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270/-

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List of Universities Attached with NTS
(این ٹی ایس سے ملحقہ یونیورسٹیوں کی فہرست)

1. University of the Punjab, Lahore	1- یونیورسٹی آف پنجاب، لاہور
2. Government College University, Lahore	2- گورنمنٹ کالج یونیورسٹی، لاہور
3. Kinnaird College of Women, Lahore	3- کنیرڈ کالج برائے خواتین، لاہور
4. Lahore College for Women University, Lahore	4- لاہور کالج فار ویمن یونیورسٹی، لاہور
5. National College of Arts, Lahore	5- نیشنل کالج آف آرٹس، لاہور
6. University of Veterinary and Animal Sciences, Lahore	6- یونیورسٹی آف ویٹرنری اینڈ اینیمل سائنسز، لاہور
7. National Textile University, Faisalabad	7- نیشنل ٹیکسٹائل یونیورسٹی، فیصل آباد
8. NWFP Agriculture University, Peshawar	8- این ڈبلیو ایف پی ایگریکلچر یونیورسٹی، پشاور
9. Pakistan Forest Institute, Peshawar	9- پاکستان فاریسٹ انسٹیٹیوٹ، پشاور
10. UET, Peshawar (Non-Engineering Programs)	10- یو ای ٹی، پشاور (انجینئرنگ کے علاوہ پروگرام)
11. University of Agriculture, Faisalabad	11- یونیورسٹی آف ایگریکلچر، فیصل آباد
12. Bahauddin Zakariya University, Multan	12- بہاؤالدین زکریا یونیورسٹی، ملتان
13. COMSATS Institute of Information Technology	13- کامسیٹس انسٹیٹیوٹ آف انفارمیشن ٹیکنالوجی
14. Fatima Jinnah Women University, Rawalpindi	14- فاطمہ جناح ویمن یونیورسٹی، راولپنڈی
15. Government College University, Faisalabad	15- گورنمنٹ کالج یونیورسٹی، فیصل آباد
16. University of Gujrat, Gujrat	16- یونیورسٹی آف گجرات، گجرات
17. University of Sargodha, Sargodha	17- یونیورسٹی آف سرگودھا، سرگودھا
18. University of Science and Technology, Bannu	18- یونیورسٹی آف سائنس اینڈ ٹیکنالوجی، بنوں
19. University of Education, Lahore	19- یونیورسٹی آف ایجوکیشن، لاہور
20. Institute of Space Technology, Islamabad	20- انسٹیٹیوٹ آف سپیس ٹیکنالوجی، اسلام آباد
21. Islamia University, Bahawalpur	21- اسلامیہ یونیورسٹی، بہاولپور
22. Arid Agriculture University, Rawalpindi	22- بارانی زرعی یونیورسٹی، راولپنڈی

Note: Separate test will be conducted for Sindh and Balochistan Medical Colleges.

نوٹ: بلوچستان اور سندھ کے میڈیکل کالجوں کے لیے الگ الگ ٹیسٹ ہوگا۔

SYLLABUS

Number of Questions & Division of Marks

سلیبس، سوالات کی تعداد اور نمبروں کی تقسیم برائے گریجویٹ لیول (پری انجینئرنگ/کمپیوٹر سائنس گروپ) نیشنل اپٹی ٹیوڈ ٹیسٹ

NAT-IE (Pre-Engineering/Computer Science Group)

Section سیکشن	Subject/Topic مضمون/عنوان	No. of Questions سوالات کی تعداد	Time وقت	Marks نمبرز
I	Verbal Ability (لفظی صلاحیت)	20	25 min	20
II	Analytical Reasoning (تجزیاتی استدلال)	20	30 min	20
III	Quantitative Reasoning (مقداری استدلال)	20	30 min	20
IV	Subject Knowledge (مضمون کا نالج)	30	35 min	30
	Total	**90**	**120**	**90**

(DETAILED DESCRIPTION OF MARKS)

A:Verbal	B:Analytical	C:Quantitative	D:Subject(IE)
A1: Sentence Completion 05	B1: Scenario Based 12	C1: Arithmetic 13	D1: Physics 10
A2: Analogy 03	B2: Stattements Based 08	C2: Algebra 04	D2: Chemistry/Computer 10
A3: Antonym 04	Total = 20	C3: Geometry 03	D3: Mathematics 10
A4: Comprehension 05		Total = 20	Total = 30
A5: Synonym 03			
Total = 20			

(Important Information) اہم معلومات

☆ NAT-IE کا پرچہ کثیر الانتخابی سوالات (MCQs) پر مشتمل ہوگا۔ ☆ ہر کثیر الانتخابی سوال (MCQ) کے نیچے چار یا پانچ (A, B, C, D, E) ممکنہ جوابات دیئے جائیں گے۔ امیدوار نے قریب ترین درست جواب کا انتخاب کرنا ہوگا۔

☆ Verbal Ability میں انگریزی زبان کی سمجھ بوجھ کی صلاحیت کا جائزہ لیا جائے گا۔ یہ حصہ Fill in the Blanks، Analogies، Synonyms، Antonyms اور Comprehension پر مشتمل ہوگا۔

☆ Analytical Reasoning کا حصہ ذہنی آزمائشوں کے سوالات پر مشتمل ہوگا۔ یہ حصہ طلبہ کے IQ کی پیمائش کرنے میں مدد فراہم کرے گا۔

☆ Analytical Reasoning کا ہر سوال ایک منطقی (عقل و استدلال پر مبنی) معمہ (Logical Puzzle) ہوگا جس کی بنیاد سوال میں دیئے گئے چند اعداد و شمار یا حالات و واقعات پر ہوگی، لہٰذا ان سوالات کے جوابات دینے پر خصوصی توجہ مرکوز کریں۔ Analytical Reasoning کے سوالات عموماً چار یا پانچ سوالات کے گروپ کی صورت میں ہوتے ہیں۔ ایک مختصر پیراگراف پر ایک سے زیادہ سوالات پوچھے جاتے ہیں۔ بعض اوقات پیراگراف کی بجائے گرافس یا ٹیبل دے دیئے جاتے ہیں۔

☆ Quantitative Reasoning والے حصے میں جو سوالات پوچھے جائیں گے، وہ بنیادی ریاضی (Basic Arithmetics) کے علم کو پرکھنے میں معاون ہونگے۔ Quantitative Reasoning میں ریاضی (حساب)، الجبرا اور جیومیٹری کو سمجھنے کی صلاحیت کو پرکھا جاتا ہے۔ یہ حصہ مندرجہ ذیل اقسام کے سوالات پر مشتمل ہوسکتا ہے:

ڈسکریٹ مقداری سوالات (Discrete Quantitative Questions)

مقداری تقابل کے سوالات (Quantitative Comparison Questions)

اعداد و شمار کے تغیر کے سوالات (Data Interpretation Questions)

☆ Subject Knowledge والے حصے میں فزکس (Physics)، کیمسٹری (Chemistry)، ریاضی (Mathematics) اور کمپیوٹر سائنس (Computer Science) کے مضامین سے متعلقہ سوالات پوچھے جائیں گے۔

☆☆☆☆☆☆☆☆

Some Important Questions
With Answers About The National Aptitude Test (NAT) & *New Testing System (NTS)*

NTS اور NAT سے متعلقہ چند اہم سوالات اور اُن کے جوابات

جب بھی کوئی نیا نظام تعلیم متعارف کرایا جاتا ہے تو طلبہ کے ذہنوں میں اسے سمجھنے کے حوالے سے متعدد سوالات جنم لیتے ہیں' جن کے جواب نہ ملنے پر انہیں ایک تشنگی محسوس ہوتی ہے۔ ہمارا ادارہ **ڈوگرز یونیک** نہ صرف طلبہ کی علمی ضروریات کو مدِنظر رکھتے ہوئے اُنہیں بہترین تدریسی مواد فراہم کرتا ہے بلکہ ان کی دیگر علمی مشکلات کے حوالے سے بھی ہر ممکن رہنمائی کرتا ہے۔

حکومت نے مختلف سرکاری یونیورسٹیوں اور کالجوں میں داخلے کے لیے انٹری ٹیسٹ (NAT) کا ایک نیا نظام متعارف کرایا اور اس انٹری ٹیسٹ کے انعقاد کی ذمہ داری NTS کو سونپی۔ یہ نظام متعارف کرائے جانے کے بعد ہمارے ادارے کو طلبہ کی بے شمار ٹیلیفون کالز اور خطوط موصول ہوئے' جس میں انہوں نے اس نئے نظام کے حوالے سے مختلف سوالات کیے۔ ان کی علمی ضروریات کو مدِنظر رکھتے ہوئے ہمارے ادارے نے ایڈیٹوریل بورڈ کی زیرِ نگرانی داخلہ ٹیسٹ کے اس نئے نظام کے بارے میں NTS گائیڈ شائع کی۔ یہ کتاب طلبہ کے لیے نہایت مفید و کارآمد ثابت ہوئی۔ طلبہ کے پوچھے گئے سوالات کو مدِنظر رکھتے ہوئے یہاں چند اہم سوالات اور ان کے جوابات دیئے جا رہے ہیں تاکہ طلبہ اپنے ذہن میں اُبھرنے والے سوالات کے جوابات حاصل کر سکیں۔

سوال 1: NTS کیا ہے؟

جواب: NTS ایک ادارہ ہے جسے حکومت پاکستان نے مختلف قسم کے امتحانات/ٹیسٹ لینے اور ان کا نتیجہ مرتب کرنے کی ذمہ داری سونپی ہے۔ پاکستان میں اس امتحانی نظام کو متعارف ہوئے زیادہ عرصہ نہیں گزرا' جب کہ دُنیا کے دیگر ممالک میں اسی طرز کا نظام کئی برسوں سے رائج ہے۔ مثلاً امریکہ میں اسے ETS' بھارت میں NTSE اور ایران میں KANKOOR کا نام دیا گیا ہے۔

سوال 2: NTS کی ضرورت کیوں پیش آئی؟

جواب: NTS کی ضرورت اس لیے پیش آئی کہ اس سے قبل مختلف تعلیمی اداروں اور یونیورسٹیوں میں داخلہ لینے کے لیے طلبہ کو علیحدہ علیحدہ امتحانات/ٹیسٹ دینا پڑتے تھے۔ حتیٰ کہ ایک ہی یونیورسٹی کے مختلف شعبوں میں داخلہ لینے کے لیے ہر شعبے کے علیحدہ امتحان/ٹیسٹ سے گزرنا پڑتا تھا۔ مگر اب NTS کا امتحان پاس کرنے کے بعد ایک طالب علم نہ صرف مختلف تعلیمی اداروں یا یونیورسٹیوں میں داخلہ لے سکتا ہے بلکہ مختلف شعبوں میں بھی اسی امتحان کی بنیاد پر بغیر کوئی اضافی امتحان دیئے داخلہ لے سکتا ہے۔

سوال 3: NTS اور دیگر امتحانات منعقد کرنے والے اداروں میں کیا فرق ہے؟

جواب: NTS اور دیگر امتحانات منعقد کرنے والے اداروں میں کوئی بنیادی فرق نہیں۔ البتہ اتنا فرق ضرور ہے کہ مختلف امتحانی ادارے مختلف نوعیت کے امتحانات منعقد کرتے ہیں۔ مثلاً انٹرمیڈیٹ اینڈ سیکنڈری ایجوکیشن بورڈز میٹرک اور ایف اے کے امتحانات کا انعقاد کرتے ہیں۔ وفاقی اور صوبائی سروس کمیشنز مختلف نوعیت کے مقابلے کے امتحانات لیتے ہیں' اسی طرح NTS کا کام مختلف تعلیمی اداروں اور یونیورسٹیوں میں داخلے کے لیے امتحانات منعقد کرنا ہے۔

سوال 4: NTS کے امتحانات کے حوالے سے آپ کا ادارہ طلبہ کو کیا مدد فراہم کرتا ہے؟

جواب: **ڈوگر پبلشرز** ایک انفرادی اشاعتی ادارہ ہے جو **ڈوگرز یونیک** کے نام سے کتب شائع کرتا ہے۔ جس طرح NTS کا کام داخلہ ٹیسٹ کا انعقاد ہے' اسی طرح اِس ادارے کا کام طلبہ کو اس امتحان کی تیاری کے سلسلے میں مطالعاتی مواد اور رہنمائی فراہم کرنا ہے۔

سوال 5: NTS کون کون سے امتحانات کا انعقاد کرتا ہے؟

جواب: NTS قسم کے امتحانات کا انعقاد عمل میں لاتا ہے' جن میں سے کچھ اہم امتحانات کا یہاں ذکر کیا جا رہا ہے:

(i) 12 سال تک تعلیم حاصل کرنے والے (انٹرمیڈیٹ یا اس کے مساوی) طلبہ کے لیے NAT I کے مختلف امتحانات منعقد کرنا۔

(ii) 14 سال تک تعلیم حاصل کرنے والے (گریجویشن یا اس کے مساوی) طلبہ کے لیے NAT II کے مختلف امتحانات منعقد کرنا۔

(iii) 16 سال تک تعلیم حاصل کرنے والے (بی ایس سی انجینئرنگ' بی ایس آنرز' ایم اے' ایم ایس سی وغیرہ) طلبہ کیلئے GAT-General اور GAT-Subject کے مختلف امتحانات منعقد کرنا۔ NTS ایچ ای سی سکالرشپس اور فارن سکالرشپس

کے لیے بھی امتحانات کا انعقاد کرتا ہے۔

سوال 6: NTS اور NAT میں کیا فرق ہے؟

جواب: NTS ایک ادارے کا نام ہے جو مختلف نوعیت کے امتحانات کا انعقاد عمل میں لاتا ہے جبکہ NAT ایک امتحان کا نام ہے جسے پاس کرنے کے بعد ایک طالب علم کسی تعلیمی ادارے یا یونیورسٹی میں داخلہ لینے کی اہلیت حاصل کر لیتا ہے۔

سوال 7: کون سے طلبہ NAT کا امتحان دینے کی اہلیت نہیں رکھتے؟

جواب: وہ طالبعلم جس نے ابھی 12 سالہ تعلیم (انٹرمیڈیٹ یا اس کے مساوی) حاصل نہیں کی' وہ NAT کا امتحان دینے کا اہل قرار نہیں پاتا۔

سوال 8: NTS میں رجسٹریشن کرانے کا طریقہ کار کیا ہے؟

جواب: NTS کا رجسٹریشن فارم حاصل کر کے اسے اس کی پشت پر دی گئی ہدایات کی روشنی میں ہر لحاظ سے مکمل کریں۔ رجسٹریشن فیس بنک میں جمع کروائیں اور رسید رجسٹریشن فارم کے ساتھ منسلک کر کے NTS کے متعلقہ دفتر کو بھجوا دیں۔

سوال 9: NTS کا رجسٹریشن فارم کہاں سے حاصل کیا جا سکتا ہے؟

جواب: این ٹی ایس (NTS) رجسٹریشن فارم' بنک ڈیپازٹ سلپ اور فارم ارسال کرنے کا لفافہ **ڈوگر پبلشرز** (17 اُردو بازار' لاہور) **ڈوگرز یونیک** بکس کی علاقائی دکانوں کے علاوہ ہماری متعلقہ کتاب کے ساتھ بلا معاوضہ حاصل کیے جا سکتے ہیں۔ اس کے علاوہ رجسٹریشن فارم اور بنک ڈیپازٹ سلپ این ٹی ایس (NTS) کی ویب سائٹ www.nts.org.pk سے ڈاؤن لوڈ کیے جا سکتے ہیں یا اخبارات میں دیئے گئے نمونے کے مطابق فارم از خود بھی بنائے جا سکتے ہیں۔ NTS کی یوزر گائیڈ کے ساتھ بھی رجسٹریشن فارم وغیرہ منسلک ہیں۔

سوال 10: NAT کی رجسٹریشن فیس کتنی ہے اور یہ کس بنک میں جمع کرائی جا سکتی ہے؟

جواب: NAT کی رجسٹریشن فیس مبلغ /300 روپے ہے' جو پاکستان کے کسی بھی شہر میں موجود یونائیٹڈ بنک (UBL) یا الائیڈ بنک (ABL) یا حبیب بنک (HBL) کی آن لائن برانچ میں (آن لائن ڈیپازٹ سلپ پر) ادا کی جا سکتی ہے۔

سوال 11: رجسٹریشن فارم کیسے پر کیا جا سکتا ہے اور اس کے ساتھ کون سی چیزوں کا ارسال کیا جانا ضروری ہے؟

جواب: رجسٹریشن فارم کو صحیح طریقے سے پر کرنے کیلئے اس کتاب میں دی گئی متعلقہ ہدایات اور پر شدہ فارم کا تفصیلی مطالعہ کریں۔ رجسٹریشن فارم کے ساتھ 1½ × 1 انچ کی دو عدد تصاویر' اصلی بنک ڈیپازٹ سلپ کے رسید فارم کے ساتھ منسلک کریں۔

سوال 12: رجسٹریشن فارم کہاں اور کیسے جمع کرایا جا سکتا ہے؟

جواب: ہر لحاظ سے مکمل رجسٹریشن فارم کسی بھی کوریئر سروس یا ڈاکخانے کے ذریعے NTS کے دفتر کو بھجوایا جا سکتا ہے۔ اگر NTS کا لفافہ استعمال کریں تو اس پر ٹکٹ لگانے کی ضرورت نہیں ہے۔

سوال 13: کیا NTS میری رجسٹریشن ہونے پر مجھے آگاہ کرے گا؟

جواب: جی ہاں' NTS رجسٹریشن فارم وصول کرنے اور اس کی پڑتال کرنے کے بعد رول نمبر سلپ/کال لیٹر جس میں آپ کا رول نمبر اور امتحانی مرکز کا پتہ تحریر ہوگا' آپ کے فراہم کردہ پتہ پر بذریعہ ڈاک ارسال کرے گا۔ اس کے علاوہ آپ NTS کی ویب سائٹ سے بھی رول نمبر سلپ کی کاپی حاصل کر سکتے ہیں۔

سوال 14: اگر مجھے وقت پر رول نمبر سلپ نہ ملے تو مجھے کیا کرنا چاہیے؟

جواب: امتحان/ٹیسٹ شروع ہونے سے ایک ہفتہ قبل آپ کو NTS کی جانب سے رول نمبر سلپ موصول ہو جائے گی۔ رول نمبر سلپ نہ ملنے کی صورت میں NTS کے دفتر سے رابطہ کریں۔

سوال 15: براہ مہربانی یہ بتائیں کہ ٹیسٹ میں امتحان کا دورانیہ کتنا ہوگا' یہ پرچہ کتنے سوالات پر مشتمل ہوگا اور نمبروں کی تقسیم کیا ہوگی؟

جواب: NTS کے ٹیسٹ میں تمام سوالات معروضی (MCQs) طرز کے ہوں گے اور تمام سوالات کا جواب دینا ضروری ہوگا:

NAT-I کے پرچوں کا دورانیہ 120 منٹ ہوگا اور اس میں 90 سوالات پوچھے جائیں گے اور ہر سوال کا ایک نمبر ہوگا۔

NAT-II کا دورانیہ بھی 120 منٹ ہوگا۔ لیکن اس میں 100 سوالات پوچھے جائیں گے اور ہر سوال کا ایک نمبر ہوگا۔

سوال 16: کیا NAT کے امتحان میں سوالات کے غلط جواب دینے پر نمبر کاٹے جائیں گے؟

جواب: NAT کے امتحان میں سوال کا غلط جواب دینے پر آپ کو اس سوال کے نمبر نہیں ملیں گے مگر غلطی کی صورت میں نمبر نہیں کاٹا جائے گا۔ گویا اس امتحان میں کوئی نیگیٹو مارکنگ نہیں ہوگی' اس لئے آپ تمام سوالات کا جواب ضرور دیں۔ اگر آپ کو کسی سوال کا جواب نہ آتا ہو تو اندازے سے جواب دے دیں۔ صحیح ہو جانے پر نمبر مل جائے گا۔ غلط ہو جانے پر کوئی نمبر نہیں کٹے گا۔

سوال 17: ایک طالب علم NAT کا امتحان زیادہ سے زیادہ کتنی مرتبہ دے سکتا ہے؟

جواب: NAT کا امتحان ایک تعلیمی سال میں چار مرتبہ منعقد ہوتا ہے۔ طالبعلم ایک تعلیمی سال میں منعقد ہونے والے چاروں امتحانات میں شرکت کر سکتا ہے۔ اس طرح دوسرے سال منعقد ہونے والے چاروں امتحانات میں بھی شرکت کر سکتا ہے۔

سوال 18: NAT کا امتحان پاس کر لینے کے بعد اس کا نتیجہ کتنے عرصہ تک کارآمد رہتا ہے؟

جواب: NAT کا امتحان پاس کر لینے کے بعد اس کا نتیجہ ایک سال تک کارآمد رہتا ہے۔ اس دوران آپ کہیں بھی داخلہ لینا چاہیں تو آپ کو دوبارہ NAT کا امتحان دینے کی ضرورت نہیں پڑے گی۔

سوال 19: ایک سے زیادہ بار NAT کا امتحان دینے کے لیے کیا مجھے دوبارہ رجسٹریشن کروانا ہوگی؟

جواب: جی ہاں' آپ جتنی مرتبہ NAT کے امتحان میں شرکت کرنا چاہیں' اتنی ہی مرتبہ آپ کو رجسٹریشن کروانا اور سارے عمل سے ازسرنو گزرنا ہوگا۔

سوال 20: کیا NAT کا امتحان پاس کر لینے پر میرا داخلہ یقینی طور پر ہو جائے گا؟

جواب: اس کا انحصار آپ کے میرٹ پر ہوگا۔ میرٹ بورڈ یا یونیورسٹی کے حاصل کردہ نمبروں اور NAT کے امتحان میں حاصل ہونے والے نمبروں کے تناسب سے بنے گا' اس لیے یہ ضروری نہیں کہ NAT کا امتحان پاس کر لینے پر آپ کو داخلہ مل جائے گا۔

سوال 21: NAT کا امتحان پاس کر لینے کے بعد اس کا رزلٹ کارڈ کسی یونیورسٹی میں داخلے کے لیے کس طرح استعمال ہوگا؟

جواب: جب آپ کسی بھی کالج یا یونیورسٹی میں داخلے کے لیے داخلہ فارم جمع کرائیں گے تو باقی کاغذات کے ساتھ NAT کے رزلٹ کارڈ کی کاپی بھی منسلک کریں۔ ہوسکتا ہے کہ کوئی کالج یا یونیورسٹی آپ سے NAT کا اصلی رزلٹ کارڈ بھی طلب کرے۔

سوال 22: NAT میں زیادہ سے زیادہ نمبر حاصل کرنے کے لیے مجھے کن کتب سے مدد لینی چاہیے؟

جواب: NTS نے NAT کے لیے جو یوزر گائیڈ شائع کی ہے' اس کی روشنی میں آپ اپنی تیاری کریں۔ اس میں دیئے گئے ماڈل پرچوں کو مدِنظر رکھیں لیکن اس کے ساتھ ساتھ آپ ٹیسٹ میں زیادہ سے زیادہ نمبر حاصل کرنے کے لیے نہ صرف اپنے متعلقہ مضامین کی درسی کتاب کا مطالعہ کریں بلکہ بازار میں اس موضوع پر دستیاب دیگر کتب کا بھی مطالعہ کریں۔

سوال 23: کیا NTS کوئی مخصوص کتاب پڑھنے کا پابند بناتا ہے؟

جواب: جی نہیں۔ NTS اس سلسلے میں کوئی پابندی نہیں لگاتا۔ آپ کو جہاں سے بھی اچھا مواد ملے' اس سے ضرور استفادہ کریں۔ اس سلسلے میں ہماری تحریر کردہ کتب آپ کے لیے انشاء اللہ مفید ثابت ہوں گی۔

سوال 24: امتحانی مرکز میں مجھے اپنے ہمراہ کیا چیزیں لے جانی چاہئیں؟

جواب: امتحانی مرکز میں آپ اپنے ہمراہ بال پوائنٹ پین (بلیو یا بلیک)' پنسل' ربڑ' پنسل تراش اور کلپ بورڈ کے علاوہ اپنی رول نمبر سلپ ضرور ساتھ لے جائیں' کیونکہ رول نمبر سلپ کے بغیر آپ کو امتحانی مرکز میں داخل ہونے کی اجازت نہیں ملے گی۔

سوال 25: NAT کا پرچہ کن حصوں پر مشتمل ہوگا اور ہر حصے میں کل کتنے سوالات پوچھے جائیں گے؟

جواب: NAT-I اور NAT-II کے پرچوں میں مندرجہ ذیل حصے لازمی طور پر شامل ہوں گے:

1.	English (Verbal)	20 Questions
2.	Analytical Reasoning	20 Questions
3.	Quantitative Reasoning	20 Questions

NAT-I میں پری انجینئرنگ' پری میڈیکل اور آرٹس کے پرچوں میں مضامین کی بنیاد پر 30 سوالات پوچھے جائیں گے۔

NAT-II میں مضامین کی بنیاد پر 40 سوالات پوچھے جائیں گے۔

(مندرجہ بالا سوالات کے علاوہ آپ کے ذہن میں کوئی سوال اُبھرے تو ہمارے ادارے سے ڈاک یا فون کے ذریعے رابطہ کریں۔ ہمارا ادارہ آپ کی خدمت کے لیے ہمہ وقت آمادہ ہے)

NATIONAL APTITUDE TEST (NAT)

Instructions for NAT (ہدایات):

Please follow these instructions carefully:

مندرجہ ذیل ہدایات کو غور سے پڑھیں:

Attendance (حاضری):

☆ There is reporting time at test centre specified on the Roll Number Slip.

☆ رول نمبر سلپ پر ٹیسٹ سنٹر پہنچنے کا وقت دیا گیا ہے۔

☆ No candidate will be admitted in the test centre after specified time.

☆ مقررہ وقت کے بعد کسی اُمیدوار کو ٹیسٹ سنٹر میں داخل نہیں ہونے دیا جائے گا۔

☆ Candidates will have to produce their Roll Number Slips at the entry point of the test centre.

☆ اُمیدواروں کو اپنی رول نمبر سلپس ٹیسٹ سنٹر میں داخلے کے مقام پر پیش کرنا ہوں گی۔

☆ No candidate will be entertained for the test without the Roll Number Slip.

☆ رول نمبر سلپ کے بغیر کسی اُمیدوار کو ٹیسٹ سنٹر میں داخل نہیں ہونے دیا جائے گا۔

Composition of Test (ٹیسٹ کا طریقہ کار):

Different type of tests will have different compositions and defined accordingly for each test type.

مختلف امتحانات کے لیے مختلف طریقہ کار ہوں گے اور ہر امتحان کا طریقہ کار بتایا جائے گا۔

☆ Question booklets will be in five different colours and shuffles.

☆ جوابی کاپیاں پانچ مختلف رنگوں اور بغیر ترتیب کے ہوں گی۔

☆ The candidate will open the each sealed question booklet at the start of test.

☆ اُمیدوار ٹیسٹ کے آغاز پر ہر مہر شدہ جوابی کاپی کو کھولے گا۔

☆ Do not break the seal till the test starts.

☆ جب تک ٹیسٹ کا آغاز نہ ہو مہر نہ توڑیں۔

☆ No candidate will be allowed to leave the seat during the test except for an un-avoidable reason, *e.g.*, toilet usage, that to in the escort of an invigilator.

☆ دوران ٹیسٹ کسی اُمیدوار کو اشد ضرورت کے بغیر نشست چھوڑنے کی اجازت نہیں دی جائے گی۔ مثال کے طور پر رفع حاجت کے لیے جاتے ہوئے اُمیدوار کے ساتھ ایک نگران جائے گا۔

☆ All papers will be collected at the end of test and no candidate will be allowed to move from the seat till the final count after the collection of the paper.

☆ ٹیسٹ کے اختتام پر تمام پیپرز اکٹھے کر لیے جائیں گے اور کسی اُمیدوار کو پیپرز اکٹھے کرنے کے بعد حتمی گنتی ہونے تک جانے کی اجازت نہیں دی جائے گی۔

☆ Don't bring calculators, mobile phones and wrist-watches with calculator in the test centre.

☆ ٹیسٹ سنٹر میں کیلکولیٹرز، موبائل فونز اور کیلکولیٹر والی کلائی گھڑی لے جانے کی اجازت نہ ہوگی۔

About Shading/Filling the Circles:

☆ Shading/filling of two answers against single question is wrong, it will be marked ZERO.

☆ ایک سوال کے دو جوابات پُر کرنا غلط ہے۔ اس کا نمبر صفر ہوگا۔

☆ Over-writing and cutting near answer circle or anywhere on answer sheet will distract the readability and may be marked ZERO in the specific answer circle.

☆ کاٹ کر دوبارہ لکھی گئی تحریر یا جواب کے لیے دیئے گئے گول دائرے کے قریب یا جوابی کاپی میں کسی بھی جگہ اوور رائٹنگ کمپیوٹر میں جوابی کاپی پڑھنے میں رکاوٹ بنے گی اور ایسے جوابی دائرے کا زیرو (0) نمبر ملے گا۔

☆ Use only blue or black ball pen to shade/fill the circles.

☆ دائرے پُر کرنے کے لیے صرف نیلا یا سیاہ بال پین استعمال کریں۔

☆ Don't bring any other stationary item including rough/extra sheets as two blank sheets for rough work are placed inside the question booklet.

☆ اپنے ساتھ ضمنی/اضافی کام کے لیے صفحات سمیت کوئی سٹیشنری سامان نہ لائیں کیونکہ امتحانی کاپی کے ساتھ اس مقصد کے لیے 2 خالی صفحات لگا دیئے گئے ہیں۔

☆ Use of any other material that is not provided by NTS will be illegal and subject to disciplinary action.

☆ NTS کے مہیا کردہ سامان کے سوا استعمال غیر قانونی ہوگا اور انضباطی کارروائی کا سامنا کرنا ہوگا۔

☆ Don't write anything on question booklet except your name, roll no. and sign on the front title of question booklet before attempting the questions.

☆ پیپر حل کرنے سے پہلے جوابی کاپی کے پہلے صفحے کے علاوہ کسی جگہ پر اپنے نام، رول نمبر اور دستخط کے سوا کچھ نہ لکھیں۔

☆ The question booklet will be taken back after the test is over, so don't attempt to tear or remove any page from question booklet. No one is allowed to keep any part of it.

☆ ٹیسٹ کے اختتام پر امتحانی کاپی واپس لے لی جائے گی لہٰذا امتحانی کاپی سے کوئی صفحہ الگ کریں نہ پھاڑیں۔ کسی کو بھی ایسا کرنے کی اجازت نہ ہوگی۔

☆ Do not ask the invigilation staff about the content of questions. They are not allowed to explain or correct any question in the paper. The checking system has the capability to determine the erroneous questions and adjust accordingly.

☆ نگران عملے سے سوالات کے مواد کے بارے میں کوئی سوال نہ کریں۔ وہ پیپر کے کسی سوال کی وضاحت یا تصحیح کرنے کے مجاز نہیں ہیں۔ غلط سوالات کو پرکھنے اور انہیں ٹھیک کرنے کی ذمہ داری چیکنگ سسٹم کے پاس ہے۔

☆ Every candidate is required to sign the attendance sheet, brought to her/him by the invigilators. The Roll Number slips will also be collected by the same staff after the attendance is completed.

☆ نگران عملہ کی طرف سے لائی گئی حاضری کاپی پر اُمیدوار کو دستخط کرنا ہوتے ہیں۔ حاضری مکمل ہونے کے بعد یہی نگران عملہ رول نمبر سلپس اکٹھی کرتا ہے۔

☆ You are bound to NTS discipline rules till you leave the test center premises.

☆ ٹیسٹ سنٹر احاطے میں موجودگی تک آپ NTS کے اصول وضوابط کے پابند ہوں گے۔

☆ Any disturbance in anyway caused by you will disqualify you from the test and NTS reserves the rights to carry out legal action against such attempt.

☆ کسی بھی وجہ سے ڈالی جانے والی خلل اندازی سے آپ ٹیسٹ سے نہ صرف نااہل قرار پائیں گے بلکہ NTS ایسی کسی بھی حرکت کے خلاف قانونی کارروائی کا حق محفوظ رکھتی ہے۔

How to Fill the Answer Sheet (جوابی کاپی کو پُر کرنے کا طریقہ):

One page printed Answer Sheet is provided to answer the questions. Use only ball pen (Black/Blue) to shade/fill the circles. (Bring pen/clip board with you, erasing materials are not allowed).

سوالات کے جوابات کے لیے ایک صفحے کی چھاپہ شدہ جوابی کاپی مہیا کی جاتی ہے۔ صرف سیاہ یا نیلا پین ہی جوابات کے دائروں کو پُر کرنے کے لیے استعمال کریں (اپنے ساتھ پین/کلپ بورڈ لے کر آئیں، مٹانے والی کوئی شے لانے کی اجازت نہیں ہے)۔

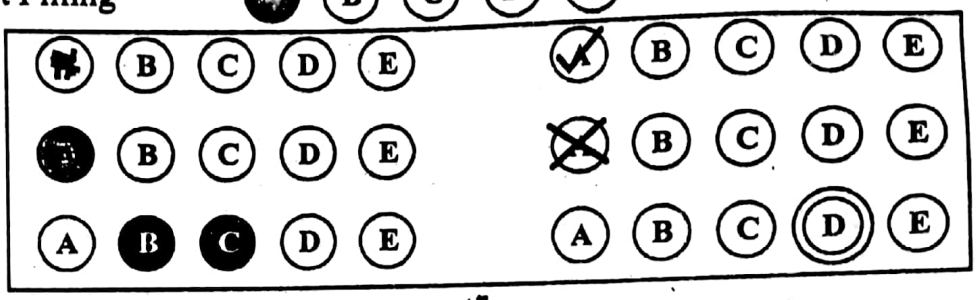
How to fill an answer?

Answer sheet contains five circles containing five options A to E inside, against each question number. The candidate has to completely shade/fill one circle that s/he thinks is correct. For example, the candidate feels that the given answer is 'A', then she may shade/fill the circle containing alphabet 'A' with ball point/pen like this.

جواب پُر کرنے کا طریقہ:

جوابی کاپی پر ہر سوال نمبر کے سامنے A سے E تک پانچ انتخابی نشانات دیئے گئے ہوتے ہیں۔ اُمیدوار کو ان میں سے درست انتخاب کو مکمل پُر کرنا ہوتا ہے۔ مثال کے طور پر اُمیدوار کے خیال میں اگر ایک سوال کا جواب 'A' ہے تو وہ اس طریقے سے بال پوائنٹ پین سے 'A' کو پُر کرے گا:

Correct Filling — پُر کرنے کا درست طریقہ



Incorrect Filling — پُر کرنے کا غلط طریقہ

Personal Data on Answer Sheet (جوابی کاپی پر ذاتی کوائف):

The answer sheet contains personal data of candidate on the top of the sheet. It has Candidate's Name, Father's Name, Roll No. and Photograph. The candidate is required to critically check these fields and sign in the required space. If any field of personal information is found incorrect, the candidate must inform the invigilator present around.

جوابی کاپی کے اوپری حصہ پر اُمیدوار کے کوائف لکھے جاتے ہیں، جس میں اُمیدوار کا نام، باپ کا نام، رول نمبر اور تصویر ہوتی ہے۔ اُمیدوار کو یہ حصہ بغور دیکھنا اور مقررہ مقام پر اپنے دستخط کرنے چاہئیں۔ اگر اُمیدوار کے ذاتی کوائف میں سے کوئی معلومات غلط ہو تو اُمیدوار کو فوراً نگران کو مطلع کرنا چاہیے۔

☆☆☆☆☆☆☆

Desired Test City (Two Digit City Code)

مجوزہ امتحانی شہر (دو ہندسوں والا شہر کا کوڈ)

City	شہر	Code	City	شہر	Code
Abbottabad	ایبٹ آباد	97	Attock	اٹک	14
Bahawalnagar	بہاولنگر	63	Bahawalpur	بہاولپور	62
Bannu	بنوں	98	Bhakkar	بھکر	53
Chakwal	چکوال	13	Dera Ghazi Khan	ڈیرہ غازی خان	71
Dera Ismail Khan	ڈیرہ اسماعیل خان	99	Faisalabad	فیصل آباد	43
Gujranwala	گوجرانوالہ	81	Gujrat	گجرات	85
Hafizabad	حافظ آباد	84	Islamabad	اسلام آباد	91
Jhang	جھنگ	41	Jhelum	جہلم	12
Karachi	کراچی	92	Kasur	قصور	25

Khanewal	خانیوال	32	Khushab	خوشاب	55
Lahore	لاہور	21	Layyah	لیہ	36
Lodhran	لودھراں	34	Mandi Bahauddin	منڈی بہاؤالدین	54
Mianwali	میانوالی	52	Mirpur (AJK)	میرپور	96
Multan	ملتان	31	Muzaffarabad	مظفرآباد	95
Muzaffargarh	مظفرگڑھ	37	Nankana Sahib	ننکانہ صاحب	23
Narowal	نارووال	83	Okara	اوکاڑہ	24
Pakpattan	پاکپتن	33	Peshawar	پشاور	93
Quetta	کوئٹہ	94	Rahim Yar Khan	رحیم یارخان	61
Rajanpur	راجن پور	72	Rawalpindi	راولپنڈی	11
Sahiwal	ساہیوال	35	Sargodha	سرگودھا	51
Sheikhupura	شیخوپورہ	22	Sialkot	سیالکوٹ	82
Toba Tek Singh	ٹوبہ ٹیک سنگھ	42	Vehari	وہاڑی	38

ON TEST DAY (ٹیسٹ والے دن)

ATTENDANCE (حاضری):

☆ **Reporting Time at test centre: 8:30 A.M. (for morning tests)**

☆ سنٹر پہنچنے کا وقت: 8:30 بجے (صبح کے ٹیسٹ کیلئے)

☆ **Reporting Time at test centre: 2:00 P.M. (for evening tests)**

☆ سنٹر پہنچنے کا وقت: 2:00 بجے (شام کے ٹیسٹ کیلئے)

☆ NO candidate will be admitted in the test centre after **8:45 A.M. (for morning tests)**

☆ کسی اُمیدوار کو 8:45 کے بعد ٹیسٹ سنٹر میں داخل نہیں ہونے دیا جائے گا (صبح کے ٹیسٹ کیلئے)

☆ NO candidate will be admitted in the test centre after **2:15 P.M. (for evening tests)**

☆ کسی اُمیدوار کو 2:15 کے بعد ٹیسٹ سنٹر میں داخل نہیں ہونے دیا جائے گا (شام کے ٹیسٹ کیلئے)

☆ Candidates will have to produce their Roll Number Slips at the test centre.

