

### INSTITUTE OF ENGINEERING

#### **Model Entrance Exam**

(Set-3)

## **Instructions:**

There are 100 multiple-choice questions, each having four choices of which only one choice is correct.

Date: 2080/03/02 (June-17) **Duration: 2 hours Time: 8 AM – 10 AM** 

# Section-A (1 marks)

1)	The mother was	concerned the	e safety of her child.			
	a) at	b) about	c) for	d) upon		
2)	You should prep	pare yourselft	his exam.	-		
	a) to take	b) taking	c) in taking	d) take		
3)	The players	here last Friday.	_			
	a) arrive	b) have arrived	c) has arrived	d) arrived		
4)	I wouldn't go th	nere if I have to	D.			
	_	b) will not	c) didn't	d) hadn't		
5)	The people will	make him a leader.				
	a) He will be ma		b) He will have bee	en made a leader.		
	c) He will make	the people a leader.	d) He will have ma	ade a leader.		
6)	I could see that she was in a bad mood, so I gave her a wide berth.					
ŕ	a) to frighten		_	b) to express openly		
	c) to avoid		d) to meditate	•		
7)	,	ne following is a comp	,			
	_	nat he was ignorant of				
	· •	ng football match.				
	,	her pay the bill at once	or return the goods.			
	d) First deserve,	- ·	G			
8)		oration the pric	ce of petrol.			
		b) has risen	c) rises	d) is rising		
9)		as his sister at	the party.	<u>-</u>		
	a) were			d) has been		
10)	Decency (Antor					
	-	b) politeness	c) decorum	d) ill-mannered		
11)	Procrastinate (S	· •	,	,		
			c) seasonal	d) abdicate		
12)	I have a piece of information that he might be interested in. The word 'information' has a stress					
		syllable.	•			
	_	b) second	c) third	d) fourth		
13)	Light year is the	e unit of:				
		b) time	c) speed	d) intensity of light		
14)	For a particle pe	erforming uniform circ	ular motion, choose the in	ncorrect statement from the following		
	a) Magnitude of particle velocity (speed) remains constant.					
	b) Particle velocity remains directed perpendicular to radius vector.					
	c) Direction of acceleration keeps changing as particle moves.					
	d) Magnitude of acceleration does not remain constant.					
15)	Which of the fo	llowing is a self-adjust	ting force?			
	a) static friction	b) Rolling fricti	on c) Sliding friction	d) Dynamic friction		
16)	The potential energy of a system increases if work is done:					
	a) upon the system by a non-conservative force					
	b) by the system against a conservative force					
	c) by the system against a non-conservative force					
	d) upon the system by a conservative force					
17)	The breaking stress of a wire depends upon:					
	a) length of the	wire	b) radius of the win	b) radius of the wire		
	c) material of the wire			d) shape of the cross-section of wire		
18)	After terminal v	elocity is reached, the	acceleration of a body fal	ling through a viscous fluid is		
	a) zero	b) equal to g	c) less than g	d) more than g		

