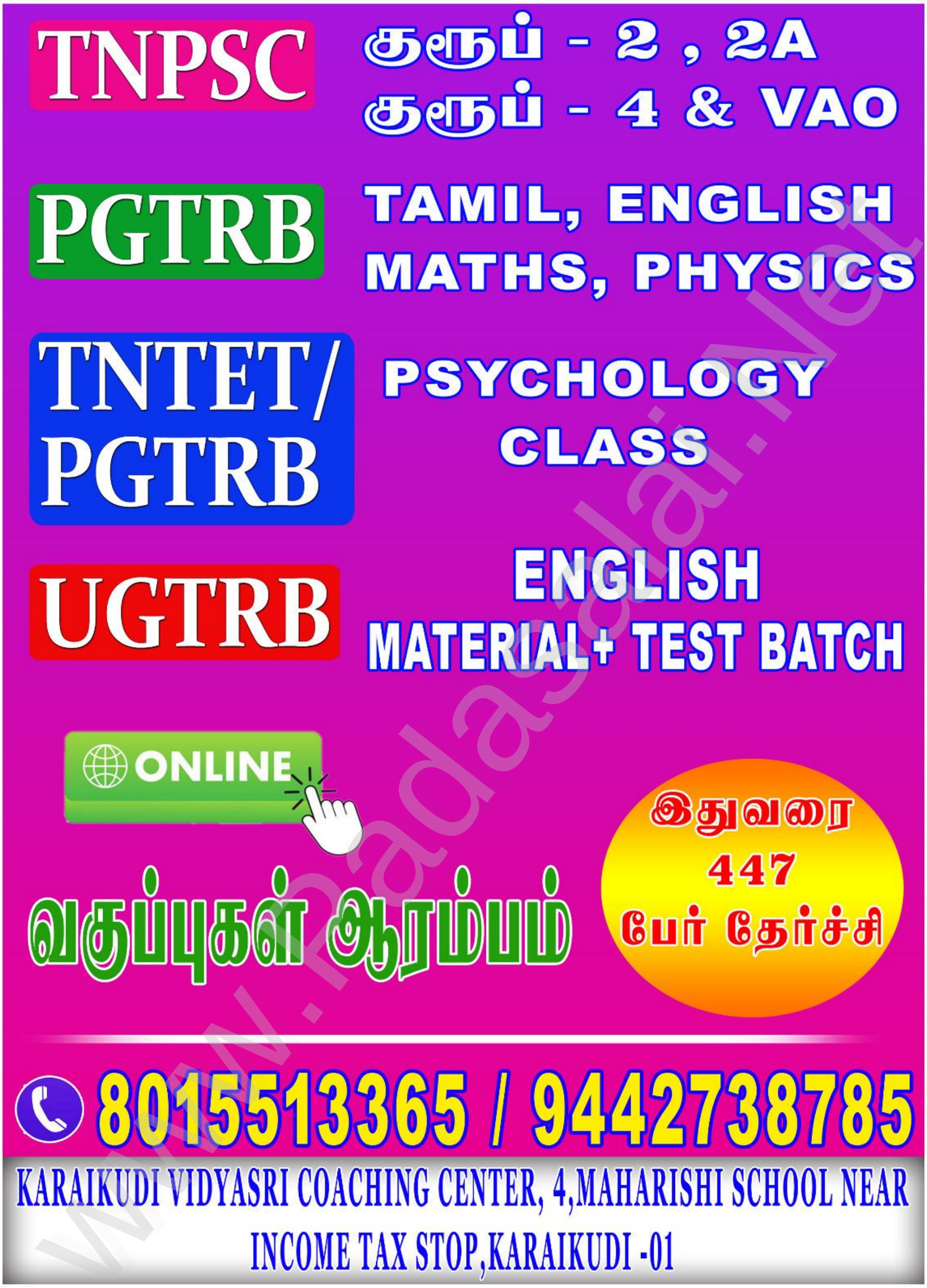
D) None

44. The constant sequence 1, 1, 1………… has the limit ….

A) 1 B) ∞ C) 0 D) None of these

45. The function f(x) = $\frac{|x|}{x}$ for x≠ 0 and f(0)= 0 is

A) Removable discontinuous B) Jump discontinuous
C) Disconti nuous of II kind D) Continuous at x= 0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TRB – P.G. – MATHS

TRB - P.G. Asst. – Maths – Unit – II (2)

Real Analysis

Test No.10

Answer key:

1	B	11	A	21	C	31	D	41	B
2	A	12	A	22	A	32	A	42	C
3	B	13	B	23	A	33	A	43	A
4	D	14	C	24	A	34	A	44	A
5	C	15	A	25	B	35	A	45	B
6	C	16	B	26	C	36	D	-	-
7	A	17	C	27	A	37	C	-	-
8	D	18	A	28	A	38	A	-	-
9	C	19	A	29	A	39	A	-	-
10	B	20	B	30	C	40	B	-	-

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TRB - P.G.Asst. – Maths – Unit – II (3) - Real Analysis

Test No: 11

1. Which one is incorrect?

A) A series of non- negative terms converges iff its partial sums form a bounded sequence

B) If $|a_n| \leq C_n$ for $n \geq N_0$, where N_0 is some fixed integer, and if $\sum C_n$ converges, then $\sum a_n$ converges

C) If $a_n \geq d_n \geq 0$ for $n \geq N_0$, and if $\sum d_n$ diverges, then $\sum a_n$ converges

D) Suppose $a_1 \geq a_2 \geq a_3 \geq \cdots \ldots\ldots \geq 0$. then the series $\sum_{n=1}^{\infty} a_n$ converges iff the series

$\sum_{k=0}^{\infty} 2^k a_{2^k} = a_1 + a_2 + 4a_4 + \ldots\ldots$ converges

2. The series 1+1+1+……

A) Converges B) Converges to 1 C) Diverges to ∞ D) Oscillates

3. Consider the statements

I. The series $\sum_{n=2}^{\infty} \frac{1}{n(\log n)^P}$ converges for P > 1

II. The series $\sum_{n=2}^{\infty} \frac{1}{n(\log n)^P}$ diverges for $P \geq 1$

Of these

A) I true, II false B) I false, II true C) I and II are true D) I and II are false

4. For any sequence $\{C_n\}$ of positive numbers, which one is correct?

A) $\lim\limits_{n\to\infty} \frac{C_{n+1}}{C_n} \leq \liminf\limits_{n\to\infty} \sqrt[n]{C_n}$ B) $\limsup\limits_{n\to\infty} \sqrt[n]{C_n} \leq \limsup\limits_{n\to\infty} \frac{C_{n+1}}{C_n}$

C) Both of these D) None of these

5. Given a sequence $\{c_n\}$ of complex numbers , the series $\sum\limits_{n=0}^{\infty} C_n Z^n$ is

A) Converges if z is in the interior of the circle

B) Diverges if z is in the exterior of the circle

C) Both of these D) None of these

6. $\sum \frac{(-1)^n}{n}$ is ………………..

A) Converges B) Converges non- absolutely

C) Conditionally converges D) All of these

7. The Cauchy product of two absolutely convergent series

A) Converges absolutely B) Diverges C) Need not be converges D) None of these

8. If f is differentiable on [a, b], then f' on [a, b]

A) Cannot have any discontinuities of II kind

B) Cannot have any simple discontinuities

C) Can have removable discontinuities

D) None of these

9. Suppose f is a real differentiable function on [a, b] and suppose $f'(a) < \lambda < f'(b)$ then there is a point $x \epsilon (a, b)$ such that

A) $f(x) = 0$ B) $f'(x) = 0$ C) $f'(x) = \lambda$ D) $f^{\cdot}(x) = \lambda$

10. If f be defined on [a, b], if f has a local maximum at a point $x \epsilon (a, b)$, and if $f'(x)$ exists, then

A) $f'(x) = 0$ B) $f''(x) = 0$ C) $f\ (x) = 0$ D) $f'(x) \neq 0$

11. Assume that f has a derivative at each point of an open interval (a, b) and f is continuous at both and points a and b. there is a point c in (a, b) such that f(b)- f(a)= $f'(c)(b-a)$. This statement is called……………..

