



**CBRT - 2018  
Question Paper Grid**

Government of Goa

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**Assistant Professor(Mathematics)**

Itemcode : **PM1031**

**Q1** : Tripitakas are the sacred books of the

- (a) Jains
- (b) Hindus
- (c) Muslims
- (d) Buddhists

Itemcode : **PM1032**

**Q2** : Mohenjodaro is situated in

- (a) The province of Sindh in Pakistan
- (b) In the State of Gujarat in India
- (c) In the State of Punjab in India
- (d) In Afghanistan

Itemcode : **PM1033**

**Q3** : The greatest Portuguese governor in the east who laid the real foundation of Portuguese power in India was

- (a) Almedia
- (b) Albuquerque
- (c) Francis Drake
- (d) Vasco de Gama

Itemcode : **PM1034**

**Q4** : Who was the author of Gita Rahasya?

- (a) Ramakrishna Paramahansa
- (b) Vijayaraghavachariar
- (c) Bal Gangadhar Tilak
- (d) Vivekananda

Itemcode : **PM1035**

**Q5** : What was the ultimate goal of Gandhi's Salt Satyagraha?

- (a) Repeal of salt laws
- (b) Curtailment of the government's power
- (c) Economic relief to the common people
- (d) Purna swaraj for India

Itemcode : **PM1036**

**Q6** : The Length of India's coastline is about

- (a) 7,500 km.
- (b) 5,900 km.
- (c) 7,000 km.
- (d) 6,100 km.

Itemcode : **PM1037**

**Q7** : Which area of India receives the least rainfall?

- (a) Ladakh
- (b) The Western Ghats
- (c) Eastern Rajasthan
- (d) Western Tamil Nadu

Itemcode : **PM1038**

**Q8** : Which of the following major sea ports of India does not have a natural harbour?

- (a) Mumbai
- (b) Cochin
- (c) Mormugao
- (d) Paradeep

Itemcode : **PM1039**

**Q9** : What is the chief source of political power in India?

- (a) People
- (b) the Constitution
- (c) the Parliament
- (d) State legislature

Itemcode : **PM1040**

**Q10** How many members of the Rajya Sabha can be nominated by the President from amongst persons who have distinguished themselves in art, literature, social service etc.?

- (a) 2
- (b) 10
- (c) 12
- (d) none

Itemcode : **PM1041**

**Q11** Choose the correct alternative  
: Melt: Liquid: : Freeze : ?

- (a) Ice
- (b) Condense
- (c) Solid
- (d) Crystal

Itemcode : **PM1042**

**Q12** Choose the correct alternative  
: Acting: Theatre:: Gambling : ?

- (a) Casino
- (b) Club
- (c) Bar
- (d) Gymn

Itemcode : **PM1043**

**Q13** Select the best alternative  
: Professor : Lecture :: Doctor : ?

- (a) Hospital
- (b) Disease
- (c) Medicine
- (d) Patient

Itemcode : **PM1044**

**Q14** Choose out the odd one  
:

- (a) Axe
- (b) Sword
- (c) Knife
- (d) Showel

Itemcode : **PM1045**

**Q15** Choose out the odd one  
:

- (a) Island
- (b) Coast
- (c) Oasis
- (d) Harbour

Itemcode : **PM1046**

**Q16** Choose the correct alternative that will continue the same pattern and fill in the blank spaces  
: 19, 2, 38, 3, 114, 4, (.....)

- (a) 228
- (b) 256
- (c) 352
- (d) 456

Itemcode : **PM1047**

**Q17** Choose the missing term out of the given alternatives  
:

U, O, I, ?, A

- (a) E
- (b) C
- (c) S
- (d) G

Itemcode : **PM1048**

**Q18** Choose the missing term out of the given alternatives  
: Z, L, X, J, V, H, T, F, ?, ?

- (a) R, D
- (b) R, E
- (c) S, E
- (d) Q, D

Itemcode : **PM1049**

**Q19** In the following letter series, some of the letters are missing which are given in that order as one of the alternatives below it. Choose the correct alternative

Abc-d-bc-d-b---cda

- (a) bacde
- (b) cdabe
- (c) dacab
- (d) decdb

Itemcode : **PM1050**

**Q20** If in a certain language NATURE is coded as MASUQE, how is FLOWER coded in that code?

- (a) FBMJND
- (b) FZMHND
- (c) GANIOE
- (d) EALIME

Itemcode : **PM1051**

**Q21** Choose the most appropriate Preposition:  
: The mother was anxious \_\_\_\_\_ the safety of her son.

- (a) At
- (b) About
- (c) For
- (d) Upon

Itemcode : **PM1052**

**Q22** Choose the most appropriate Preposition:  
: There is no exception \_\_\_\_\_ this rule.

- (a) In
- (b) To
- (c) For
- (d) About

Itemcode : **PM1053**

**Q23** Choose the exact meaning of the idiomatic expression/phrase given below:  
: When I saw him in the morning, he looked like a duck in a thunderstorm.