19) In a cyclic process, which of the following statement is correct?			statement is correct?			
	a) change in internal energy is not zero					
	•	to its initial state and i				
		•	ot equal to work done	by the system		
• • •	d) change in internal					
20)		-	the other, medium is re	-		
	a) conduction	b) convection	c) radiation	d) both (a) and (b)		
21)	Speed of sound wave					
	, , , , , , , , , , , , , , , , , , ,	-	bulk modulus of the n	nedium		
	b) inversely proportional to the bulk modulus of the medium					
		al to the density of the				
22)		onal to the density of the		137 1 .1		
22)		_	•	nd X respectively, then a material		
		lielectric in a capacitor				
	a) high K and high X		b) high K and low X			
22)	c) low K and high X		d) low K and low X			
23)		perature, the conductiv	•			
		nd of semiconductor de				
		reases and of metals de				
	,	semiconductors increa				
24)	*	semiconductor decreas		two fields are perallel to each other		
24)			-	two fields are parallel to each other.		
	a) circle	b) ellipse	nis region. The path of c) helix	-		
25)		· •	the induced emf is equ	d) straight line		
25)	a) thickness of coil	inge of current is unity,	b) number of turns in			
	c) coefficient of self-	inductance	d) total flux linked wi			
26)	,		e with respect to object			
20)	a) virtual and erect	_	_	d) virtual and inverted		
27)	<i>'</i>	,		· ·		
, , , , , , , , , , , , , , , , , , , ,			d) disappear			
28) In an unbiased p-n junction, holes diffuse from the p-region to n-region because of:			,			
20)	a) the attraction of free electrons of n-region					
	b) the higher hole concentration in p-region than that in n-region					
	c) the higher concentration of electrons in the n-region than that in the p-region					
	=	rence across the p-n jur	_	h 1-81011		
29)			e lowest orbit correspo	nds to:		
- /	a) infinite energy	b) maximum energy	*	d) zero energy		
30)	The IUPAC name of		, a a a <b>6</b> ,	.,		
/	a) Glyoxal	b) Ethane-1,2-diol	c) Ethane-1,2-dial	d) 2-oxo ethanoic acid		
31)	, •	and sand is purified by		,		
,	a) Distillation	b) Sublimation	c) Crystallization	d) Separating funnel		
32)	Fumes of fuming sulp	•	, •	, 1		
ŕ	a) SO <sub>2</sub>	b) SO <sub>3</sub>	c) H <sub>2</sub> SO <sub>4</sub>	d) $H_2S_2O_7$		
33)	Excess of NaOH read	ets with zinc to form:	,	,		
ŕ	a) Zn(OH) <sub>2</sub>	b) ZnO	c) ZnH <sub>2</sub>	d) Na <sub>2</sub> ZnO <sub>2</sub>		
34)	Which of the following is correctly arranged in increasing order of atomic size?					
,	a) $F < 0 < C < Cl$		b) $C < 0 < F < Cl <$			
	c) $Cl < Br < F < C$		d) $0 < F < C < Cl <$			
35)	Glauber's salt is:		*			
•	a) Na <sub>2</sub> CO <sub>3</sub> .10H <sub>2</sub> O	b) CuSO <sub>4</sub> .5H <sub>2</sub> O	c) Na <sub>2</sub> SO <sub>4.</sub> 10H <sub>2</sub> O	d) FeSO <sub>4</sub> .7H <sub>2</sub> O		