A) Mean value theorem B) Generalized mean value theorem

C) Rolle's Theorem D) Duplex theorem

12. Let $f(x) = x^2 \sin\frac{1}{x}$, $x \neq 0$ and f (0) = 0, then

A) $f'(0)$ exists and f' is not continuous at x= 0

B) $f'(0)$ exists and f' is continuous at x= 0

C) $f'(0)$ does not exists and f' is continuous at x= 0

D) $f'(0)$ does not exists and f' is not continuous at x= 0

13. A suitable point c of Rolle's theorem for the function f(x)= (x-a) (b-x), $a \leq x \geq b$, is…………………

A) $\frac{b-a}{2}$ B) $\frac{a-b}{2}$ C) $\frac{a+b}{2}$ D) 2 (b - a)

14. If f and g are continuous on [a, b] and if g (t) ≥0, (a ≤ t ≤ b), then there exists $c \in (a, b)$ such that $\int_a^b f(x)\, g(x)\, dx$ = ………………………

A) f (c) g (c) [b – a] B) $f(c)\int_a^b g(x)\, dx$ C) f (c) g(c) D) None of these

15. The critical points of $f(x) = \sqrt[3]{x^3} - x$ are ……………………

A) $x = \frac{1}{\sqrt{3}}$ B) $x = -\frac{1}{\sqrt{3}}$ C) $x = \pm\frac{1}{\sqrt{3}}$ D) $0, \pm 1, \pm\frac{1}{\sqrt{3}}$

16. The function $f(x) = 1-2x-x^2$; [-4, 1] has absolute minimum at x= ……………..

A) 1 B) -4 C) -1 D) 0

17. $f(x) = 2x^3 + 5x^2 - 4x$ has local maximum at

A) x= 2 B) 12 C) x= - 2 D) x= $\frac{1}{3}$

18. In $(-\infty,1)$, $f(x) = (x-1)^{\frac{1}{3}}$ is…………………

A) Concave down ward B) Concave upward

C) Convex down ward D) Convex upward

19. Given a function $f(x) = |x|$ for all $x \in$ R, the function f is………………..

A) Differentiable at x= 0 B) Continuous at x= 0

C) Both of these D) None of these

20. If $f(x) = x\,|x|$ for $x \in$ R, then $f'(x)$= ……………………… for every x in R

A) 2 B) $|x|$ C) 2 $|x|$ D) does not exists

21. For the function f(x) = (1-x) 2 if x> 1 and f(x)= 1-x if x< 1, $f_+'(1)$ = ……………

A) 1 B) -1 C) 0 D) None of these

22. The polynomial $2x^3 - 15x^2 + 36x + 1$ is monotonically decreasing in...............
A) $(-\infty,2)$ B) $(3,\infty)$ C) (2, 3) D) None of these

23. If f is a continuous function on the closed bounded interval [a, b] and if
$\phi'(x) = f(x)$, then $\int_a^b f(x)dx = \phi(b) - \phi(a)$ for
A) $x \in$[a, b] B) $x \in$(a, b) C) $x \in$[a, b) D) $x \in$(a, b]S

24. Consider the following statement
I. A differentiable function is continuous
II. A continuous function if differentiable
III. A continuous function on a closed interval [a, b] of finite length is Uniformly continuous on [a, b] which of these statements are correct?
A) I, II and III B) II and III C) I and II D) I and II

25. The series $\sum_{n=1}^{\infty} \frac{1}{(1+\frac{1}{n})^{n2}}$ is ....
A) Convergent B) Divergent C) Oscillatory D) None of these

26. The series $1 + x + x^2 + \ldots\ldots + x^n + \ldots\ldots\ldots\ldots$
A) Converges for $|x| < 1$ B) diverges for $|x| < 1$
C) Converges for $|x| = 1$ D) None of these

27. The series $1/3^P + 1/5^P + 1/7^P + \ldots\ldots\ldots\ldots$ Converges, if
A) P < 1 B) P = 1 C) P > 1 D) None of these

28. The series $\sum \frac{\angle n\, 2^n}{n^n}$ is ....
A) Convergent B) Divergent
C) Conditionally convergent D) None of these

29. A Cauchy sequence is convergent if it is
A) Sequence of real numbers B) Sequence of rational numbers
C) Sequence of irrational numbers D) Bounded sequence of rational numbers

30. Which of the following is absolutely convergent?
A) $\sum (-1)^n/_n$ B) $\sum \frac{1}{\sqrt{n}}$ C) $\sum \frac{1}{\log(n+1)}$ D) $\sum (-1)^n/_{n^{3/2}}$

31. Which one of the following is not true?

A) Every Cauchy sequence is Convergent

B) Every convergent sequence is a Cauchy sequence

C) A bounded sequence has Convergent Subsequence

D) Every Cauchy sequence is bounded

32. Let g (x) = $\sqrt{x}$ and f(x)= $\sqrt{1-x^2}$ where -1< x<1 then gof is continuous at

A) x=1 B) x=-1 C) x=0 D) at each Point in (-1, 1)