- (a) Entrapped
- (b) Distressed
- (c) Peaceful
- (d) Timid

Itemcode : **PM1054**

**Q24** Choose the exact meaning of the idiomatic expression/phrase given below:  
: Our College is within a stone's throw of the railway station.

- (a) Very far off
- (b) Within a definite circumstance
- (c) At a short distance
- (d) With a certain radius

Itemcode : **PM1055**

**Q25** Choose the correct Synonym from the words given:  
: Abysmal

- (a) Mixed
- (b) Horrifying
- (c) Hollow
- (d) Superficial

Itemcode : **PM1056**

**Q26** Choose the correct Synonym from the words given:  
: Zealot

- (a) Foolish
- (b) Energetic
- (c) Dumb
- (d) fanatic

Itemcode : **PM1057**

**Q27** Choose the correct Antonym from the words given below:  
: Clandestine

- (a) Open

- (b) Vague
- (c) Bright
- (d) Unreal

Itemcode : **PM1058**

**Q28** Choose the correct Antonym from the words given below:  
: Sporadic

- (a) Irregular
- (b) Uneven
- (c) Frequent
- (d) Regularly

Itemcode : **PM1059**

**Q29** Spot the error in the following sentences given below by indicating your answer with the correct alphabet:  
:

- (a) Having been found guilty
- (b) On murder
- (c) The accused was
- (d) Sentenced to death

Itemcode : **PM1060**

**Q30** Spot the error in the following sentences given below by indicating your answer with the correct alphabet:  
:

- (a) A more irrational world
- (b) To this one in which
- (c) We presently live
- (d) Could hardly be conceived

Itemcode : **PM1001**

**Q31** A homogeneous system of  $m$  linear equations in  $n$  variables will  
: have

- (a) a unique solution if  $m \leq n$ .
- (b) a unique solution if  $n \leq m$ .
- (c) infinitely many solutions if  $m < n$ .
- (d) infinitely many solutions if  $n < m$ .

Itemcode : **PM1002**

**Q32** The real vector space of all complex  $n \times n$  matrices  $A$  such that  
:  $A^t = \bar{A}$  is of (real) dimension

- (a)  $n^2$
- (b)  $n^2 - n$
- (c)  $2(n^2 - n)$
- (d)  $(n^2 - n)/2$

Itemcode : **PM1003**

**Q33** Let  $A$  and  $B$  be two  $n \times n$  real matrices. Then  $\text{rank}(AB)$   
:

- (a)  $= \max\{\text{rank}(A), \text{rank}(B)\}$
- (b)  $= \text{rank}(A) \cdot \text{rank}(B)$ .
- (c)  $= \text{rank}(A) + \text{rank}(B)$ .
- (d)  $\leq \min\{\text{rank}(A), \text{rank}(B)\}$ .

Itemcode : **PM1004**

**Q34** Let  $V$  be an inner product space such that  $\dim(V) = n \in \mathbb{N}$ . If  
:  $S$  is an orthonormal set in  $V$  containing  $m$  elements, then

- (a)  $m = n$
- (b)  $m > n$
- (c)  $m \leq n$
- (d)  $m > n$

Itemcode : **PM1005**

**Q35** Let  $T$  be a self-adjoint operator on a real finite dimensional inner  
: product space  $V$ . Then it is not true that,

- (a) there is a unique unitary operator  $U$  on  $V$  such that  $UTU^{-1}$  is diagonal
- (b)  $T$  is a linear combination of projections on  $V$ .
- (c)  $T$  is a normal operator.
- (d) eigenvalues of  $T$  are real.

Itemcode : **PM1006**

**Q36** Let  $(a_n)$  be a sequence of real numbers. Then  $(a_n)$  converges in  $\mathbb{R}$  if  
:

- (a)  $(a_n)$  is bounded.

- (b)  $(a_n)$  is monotone.
- (c)  $|a_n - a_{n+1}| \rightarrow 0$  as  $n \rightarrow \infty$ .
- (d)  $\sum_{n=1}^{\infty} a_n$  converges in  $\mathbb{R}$ .

Itemcode : **PM1007**

**Q37**  
:  $\sum_{n=1}^{\infty} \frac{n}{2^n} =$

- (a)  $\frac{1}{2}$ .
- (b) 1.
- (c) 2.
- (d) 4.