36)	Which has maximum		) 2	1) 1 C NO
37)	a) 7 g N <sub>2</sub> The value of n and 1 f	b) 16 g O <sub>2</sub> for the last electron of F	c) 2 g H <sub>2</sub> Fe <sup>3+</sup> is:	d) 16 g NO <sub>2</sub>
20)	a) 2 and 3	b) 3 and 3	c) 3 and 2	d) 4 and 2
38)	a) $K_2MnO_4$	state of Mn is shown by $KMnO_4$	c) $MnO_4^{2-}$	d) $Mn_2O_2$
39)	The conjugate acid of	$EHPO_4^{2-}$ is:	, .	, 2 2
40)		b) $PO_4^{3-}$ X <sub>3</sub> is x molL <sup>-1</sup> . The solu	/ <b>=</b> 1	d) $H_3PO_3$
ĺ	a) x <sup>5</sup>	b) $16x^2$	c) $96x^5$	d) 108x <sup>5</sup>
41)		at C, $\tan A + \tan B =$	2	-2
	a) $\frac{b^2}{ac}$	b) $a + b$	c) $\frac{a^2}{hc}$	d) $\frac{c^2}{ab}$
42)	The least value of 4s	$\sin^2\theta + 5\cos^2\theta$ is:	DC	ub
	a) 1	b) 2	c) 4	d) 5
43)	If $\cos^{-1}(2x^2 - 1) +$	$2\cos^{-1}x = 360^{\circ}$ , then	x lies in the interval:	
	a) [0, 1]	b) $\left[\frac{1}{2}, \frac{1}{4}\right]$	c) $[-1, 0]$	$d)\left[-1,-\frac{1}{2}\right]$
44)	If $\vec{a} + \vec{b} + \vec{c} = 0$ , then	n the angle between $ec{b}$ a	and $\vec{c}$ is given by:	
	a) $\cos \theta = \frac{a^2 - b^2 - c^2}{a^2 - b^2}$		b) $\cos \theta = \frac{b^2 + c^2 - a^2}{a^2 + a^2}$	
	a) $\cos \theta = \frac{a^2 - b^2 - c^2}{2bc}$ c) $\cos \theta = \frac{a^2 + b^2 - c^2}{2ab}$		b) $\cos \theta = \frac{b^2 + c^2 - a^2}{2bc}$ d) $\cos \theta = \frac{a^2 + c^2 - b^2}{2ac}$	
45)	If a h are the roots of	the equation $x^2 - px$	$+ a = 0$ then $\frac{1}{2} + \frac{1}{4} =$	
73)	1	px	a = 0, then $a = b$	1) P
		b) $\frac{1}{q}$		d) $\frac{p}{q}$
46)	If $x = 1 + \frac{1}{1!} + \frac{4}{2!} + \frac{8}{3!}$	$\frac{1}{1} + \cdots$ , then $x^{-1}$ is equ	al to:	
		b) <i>e</i> <sup>2</sup>		d) $e^{-1}$
47)	The n <sup>th</sup> term of a GP is 128 and the sum of its n terms is 255. If its's common ratio is 2, then its first term is:			s's common ratio is 2, then its first
	a) 1	b) 2	c) 3	d) 4
48)	The complex number	$\frac{1+2i}{1-i}$ lies in:		
	a) first quadrant	b) second quadrant		d) fourth quadrant
49)		matrices such that AB		
	a) 2AB	b) 2BA	c) A + B	d) AB
50)	If $f(x) = \frac{1-x}{1+x}$ , then $f(x) = \frac{1-x}{1+x}$	$f[f(\cos 2\theta)] =$		
	a) $\tan 2\theta$	b) $\sec 2\theta$	c) $\cos 2\theta$	d) $\cot 2\theta$
51)	Which one of the following	•		
	a) $A = \{x : x \in R, x^2 = R\}$		b) $B = \{x : x \in R, x^2 = R\}$	
~~\	c) $C = \{x : x \in R, x^2 = x^2$	-9=0	d) $D = \{x : x \in R, x^2 \in R\}$	= x + 2
52)	$\lim_{x \to 1} (1 - x) \tan \frac{\pi x}{2} =$			
	a) $\frac{\pi}{2}$	b) $\frac{2}{\pi}$	c) π	d) $\frac{1}{\pi}$
53)	If $y = x + e^x$ , then $\frac{a}{a}$	$\frac{d^2y}{dx^2}$ =		
	a) $y - x$	b) <i>x/y</i>	c) <i>y/x</i>	d) $x - y$
54) $x^3 - 3x^2 + 6x + 7$ has:				
	a) a maximum but no minima		b) a minima but no maxima	
	c) both maxima and minima		d) no maxima and no minima	

- 55) ∫<sub>0</sub><sup>π</sup> cos³x dx =

  a) -1
  b) 0
  c) 1
  d) π

  56) If a line with y-intercept 2 is perpendicular to the line 3x 2y = 6, then its x-intercept is:

  a) 1
  b) 2
  c) 3
  d) 4

  57) If the circles x² + y² + ax + 1 = 0 and x² + y² 3x + y + 5 = 0 intersect orthogonally, the value of a is:

  a) -4
  b) 4
  c) -2
  d) 2

  58) If (±1,0) and (±2,0) are respectively the foci and vertices of an ellipse, then the length of its minor
- axis is: a) 2 b) 4 c)  $2\sqrt{3}$  d)  $2\sqrt{5}$
- The eccentricity of the hyperbola whose asymptotes are 3x + 4y = 2 and 4x 3y + 5 = 0 is: a) 1 b) 2 c)  $\sqrt{2}$  d) 3
- 60) Dc's of line joining points (4, 3, -5) and (-2, 1, -8) are: a) 6, 2, 3 b) 2, 4, -13 c) 6/7, 2/7, 3/7 d) 5/12, 7/12, 11/12

#### Section-B (2 marks)

Read the following passages and answer the questions given below.