☆ اُمیدواروں کو ٹیسٹ سنٹر میں اپنی رول نمبر سلپس پیش کرنا ہوں گی۔

☆ Without the Roll Number Slip, no candidate will be allowed to sit in the test.

☆ رول نمبر سلپ کے بغیر کسی اُمیدوار کو ٹیسٹ میں بیٹھنے کی اجازت نہ ہوگی۔

PROCEDURE OF TEST (ٹیسٹ کا طریقہ کار):

☆ NAT will contain Multiple Choice Questions (MCQs)

☆ NAT کثیر الانتخابی سوالات پر مشتمل ہوگا۔

☆ Time Allowed for NAT is 120 Minutes.

☆ NAT ٹیسٹ کیلئے مختص وقت 120 منٹ (2 گھنٹے) ہوگا۔

☆ NO extra time will be allowed.

☆ کوئی اضافی وقت نہیں دیا جائے گا۔

☆ There is NO Negative Marking.

☆ نیگیٹو مارکنگ نہیں ہوگی۔

SAMPLE ANSWER SHEET

Color of your Question Book (fill only one circle)				
Yellow	Green	White	Blue	Pink
○	○	○	○	○

Roll No._____

Name:_____ **Father Name:**_____

NTS Signatory:_____

Candidate's Signature:_____

Question Book No._____

Do not write or mark anything in this box

Fill the appropriate circle completely LIKE THIS ● Improper filled circles will be marked incorrect by the machine

1.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	31.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	61.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
2.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	32.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	62.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
3.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	33.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	63.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
4.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	34.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	64.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
5.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	35.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	65.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
6.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	36.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	66.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
7.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	37.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	67.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
8.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	38.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	68.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
9.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	39.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	69.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
10.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	40.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	70.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
11.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	41.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	71.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
12.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	42.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	72.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
13.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	43.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	73.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
14.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	44.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	74.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
15.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	45.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	75.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
16.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	46.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	76.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
17.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	47.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	77.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
18.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	48.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	78.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
19.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	49.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	79.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
20.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	50.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	80.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
21.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	51.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	81.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
22.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	52.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	82.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
23.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	53.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	83.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
24.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	54.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	84.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
25.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	55.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	85.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
26.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	56.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	86.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
27.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	57.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	87.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
28.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	58.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	88.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
29.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	59.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	89.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
30.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	60.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	90.	Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

ہدایات: اُمیدوار مقررہ مقامات پر اپنا رول نمبر، نام، باپ کا نام غور سے دیکھے۔ اگر کسی قسم کی غلطی پائی جائے تو اُمیدوار فوراً نگران عملے کو اس ... آگاہ کرے۔

SAMPLE PAPER

National Aptitude Test (NAT)

Test Type: NAT-IE (Pre-Engineering / Computer Sciences Group)
Having 12 years (Intermediate or Equivalent Education)

Questions: 90

Time: 2 Hrs.

Instructions: Please read the following instructions carefully before attempting the paper.

i. 90 MCQs are given on various topics, which carry equal marks. Each correct answer carries 1 mark. Attempt all the questions.
ii. In every question, four / five options are given (A, B, C, D, E), you have to select only one correct option.
iii. Mark your choice by filling in the appropriate circle against each question.
iv. Use ball point pen (black or blue) to shade / blacken the corresponding circle in the answer sheet.
v. The candidates should carefully think about their answer before filling the circles on the answer sheet.
vi. Erasing, cutting or overwriting is not allowed. Once an answer has been given on the answer sheet, the candidate will not be permitted to change any of his/her answer in any way. All such answers will be treated as wrong.
vii. The candidate should not write any thing regarding answers on the question paper. All answers must be given on the answer sheet only.

Verbal Section	No. of Questions: 20

Complete the following sentences by selecting the most appropriate word from the given lettered choices (A, B, C, D) below each question.

1. ***The driver suddenly applied the brakes when he saw a _____ truck ahead of him.***
   (A) Stationary (B) Moving
   (C) Static (D) Immobile

2. ***Salma is much too _____ to have anything to do with that obnoxious affair.***
   (A) Noble (B) Proud
   (C) Happy (D) Difficult

3. ***Nearly everybody has trouble _____ at one time or another.***
   (A) Sleep (B) In sleeping
   (C) During sleeping (D) Sleeping

4. ***Their conversation was unsettling, for the gravity of their topic contrasted so oddly with the _____ of their tone.***
   (A) Uniqueness (B) Rapidity
   (C) Lightness (D) Precision

5. ***_____ crude hydrocarbons into such products as gasoline and petrochemicals is at the heart of the petroleum industry.***
   (A) Refined (B) Refining
   (C) For refining (D) Refine

In the following questions, select the pair of words given against (A, B, C, D) which has the same relation as between the first two original lettered words.

6. ***CORPULENCE: STOUT::***
   (A) Boldness: Hirsute (B) Erudition: Learned
   (C) Gauntness: Beautiful (D) Competence: Strict

7. ***INDIGENT: WEALTH::***
   (A) Emaciated: Nourishment (B) Aristocratic: Stature
   (C) Variegated: Variety (D) Contended: Happiness

8. ***RUN: RACE::***
   (A) Walk: Pogo stick (B) Swim: Boat
   (C) Fly: Kite (D) Sink: Bottle

9. ***SNAKE: FANG::***
   (A) Teacher: College (B) Stag: Horns
   (C) Vampire: Teeth (D) Lion: Den

10. ***MIGHT: RIGHT::***
   (A) Form: Formal (B) Serve: Wait
   (C) Abuse: Deny (D) Shyness: Boldness

Select the lettered choice (A, B, C, D) that is most nearly opposite in meaning to the word in capital letters.

11. ***AXIOM:***
    (A) Maxim (B) Angle
    (C) Absurdity (D) Height
12. ***URBAN:***
    (A) Rural (B) Sophisticated
    (C) Polished (D) Pure
13. ***EXCLUDE:***
    (A) Refined (B) Include
    (C) Parallel (D) Pastoral
14. ***PARTICULAR:***
    (A) Formal (B) Specific
    (C) Connected (D) General
15. ***COAGULATE:***
    (A) Culmination (B) Amity
    (C) Dissipate (D) Sloppy

Read the following passage carefully and answer the questions given at its end:

Something is radically wrong with the entire structure of human relationship that makes man delight in killing man, whether it be in the name of civilization or religion or anything else. Two wrongs do not make a right, hatred must beget hatred. It is this fundamental truth that women have got to bring home to the people in their respective countries. No peace treaties can avail that have revenge as their basis and self-righteous arrogance and hypocrisy in the so-called victors. But women are the natural preservers of life.

16. ***Which of the following expresses most accurately the idea contained in the opening sentence of the passage?***
    (A) Man destroying another man is a painful practice.
    (B) A social structure that permits people to kill each other for religion is inherently rotten.
    (C) It is strange that one religion encourages its followers to kill the followers of another religion.
    (D) It is wrong on man's part to derive pleasure out of killing others for any motive whatsoever.
17. ***The expression "Two wrongs do not make a right" means that:***
    (A) A wrong action in retaliation does not mend matters.
    (B) Hatred destroys the person who perpetrates it.
    (C) A tit for tat policy aggravates hatred.
    (D) Even repeated assertions of a wrong statement do not make it right.
18. ***Which of the following statements is not implied in the passage?***
    (A) It is human tendency to kill others professing different religion.
    (B) It is the duty of women to foster peace and harmony amongst their countrymen.
    (C) Peace treaties among nations tend to establish peace in the world.
    (D) If you hate someone, he is bound to respond with the same feeling.
19. ***Which word is opposite in meaning to 'preserver' as used in the passage?***
    (A) Enemy (B) Destroyer
    (C) Rival (D) Belligerent
20. ***Which of the following would sum up most suitably the central idea of the passage?***
    (A) The role of women in the world of hatred and violence
    (B) Man's instinct of destroying others
    (C) Hatred leads to further hatred
    (D) The significance of peace treaties

Analytical Section | Total Questions: 20

Questions 21 to 24:

At All-Pakistan Weightlifting Championship, seven college athletes..... *M, N, O, P, Q, R* and *S*.... are being weighted. In order to make categories, the coach has given the following information:

(i) Each athlete has not exactly the same weight as another athlete.

(ii) R is heavier than *S*, but lighter than *O*.
(iii) P is heavier than *S*.
(iv) Both *M* and *N* are heavier than *O*.

21. ***Which of the following could not be true?***
(A) *M* is the heaviest.
(B) *N* is the heaviest.
(C) *P* is the heaviest.
(D) More than three athletes are heavier than *R*.
(E) More than three athletes are lighter than *R*.

22. ***Which of the following, if true, would be sufficient to determine the lightest athlete?***
(A) *P* is the heaviest.
(B) *P* is lighter than *R*.
(C) *R* is heavier than *Q*.
(D) *Q* is heavier than *R*.
(E) Five candidates are lighter than *M*.

23. ***If Q is heavier than M, how many different ranking by weight, of the athletes are possible?***
(A) 1
(B) 2
(C) 3
(D) 5
(E) 7

24. ***If O is heavier than P, which of the following cannot be true?***
(A) *P's* weight is equal to the average of *R's* weight and *S's* weight.
(B) *Q's* weight is equal to the average of *R's* weight and *S's* weight.
(C) *P's* weight is equal to the average of *M's* weight and *N's* weight.
(D) *Q* is the second lightest.

Questions 25 to 28:
Three women — *X*, *Y*, and *Z* are travelling in a van with five children — *A*, *B*, *C*, *D* and *E*. The van has a driver's seat and one passenger seat in the front, and two benches behind the front seats, one bench behind the first. Each bench has room for exactly three people. Everyone must sit in a seat or on a bench and seating is subject to the following restrictions: A woman must sit on each bench. Either *X* or *Y* must sit in the driver's seat. *C* must sit immediately beside *E*.

25. **Which of the following can sit in the front passenger seat?**
(A) *C*
(B) *D*
(C) *X*
(D) *Y*
(E) *Z*

26. **Which of the following groups of three can sit together on a bench?**
(A) *A*, *C* and *E*
(B) *A*, *C* and *Z*
(C) *A*, *Y* and *Z*
(D) *B*, *D* and *Y*
(E) *D*, *E* and *X*

27. **If *A* sits immediately beside Z, which of the following CANNOT be true?**
(A) *C* sits immediately beside *Y*.
(B) *D* sits immediately beside *Z*.
(C) *B* sits in the front passenger seat.
(D) *A* sits on the same bench as *B*.
(E) *B* sits on the same bench as *X*.

28. **If *Y* sits on a bench that is behind where *C* is sitting, which of the following must be true?**
(A) *B* sits in a seat or on a bench that is in front of where *E* is sitting.
(B) *D* sits in a seat or on a bench that is in front of where A is sitting.
(C) *A* sits on the same bench as *B*.
(D) *D* sits on the same bench as *Y*.
(E) *E* sits on the same bench as *Z*.

Two statements, labeled *X* and *Y*, follow each of the following questions. The statements contain certain information. In the questions you do not actually have to compute an answer, rather you have to decide whether the information given in the statements *X* and *Y* is sufficient to find a correct answer by using basic mathematics and everyday facts.

29. **How much time will computer need to solve 150 problems?**
X. **The computer needs 50 seconds to solve one problem.**
Y. **Computer never takes more than 60 seconds to solve a problem.**
(A) Statement *X*. Alone is sufficient but *Y*. Alone is not sufficient to answer this question.
(B) Statement *Y*. Alone is sufficient but *X*. Alone is not sufficient to answer this question.
(C) Statements *X* and *Y*. TOGETHER are sufficient to answer the question but NEITHER of them is sufficient ALONE.

(D) Statements *X* and *Y*. COMBINED are NOT sufficient to answer the question and additional information is needed to find the correct answer.

30. A horse ran 80 miles without stopping. What was its average speed in miles per hour?

X. **The journey started at 6 PM and ended at 2 AM the following day.**

Y. **The horse ran 20 miles per hour for the first 40 miles.**

(A) Statement *X*. ALONE is sufficient but *Y*. ALONE is not sufficient to answer this question.

(B) Statement *Y*. ALONE is sufficient but *X*. ALONE is not sufficient to answer this question.

(C) Statements *X* and *Y*. TOGETHER are sufficient to answer the question but NEITHER of them is sufficient ALONE.

(D) Statements *X* and *Y*. COMBINED are NOT sufficient to answer the question and additional information is needed to find the correct answer.

Questions 31 to 35: A project to consolidate the programme of a large university and a small college is setup. It is agreed that the representatives work in small committees of three, with two representatives of the large university. It was also agreed that no committee be represented by faculty members of the same subject area. The large university was represented by the following professors: J, who teaches English Literature, K, who is chairman of the Mathematics Department, and L, who is in the Department of Natural Sciences. The small college appointed the following: M, who teaches Mathematics, N, who is a Arabic teacher, and O and P, who teach English Literature.

31. ***Which of the following must be true?***

I. ***If J serves on a committee, P must be assigned to that committee.***

II. ***If J cannot serve on a committee, then M cannot be assigned to that committee.***

III. ***If J cannot serve on a committee, then L must be serve on that committee.***

(A) I only (B) II only
(C) III only (D) I and II only
(E) II and III only

32. ***Which of the following represents a committee properly composed?***

(A) K, L, N (B) K, L, M
(C) J, K, L (D) J, O, N
(E) J, K, M

33. ***Which of the following may serve with P?***

(A) K and M (B) K and L
(C) K and O (D) J and K
(E) M and N

34. ***If L is not available for service, which of the following must be on the committee?***

(A) M and J (B) O and J
(C) N and J (D) N and O
(E) P and J

35. ***Which of the following must be true?***

I. ***N and O are always on the same committee.***

II. ***M and O never serve on the same committee.***

III. ***When M serves, L must serve.***

(A) I only (B) II only
(C) I and II only (D) III only
(E) II and III only

Questions 36 to 40: The letters A, B, C, D, E, F, and G not necessarily in that order, stand for seven consecutive integers from 1 to 10.

D is 3 less than A.
F is as much less than B as C is greater than D.
B is the middle term.
G is greater than F.

36. ***The fifth integer is:***

(A) A (B) C
(C) D (D) E
(E) F

37. ***A is as much greater than F as which integer is less than G?***

(A) A (B) B
(C) C (D) D
(E) E

38. *If A = 7, the sum of E and G is:*
(A) 8 (B) 10
(C) 12 (D) 14
(E) 16

39. *An integer T is as much greater than C as C is greater than E. T can be written as A + E. What is D?*
(A) 2 (B) 3
(C) 4 (D) 5
(E) Cannot be determined

40. *The greatest possible value of C is how much greater than the smallest possible value of D?*
(A) 2 (B) 3
(C) 4 (D) 5
(E) 6

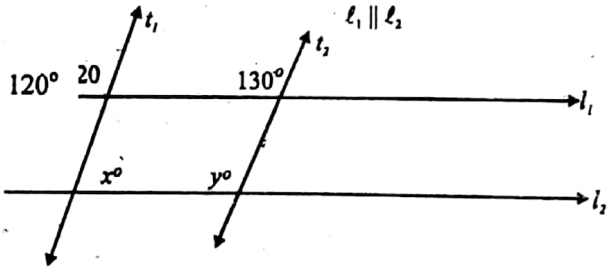
Quantitative Section | No. of Questions: 20

41. *If $5x + 3 = 3x + 5$, then $x = ?$*
(A) 1 (B) 2
(C) $\frac{1}{2}$ (D) $\frac{1}{3}$

42. *If $(a - b)^2 = a^2 - b^2$ and $a \neq b$, then which of the following is true?*
I $a = 0$
II $b = 0$
III $a = -b$
(A) I only (B) II only
(C) I and II only (D) I and III only

43. *If $3x - 5 = 3 + 2x$, what is the value of x?*
(A) 12 (B) 10
(C) 8 (D) 6

44. *In the following figure*



$x + y =$
(A) 230 (B) 210
(C) 110 (D) 190

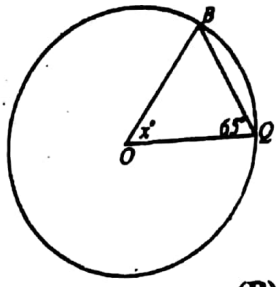
45. *What is the circumference of a circle whose diameter is 7 inches?*
(A) 44 inches (B) 32 inches
(C) 28 inches (D) 22 inches

46. *Find the sum if –4 is added to –4.*
(A) +8 (B) –8
(C) –16 (D) +16

47. *If $2^a = x$ and $2^b = y$, then $xy =$*
(A) 9^{a+b} (B) 2^{ab}
(C) 4^{a+b} (D) 2^{a+b}

48. *Evaluate $3a^2 - 2b$, if $a = -3$, $b = -1$.*
(A) 15 (B) 25
(C) 18 (D) 29

49. *In the following figure, O is the center of the circle. What is the value of x?*



(A) 65° (B) 50°
(C) 45° (D) 35°

50. *Which of the following is closest to the value of* $\frac{3654 \times 248}{1756}$?

(A) 500 (B) 50
(C) 150 (D) 5

51. *If the average (arithmetic mean) of three consecutive integers is M, then which of the following must be true?*

I *Any one of the three numbers is M*
II *The average of two of the three numbers is M.*
III *M is also an integer*

(A) I only (B) II only
(C) III only (D) I, II and *X*

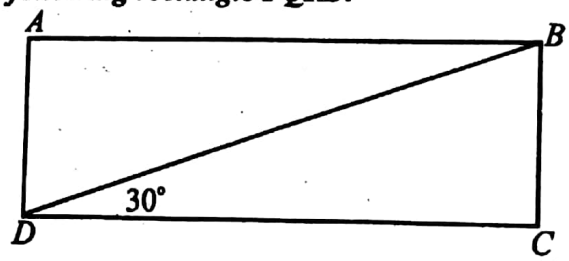
52. *If* $a^2 = 17$, *then* $(a + 1)(a - 1) = ?$

(A) 15 (B) 12
(C) $\sqrt{18}$ (D) 16

53. $(2.3 \times 10^3) + (2.3 \times 10^2) + (2.3 \times 10) = ?$

(A) 2,553 (B) 255.3
(C) 255 (D) 25.53

54. *What is the area of the following rectangle PQRS?*

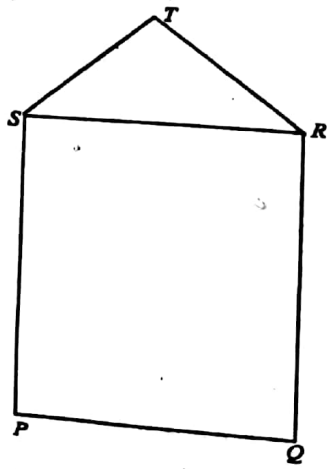


(A) $25\sqrt{3}$ (B) $16\sqrt{3}$
(C) $12\sqrt{3}$ (D) 64

55. *A plane travelling 600 miles per hour is 30 miles from an airport at 4:58 p.m. At what time will it arrive at the airport?*

(A) 5:05 p.m. (B) 5:03 p.m.
(C) 5:02 p.m. (D) 5:01 p.m.

56. *In the following figure, the area of the isosceles triangle RST is 8 and the area of the square PQRS is 64. What is the distance from P to T?*



(A) 64 (B) 5
(C) 41 (D) $2\sqrt{29}$

57. *Aslam's weekly salary increased from Rs. 175 to Rs. 201.25. Find the percent of increase.*
(A) 5% (B) 10%
(C) 15% (D) 25%

58. *If S_1 is the sum of integers from 1 to 60 and S_2 is the sum of the integers from 61 to 100, what is the value of $S_2 - S_1$?*
(A) 2500 (B) 2100
(C) 1800 (D) 1390

59. *If p, q and r are different prime numbers less than 15, what is the greatest possible value of $\frac{p+q}{r}$?*
(A) 9 (B) 2
(C) 13 (D) 12

60. *The single discount equivalent to two successive discounts of 10% and 15% is:*
(A) 20% (B) 23.5%
(C) 24% (D) 25%

Subject Section	No. of Questions: 30

CHEMISTRY

61. *Which of the following will raise the boiling point of a sample of water?*
(A) Heat the water (B) Mix gasoline into the water
(C) Bring the water sample to a higher altitude (D) Place the water sample on a magnetic stirrer
(E) Dissolve table sugar into the water

62. *An atom of an element contains 20 protons, 20 neutrons, and 20 electrons. Name the element:*
(A) Halogen (B) Alkali metal (C) Nobel gas (D) Alkaline earth metal

63. *A compound with a molecular weight of 56 amu has an empirical formula of CH_2. What is its molecular formula?*
(A) C_2H_2 (B) C_2H_4
(C) C_4H_8 (D) C_4H_{10}
(E) C_6H_{12}

64. *Which of the following is a ketone?*
(A) Acetone (B) Formaldehyde
(C) Formic acid (D) Propanol

65. *At STP, which element has definite shape and volume?*
(A) Hg (B) Ag (C) Xe (D) Ne

66. *At standard pressure, the steam water equilibrium temperature occurs at _____ K.*
(A) 100 (B) 273 (C) 373 (D) 473

67. *Bleaching powder is a mixture of:*
(A) $CaCl_2$ and $CaOCl_2$ (B) $CaOCl_2$ and $Ca(OCl)_2$
(C) $CaCl_2$ and $Ca(OCl)_2$ (D) None of the above

68. *Name the elements which contain atoms that form coloured ions and have more than one positive oxidation state:*
(A) Alkaline metals (B) Transition elements (C) Alkali metals (D) Nobel gases

69. ***Which of the following is closest in mass to a proton?***
(A) Alpha particle (B) Positron
(C) Neutron (D) Electron
(E) Hydrogen Molecule

70. ***As sodium phosphate dissolves in 100 milliliters of pure water, the pH of the resulting solution:***
(A) Increases (B) Decreases (C) Remains same (D) Cannot be determined

PHYSICS

71. ***A 40 Newton object is lifted 10 meters above the ground and then released. After object has fallen 4 meters and is 6 meters above the ground, its Kinetic Energy will be, in joules:***
(A) 5 (B) 160
(C) 240 (D) 400
(E) 5,120

72. ***In an experiment, an object was placed on the principal axis of a convex lens 25 centimeters away from the lens. A real image 4 times the size of the object was obtained. The focal length of the lens is:***
(A) 20 cm (B) 25 cm
(C) 33 cm (D) 50 cm
(E) 100 cm

73. ***A rock is dropped from a high bridge. At the end of 3 seconds, what is the speed of the rock in centimeters per second?***
(A) 1,000 (B) 2,000 (C) 3,000 (D) 4,000

74. ***In electrostatics:***
(A) All of the Newton's laws are valid (B) Newton's first law may not be valid
(C) Newton's second law may not be valid in certain cases (D) Newton's third law may not be valid in certain cases

75. ***Salim walks 2 meters north, 4 meters west, and 2 meters south. What is his final displacement?***
(A) 4 m west (B) 2 m south (C) 4 m east (D) 2 m north

76. ***If the speed of an object is tripled, its kinetic energy is _____ times its original speed.***
(A) 3 (B) 6 (C) 9 (D) 12

77. ***For the Boyle's law to hold good, the necessary conditions is:***
(A) Isothermal (B) Adiabatic
(C) Isobaric (D) Isochoric

78. ***A temperature of 450 Kelvin is equivalent to a Celsius temperature of:***
(A) 120° (B) 177° (C) 273° (D) 477°

79. ***Compton effect proves the _____.***
(A) Photon theory of light (B) Dual nature of light
(C) Wave nature of light (D) Uncertain nature of light

80. ***The term _____ movement refers to irregular motions of small particles suspended in a fluid.***
(A) Stretching (B) Capillary (C) Elastic (D) Brownian

COMPUTER SCIENCE

81. ***A set of well defined rules for the solution of a problem in finite number of steps is called:***
(A) Algorithm (B) Program
(C) Executable (D) None of the above

82. ***Raw data is processed by the computer into:***
(A) Paragraphs (B) Number sheets (C) Information (D) Integers

83. ***The bit can have how many possible values:***
(A) 0 (B) 1
(C) 2 (D) 3

84. ***What is called the loading of operating system in a personal computer?***
(A) Paging (B) Interrupting (C) Filling (D) Booting

85. ***A device that enables computers to communicate with other computers via phone line is a:***
(A) Modem (B) Chip
(C) Disk (D) Floppy disk

MATH

86. ***If the vertex function f(x) is at (1, 1), where is the vertex of the function f(x – 2) + 1?***
(A) (2, 3) (B) (3, 2)
(C) (2, –1) (D) (–1, 0)
(E) (–1, 2)

87. $\lim_{x \to -3} \frac{x^2 - 9}{x + 3} = ?$
(A) –6 (B) 6 (C) 0
(D) 1 (E) –1

88. $\int \frac{1}{x} dx = ?$
(A) 0 (B) In x (C) x^0
(D) x^{-2} (E) x^2

89. ***If Rabia's average rose from 62 to 82, by what percent did her average increase?***
(A) 33.33% (B) 32.80%
(C) 33% (D) 35%
(E) 40%

90. ***If slopes of the two lines are equal, then lines must be:***
(A) Perpendicular (B) Intersecting (C) Parallel
(D) Not parallel (E) Intercepting

****

ANSWER KEY

Use only Ball Point Pen (Black/Blue) to shade / fill the circles. ●

1	**A**	B	C	D	E
2	**A**	B	C	D	E
3	**A**	B	C	D	E
4	A	B	**C**	D	E
5	A	B	C	**D**	E
6	A	**B**	C	D	E
7	**A**	B	C	D	E
8	A	B	**C**	D	E
9	A	B	**C**	D	E
10	A	**B**	C	D	E
11	A	B	**C**	D	E
12	**A**	B	C	D	E
13	A	**B**	C	D	E
14	A	B	C	**D**	E
15	A	B	**C**	D	E
16	A	B	C	**D**	E
17	**A**	B	C	D	E
18	A	B	C	**D**	E
19	A	**B**	C	D	E
20	**A**	B	C	D	E
21	A	B	C	D	**E**
22	A	B	C	**D**	E
23	A	B	**C**	D	E
24	**A**	B	C	D	E
25	A	**B**	C	D	E
26	A	B	C	**D**	E
27	A	B	C	D	**E**
28	A	B	C	D	**E**
29	**A**	B	C	D	E
30	**A**	B	C	D	E
31	A	B	C	D	**E**
32	**A**	B	C	D	E
33	A	**B**	C	D	E
34	A	B	**C**	D	E
35	A	B	C	D	**E**
36	A	**B**	C	D	E
37	A	B	C	**D**	E
38	A	B	C	**D**	E
39	A	B	C	**D**	E
40	A	B	C	**D**	E
41	**A**	B	C	D	E
42	A	**B**	C	D	E
43	A	B	**C**	D	E
44	A	B	C	**D**	E
45	A	B	C	**D**	E
46	A	**B**	C	D	E
47	A	B	C	**D**	E
48	A	B	C	**D**	E
49	A	**B**	C	D	E
50	**A**	B	C	D	E
51	A	B	C	**D**	E
52	A	B	C	**D**	E
53	**A**	B	C	D	E
54	A	**B**	C	D	E
55	A	B	C	**D**	E
56	A	B	C	**D**	E
57	A	B	**C**	D	E
58	A	B	C	**D**	E
59	A	B	C	**D**	E
60	A	**B**	C	D	E
61	A	B	C	D	**E**
62	A	B	C	**D**	E
63	A	B	**C**	D	E
64	**A**	B	C	D	E
65	A	**B**	C	D	E
66	A	B	**C**	D	E
67	A	B	**C**	D	E
68	A	**B**	C	D	E
69	A	B	**C**	D	E
70	**A**	B	C	D	E
71	A	**B**	C	D	E
72	**A**	B	C	D	E
73	A	B	**C**	D	E
74	A	B	C	**D**	E
75	**A**	B	C	D	E
76	A	B	**C**	D	E
77	**A**	B	C	D	E
78	A	**A**	C	D	E
79	**A**	B	C	D	E
80	A	B	C	**D**	E
81	**A**	B	C	D	E
82	A	B	**C**	D	E
83	A	B	**C**	D	E
84	A	B	C	**D**	E
85	**A**	B	C	D	E
86	A	**B**	C	D	E
87	**A**	B	C	D	E
88	A	**B**	C	D	E
89	**A**	B	C	D	E
90	A	B	**C**	D	E

****

Verbal Reasoning

Verbal means 'pertaining to words' and ability means 'power of mind to do things', so in verbal test questions are stated in the form of words (language). The candidates are supplied with a question paper which contains variegated exercises designed to test their knowledge and intelligence. The purpose of the 'Verbal Test' is to evaluate and analyze candidate's English comprehension and understanding towards the language. These tests can be of various kinds but the questions about sentence completion and analogy testing will be asked randomly. There will be also a question about critical reading (comprehension) that will be asked separately. The brief explanation about these questions will be given on the next pages. This section is consisted of following types of questions:

1. Sentence Completion 2. Analogy Test 3. Critical Reading

Part 1 Sentence Completion

In such type of questions, one or two blanks are given in a sentence, each blank indicates that something has been omitted. Four or five lettered words or sets of words are given below the sentence. The candidate is asked to choose the word or set of words, when inserted in the sentence, best fits the meaning of the sentence as a whole. Various choices i.e., (A) (B) (C) (D) are provided in these kinds of questions. The candidate is asked to complete the sentence by filling in the blanks with the most suitable choice. These questions are designed to determine the candidate's ability to recognize the following areas:

- Correct Sentence Structure
- Correct Choice of Vocabulary
- Applied Grammar (Rules)

The questions about sentence completion can be related to any of the other areas of study i.e., science, geography, general knowledge, history, literature etc., but the subject matter would not hinder the candidate's language ability. The knowledge of correct grammar and vocabulary is required to complete the sentence.

In this test, words and their correct use is judged. This test gives a good idea of the memory and the power to apply it at an appropriate time.

In sentence completion questions, you are given a sentence containing one or more blanks. A number of words or pair of words are suggested to fill the blank spaces. You must select the word or pair of words that will best complete the meaning of the sentence as a whole.

In a typical sentence completion question, if any of the answer choices is inserted into the blank spaces, the resulting sentence will be technically correct, but it may not make sense. Usually, more than one choice makes sense, but only one completely carries out the full meaning of the sentence. There is one best answer.

HOW TO ANSWER SENTENCE COMPLETION QUESTIONS

1. Read the sentence carefully. Try to understand what it means.
2. Consider the blank or blanks with relation to the meaning of the sentence. Is a negative connotation called for or a positive one? If there are two blanks, should the pair be comparative, contrasting, or

complementary? Are you looking for a term that best defines a phrase in the sentence?

3. Eliminate those answer choices that do not meet the criteria you established in step two.
4. Read the sentence to yourself, trying out each of the remaining choices, one by one. Which choice is the most exact, appropriate, or likely considering the information given in the sentence? Which of the choices does the best job of completing the sentence?
5. First answer the questions you find easy. If you have trouble with a question, leave it and go back to it later. If a fresh look does not help you to come up with a sure answer make an educated guess.

EXAMPLES WITH EXPLANATORY ANSWERS

Direction: Select appropriate word from the choices to fill blanks.

Example 1. My father _____ me that I should have informed him.

(A) said (B) told (C) asked (D) tell

The correct answer is (B). The sentence is the indirect narration so 'said' cannot be used. Asked cannot be used in the indirect narration 'if' or what, where etc. must used.

Example 2. He was _____ of all the valuable possessions.

(A) robbed (B) stolen (C) pinched (D) established

The correct answer is (A). Stolen cannot be used because a man cannot be stolen, only goods can be stolen; Similarly 'pinched' has no sense of 'deprive'.

Example 3. Those who feel that war is stupid and unnecessary think that to die on the battlefield is _____.

(A) courageous (B) pretentious (C) useless (D) illegal

The correct answer is (C). The key to this answer is the attitude expressed -- that war is stupid and unnecessary. Those who are antagonistic toward war would consider a battlefield death to be useless. While it is true that giving one's life in the field of battle is courageous (A), that is not the answer in the context of this sentence. Choice (B), pretentious, meaning "affectedly grand or ostentatious," does not go along with the idea that war is stupid. Choice (D) does not make sense in relation to a battlefield death.

Example 4. If you hear the ____ of a gun, don't worry; it's only my car backfiring.

(A) burst (B) report (C) retort (D) flash

The correct answer is (B) report. The sound of an explosion, whether from a gun or a car, is called a report.

Example 5. He demanded _____ obedience from us, and was always telling us we must be ____ subjects.

(A) total, foolish (B) partial, cringing (C) formal, rigorous (D) complete, compliant

The correct answer is (D). You may assume that no one demands partial or marginal obedience. Compliant is the best adjective for subjects.

Example 6. We are ____ going to have to face the reality that the resources of Earth are ____.

(A) finally, worthless (B) gradually, limitless (C) eventually, finite (D)quickly, unavailable

The correct answer is (C). As the Earth's resources are not limitless, worthless, or unavailable, only (C) logically completes this sentence.

Example 7. One reunion was completely ____ who'd have guessed we would have booked the same flight?

(A) illogical (B) fortuitous (C) expected (D) abandoned

The correct answer is (B) fortuitous. The sentence implies that the reunion occurred by chance so it was fortuitous.

Example 8. The presence of armed guards _____ us from doing anything disruptive.

(A) defeated (B) excited (C) irritated (D) prevented

The correct answer is (D) prevented. Armed guards are intended to prevent any kind of disruption. Answer (D) is the only logical and grammatical choice.

Example 9. Held up only by a _____ steel cable, the chairlift was _____ to carry only two people.

(A) slender, instructed (B) single, intended (C) sturdy, obliged (D) massive, designed

The correct answer is (B). This sentence is concerned with the design of the lift. As it says "held up only by", you may assume that the cable is not large, which eliminates (C) and (D). Of the three remaining options, only intended (B) completes the sentence logically.

Example 10. ____ the factories had not closed, and those who needed work most were given a chance to

survive during the economic disaster.

(A) Unintentionally (B) Mercifully (C) Blithely (D) Importunately

The correct answer is (B). According to the sense of this sentence, it was merciful, not unintentional, blithe, importunate, or tragic, that the factories remained open.

KINDS OF SENTENCE COMPLETION

TYPE I: SENTENCE COMPLETION USING VOCABULARY
TYPE II: SENTENCE COMPLETION USING GRAMMAR
TYPE III: SENTENCE COMPLETION USING APPROPRIATE FILLER

TYPE-I

SENTENCE COMPLETION USING VOCABULARY

Part A: Selecting the appropriate word from five alternative provided.

Learn by Example

Some people _____ themselves into believing that they are indispensable to the organisation they work for.

(A) Keep (B) Fool (C) Force (D) Denigrate (E) Delude

Answer: The correct word must be 'delude'. So answer is (E).

Multiple Choice Questions (MCQs)

Directions: Pick out the most effective word from the given words to fill in the blanks to make the sentence meaningfully complete.