Itemcode : **PM1008**

**Q38**  
: Let  $f : (0, 1) \rightarrow \mathbb{R}$  be defined as  $f(t) = \frac{\cos t - 1}{t^2}$  for  $t \neq 0$  and  $f(0) = -1/2$ . Then,

- (a)  $f$  is differentiable twice in  $(-1, 1)$ .
- (b)  $f$  is differentiable in  $(-1, 1)$  but  $f'$  is not differentiable at 0.
- (c)  $f$  is continuous in  $(-1, 1)$  but  $f$  is not differentiable at 0.
- (d)  $f$  is not continuous at 0.

Itemcode : **PM1009**

**Q39**  
: Let  $A = \{1/m - 1/n : m, n \in \mathbb{N}\}$ . Then  $\inf A =$

- (a) 1
- (b) -1
- (c) 0
- (d) -2

Itemcode : **PM1010**

**Q40**  
: Let  $f : (0, 1) \rightarrow \mathbb{R}$  be monotonic. Then  $f$

- (a) is differentiable.
- (b) is continuous, but need not be differentiable.
- (c) can have only finitely many points of discontinuities.
- (d) can have infinitely many points of discontinuities.

Itemcode : **PM1011**

**Q41** The number of non-isomorphic groups of order 35 is  
:

- (a) 1.
- (b) 2.
- (c) 4.
- (d) 6.

Itemcode : **PM1012**

**Q42** The number of elements of order 5 in  $A_5$  is  
:

- (a) 0.
- (b) 16.
- (c) 20.
- (d) 24.

Itemcode : **PM1013**

**Q43**  
: Let  $S = \{\sigma \in S_3 : \sigma \text{ is conjugate to } (1,2,3)\}$ . The number of elements in  $S$  is

- (a) 15
- (b) 20
- (c) 24
- (d) 30

Itemcode : **PM1014**

**Q44** Let  $R$  be a commutative ring with unity and  $M_1$  and  $M_2$  be two distinct maximal ideals in  $R$ . Then,

- (a)  $M_1 \cup M_2$  is a maximal ideal.

- (b)  $M_1 \cap M_2$  is a maximal ideal.
- (c)  $M_1 + M_2$  is a maximal ideal.
- (d)  $M_1 + M_2 = R$ .

Itemcode : **PM1015**

**Q45** Let  $I$  be an ideal in a commutative ring with unity  $M$  such that  
:  $M/I$  is a field. Then,  $I$  is

- (a) a maximal ideal.
- (b) a prime ideal, but not a maximal ideal.
- (c) principal ideal, but not a maximal ideal.
- (d)  $I = R$ .

Itemcode : **PM1016**

**Q46** The Wronskian of the solutions of  $y'' + xy' + x^2y = 0$  is (with  $c$   
: an arbitrary constant)

- (a)  $ce^{-\frac{x^2}{2}} - \frac{x_0^2}{2}$ .
- (b)  $ce^{-\frac{x^2}{2}}$ .
- (c)  $e^{-x^2} - e^{-x_0^2}$ .
- (d)  $e^{-x^2}$ .

Itemcode : **PM1017**

**Q47** If  $P_m(x)$  is the Legendre polynomial of degree  $m$ , then  $\int_{-1}^1 xP_1(x)dx =$

- (a) 3/2
- (b) 1
- (c) 2/3
- (d) 0

Itemcode : **PM1018**

**Q48** The Laplace transform of the Dirac delta function  $f(t) = \delta_{t_0}(t)$   
: with impulse at  $t = t_0 > 0$  is  $F(p) =$

- (a)  $e^{-t_0 p}$ .
- (b) 1.
- (c)  $e^{t_0 p}$ .
- (d)  $1/p$ .

Itemcode : **PM1019**

**Q49** The general solution of  $x\frac{\partial z}{\partial x} + y\frac{\partial z}{\partial y} = z$  is given using a differen-  
: tiable function  $F$  by

- (a)  $F(x; y; z) = 0$ .
- (b)  $z = yF(x=y)$
- (c)  $F(x=y; z=y) = 0$ .
- (d)  $z = F(x,y)$ .

Itemcode : **PM1020**

**Q50** The canonical form of the equation  $(n - 1)^2 z_{xx} - y^{2n} z_{yy} =$   
:  $ny^{2n-1} z_y$  where  $n > 1$  is an integer, is of the form

- (a)  $z_{\alpha\alpha} + z_{\beta\beta} = \phi(\alpha, \beta, z, z_\alpha, z_\beta)$ .
- (b)  $z_{\eta\eta} = \phi(\xi, \eta, z, z_\xi, z_\eta)$ .
- (c)  $z_{\xi\eta} = \phi(\xi, \eta, z, z_\xi, z_\eta)$ .
- (d)  $z_{\xi\xi} = \phi(\xi, \eta, z, z_\xi, z_\eta)$ .