33. If f is differentiable at C, then

A) f is monotonic at C B) f is continuous at C

C) f ′ is continuous at C D) Left hand derivative ≠ right hand derivative

34. The value of C in the Cauchy's mean value theorem when g (x)= e^x and f(x)= e^{-x} is

A) $\frac{a-b}{2}$ B) $\frac{a+b}{2}$ C) $\frac{ab}{2}$ D) 2ab

35. Which of the following is not true

A) Every countable set is measure zero in R1

B) Intervals are not of measure zero

C) The set of all rational numbers is of measure zero

D) The set of irrational numbers is of measure zero

36. Every Cauchy sequence of points in M is convergent in M then M is

A) Connected B) Complete C) Compact D) Totally bounded

37. $\underset{n\to\infty}{Lt}\left(1+\frac{1}{n}\right)^n$ is

A) n! B) $n/2$ C) e D) None

38. Let f is continuous on a closed bounded interval [a, b] and if F(x)= $\int_a^x f(t)\,dt$ when a ≤ x ≤ b then

A) F′ (x)= f (x) B) F(x)= f ′ (x) C) F(x)= f(x) D) F ′ (x)= f ′ (x)

39. Absolute convergence of Σa_n implies Σa_n is

A) Divergent B) Conditionally convergent

C) oscillatory D) Convergent

40. The geometric series 1+ x+x^2+….. converges if

A) $|x|>1$ B) $|x|=1$ C) $|x|<1$ D) $|x|\geq 1$

41. An example of the series which is convergent but not absolute is

A) $1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \ldots\ldots\ldots\ldots\ldots$ B) $1 + \frac{1}{3} + \frac{1}{5} + \ldots\ldots\ldots\ldots\ldots$

C) $\frac{1}{2} + \frac{1}{4} + \frac{1}{6} + \ldots\ldots\ldots\ldots\ldots$ D) $1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \ldots\ldots\ldots\ldots\ldots$

42. The series $\sum n^{-s}$ egs. If

A) s < 1 B) s > 1 C) s =1 D) s = 0

43. I. f is continuous at c, then it is Different at c

II. f is Different at c, then it is continuous at c

III. f is uniformly continuous at c, then f is continuous at c

IV. f is continuous then f is uniformly continuous Of these

A) Only II is true B) Only III is true C) I And III are true D) II and III are true.

44. If f^1 (x) =0 for every x in the closed bounded interval in [a, b], then f is

A) Zero B) continuous C) constant D) bounded

45. Which one is incorrect?

A) $1 - \frac{1}{2} + \frac{1}{2} - \frac{1}{4} + \frac{1}{3} - \frac{1}{8} + \ldots\ldots\ldots\ldots\ldots$ is divergent

B) $1\frac{1}{2} - 1\frac{1}{4} + 1\frac{1}{8} - 1\frac{1}{16} + \ldots\ldots\ldots\ldots\ldots$ is convergent

C) $\frac{1}{1^P} + \frac{x}{3^P} + \frac{x^2}{5^P} + \ldots\ldots\ldots + \frac{1}{(2n-1)^P} + \ldots\ldots$ is convergent for x<1

and divergent for x>1

D) None of these

46. Let f(x) = $e^{-|x|}$ for every $x \in R$. Then it is

A) Continuous at x=0 and Differentiable at x=0

B) not Continuous at x=0 and Differentiable at x=0

C) Continuous at x=0 but not Differentiable at x=0

D) not continuous at x=0 and not Differentiable at x=0

47. Let g(x) = x if $x \in [0,1)$ and g(x) = 0 if x= 1 then

A) Rolles theorem is true B) Rolles theorem is not true

C) $g(o) \neq g(1)$ D) None of these

48. Determine θ and that appears in the mean value theorem for f(x) = x^2-2x+3, a = ½ and h = ½

A) ½ B) 1/3 C) 2 D) 0

49. For f(x) = x^3 at x=0, f has ………

A) local extreme at x=0 B) no local extreme at x=0

C) $f^1(0) \neq 0$ D) None of these

50. The series $\sum \frac{1}{k^p}$ cos Kx is

A) Uniformly convergent for p > 1 B) Uniformly convergent for p <1

C) Uniformly Divergent for p > 1 D) None of these

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TRB - P.G.Asst. – Maths – Unit – II (3) - Real Analysis
Test No: 11