An earthquake comes like a thief in the night, without warning. It was necessary, therefore to invent instruments that neither slumbered nor slept. Some devices were quite simple. One, for instance, consisted of rods of various lengths and thicknesses which would stand up on end like ninepins. When a shock came it shook the rigid table upon which these stood. If it were gentle, only the more unstable rods fell. If it were severe, they all fell. Thus, the rods by falling and by the direction in which they fell, recorded for the slumbering scientist, the strength of a shock that was too weak to waken him and the direction from which it came. But, instruments far more delicate than that were needed if any really serious advance was to be made.

The ideal to be aimed at was to devise an instrument that could record with a pen on paper the movements, of the ground or of the table, as the quake passed by. While I write my pen moves but the paper keeps still. With practice, no doubt, I could, in time, learn to write by holding the pen still while the paper moved. That sounds a silly suggestion, but that was precisely the idea adopted in some of the early instruments (seismometers) for recording earthquake waves. But when table, penholder and paper are all moving how is it possible to write legibly? The key to a solution of that problem lay in an everyday observation. Why does a person standing in a bus or train tend to fall when a sudden start is made? It is because his feet move on, but his head stays still.

- 61) Why was it necessary to invent instruments to observe an earthquake?
  - a) Because the earthquake comes like a thief in the night
  - b) To make people alert about earthquake during their conscious as well as unconscious hours
  - c) To prove that we are technically advanced
  - d) To experiment with the control of man over nature
- A simple device which consisted of rods that stood up on end like ninepins was replaced by a more sophisticated one because it failed:
  - a) to measure a gentle earthquake
- b) to measure a severe earthquake
- c) to record the direction of earthquake
- d) to record the facts with a pen or paper
- 63) The everyday observation referred to in the passage relates to:
  - a) a moving bus or train
  - b) the sudden start of a bus
  - c) the tendency of a standing person to fall when a bus or train moves suddenly
  - d) people standing in a bus or train

64)

	c) both pen and pape	r that should move				
	d) neither pen nor paper that should move					
65)			_	ocity of 72 km/hr. A bird is flying		
	-	n opposite direction wi	th a velocity 18 km/hr.	The time taken by the bird to cross		
	the train is:					
	a) 35 s	b) 27 s	c) 11.6 s	d) 7 s		
66)				s axis with an angular speed of 100		
		momentum of the cyli		1) 400 7		
	a) 40 J s	b) 400 J s	c) 20 J s	d) 200 J s		
67)	A block of wood floats in water with $\left(\frac{4}{5}\right)^{th}$ of its volume submerged. If the same block just floats in					
	liquid, the density of	the liquid (in kg m <sup>-3</sup> ) i				
	a) 1250	b) 600	c) 400	d) 800		
68)				ecutes simple harmonic motion with		
	<b>-</b> • • • •	Hz. The value of spring	=	0.737		
(0)	a) 4 N m <sup>-1</sup>	b) 3 N m <sup>-1</sup>	c) 2 N m <sup>-1</sup>	d) 5 N m <sup>-1</sup>		
69)	-	<del>-</del>	•	opproaches him with a velocity of 15		
		nd in air is $300  ms^{-1}$ )	the driver of the car as	s he passes the policeman is:		
	a) 25 Hz	b) 50 Hz	c) 100 Hz	d) 150 Hz		
70)	,	,		meter. The final temperature of the		
70)	mixture is:	mixed with 100 g of w	ater at 50 C in a caron	ineter. The final temperature of the		
	a) 31.2 °C	b) 32.8 °C	c) 36.7 °C	d) 38.2 °C		
71)	,			s suddenly expanded to 8 times its		
,	original volume is $(y)$		·			
	a) 70.25 K		c) 72.25 K	d) 73.25 K		
72)	,	· ·		ectric field at a distance 20 cm from		
12)				wards. The net charge on the sphere		
	is:		and points radially in	wards. The net enarge on the sphere		
		b) $4.5 \times 10^{-9}$ C	c) $-5.3 \times 10^{-9} C$	d) $5.3 \times 10^{-9}$ C		
73)				2 cm length of the wire. If the cell is		
,				en the emf of second cell is:		
	a) 3.05 V	b) 2.05 V	c) 4.05 V	d) 6.05 V		
74)				external magnetic field of 0.35 T		
	•	of magnitude equal to	$4.5 \times 10^{-2} Nm$ . The	magnitude of magnetic moment of		
	the given magnet is:					
	a) $26 JT^{-1}$	b) $2.6 JT^{-1}$	c) $0.26 JT^{-1}$	d) $0.026 JT^{-1}$		
75)			e connected in series	to a 220 V, 50 Hz ac source. The		
	impedance of the circ		) 20 17 0	1) 201 5 0		
70	a) $250 \Omega$	b) 268 Ω	c) 29.15 Ω	d) 291.5 Ω		
76)				ace whose radius of curvature and light source from the glass surface		
		osition image will be for		fight source from the glass surface		
	a) 25 cm	b) 50 cm	c) 100 cm	d) 200 cm		
77)	,			h light of wavelength 6000 Å. If the		
,				rn is 3.00 mm. The width of the slit		