1. ***Kamal's friends had nothing to offer him other than _____ in his grief.***
   (A) Solution (B) Consolation
   (C) Friendship (D) Kindness
   (E) Happiness

2. ***There is no doubt that one has to keep _____ with the changing times.***
   (A) Pace (B) Himself
   (C) Aside (D) Oneself
   (E) Tuning

3. ***Belying has mother's worries, Amir's behaviour throughout the function was _____.***
   (A) Imaginable (B) Imperial
   (C) Immodest (D) Impeccable
   (E) Impervious

4. ***After reaching New York, Azhar will have to _____ himself to the new surroundings.***
   (A) Submit (B) Adapt
   (C) Mix (D) Develop
   (E) Acquaint

5. ***Dowry is no longer permitted by law even in _____ marriage.***
   (A) Natural (B) Bigamous
   (C) Love (D) Conventional
   (E) Polygamous

6. ***Research has also _____ the illusion that childhood dreams are pure innocence.***
   (A) Dispelled (B) Discovered
   (C) Accepted (D) Observed
   (E) Established

7. ***Everyone should _____ himself against illness since medical care has now become expensive.***
   (A) Brace (B) Ensure
   (C) Vaccinate (D) Insure
   (E) Inoculate

8. ***How much did it _____ to reach Bombay by car?***
   (A) Cost (B) Estimate
   (C) Charge (D) Price

(E) Pay

9. *In the departmental inquiry, it was denied that the police had committed any _____ on people under their custody.*
(A) Blunder (B) Beatings
(C) Injuries (D) Crime
(E) Excesses

10. *The petition before the Court prayed for _____ the appointment orders issued by the management.*
(A) Posting (B) Quashing reject as invalid
(C) Granting (D) Removing by legal procedure
(E) Dismissing

11. *Man power is the _____ means of converting other resources to mankind's use and benefit.*
(A) Indivisible (B) Indispensable
(C) Insuperable (D) Inimitable good or unusual
(E) Inequitable

12. *I am given to _____ that you are going abroad.*
(A) Predict (B) Understand
(C) Learn (D) Think
(E) Apprehend

13. *_____ by people's perception it seems that democracy has succeeded in Pakistan.*
(A) Making (B) Planned
(C) Following (D) Going
(E) Liked

14. *The passengers and crew members of the aeroplane had a _____ escape when it was taking off from the runway.*
(A) Little (B) Brief
(C) Narrow (D) Large
(E) Better

15. *He very successfully _____ all the allegations leveled against him.*
(A) Retaliated (B) Rebutted
(C) Extricated (D) Eradicated
(E) Protected

16. *A glue produced by bees to _____ their hives appears to contain antibiotic substances.*
(A) Build (B) Decorate
(C) Collect (D) Design
(E) Structure

17. *He applied for and was _____ legal aid by the Labour Ministry.*
(A) Allowed (B) Awarded
(C) Offered (D) Granted
(E) Implemented

18. *The defending champion justified his top _____ by clinching the title.*
(A) Technique (B) Supremacy
(C) Skill (D) Form
(E) Billing Relative Prominence of name

19. *He has _____ people visiting him at his house because he fears it will cause discomfort to neighbours.*
(A) Stopped (B) Warned
(C) Curtailed (D) Requested
(E) Forbidden

20. *There are _____ views on the issue of giving bonus to the employees.*
(A) Modest (B) Adverse
(C) Independent (D) Divergent

(E) Valuable

21. *Freedom is not a _____ but our birth right.*
(A) Farce (B) Illusion
(C) Sin (D) Gift
(E) Presentation

22. *My father keeps all his _____ papers in a lock and key.*
(A) Useful (B) Confidential
(C) Required (D) Necessary
(E) Enclosed

23. *I am _____ forward to our picnic scheduled in the next month.*
(A) Looking (B) Planning
(C) Seeing (D) Going
(E) Organizing

24. *Akram is too _____ as far as his food habits are concerned.*
(A) Curious (B) Involved
(C) Enjoyable (D) Fastidious
(E) Interesting

25. *Most of the issues discussed in the meeting were trivial and only a few were _____.*
(A) Interesting (B) Irrelevant
(C) Practical (D) Complex
(E) Significant

ANSWERS

1.	(B)	2.	(A)	3.	(D)	4.	(B)	5.	(C)
6.	(A)	7.	(D)	8.	(A)	9.	(E)	10.	(B)
11.	(B)	12.	(B)	13.	(D)	14.	(C)	15.	(B)
16.	(A)	17.	(D)	18.	(E)	19.	(A)	20.	(D)
21.	(D)	22.	(B)	23.	(A)	24.	(D)	25.	(E)

Part B: Selecting the appropriate word from four alternatives provided.

Learn by Example

Many women in developing countries experience a cycle of poor health that _____ before they are born and persists through adulthood passing from generation to generation.

(A) Derives (B) Establishes
(C) Begins (D) Originates

Answer: The correct word must be 'Begins'. So answer is (C).

Multiple Choice Questions (MCQs)

Directions: In each of the following questions, a sentence is given with a blank to be filled in with an appropriate word. Four alternatives are suggested for each question. Choose the correct alternative.

1. *He lives in the world of _____.*
(A) Conclusions (B) Delusions
(C) Allusions (D) Illusions

2. *He did not register his _____ to the proposal.*
(A) Disfavour (B) Dissent
(C) Deviation (D) Divergence

3. *He _____ that he could speak five languages.*
(A) Submitted (B) Suggested
(C) Challenged (D) Boasted

4. *Though Bonsai, a well-known art form, originated in China, it was _____ by the Japanese.*
(A) Cultivated (B) Perfected
(C) Finished (D) Borrowed

5. *Will you, like the _____ gentleman and soldier you are, leave at once before he finds you here?*

(A) Chivalrous (B) Luminous
(C) Barbarous (D) Ostentatious

6. *A crescendo of metallic thuds arose from the market, where the iron-smiths were _____ the pieces of metals.*
(A) Thrashing (B) Striking
(C) Hammering (D) Flattening

7. *The child's earliest words deal with concrete objects, only later he is able to grapple with _____.*
(A) Opinions (B) Decisions
(C) Abstractions (D) Maxima

8. *He lost the match easily because he had played a _____ five set match in the earlier round.*
(A) Wonderful (B) Controversial
(C) Sensational (D) Grueling extremely tiring

9. *In these days of inflation, the cost of consumer goods is _____.*
(A) Climbing (B) Raising
(C) Ascending (D) Soaring

10. *The most important task of the Air Force is to _____ the country against an air attack by an enemy.*
(A) Defend (B) Secure
(C) Protect (D) Save

11. *The Committee's appeal to the people for money _____ little response.*
(A) Gained (B) Provided
(C) Evoked (D) Provoked

12. *The manager tried hard to _____ his men to return to work before declaring a lockout.*
(A) Encourage (B) Permit
(C) Motivate (D) Persuade

13. *Our flight was _____ from Lahore to Islamabad airport.*
(A) Diverted (B) Reverted
(C) Deflected (D) Shifted

14. *Once I forgot the piece of paper on which the name of the hotel was written, I was as _____ as lost.*
(A) Good (B) Bad
(C) Much (D) Sure

15. *He is very _____ on meeting foreigners and befriending them.*
(A) Insistent (B) Keen
(C) Anxious (D) Fond

16. *Colgate has also set an ambitious aim of _____ an eight percent value share of the tooth paste market by the end of the first year.*
(A) Cornering (B) Soliciting
(C) Keeping (D) Distributing

17. *A person who constantly calls attention to his trails and sufferings is in danger of developing a martyr complex and impressing others that he is _____ seeking sympathy.*
(A) Consciously (B) Willingly
(C) Purposefully (D) Emphatically

18. *He is working under such _____ conditions that it is difficult to maintain his self-respect.*
(A) Inimical (B) Humiliating
(C) Low (D) Difficult

19. *The Hubble Space Telescope will search for planets around other stars, a key to the _____ for extra terrestrial life, and examine interstellar dust and gases out of which stars are born.*
(A) Quest (B) Enquiry
(C) Discovery (D) Perception

20. *The manner in which bombs exploded in five trains within a short span of time suggests that it is a part of a _____.*

(A) Conspiracy (B) Sabotage
(C) Game (D) Villainy

21. *I _____ a car to be absolutely necessary these days.*
(A) Consider (B) Agree
(C) Think (D) Regard

22. *He didn't have the _____ idea of the villager's problems.*
(A) Faintest (B) Feeblest
(C) Smallest (D) Finest

23. *This is a _____ translation of the speech.*
(A) Literal (B) Literary
(C) Verbatim (D) Verbal

24. *The news of the secret deal soon _____ despite official silence.*
(A) Leaked out (B) Divulged
(C) Discovered (D) Disclosed

25. *No man had a more _____ love for literature, or a higher respect for it, than Dr. Shabbir.*
(A) Animated (B) Adroit
(C) Arduous (D) Ardent

26. *I have often _____ why he went to live abroad.*
(A) Thought (B) Surprised
(C) Puzzled (D) Wondered

27. *He lives near a lonely _____ of countryside.*
(A) Stretch (B) Section
(C) Piece (D) Length

28. *When their examinations were over, the children gleefully _____ the books they had been reading.*
(A) Shelve (B) Overthrew
(C) Despised (D) Neglected

29. *Not only did she condemn vice, she almost equally despised the _____ acceptance of an advantage.*
(A) Unholy (B) Furtive
(C) Commendable (D) Tacit

ANSWERS

1.	(D)	2.	(B)	3.	(D)	4.	(B)	5.	(A)
6.	(D)	7.	(C)	8.	(D)	9.	(D)	10.	(A)
11.	(C)	12.	(D)	13.	(A)	14.	(A)	15.	(B)
16.	(A)	17.	(A)	18.	(B)	19.	(A)	20.	(A)
21.	(A)	22.	(A)	23.	(A)	24.	(A)	25.	(D)
26.	(D)	27.	(A)	28.	(D)	29.	(D)		

Part C: Selecting the appropriate pair of words to fill in two blanks in a sentence

Learn by Example

The Deputy Manager _____ to resign because all his proposals were _____ down by his superiors.
(A) Offered, thrown (B) Gave, held
(C) Began, kept (D) Willing, knocked
(E) Threatened, turned

Answer: The pair of words are 'threatened', 'turned'. So answer is (E).

Multiple Choice Questions (MCQs)

Directions: In each sentence below, there are two blank spaces. Below each sentence some pairs of words are given. Pick out the most appropriate pair to fill in the blanks in the same order, to make the sentence meaningfully complete.

1. *He granted the request because he was _____ to _____ his friend.*

(A) Sure, displease
(B) Unwilling, please
(C) Bound, hurt
(D) Destined, agonise
(E) Reluctant, disappoint

2. *The charges made in the system were so _____ that they didn't require any _____.*
(A) Marginal, expenses
(B) Certain, expertise
(C) Big, time
(D) Genuine, intelligence
(E) Obvious, modifications

3. *In _____ of International matters, there is always an element of risk in _____ one might do.*
(A) Defence, wrong
(B) Case, whatever
(C) View, whichever
(D) Many, doing
(E) Spite, whatever

4. *_____ is a criminal _____ in England and covers cases where offensive descriptions of Christianity are published.*
(A) Blasphemy, offence
(B) Obscenity, deviation
(C) Heathenism, act
(D) Sacrilege, violence
(E) Impiety, transgression

5. *We are _____ to have him _____ here to make this function a great success.*
(A) Sure, come
(B) Pleased, over
(C) Prood, leave
(D) Happy, arrive
(E) Wonderful, again

6. *He was so convinced that people were driven by _____ motives that he believed there was no such thing as a purely _____ act.*
(A) Altruistic, praiseworthy
(B) Ulterior, selfless
(C) Personal, anti-social
(D) Personal, eternal
(E) Sentimental, divine

7. *We _____ him with many promises, but nothing would _____ him.*
(A) Attracted, fascinate
(B) Gave, deprive
(C) Tempted, influence
(D) Provoked, dessicate
(E) Negotiated, please

8. *The counter clerk was very busy and _____ not pay _____ to Sameer's request.*
(A) Had, cash
(B) Did, attention
(C) Can, help
(D) Could, respect
(E) Certainly, acceptance

9. *The construction of the hall has been _____ because of the _____ of cement in the market.*
(A) Hampered, shortage
(B) Prevented, supply
(C) Held, non-availability
(D) Denied, restrictions
(E) Completed, disappearance

10. *The bandit _____ the traveller of his purse of gold and _____ him grievously.*
(A) Demanded, beat
(B) Robbed, wounded
(C) Snatched, hurt
(D) Stole, injured

11. *She was _____ because all her plans had gone _____.*
(A) Distraught, awry
(B) Frustrated, magnificently
(C) Elated, wild
(D) Dejected, splendidly

12. *The candidates' _____ at the polls was _____ as he won with a striking margin.*
(A) Image, real
(B) Strategy, unsuccessful
(C) Claim, unrealistic
(D) Victory, overwhelming
(E) Candidature, inappropriate

13. *He is so _____ that everyone is always _____ to help him in his work.*
(A) Adamant, enthusiastic
(B) Miserly, ignorant
(C) Helpful, reluctant
(D) Aloof, cooperative
(E) Magnanimous, eager

14. *The activities of the association have _____ from the _____ objectives set for it in the initial years.*
(A) Details, grand (B) Emerged, total
(C) Grown, simple (D) Deviated, original
(E) Increased, perverse

15. *The leaders were _____ needed by those to _____ they were addressed.*
(A) Scarcely, whom (B) Rarely, where
(C) Angrily, who (D) Readily, which
(E) Joyfully, when

16. *Instead of _____, prove your worth by _____ something.*
(A) Worrying, paying (B) Writing, reading
(C) Begging, demanding (D) Talking, doing
(E) Donating, demanding

17. *Due to _____ rainfall this year, there will be _____ cut in water supply.*
(A) Sufficient, no (B) Surplus, abundant
(C) Enough, substantial (D) Meager, least
(E) Abundant, considerable

18. *We must explore _____ sources of energy as our supply of fossil fuel has been _____.*
(A) Natural, exhausted (B) Sufficient, increased
(C) Alternative, depleted (D) Guaranteed, over
(E) Innovative, augmented

19. *He had managed to _____ several times, but was finally _____ by the police.*
(A) Escape, arrested (B) Cheat, robbed
(C) Deceive, cheated (D) Defend, acquitted
(E) Abscond, kidnapped

20. *Children are more _____ than adults, it is _____ their quickness in learning a new language.*
(A) Conservative, seen in (B) Susceptible, demonstrated in
(C) Intelligent, disproved by (D) Adaptable, reflected in
(E) Resourceful, proportionate to

21. *The Education Minister emphasized the need to discover and _____ each student's _____ talents.*
(A) Suppress, potential (B) Flourish, hidden
(C) Enlarge, dormant (D) Belittle, concealed
(E) Develop, intrinsic

22. *He is usually _____, but today he appears rather _____.*
(A) Quiet, calm (B) Happy, humorous
(C) Strict, unwell (D) Tense, restless
(E) Calm, disturbed

23. *The war _____ immediately after the cease-fire proposal was _____ bilaterally.*
(A) Began, thwarted (B) Extended, mitigated
(C) Receded, exchanged (D) Started, prepared
(E) Ended, accepted

24. *Yousaf _____ another feather _____ his cap by his wonderful performance in the one day match.*
(A) Took, in (B) Created, for
(C) Kept, by (D) Captured, from
(E) Added, to

25. *Any system is likely to _____ for _____ of support from the public.*
(A) Fail, want (B) Finish, failure
(C) Survive, lack (D) Succeed, reason
(E) Launch, paucity

ANSWERS

1.	(E)	2.	(E)	3.	(B)	4.	(A)	5.	(B)
6.	(B)	7.	(C)	8.	(B)	9.	(A)	10.	(B)
11.	(A)	12.	(D)	13.	(E)	14.	(D)	15.	(A)
16.	(D)	17.	(A)	18.	(A)	19.	(A)	20.	(D)
21.	(E)	22.	(E)	23.	(E)	24.	(E)	25.	(A)

TYPE-II

SENTENCE COMPLETION USING GRAMMAR

Learn by Example

Genius does what it must, and talent does what it _____.

(A) Can (B) Would
(C) May (D) Should

Answer: The correct word is 'can'. Hence the answer is (A).

Multiple Choice Questions (MCQs)

1. ***The passengers were very happy _____ the friendly and warm treatment given to them.***
   (A) From (B) To
   (C) By (D) About
2. ***The higher you go, the more difficult it _____ to breathe.***
   (A) Is becoming (B) Became
   (C) Has become (D) Becomes
3. ***The children were disappointed because they had hoped _____ with us.***
   (A) Would have gone (B) To had gone
   (C) To have gone (D) To go
4. ***She stood _____ Ahsan, but could not utter a single word for quite some time.***
   (A) About (B) Before
   (C) For (D) To
   (E) Towards
5. ***He is the friend _____ I trust most.***
   (A) Which (B) Who
   (C) Him (D) Whom
6. ***You must dispense _____ his service.***
   (A) With (B) Of
   (C) In (D) At
7. ***The telephone _____ several times before I answered it.***
   (A) Has rung (B) Was ringing
   (C) Would ring (D) Had rung
8. ***I shall not desert him _____ all the world.***
   (A) By (B) For
   (C) With (D) From
9. ***I bought a new car last year, but I _____ my old car yet, so at present I have two cars.***
   (A) Have sold (B) Did not sell
   (C) Could not sell (D) Have not sold
10. ***No sooner did he go in _____ he came out.***
   (A) Than (B) And
   (C) Then (D) When
11. ***The judge acquitted the prisoner _____ the charge of murder.***
   (A) About (B) From
   (C) Of (D) With
12. ***An argument _____ between the two friends.***
   (A) Broke out (B) Broke in

(C) Sprang up (D) Rose up

13. *When I was a child, I _____ to school everyday instead of going by cycle.*
(A) Had walked (B) Have walked
(C) Walked (D) Have been walking

14. *Nobody has come to see us _____ we bought these fierce dogs.*
(A) Since (B) For
(C) When (D) Till

15. *He ran _____.*
(A) Quickly (B) So quickly
(C) Quick (D) So quick

16. *In Bush, Saddam was up _____ more than his match.*
(A) Into (B) For
(C) To (D) Against

17. *The doctor advised him to go _____ several medical tests.*
(A) Through (B) Into
(C) Under (D) About

18. *If you persist in telling lies to me I shall sue you _____ slander.*
(A) For (B) On
(C) With (D) To

19. *The waiter hasn't bought the coffee _____ I've been here an hour already.*
(A) Up (B) Till
(C) Still (D) Yet

20. *The modern club is simply a more refined substitute _____ the old fashioned tavern.*
(A) For (B) With
(C) Of (D) To

21. *After the advice of his father, he was reconciled _____ his wife.*
(A) With (B) To
(C) Into (D) By

22. *The doctor tried both penicillin and sulphanilamide; the penicillin proved to be the _____ effective drug.*
(A) Most (B) Bad
(C) Very (D) More

23. *However honest he _____, I do not trust him.*
(A) Might be (B) Could be
(C) Is (D) May be

24. *He became the Governor of a Province _____.*
(A) In course of time (B) At times
(C) Little by little (D) By and large

25. *_____ the rain stopped, the play had to be suspended.*
(A) When (B) Since
(C) While (D) Until

ANSWERS

1.	(C)	2.	(D)	3.	(D)	4.	(B)	5.	(D)
6.	(A)	7.	(D)	8.	(B)	9.	(D)	10.	(A)
11.	(C)	12.	(C)	13.	(C)	14.	(A)	15.	(A)
16.	(D)	17.	(A)	18.	(A)	19.	(D)	20.	(A)
21.	(B)	22.	(D)	23.	(D)	24.	(A)	25.	(D)

TYPE-III
SENTENCE COMPLETION USING APPROPRIATE FILLER

Learn by Example

The notice at the petrol pump should be _____.

(A) All engines need to be switched off
(B) All engines have to be switched off
(C) All engines must have to be switched off
(D) All engines must be switched off.

Answer: (D)

Multiple Choice Questions (MCQs)

Directions: In each of the following questions, an incomplete statement followed by some fillers is given. Pick out the best one which can complete the incomplete statement correctly and meaningfully.

1. ***If they share burden alternately, they _____.***
   (A) Won't get tired (B) Will get fatigued
   (C) Can't feel tiring (D) Will get tired soon
   (E) Don't get tired

2. ***When I saw him through the window _____.***
   (A) I ran out to open the door (B) I have run out to open the door
   (C) I should run out to open the door (D) I am running out to open the door

3. ***Every person must learn _____.***
   (A) That his time needs a wise use (B) Wise ways in his time's use
   (C) To make wise use of his time (D) To using his time in a wisely manner
   (E) That how wisely his time can be used

4. ***The income tax raid was too sudden _____.***
   (A) So that the man escaped (B) For the man escaping
   (C) Then the man escaped (D) For the man to escape

5. ***Many people have law degrees _____.***
   (A) But not all of them practice law (B) However it isn't practised by all
   (C) And some of them do have practice also (D) But some of them do not practice it
   (E) Yet some are not undergoing practices

6. ***He passed the examination in the first class because he _____.***
   (A) Worked hardly for it (B) Was hard working for it
   (C) Was working hard for it (D) Had worked hard for it

7. ***'Where are my spectacles?' _____***
   (A) There are they, on your nose! (B) There they are, on your nose!
   (C) Here are they, on your nose! (D) Here they are, on your nose!

8. ***With great difficulty, _____.***
   (A) He could keep his cool (B) He could get annoyed
   (C) He could not tolerate his nonsense (D) He could lose his temper
   (E) He could perform his usual functions easily

9. ***He always stammers in public meetings, but his today's speech _____.***
   (A) Was not liked by the audience (B) Was not received satisfactorily
   (C) Was surprisingly fluent (D) Was fairly audible to everyone present in the hall
   (E) Could not be understood properly

10. ***The Chairman rejected the proposal of increasing employee's salary because:***
    (A) The company had already gained three thousand crore profit
    (B) The company did not have sufficient funds to afford the rise
    (C) The number of employees in the company was very small
    (D) The employees had been demanding it for a long time
    (E) It was not difficult for the company to bear additional burden

11. ***To succeed in a difficult task, _____.***

(A) You need a person of persistent (B) One needs to be persistent
(C) One needs to be persistence (D) Persistent is needed
(E) Persistent is what one needs

12. *I shall not be late for dinner _____.*
(A) Unless the train will be late (B) Unless the train will not be late
(C) If the train is late (D) Unless the train is late

13. _____ *I would not have helped such an ungrateful man.*
(A) Had I been in your place
(B) Even after knowing that he was ungrateful
(C) Had I asked him for his help
(D) Though he did not deserve any help at all
(E) If he had shown due respect to me

14. *Unless you work very hard, _____.*
(A) You are not being successful (B) You will not be successful
(C) You ought to be successful (D) You be not successful

15. *The more we looked at the piece of modern art, _____.*
(A) We liked it less (B) The less we liked it
(C) It looked better (D) The more we like it
(E) Better we liked it

16. *In order to raise the company profit, the employees:*
(A) Decided to raise the cost of raw material
(B) Requested the management to implement new welfare schemes
(C) Demanded two additional increments
(D) Decided to go on paid holidays
(E) Offered to work over time without any compension

17. *He seized control of the country _____.*
(A) By using diplomacy and force (B) By diplomacy and being forceful
(C) By being a diplomat and forceful (D) Not only because of diplomacy but force

18. *The doctor warns him that unless he gives up smoking:*
(A) His health will soon be recovered (B) He will not recover
(C) Will he be able to recover (D) He will not suffer

19. *Whichever way you approach the problem, _____*
(A) It will not solve (B) It will not be solved
(C) No one will not solve it (D) It will not be solve

20. *He is so lazy that he:*
(A) Can't delay the schedule of completing the work
(B) Can't depend on others for getting his work done
(C) Always extends help to others to complete their work
(D) Can seldom complete his work on time
(E) Dislikes to postpone the work that he undertakes to do

21. *How much a man earns is as important as _____.*
(A) Where does he earn
(B) Why does he earn of all
(C) When does he do so
(D) How does he do it
(E) How well he spends it

22. *Shan, where are you? _____, up this tree.*
(A) There I am (B) There am I
(C) Here I am (D) Here am I

23. *My mother is so poor:*
(A) To get medical help for my father (B) That she cannot buy food for us

(C) To send me to school (D) Because she will not work

24. *He tames animals because he:*
(A) Is fond of them (B) Hates them
(C) Seldom loves them (D) Is afraid of them
(E) Wants to set them free

25. *He has no money now:*
(A) Because he was very rich once
(B) As he has given up all his wealth
(C) Because he always spends money with utmost care
(D) Because he had received huge donations once
(E) Although he was very poor once

ANSWERS

1.	(A)	2.	(A)	3.	(C)	4.	(D)	5.	(A)
6.	(D)	7.	(B)	8.	(A)	9.	(C)	10.	(B)
11.	(B)	12.	(D)	13.	(A)	14.	(B)	15.	(B)
16.	(E)	17.	(A)	18.	(B)	19.	(B)	20.	(D)
21.	(D)	22.	(C)	23.	(B)	24.	(A)	25.	(B)

Multiple Choice Questions (MCQs)

(Sentence Completion)

TEST NO. 1

◈ *Choose the word which best completes each sentence.*

1. *We lost confidence in Salim because he never _____ the grandiose promises he had made.*
(A) Tired of (B) Delivered on
(C) Retreated from (D) Forgot about

2. *The driver suddenly applied the brakes when he saw a _____ truck ahead of him.*
(A) Stationary (B) Moving
(C) Static (D) Immobile

3. *Knowledge is like a deep well fed by _____ springs, and your mind is the little bucket that you drop in it.*
(A) External (B) Perennial
(C) Immortal (D) Inehaustible

4. *Salma is much too _____ to have anything to do with that obnoxious affair.*
(A) Noble (B) Proud
(C) Happy (D) Difficult

5. *There is no incentive for America to sign the treaty since there is every reason to _____ no other nation intends to honour its provisions.*
(A) Regret (B) Inform
(C) Believe (D) Occupy

6. *A legislation was passed to punish brokers who _____ their clients funds.*
(A) Defalcate (B) Devastate
(C) Devour (D) Embezzle

7. *Normally, an individual thunderstorm _____ about 45 minutes.*
(A) Lasts (B) Ends
(C) Remains (D) Continues

8. *The task seemed impossible but somehow Jalil _____ very skilfully in the end.*
(A) Pulled it up (B) Pulled it off
(C) Pulled it away (D) Pulled it out

9. *The unruly behaviour of the children _____ their parents.*
(A) Aggrieved (B) Impeached
(C) Incensed (D) Tempered

10. *We were amazed that a man who had been heretofore the most _____ of public speakers could, in a single speech, electrify an audience and bring them cheering.*
(A) Pedestrian (B) Accomplished
(C) Masterful (D) Auspicious

11. *The chairperson is a scintillating speaker whose lectures completely _____ students.*
(A) Entertain (B) Absorb
(C) Enthrall (D) Alienate

12. *Ali _____ force himself to work on till late in the night.*
(A) Would (B) Would be
(C) Could (D) Used to

13. *The officers threatened to take reprisals if the lives of their men were _____ by the conquered natives.*
(A) Destroyed (B) Endangered
(C) Enhanced (D) Irritated

14. *His moral decadence was marked by his _____ from the ways of integrity and honesty.*
(A) Obsession (B) Declivity
(C) Departure (D) Opprobrium

15. *Her reaction was not the only _____ one.*
(A) Workable (B) Possible
(C) Likely (D) Good

16. *After a period of protracted disuse, a muscle will atrophy, _____ both its strength and the ability to perform its function.*
(A) Insuring (B) Regaining
(C) Sustaining (D) Losing

17. *True health and true success go together for they are inseparably _____ in the thought realm.*
(A) Interwined (B) Tied up
(C) Bound up (D) Inter-related

18. *If you are trying to make a strong impression on your audience you cannot do so by being understated, tentative, for _____.*
(A) Passionate (B) Authoritative
(C) Restrained (D) Argumentative

19. *Although, I had pledged not to tell anyone of the previous evening's trauma, the compulsive urge to unburden myself became _____.*
(A) Preposterous (B) Overwhelming
(C) Impassive (D) Irresistible

20. *The _____ arguments put forth for not disclosing the facts did not impress anybody.*
(A) Specious (B) Intemperate
(C) Spurious (D) Convincing

ANSWERS

1.	(B)	2.	(A)	3.	(B)
4.	(A)	5.	(C)	6.	(D)
7.	(A)	8.	(D)	9.	(C)
10.	(A)	11.	(C)	12.	(A)
13.	(B)	14.	(C)	15.	(B)
16.	(D)	17.	(A)	18.	(C)
19.	(D)	20.	(A)		

TEST NO. 2

◆ *Choose the word which, when inserted in the sentence, best fits the meaning of sentence.*

1. *Some officers have _____ their previous statements denying any involvement on their part with the contra aid network.*
   (A) Recanted (B) Protracted
   (C) Justified (D) Repeated
2. *As the market becomes _____ competitive, some companies will make larger profits.*
   (A) Well (B) More
   (C) Less (D) Fully
3. *Although, the conditions in which Riaz chooses to live suggest that he is miserly, his contributions to worthwhile charities show that he is _____.*
   (A) Intolerant (B) Stingy
   (C) Generous (D) Thrifty
4. *He suggests that the meeting _____ postponed.*
   (A) Be (B) Is
   (C) Must (D) Would be
5. *Modern architecture has discarded the _____ trimming on buildings and emphasises simplicity of life.*
   (A) Flamboyant (B) Flabbergasting
   (C) Gaudy (D) Gaunt
6. *Can he see his wife again? No, he _____.*
   (A) Could (B) Can
   (C) Will not (D) Cannot
7. *A man is one of those blessed artists who combine profundity and _____.*
   (A) Fun (B) Education
   (C) Depth (D) Wisdom
8. *The accused was released on _____ pending hearing of his case.*
   (A) Bond (B) Bale
   (C) Bail (D) Deposit
9. *Sadiq's _____ in his family's position is great but he does not boast about it.*
   (A) Status (B) Proud
   (C) Pride (D) Presumption
10. *There are many dialects of English with radically different pronunciations of the same word, but the spelling of these words is _____.*
    (A) Shortened (B) Inconstant
    (C) Contemplated (D) Uniform
11. *New concerns about growing religious tension in Kashmir were _____ this week between Hindus and Muslims.*
    (A) Dispersed (B) Fueled
    (C) Invalidated (D) Restrained
12. *Wasim was so good at Mathematics that his friends considered him to be a _____.*
    (A) Prodigy (B) Prodigal
    (C) Primeval (D) Profligate
13. *The majority report issued by the committee was completely _____, extolling in great detail the plan's strengths but failing to mention at all its shortcomings.*
    (A) Skewed (B) Unbiased
    (C) One-sided (D) Comprehensive
14. *I decided to sell a piece of land when I was offered a more _____ price.*
    (A) True (B) Realistic
    (C) Exact (D) Correct
15. *The enemy paid a large sum as _____.*
    (A) Punishment (B) Reward

(C) Restitution (D) Compensation

16. *Despite the mixture's _____ nature, we found that by lowering its temperature in the laboratory we could reduce its tendency to vaporize.*
(A) Homogeneous (B) Resilient
(C) Volatile (D) Acerbic

17. *Many boys were _____ at street corners for the coffee bar to open.*
(A) Hanging upon (B) Hanging about
(C) Hanging back (D) Hanging on

18. *His monotonous voice acted like _____ and his audience was soon asleep.*
(A) An emetic (B) An anaesthetic
(C) A sedative (D) A purgative

19. *My finger is still _____ where I caught it in the door yesterday.*
(A) Sore (B) Wounded
(C) Injured (D) Bruised

20. *The flood water pushed against the river wall and _____ from a sudden break made by it.*
(A) Ran out (B) Serged up
(C) Gushed out (D) Flowed

ANSWERS

1.	(A)	2.	(B)	3.	(C)
4.	(A)	5.	(C)	6.	(D)
7.	(A)	8.	(C)	9.	(A)
10.	(D)	11.	(B)	12.	(A)
13.	(C)	14.	(B)	15.	(D)
16.	(C)	17.	(B)	18.	(C)
19.	(D)	20.	(B)		

TEST NO. 3

◈ *Complete the sentences by given choices.*

1. *Measurement is, like any other human endeavour, a complex activity, subject to error, not always used _____, and frequently misinterpreted and misunderstood.*
(A) Properly (B) Innovatively
(C) Mistakenly (D) Systematically

2. *Non-violence is the law of saints as violence is the law of the _____.*
(A) Coward (B) Foolish
(C) Brute (D) Ignorant

3. *His injury was very painful but not incapacitating and he managed to _____ the game in spite of it.*
(A) Interrupt (B) Conceal
(C) Abandon (D) Finish

4. *They have some difficulty _____ all the employees, especially the smaller ones to confirm _____ the adopted scale of wages.*
(A) Getting, to (B) In getting, upon
(C) To get, over (D) To getting, with

5. *This contract was _____; it was not valid now.*
(A) Nullified (B) Annulled
(C) Invalid (D) Canceled

6. *To the dismay of the student body, the class president was _____ berated by the principal.*
(A) Privately (B) Magnanimously
(C) Inconspicuously (D) Ignominously

7. *We never believed that he would resort to _____ in order to achieve his end, we always regarded him as an honest man.*
(A) Logic (B) Subterfuge

(C) Charm (D) Diplomacy

8. *It was the help he got from his parents which _____ him through the tragedy.*
(A) Boosted (B) Supported
(C) Helped (D) Parked

9. *The plot of the play was extremely complicated and included many minor characters _____ to the central events.*
(A) Tangential (B) Contemporary
(C) Essential (D) Momentous

10. *It is a marble wall, _____ no bills.*
(A) Stick (B) Affix
(C) Paste (D) Attach

11. *You will have to catch the morning flight, so you _____ better get ready.*
(A) Would (B) May
(C) Had (D) Should

12. *The controversy is likely to create _____ between the two rivals.*
(A) Doubt (B) Amity
(C) Bitterness (D) Revenge

13. *The authority of voice in Faraz writing strikes many readers today as _____ colonialism.*
(A) Cognizant of (B) Detrimental to
(C) Consonant with (D) Independent of

14. *Beauty is to ugliness as adversity is to _____.*
(A) Prosperity (B) Cowardice
(C) Miser (D) Happiness

15. *Whenever Imran refers to his favourites he is voluble, but when he talks of his adversaries he is _____.*
(A) Rough (B) Reticent
(C) Miserly (D) Aggressive

16. *The chairman's intolerance of _____ among his aides was intensified by his insistence upon total loyalty from all.*
(A) Compliance (B) Flattery
(C) Dissent (D) Dishonesty

17. *Despite the millions of rupees spent on improvements, the telephone system in Pakistan remains _____.*
(A) Suspicious (B) Primitive
(C) Outdated (D) Impartial

18. *Do you think Irum is avoiding you? Yes, I _____.*
(A) Do (B) Agree
(C) Did (D) Have not

19. *Few plants can grow beneath the canopy of the sycamore tree, whose leaves produce a natural herbicide that leaches into the surrounding soil, _____ other plants that might compete for water and nutrients.*
(A) Refreshing (B) Nourishing
(C) Distinguishing (D) Inhibiting

20. *Even when Akram's reputation was in _____ almost everyone was willing to admit that he had genius.*
(A) Eclipse (B) Peregrination
(C) Rebuttal (D) Accumulation

ANSWERS

1.	(A)	2.	(C)	3.	(D)
4.	(A)	5.	(B)	6.	(D)
7.	(B)	8.	(C)	9.	(A)
10.	(B)	11.	(D)	12	(C)

13.	(C)	14.	(A)	15.	(B)
16.	(C)	17.	(B)	18.	(C)
19.	(D)	20.	(A)		

TEST NO. 4

◈ *Select anyone the most suitable answer.*

1. *I do not think, Javed will gain anything by insulting and _____ the man Javed do not agree with.*
   (A) Depicting (B) Revamping
   (C) Defaming (D) Charging
2. *Although, a few years ago the fundamental facts about the silky way seemed fairly well _____, now even its mass and its radius have come into question.*
   (A) Ignored (B) Established
   (C) Determined (D) Problematic
3. *Naveed's _____ of the topic was so good that students had few doubts to raise at the end.*
   (A) Clarity (B) Exposure
   (C) Picturisation (D) Exposition
4. *A good lawyer will argue only what is central to an issue, eliminating _____ information which might jeopardize the client.*
   (A) Extraneous (B) Prodigious
   (C) Seminal (D) Erratic
5. *Ali got the company car for a _____ price as he was the senior most employee in the company.*
   (A) Nominal (B) Fixed
   (C) Discounted (D) Reduced
6. *His novel is both so eloquent in its passion and so searching in its candor that it is bound to _____ any reader.*
   (A) Bore (B) Disappoint
   (C) Unsettle (D) Embarrass
7. *We felt as if the ground was _____ beneath our feet.*
   (A) Digging (B) Slipping
   (C) Sinking (D) Bursting
8. *It is irritating to try to keep a commitment that you know you are not going to _____.*
   (A) Honour (B) Decorate
   (C) Glorify (D) Dignify
9. *Because Rehana had a reputation for _____ we were surprised and pleased when she greeted us so affably.*
   (A) Graciousness (B) Insolence
   (C) Arrogance (D) Querulousness
10. *Through a _____ circumstance, they unexpectedly found themselves on the same bus with Mohsin.*
    (A) Referential (B) Fortuitous
    (C) Lambent (D) Elusive
11. *Could you appease her curiosity? No, I _____.*
    (A) Did not (B) Could not
    (C) Have not (D) Could never
12. *Unlike the images in symbolist poetry which are often vague and obscure, the images of surrealist poetry are startlingly _____ and bold.*
    (A) Trivial (B) Concrete
    (C) Furtive (D) Virulent
13. *The child was so spoiled by his parents that he pouted and become _____ when he did not receive all of their attention.*
    (A) Sullen (B) Discreet
    (C) Suspicious (D) Elated
14. *Everyone in this universe is accountable to God _____ his actions.*

(A) Of (B) Against
(C) For (D) About

15. *I am not concerned _____ him in that business.*
(A) By (B) About
(C) For (D) With

16. *Just as disloyalty is the mark of the renegades _____ is the mark of the craven.*
(A) Cowardice (B) Avarice
(C) Vanity (D) Temerity

17. *The new owners of the paper changed the _____ completely.*
(A) Outlook (B) Outlet
(C) Layout (D) Outlay

18. *Contrary to popular opinion, bats are not generally aggressive and rabid, most are shy and _____.*
(A) Innocuous (B) Turgid
(C) Disfigured (D) Punctual

19. *Sadia _____ at me in doubt and disbelief.*
(A) Watched (B) Gazed
(C) Gaped (D) Looked

20. *If you are seeking _____ that will resolve all our ailments, you are undertaking an impossible task.*
(A) A direction (B) A contrivance
(C) A panacea (D) A precedent

ANSWERS

1.	(C)	2.	(B)	3.	(D)
4.	(A)	5.	(A)	6.	(C)
7.	(B)	8.	(C)	9.	(D)
10.	(B)	11.	(A)	12.	(B)
13.	(A)	14.	(C)	15.	(D)
16.	(A)	17.	(C)	18.	(A)
19.	(B)	20.	(C)		