1		11	A	21	C	31	D	41	
2		12	A	22	D	32		42	
3		13	C	23	C	33		43	
4		14	B	24	A	34		44	
5		15	C	25	D	35		45	
6		16	D	26	A	36		46	
7		17	B	27	A	37		47	
8		18	C	28	C	38		48	
9		19	C	29	A	39		49	
10		20	B	30	A	40		50	

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TRB – P.G. – MATHS - UNIT - III (1)
Fourier Series
Test No.12

1. Assume that f∈ $L([-\pi,\pi])$ and that f has period 2π. If f(-x) = f(x) when 0 < x < π, then

   A) $f(x) \sim \frac{a_0}{2} + \sum_{n=1}^{\infty}(a_n \cos nx + b_n \sin nx)$ B) $f(x) \sim \sum_{n=1}^{\infty} b_n \sin nx$

   C) $f(x) \sim \Sigma a_n \cos nx$ D) $f(x) \sim \frac{a_0}{2} + \sum_{n=1}^{\infty} a_n \cos nx$

2. The fourier coefficient a_0 for $f(x) = x \sin x,\ -\pi \le x \le \pi$

   A) 1 B) $\frac{\pi}{2}$ C) π D) None of these

3. Consider the statements

   I: Two distinct continuous functions can have the same fourier coefficients

   II: The only continuous function orthogonal to every ϕ_n is the zero function

   Of these , the following is true

   A) I only B) II only C) I and II D) None of these

4. Which one is incorrect?

   A) $\zeta(4) = \frac{\pi^4}{90}$ B) $\zeta(6) = \frac{\pi^6}{735}$ C) $\zeta(2) = \frac{\pi^2}{6}$

   D) None of these

5. Let S = $\{\phi_0, \phi_1, \phi_2, .., \}$be an orthonormal set on I and let $\{C_n\}$ be a sequence such that $\Sigma|C_n|^2 < \infty$, Then there is a function fϵL^2 (I) such that

   A) $(f, \phi_k) = C_k$ for each K ≥ 0 only B) $\|f\|^2 = \sum_{k=0}^{\infty}|C_k|^2$

   C) Both (A) and (B) D) None of these

6. Let S = $\{\phi_0, \phi_1, \phi_2, .., \}$ be an orthonormal system on I and f ∈ L^2 (I) .

Then $f \sim \sum_{n=0}^{\infty} C_n \phi_n(x)$, where C_n is ………….. $(n = 0, 1, 2, \ldots)$

A) $\int_I f(x)\ \phi_n(x)\ dx$ B) $\int_I f(x)\ \overline{\phi_n(x)}\ dx$ C) $\int_I f(x)\ dx$ D) $\int_I \phi_n(x)\ dx$

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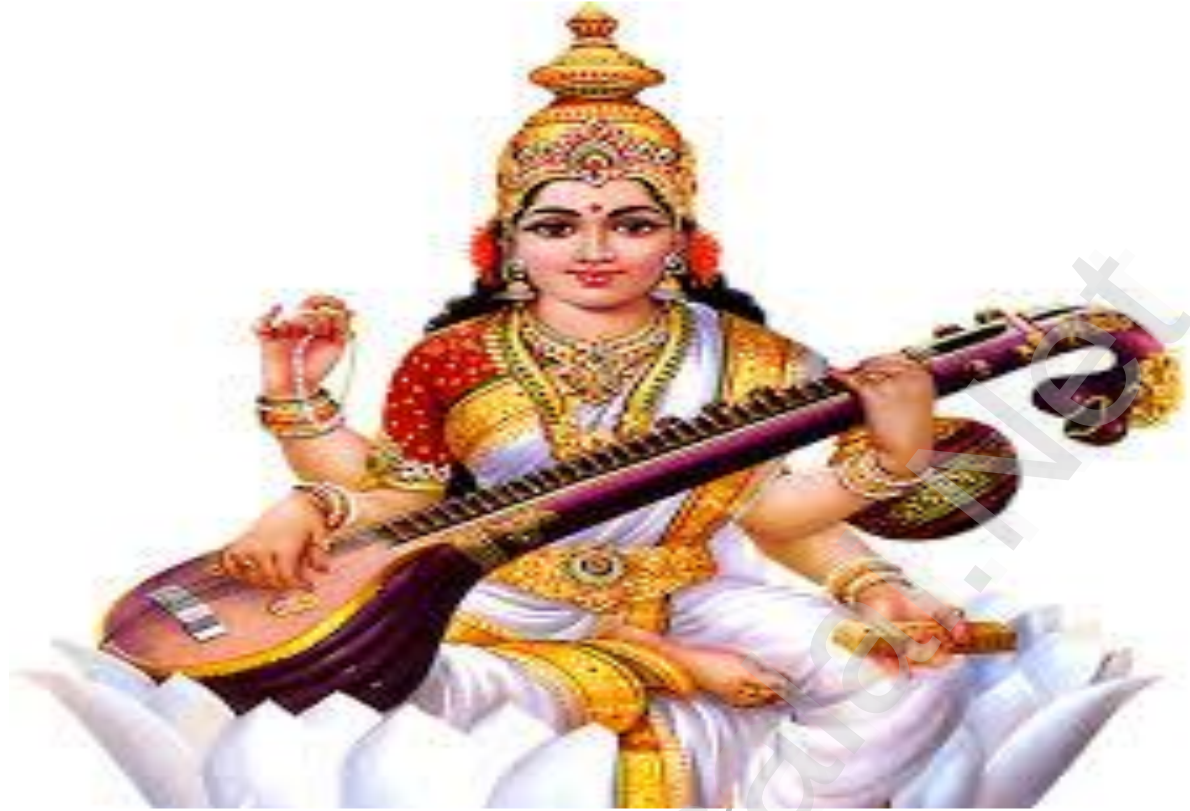