a)  $1 \times 10^{-4} m$  b)  $2 \times 10^{-4} m$  c)  $0.5 \times 10^{-4} m$  d)  $4 \times 10^{-4} m$ 

The early seismometers adopted the idea that in order to record the earthquake, it is:

a) the pen that should move just as it moves when we write on paper

b) the pen that should stay still and the paper should move

78)	0	length of an electron w	^	0	
	a) 2.13 Å	b) 1.13 Å	c) 4.15 Å	d) 3.14 Å	
79)	In para-hydrogen, spin of the electrons are in the:				
	a) same direction but those of the protons in opposite direction				
	b) opposite direction but those of the protons in same direction				
		d so also the spins of pr			
		and so also the spins of	-		
80)		ng compound contains	*	$d \pi$ bonds?	
	a) Benzene		b) Mesitylene		
	c) enolic form of ace	tone	d) Tetracyanoethene		
81)	$A \xrightarrow{PCl_5} B \xrightarrow{alc.KOH} C \xrightarrow{H-}$	tone $\xrightarrow{OH/H^+} D \xrightarrow{Conc.H_2SO_4,140^\circ}$	c → E		
	What is E in the given reaction if A is a primary alcohol which gives the Iodoform test?				
	c) $CH_3 - CH_2 - 0 -$	$-CH_2-CH_3$	d) $CH_3 - CH_2 - HS$	$O_4$	
82)	In the reaction, $xMn$	$O_4^- + yH_2O_2 \rightarrow 2 M_1$	$n^{2+} + 5H_2O + 9O_2 +$	$ze^{-}$ , the value of x, y and z are:	
ŕ	a) 2, 5, 6		c) 3, 5, 5		
83)		of charge is passed thro	ugh two electrolytes of	f ZnCl <sub>2</sub> and AlCl <sub>3</sub> and the weight of	
		gram, what will be the			
	a) 63.5 gram	b) 26 gram	c) 49.125 gram	d) 13.5 gram	
84)	A signature written v	with carbon pencil wei	ghs 1 mg. What is the	number of carbon atoms present in	
	the signature?				
		b) $0.502 \times 10^{20}$		d) $5.02 \times 10^{20}$	
85)		HCOOH solution whi	ch is 1.3% ionized is:		
	a) 2.88	b) 3.36	c) 6.96	d) 10.66	
86)	In a $\triangle ABC$ , $\frac{b+c}{a} =$	b) $\frac{\cos\left(\frac{B-C}{2}\right)}{\sin\frac{A}{2}}$			
	$\sin\left(\frac{B-C}{c}\right)$	$\cos\left(\frac{B-C}{c}\right)$	$\cos\left(\frac{B+C}{c}\right)$	$\cos(\frac{B+C}{c})$	
	a) $\frac{\left(\frac{2}{A}\right)}{\cos^{\frac{A}{A}}}$	b) $\frac{\left(\frac{2}{sin^{\frac{A}{A}}}\right)}{sin^{\frac{A}{A}}}$	c) $\frac{\left(\frac{2}{3}\right)^{A}}{\sin^{A}}$	d) $\frac{\left(\frac{2}{A}\right)}{\cos^{\frac{A}{A}}}$	
87)	The general solution	of $2\sin^2 x + \sqrt{3}\cos x$	1 1 - 0 ic:	2	