TEST NO. 5

1. *Didn't you tell me that you would come to see me? No, I _____.*
(A) Didn't (B) Had not
(C) Have not (D) Could not

2. *We must _____ the tickets for the movie in advance.*
(A) Remove (B) Take
(C) Draw (D) Buy

3. *Only _____ were present at the seminar.*
(A) A few people (B) A little people
(C) A few people (D) The little people

4. *The stenographer is very efficient. He is _____ to his firm.*
(A) An asset (B) A boon
(C) A credit (D) A blessing

5. *The twins are so alike that I cannot _____ one from the other.*
(A) Say (B) Notice
(C) Discern (D) Tell

6. *Just _____ the files on my table.*
(A) Let (B) Leaves
(C) Stay (D) Leave

7. *I never miss a cricket match. I _____ fond of cricket since childhood.*
(A) Am (B) Has been
(C) Have been (D) Will be

8. *All of us should abide _____ the laws of our country.*
(A) By (B) In
(C) To (D) With

9. *The period of the fall of the Roman Empire was a dark period for _____ as well as for other arts.*
(A) Aesthetics (B) Gastronomy
(C) Astrology (D) Histrionics

10. *Multan _____ a very hot climate.*
(A) Has (B) Have
(C) Has been (D) With

11. *That professor enjoys teaching and _____.*
(A) Writing (B) Written
(C) To write (D) Write

12. *She came _____ with me to see the circus.*
(A) After (B) Across
(C) Along (D) Off

13. *The police has been looking for him _____ four weeks.*
(A) During (B) For
(C) Since (D) Till

14. *_____ discovery of insulin, it was not possible to treat diabetes.*
(A) Prior (B) Before to the
(C) Prior to the (D) To prior the

15. *Do no hanker _____ worldly pleasures.*
(A) For (B) Towards
(C) After (D) About

16. *In partnership with Pakistan, South Korea _____ on Motorway.*
(A) Helped worked (B) Helping work
(C) Helped working (D) To help working

17. *He is too dull _____ the problem.*
(A) Solving (B) To solving
(C) Solves (D) To solve

18. *Distribute the handouts _____ the candidates.*
(A) Between (B) Among
(C) To (D) In

19. *Thank you for _____ me your book.*
(A) Borrowing (B) Lending
(C) Borrowed (D) Had lent

20. *Although he is blind, he is very fast _____ calculations.*
(A) At (B) About
(C) In (D) With

ANSWERS

1.	(C)	2.	(D)	3.	(A)	4.	(A)	5.	(D)
6.	(D)	7.	(C)	8.	(A)	9.		10.	(A)
11.	(A)	12.	(C)	13.	(B)	14.	(C)	15.	(C)
16.	(C)	17.	(D)	18.	(B)	19.	(B)	20.	(A)

TEST NO. 6

◆ ***Select the word that best completes each of the following sentences:***

1. ***The reasoning in this editorial is so _____ that we cannot see how anyone can be deceived by it.***
(A) Dispassionate (B) Cogent
(C) Specious (D) Coherent

2. ***Sometimes, it is necessary for an author to know what is going on in the minds of his characters. This is called _____.***

(A) Omniscience (B) Omnipotence
(C) Truclence (D) Omnipresence

3. *The press conference did not clarify many issues since the president responded with obfuscation and _____ rather than clarity and precision.*
(A) Lucidity (B) Vagueness
(C) Formality (D) Humor

4. *Sri Lanka, for the present, is deeply _____ in economic difficulties, but, the Government has taken a pledge to set everything right within 2 years.*
(A) Ruined (B) Swamped
(C) Saturated (D) Engrossed

5. *I don't know _____ to value your qualities.*
(A) Only how (B) How
(C) So how (D) That how

6. *The _____ of evidence was on the side of the plaintiff since all but one witness testified that Salim's story was correct.*
(A) Brunt (B) Accuracy
(C) Propensity (D) Preponderance

7. *Patriotism, like so many other objects of this imperfect world, is a _____ web of good and evil.*
(A) Tangled (B) Entrapped
(C) Entangled (D) Complicated

8. *It is difficult for a modern audience, accustomed to the minutiae of film and TV; to appreciate opera with its grand spectacle and _____ gestures.*
(A) Subtle (B) Inane
(C) Monotonous (D) Extravagant

9. *She should continue to remain cold towards her lover till the latter has taken _____ to move her heart to kindness.*
(A) Suffering (B) Pain
(C) Trouble (D) Pains

10. *Though Akram was theoretically a friend of labour, his voting record in party _____ that impression.*
(A) Belied (B) Confirmed
(C) Maintained (D) Implied

11. *To _____ a bus here is not so easy.*
(A) Obtain (B) Get
(C) Gain (D) Acquire

12. *Because of the moon's _____ gravity, it has little or no substance.*
(A) Weak (B) Dull
(C) Frail (D) Unsubstantial

13. *Behaviorism was a protest against the _____ psychological tradition which held that the proper data of psychology were mentalistic.*
(A) Moralistic (B) Orthodox
(C) Redoubtable (D) Rudimentary

14. *He had a terrible night caused by an _____ during his sleep.*
(A) Delusion (B) Hypochondria
(C) Debility (D) Obsession

15. *A metaphorical statement is an _____ comparison; it does not compare things explicitly, but suggests a likeness between them.*
(A) Implied (B) Ardent
(C) Unfair (D) Inherent

16. *Any leader who allows nepotism to flourish should be subject to _____.*
(A) Stringency (B) Punish
(C) Autopsy (D) Condemnation

17. *A lively joke is a _____ expression for the moment.*
(A) Apt (B) Befitting
(C) Proper (D) Correct

18. *A scathing review of the recent performance of dancers called the production grotesque and the conducting of the orchestra _____.*
(A) Munificent (B) Pedestrian
(C) Prejudicial (D) Heretical

19. *The appropriate word used for marriage between people of different races is _____.*
(A) Embolism (B) Scurrility
(C) Reverberation (D) Nonsequitur

20. *The ravages of time had left the caste _____; it towered above the village, looking much as it must have done in King Faisal's time.*
(A) Untouched (B) Lonely
(C) Destroyed (D) Alone

ANSWERS

1.	(C)	2.	(A)	3.	(B)
4.	(A)	5.	(B)	6.	(D)
7.	(A)	8.	(D)	9.	(C)
10.	(A)	11.	(B)	12.	(A)
13.	(B)	14.	(D)	15.	(A)
16.	(D)	17.	(C)	18.	(B)
19.	(D)	20.	(A)		

TEST NO. 7

◈ *Choose the word for blank spaces.*

1. *I have no _____ motive in offering this advice; I seek no personal advantage.*
(A) Ulterior (B) Nominal
(C) Disinterested (D) Incongrous

2. *We had a wonderful view of the day through the _____.*
(A) Proximity (B) Hole
(C) Window (D) Vicinity

3. *Because customers believe that there is a direct correlation between price and value, software manufacturers continue to _____ their prices at an astonishing rate.*
(A) Control (B) Raise
(C) Inflate (D) Determine

4. *To find the volume of an irregular solid you must _____ Archimedes Principle.*
(A) Practice (B) Exploit
(C) Apply (D) Employ

5. *Hamid and Javed were part of that inner _____ of the police whose distinguished legacy dominated national domestic policy.*
(A) Sanctum (B) Core
(C) Life (D) Circle

6. *Artists and poets are possessed of the same qualities of mind, governed by the same principles of taste, and are consistently is sympathy and never in _____ with one another.*
(A) Danger (B) Accord
(C) Collusion (D) Disagreement

7. *That charming girl was the _____ of all eyes.*
(A) Cynosure (B) Aim
(C) Target (D) Ambition

8. *This garden has been preserved in all its _____ wildness so that visitors in future years may see how people lived during the previous centuries.*
(A) Esoteric (B) Pristine
(C) Hedonistic (D) Prospective

9. *The gold ornament was _____ with precious stones.*
(A) Beautiful (B) Studded
(C) Adorned (D) Decorated

10. *The most difficult modern compositions for the piano _____ the audience.*
(A) Incited (B) Excited
(C) Thrilled (D) Disappointed

11. *The High Court, is striking down the state law, ruled the statute had been enacted in an atmosphere charged with religious convictions which had _____ the law-making process.*
(A) Repealed (B) Infected
(C) Written (D) Influenced

12. *Nighat is kind; her husband is not _____ a man.*
(A) Such (B) Like
(C) So (D) As well

13. *If you carry this truculent attitude to the conference, you will _____ any supporters you may have at this moment.*
(A) Alienate (B) Delight
(C) Attract (D) Defer

14. *I have no _____ to listen to his silly talk.*
(A) Trouble (B) Convenience
(C) Patience (D) Perseverence

15. *The latest research indicates that feelings of love occur in the nonverbal part of brain, which helps to explain why people are often able to experience such feelings but not _____ them.*
(A) Convey (B) Remove
(C) Explain (D) Believe

16. *The young man was quickly promoted when his boss saw how _____ he was.*
(A) Assiduous (B) Cursory
(C) Lethargic (D) Indigent

17. *The courtiers had to swear _____ to the new king.*
(A) Allegiance (B) Obedience
(C) Loyalty (D) Faithfulness

18. *He never _____ to her in the near past.*
(A) Wrote (B) Write
(C) To write (D) Written

19. *Progress in government, literature, art, religion, science and philosophy _____ great civilisations from mere groups of society.*
(A) Relinquish (B) Distinguish
(C) Describe (D) Extol

20. *The _____ pittance the widow receives from the society cannot keep her from poverty.*
(A) Indulgent (B) Munificent
(C) Niggardly (D) Magnanimous

ANSWERS

1.	(A)	2.	(C)	3.	(B)
4.	(C)	5.	(B)	6.	(D)
7.	(A)	8.	(B)	9.	(D)
10.	(C)	11.	(B)	12.	(D)
13.	(A)	14.	(B)	15.	(C)
16.	(A)	17.	(D)	18.	(A)
19.	(B)	20.	(C)		

TEST NO. 8

◆ **Complete the sentences by given choices:**

1. *For Arshad, art became a _____ ritual; paper and pencils were holy objects to him.*
(A) Futile (B) Fascinating

(C) Sacred (D) Superficial

2. *Since there was adequate grazing area for the herds, the land was _____ populated.*
(A) Sparsely (B) Disproportionately
(C) Rustically (D) Inadequately

3. *It is _____ that students do not repay their loans.*
(A) Laudable (B) Unfortunate
(C) Unforgivable (D) Regrettable

4. *The tapeworm is an example of _____ organism.*
(A) Parasitic (B) Protozoan
(C) Exemplary (D) Hospitable

5. *He said that there was no going back because his decision was _____.*
(A) Palatable (B) Peremptory
(C) Premeditated (D) Revolutionary

6. *Although his initial success was _____ by the fact that Faisal was the son of a famous actor, the critics later acclaimed him as a star in his own right.*
(A) Refuted (B) Superceded
(C) Enhanced (D) Trivialized

7. *That was an _____ addition of this book.*
(A) Summarized (B) Abbreviated
(C) Shortened (D) Abridged

8. *Shy and hypochondriacal Akbar was uncomfortable at public gatherings, his character made him a most _____ lawmaker and practicing politician.*
(A) Fervent (B) Effective
(C) Unlikely (D) Gregarious

9. *The event came _____ as he had predicted it.*
(A) Up (B) Off
(C) By (D) About

10. *Moeen is _____ opponent, you must respect and fear him at all times.*
(A) Craven (B) Redoubtable
(C) Insignificant (D) Disingenuous

11. *Now she feels the folly of _____ him.*
(A) Quarreling with (B) Quarrel on
(C) Quarreling to (D) Quarreling against

12. *His answer was such _____ I expected him to give.*
(A) As (B) Like
(C) Which (D) That

13. *His true feelings _____ themselves in his sarcastic asides; only then was his bitterness revealed.*
(A) Developed (B) Concealed
(C) Manifested (D) Grieved

14. *Contrary to popular belief, they were not peace-loving astronomers but _____ warriors who viewed their gods as cruel and vengeful.*
(A) Reluctant (B) Amicable
(C) Skilled (D) Formidable

15. *We must try to understand his momentary aberration for Ashraf has _____ more strain and anxiety than any among us.*
(A) Undergone (B) Forgotten
(C) Described (D) Understood

16. *I do not think, you will gain anything by insulting and _____ the man you do not agree with.*
(A) Depicting (B) Revamping

(C) Defaming (D) Charging

17. *Although, alcoholism has long been regarded as a personality disorder, there is evidence to suggest that alcoholics are often the children of alcoholics and that they are born with a _____ the disease.*
(A) Deterioration of (B) Respect for
(C) Liability for (D) Predisposition to

18. *Milk is a _____ food.*
(A) Wholesome (B) Nutritious
(C) Health giving (D) Pure

19. *So many servants attended _____ him during his illness.*
(A) On (B) With
(C) At (D) Upon

20. *Because it arrives so early in the season, before many other birds, the robin has been called the _____ of spring.*
(A) Compass (B) Harbinger
(C) Autocrat (D) Hostage

ANSWERS

1.	(C)	2.	(A)	3.	(D)
4.	(A)	5.	(B)	6.	(C)
7.	(B)	8.	(C)	9.	(D)
10.	(B)	11.	(C)	12.	(A)
13.	(C)	14.	(D)	15.	(A)
16.	(C)	17.	(D)	18.	(B)
19.	(A)	20.	(B)		

TEST NO. 9

◈ *Choose the word which when inserted in the sentence, best fits the meaning of sentence.*

1. *Overindulgence _____ character as well as physical stamina.*
(A) Maintains (B) Debilitates
(C) Stimulates (D) Strengthens

2. *_____ the event of Aslam's resigning his job, his family would starve.*
(A) In (B) On
(C) At (D) Within

3. *Despite the fact that Nadia was much _____, the scientist continued to present her controversial theory to the public.*
(A) Imitated (B) Chastened
(C) Maligned (D) Admired

4. *Traffic speed limits are set at a level that achieves some balance between the danger of _____ speed and the desire of most people to travel as quickly as possible.*
(A) Excessive (B) Prudent
(C) Marginal (D) Normal

5. *Wooden surface was glued _____ the steel surface.*
(A) Within (B) Against
(C) Onto (D) Into

6. *His _____ tactics may compel me to cancel the contract as the job must be finished on time.*
(A) Offensive (B) Dilatory
(C) Infamous (D) Confiscatory

7. *In the world of today, material values take precedence _____ spiritual values.*

(A) Over (B) At
(C) On (D) About

8. *The supposedly impregnable defenses of the country's southern border became _____ when the officer discovered that the defenses could be circumvented by an approach from the east.*
(A) Useless (B) Flexible
(C) Valuable (D) Worthless

9. *Work hard lest you _____ fail.*
(A) Will (B) Should
(C) Can (D) Should not

10. *Usman is not attracted by the peripatetic life of the _____ always wandering through the countryside.*
(A) Vagabond (B) Mendicant
(C) Almsgiver (D) Philosopher

11. *For Amna, each new school year was an_____ experience, but her brother awaited the coming of autumn with dread.*
(A) Exhausting (B) Illuminating
(C) Exciting (D) Exhilarating

12. *_____ is a person who dabbles in art and letters.*
(A) Philosopher (B) Philistine
(C) Chauvinist (D) Dilettante

13. *Faced with these massive changes, the government keeps its own counsil, although generally benevolent, it has always been _____ regime.*
(A) Reticent (B) Indifferent
(C) Altruistic (D) Unpredictable

14. *Train is _____ of different bogeys.*
(A) Made of (B) Make up of
(C) Made with (D) Made up

15. *The legal system of Russia can no longer regard itself as _____ and standing apart from those of other countries.*
(A) Damaging (B) Arbitrary
(C) Binding (D) Independent

16. *The members of the religious sect ostracized the _____ who had abandoned their faith.*
(A) Recreant (B) Coward
(C) Suppliant (D) Litigant

17. *Saima _____ my name from across the river.*
(A) Cried (B) Called
(C) Cried out (D) Shouted

18. *After having worked in the soup kitchen feeding the hungry, the volunteer began to see her own good fortune as a _____.*
(A) Threat (B) Fluke
(C) Omen (D) Reward

19. *To the ambassador, who believed that some measure of _____ should always characterize junior staffers, the new aid seemed very presumptuous.*
(A) Energy (B) Integrity
(C) Humility (D) Sincerity

20. *He worked _____, because he aspired to stand first in the examination.*
(A) Very hard (B) Harder
(C) Much hard (D) The harder

ANSWERS

1.	(B)	2.	(A)	3.	(C)
4.	(A)	5.	(C)	6.	(B)
7.	(A)	8.	(D)	9.	(B)
10.	(A)	11.	(C)	12.	(D)
13.	(A)	14.	(C)	15.	(D)
16.	(A)	17.	(D)	18.	(B)
19.	(C)	20.	(A)		

TEST NO. 10

◈ *Choose the word that is most nearly the same in meaning to the key word.*

1. *Those defenders of the tobacco industry who deny that there is a casual linkage between cigarette smoking and many diseases all but _____ the statistical evidence that very clearly demonstrates the connection.*
   (A) Ignore (B) Signify
   (C) Explain (D) Refute
2. *I have come to see the loss, I won't see any one _____.*
   (A) Except (B) Else
   (C) Or else (D) Other
3. *This state is a colony, however, in most matters, it is _____ and receives no order from the mother country.*
   (A) Distant (B) Autonomous
   (C) Submissive (D) Amorphous
4. *Take any apple _____ you like.*
   (A) What (B) As
   (C) Which (D) That
5. *By the middle of January, the river had become so choked with ice as to be _____ even for the smallest of boats.*
   (A) Inactive (B) Unreliable
   (C) Impassable (D) Unattractive
6. *They fired upon the enemy from behind the trees, walls and any other _____ point they could find.*
   (A) Vantage (B) Indefensible
   (C) Exposed (D) Definitive
7. *The dog is _____ faithful animal.*
   (A) The (B) Not
   (C) A (D) Very
8. *In their most recent report to the shareholders, the directors _____ financial information on international sales.*
   (A) Distort (B) Omit
   (C) Invent (D) Substitute
9. *Maria has been waiting for you _____ morning.*
   (A) Till (B) From
   (C) For (D) Since
10. *The evil of class and race hatred must be eliminated while it is still in an _____ state.*
    (A) Independent (B) Amorphous
    (C) Embryonic (D) Uncultivated
11. *The candidate later _____ the broad generalization concerning welfare recipients by noting that*

the vast majority are not able to find significant employment.

(A) Verified (B) Qualified
(C) Withdrew (D) Clarified

12. *Haider is either a scholar _____ a professional teacher.*

(A) Else (B) Or else
(C) Or (D) And

13. *In many countries, the proponents of a centrally controlled economy, although in _____, continue to constitute a powerful political force.*

(A) Control (B) Restart
(C) Disarray (D) Error

14. *Raheela spoke _____ that it was applauded by all.*

(A) Well (B) As well
(C) Very well (D) So well

15. *Studded starfish are well protected from most predators and parasites by _____ surface whose studs are actually modified spines.*

(A) A fragile (B) An obtuse
(C) An armoured (D) A brittle

16. *The committee censured the member, noting that his behaviour was the very _____ of ethical conduct.*

(A) Essence (B) Embodiment
(C) Nature (D) Antithesis

17. *Stand here, _____ I speak.*

(A) While (B) As
(C) When (D) The time

18. *We need more men of culture and enlightenment, we have too many _____ among us.*

(A) Students (B) Philistines
(C) Philosophers (D) Visionaries

19. *The successful _____ of a novel or a poem requires fluency in two languages.*

(A) Publication (B) Reproduction
(C) Writing (D) Translation

20. *Let us wait _____.*

(A) So little (B) Little
(C) A little (D) The little

ANSWERS

1.	(A)	2.	(B)	3.	(B)
4.	(D)	5.	(C)	6.	(A)
7.	(C)	8.	(A)	9.	(D)
10.	(C)	11.	(B)	12.	(C)
13.	(B)	14.	(D)	15.	(C)
16.	(D)	17.	(A)	18.	(B)
19.	(D)	20.	(C)		

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Part 2 Analogy Questions

The word analogy means "an agreement or correspondence in certain respect between things otherwise different ---- a resemblance of relations, as in the phrase, "knowledge is to the mind, what light is to the eye": relation in general: likeness: correspondence of a word or a phrase with the genius of a language, as learned from the manner in which its words and phrases are ordinarily formed: similarity of derivative or inflectional processed."

The Urdu meaning of the word analogy is

Example 1: interesting the missing word.

Days is to night as truth is to falsehood.

Answer: In the above sentence, the word falsehood has been inserted.

Example 2: which choice gives the answer?

1. Man is to run as bird is to _____.

Choices: (i) fly, (ii) run, (iii) weak.

Answer: (i)

Example 3: ring is to finger as watch is to ____

Choices: (i) arm, (ii) wrist, (iii) leg.

Answer: (ii)

TYPES OF ANALOGY TESTS

First Type: The first type is that in which two words which have some relationship with each other are presented. These are followed by another word and a number of choices. One word from the choices is to be picked up to establish the same relation with the third word as the first two have. For example----

Day is no Night as Cold is to?

(A) Ice (B) Wet
(C) Warm (D) Snow

The correct answers is (C).

Day and Night bear the relation of the opposites. As cold is opposite of warm.

Second Type: Part relationship----- In this type of relationship, the two words represent the parts of a bigger thing. For example----

Lyric is to Ode as

Head is to legs
Sky is to earth
Bomb is to science
Newspaper is to journalist

The correct answer is (A).

In the above quoted example, Lyric and Ode are two types of poems. Similarly, head and legs are two parts of the human body.

Third Type: Another type of analogy is in which one of the four relationship element is not given. One out of the choices is selected. Example----

Ship is to Fish as

(A) Kite (B). Feather
(C) Tree (D) Chirp

is to bird

The correct answer is (A).

Explanation ---- Both ship and fish are found in water. This is the relationship between the two words. For bird, we will have to pick up kite because both are seen in air.

HOW TO ATTEMPT THIS QUESTION

Step One --- Establish the relationship between the first two words.

Step Two --- Find the same relationship among the choices which follows the pattern of the two words.

KINDS OF RELATIONSHIP

1. ***Purpose relationship*** __ ***Example*** __ ***Glove: Balls as***
(A) Hook: Fish (B) Winter: Weather
(C) Games: Sports (D) Stadium: Seats

The correct answer is (A)

The purpose of glove is to help in catching the ball and the purpose of hook is to catch fish. The correct answer is (A)

2. ***Cause and effect relationship_Example__ Race: Fatigue as:***
(A) French: Athlete (B) Fast: Hunger
(C) Art: Bug (D) Walking: Running

The correct answer is (B) because fatigue is the effect of race; hunger is the effect of fast.

3. ***Part whole relationship*** __***Example***__ ***Snake: Reptile as***
(A) Patch: Thread (B) Removal: Snow
(C) Struggle: Wrestle (D) Hand: Clock

4. ***Action to object and object to action relationship, Examples***__
A. Kick: Football:
(A) Kill: Bomb (B) Break: Pieces
(C) Question: Team (D) Smoke: Pipe
B. Steak: Broil:
(A) Bread: Bake (B) Food: Sell
(C) Wine: Pour (D) Sugar: Spill

Kick shows action and Football the object of action. This very relationship is represented in (D) i.e., smoking is action and pipe is the object. For B answer is (A).

5. ***Synonym relationship—***
Enormous: Huge as
(A) Rough: Rock (B) Muddy: Unclear
(C) Purse: Kitchen (D) Black: White

The correct answer is (B) because "muddy" and unclear are synonyms.

6. ***Antonym relationship—Example——***
Purity: Evil as
(A) Suavity: Bluntness (B) North: Climate
(C) Angle: Horns (D) Boldness: Victory

The correct answer is (A) because the two words are antonyms.

7. ***Place relationship—Example—Faisal Mosque: Islamubad as***
(A) Red Square: Moscow (B)Albany: New York
(C) India: Madras (D) Pakistan: Nepal

Faisal Mosque is situated in Islamabad so is Albany in New York.

8. ***Degree relationship—Example—Warm: Hot as***
(A) Glue: Paste (B) Climate: Weather
(C) Bright: Genius (D) Frown: Anger

Warm is less hot and frown is less anger.

9. ***Sequence relationship—Spring: Summer at.***
(A) Thursday: Wednesday
(B) Wednesday: Monday
(C) Monday: Wednesday
(D) Wednesday: Thursday

Summer comes after Spring so does Thursday after Wednesday.

10. ***Association relationship—Example—Devil: Wrong as***
(A) Colour: Sidewalk (B) Slipper: State
(C) Ink: Writing (D) Picture: Bed

Devil is associated with wrongs so ink is associated with writing.

11. Grammatical relationship— Example— Restore: Climb as

(A) Segregation: See (B) Nymph: In
(C) Room: Although (D) Run: See

Restore and climb are verbs so are run and see.

EXAMPLES WITH EXPLANATORY ANSWERS

Example 1 BRIM: HAT::

(A) hand: glove
(B) spoke: umbrella
(C) skirt: hem
(D) snood: hood
(E) lace: shoe

Answer: The correct answer is (E)

What is the relationship between BRIM AND HAT? A brim is a part of a hat, so the relationship is that of part to whole. The next step is to examine the answer choices to find another pair of words which bear the same relation to each other. Consider each answer choice in turn.

(A) A hand is not a part of a glove, so eliminate **(A)**.

(B) A spoke is part of an umbrella, so (B) is a likely choice. But don't mark your answer yet. You must always look at all five choices before making your final decision.

(C) A hem is part of a skirt, but BEWARE. The relationship in (C) is whole (the skirt) to part (the hem), which is the reverse of the initial relationship. Your answer must maintain the same relationship in the same sequence as the original pair. Eliminate (C).

(D) If you know that a snood is a hair net, you can see that snood, hood, and hat are all headgear. However, a snood is not a part of a hood, so (D) is incorrect. If you do not know the meaning of one word among the choices, do not fall into the trap of choosing that answer just because it's unfamiliar. Consider all the choices carefully before you mark an unknown answer as correct.

(E) A lace is a part of a shoe, so (E) appears to be a perfectly good answer.

Having found two likely answers, (B) and (E), you must go back to the original pair and determine its other distinguishing characteristics. A brim is a part of a hat, but it is not a necessary part. Not all hats have brims. A lace is a part of a shoe, but it is not a necessary part. Some shoes have buckles and some are slip-ons. A spoke, however, is a necessary part of an umbrella. Furthermore, a brim is a part of a hat, which is wearing apparel. A lace is part of a shoe, which is also wearing apparel. But an umbrella is not something to wear. Thus there are two counts on which to eliminate (B) and to choose (E) as the best answer.

Usually, the problem with analogies is refining the relationship to find the best answer. Sometimes, however, the difficulty will be in finding even one correct answer. If this happens, you may have to redefine the relationship. Consider an analogy which begins LETTER: WORD. You first thought is probably that a letter is part of a word, and so you look for an answer choice that shows a part-to-whole relationship. However, suppose the question looks like this:

Example 2. LETTER: WORD::

(A) Procession: Parde (B) Dot: Dash
(C) Whisper: Orate (D) Song: Note
(E) Spell: Recite

Answer: The correct answer is (D).

Not one of these choices offers a part-to-whole relationship. Returning to the original pair, you must then consider other relationship between letter and word. If letter is not "letter of the alphabet," but, rather, "written communication," then a word is part of a letter and the relationship becomes that of the whole to its part. Now the answer is immediately clear. A song is the whole of which a note is a part.

Example 3. PILOT: STEER:: guide or control

(A) Chef: Dine (B) Boss: Obey
(C) Lawyer: Retain (D) Guard: Protect

Answer: The correct answer is (D)

At first glance several of these answers may seem to work. "A pilot is someone who steers." "A

soldier is someone who is commanded." The relationship looks promising, but it's not correct. Ask yourself who is doing what to whom? In the original pair, the pilot is doing something: the pilot is steering. The choices B and C: a boss is someone who is obeyed: a lawyer is someone who is retained (hired). Again, the original grammatical relationship is reversed.

By definition, a pilot is a person who steers. In the same way, by definition, a guard is a person who protects.

Example 4. INTERLOPE: INTRUSION::

(A) Witness: Interrogation (B) Actor: Intermission
(C) Recluse: Interference (D) Mediator: Intercession

Answer: The correct answer is (D).

Again, ask yourself who is doing what to whom. An interloper is a person who butts in or thrusts himself into the business of others. An interloper commits an intrusion; he or she intrudes. A witness, on the other hand, is not the person who conducts the interrogation. A witness is the person who is being interrogated.

You can eliminate choice (A) and any other answer choices in which the original relationship is reversed. The mediator or go-between is the person who acts, trying to reconcile quarrelling parties by means of intercession.

Exan ple 5. CONSTELLATION: STARS::

(A) Prison: Bars (B) Assembly: Speaker
(C) Troupe: Actors (D) Mountain: Peak

Answer: The correct answer is (C)

A constellation is made up of stars. A troupe (not troop but troupe) is made up of actors. Choice C is correct.

Note, by the way, the characteristics of the analogy you have just analyzed, CONSTELLATION: STARS. It is a good analogy. The relationship between the words is built-in; if you look up constellation in a dictionary, you will see that a constellation is a group of stars. The words are related by definition.

Your correct answer choice has got to have the same characteristics as the original pair. The words must have a clear relationship. They must be related by definition. If you substitute them in your test sentence, they must fit it exactly.

Example 6. FISH. TROUT::

(A) Ocean: Wave (B) Mammal: Whale
(C) Bird: Aviary (D) Antenna: Insect

Answer: The correct answer is (B)

A trout is a kind of fish. A whale is a kind of mammal. (Class and Members)

Example 7. DIMMED: LIGHT::

(A) Beached: Texture (B) Muffled: Sound
(C) Measured: Weight (D) Tragrant: Smell

Answer: The correct answer is (B)

Light that is dimmed is lessened in brightness. Sound that is muffled is lessened in volume.

Example 8. DOCTOR: DISEASE::

(A) Moron: Imbecility
(B) Pediatrician: Senility
(C) Psychiatrist: Maladjustment
(D) Broker: Stocks

Answer: The correct answer is (C)

A doctor attempts to treat a disease. A psychiatrist attempts to treat a maladjustment.

Example 9. PATRON: SUPPORT::

(A) Spouse: Divorce
(B) Restaurant: Management
(C) Counselor: Advice
(D) Host: Hostility

answer: The correct answer is (C). A patron by definition provides patronage or support. A counselor by definition provides advice.

Example 10. CLOCK: TIME::

(A) Watch: Wrist (B) Odometer: Speed
(C) Hourglass: Sand (D) Yardstick: Distance

Answer: The correct answer is (D)

A clock measures time. A yardstick measures distance. (Function).

The candidate should know about the different types of analogies that are more frequently asked in the question paper. Some of the common analogy types are as follows:

i. Synonyms:

Some words are linked together in a pair which means the same or has a similar dictionary definition e.g., Large-Big.

ii. Describing Qualities:

Some pairs have some words in which one word describes the other word, e.g., Hot-Iron.

iii. Class and Member:

Some pairs have words which are based on class and member basis, e.g., Vehicle-Car

iv. Antonyms:

Some pairs consist of the words that are opposite to each other, e.g., Confess-Deny.

v. Describing Intensity:

Some pairs consist of the words in which one describes the intensity of the other, e.g., Anger-Rage (violent anger).

vi. Function:

In some pairs, a word describes the function of the other word, e.g., Football-Pay.

vii. Manners:

Some words in a speech describe the manners and behavior e.g., Weep-Bitterly.

viii. Worker-Workplace

Some pairs in a word describe the profession and its workplace, e.g., Teacher-Class.

Multiple Choice Questions (MCQs)

TEST-1

Directions: In the following questions, select the pair of words given against *(A)*, *(B)*, *(C)* or *(D)* which has the same relation as between the first two words.

1. ***VERITY: CASUISTRY::***

(A) Egalitarian: Equality (B) Sweet: Mellifluous
(C) Constant: Capricious (D) Milk: Cream

2. ***NAIVE: INGENUE::***

(A) Ordinary: Genius (B) Venerable: Celebrity
(C) Urbane: Sophisticate (D) Crafty: Artisan

3. ***HORSE: CORRAL::***

(A) Oyster: Reef (B) Dog: Muzzle
(C) Sheep: Flock (D) Pig: Sty

4. ***PROOF: ALCOHOL::***

(A) Cream: Milk (B) Canteen : Water
(C) Tanker: Oil (D) Octane: Gasoline

5. ***APOSTATE: RELIGION::***

(A) Potentate: Kingdom (B) Traitor: Country
(C) Bureaucrat: Government (D) Jailer: Law

6. ***ANIMAL : MONKEY::***

(A) Zebra : Giraffe (B) Stationery : Pencil
(C) Book: Cap (D) Tree: Wood

7. ***MARATHON: STAMINA::***

(A) Relay: Independence (B) Hurdle: Perseverance
(C) Sprint: Celerity (D) Jog: Weariness

8. ***DESCRY: DISTANT::***

(A) Mourn: Lost (B) Whisper: Muted
(C) Discern: Subtle (D) Destroy: Flagrant

9. *FOX: CUNNING::*
(A) Dog: Playful (B) Hyena: Amusing
(C) Beaver: Industrious (D) Vixen: Cute

10. *HOUSE : BIG::*
(A) Home : Live (B) School : Daily
(C) Water : Cold (D) Clothes : Socks

11. *PRIDE : LIONS::*
(A) Gaggle : Geese (B) Honor: Thieves
(C) Snarl: Wolves (D) Arrogance: Kings

12. *BIBULOUS: DRINK::*
(A) Rapacious: Clothing (B) Gluttonous: Food
(C) Altruistic: Money (D) Vegetarian: Meat

13. *IMPROMPTU: REHEARSAL::*
(A) Practiced: Technique (B) Makeshift: Whim
(C) Offhand: Premeditation (D) Glib: Fluency

14. *HEAVY : LIGHT*
(A) Fat : Thin (B) Stupid : Idiot
(C) Rough: Surface (D) Beautiful: Diary

15. *HERMIT: GREGARIOUS::*
(A) Miser: Penurious (B) Ascetic: Hedonistic
(C) Coward: Pusillanimous (D) Scholar: Literate

16. *BELLWETHER: BAROMETER::*
(A) Proselyte: Spark plug (B) Panhandler: Kill
(C) Embezzler: Abduct (D) Cynosure: Magnet

17. *PERJURY: OATH::*
(A) Plagiarism: Authority (B) Embezzlement: Trust
(C) Disrespect: Age (D) Testimony: Court

18. *ELISION: SYLLABLES::*
(A) Contraction: Letters (B) Thesis: Ideas
(C) Diagnosis: Symptoms (D) Almanac: Facts

19. *OBLIVIOUS: AWARENESS::*
(A) Comatose: Consciousness (B) Serene: Composure
(C) Erudite : Knowledge (D) Adroit: Skill

20. *DIDACTIC: TEACH ::*
(A) Sophomoric: Learn (B) Satiric: Mock
(C) Reticent: Complain (D) Chaotic : Rule

21. *ACT : ACTION::*
(A) Therapy : Thermometer (B) Oblivion: Obvious
(C) Liturgy: Literature (D) Image: Imagine

22. *SONG: RECITAL::*
(A) Author: Bibliography (B) Episode: Series
(C) Coach: Team (D) Dancer: Agile

23. *MENDACITY: HONESTY ::*
(A) Courage: Cravenness (B) Truth: Beauty
(C) Courage: Fortitude (D) Unsophistication: Ingenuousness

24. *HEIGHT: MOUNTAIN::*
(A) Depth: Trench (B) Shade: Tree
(C) Weight: Age (D) Speed: Highway

25. *DETRITUS: GLACIER::*
(A) Thaw: Snowfall (B) Snow: Ice Cap

(C) Silt: River (D) Range: Mountain

TEST-2

Directions: In the following questions, select the pair of words given against *(A), (B), (C), (D), (E)* which has the same relation as between the first two words:

1. ***Oasis: Desert***
   (A) Lunch: Dessert (B) Inveigh: Inveigle
   (C) Forest: Jungle (D) Ocean: Bay
   (E) Affluence: Poverty
2. ***Sad: Morose***
   (A) Robust: Weak (B) Ingress: Egress
   (C) Grass: Food (D) Glad: Happy
3. ***Work: Tired***
   (A) Player: Field (B) Swim: Pool
   (C) Race: Fatigue (D) Book: Knowledge
   (E) Cook: Eat
4. ***Thin: Sparse***
   (A) Tract: Tome (B) Prologue: Epilogue
   (C) Preface: Book (D) Tree: Tall
   (E) Corpulent: Obese
5. ***Sad: Melancholic***
   (A) Over: Under (B) Joy: Ecstasy
   (C) Weak: Robust (D) Book: Writer
   (E) Floor: Ceiling
6. ***Flurry: Confusion***
   (A) Water: Thirst (B) Night: Sleep
   (C) Colour: Attraction (D) Job: Pay
   (E) Intimidate: Fear
7. ***Turbid: Muddy***
   (A) River: Lake (B) Tree: Darkness
   (C) Bell: Ring (D) Huge: Colossal
   (E) Deep: Shallow
8. ***Fresh: New***
   (A) Disease: Malaise (B) Supercilious: Meek
   (C) Epical: Humorous (D) Indigent: Affluent
   (E) Strident: Polite
9. ***Wheel: Hub***
   (A) Sea: Island (B) Body: Heart
   (C) Ruling Party: Cabinet (D) Life: Happiness
   (E) Watch: Needle
10. ***Speech: Peroration***
    (A) Dinner: Dessert (B) Country: Boundary
    (C) Argument: Conclusion (D) Style: Debate
    (E) Money: House
11. ***Death: Lament***
    (A) Impose: Fine (B) Cast: Vote
    (C) Make: Furniture (D) Celebrate: Centenary
    (E) Learn: Lesson
12. ***Virus: Disease***
    (A) Discussion: Fight (B) Desire: Success
    (C) Suggestion: Acceptance (D) Bombardment: Destruction
    (E) Clothes: Gentleman