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141. Find the singular solution of $z = px + qy + p^2 + q^2$

A) $z = ax + by + a^2 + b^2$ B) $x^2 + y^2 + 4z = 0$

C) $xyz = 4$ D) $x^2 + y^2 + z^2 = 0$

142. The complementary fn of $(x^2 D^2 - 3xD - 5)y = \sin(\log x)$ is

A) $C_1 x^5 + C_2 x^{-1}$ B) $C_1 x^{-5} + C_2 x^{-1}$

C) $C_1 \cos 5x - C_2 \sin x$ D) $C_1 e^{5x} + C_2 e^{-x}$

143. ………… theorem states; for any real x_0, and constants α, β there exists a solution ϕ of the initial value problem $L(y) = 0, y(x_0) = \alpha, y'(x_0) = \beta$ on (-∞, ∞)

A) Existence theorem B) Abel's theorem

C) Uniqueness theorem D) Wronks kian

144. Solve $(x + 2z)P + (4zx - y)q = 2x^2 y$

A) $\phi\left(xy/z^2, x^2 - y - z\right) = 0$ B) $\phi(xy - z^2, x^2 - y^2 - z^2) = 0$

C) $\phi(xy - z^2, x^2 - y - z) = 0$ D) $\phi(xy + z^2, x^2 - y + z) = 0$

145. If $H_n(x)$ is a Hermite polynomial of deg n then $H_3(x)$ is

A) 2x B) $4x^3 - 2$ C) $8x^3 + 12x$ D) $8x^3 - 12x$

146. Let $J_\alpha(x)$ be the Bessel's fn of the first kind of order α. then the value of $\left(J_{1/2}(x)\right)^2 + \left(J_{-1/2}(x)\right)^2$ is

A) $\frac{2}{\pi x}\cos^2 x$ B) $\frac{2}{\pi x}\sin^2 x$ C) $\frac{2}{\pi x}$ D) $\frac{4}{\pi 2x^2}$

147. Solve $xp - yq = xy$

A) $\phi(xy \log y) = 0$ B) $\phi(xy, z + xy\log y) = 0$

C) $\phi\left({}^{x}/_{y}, \log y\right) = 0$ D) None

148. Solve $x^2(y - Px) = yP^2$

A) $y^2 = cx^2 + c^2$ B) $y = cx + c^2$ C) $y^2 = cx + c^2$ D) None

149. Solve (y-px) (P-1) =P

A) $y = cx + \frac{c^2}{c+1}$ B) $y = cx + \frac{c}{c+1}$ C) $y = Px + \frac{\rho}{P+1}$ D) None