Itemcode : **PM1021**

**Q51** Let  $f(x, y) = x^2 - y^2$ ,  $(x, y) \in \mathbb{R}^2$ . Then,  $(0,0)$  is a

- (a) regular point of  $f$ .
- (b) local maximum of  $f$ .
- (c) local minimum of  $f$ .
- (d) point of inflection of  $f$ .

Itemcode : **PM1022**



**Q52** Let  $f : \mathbb{R}^m \rightarrow \mathbb{R}^n$  be a differentiable map on  $\mathbb{R}^m$ . Then the derivative  $f'$  is a map from

- (a)  $\mathbb{R}^m \rightarrow \mathbb{R}^n$ .
- (b)  $\mathbb{R}^m$  to the set of all linear maps from  $\mathbb{R}^m \rightarrow \mathbb{R}^n$ .
- (c) the set of all linear maps from  $\mathbb{R}^m \rightarrow \mathbb{R}^n$  to the space  $\mathbb{R}^n$ .
- (d) the set of all linear maps from  $\mathbb{R}^m \rightarrow \mathbb{R}^n$  to the set of all linear maps from  $\mathbb{R}^m \rightarrow \mathbb{R}^n$ .

Itemcode : **PM1023**

**Q53** Let  $f : [0, 1] \rightarrow \mathbb{R}$  be defined as  $f(x) = 0$  for all  $x \in \mathbb{Q}$  and equal to 1 otherwise. Then  $f$  is

- (a) continuous at all rational numbers and not Riemann integrable.
- (b) continuous at all irrational points and not Riemann integrable.
- (c) discontinuous at every point and Riemann integrable.
- (d) discontinuous at all points and not Riemann integrable.

Itemcode : **PM1024**

**Q54** The function  $z \sin \frac{1}{z}$  ( $z \in \mathbb{C}$ )

- (a) admits a zero at  $z = 0$ .
- (b) admits a pole at  $z = 0$ .
- (c) has an essential singularity at  $z = 0$ .
- (d) is regular and nonzero at  $z = 0$ .

Itemcode : **PM1025**

**Q55** Let  $f$  be analytic on the disc  $|z| < 1$  such that  $f(1/n) = \frac{n-2}{2n+1}$ . Then  $f(0) =$

- (a) 0.
- (b) 1/2.
- (c) 1.
- (d) -2.

Itemcode : **PM1026**

**Q56** Let  $f(z)$  and  $g(z)$  be analytic in  $|z| < 1$  such that  $f(z) = 0$  if and only if  $g(z) = 0$ . The  $f(z)=g(z)$

- (a) have no poles in  $|z| < 1$ .
- (b) can have zeros but cannot have any singularity in  $|z| < 1$ .
- (c) can have singularities, but not zeros in  $|z| < 1$ .
- (d) may or may not be analytic in  $|z| < 1$ .

Itemcode : **PM1027**

**Q57** Let  $X = (0, \infty)$ ,  $Y = (0, 1)$  and  $Z = [0, 1)$ . Then,

- (a)  $X$  is homeomorphic to  $Y$  and not homeomorphic to  $Z$ .
- (b)  $Y$  is homeomorphic to  $Z$  and not homeomorphic to  $X$ .
- (c)  $Z$  is homeomorphic to  $X$  and not homeomorphic to  $Y$ .
- (d) each one of  $X$ ,  $Y$  or  $Z$  is not homeomorphic the other.

Itemcode : **PM1028**

**Q58** Let  $S$  be a dense subsets of  $\mathbb{R}$ . Then, it may not true that

- (a)  $S + \mathbb{Q}$  is dense in  $\mathbb{R}$ .
- (b)  $S \cdot \mathbb{Q}$  is dense in  $\mathbb{R}$ .
- (c)  $S \cap \mathbb{Q}$  is dense in  $\mathbb{R}$ .
- (d)  $S \cup \mathbb{Q}$  is dense in  $\mathbb{R}$ .

Itemcode : **PM1029**

**Q59** For a real sequence  $(a_n)$ , let  $f(a_n) = \sum_{n=1}^{\infty} a_n$ . Then  $f$  is a

- (a) functional on  $l^1$  but not a functional on  $l^p$  for any  $1 < p < \infty$ .

- (b) functional on  $l^p$  for all  $1 \leq p < \infty$  but not a functional on  $C_0$ .
- (c) functional on  $C_0$  but not a functional on  $l^\infty$ .
- (d) functional on  $l^\infty$ .

Itemcode : **PM1030**

**Q60** Let  $X$  be a linear subspace of an inner product space  $Y$ . Then  $X = Y$  if :

- (a)  $X$  contains an orthonormal basis for  $Y$
- (b)  $X^\perp = \{0\}$ .
- (c) there is a functional  $f$  on  $Y$  such that  $f(x) = 0$  for all  $x \in X$ .
- (d) interior of  $X$  is non-empty.