13. ***Foot: Toe***
(A) Body: Legs
(B) Belly: Intestines
(C) Nail : Fingers
(D) Hand : Fingers
(E) Leaves: Tree

14. ***Zenith: Nadir***
(A) Serious: Sober
(B) Food: Hungry
(C) Fat : Protein
(D) Majestic: Sublime
(E) Peak: Foot

15. ***Giggle: Chortle***
(A) Smile: Grin
(B) Melancholy: Antipathy
(C) Emancipation: Bondage
(D) Insipid: Charming
(E) Edifice: Facade

16. ***Immaculate: Spotless***
(A) Fastidious: Punctilious
(B) Careless: Carefree
(C) Mitigate: Pain
(D) Allay: Aggravate
(E) Ally: Lesson

17. ***Fever: Flush***
(A) Liquid: Gas
(B) Malaria: Shiver
(C) Wings: Flap
(D) Rehearsal: Drama
(E) Cough: Cough

18. ***Pistol: Shoot***
(A) Stone: Throw
(B) Catechism: Church
(C) Ball: Goal
(D) Shaft: Fling
(E) Sword: Cut

19. ***Prelude: Symphony***
(A) Drama: Epilogue
(B) Epilogue: Prologue
(C) Meal: Dessert
(D) Ticket: Show
(E) Preamble: Constitution

20. ***Chains: Clang***
(A) Leaves: Twigs
(B) Coins: Jingle
(C) Door: Lock
(D) Wolf: Roar
(E) Wire: Snap

21. ***Loud: Blatant***
(A) High: Low
(B) Circle: Oval
(C) Penchant: Trenchant
(D) Noisome: Fetid
(E) Good: Bad

22. ***Earth: Sun***
(A) Venus: Mars
(B) Pluto: Moon
(C) Sun: Galaxy
(D) Sun: Star
(E) Universe: Pole-Star

23. ***Room: Cell***
(A) Fort: Battlements
(B) Arcade: Arbour
(C) Hall: Room
(D) Building: Office
(E) Bedroom: Bed

24. ***Coal: Mine***
(A) Rice: Husk
(B) Heart: Body
(C) Seed: Pod
(D) Marble: Quarry
(E) Paper: Pulp

25. ***Lion: Pride***
(A) Tiger: Strength
(B) Wolf: Cub
(C) Building: Height
(D) Fish: School
(E) Book: Study

26. *Voice: Aphasia*
(A) Hearing: Ear (B) Nose: Smell
(C) Sleep: Somnambulism (D) Hunger: Starvation
(E) Sight: Blindness

27. *Swan: Cygnet*
(A) Horse: Filly (B) Elephant: Goad
(C) Pig: Sty (D) Tree: Forest
(E) Leaf: Flower

28. *Reaper: Scythe*
(A) Surgeon: Scalpel (B) Barber: Hair
(C) Butcher: Sheep (D) Batsman: Bat
(E) Writer: Ink

29. *Hassock: Kneeling*
(A) Kitchen: Cooking (B) Bedroom: Sleeping
(C) Field: Running (D) Chair: Sitting
(E) Hearth: Cooking

30. *Barometer: Pressure*
(A) Humidity: Hygrometer (B) Blood Circulation: Stethoscope
(C) Height: Pole (D) Sea: Wave
(E) Height: Depth

31. *Bugle: Sound*
(A) Horn: Head (B) Horn: Blow
(C) Flute: Hole (D) Flute: Blow
(E) Drum: Hit

32. *Say: Assert*
(A) Request: Implore (B) Tell: Narrate
(C) Paint: Describe (D) Tea: Coffee
(E) Solve: Sum

33. *Grain: Skin*
(A) Wheat: Barley (B) Wood: Table
(C) Wood: Grain (D) Book: Wrapper
(E) Book: Alphabet

34. *Staircase: Degrees*
(A) Ladder: Rung (B) House: Storey
(C) Tree: Trunk (D) Table: Legs
(E) Book: Leaves

35. *Mascot: Ominous*
(A) Auspices: Auspicious (B) Loss: Defeat
(C) Game: Player (D) Beginning: Introduction
(E) Victory: Defeat

36. *Book: Leaves*
(A) Table: Legs (B) Teacher: Books
(C) Rosary: Beads (D) Country: Government
(E) Classroom: Desks

37. *Peacock: Pride*
(A) Goat: Kid (B) Man: Manikin
(C) Lion: Bravery (D) Monkey: Man
(E) Loan: Debt

38. *Painter: Brush*
(A) Student: Paper (B) Sculptor: Chisel
(C) Farmer: Field (D) Writer: Ink
(E) Doctor: Medicine

39. *Wool: Shear*
(A) Bicycle: Pedal (B) Fan: Switch
(C) Tree: Planted (D) Feather: Pluck
(E) Bell: Ring

40. *Wool: Cashmilon*
(A) Sheep: Grass (B) Cloth: Dress
(C) Wood: Furniture (D) Paper: Bamboo
(E) Butter: Margarine

41. ***Slip: Hurt***
(A) Neglect: Punishment (B) Plant: Tree
(C) Hard Work: Depreciate (D) Stand: Walk
(E) Cry: Pain

42. ***Society: Ostracise***
(A) Family: Member (B) Zoo: Animal
(C) Judge: Order (D) Government: Excise

43. ***Wolf: Cub***
(A) Old Man: Young Man (B) Forest: Tree
(C) Parliament: Cabinet (D) Swan: Cygnet
(E) Book: Booklet

44. ***Speak: Shout***
(A) Whimper: Bang (B) Silence: Whisper
(C) Gallop: Stop (D) Eat: Digest
(E) Word: Sentence

45. ***Friend: Love***
(A) Enemy: Hate (B) Woman: Marry
(C) Officer: Defied (D) Leader: Hear
(E) Neighbour: Talk

46. ***Cool: Liked***
(A) Cold: Disliked (B) Hot: Welcomed
(C) Truth: Hidden (D) Weather: Pleasant
(E) Question: Solved

47. ***Expand: Expensive***
(A) Expand: Expansive (B) Deceive: Deception
(C) Defend: Intrusive (D) Think: Pensive
(E) Sensitive: Obstrusive

48. ***Watch: Wrist***
(A) Clock: Time (B) Room: Sitting
(C) Success: Work (D) Ornaments: Decoration
(E) Grain: Field

49. ***Bulb: Socket***
(A) Pen: Inkpot (B) Necklace: Neck
(C) Foot: Knee (D) Eye: Socket
(E) Hair: Scalp

50. ***Aeroplane: Pilot***
(A) House: Mason (B) School: Principal
(C) Assembly: Speaker (D) Car: Chauffeur
(E) Machine: Engineer

ANSWERS

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

SYNONYM/ANTONYM TESTS

Directions. In the following questions, each word is followed by four responses *a, b, c* and *d*. You should choose the correct synonym of the given word out of the four choices.

1. ***Abandon :***
   (A) vacate (B) foil
   (C) lose (D) gain
2. ***Abdicate :***
   (A) give up (B) imperious
   (C) rude (D) dissent
3. ***Abhor :***
   (A) crave (B) reconcile
   (C) Detest (D) rude
4. ***Abnegation :***
   (A) indulgence (B) rejection
   (C) complete (D) final
5. ***Axiom :***
   (A) absurdity (B) shirk
   (C) elude (D) maxim
6. ***Bloated :***
   (A) privileged (B) emaciated
   (C) swollen (D) rapture
7. ***Blemish :***
   (A) disgrace (B) eccentric
   (C) young (D) fair
8. ***Bizzare :***
   (A) normal (B) strange
   (C) logical (D) tense
9. ***Bawl :***
   (A) mulberry (B) mutter
   (C) vociferate (D) daub
10. ***Bequeath :***
    (A) alienate (B) stab
    (C) obstruct (D) dispose of
11. ***Cataclysm :***
    (A) reverse (B) upheavel
    (C) pungent (D) trash
12. ***Cupidity :***
    (A) extravagance (B) shrewd
    (C) complaisant (D) avarice
13. ***Cumbersome :***
    (A) awkward (B) analyse
    (C) decay (D) grow
14. ***Culmination :***
    (A) nadir (B) apex
    (C) lenient (D) blast
15. ***Crestfallen :***
    (A) humiliated (B) hard
    (C) elite (D) frustrated
16. ***Deluge :***
    (A) flood (B) object
    (C) annihilate (D) restore
17. ***Dereliction :***
    (A) attention (B) neglect
    (C) divorce (D) restore
18. ***Derogate :***
    (A) exaggerate (B) calm
    (C) deflenerate (D) ordain
19. ***Dormant :***
    (A) active (B) vigilant
    (C) warbling (D) inert
20. ***Don :***
    (A) doff (B) assume
    (C) pine (D) blithe
21. ***Exemplify :***
    (A) reprehensible (B) illustrate
    (C) empty (D) finish
22. ***Entramel :***
    (A) hamper (B) extricate
    (C) apathy (D) amuse
23. ***Emendation :***
    (A) irritant (B) stoicism
    (C) barren (D) rectification
24. ***Elude :***
    (A) evade (B) rule
    (C) sway (D) fascinate
25. ***Exudation :***
    (A) aridity (B) ecstasy
    (C) percolation (D) horrid
26. ***Frivolous :***
    (A) scrious (B) trivial
    (C) peculiar (D) candid
27. ***Furtive :***
    (A) public (B) open
    (C) secretive (D) combine
28. ***Fugitive :***
    (A) escaping (B) enduring
    (C) vain (D) weak
29. ***Fulminate :***
    (A) clamour (B) misfire
    (C) barren (D) prodigal
30. ***Frugal :***
    (A) prolific (B) efficacious
    (C) clamour (D) thrifty
31. ***Guile :***
    (A) candour (B) wander
    (C) deceit (D) sense
32. ***Grotesque :***
    (A) ordinary (B) archaic
    (C) usual (D) crawl
33. ***Gluttony :***
    (A) frugality (B) torment
    (C) voracity (D) thwart
34. ***Grardiloquence :***
    (A) simplicity (B) wanton
    (C) shear (D) verbosity
35. ***Grief :***
    (A) delight (B) sorrow
    (C) redundancy (D) beauty

Directions. In the following questions, each word is followed by four responses *a, b, c* and *d*. Y ' choose the correct antonym of the given

word out of the four choices.

36. ***Abbreviate :***
(A) abridge (B) expand
(C) achieve (D) accept

37. ***Abjure :***
(A) acknowledge (B) disown
(C) deny (D) hate

38. ***Absurd :***
(A) scarcity (B) adorn
(C) rational (D) flourish

39. ***Abundant :***
(A) ample (B) enough
(C) great (D) scant

40. ***Acerbity :***
(A) Sweat (B) gentleness
(C) tasty (D) account

41. ***Blooming :***
(A) Fading (B) flowering
(C) quiet (D) mild

42. ***Bliss :***
(A) merge (B) disseminate
(C) dull (D) suffering

43. ***Bewitch :***
(A) disenchant (B) rapture
(C) profit (D) avail

44. ***Bauble :***
(A) plaything (B) valuable
(C) modest (D) besiege

45. ***Busy :***
(A) bully (B) curb
(C) indolence (D) occupied

46. ***Celebrity :***
(A) celebration (B) solemnity
(C) obscurity (D) hazy

47. ***Cataclysm :***
(A) peace (B) deluge
(C) quibble (D) conjecture

48. ***Concord :***
(A) consolidate (B) bestow
(C) outline (D) discord

49. ***Compliance :***
(A) condone (B) clamour
(C) resistance (D) condense

50. ***Circumlocution :***
(A) amass (B) ambiguity
(C) effusion (D) simplicity

51. ***Despicable :***
(A) worthy (B) contemptible
(C) earn (D) purity

52. ***Ductile :***
(A) indistinct (B) vague
(C) inelastic (D) quiescent

53. ***Dormant :***
(A) Inert (B) doff
(C) indulgence (D) active

54. ***Dissipate :***
(A) accumulate (B) distil
(C) percolate (D) emanate

55. ***Disdain :***
(A) haughtiness (B) erroneous
(C) respect (D) contempt

56. ***Ephemeral :***
(A) transient (B) perpetual
(C) disencumber (D) demote

57. ***Erudition :***
(A) ignorance (B) evict
(C) scholarship (D) dubious

58. ***Exultation :***
(A) ecstasy (B) frugality
(C) mourning (D) severe

59. ***Expunge :***
(A) erase (B) dilate
(C) entity (D) imprint

60. ***Extenuate :***
(A) palliate (B) quality
(C) enhance (D) offhand

61. ***Flux :***
(A) stillness (B) motion
(C) swerve (D) wince

62. ***Fatigue :***
(A) vitality (B) weariness
(C) solemn (D) enchant

63. ***Fume :***
(A) frown (B) chafe
(C) comply (D) dupe

64. ***Fugitive :***
(A) evanescent (B) captive
(C) unkempt (D) smart

65. ***Fulminate :***
(A) murmur (B) clamour
(C) efficacious (D) vain

66. ***Gallant :***
(A) bold (B) fine
(C) frolic (D) coward

67. ***Garrulity :***
(A) reticence (B) gaudy
(C) superb (D) abettor

68. ***Generous :***
(A) magnanimous (B) visual
(C) vivid (D) stingy

ANSWERS

1	(A)	2	(A)	3	(C)	4	(B)	5	(D)
6	(C)	7	(A)	8	(B)	9	(C)	10	(D)
11	(B)	12	(D)	13	(A)	14	(B)	15	(D)
16	(A)	17	(B)	18	(C)	19	(D)	20	(B)
21	(B)	22	(A)	23	(D)	24	(A)	25	(C)
26	(B)	27	(C)	28	(A)	29	(A)	30	(D)
31	(C)	32	(B)	33	(C)	34	(D)	35	(B)
36	(B)	37	(A)	38	(C)	39	(D)	40	(B)
41	(A)	42	(D)	43	(A)	44	(B)	45	(C)
46	(C)	47	(A)	48	(D)	49	(C)	50	(D)
51	(A)	52	(C)	53	(D)	54	(A)	55	(C)
56	(B)	57	(A)	58	(C)	59	(D)	60	(C)
61	(A)	62	(A)	63	(C)	63	(B)	65	(A)
66	(D)	67	(A)	68	(D)				

Part 3 Critical Reading

COMPREHENSION

Introduction:

Comprehension means the act of comprehending or the capacity of the mind to understand. In the examination papers, questions on comprehension test are included to judge the ability of the students to understand the given passage.

In the English language paper, questions on comprehension test are very important for the students appearing in the competitive examinations. Therefore, they should try to learn how to solve these questions. Practice of solving these questions will greatly help them in the examination.

LONG PASSAGE COMPREHENSION
PASSAGES WITH EXPLANATORY ANSWERS

PASSAGE – 1

The Romans – for centuries is the masters of war and politics across Europe, Northern Africa, and Asia Minor – have often been criticized for producing few original thinkers outside the realm of politics. This criticism, while in many ways true, is not without its problems. It was, after all, the conquest of Greece that provided Rome with its greatest influx of educated subjects. Two of the great disasters in intellectual history – the murder of Archimedes and the burning of Alexandria's library – both occurred under Rome's watch. Nevertheless, a city that was able to conquer so much of the known world could not have been devoid of the creativity that characterizes so many other ancient empries.

Engineering is one endeavour in which the Romans showed themselves capable. Their aqueducts carried water hundreds of miles along the tops of vast arcades. Roman roads built for the rapid deployment of troops, criss-cross Europe and still form the basis of numerous modern highways that provide quick access between many major European and African cities. Indeed, a large number of these cities owe their prominence to Rome's economic and political influence.

Many of those major cities lie for beyond Rome's original province, and Latin-derived languages are spoken in most Southern European nations. Again a result of military influence, the popularity of Latin and its off spring is difficult to overestimate. During the centuries of ignorance and violence that followed Rome's decline, the Latin language was the glue that held together the identity of an entire continent. While seldom spoken today, it is still studied widely, if only so that such master or rhetoric as Cicero can be read in the original.

It is Cicero and his like who are perhaps the most overlooked legacy of Rome. While far from being a democracy, Rome did leave behind useful political tool that serve the American republic today. "Republic" itself is Latin for "the people's business," a notion cherished in democracies worldwide. Senators owe their name to Rome's class of elders; Representatives owe theirs to the Tributes who seized popular prerogatives from the Senatorial class. The veto was a Roman notion adopted by the historically aware framers of the Constitution, who often assumed pen names from the lexion of Latin life. These accomplishments, as monumental as any highway or coliseum, remain prominent features of the Western landscape.

Multiple Choice Questions (MCQs)

1. The author describes "two of the great disasters in intellectual history" in order to
   (A) establish a point directly related to the main argument
   (B) show that certain historical claims are inaccurate
   (C) demonstrate the importance of certain historical data
   (D) disprove the claims made by other with a different view
   (E) concede the partial accuracy of an opposing view
2. According to the passage, ancient Roman roads
   (A) connected many major cities in ancient Europe
   (B) are engineering marvels unequalled in modern times
   (C) are similar in some respects to modern highways

(D) were products of democratic political institutions
(E) caused the development of modern European cities

3. According to the passage, which of the following accurately describes the Latin language?
I. It spread in part due to Rome's military power
II. It is reflected in modern political concepts
III. It is spoken today in some parts of Europe
(A) I only
(B) II only
(C) I and II only
(D) I and III only
(E) II and III only

4. It can be inferred from the passage that the framers of the Constitution
(A) were familiar with certain aspects of Roman government
(B) were similar to the Roman elders
(C) embraced the veto as the hallmark of Roman democracy
(D) overlooked Cicero's contributions to the theory of democracy
(E) formed a government based on world-wide democracy

5. The primary purpose of the passage is to
(A) reveal the indifferent attitude taken by the ancient Romans toward the fine arts
(B) discuss the lasting accomplishments achieved by ancient Romans
(C) analyse the use of the Latin language by the framers of the Constitution
(D) show that the construction of roads and aqueducts could not have been accomplished in ancient Greece
(E) Compare the destruction of the library at Alexandria to the murder of Archimedes

6. Which of the following is NOT described in the passage as a part of ancient Roman life that left a lasting legacy?
(A) The Latin languages
(B) Military accomplishments
(C) An extensive system of roads
(D) A democratic system of government
(E) Wide-ranging economic influence

Explanatory Answers

Ans. 1 (E). This specific question has a line number. Remember to read a bit above and below the cited lines. The two disasters citied are mentioned to give an example of Rome's failings, before countering with a number of Rome's successes. The best answer was choice (E).

Ans. 2 (A). The specific question also has a good lead phrase : "Roman roads." You'll find it in the second paragraph. Choice (C) is wrong because these roads are not just similar to modern highways – they form the basis of these highways. Choice (E) is a bit too extreme. The cities may owe their prominence to these roads, but they were not "caused" by the roads. The correct answer is choice (A).

Ans. 3 (C). This is a specific question with a good lead phrase: "Latin language." You'll find it in the third paragraph. The correct answer is choice (C).

Ans. 4 (A). The specific question also has a good lead phrase: "framers of the Constitution". You'll find it in the last paragraph. You may have been to choices (A) and (C). Choice (C) used extreme language and went a bit too far. Great as the veto is, did the founding fathers consider it the "hallmark" of democracy? The passage doesn't say so. The correct answer was choice (A).

Ans. 5 (B). The first paragraph puts forth the idea that, despite criticism levelled against it, ancient Rome had many lasting accomplishments. The following three paragraphs give examples of these accomplishments.

Ans. 6 (D). In the fourth paragraph, it is explicitly stated that despite its political innovations, Rome was "far from being a democracy." All of the other choices are touched upon somewhere in the passage.

PASSAGE 2

Anthropologists who study orangutans, distant cousins of the human race, find in the animals behaviour hints of how our earliest ancestors may have lived. It has long been accepted that primates originally dwelt in the treetops and only migrated to the ground as forests began to dwindle. While to a

certain extent, all primates except humans spend at least some time dwelling in trees, the orangutans can grow as heavy as 330 pounds and live for decades, requiring copious amounts of fruit simply to stay alive. Thus, they become very jealous of the territory where they find their food. Compounding this territoriality are the breeding habits of orangutans, since females can only breed every few years and, like humans, give birth not to litters but single off-spring.

Consequently, orangutans are solitary, territorial animals who have difficulty foraging in any part of the forest where they were not raised. Orangutans take from poachers by customs agents undergo incredible hardship on their return to the wild. Incorrectly relocating a male orangutan is especially problematic, often ending in the animal's death at the hands of a rival who sees not only his territory but also the females of his loosely knit community under threat from an outsider. While humans, like chimpanzees, are more gregarious and resourceful than orangutans, the latter provide anthropologists with useful information about the behaviour of prehominid primates and how apelike behaviour influenced out ancestors' search for the food and family beneath the forest's canopy.

Multiple Choice Questions (MCQs)

1. The primary purpose of this passage is to
   (A) Describe some behavioural and evolutionary characteristics of orangutans
   (B) Analyse the reasons why early primates left their forest dwellings
   (C) Illustrate the dangers posed to orangutans by poachers
   (D) Show how orangutan behaviour differs from that of other primates
   (E) Criticise anthropologists who misinterpret orangutan behaviour
2. The author of the passage discusses "orangutans taken from poachers" in order to
   (A) Stress the importance of preserving orangutans as a species
   (B) Indicate the widespread practice of animal poaching
   (C) Refute the theory that orangutans can live in a variety of environments
   (D) Contrast the behaviour of orangutans with that of other apes
   (E) Emphasize the consequences of orangutan territoriality
3. The passage indicates that it is difficult to return orangutans to the wild for which of the following reasons?
   A. The threat posed by new comers to other orangutans' territory
   B. The conflict between males over available females
   C. The scarcity of available food in the orangutan's environment
   (A) A only (B) A and B only
   (C) A and C only (D) B and C only
   (E) A, B, and C.
4. Which of the following can be inferred about differences between the behaviour of orangutans and that of other ape species?
   (A) While orangutans spend much of their time on the treetops, other apes live exclusively on the ground
   (B) Orangutans and other types of apes are all sociable species, but orangutans are more likely to bond for life
   (C) Apes such as chimpanzees rely less upon their size than the average orangutans do
   (D) Orangutans spend less time in the company of their members of their species than do some other apes
   (E) Because of their stringent territoriality, orangutans are less likely to elude capture by poachers than are other apes.
5. According to the author, anthropologists study the behaviour of orangutans in order to
   (A) Prevent orangutans from becoming the target of poaching
   (B) Assist customs agents in the relocation of orangutans
   (C) Analyse the causes and consequences of contemporary human behaviour
   (D) Prevent larger orangutans from eliminating their weaker rivals
   (E) Better understand the factors that influenced human evolution

6. Which of the following are factors that the author indicates contribute to the orangutan's territoriality?
   (A) The lack of available food and the antisocial nature of orangutans
   (B) The orangutan's need for large quantities of food and the infrequency with which it mates
   (C) The threat posed by poachers and the orangutan's inability to protest itself from them
   (D) The difficulties that orangutans face when compelled to socialize with other species such as chimpanzees
   (E) The constant dangers that present themselves whenever one orangutan encounters another
7. It can be inferred from the passage that one development responsible for the evolution of distinct ape species was
   (A) Early primates inability to survive in the forest
   (B) The shrinking of the available primitive forest
   (C) The growth of human and chimpanzee communities
   (D) The orangutan's eventual dominance of the treetops
   (E) The encroachment of other species into the primitive forest

Explanatory Answers

Ans. 1 (A). The answer to this general question came from understanding the main idea. The passage did not analyse the reasons primates left trees (B), or devote itself to a discussion of poachers (C), or do a point-by-point comparison of orangutans with other primates (D), or criticize anthropologists (E). The correct answer is choice (A).

Ans. 2 (E). The specific question has a line number. Remember to read a bit above and below the cited lines. The answer to this question actually came just *below* the quote. The poacher example is simply a further illustration of orangutans' territorial nature. The correct answer is choice (E).

Ans. 3 (B). Both statements I and II were mentioned, statement III was not. The correct answer is choice (B).

Ans. 4 (D). This is a specific question with no line number, and, really, no lead word. We're looking for differences between orangutans and other types of apes. The only other types of monkey mentioned is the chimpanzee who is said to be more gregarious. The correct answer is choice (D).

Ans. 5 (E). The specific question also has a good lead word: "anthropologists." It is found in two places, at the very beginning and the very end of the passage. You were probably down to choices (C) and (E). Why was (C) wrong? Because anthropologists only see parallels with *early* man.

Ans. 6 (B). The specific question also has a good lead word: "Territoriality," you'll find it in the second half of the first paragraph, which discusses two cases: the need for large amounts of food, and breeding habits. You were probably down to (A) or (B). Why was (A) wrong? It didn't discuss both food and breeding habits. Choice (B) was correct.

Ans. 7 (B). The second sentence of the first paragraph ends, ... "only migrated to the ground as forests began to dwindle." That gives us choice (B).

NOTE

This is a science passage. Paragraph one says the orangutan, studied by scientists for its resemblance to early humans, lives in trees and is very territorial. Paragraph two describes the orangutan's solitary territorial behaviour, which resembled that of early humans.

PASSAGE 3

Though the U.S. prides itself on behing a leader in the world community, a recent report shows that it lags far behind other industrialized countries in meeting the needs of its youngest and most *vulnerable* citizens. The U.S. has a higher infant mortality rate, a higher proportion of low birth weight babies, a smaller proportion of babies immunized against childhood diseases and a much higher rate of adolescent pregnancies. These findings, described as a "quiet crisis" requiring immediate and far-reaching action, appeared in a report prepared by a task force of educators, doctors, politicians and business people. According to the report, a fourth of the nation's 12 million infants and toddlers live in poverty. As many as half *confront* risk factors that could harm their ability to develop intellectually, physically and socially. Child immunizations are too low, more children are born into poverty, more are in *substandard* care while their

parents work and more are being raised by single parents. When taken together, these and other risk factors can lead to educational and health problems that are much harder and more costly to reverse.

The crisis beings in the womb with unplanned parenthood. Women with unplanned pregnancies are less likely to seek pre-natal care. In the U.S., 80% of teenage pregnancies and 56% of all pregnancies are unplanned. The problems continue after birth where unplanned pregnancies and *unstable* partnerships often go hand in hand. Since 1950, the number of single parent families has nearly tripled. More than 25 percent of all births today are to unmarried mothers. As the number of single parent families grows and more women enter the work force, infants and toddlers are increasingly in the care of people other than their parents.

Most disturbingly, recent statistics show that American parents are increasingly neglecting or *abusing* their children. In only four years from 1987-1991, the number of children in foster care increased by over 50 percent. Babies under the age of one are the fastest growing category of children entering foster care. The crisis affects children under the age of three most *severely*, the report says. Yet, it is this period-from infancy through preschool years-that sets the stage for a child's future.

Multiple Choice Questions (MCQs)

1. The main focus of the passage is on the plight of
   (A) Low birth weight babies (B) Unwed mothers
   (C) Orphaned children (D) Teenage mothers
   (E) None of these
2. Children falling in which age group are most severely affected by the 'quiet crisis'?
   (A) Between 2 & 3 years (B) Between 1 & 3 years
   (C) Below 1 year (D) Below 3 years
   (E) None of these
3. Which of the following does not constitute the 'quiet crisis' in the U.S. as per the task force report?
   (A) Lower rate of babies surviving childhood diseases
   (B) Larger proportion of babies who are deprived of immunization
   (C) Lower proportion of new born babies with normal weight
   (D) higher incidence of adolescent girls becoming mothers
   (E) Increasing cases of teenage couples getting divorced
4. Which of the following statements is not true in the context of the passage?
   (A) In the U.S., the number of infants living in poverty is about 3 million
   (B) Only 20 percent of all the pregnancies in the U.S. are planned
   (C) The number of single-parent families today is approximately three times that of four decades ago
   (D) The number of children in the U.S. entering foster care has decreased after 1991
   (E) About 6 million infants in the U.S. are likely to develop educational and health problems
5. The number of children born to married mothers in the U.S. is approximately how many times the number of children born to unwed mothers?
   (A) 3 times (B) 3.5 times
   (C) 1.5 times (D) 2 times
   (E) Not mentioned in the passage
6. Children born out of unplanned pregnancies are highly vulnerable because
   (A) They are mostly malnourished
   (B) They are less likely to receive parental care
   (C) They are raised by single parents
   (D) Their parents are mostly poor
   (E) Their parents are emotionally immature
7. Decide which of the following factors is/are responsible for the physical, intellectual and social under-development of infants in the U.S.?
   (A) Illiteracy of parents (B) Lack of parental care
   (C) Poverty
   (A) Only A (B) Only B

(C) Only C
(D) Both A & C
(E) Both B & C

8. An increasing number of infants in the U.S. are in the foster care on account of
(A) An increasing number of employed couples who are required to stay apart
(B) An increasing number of women getting divorced and abandoning their babies
(C) An increasing number of single parent families with the female member working
(D) An increasing number of women maintaining the status of unwed motherhood and becoming economically independent
(E) An increasing number of parents who lack awareness about baby-care

9. The task force report seems to be based on the data pertaining to the period
(A) 1987 onwards till date
(B) 1950-91
(C) 1987-91
(D) 1950 onwards till date
(E) 1991 onwards till date

Directions (Q 10-12): Choose the word which is most nearly the same in meaning as the given word as used in the passage.

10. Confront
(A) Succumb
(B) Eliminate
(C) Face
(D) Tolerate
(E) Oppose

11. Vulnerable
(A) Risky
(B) Promising
(C) Insecure
(D) Indispensable
(E) Delicate

12. Abusing
(A) Ill treating
(B) Accusing
(C) Cursing
(D) Beating
(E) Oppressing

Directions (Q 13-15): Choose the word which is most opposite in meaning to the given word as used in the passage.

13. Severely
(A) Minutely
(B) Normally
(C) Drastically
(D) Intensely
(E) Slightly

14. Unstable
(A) Stagnant
(B) Confined
(C) Changing
(D) Steady
(E) Constant

15. Substandard
(A) Excellent
(B) Valuable
(C) Impoverished
(D) Compassionate
(E) Beneficial

ANSWERS

1.	(A)	2.	(D)	3.	(E)	4.	(D)
5.	(A)	6.	(B)	7.	(E)	8.	(C)
9.	(B)	10.	(C)	11.	(E)	12.	(A)
13.	(E)	14.	(D)	15.	(B)		

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SHORT PASSAGE COMPREHENSION

Learn by Example

Read the passage carefully once and detect its theme. Note what the questions are about. Answer the questions.

PASSAGE WITH EXPLANATORY ANSWERS

It is difficult to reconcile the ideas of different schools of thought on the question of education. Some people maintain that pupils at school should concentrate on a narrow range of subjects which will benefit them directly in their subsequent careers. Others contend that they should study a wide range of subjects so that they have not only the specialized knowledge necessary for their chosen careers but also sound general knowledge about the world they will have to work and live in. Supporters of the first theory state that the greatest contributions to civilization are made by those who are most expert in their trade or profession. Those on the other side say that, unless they have a broad general education, the experts will be too narrow in their outlook to have sympathy with their follows or a proper sense of responsibility towards humanity as a whole.

Multiple Choice Questions (MCQs)

1. 'Schools of thought' can be explained as:
   - (A) Groups of people who study in a particular school thoughtfully
   - (B) Groups of people having the same ideas but with different perception on a particular subject
   - (C) Groups of people whose job is to think
   - (D) Groups of people who are schooled to think
2. Broad general knowledge is necessary because
   - (A) It teaches us about different things
   - (B) It broadens one's outlook
   - (C) Specialisation is incomplete without it
   - (D) Without it no one would get a job
3. The idea of the first school of thought in the passage is that
   - (A) Students should study all the subjects they want to
   - (B) Students should study a few subjects that will help them in their profession
   - (C) Students should concentrate on studies
   - (D) Students should not undertake any specialized work
4. Supporters of the first theory say that
   - (A) Experts have done nothing to help mankind
   - (B) People with general knowledge are more useful than experts
   - (C) Experts have contributed most to progress in the modern world
   - (D) People with general knowledge have contributed to civilization
5. According to the second school of thought, education will not be very effective if pupils
   - (A) Ignore the study of fine arts
   - (B) Have nothing but general knowledge
   - (C) Have inadequate knowledge of their own work
   - (D) Do not have a wide general education

Explanatory Answers

1. **(B)** 'Schools of thought' means two persons or groups having different ideas or opinions on the same subject or topic.
2. **(B)** The second school of thought supports the idea of having knowledge of a wide range of subjects for wider perception and outlook.
3. **(B)** The idea of the first school of thought is that people should focus on few subjects to benefit their career.

4. (C) The statement, 'Supporters of the first theory...expert in their trade or profession' gives the answer.

5. (D) The second school of thought opines that pupils should only concentrate on subjects of their interest to have an effective education and career.

SHORT PASSAGES WITH EXPLANATORY ANSWERS

Passage 1

Books are, by far, the most lasting product of human effort. Temples crumble into ruin. Pictures and statues decay, but books survive. Time does not destroy the great thoughts which are as fresh today as when they first passed through their author's mind. These thoughts speak to us through the printed page. The only effect of time has been to throw out of currency the bad products. Nothing in literature which is not good can live for long. Good books have always helped man in various spheres of life. No wonder that the world keeps its books with great care.

Multiple Choice Questions (MCQs)

1. Of the product of human effort, books are the most
   - (A) Permanent
   - (B) Important
   - (C) Enjoyable
   - (D) Useful
2. Time does not destroy books because they contain
   - (A) Useful material
   - (B) Subject-matter for education
   - (C) High ideals
   - (D) Great ideas
3. "To throw out of currency" means
   - (A) Destroy
   - (B) Put out of use
   - (C) Extinguish
   - (D) Forget
4. The world keeps its books with care because
   - (A) They bring great ideas to us
   - (B) They educate us
   - (C) They make us successful
   - (D) They help us in various spheres of life

Explanatory Answers

1. (A) The phrase 'books survive' indicates that books are permanent and cannot be destroyed easily.
2. (D) 'Time does not destroy the great thoughts', provides the correct answer.
3. (B) The author implies that bad products have always been discarded or 'thrown out of currency' with time while good things like books have always withstood the test of time.
4. (D) The author says that good books have always been handled with care by the world as they have helped man in different phases of life.

Passage 2

The low unit of gas is a real temptation to anyone choosing between gas and electrical processes. But gas-fired processes are often less efficient, require more floor space, take longer and produce more variable product quality. The drawbacks negate the savings many businesses believe they make.

By contrast, electricity harnesses a unique range of technologies unavailable with gas. And many electric processes are well over 90 percent efficient, so far less energy is wasted with benefits in terms of products quality and overall cleanliness, it can so often be the better and cheaper choice. Isn't that tempting?

Multiple Choice Questions (MCQs)

1. The passage can be described as
   - (A) An advertisement for electricity and its efficiency
   - (B) An extract from a science journal
   - (C) An account of the growth of technology

(D) An appeal not to use gas

2. What does the writer mean by 'variable quality'?
   (A) The quality of the products cannot be assessed
   (B) Products from gas-fired processes are inefficient
   (C) The kind of products vary from time to time
   (D) The quality of the products is not uniform

3. "Electricity harnesses a unique range of technologies" – What does the writer mean? Electricity
   (A) Has developed new technologies
   (B) Ensures power for electricity and its efficiency
   (C) Depends on new kinds of technology
   (D) Makes use of several technologies

Explanatory Answers

1. (B) The passage brings to attention that the 'low unit of gas' should not lead anyone to use gas processes as it has many negative factors. It serves to make aware the reader of the scientific reason for using electric processes and hence the passage looks to be an extract from a science journal.
2. (D) 'Variable quality' means quality which is not consistent or uniform.
3. (B) According to the passage, electricity provides a wide range of technologies and such processes are far more efficient and consumes less energy when compared to gas processes.

Passage 3

There was a marked difference of quality between the personages who haunted the near bridge of brick and the personages who haunted the far one of stone. Those of lowest character preferred the former, adjoining the town; they did not mind the glare of the public eye. They had been of no account during their successes; and though they might feel dispirited, they had no sense of shame in their ruin. Instead of sighing at their adversaries they spat, and instead of saying the iron had entered into their luck. The miserables who would pause on the remoter bridge were of a politer stamp – persons who did not know how to get rid of the weary time. The eyes of this species were mostly directed over the parapet upon the running water below. While one on the townward bridge did not mind who saw him so, and kept his back to the parapet to survey the passerby, one on this never faced the road, never turned his head at coming foot-steps, but, sensitive to his own condition, watched the current whenever a stranger approached, as if some strange fish interested him, though every finned thing had been poached out of the river years before.