150. Find the C. I of $px + qy = pq$

A) $z = \frac{(ax+y)^2}{2} + b$ B) $az = \frac{ax+y}{2} + b$

C) $az = ax + y + b$ D) $az = \frac{(ax+y)^2}{2} + b$

151. Diff. equ of $y = ax^2$

A) $2y = x^2y''$ B) $xy' = 2y$ C) $xy = 2y'$ D) $xy'' = 2y$

152. The P.I. of $(D^3 - D)y = e^x + e^{-x}$ is

A) $\frac{1}{2}(e^x + e^{-x})$ B) $\frac{1}{2}x(e^x + e^{-x})$

C) $\frac{1}{2}x^2(e^x + e^{-x})$ D) $\frac{1}{2}x^2(e^x - e^{-x})$

153. Which one is incorrect

A) $\sum_{r=0}^{\infty}(-1)^r \frac{1}{r!\,(n+r)!}\left(\frac{x}{2}\right)^{2r+n}$ B) $\sum_{r=0}^{\infty}(-1)^r \frac{1}{r!\,\Gamma(n+r+1)}\left(\frac{x}{2}\right)^{2r+n}$

C) $\sum_{r=0}^{\infty}\frac{1}{\Gamma(r+1)\,\Gamma(n+r+1)}\left(\frac{x}{2}\right)^{2r+n}$ D) $\sum_{r=0}^{\infty}(-1)^r \frac{1}{r!\,(n+r+1)!}\left(\frac{x}{2}\right)^{2r+n}$

154. Solve $\frac{\partial^2 v}{\partial x\,\partial t} = e^{-t}\cos x$ given that u = 0 when t = 0 and $\frac{\partial u}{\partial t} = 0$ when x = 0

A) $u = -e^{-t}\sin x + \sin x$ B) $u = e^{-t}\sin x + \cos x$

C) $u = -e^{-t}\sin x + \cos x$ D) $u = -e^{-t}\cos x + \sin x$

155. Solve. $(1 + 2xy\cos x^2 - 2xy)dx + (\sin x^2 - x^2)dy = 0$

A) $x - y\,sinx^2 + yx^2 = C$ B) $x + y\,sinx^2 + yx^2 = C$
C) $x - y\,sinx^2 - yx^2 = C$ D) $x + y\,sinx^2 - yx^2 = C$

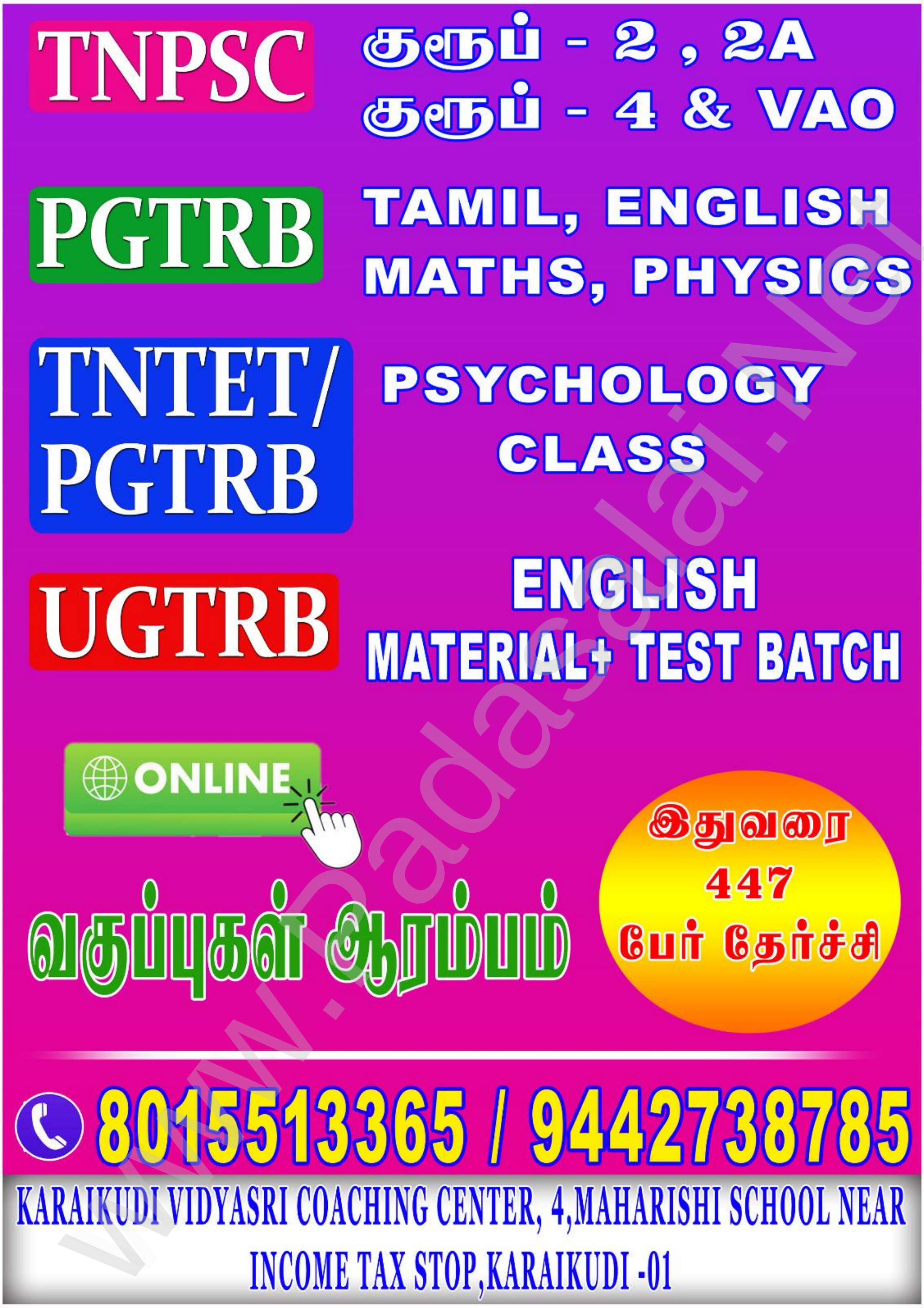
156. Solve $P = log_e(px - y)$
A) $y = e^P + Px$ B) $y = Px - e^P$
C) $y = Px - e^{-P}$ D) $y = Px + e^{-P}$