87)	The general solution $\pi$	of $2\sin^2 x + \sqrt{3}\cos x$ b) $2n\pi + \frac{5\pi}{6}$	$\tau = 0.18$ .	$5\pi$	
	a) $2n\pi + \frac{1}{6}$	b) $2n\pi + \frac{\pi}{6}$	c) $n\pi + \frac{1}{6}$	d) $n\pi \pm \frac{\pi}{6}$	
88)	If A and B are the sums of odd and even terms respectively in the expansion of $(x + a)^n$ , then				
	, , , , ,	$)^{2n}$ is equal to:			
		b) $4(A - B)$		d) 4 <i>AB</i>	
89)		M = 6, AM = A, HM =		18, then A is equal to:	
	a) 5, 10	b) 5, 1/5		d) 10, 1	
90)	If $\left(\frac{1+i}{2}\right)^3 - \left(\frac{1-i}{2}\right)^3 =$	x + iy, then $(x, y) =$			
, ,	(1 () (11()		c) (2,0)	4) ( 2 0)	
01)	, , , ,			d) $(-2,0)$	
91)		can 20 persons sit roun	d a circular table so th	at two particular persons always sit	
	together is: $(171) \times (21)$	b) $(18!) \times (2!)$	a) (10I)	d) (19!) × (2!)	
92)				u) (19:) ^ (2:)	
92)	$\lim_{x\to 0} \kappa \text{ acosec } x =$	$\lim_{x\to 0} k \ x coseckx, \text{ then } k$	<i>κ</i> –		
	a) 1	b) -1	c) ±1	d) ±2	
93)	If $y = \sqrt{x \log_e x}$ , th	en $\frac{dy}{dx}$ at $x = e$ is:			
	a) $\frac{1}{e}$	b) 1/2	c) $\sqrt{e}$	d) $\frac{\sqrt{e}}{2}$	
		• -	C) VE	$\frac{1}{2}$	
94)		os x) has a maxima at:	$\pi$	$\pi$	
	a) $x = \frac{\pi}{2}$	b) $x = \frac{\pi}{2}$	c) $x = \frac{\pi}{4}$	d) $x = \frac{\pi}{\epsilon}$	

95)

d)  $\frac{-2}{e^{x}+1} + c$ 

a)  $\frac{1}{e^{x}+1} + c$  b)  $\frac{-1}{e^{x}+1} + c$  c)  $\frac{2}{e^{x}+1} + c$  The area enclosed within the curve |x| + |y| = 1 is: 96)

b)  $2\sqrt{2}$ 

c)  $\sqrt{2}$ 

If one of the lines given by  $ax^2 + 2hxy + by^2 = 0$  passes through (2,3) and the other passes through 97) (4,5), then a + 2h + b is equal to:

b) 1

c) 2

b)  $16x^2 + 16y^2 + 24x - 48y - 13 = 0$ 

The equation of circle concentric to the circle  $2x^2 + 2y^2 - 3x + 6y + 2 = 0$  and having area double 98) the area of this circle is:

a)  $8x^2 + 8y^2 - 24x + 48y - 13 = 0$ 

c)  $16x^2 + 16y^2 - 24x + 48y - 13 = 0$ d)  $8x^2 + 8y^2 + 24x - 48y - 13 = 0$ If x + y - a = 0 is a tangent to the parabola  $y^2 - y + x = 0$ , then its point of contact is: 99)

b) (1,0)

c) (0,1)

d)(0,-1)

If the product of distance of point (1, 2, -1) from planes 2x - 3y + z + k = 0 and x + 2y + 3z = 0100) is 1, then k equals:

a) 12

b) 14

c) 10

d) 8

Thank You!!!!!!