Multiple Choice Questions (MCQs)

1. The two bridges were known
   (A) For attaching dejected people to them
   (B) For being equi-distant from town
   (C) For being haunted places
   (D) For their similar design

2. People belonging to the lower strata, in their moments of distress:
   (A) Felt ashamed of their failures
   (B) Dressed shabbily to earn sympathy
   (C) Visited the brick-made bridge
   (D) Remembered their days of glory

3 The bridge of stone was frequented by
   (A) All the sections of society
   (B) The sophisticated but luckless
   (C) Those fond of fishing
   (D) None of the above

4. The attitude of the lowly and genteel towards strangers was
   (A) Virulently hostile
   (B) Completely indifferent
   (C) Entirely different
   (D) Virtually the same
5. In this passage, the author is trying to
   (A) Explain the variety of ways in which strangers can be treated
   (B) Describe how people of different classes behaved when unhappy
   (C) Explain the difference between the construction of two bridges
   (D) Describe the way different sections of people like to dress

Multiple Choice Questions (MCQs)

1. (A) The passage talks of dispirited people standing on the bridges. Hence one can say that the two bridges were known for 'the miserables' or the dejected people be coming frequently to those bridges.
2. (D) The statement, 'they did not mind the glare of the public eye', gives the correct answer.
3. (D) The bridge of stone was frequented by mostly dispirited and miserable people. Hence the answer is (D).
4. (C) The altitude of the lonely and genteel towards strangers was entirely different. According to the passage, they pretended to inspect the river under the bridge for some strange fish, whenever a stranger came nearby.
5. (B) They author tried to explain the different kinds of behaviour of people of different classes when they were unhappy. Here he used the bridge to explain the behaviour of these different classes of people.

Passage 4

It is to progress in the human sciences that we must look to undo the evils which have resulted from a knowledge of the physical world hastily and superficially acquired by populations unconscious of the changes in themselves that the new knowledge has made imperative. The road to a happier world than any known in the past lies open before us if atavistic destructive passions can be kept in leash while the necessary adaptations are made. Fears are inevitable in our time, but hopes are equally rational and far more likely to bear good fruit. We must learn to think rather less of the dangers to be avoided than of the good that will lie within our grasp if we can believe in it and let it dominate our thoughts. Science, whatever unpleasant consequences it may have by the way, is in its very nature a liberator, a liberator of bondage to physical nature and in to come, a liberator from the weight of destructive passions. We are on the threshold of utter disaster or unprecedentedly glorious achievement. No previous age has been fraught with problems so momentous; and it is to science that we must look to for a happy future.

Multiple Choice Questions (MCQs)

1. What does science liberate us from? It liberates us from
   (A) Idealistic hopes of a glorious future
   (B) Slavery to physical nature and from passions
   (C) Bondage to physical nature
   (D) Fears and destructive passions
2. To carve out a bright future a man should
   (A) Cultivate a positive outlook
   (B) Analyse dangers that lie ahead
   (C) Try to avoid dangers
   (D) Overcome fears and dangers
3. If man's bestial yearning is controlled
   (A) The future will be brighter than the present
   (B) The future will be tolerant
   (C) The present will be brighter than the future

(D) The present will become tolerant

4. Fears and hopes, according to the author
   (A) Are irrational
   (B) Are closely linked with the life of modern man
   (C) Can yield good results
   (D) Can bear fruit

5. Should human sciences be developed because they will
   (A) Make us conscious of the changing world
   (B) Provide more knowledge of the physical world
   (C) Eliminate the destruction caused by a superficial knowledge of the physical world
   (D) Make us conscious of the changes in ourselves

Explanatory Answers

1. (B) The phrase, 'liberator from the weight of destructive passions', provides the correct answer.
2. (A) According to the passage, despite problems and dangers, we must adopt an optimistic or a positive outlook and look at science as a means to secure a bright future.
3. (A) The sentence, 'The road to a happier world...adaptations are made,' provides the correct answer. [Bestial means 'beast-like' or brutal]
4. (B) Fears and hopes are bound to occur in one's life, according to the passage.
5. (C) The statement, 'Science, whatever unpleasant... passions,' provides the correct answer.

Passage 5

The Nobel Committee, in fact, a notoriously conservative body which among other things had a marked antipathy to pure science, especially to Mathematical Physics. Restrained by a clause in Alfred Nobel's will that the prize should go to the person whose 'discovery or invention' shall have conferred the greatest benefit to mankind, the committee initially ignored the great theoretical advances in Physics. Wrecked, no doubt, by guilt that he had become a merchant of death through his invention of dynamite and smokeless powder and plagued by sadistic fantasies of destruction, the Swedish chemist, engineer and aspiring poet, Alfred Nobel, who has been described as Europe's richest vagabond, left his colossal fortune to the cause of progress in human knowledge. Five prizes were installed, one each for Literature ('to the person who shall have produced in the field of Literature, the most outstanding work of an idealistic tendency'), Physics, Chemistry, Medicine and Peace ('to the person who shall have done the most or the best work for fraternity among nations for abolition or reduction of armies, and for holding or promotion of Peace').

Multiple Choice Questions (MCQs)

1. The Nobel Committee has been called a conservative body because
   (A) Its members are old fashioned
   (B) It awards prizes only to those people who adopt a conservative approach
   (C) It is conservative in choice of subjects
   (D) Its members believe in a conservative ideology

2. In the beginning, the Nobel Committee ignored the great advances in theoretical physics because
   (A) The Committee felt that the discovery and invention in the field did not contribute to the benefit of mankind
   (B) They proved to be merchants of death and hence dangerous to mankind
   (C) They were different from other branches of Physics
   (D) They were concerned with theory and did not suggest its application

3. Noble Prize would not be given to
   (A) A composer who composed a symphony
   (B) An author who wrote a novel

(C) A diplomat who negotiated a peace settlement
(D) A doctor who discovered a vaccine

4. Alfred Nobel left his colossal fortune to the cause of progress in human knowledge because he
(A) Felt guilty for having invented highly destructive things
(B) Felt guilty for having earned so much money
(C) Was 'Europe's richest vagabond'
(D) Was a chemist, engineer and an aspiring poet

Explanatory Answers

1. (C) The Nobel Committee is a conservative body because it does not favour subjects like 'Mathematical Physics'.
2. (A) The statement, 'will that the prize should go to the person ... in Physics,' provides the correct answer.
3. (A) The five prizes installed for conferring 'Nobel Prize...' do not include music.
4. (A) The phrase, 'wrecked, no doubt, by guilt...,' gives the correct answer.

Passage 6

Mountaineering is now looked upon as the king of sports. But men have lived amongst the mountains since prehistoric times and in some parts of the world, as in the Andes and Himalayas, difficult mountain journeys have inevitably been part of their everyday life. However, some of the peaks were easily accessible from most of the cities of Europe. It is quite interesting that while modern mountaineers prefer difficult routes for the greater enjoyment of sport, the early climbers looked for the easiest ones, for the summit was the prize they all set their eyes on. Popular interest in mountaineering increased considerably after the ascent of the Alpine peak of Matterhorn in 1865 and Edward Whymper's dramatic account of the climb and fatal accident which occurred during the descent.

In the risky sport of mountaineering, the element of competition between either individuals or teams is totally absent. Rather one can say that the competition is between the team and the peaks themselves. The individuals making up a party must climb together as a team, for they depend upon one another for their safety. Mountaineering can be dangerous unless reasonable precautions are taken. However, the majority of fatal accidents happen to parties which are inexperienced or not properly equipped. Since many accidents are caused by bad weather, the safe climber is the man who knows when it is time to turn back, however, tempting it may be to press on and try to reach the summit.

Multiple Choice Questions (MCQs)

1. Mountaineering is different from other sports because
(A) There is no competition between individuals
(B) It is most thrilling and exciting
(C) It can be fatal
(D) It is risky and dangerous

2. People living in the Andes and the Himalayas made mountain journeys because
(A) It was a kind of sport
(B) They had to undertake them in their day-to-day life
(C) They lived in pre-historic times
(D) Of the challenge offered by the difficult journey

3. Mountaineers climb as a team because
(A) The height is too much for one individual
(B) They have to rely on each other for safety
(C) There is no competition among them
(D) The competition is between the team and the peak

4. "....the summit was the prize they all set their eyes on". In the context of the passage this means
(A) They chose a route from which they could see the summit clearly
(B) They cared for nothing but the prize of reaching the summit

(C) They kept their eyes steadily on reaching the peak
(D) Reaching the top was their exclusive concern

5. "to press on" in the last sentence means
(A) To continue in a determined manner
(B) To work fearlessly
(C) To force upon others
(D) To struggle in a forceful manner

Explanatory Answers

1. (D) The phrase 'In the risky sport of mountaineering...', suggests that this kind of sport is different from other sports in being more dangerous and fatal.
2. (B) The statement, '...difficult mountain journeys have been part of their everyday life,' provides the correct answer.
3. (B) The statement, '...climb together as a team, for they depend upon one another for their safety' provides the correct answer.
4. (D) The challenge of the sport lay in reaching the peak. Hence the answer is (D).
5. (A) 'To press on' means to be persistent in one's struggle to achieve the objective or in other words to continue in a determined manner.

Passage 7

After submitting his resignation, Albert came out and took the long narrow road leading to the railway station which was one of the busiest roads in the city. Sad and depressed and worried about looking for a new job, Albert looked around for a cigarette shop. He walked up to the end of the road but found no tobacconist. It was odd that such a busy thoroughfare with thousands of people passing through did not even have a single cigarette shop. He suddenly felt that it was no longer necessary for him to hunt for a job. He decided to open a tobacco shop himself. It was bound to be profitable, he felt.

Multiple Choice Questions (MCQs)

1. After submitting his resignation, Albert came out worried about
(A) A job
(B) The next available rain
(C) A shelter
(D) Cigarettes

2. Albert was sad and depressed because
(A) He was not able to buy cigarettes
(B) He was worried about finding a job
(C) He had no money for the train journey
(D) He had to walk on a long road

3. There was no cigarette shop on that road because
(A) It was a very narrow road
(B) Cigarette-shop owners do not make any profit
(C) Smoking is banned in that area
(D) Just by chance nobody had opened one on that road

4. Albert decided not to look for a new job because
(A) There was no hope of finding a job
(B) He saw the possibility of self-employment
(C) The thought of having to look for a job greatly distressed him
(D) He did not want to work at all

5. A cigarette shop on a busy road was bound to be profitable because
(A) Cigarettes are inexpensive items and people buy them willingly
(B) A cigarette shop on a busy road would attract a large number of customers
(C) Cigarette shops are known to make a great deal of profit

(D) Any shop on a busy street would attract a large number of customers

Explanatory Answers

1. (A) According to the author, Albert gave resignation from his job to look for a new job. Hence the answer is (A).
2. (D) Albert was worried and depressed about looking for a new job.
3. (D) According to the author, it was strange that there was not any single cigarette shop on such a busy road and hence assumed that it must be chance that nobody opened one.
4. (B) Albert thought of opening a cigarette shop on that busy road thereby indicating that he wanted to be self-employed.
5. (B) A cigarette shop on a busy road was bound to be profitable, especially when there was none there, and would be attracting many customers.

Passage 8

In this work of incessant and feverish activity, men have little time to think, much less to consider ideals and objectives. Yet how are we to act, even in the present, unless we know which way we are going and what our objectives are? It is only in the peaceful atmosphere of a University that these basic problems can be adequately considered. It is only when the young men and women, who are in the university today and on whom the burden of life's problems will fall tomorrow, learn to have clear objectives and standards of values that there is hope for the next generation. The past generation produced some great men but as a generation it led the world repeatedly to disaster. Two world wars are the price that has been paid for the lack of wisdom on man's part in this generation.

I think that there is always a close and intimate relationship between the end we aim at and the means adopted to attain it. Even if the end is right but the means are wrong, it will vitiate the end or divert us in a wrong direction. Means and ends are thus intimately and inextricably connected and cannot be separated. That, indeed, has been the lesson of old taught us by many great men in the past, but unfortunately it is seldom remembered.

Multiple Choice Questions (MCQs)

1. People have little time to consider ideals and objectives because
   - (A) They have no inclination for such things
   - (B) They are excessively engaged in their routine activities
   - (C) They consider these ideals meaningless
   - (D) They do not want to burden themselves with such ideas
2. 'The burden of life's problems' in the fourth sentence refers to
   - (A) The onerous duties of life
   - (B) The sorrows and sufferings
   - (C) The incessant and feverish activities
   - (D) The burden of family responsibilities
3. The two world wars are the price that man paid due to
   - (A) His ignoring the ideals and objectives of life
   - (B) His excessive involvement in feverish activities
   - (C) The absence of wisdom and sagacity
   - (D) His not caring to consider the life's problems
4. According to the writer the adoption of wrong means even for the right end would
   - (A) Impede our progress
   - (B) Deflect us from the right path
   - (C) Not let us attain our goal
   - (D) Bring us dishonour
5. The word 'vitiate' used in the second paragraph means
   - (A) Tarnish
   - (B) Destroy
   - (C) Negate
   - (D) Debase

Explanatory Answers

1. (B) The phrase, 'In this work of incessant and feverish activity' means that men are always busy with their daily work and activities.
2. (A) 'The burden of life's problems' means burdened with life's responsibilities or undertaking the onerous (burdensome) duties of life.
3. (C) The statement, 'Two world wars...has been paid for the lack of wisdom in man's part in this generation' gives the correct answer.
4. (B) The statement, 'Even if the end is right...divert us in the wrong direction', gives the correct answer. 'Deflect' means 'to divert' or to turn away from a certain direction.
5. (D) 'Vitiate' means to spoil or impair. Hence it means debase meaning 'to pollute' or to contaminate.

Passage 9

In the past thirty years, drugs have been discovered that prevent and cure physical disease and reverse the disturbances that occur in certain mental illness. Excitement over what drugs can do has led people to believe that any ailment, infective or psychic, can be relieved by taking a pill. At the first sign of nervousness, they try pep-up pills. Medical journals now advertise tranquillizers, and other mood-altering drugs; doctors prescribe them; and the public expect miracles from them. In such an atmosphere, it is not surprising that drug abuse has spread.

Multiple Choice Questions (MCQs)

1. According to the author, in recent years there has been
   - (A) Recognition of the ill-effects of medicine
   - (B) A misplaced trust in drugs
   - (C) A distrust of drugs
   - (D) None of the above
2. According to the passage, the medicines that have been discovered in recent times
   - (A) Can reduce mental illnesses
   - (B) Cannot cure mental illnesses
   - (C) Can cure mental illnesses
   - (D) Can help treat some symptoms of mental illnesses
3. People often believe that
   - (A) Medicines can cure all the diseases
   - (B) Doctors cannot cure all the diseases
   - (C) Medicines cannot cure all the diseases
   - (D) Doctors can cure all the diseases

Explanatory Answers

1. (B) The author talks of the immense trust of people in drugs followed by the statement '...drug abuse has spread'. This indicates a misplaced trust in drugs.
2. (D) The statement 'drugs...reverse the disturbances that occur in some mental illness' gives the answer.
3. (A) The sentence 'Excitement...pill' gives us the answer.

Passage 10

When we are suddenly confronted with any terrible danger, the change of nature we undergo is equally great. In some cases, fear paralyses us. Like animals, we stand still, powerless to move a step in fright or to lift a hand in defence of our lives, and sometimes we are seized with panic, and again, act more like the inferior animals than rational beings. On the other hand, frequently in cases of sudden extreme peril, which cannot be escaped by fright, and must be instantly faced, even the most timid men at once as if by miracle, become possessed of the necessary courage, sharp quick apprehension, and swift decision. This is a miracle very common in nature. Man and the inferior animals alike, when confronted with almost certain

death 'gather resolution from despair' but there can really be no trace of so debilitating a feeling in the person fighting, or prepared to fight for dear life. At such times, the mind is clearer than it has ever been; the nerves are steel, there is nothing felt but a wonderful strength and daring. Looking back at certain perilous moments in my own life, I remember them with a kind of joy, not that there was any joyful excitement then; but because they brought me a new experience, a new nature, as it were and lifted me for a time above myself.

Multiple Choice Questions (MCQs)

1. An appropriate title for the above passage would be
   - (A) The change of nature
   - (B) Courage and panic
   - (C) The will to Fight
   - (D) The miracle of confronting danger
2. The author names three different ways in which a man may react to sudden danger. What are they?
   - (A) He may be paralysed with fear, or seized with panic, or as if by miracle, become possessed of the necessary courage, and face the danger
   - (B) He may be paralysed with fear, run away or fight.
   - (C) He may flee in panic, or fight back or stand still
   - (D) He may be paralysed with fear, seized with panic or act like an inferior animal
3. The distinction between 'inferior animals' and 'rational beings' is that
   - (A) The latter are stronger
   - (B) The latter are capable of reasoning things out whereas the former cannot do so
   - (C) The former are incapable of fighting
   - (D) The latter are clever
4. Explain the phrase 'gather resolution from danger'.
   - (A) Not to lose hope, but fight
   - (B) Find courage to face the danger
   - (C) Find hope and courage
   - (D) A state of utter hopelessness steels one to fight out the danger
5. The author feels happy in the recollection of danger faced and overcome because
   - (A) He survived his ordeal
   - (B) He was lucky to be alive
   - (C) They brought him a new experience
   - (D) They brought him a new experience, and lifted him above himself for a time

Explanatory Answers

1. **(D)** The passage talks of the different ways in which people react when faced with any kind of danger and hence the title should be 'The miracle of confronting danger'
2. **(A)** In the first few lines, the author talks of fear paralyzing a person or being seized with panic when faced with danger. Then he goes on to explain that some people become amazingly courageous in times of peril and danger.
3. **(B)** The author while stating the different reactions of men when confronted with danger makes a comparison with animals who tend to become powerless or behave irrationally in times of danger.
4. **(D)** The phrase 'gather resolution from danger' means to brace oneself or assemble the strength to face danger.
5. **(D)** The statement, 'Looking back…joyful excitement' gives the answer.

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Analytical Reasoning

Each analytical reasoning question is designed to test the analytical skills. Usually, each logical reasoning question is a logical puzzle, based on given conditions. These questions have only one correct answer, which is asked to be selected.

Analytical reasoning questions consist of groups of four or five questions. At begging, a short passage followed by a set of conditions is given. Sometimes, graphs and tables are given instead of passage. To understand this type of questions, we define some logical terms and their applications with examples.

Preposition:
A declarative statement which may be true or false but not both is called a preposition. For example, the statement x = y can be either true or false and there could not be any other possibility.

Symbols Used in Logic:
Capital letters are used to represent specific statements.

For Example:
A: A triangle has four angles.
B: $\sqrt{17}$ is an irrational number.
C: $20 + 18 = 36$.

Solution: B is true; A and C are false.

Lower case letters, such as p, q are used to efer the preposition that are not specific. The following table is a brief list of the symbols which can be used:

Symbol	Meaning	Expression	How to read
~	not	$\sim p$	not p; negation of p
^	and	$p \wedge q$	p and q
v	or	$p \vee q$	p or q
→	If...then, implies	$p \rightarrow q$	If p then q p implies q
↔	If and only if is equivalent to	$p \leftrightarrow q$	p if and only if q p is equivalent to q

Explanation:

1. Negation:
The negation of a statement has the opposite truth value of the statement. The symbol for negation is ~, thus, $\sim p$ is read: "not p", "the negation of p" or "it is false that p". The adjoining table called the truth table, gives the possible truth values of p and $\sim p$. Thus

p	$\sim p$
T	F
F	T

The negation of true statement is a false statement.
The negation of false statement is a true statement.

2. Conjunction:
Conjunction of two statements p and q is denoted by $p \wedge q$ (p and q) and it is considered to be true only if both of its components are true.

3. Disjunction:
Disjunction of p and q is p or q. It is symbolically written $p \vee q$. The disjunction $p \vee q$ is considered to be true when at least one of the components p and q is true, and false if both components are false.

4. Implication or Conditional:
A compound statement of the form if p then q, also written p implies q, is called an implication or conditional.
In the conditional statement below, p is called the antecedent or hypothesis, and q is called the consequent.

$$p \rightarrow q$$

Examples:
(i) If he works hard, then he will got through.
(ii) If he wastes time, then he will fail.
(iii) If $a = 3$, then $a^2 = 9$.
(iv) If $a = -3$, then $a^2 = 9$.

5. Biconditional:
If $p \rightarrow q$ and $q \rightarrow p$, then the preposition p and q are said to be biconditional and shortly written as "p if and only if q". Symbolically, it is written as:
$(p \rightarrow q) \wedge (q \rightarrow p) = p \rightarrow q$

Examples:
(i) If an triangle is an isosceles triangle then, its two angles are congruent.
(ii) If $x = y$, then $ax = ay$, where a, x and y are real numbers and $a \neq 0$.

Note: $p \leftrightarrow q$ is true only when both p and q are true or both p and q are false.

Model Example:
At All-Pakistan Weightlifting Championship, seven college athletes...M, N, O, P, Q, R and S... are being weighted. In order to make categories, the coach has given the following information:
(i) Each athlete has not exactly the same weight as another athlete.
(ii) R is heavier than S, but lighter than O.
(iii) P is heavier than S.
(iv) Both M and N are heavier than O.

1. ***Which of the following could not be true?***
   (A) M is the heaviest. (B) N is the heaviest.
   (C) P is the heaviest.
   (D) More than three athletes are heavier than R.
   (E) More than three athletes are lighter than R.
2. ***Which of the following, if true, would be sufficient to determine the lightest athlete?***
   (A) P is the heaviest. (B) P is lighter than R.
   (C) R is heavier than Q. (D) Q is heavier than R.
   (E) Five candidates are lighter than M.
3. ***If Q is heavier than M, how many different ranking by weight, of the athletes are possible?***
   (A) 1 (B) 2
   (C) 3 (D) 5 (E) 7
4. ***If O is heavier than P, which of the following cannot be true?***
   (A) P's weight is equal to the average of R's weight and S's weight.
   (B) Q's weight is equal to the average of R's weight and S's weight.
   (C) P's weight is equal to the average of M's weight and N's weight.
   (D) Q is the second lightest.

Solution: First of all, we decompose the given information, symbolically:
(i) $M \neq N \neq O \neq P \neq Q \neq R \neq S$
(ii) $R > S, R < O$
(iii) $P > S$

(iv) $M > O \wedge N > O$

1. **(E)** From above, we find the exact answer.
Take false option, "M is the heaviest"
From the given information, $M > O$ and $N > O$, also $R < O$. Thus option A must be true.
Now, take second option, "N is the heaviest"
From above conclusion, it may be possible that N is the heaviest.
Third option is, "P is the heaviest". We solve it symbolically:

$\because \quad R > S \wedge R < O \Rightarrow S < R < O$

also $\quad P > S \Rightarrow P \wedge R > S$

But $\quad M \wedge N > O \Rightarrow R < M \wedge N$

From above, we cannot deduct that option "P is the heaviest" is wrong.
In third option, more than three athletes are heavier than R. Since, from the given information, $R > S$ But $R < O$ also $M > O$ and $N > O \Rightarrow M, N > O$.
$\Rightarrow M, N, O > R$. Because the information about Q not given, therefore, Q may be greater than R. This option may be true. Now we take the option E, according to this option, more than three athletes are lighter than R, Here we analyze it. Information (i), (ii) and (iv) can be written symbolically, as

$$\boxed{M, N > O} > R > S$$

Since, from above the three circled athletes are heavier than athlete R, and athlete R is heavier than only S. Suppose if the remaining two athletes P and Q are lighter than R. In this condition only three athletes are lighter than athlete R. Thus it is impossible that more than three athletes are lighter than R.
Thus the answer is "Choice E".

2. **(D)** The first option is "P is the heaviest". Suppose P is the heaviest, then $P > S$, also $R > S$
$\Rightarrow P > R$, But $R < O \Rightarrow P > O$ (given)
$\Rightarrow P > M, N$, from this evaluation we cannot determine the lightest.
Take a look at the second option, "P is lighter than R", Suppose P is lighter than R, the $R > P \wedge R > S$ $\Rightarrow R > P \wedge S$.
This is also unsufficient to find the lightest weight.
In option C, R is heavier than Q, if R is heavier than Q, then, symbolically

$$R > Q \wedge R > S. \because O > R \Rightarrow O > R, Q, S$$

Hence it is not possible to find the lightest weight. In option D, Q is heavier than R. If this is true, then $Q > R \wedge R > S \Rightarrow Q > R > S$
But $R < O$, therefore, $Q > O > R > S$, also
$M, N > O \quad \Rightarrow Q > M, N > O > R > S$
$\Rightarrow Q > M, N > O > R, P > S$
Thus, we can find the lightest weight after accepting this option.
Hence, the correct choice is choice D.

3. **(C)** If Q is heavier than M, then
$Q > M \Rightarrow Q > O$
$\because O > R \Rightarrow Q > O > R$
$\because R > S \Rightarrow Q > O > R > S$
Thus, the three categories are possible, which are
(i) $Q > O$ (ii) $O > R$ (iii) $R > S$

4. If O is heavier than P, then according to the first option which says that, P's weight is equal to the average of R's weight and S's weight.
$\because P > S \wedge O > P \Rightarrow O > S$, i.e., $O > P > S$ also $R < O$. But $R > S \Rightarrow O > R > S$

Multiple Choice Questions (MCQs)

Question 1-3:
A chemist is preparing a nutriment using eight different vitamins and minerals...A, B, C, D, E, H, F (Ferric),

and Z (Zinc). According to the recipes, the following requirements apply to the use of ingredients:

(i) If *B* is used, both *C* and *Z* must also be used.
(ii) *E* and *H* must always be used together.
(iii) If C is used, at least two of *A*, *B* and *F* must also be used.
(iv) *C* and *H* cannot be used together.
(v) *E*, *F* and *Z* cannot all be used in a same nutrient.
(vi) *A*, *D* and Z cannot all be used in the same nutriment.

Question 1:

1. ***Which of the following is a suitable combination of vitamins and minerals for a nutriment?***
(A) *A, B, C, F* (B) *D, E, H, Z*
(C) *A, D, E, Z* (D) *C, D, E, F* (E) *E, H, F, Z*

2. ***Which of the following cannot be included in a nutriment that contains E?***
(A) *B* (B) *D*
(C) *H* (D) *F* (E) *Z*

3. ***By the addition of exactly one more mineral, which of the following could make an acceptable combination of vitamins and minerals?***
(A) *A, D, Z* (B) *B, H, E*
(C) *C, D, H* (D) *C, E, Z* (E) *E, H, F*

Questions 4-6: A railway track from Lahore to Islamabad consists of six main stations, *P*, *Q*, *R*, *X*, *Y* and Z. Trains run only according to the following condition:

(i) From *P* to *Q*
(ii) From *Q* to *P* and from *Q* to *R*
(iii) From *R* to *X*
(iv) From *X* to *Q* and from *X* to *Y*
(v) From Z to *P*, from Z to *Y* and from Z to *R*.
(vi) From *Y* to *X*.
(vii) It is possible to transfer a station for another train.

4. ***The complete and accurate listing of the stations from which it is possible to reach R with exactly one transfer, is:***
(A) *P* and *Q* (B) *P* and *X*
(C) *X* and *Y* (D) *X* and Z (E) *X*, *P* and Z

5. ***The greatest number of stations that can be visited without visiting any station more than once, is:***
(A) 4 (B) 5
(C) 6 (D) 3 (E) 2

6. ***The trip which requires greatest number of transfers, is:***
(A) *P* to *R* (B) *Q* to *Y*
(C) Z to *Q* (D) Z to *R* (E) Z to *Y*

7. ***A group of dog lovers declare that the principal virtue of the dog is its general friendliness towards all people. But, another group of cat lovers declare that the principal virtue of the cat is its peculiar friendliness towards its provider.***
Which of the following is true of the claims of both dogs and cats lovers?
(A) Animals have not a sense to understand human behaviour.
(B) Groups of animal lovers are friendly.
(C) Friendliness is a virtue.
(D) They apply the same standard.
(E) Uncommon virtue of friendliness.

8. ***Rizwan was born in 1956, and so in 1965 he was nine years old. If we per use this example, it is clear that the last two digits of a person's birth will be the same as the last two digits of the year of that person's ninth birthday, except that the position of the digits will be reversed.***
Identify, which is the best criticism of the assertions made above.
(A) The generalization is valid only for those, in which last digit of their birth years is greater than four.

(B) The generalization is applicable only for those birth years that do not end in two zeroes.
(C) This example is not best illustration of the fact.
(D) The generalization is valid only for those birth years in which the difference of the last two digits is one.
(E) The generalization is valid only for those birth years that ends with 6.

Questions 9-10: At IOWA University, Students of Economics must complete a total of twelve courses selected from three different parts of the syllabus...comparative economics, environmental economics, and regional economics...in order to graduate, the students must meet the following course distribution requirements:

(i) At least six of the required twelve courses must be from the environmental economics.
(ii) At least five of the required twelve courses must be from comparative economics and regional economics, with at least one, but no more than three, selected from comparative economics.

9. ***The minimum number of regional economics courses required to fulfil the course distribution requirements is***
(A) 1 (B) 3
(C) 5 (D) 2 (E) 4

10. ***If the student has completed six environmental economics courses and one regional economics course, the possible groups of courses to fulfil the course distribution requirements must include at least:***
(A) One Environmental Economics Course
(B) Three Regional Economics Courses
(C) One Regional Economics Course
(D) Two Comparative Economics Courses
(E) Three Comparative Economics Courses

Questions 11-15: Six candidates.....Ali, Amin, Omer, Hamza, Saleem and Osama are being interviewed for a job. The interview will take place over four consecutive days, starting on Thursday. Each candidate will have only one interview. The day on which the different candidates will interview must confirm to the following conditions:

(i) At least one interview will take place each day.
(ii) No more than two interviews will take place on any day.
(iii) No more than three interviews will take place on any two consecutive days.
(iv) Ali's interview must take place on Saturday.
(v) Amin's interview must take place on the same day with another interview.
(vi) Saleem's interview must take place on the day before Osama's interview.
(vii) Omer's interview must take place on a day after Hamza's interview.

11. ***If only one interview takes place on Thursday which candidate could have that interview?***
(A) Ali (B) Amin
(C) Omer (D) Saleem
(E) Osama

12. ***If the director decides to take two interviews on Thursday and two on Sunday, how many candidates would be eligible to interview on Friday?***
(A) 1 (B) 2
(C) 3 (D) 4
(E) 5

13. ***If Hamza and Osama have their interviews on the same day which of the following must be true?***
(A) Hamza's interview will take place on Thursday.
(B) Saleem's interview will take place on Friday.
(C) Amin's interview will take place on Saturday.
(D) Osama's interview will take place on Saturday.
(E) Amin's interview will take place on Sunday.

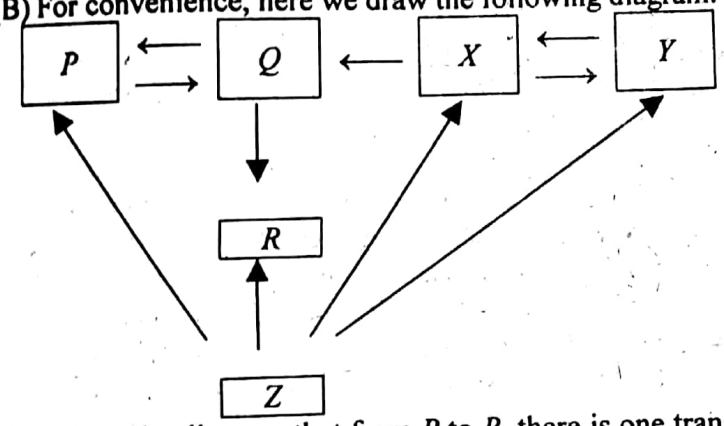
Explanatory Answers

Q1. (B) Take first option, which is *A, B, C, B*. By the first condition, $B \rightarrow (C \wedge Z)$. But *D* has not given, so this combination is not suitable. Now take the second combination, which is *D, E, H*, Z. This option is a correct choice, since it satisfies all the given conditions.
The third option is rejected due to the sixth condition. According to this condition, *A*, *D* and *Z* cannot be used altogether in a nutriment. Since *H* is not present with *E*, thus we reject option *D* due to second condition. The fourth condition is rejected due to fifth condition. So the correct answer is choice *B*.

Q2. (A) If nutriment contains *E*, then according to second condition, $E \leftrightarrow H$. But according to fourth condition $H \rightarrow \sim C$.
If we include *B* in the nutriment, then according to first condition $B \rightarrow (C \wedge Z)$ *i.e.*, *C* and *Z* must also be used. But if we use *C* then *H* must be absent in the nutriment. But *E* and *H* must always be used together. Thus we cannot include *B* in the presence of *E*. The correct choice is option *A*.

Q3. (E) Since A, *D* and *Z* cannot all be used in a nutriment, so we reject option A. The option *B* is, *B, H, E*, Since, C and *Z* must also be used with *B* (first condition) so we reject option B. Since C and *H* cannot be used together, so we reject option *C*. Since *E* and *H* must always be used together, so we reject option D. So the correct choice is option E. Which satisfies all the given conditions.

Q4. (B) For convenience, here we draw the following diagram:



It is clear from the diagram that from *P* to *R*, there is one transfer, but from *Q* to *R*, there is not any transfer, the track is direct. Thus, the option A is not possible. Now, from *P* to *R* these is only one transfer and same is the case from *X* to *R*. Thus option B is the correct choice.

Q5. (C) Here, the following list shows the track of trains that can be visited without visiting any station more than once:

$R \rightarrow X$
$Q \rightarrow R$
$Z \rightarrow R$
$Z \rightarrow P$
$Z \rightarrow Y$
$Q \rightarrow X$

The stations used in above tracks on
R, X, Q, Z, Y, P
Thus option (C) is the correct choice.

Q6. (B) From $P \rightarrow R$, there is only one transfer, *i.e.*, $P \rightarrow Q$. From $Q \rightarrow Y$, there are two transfers, *i.e.*, $Q \rightarrow R$ and $R \rightarrow X$. From *Z* to *Q*, there is only one transfer *i.e.*, $Z \rightarrow P$. From *Z* to *R*, there is not any transfer. At last, *Z* to *Y* there is not any transfer. Thus the correct choice is option B, *i.e.*, 2.

Q7. (C) This question asks you to identify the main point of both dog and cat lovers. According to first option, animals have not a sense to understand human behaviour. Since animals have a great sense to

understand human behaviour, like, love, anger, etc., so we reject this option. It is not sufficient that only the pet lovers should be friendly, the animals (cats, dogs etc.) should also be friendly. Thus, option *B* is not a the best choice. The best choice is option C, since it focusses upon the characteristic of animals and their lovers, which they require.

Q8. (D) The given generalization is true only if the difference of the last two digits of birth year is 1. Suppose a man was born in 1959 and so in 1995, he was 36 years old. This is a same example as given, the only difference is the, difference of the last two digits of birth year which is not 1. Now, suppose that a man was born in 1956 and so in 1965 he was 9 years old. This is so because the difference of the last two digits of the birth year in 1 *i.e.*, (6 – 5 = 1). Thus the correct answer is the option D.

Q9. (D) Since at least five courses must be from comparative and regional economics, with at least one, but no more than three selected from comparative economics. Thus if we select three courses from comparative economics, we must select two courses from regional economics group. Thus the correct choice is option D.

Q10(C)

C	E	R
	6	1
3	1	1
3 +	7 +	2 = 12

From above, we took 1 regional economics which is least. Thus if we take 3 from comparative and one from environmental economic, it will fulfil the requirement.

Q(11).D Here, first, we express the given conditions symbolically. Name of candidates Ali, Amin, Omer, Hamza, Saleem and Osama.

Days: Thu, Fri, Sat, Sun

Each days condition: 1 or 2 interviews

2 consecutive days: 2 or 3 interviews

Ali's interview = Saturday

According to condition (iv), Ali's interview will take place on Saturday. According to condition (v), Amin's interview must take place on the same day, an another interview. Thus choices C and E are impossible. Since Omer's interview must take place on a day after Hamza's interview and Osama's interview must take place on a day after Saleem's interview, cannot take place on Thursday. Thus the correct choice is choice D.

Q(12). According to third condition, no more than three interviews will on any two consecutive days. Thus only one interview can take place on Friday. Therefore according to fifth condition, it cannot be Amin. Since Ali's interview is on Saturday. Thus, it cannot be Ali. Any of the other four candidates could be interviewed on Friday as indicated in the following points:

	Thu	Fri	Sat	Sun
(i)	Hamza/Saleem	Omer	Ali	Amin/Osama
(ii)	Amin/Saleem	Hamza	Ali	Omer/Osama
(iii)	Amin/Hamza	Saleem	Ali	Omer/Osama
(iv)	Hamza/Saleem	Osama	Ali	Amin/Omer

Thus the correct choice is D.

Q13. (E) The possible schedule to fulfil this condition is:

Thu	Fri	Sat	Sun
Saleem	Hamza/Osama	Ali	Amin/Omer

Thus the correct choice is choice (E).

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Quantitative Reasoning

The basic mathematical skills, understanding of elementary mathematical concepts, and the ability to reason quantitatively and solve problems in a quantitative setting are measured in the quantitative part of the test. The knowledge of **arithmetic, algebra, geometry** and **data analysis**, which are usually essential area of study of the high school level are measured in balanced questions. The questions about quantitative ability can also be asked from:

- Discrete Quantitative Questions
- Quantitative Comparison Questions
- Data Interpretation Questions etc.

This section is discussed and explained in detail in this book. Topic by topic explanation is given to facilitate the candidates. Explanatory answers are also given to avoid complications.

Part 1 Arithmetic

Chapter-1: NUMBERS

Numbers:
In decimal number system, we use ten symbols 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 called digits, to represent any number.

Note: A group of figures, denoting a number is called numeral.

Types of Numbers

Natural Numbers:
Numbers which we use for counting the objects are known as natural numbers. It is denoted by 'N'.

$$N = \{1, 2, 3, 4 \ldots\ldots\}$$

Whole Numbers:
All Natural Numbers together with zero form the set of all whole numbers. It is denoted by 'W'.

$$W = \{0, 1, 2, 3, \ldots\ldots\}$$

Integers:
The set of numbers which consists of whole numbers and negative numbers is known as integers. It is denoted by Z.

$$Z = \{\ldots\ldots -3, -2, -1, 0, 1, 2, 3, \ldots\ldots\}$$

Positive Integers:
The set $Z^+ = \{1, 2, 3, 4, \ldots\ldots\}$ is the set of all positive integers. It is clear that positive integers and natural numbers are synonyms.