157. The necessary and sufficient conditions for integrability of the D.E. $Pdx + Qdy + Rdz = 0$
A) $\sum P\left(\frac{\partial Q}{\partial y} - \frac{\partial R}{\partial z}\right) = 0$ B) $\sum P\left(\frac{\partial R}{\partial z} - \frac{\partial Q}{\partial y}\right) = 0$
C) $\sum P\left(\frac{\partial Q}{\partial z} - \frac{\partial R}{\partial y}\right) = 0$ D) $\sum P\left(\frac{\partial Q}{\partial z} + \frac{\partial R}{\partial y}\right) = 0$

158. In $J_n(x)$ is Bessel function of order n, then which one of the following is false?
A) $J_n(-x) = (-1)^n J_n(x)$ B) $J_n(x) = \frac{1}{2}[J_{n-1}(x) + J_{n+1}(x)]$
C) $\frac{d}{dx}\left(x^n J_n(x)\right) = x^n J_{n-1}(x)$ D) $x^n J_n'(x) = x^n J_{n+1}(x) + n J_n(x)$

159. When Bernoulli's equation reduced to linear form
A) $n \neq 0, 1$ B) $n = 0, 1$ C) $P = Q$ D) $P \neq Q$

160. The partial diff. equ. by eliminating a and b from $(x-a)^2 + (y-b)^2 = z^2 cot^2\alpha$ is
A) $p^2 - q^2 = \alpha^2$ B) $(p+q)^2 = tan^2\alpha$
C) $p^2 + q^2 + pq = tan^2\alpha$ D) $p^2 + q^2 = tan^2\alpha$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Answer Key

1		21	B	41	A	61	C	81		101		121	C	141	B
2		22	A	42	A	62	A	82		102		122	A	142	A
3		23	A	43	C	63	A	83		103		123	A	143	A
4		24	D	44	B	64	A	84		104		124	C	144	C
5		25	B	45	C	65	A	85		105		125	A	145	D
6		26	A	46	A	66	A	86		106		126	D	146	C
7		27	B	47	C	67	D	87		107		127	C	147	B
8		28	B	48	A	68		88		108		128	A	148	A
9		29	B	49		69		89		109	C	129	B	149	B
10		30	C	50	A	70		90		110		130	B	150	D
11		31	A	51	A	71		91		111	B	131	B	151	
12		32	C	52	C	72		92		112	C	132	C	152	
13		33	B	53	C	73		93		113	D	133	D	153	
14		34	D	54	A	74		94		114	B	134	D	154	
15		35		55	C	75		95		115	C	135	A	155	
16		36	C	56	B	76		96		116	D	136	C	156	
17		37	B	57	D	77		97		117	A	137	C	157	
18		38	D	58	B	78		98		118	C	138	B	158	
19	C	39	A	59	C	79		99		119	B	139	B	159	
20	B	40	C	60	D	80		100		120	B	140	A	160	

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