Negative Integers:
The set $Z^- = \{-1, -2, -3, \ldots\ldots\}$ is the set of all negative integers.

Remember: "0" is neither positive nor negative.

Non-Negative Integers:
The set $\{0, 1, 2, 3, \ldots\ldots\}$ is a set of non-negative integers.

Non-Positive Integers:
The set $\{0, -1, -2, -3, \ldots\ldots\}$ is the set of non-positive integers.

Even Numbers:
The numbers which are divisible by 2 are called Even Numbers.

$E = \{2, 4, 6, \ldots\ldots\}$

Odd Numbers:
The numbers which are not divisible by 2 are called Odd Numbers.

$O = \{3, 9, 11, 17, 19, \ldots\ldots\}$

Properties of zero:

1. 0 is neither positive nor negative.
2. 0 is an even integer.
3. 0 is smaller than every positive number.
4. 0 is greater than every negative number.
5. For any integer p; $p \times 0 = 0$.
6. For any integer p (including 0): $p \div 0 = 0$.
7. For any positive integer p; $0 \div p$; $\frac{0}{p}$ = undefined.
8. For every integer p; $p + 0$ and $p - 0 = p$.
9. If the product of two or more numbers is 0, then at least one of them is 0.

Properties of one:

1. For any number p: $p \times 1 = p$ and $\frac{p}{1} = p$.
2. 1 is the divisor of every integer.
3. 1 is an odd integer.
4. 1 is not a prime number, because prime numbers should be greater than 1.
5. 1 is the smallest positive integer.
6. For any number n : $1^n = 1$.

Factors and Multiples:
A number which divides a given number exactly is called a factor of the given number.

Example 1: Find the factors of (i) 64 and (ii) 75.

Solution: (i) $64 = 1 \times 64$
$= 2 \times 32$
$= 4 \times 16$
$= 8 \times 8$

The factors of 64 are 1, 2, 4, 8, 16, 32 and 64.

(ii) $75 = 1 \times 75$
$= 3 \times 25$
$= 5 \times 15$

The factors of 75 are 1, 3, 5, 15, 25 and 75.

Division Algorithm:
Let a and b be two given integers such that $b \neq 0$. On dividing a by b, let q be the quotient and r the remainder, then $a = bq + r$.

Clearly, $0 < r < b$

In general, we have

Dividend = (Divisor × Quotient) + Remainder

Multiple of a Number:
A multiple of any natural number is a number obtained by multiplying that number by any natural number.

Example: Find the multiples of:

(i) 4 less than 30 (ii) 9 less than 60

Solution: (i) $4 \times 1 = 4$
$4 \times 2 = 8$

$4 \times 3 = 12$
$4 \times 4 = 16$
$4 \times 5 = 20$
$4 \times 6 = 24$
$4 \times 7 = 28$ etc.

$\therefore$ The multiples of 4 less than 30 are 4, 8, 12, 16, 20, 24 and 28.

(ii) $9 \times 1 = 9$
$9 \times 2 = 18$
$9 \times 3 = 27$
$9 \times 4 = 36$
$9 \times 5 = 45$
$9 \times 6 = 54$ etc.

$\therefore$ The multiples of 9 less than 60 are 9, 18, 27, 36, 45 and 54.

Divisible of a Number:

If a number divides a second number without leaving any remainder, then we say that the second number is divisible by the first number. For example, since the number 2 divides 14 without leaving any remainder, we say that 14 is divisible by 2.

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Chapter 2

MULTIPLICATION AND DIVISION

MULTIPLICATION

Multiplication is a short method of adding the same number repeatedly.

PROPERTIES OF MULTIPLICATION

1. Multiplication is commutative for rational numbers.
   Example:

$$\frac{a}{b} \times \frac{c}{d} = \frac{ac}{bd} = \frac{c}{d} \times \frac{a}{b}$$

$$\frac{2}{3} \times \frac{5}{7} = \frac{10}{21} = \frac{5}{7} \times \frac{2}{3}$$

2. Multiplication is associative for rational numbers.
   Example:

$$\frac{a}{b} \times \left(\frac{c}{d} \times \frac{e}{f}\right) = \frac{ace}{bdf} = \left(\frac{a}{b} \times \frac{c}{d}\right) \times \frac{e}{f}$$

$$\frac{2}{3} \times \left(\frac{5}{7} \times \frac{11}{13}\right) = \frac{110}{273} = \left(\frac{2}{3} \times \frac{5}{7}\right) \times \frac{11}{13}$$

3. Multiplication is distributive over addition and subtraction for rational numbers.
   Example:

$$\frac{a}{b} \times \left(\frac{c}{d} \pm \frac{e}{f}\right) = \frac{a}{b} \times \frac{c}{d} \pm \frac{a}{b} \times \frac{e}{f}$$

$$\frac{2}{3} \times \left(\frac{5}{7} \pm \frac{11}{13}\right) = \frac{2}{3} \times \frac{5}{7} \pm \frac{2}{3} \times \frac{11}{13}$$

4. For any rational number $\frac{x}{y}$, $\frac{x}{y} \times 1 = \frac{x}{y} = 1 \times \frac{x}{y}$, one is called multiplicative identity.

5. Two rational numbers $\frac{a}{b}$ and $\frac{b}{a}$ are the multiplicative inverses of each other.

$$\frac{a}{b} \times \frac{b}{a} = 1 = \frac{b}{a} \times \frac{a}{b}$$

Note: The sign of the product is +ive, if there are an even number of negative factors or there are no negative factors. The sign of the product is –ive, if there are an odd number of negative factors

DIVISION

The process of subtraction of the same number form a given number for a few times is called division (÷), *i.e.*,

$$6 \div 2 = 3$$

(2 can be subtracted 3 times from 6)

IMPORTANT POINTS

1. Division is the inverse operation of multiplication. For example $6 \div 2 = 3$ means to find the number by which 2 should be multiplied so as to obtain 6.

   Because $3 \times 2 = 6$

   Therefore, $6 \div 2 = 3$

2. When a number is divided by another number, the first number *i.e.* the number which is being divided is called the ***dividend***, the second number which divides is called the ***divisor*** and the number obtained as a result of division is called the ***quotient***. In the above example, 6 is the dividend, 2 is the divisor and 3 is the quotient.
3. The operation of division starts from the left whereas the operations of addition, subtraction and multiplication start from the right.

Divisibility:

The following table gives the rules to test the divisibility from 2 to 19.

Divisibility by	If	Example
2	Any number in the unit's place which is either even or zero.	12, 10, 26, 32, 38, 567992, 11110234
3	The sum of digits is divisible by 3.	321 : 3 + 2 + 1 = 6 is divisible by 3.
4	The last two digits of a number is divisible by 4.	725324 : 24 is divisible by 4.
5	The number ends with 5 or zero.	4112370, 5321095, 3331210, etc.
6	A number is divisible by 2 and the sum of the digits of the number is multiple of 3.	342, 63924, 154, 261 etc.
8	The last three digits of a number is divisible by 8. or The last three digits of a number are zero.	2125000, 135923120, 7792320, 1256, etc.
9	The sum of all the digits of a number is divisible by 9.	33456735 : 3 + 3 + 4 + 5 + 6 + 7 + 3 + 5 = 36 divisible by 9.
10	Any number which ends with zero.	70, 789790, 7111130, 5773313570, 112300100 etc.
11	The sum of digits at odd and even places are respectively equal or differ by a number divisible by 11.	4235682 : Sum 1 = 4 + 3 + 6 + 2 = 15 Sum 2 = 2 + 5 + 8 = 15 Sum 1 = Sum 2, the number is divisible by 11. or 283712 : Sum 1 = 2 + 3 + 1 = 6 and Sum 2 = 8 + 7 + 2 = 17, their differ 17 – 6 = 11 is divisible by 1.
12	The number which is divisible by both 4 and 3.	135792 etc.
14	The number which is divisible by both 2 and 7.	98, 504 etc.
15	The number which is divisible by 3 and 5.	360, 733352215 etc.
16	The number whose last 4 digit number is divisible by 16.	253421020, 27954204 etc.
18	Any number which is divisible by 9 and has its last digit even (or zero).	2709360, 252630 etc.
25	The number formed by the last two digits of the number is divisible by 25.	257275, 25277750 etc.

Model Examples:

Q1. Multiply 63987 by 91763 is not more than 3 lines.

Solution:

```
        63986
   (×)  91763
      403 1181      Multiplication by    63
     4479 09××      Multiplication by   700
   582281 7×××      Multiplication by 91000
   5871639081
```

Q2. Find the number, one-sixth of which exceeds its one-ninth by 654.

Solution: Let the number be x

$$\therefore \quad \frac{x}{6} - \frac{x}{9} = 654$$

$$\frac{x}{18} = 654$$

$$\Rightarrow \quad x = 654 \times 18 = 11772 \qquad \text{Ans.}$$

Q3. Find the quotient and remainder when $x^2 + bx - 5$ is divided by $x + 1$. For what value of 'b' will the remainder be zero?

Solution:

$$x+1\,\overline{)\,x^2 + bx - 5\,}\,(x + (b-1)$$

$$\begin{array}{l} x^2 + x \\ - \quad - \\ \hline (b-1)x - 5 \\ (b-1)x - 1 + b \\ - \qquad + \quad - \\ \hline -4 - b \end{array}$$

So Quotient $= x + b - 1$ Ans.

Remainder $= -(b + 4)$

For remainder $= 0$

$$-b - 4 = 0$$

$$\Rightarrow \quad \boxed{b = -4}$$

Q4. The speed of mail train is 1,370 meters per minute. Express it in miles per hour correct to three significant figures, given that 1 metre = 39.37 inches.

Solution: Speed of mail train = 1,370 metres per minute

$$= 1370 \times 60 \text{ metres per hour}$$

$$= \frac{1370 \times 60 \times 39.37}{12 \times 3 \times 1760} \text{ miles per hour}$$

$$= 51.077 \text{ miles per hour} \qquad \textbf{Ans.}$$

Q5. A boy when asked to multiply a number by 7/8, divided this instead, by 7/8 and found the answer $1\frac{1}{14}$ too great. Find the number and the correct answer.

Solution: Let the number be 'x'

$$\therefore \quad \left(x \div \frac{7}{8}\right) - \left(x \times \frac{7}{8}\right) = \frac{15}{14}$$

$$\frac{8x}{7} - \frac{7x}{8} = \frac{15}{14}$$

$$\frac{64x - 49x}{56} = \frac{15}{14}$$

or

$$\frac{15x}{56} = \frac{15}{14}$$

$$\therefore \quad x = \frac{56 \times 15}{14 \times 15} = 4 \qquad \textbf{Ans.}$$

Correct answer $= 4 \times \frac{7}{8} = 3\frac{1}{2}$ **Ans.**

Q6. The sum of the squares of two consecutive integers is 1105. Find the integers and check your answer.

Solution: Let the two consecutive positive numbers be:

$$x, x+1$$

Then sum of the squares of these consecutive numbers = 1105

$$\therefore \quad x^2 + (x+1)^2 = 1105$$
$$x^2 + x^2 + 2x + 1 = 1105$$
$$2x^2 + 2x - 1104 = 0$$
$$x^2 + x - 552 = 0$$

or
$$x^2 + 24x - 23x - 552 = 0$$
$$x(x+24) - 23(x+24) = 0$$
$$(x-23)(x+24) = 0$$
$$\Rightarrow \quad x = 23 \quad \text{or } x = -24$$

As the two consecutive numbers are +ve integers, therefore, we neglect the –ve number.
Thus the two consecutive numbers are 23 and 24. **Ans.**

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Chapter 3

HIGHEST COMMON FACTOR & LEAST COMMON MULTIPLE

The highest common factor of two or more numbers is the greatest number which divides each of them exactly.

Methods of finding H.C.F.

(i) ***By Prime Factors.***

Resolve the given number into their prime factors. The product of all prime common factors is known as H.C.F.

Model Example

Find the H.C.F. of 630, 1050 and 1260.

Solution:

$$630 = 2.3.3.5.7$$
$$1050 = 2.3.5.5.7$$
$$1260 = 2.2.3.3.5.7$$

$\therefore$ H.C.F. is $2.3.5.7 = 210$. **Ans.**

(ii) ***By Division:***

Find the H.C.F. of 5133 and 3953

```
3953) 5133 (1
      3953
      1180) 3953(3
            3540
            413) 1180(2
                 826
                 354) 413(1
                      354
                       59) 354(6
                           354
                            ×
```

Various Steps:

Step I. Dividing the greatest number by the lesser, we get the remainder 1180.
Step II. Dividing the previous divisor 3953 by 1180, we get the remainder 413.
Step III. Dividing the previous divisor 1180 by 413 we get the remainder 354.

Step IV. Dividing the previous divisor 413 by 354 we get the remainder 59.
Step V. Dividing the previous divisor 354 by 59 we get no remainder.
∴ The last divisor 59 is the H.C.F.
H.C.F. is also known as Greatest Common Measure (G.C.M.)

LEAST COMMON MULTIPLE (L.C.M)

The Least Common Multiple of two or more given numbers is the least number which is exactly divisible by each of them.

Methods of Finding L.C.M.

(i) ***By Factors.*** Resolve the given numbers into prime factors, and find the product of the highest powers of all the factors that occur in the given number. The product will be the required L.C.M.

Model Example

Q1. Find the L.C.M. of 70, 80, 90.

Solution:

$$70 = 2 \times 5 \times 7$$
$$80 = 2^4 \times 5$$
$$90 = 2 \times 3^2 \times 5$$

L.C.M. $= 2^4.3^2.5.7 = 5040$ Ans.

(ii) ***With the help of H.C.F.*** The product of two numbers is equal to the product of their L.C.M. and H.C.F.

∴ L.C.M. of two numbers

$$= \frac{\text{Product of numbers}}{\text{H.C.F.}}$$

L.C.M. and H.C.F. of Factions.

L.C.M. of two or more fractions

$$= \frac{\text{L.C.M. of numerators}}{\text{H.C.F. of denominators}}$$

H.C.F. of two or more fractions

$$= \frac{\text{L.C.M. of numerators}}{\text{H.C.F. of denominators}}$$

Model Examples

Q1. The H.C.F. of two numbers is 34 and their L.C.M. is 4284. If one of the numbers is 204, find the other.

Solution: As product of 2 numbers
= their H.C.F. × L.C.M.

The other number is $= \frac{34 \times 4284}{204}$

$= 714$ **Ans.**

Q2. What is the highest number of four digits which will leave a remainder of 1 when divided by any of numbers 6, 9, 12, 15, or 18?

Solution: L.C.M. of 6, 9, 12, 15, 18 = 180

Greatest no. of 4 digits = 9999

Greatest no. of 4 digits divisible by

180 = 9999 – 99 = 9900

```
      55
180 ) 9999
      900
      999
      900
       99
```

∴ Reqd. No. = 9900 + 1 = 9901 **Ans.**

Q3. Three men A, B and C go walking round a circle one mile in circumference at the rates of 160, 120 and 105 yards per minute, respectively. If they all start together and walk in the same direction, when will they first be together again?

Solution: Circumference of the circle

$\therefore$ 1 mile or 1760 yds

A will complete the circle in

$$= \frac{1760}{160} = 11 \text{ min}$$

B will complete the circle in

$$= \frac{1760}{120} = \frac{44}{3} \text{ min.}$$

C will complete the circle in

$$= \frac{1760}{105} = \frac{352}{21} \text{ min.}$$

L.C.M. of 11, $\frac{44}{3}$, $\frac{352}{21}$ = 352 minutes.

$\therefore$ they will be together again first after 352 min. or 5 hrs. 52 min. **Ans.**

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Chapter 4

SQUARE ROOT

Methods of Finding Square Root:

(i) By Factors. Resolve the number into its prime factors. The square root is the product of the prime factors taken half as many times as they occur in the number.

(ii) By Division.

Model Example

Find the square root of 2480625.

Solution:

```
    1 | 2480625   (1575
      | 1
   25 | 148
      | 125
  307 |  2306
      |  2149
 3145 |   15725
      |   15725
      |      ×
```

Ans. 1575

Q2. Find the square root of 43.45 to four decimal places.

Solution:

```
    6 | 43.45     (6.5916
      | 36
  125 |  7.45
      |  6.25
 1309 |   12000
      |   11781
13181 |    21900
      |    13181
131826 |     871900
       |     790956
       |      80944
```

As remainder is more than half 6.5917 **Ans.**

Q3. Find the value of $\sqrt{\frac{2+\sqrt{3}}{2-\sqrt{3}}}$ correct to three decimal places.

Solution: $\sqrt{\frac{2+\sqrt{3}}{2-\sqrt{3}}} = \sqrt{\frac{(2+\sqrt{3})(2+\sqrt{3})}{(2-\sqrt{3})(2-\sqrt{3})}}$ (Rationalization)

$= \sqrt{\frac{(2+\sqrt{3})^2}{(2)^2-(\sqrt{3})^2}}$

$= \sqrt{\frac{(2+\sqrt{3})^2}{4-3}} = 2+\sqrt{3} = 2+1.732$

$= 3.732$ **Ans.**

Unitary Method and Chain Rule

IMPORTANCE:

The unitary method and chain rule have quite an importance in our daily life. It is explained by the following model examples.

Model Examples:

Q1. In a kilometer race A can beat B by 40 metres and B can beat C by 50 metres. How many metres can A beat C in a 500 metres race?

Solution: When A covers 1000 m.

B covers $1000 - 40 = 960$ m.

and When B covers 1000 m.

C covers $1000 - 50 = 950$ m.

$\therefore$ When B covers 960 m.

C covers $\frac{950}{1000} \times 960\,\text{m} = 912$ m.

i.e., when A covers 1000 m. C covers $\frac{912}{2}$

$= 456$ m.

or when A covers 500 m. race, A will beat C by

$= 500 - 456 = 44$ m.

Q2. Divide Rs. 510 between A, B and C so that A gets 2/3 of what B gets and B gets ¼ of what C gets. Find the share of each.

Solution: Let C's share be Rs. x

$\therefore$ B's // // $= \frac{x}{4}$

A's // // $= \frac{2}{3} \times \frac{x}{4} =$ Rs. $\frac{x}{6}$

Total amount = Rs. 510

$\therefore \quad x + \frac{x}{4} + \frac{x}{6} = 510$

$\frac{12x + 3x + 2x}{12} = 510$

$\therefore \quad x = \frac{12 \times 510}{17} = 360$

$\therefore$ A's share $= \frac{360}{6} =$ Rs. 60

B's // $= \frac{360}{4} =$ Rs. 90

C's // = Rs. 360

Ans

Q3. Divide Rs. 600 among A, B, and C so that Rs. 40 more than 2/5 of A's share, Rs. 20 more than 2/7 of B's share, Rs. 10 more than $\frac{9}{17}$ of C's share may be equal.

Solution: Let $\frac{2}{5}$ of A's share + Rs. 40 = $\frac{2}{7}$ of B's share + Rs. 20 = $\frac{9}{17}$ of C's share + Rs. 10 be = x.

$\therefore$ $\frac{2}{5}$ of A's share = $x - 40$

or A's share = $\frac{5}{2}(x-40)$

Similarly B's share = $\frac{7}{2}(x-20)$

C's share = $\frac{17}{9}(x-10)$

As total amount = Rs. 600

$$\therefore \quad \frac{5x-200}{2}+\frac{7x-140}{2}+\frac{17x-170}{9}=600$$

$$\frac{45x-1800+63x-1260+34x+340}{18}=600$$

or $142x - 3400 = 600 \times 18 = 10800$

$142x = 10800 + 3400 = 14200$

$$x=\frac{14200}{142}=100$$

$$\left.\begin{aligned} \therefore \text{ A's share} &= \frac{5}{2}(100-40) = \text{Rs. } 150 \\ \text{B's share} &= \frac{7}{2}(100-20) = \text{Rs. } 280 \\ \text{C's share} &= \frac{17}{9}(100-10) = \text{Rs. } 170 \end{aligned}\right\} \textbf{Ans.}$$

Q4. A garrison has enough provision for 52 days. After 20 days, a reinforcement of 400 men arrives and the food would then last for 24 days only. How many men were there in the garrison originally?

Solution: Let there be x men in the garrison originally. After 20 days no. of men = $x + 400$.

If these men had not joined, the provision would have lasted for $50 - 20 = 32$ days more.

$\therefore$ For x men the provision can last for 32 days

// 1 // // // $32x$ //

For $(x + 400)$ men of provision can last for $\frac{32x}{x+400}$ days

But provision lasted for 24 days

$$\therefore \quad \frac{32x}{x+400}=24$$

or $32x = 24x + 9600$

$8x = 9600$

or $x = 1200$ men. **Ans.**

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Chapter 5

FRACTIONS AND DECIMALS

FRACTIONS:

If any unit be divided into any number of equal parts, one or more of these parts is called a fraction of the unit.

Example: The fractions one-fourth, two-third and three-fourth are respectively written as $\frac{1}{4}, \frac{2}{3}$ and $\frac{3}{4}$

NUMERATOR AND DENOMINATOR:

The upper number, which shows the number of parts taken to form the fraction, is called numerator.

The lower number, which indicates the number of equal parts in which the unit is divided, is called denominator.

Terms of The Fraction:

The numerator and the denominator of a fractions are called its terms.

Note: A fraction is also called a rational number.

Lowest Terms of a Fraction:

When the numerator and the denominators of a fraction have no common factor, the fraction is said to be is its lowest terms:

Example: $= \frac{6}{10} = \frac{3\times2}{5\times2}$

In the above example denominator and the numberator have a common factor, thus $\frac{6}{10}$ is not is its lowest terms. If we cancel out 2 by dividing numerator and denominator by 2 we find $\frac{3}{5}$, which has no common factor. hence $\frac{3}{5}$ is in its lowest terms.

Proper Fraction:

A proper fraction is one whose numerator is less than the denominator.

Example: $\frac{2}{3}, \frac{5}{7}, \frac{23}{46}$ are proper fractions.

Note: The value of proper fractions is always less than 1

IMPROPER FRACTION:

A fraction whose numerator is equal to or greater than the denominator is called improper fraction.

Example: $\frac{15}{13}, \frac{13}{5}$, and $\frac{21}{14}$ are improper fractions.

Note: The value of an improper fractions is always more than as equal to 1.

Mixed Fraction:

When an improper fraction is changed to consist of a whole number and a fraction, it is called a mixed fraction.

Example: The improper fraction $\frac{15}{13}$ can be written as $\frac{2}{13}$, which is a mixed fraction.

$$\begin{array}{r} 1 \\ 13\overline{)\,15} \\ \underline{13} \\ 2 \end{array}$$

Compound Fraction:

A fractions of a fraction is called a compound fraction.

Example: $\frac{1}{3}$ of $\frac{3}{5}$ is a compound fraction.

Thus $\frac{1}{3}$ of $\frac{3}{5} = \frac{1}{\cancel{3}} \times \frac{\cancel{3}}{5} = \frac{1}{5}$

Complex Fractions:

A complex fraction is one in which the numerator or denominator or both are fractions.

Example: $\frac{3/2}{5}$, $\frac{3}{2/5}$, $\frac{2/5}{3/7}$ and $\frac{1/3+1/2}{2/3-1/5}$ are complex fractions.

Example 1: One third of one-seventh of a plot is sold Rs. 45000. What is the value of six-twnety fifth of the plot.

Solution: One third of one seventh $= \frac{1}{3} \times \frac{1}{7} = \frac{1}{21}$

Now, $\frac{1}{21}$ of a plot costs = Rs. 45000.

$\frac{1}{21} \times \frac{6}{25} = 45000 \times \frac{21 \times 6}{2}$

$\frac{6}{25}$ of the plot will cost $= \frac{45000}{1/2} \times \frac{6}{25}$

$$= \frac{45000 \times 21 \times 6}{25}$$

Example 2: A sum of money increased by its sixth part amount to Rs. 56. Find the sum.

Solution: Let x be the amount of money, thus

$x + \frac{x}{6} = 56$

$$x + \frac{x}{6} = 56 \Rightarrow \frac{6x + x}{6} = 56$$

$$\Rightarrow \frac{7x}{6} = 56$$

$$\Rightarrow 7x = 56 \times 6$$

$$\Rightarrow x = \frac{56 \times 6}{7} = 48$$

VULGAR FRACTIONS

In questions of fractions signs +, –, ×, ÷, "*of*" ('of' signifies *multiplication*) and brackets are often involved. In simplifying these questions the following order must be followed:

IMPORTANT POINTS

(i) Remove the brackets.
(ii) Then quantities which are connected by *'of'* should be simplified.
(iii) Then division and multiplication are carried out.
(iv) Operation of addition and subtraction are performed at last.

Note: The above rules can be easily remembered by the word 'BODISA' of which 'B' stands for brackets, O for 'of', D for division, I for into, S for subtraction and A for addition.

Model Examples:

Example 3: $7\frac{1}{2} - \frac{1}{9}\left[3\frac{3}{4} \div \left\{\frac{5}{6} of \frac{2}{3}\left(\frac{1}{3} - \overline{\frac{1}{4} - \frac{1}{6}}\right)\right\}\right]$

Solution:

$$= 7\frac{1}{2} - \frac{1}{9}\left[\frac{15}{4} \div \left\{\frac{5}{6} of \frac{2}{3}\left(\frac{1}{3} - \frac{3-2}{12}\right)\right\}\right]$$

$$= 7\frac{1}{2} - \frac{1}{9}\left[\frac{15}{4} \div \left\{\frac{5}{6} of \frac{2}{3}\left(\frac{1}{3} - \frac{1}{12}\right)\right\}\right]$$

$$= 7\frac{1}{2} - \frac{1}{9}\left[\frac{15}{4} \div \left\{\frac{5}{6} of \frac{2}{3}\left(\frac{3}{12}\right)\right\}\right]$$

$$= 7\frac{1}{2} - \frac{1}{9}\left[\frac{15}{4} \div \left\{\frac{5}{6} of \frac{1}{6}\right\}\right]$$

$$=7\frac{1}{2}-\frac{1}{9}\left[\frac{15}{4}\div\frac{5}{36}\right]$$

$$=7\frac{1}{2}-\frac{1}{9}\left[\frac{15}{4}\times\frac{36}{5}\right]$$

$$=7\frac{1}{2}-\frac{1}{9}\times3\times9=7\frac{1}{2}-3=4\frac{1}{2}$$ **Ans.**

Example 4: Simplify

$$\frac{\frac{1}{6}+\frac{5}{12}\times\left(\frac{4}{5}-\frac{5}{7}\right)}{\frac{3}{4}\,if\,1\frac{2}{3}-\frac{3}{5}\,of\,1\frac{4}{7}}\div\frac{\frac{1}{3}+\frac{1}{7}-\frac{2}{5}}{\frac{1}{5}+\frac{1}{9}-\frac{2}{7}}$$

Solution:

$$=\frac{\frac{1}{6}+\frac{5}{12}\times\left(\frac{4}{5}-\frac{5}{7}\right)}{\frac{3}{4}\times\frac{5}{3}-\frac{3}{5}\times\frac{11}{7}}\div\frac{\frac{1}{3}+\frac{1}{7}-\frac{2}{5}}{\frac{1}{5}+\frac{1}{9}-\frac{2}{7}}$$

$$=\frac{\frac{1}{6}+\frac{5}{12}\times\left(\frac{28-25}{35}\right)}{\frac{5}{4}-\frac{33}{35}}\div\frac{\frac{35+15-42}{105}}{\frac{63+35-90}{315}}$$

$$=\frac{\frac{1}{6}+\frac{1}{28}}{\frac{5}{4}-\frac{33}{35}}\div\frac{8}{105}\times\frac{315}{8}$$

$$=\frac{\frac{14+3}{84}}{\frac{175-132}{140}}\div3=\frac{17}{84}\times\frac{140}{43}\times\frac{1}{3}$$

$$=\frac{85}{387}$$ **Ans.**

Continued Fraction:

The fractions of the form $a+\cfrac{b}{c+\cfrac{d}{e+\cfrac{f}{g}}}$

etc. are known as continued fractions where $a, b, c,$ ..... etc., are any numbers.

Note: In order to simplify such fractions, we begin with the lowest part and proceed step by step, upwards.

Model Examples:

Example 5: Simplify:

$$\left\{1+\cfrac{1}{2+\cfrac{2}{3+\cfrac{3}{4}}}\right\}\div\left\{\cfrac{4}{4+\cfrac{4}{3+\cfrac{3}{2}}}\right\}$$

Solution:

$$\left\{1+\cfrac{1}{2+\cfrac{2}{\cfrac{15}{4}}}\right\}\div\left\{\cfrac{4}{4+\cfrac{4}{\cfrac{9}{2}}}\right\}$$

$$=\left\{1+\cfrac{1}{2+\cfrac{8}{15}}\right\}\div\left\{\cfrac{4}{4+\cfrac{8}{9}}\right\}$$

$$=1+\left\{\cfrac{1}{\cfrac{38}{15}}\right\}\div\left\{\cfrac{4}{\cfrac{44}{9}}\right\}$$

$$=\left\{1+\frac{15}{38}\right\}\div\left\{\frac{36}{44}\right\}$$

$$=\frac{53}{38}\times\frac{44}{36}=\frac{583}{342}$$ **Ans.**

DECIMAL FRACTION: A fraction involving decimal point is called decimal fraction.

Conversion of a decimal fraction into vulgar fraction:

Rule. Write down the given number in the numerator omitting the decimal point and for the denominator write 1 followed by as many zeroes as there are figures on the right of the decimal point.

As $$46.76=\frac{4676}{100}$$

and $$199.0083=\frac{1990083}{10000}$$

Model Example

Q1. Simplify

$$\frac{0.1\times0.1\times0.1+0.01+0.01\times0.01}{0.2\times0.2\times0.2+0.08+0.04\times0.02}$$

Solution:

$$=\frac{\frac{1}{10}\times\frac{1}{10}\times\frac{1}{10}+\frac{1}{100}+\frac{1}{100}\times\frac{1}{100}}{\frac{2}{10}\times\frac{2}{10}\times\frac{2}{10}+\frac{8}{100}+\frac{4}{100}\times\frac{2}{100}}$$

$$= \frac{\frac{1}{1000}+\frac{1}{100}+\frac{1}{10000}}{\frac{8}{1000}+\frac{8}{100}+\frac{8}{10000}}$$

$$= \frac{\left(\frac{1}{1000}+\frac{1}{100}+\frac{1}{10000}\right)}{8\left(\frac{1}{1000}+\frac{1}{100}+\frac{1}{10000}\right)}$$

$$= \frac{1}{8} \quad \textbf{Ans.}$$

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Chapter 6

PERCENTAGE

Percentage:

The term 'percent' is a short form of the Latin word 'per centum' meaning 'out of hundred'. It can best be defined as:

> "A fraction whose denominator is 100 is called a percentage and the numerator of the fraction is called the rate percent."

A rate percent is reduced to an equivalent fraction dividing it by 100.

Change of percentage into Fraction or Decimal:

To convert a percentage to a fraction, mixed number or decimal, divide it by 100, and reduc , if possible. If necessary, the relating fraction may then be changed to a decimal.

Example:

(i) Express $2\frac{1}{7}\%$ to a fraction

(ii) Change $\frac{3}{4}\%$ to a decimal.

Solution:

(i) $2\frac{1}{7}\% = \frac{15}{7}\%$

$$= \frac{15}{7} \times \frac{1}{100}\left(\text{Replace \% by } \frac{1}{100}\right)$$

$$= \frac{3}{140}$$

$$= \frac{3}{140}$$

(ii) $\frac{3}{4}\% = \frac{3}{4} \times \frac{1}{100}\left(\text{Replace \% by } \frac{1}{100}\right)$

$$= \frac{3}{400} = .0075$$

Change of Fraction into Percentage:

To change a fraction or a mixed numbers to a percent.

a. Multiply the fraction or mixed number by 100%.

b. Reduce, if possible

c. Affix a % sign.

Example 2:

(i) Change $\frac{1}{80}$ to a percent.

(ii) Change 0.05 to a percent

Solution:

(i) $\frac{1}{80} = \frac{1}{80} \times 100\%$

$= 1.25\%$

(ii) $0.05 = 0.05 \times 100\%$

$= \frac{5}{100} \times 100\%$

$= 5\%$

Expressing One Quantity as a Percentage of Another:

To express one quantity "p" as a percentage of another quantity "q".

a. Write p as a fraction of q.

b. Multiply the fraction $\frac{p}{q}$ by 100% to convert it to a percentage

Example 3:

There are 56 boys in a class of 140 students. What is the percentage of the boys?

Solution:

Total students $= q = 140$

Boys $= p = 56$

Fraction $= \frac{p}{q}$

$= \frac{56}{140}$

Percentage $= \frac{56}{140} \times 100\%$

$= 40\%$

Important Tip:

If a salary of a man is first increased by x% and then it has decreased x%, the change in its initial salary is less by x% of x or $\frac{x^2}{100}$.

Note:

If two values are respectively a% and b% more than a third value, then the first is $\frac{100+a}{100+b} \times 100$'s of the second.

Example 4:

Two numbers are respectively 20% and 50% more than a third, what percentage is the first to the second?

Solution:

Following the above, we have the value

$= \frac{100+20}{100+50} \times 100\%$

$= \frac{120}{150} \times 100\%$

$\frac{100+20}{100+50} \times 100$

$\frac{120}{150} \times 100$

$= 8\frac{1}{3}\%$

Important Tip:

If the first value is $r\%$ more than the second value, then the second is $\left[\frac{r}{100+r}\times 100\right]\%$ less than the first value.

Example 5:

If Hamza's salary is 35% more than that of Osama, then how much percent is Osama's salary less than that of Hamza?

Solution:

Following the above theorem, we have the value

$$= \left[\frac{35}{100+35}\times 100\right]\%$$

$$= \left[\frac{35}{135}\times 100\right]$$

Important Tip:

If the first value is $r\%$ less than the second value, then the second is $\left[\frac{r}{100-r}\times 100\right]\%$ more than the first value.

Example 6:

If Maryam's salary is 25% less than that of Fatima, then how much percent is Fatima's salary more than that of Maria?

Solution:

Following the above theorem, we have

$$\left[\frac{25}{100-25}\times 100\right]\%$$

$$= 33\frac{1}{3}\%$$

Important Tip:

$a\%$ of a quantity is taken by the first, $b\%$ of the remaining is taken by the second and $c\%$ of the remaining is taken by the third person. Now if X is left then there was

$$\frac{X\times 100\times 100\times 100}{(100-x)(100-y)(100-z)}$$

in the beginning.

Example 7:

After deduction 20% from a certain sum, and then 30% from the remainder, there is 3500 left. Find the original sum.

Solution:

Following the above theorem, we have

$$= \frac{3500\times 100\times 100}{(100-20)(100-30)}$$

$$= \frac{3500\times 100\times 100}{80\times 70}$$

$$= 6250$$

Model Examples

Example 8:

In an examination paper of 5 questions, 5 percent of the candidates answered all of them and 5 percent none

of the rest, 25 percent answered only one question, and 20 percent answered only 4. If 24½ percent of the entire candidates answered only 2 questions and 200 candidates answered only 3, how many candidates appeared at the examination?

Solution: Let the total no. of candidates be x

$\frac{5x}{100}$ answered all the questions and $\frac{5x}{100}$ answered none.

The remaining candidates $= x - \left(\frac{5x}{100} + \frac{5x}{100}\right)$

$= \frac{9x}{10}$

No. of candidates answering only one question $= \frac{25}{100} \times \frac{9x}{10} = \frac{9x}{40}$

No. of candidates answering four questions $= \frac{20}{100} \times \frac{9x}{10} = \frac{9x}{50}$

No. of candidates answering two questions $= \frac{49}{200} \times x$

No. of candidates who answered three questions

$$= x - \left(\frac{5x}{100} + \frac{5x}{100} + \frac{9x}{40} + \frac{9x}{50} + \frac{49x}{200}\right) = 200$$

$$\Rightarrow x - \left(\frac{10x + 10x + 45x + 36x + 49x}{200}\right) = 200$$

$$\Rightarrow \frac{(200 - 50)x}{200} = 200$$

$$\Rightarrow \quad 50x = 40000$$

$$x = 800 \text{ Ans.}$$

Example 9:

The following table gives the number of the candidates (boys and girls) who appeared an examination. To complete the missing figure, find the number of candidates and their passing percentage.

Candidates	Appeared	Passed	Passing percentage (correct to one decimal place)
Boys	6720	3528	---
Girls	4750	---	62.4
Total	11470	---	---

Solution: Passing percentage of boys $= \frac{3528}{6720} \times 100$

$= 52.5\%$ **Ans.**

No. of girls passed $= \frac{62.4}{100} \times 4750$

$= 2964$ **Ans.**

Total no. of candidates passed $= 3528 + 2964$

$= 6492$ **Ans.**

Total pass percentage $= \frac{6492}{11470} \times 100$

$= 56.6\%$ **Ans.**

Example 10:

In 1990, the population of a town is given below:

Men	7640
Women	6675
Boys	5628
Girls	4872
Total	24815

In 1992, men increased by 5 percent, women by 8 percent and total population by 20 percent, and for every 7 boys there are 6 girls. Find the number of boy in 1992.

Solution: Increase in the no. of men in 1992. $= \frac{5}{100} \times 7640 = 382$

Total no. of men in 1992 $= 7640 + 382 = 8022$

Increase in the no. of women in 1992 $= \frac{8}{100} \times 6675 = 534$

Total no. of women in 1992 $= 6675 + 534 = 7209$

Increase in the total population in 1992 $= \frac{20}{100} \times 24815 = 4963$

Total population in 1992 $= 24815 + 4963 = 29778$

Total no. of boys and girls in 1992 $= 29778 - (8022 + 7209)$

$= 29778 - 15231$

$= 14547$

No. of boys $= \frac{7}{13} \times 14547$

$= 7833$ **Ans.**

Example 11:

Complete the following table which gives the enrolment in professional courses of one country in (1990-91) and (1995-96) and calculate the percentage increase in the first three totals of 1995-96 over those of 1990-91.

Solution:

Categories	1990-91		
	Boy	Girls	Total
Higher Secondary stage	57,676	9,511	67,187
Undergraduate stage	169,259	15,715	184,974
Postgraduate & Research	12,052	898	12,950
Total of all stages	238,987	26,124	265,111

Categories	1995-96		
	Boy	Girls	Total
Higher Secondary stage	93,760	14,585	108,345
Undergraduate stage	256,040	33,415	289,455
Postgraduate & Research	20,200	2,000	22,200
Total of all stages	370,000	50,000	420,000

Solution: Increase in no. of boys

$= 370,000 - 238987 = 131013$

% increase $= \frac{131013}{238987} \times 100$

$= 54.8\ \%$ **Ans.**

Increase in no. of Girls

$= 50,000 - 26124 = 23876$

% increase $= \frac{23876}{26124} \times 100$

$= 91.39\ \%$ **Ans.**

Total increase $= 420{,}000 - 265{,}111$
$= 154889$

% increase $= \dfrac{154{,}889}{265{,}111} \times 100$
$= 58.42\ \%$ **Ans.**

Example 12:
The civilian industrial products of a country are given below in million dollars. Complete the columns of 'increase over the preceding year' and 'percentage increase'.
Solution:

		Increase over the preceding year	*Percentage increase*
1951	27,003		
1952	29,314	2,311	8.60
1953	32,439	3,125	10.68
1954	36,335	3,896	12.00
1955	40,033	3,698	10.18

Example 13:
In an examination, 75% of candidates passed in English and 65% in mathematics while 15% failed both in English as well as mathematics. If 495 candidates passed in both the subjects, find the total number of candidates who took the examination.
Solution: Let the total number of students be 100

25 failed in English
35 failed in Mathematics
15 failed in both
No. of failed students $= 25 + 35 - 15 = 45$
No. of passed in both subjects $= 100 - 45 = 55$
If no. of passed students is 55, then total no. of students = 100
If no. of passed students is 495, total no. of students $= \dfrac{100}{55} \times 495$
$= 900$ **Ans.**

Example 14:
A candidate who gets 30 percent marks in an examination fails by 30 marks, but another candidate who gets 42 percent marks gets 42 marks more than that necessary for passing. Find the maximum number of marks and the percentage necessary for passing.
Solution: Let the passing marks $= x$
Now the candidate gets 30% marks and by this he gets 30 marks less than passing marks.
It means, he gets $(x - 30)$ marks
If he gets 30 marks, it means, maximum marks $= 100$

If he gets $(x - 30)$ marks, maximum marks $= \dfrac{100}{30}(x - 30)$ ...(*i*)

In the second case the candidate gets 42% marks such that he gets 42 marks above the passing marks.
It means, he gets $(x + 42)$ marks.
If he gets 42 marks, then maximum marks $= 100$

If he gets $(x + 42)$ marks, maximum marks $= \dfrac{100}{42}(x + 42)$ ...(*ii*)

As (*i*) and (*ii*) are equal because maximum marks are the same in both cases.

$$\frac{100}{30}(x - 30) = \frac{100}{42}(x + 42)$$

or
$$\frac{x - 30}{5} = \frac{x + 42}{7}$$

or $7x - 210 = 5x + 210$

$\Rightarrow \quad x = 210$

Putting the value of x in (i) we get

Maximum marks $= \frac{100}{30}(210-30) \quad = 600$ **Ans.**

If maximum marks are 600 then passing marks $= 210$

If maximum marks are 100 then passing marks $= \frac{210}{600} \times 100 = 35\%$

$\therefore$ Passing percentage $= 35\ \%$ **Ans.**

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Chapter 7

RATIO AND PROPORTION

RATIO:

The number of times one quantity contains another quantity of the same kind is called the ratio of the two quantities.

Note: The ratio of two quantities is equivalent to the fraction that one quantity is to the other.

Example: There can be ratio between Rs. 30 and Rs. 40, but there can be no ratio between Rs. 30 and 40 apples.

Remember: The ratio 3:5 is written as 3:5 or $\frac{3}{5}$, 3 and 5 are called the terms of the ratio. 3 is the first and 5 is the second term.

Note: The first term of a ratio is called the antecedent and the second the consequent.

If a set of objects is divided into two groups in the ratio $a : b$, then the first group contains $\frac{a}{a+b}$ of the total objects. The second group contain $\frac{b}{a+b}$ of the total number of objects.

Important Example:

If a bag containing twelve mirrors is dropped, which of the following cannot be the ratio of the broken mirrors to unbroken mirrors?

(i) 2: 1 ii) 3:1 iii) 3:2 iv) 1:1 v) 7:5

Solution:

Since there are 12 mirrors is the bag. So 12 must be divisible by the sum of terms in the ratio exactly. We see that 2+1=3 divides 12 exactly 3+1=4 also divides exactly. Only the ratio 3+2=5 doesn't divide 12 exactly. Thus the correct answer is (iii)

PROPORTION:

The equality of ratios is called proportios.

Example:

Consider the two ratios

Ist ratio	2nd ratio
5:15	7:21

Since 5 is one-third of 15, and 7 is one-third of 21, the two ratios are equal.

Note: The first and fourth terms are called extremes, and the second and third terms, are called the means. In above example 5 and 21 are extremes, while 15 and 7 are means.

Important Points:

1. If four quantities be in proportion, the product of the extremes is equal to the product of the means.
2. Three quantities of the same kind are said to be in continued proportion when the ratio of the first to the second is equal to the ratio of the second to the third.

Aid to Memory:

The mean proportional between two numbers is equal to the square root of their product.

Example: Find

i). Fourth proportions to 5, 10, 5

ii) Third proportion of 5 and 10.

iii) Mean proportions between .04 and 0.09.

Solution:

(i) Let $5 : 10 :: 5 : x$

Then $5x = 10 \times 5 \Rightarrow 5x = 50 \Rightarrow \boxed{x = 10}$

(ii) Let $5 : 10 :: 10 : x$

Then $5x = 10 \times 10 \Rightarrow 5x = 100 \Rightarrow \boxed{x = 20}$

(iii) Mean proportion between .04 and .09

$$= \sqrt{.04 \times .09} \quad = \sqrt{.0036}$$

$$= \sqrt{\frac{36}{1000}} \quad = \frac{6}{100} = 0.06$$

Direct Proportion:

If the given two quantities are so related to each other that if one of them is multiplied (or divided) by any number, the other is also multiplied (or divided) by the same number.

Inverse Proportion:

If two quantities are so related that if one of them is multiplied by any number, the other is divided by the same number.

Example:

1. If 5 balls cost Rs. 7, what do 15 balls cost?

Solution: This example is an illustration of direct proportion. Therefore, setting a proportion.

$\therefore \quad 5 : 7 :: 15 : x$

$\Rightarrow 5x = 15 \times 7 \Rightarrow x = \frac{15 \times 7}{5} = 21$

2. If 5 men can build a house in 28 days, in how many days will 10 men build it?

Solution:

This example is an illustration of inverse proportion. Here, if we increase number of men.

2, 3, 4 ..... times, the number of days will be decreased.

2, 3, 4..... times, Thus the inverse ratio of the number of men is equal to the ratio of the corresponding number of days.

$\therefore \quad \frac{1}{15} : \frac{1}{10} :: 28 : x$ days

$\Rightarrow \quad x = \frac{1}{5} = \frac{1}{10} \times 28$

$\Rightarrow \quad x = \frac{28 \times 15}{10} = 42$ days.

DOUBLE RULE OF THREE:

Example: If 8 men can reap 80 hectares in 24 days, how many hectares can 36 men reap in 30 days.

Solution: We resolve this problem in two parts.

Ist Part: If 8 men can reap 80 hectors, how many hectares can 36 men reap.

Setting a proportion

8 men : 36 men : : 80 hectares : x hecter

$$x = \frac{36 \times 80}{8} = 360 \text{ hectres}$$

2nd Part: If 360 hectares can be reaped in 24 days, how many hectares can be reaped in 30 days?

24 days : 30 days = 360 hectares : x hector

$$x = \frac{360 \times 30}{24} = 450$$

SINGLE STEP:

8 men : 36 men
24 days : 30 days | : : 80 hectare : x hector

Required No. of hectares : $= \dfrac{\text{Multiplication of means}}{\text{Multiplication of Ist terms}}$

$$= \frac{80 \times 36 \times 30}{8 \times 24} = 450$$

Model Examples:

Example 1: Three liquids contain petrol and spirit mixed in the ratio 2 : 3, 3 : 4 and 4 : 5, respectively. A motor owner mixes 20 litres of the first, 21 litres of the second and a few litres of third. If the ratio of petrol to spirit in the mixture is 29 : 39, find the number of litres of the third liquid taken for the mixture.

Solution: 20 litres of the first liquid has 2/5 × 20
= 8 litres of petrol and 12 litres of spirit
21 litres of the second liquid have 3/7 × 21
= 9 litres of petrol and 12 litres of spirit.

Suppose x litres of the third liquid are taken, it will have $\frac{4x}{9}$ litres of petrol and $\frac{5x}{9}$ litres of spirit.

$\therefore$ Total petrol in the mixture $= 8 + 9 + \frac{4x}{9}$ litres

and total spirit $= 12 + 12 + \frac{5x}{9}$ litres.

$$\text{Ratio of these} = \frac{17 + \frac{4x}{9}}{24 + \frac{5x}{9}} = \frac{29}{39}$$

$\therefore$ $663 + \frac{156}{9}x = 696 + \frac{145}{9}x$

or $\left(\frac{156}{9} - \frac{145}{9}\right)x = 696 - 663$

or $\frac{11}{9}x = 33$

or $x = \frac{9}{11} \times 33 = 27$ litres.

Example 2: Of two kinds of alloy, silver and copper are contained in one in the ratio of 5 : 1 and in the other in the ratio of 7 : 2. What weights of the two alloys should be melted and mixed together so as to make up a 5 lb mass with 80% of silver?

Solution: Let the alloys taken be in the ratio of 6 : $9x$

So in 1st alloy wt. of silver = 5
// // // copper = 1
in 2nd alloy wt. of silver = $7x$
// // // copper = $2x$
wt. of silver = $5 + 7x$
and Total wt. = $9x + 6$

But $(5+7x)\frac{100}{80} = 9x+6$

$\therefore$ $25 + 35x = 36x + 24$

$x = 1$

So alloys are taken in 6 : 9 ratio.

Total wt. of 2nd alloys = 5 lb

// // 1st alloy $= \frac{6}{15} \times 5 = 2$ lb

// // 2nd // $= \frac{9}{15} \times 5 = 3$ lb

Ans.

Example 4: An alloy contains copper and zinc in the ratio of 5 : 3 and another alloy contains copper and tin in the ratio 8 : 5. If equal weights of both the alloys are melted together find the weight of tin in the resulting alloy per kg.

Solution: Let weight of both alloys be taken to be 13 kg.

$\therefore$ wt. of resulting alloy = 26 kg.

In 2nd alloy in 13 kg. wt. of tin = 5 kg.

$\therefore$ in resulting alloy of

26 kg. wt. of tin = 5 kg.

$\therefore$ wt. of tin per kg. of resulting alloy $= \frac{5}{26}$ kg.

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Chapter 8

AVERAGE

In Mathematics, average is a representative of a number of given quantities. Average is of several kinds.

METHOD OF FINDING AVERAGE

To find average of any number of quantities of the same kind is to add all the items together and then divide the sum by the number of items.

$$\therefore \text{ Average} = \frac{\text{Sum of all the items}}{\text{No. of items}}$$

Model Examples

Example 1: The average daily temperature from 9th January to 16th January (both inclusive) was 38.6° and that from the 10th to 17th January (inclusive) was 39.2°. What was the temperature on 17th January?

Solution: Total temp. from 9th Jan. to 16th Jan.

$= 38.6 \times 8°C$

$= 308.8°C$

Since the temp. on 9th $= 34.6°C$

$\therefore$ Total temp. from 10th Jan. to 16 Jan.

$= 308.8 - 34.6$

$= 274.2°C$

Total temp. from 10 to 17th Jan.

$= 39.2 \times 8°C$

$= 313.6°C$

$\therefore$ Temp on 17th Jan. $= 313.6 - 274.2$

$= 39.4°C$

Example 2: A goods train in five successive minutes from its start runs 68 metres, 127 metres, 208 metres, 312 metres and 535 metres and for next five minutes in maintains average speed of 33 km/hr. Find the whole distance covered and the average speed of train in km/hour.

Solution: Distance covered in first five minutes.

$$= \frac{68+127+208+312+535}{1000} \text{ kms.}$$

$$= \frac{5}{4} \text{ kms.}$$

Now average speed for next five minutes

$= 33$ km/hr.

$\therefore$ Distance covered in next five minutes $= \frac{33 \times 5}{60} = \frac{11}{4}$ km

Total distance covered in 10 minutes $= \frac{5}{4} + \frac{11}{4} = \frac{16}{4}$

$= 4$ kms. **Ans.**

Average speed $= \frac{4}{10}$ km/min.

$= \frac{4}{10} \times 60$

$= 24$ km/hr. **Ans.**

Example 3: The average salary per head of all the workers of an institution is Rs. 60. The average salary per head of 12 officers is Rs. 400. The average salary per head of the rest is Rs. 56. Find the total no. of workers in the institute.

Solution: Let the total No. of workers $= x$

$\therefore$ Total salary drawn $= 60x$ .....(*i*)

Salary of 12 officers $= 12 \times 400 = 4800$ Rs.

// // // // the rest $= (x - 12) \times 56$

Hence total salary of the workers

$= (x - 12)56 + 4800$ .....(*ii*)

Equating (*i*) and (*ii*)

$60x = 4800 + 56x - 672 \Rightarrow 4x = 4128$

$\Rightarrow x = 1032$ **Ans.**

Example 4: On a journey across Karachi the overage speed of a taxi 20 m.p.h. for 70% of the distance, 25 m.p.h. for 10% of it and 8 m.p.h. for the remainder. Find the average speed for the whole journey.

Solution: Let the distance be 100 miles.

Time taken for 70% journey at 20 m.p.h. $= \frac{70}{20} = 3.5$ hrs.

Time taken for 10% journey at 25 m.p.h. $= \frac{10}{25} = 2/5$ hrs.

Total taken for 20% journey at 8 m.p.h. $= \frac{20}{8} = 2.5$ hrs.

Total time taken $= 3.5 + \frac{2}{5} + 2.5 = 6\frac{2}{5}$ hrs.

$\therefore$ Average speed $= \frac{100}{\frac{32}{5}} = \frac{125}{8}$

$= 15.625$ m.p.h. **Ans.**

Example 5: A batsman has a certain average of runs for 16 innings. In the 17th innings, he makes a score of 85 runs there by increasing his average by 3. What is the average of the 17th inning.

Solution: To increase the average by 3 runs he has to make $17 \times 3 = 51$ runs more than the average of previous innings.

$\therefore$ Average of 16 innings $= 85 - 51 = 34$

// // 17 // $= 34 + 3 = 37$ **Ans.**

Example 6: A motorist set out at 10 a.m. to travel from Lahore to Gujrat, suppose a distance of 80 miles. He estimated that he could maintain an average speed of 25 m.p.h. For the first 44 miles from Lahore to Gujranwala his speed, averaged 30 m.p.h. but afterwards he was delayed by traffic and reached Gujrat 24 minutes later than the estimated time. Calculate:

(i) His time of arrival in Gujrat

(ii) His average speed from Gujranwala to Gujrat

Solution: Total distance from Lahore to Gujrat = 80 miles.

Average speed estimate from Lahore to Gujrat = 25 m.p.h.

Estimated time taken from Lahore to Gujrat $= \frac{80}{25} = \frac{16}{5}$ hours

But he was late by $\frac{24}{60}$ hours.

$\therefore$ Total actual time taken $= \frac{16}{5} + \frac{24}{60}$

$= \frac{18}{5}$ hours

= 3 hours 36 minutes.

He starts at 10:00 A.M. and will reach there at Gujrat at 1:36 P.M.

Now distance from Lahore to Gujranwala = 44 miles

Average speed from Lahore to Gujranwala = 30 m.p.h.

Time taken from Lahore to Gujranwala $= \frac{44}{30}$ hours

$= \frac{22}{15}$ hours

Now distance from Gujranwala to Gujra $= 80 - 44$

= 36 miles.

Time taken from Gujranwala to Gujrat $= \frac{18}{5} - \frac{22}{15}$

$= \frac{32}{15}$ hours

Average speed from Gujranwala to Gujrat $= \frac{36}{\frac{32}{15}}$ miles/hr.

= 16.9 miles per hour (app.) **Ans.**

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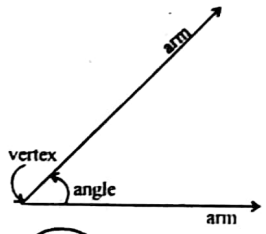
Part 3 Geometry

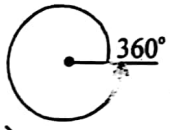
Chapter 1

LINES AND ANGLES

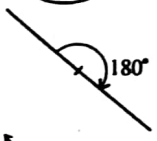
Angle:
An angle is formed by the intersection of two line segments, which may be rays or lines.
In the diagram, an angle is shown by two lines (the arms) meeting at a point. The meeting point or point of intersection is called the vertex.



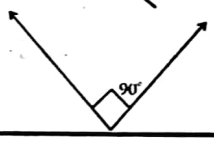
The unit of measure is the degree.
One full turn is 360 degrees (360°)



A half $\left(\frac{1}{2}\right)$ turn is 180 degrees (180°)



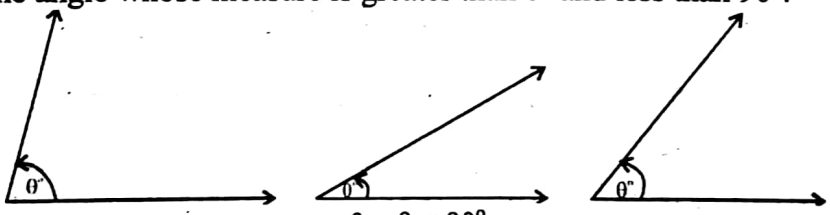
A $\frac{1}{4}$ turn is 90 degrees (90°).



Note:
1. A half turn (180°) is also called straight angle.
2. A $\frac{1}{4}$ turn (90°) is also called a right angle.

Classification of Angles:
Angles are classified according to their degree measures.

Acute Angle:
An acute angle is the angle whose measure is greater than 0° and less than 90°.

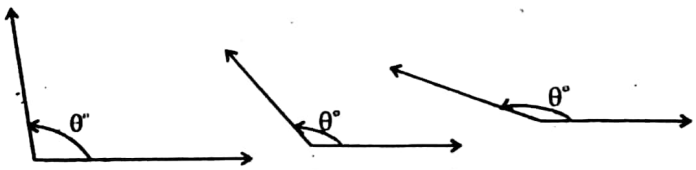


$0 < \theta < 90°$

In all above figures θ lies between 0 and 90°.

Obtuse Angle:
An angle whose measure is greater than 90° and less than 180° is called obtuse angle.

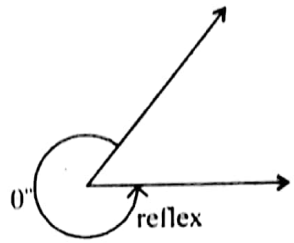
Examples:



$90° < \theta < 180°$

In all above figures θ lies between 90° and 180°.

Reflex Angle:
A reflex angle is between 180° and 360°.
Example:

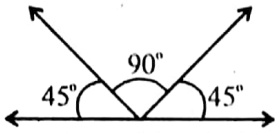


$180° < \theta < 360°$

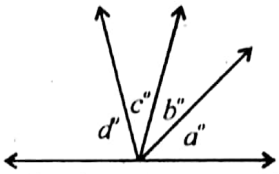
A reflex angle lies between 180° and 360° degrees.

Calculating Angles:

Angles on a straight line add up to 180°.



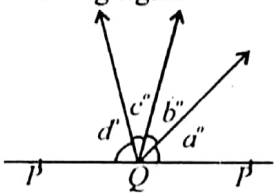
$45° + 90° + 45° = 180°$



$a° + b° + c° + d° = 180°$

A straight angle is 180°. So angles on a straight line add up to 180°.

Example 1:
What is the average of a, b, c and d in the following figure



Solution:
In the given figure since $\angle PQR$ is a straight angle. Because the angles on a straight line add up to 180°, therefore

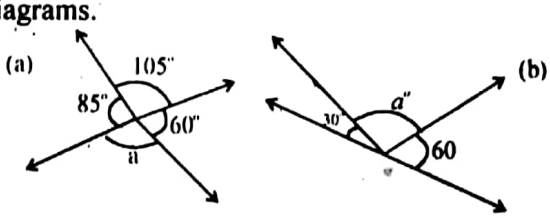
$$a + b + c + d = 180°$$

Average is

$$\frac{180°}{4} = 45°$$

Angles in a full turn add upto 360°.

Example 2:
Find the angle a in these diagrams.

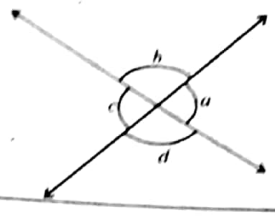


Solution:

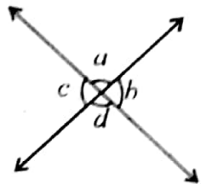
a) $a = 360° - (60° + 105° + 85°)$
$= 360° - 250°$
$= 110°$

b) $a = 180° - (60° + 30°)$
$= 180° - 90°$
$= 90°$

Vertical Angles:
When two straight lines intersect, they make four angles. The two opposite angles are called vertical angles. In this diagram angles a, c and b, d are vertical angles.

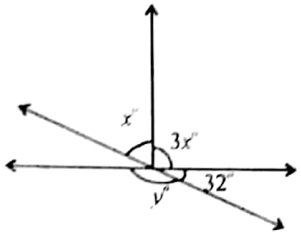


Vertically opposite angles are equal



$\angle a = \angle d$; $\angle c = \angle b$

Example 3:
Find the value of pronumerals in the following diagram, giving reasons:

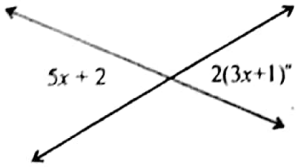


Solution:
Because angles on a straight line add up to 180°, and vertically opposite angles are equal:

$\therefore \quad 3x + x + 32 = 180^\circ \Rightarrow 4x = 148 \Rightarrow x = 37^\circ$

Again $\quad y^\circ = 3x^\circ + x^\circ \Rightarrow y = 4(37^\circ) \Rightarrow y = 148^\circ$

Example 4:
What is the value of x in the following diagram?



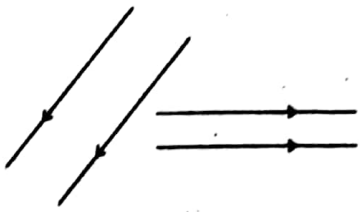
Solution: Since the vertically opposite angles are equal:

$5x + 11 = 2(3x + 1)$

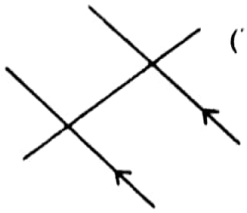
$5x + 11 = 6x + 2$

$\Rightarrow \quad x = 9$

Parallel Lines: Parallel lines are always the same distance apart. They never meet, even if you make them longer. Parallel lines form no angles.



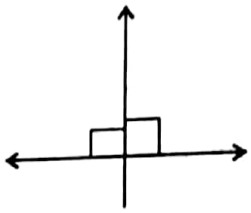
Transversal:
A straight line which cuts parallel lines is called a **transversal**.



(Transversal)

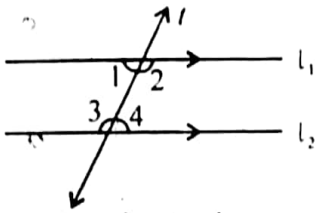
Perpendicular:

If two lines interest in such a way that they form right angles are called perpendicular

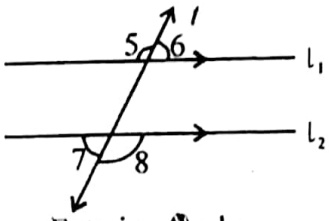


Interior Angles:

In the figure below, transversal t intersects lines ℓ_1 and ℓ_2 to form interior and exterior angle.



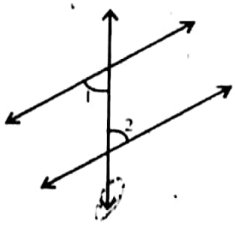
Interior Angles

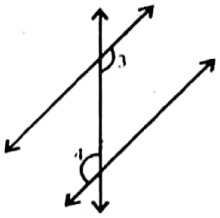


Exterior Angles

Alternate Angles:

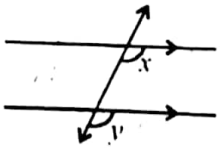
When a transversal cuts parallel lines Alternative Angles are formed. These alternative angles are equal.



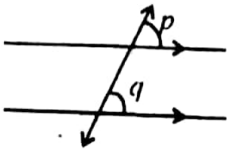


Corresponding Angles:

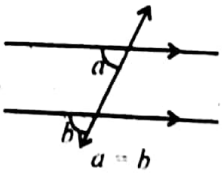
Corresponding angles are two angles in corresponding positions relative to the two lines and the transversal. These corresponding angles are also equal. A pair of equal corresponding angles is shown below.



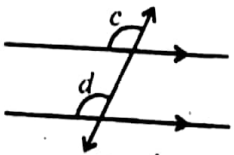
$x \quad y$



$p = q$

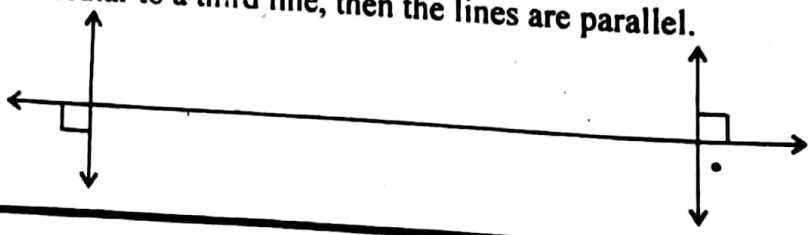


$a = b$



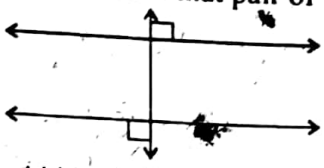
$c = d$

If two lines are both perpendicular to a third line, then the lines are parallel.



Alternatively

If a line is perpendicular to each of a pair of lines, then that pair of lines are parallel.



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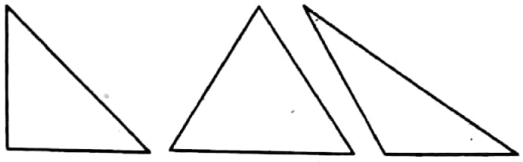
Chapter 2

TRIANGLES

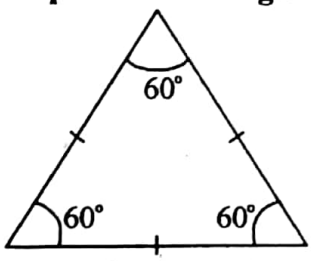
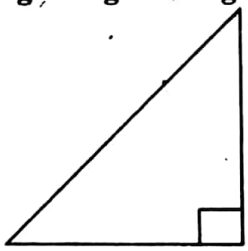
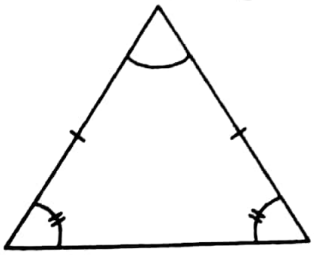
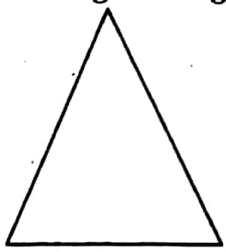
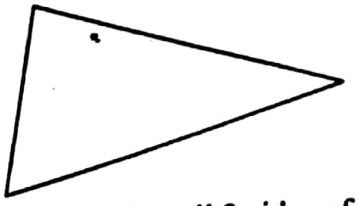
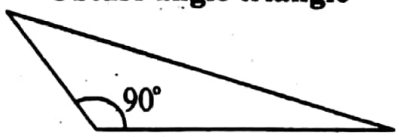
Triangle:

A three-sided polygon is called a triangle.

Examples:

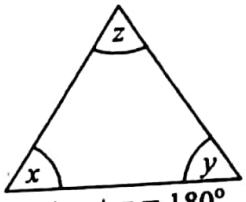


Types of Triangle:

Due to side	Due to Angle
Equilateral triangle  An equilateral triangle has 3 equal sides.	**Right angle triangle**  A right angle triangle has one angle has 90°.
Isosceles triangle  An isosceles triangle has 2 equal sides.	**Acute angle triangle**  An acute angle triangle all 3 angles measurement are less than 90°.
Scalene triangle  A scalene triangle has all 3 sides of different lengths.	**Obtuse angle triangle**  An obtuse angle triangle has one angle greater than 90°.

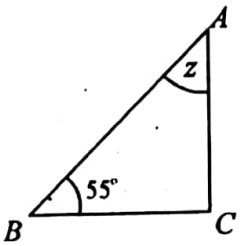
Angle's Sum of Triangle:

In any triangle, the sum of the measures of the three angles is 180°.



$x + y + z = 180^\circ$

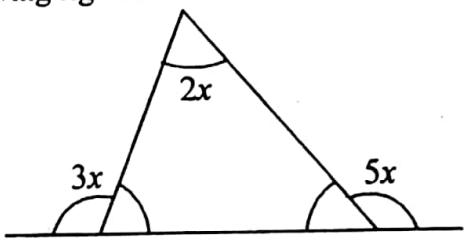
Example 1:
In the figure below, what is the value of z?



Solution:
Because, the angle of a triangle add up to 180°. Therefore

$$55^\circ + 90^\circ + Z = 180^\circ$$
$$\Rightarrow \quad Z = 180^\circ - 145^\circ$$
$$\Rightarrow \quad Z = 35^\circ$$

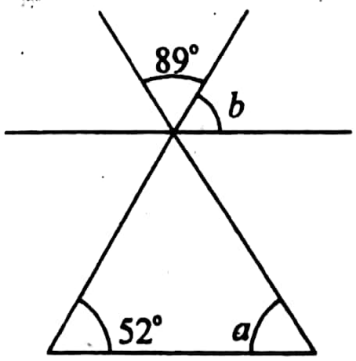
Example 2:
Calculate the value of x in the following figure:



Solution:
Because the sum of the straight angles is 180°, therefore the missing angles of the triangle are $(180^\circ - 3x)$, $(180^\circ - 5x)$ and $2x$.

$$(180^\circ - 5x) + (180^\circ - 3x) + 2x = 180^\circ$$
$$360^\circ - 6x = 180^\circ$$
$$-6x = 180^\circ - 360^\circ$$
$$-6x = -180^\circ$$
$$\boxed{x = 30^\circ}$$

Example 3:
Calculate the value of



Solution:
We know when two lines intersect each other then opposite angles are equal, therefore, the third angle of the triangle will be 89°. Hence

$$\angle 52^\circ + \angle a + \angle 89^\circ = 180^\circ$$
$$\angle a = 180^\circ - (52^\circ + 89^\circ)$$

$$\boxed{\angle a = 39^o}$$

Now, because corresponding angles are equal, here $\angle 52$ and $\angle b$ are pair of corresponding angles. Therefore

$$\angle b = \angle 52$$

$$\boxed{\angle b = 52^o}$$

Properties of Isosceles Triangle:

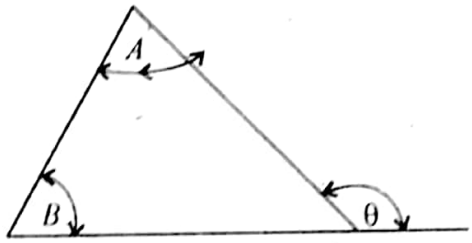
1. If two sides of a triangle are congruent, then the angles opposite to these sides are congruent.
2. If the three angles of a triangle are congruent, then the three sides are also congruent.
3. If two angles of a triangle are congruent, then the sides opposite these angles are also congruent.
4. If three sides of a triangle are congruent, then the three angles are also congruent.

Angle Properties of Triangle:

1. In every triangle the greatest angle is opposite to the longest side.
2. In every triangle the sum of the lengths of any two sides is always greater than the length of the third side.
3. In every triangle the shortest side is opposite to the smallest angle.
4. When the side of a triangle is produced the exterior angle so formed which is equal to the sum of the opposite interior angles.

Example:

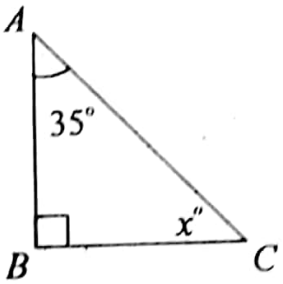
In the figure below



$$\angle\theta = \angle A + \angle B$$

5. In any right triangle, the sum of the measures of the two acute angles is 90°.

Example:



Find the value of x.

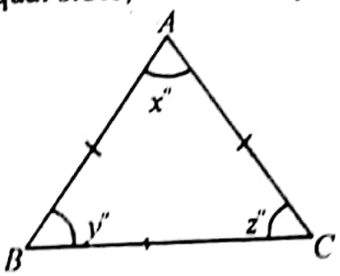
Solution:

Since, the sum of the measures of the two acute angles is 90°, therefore

$$x + 35^o = 90^o$$

$$\boxed{x = 90^o - 35^o = 55^o}$$

6. An equilateral triangle has three equal sides, and three equal angles of 60°.



Example:

The above triangle is an equilateral triangle. Therefore,

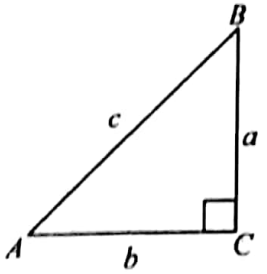
$$x^o = y = z = 60^o$$

Right Triangle:

1. **Pythagoras' Theorem:**

It states that, in any right-angled triangle, the square on the hypotenuse is equal to the sum of the squares of the other two sides.
Using the letters in the diagram, the theorem is written as

$$c^2 = a^2 + b^2$$



This relation may be written as

$$a^2 = c^2 - b^2 \quad \text{or} \quad b^2 = c^2 - a^2$$

2. Pythagorean Triples:

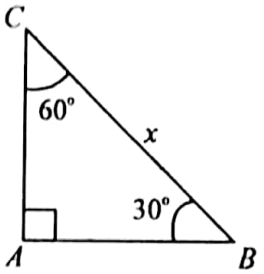
Pythagorean triples are sets of numbers that satisfy Pythagorean theorem.
Let x be any positive number, then there is a right triangle whose sides are $3x$, $4x$ and $5x$.
It mean, any multiples of this set such as $6x$, $8x$, $10x$ or $9x$, $12x$, $15x$ form a Pythagorean triple. The most common Pythagorean triples are:

3, 4, 5
5, 12, 13
7, 24, 25

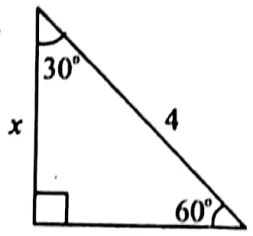
3. The 30°–60°–90° Triangle:

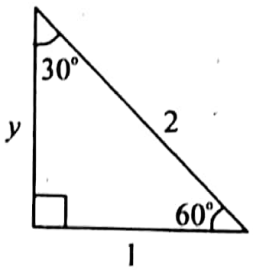
Let x be the hypotenuse of triangle ABC. Then

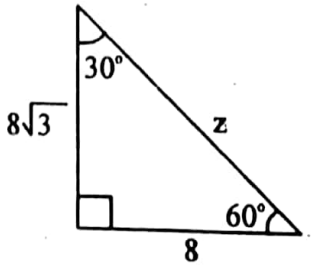
1) The leg opposite the 30° angle is $\frac{1}{2}(x)$.
2) The leg opposite the 60° angle is $\frac{1}{2}(x)(\sqrt{3})$.



Examples:







$x = 2\sqrt{3}$ $\quad$ $y = \sqrt{3}$ $\quad$ $z = 16$

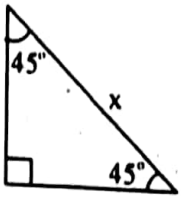
Note: In an equilateral triangle, an altitude forms a 30°–60°–90° triangle and is equal to

$$\frac{1}{2}(\text{hyp}).\sqrt{3}$$

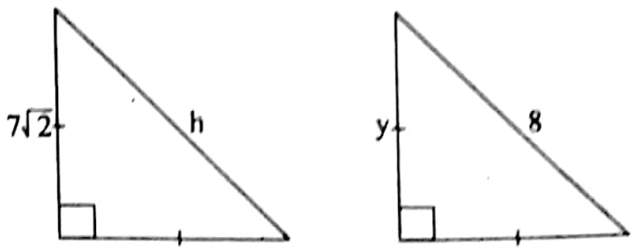
4. The 45°–45°–90° Triangle:

Let x be the hypotenuse of an isosceles right triangle, then

1) Each leg is $\frac{1}{2}(x).\sqrt{2}$
2) Hypotenuse = leg.$\sqrt{2}$



Examples:

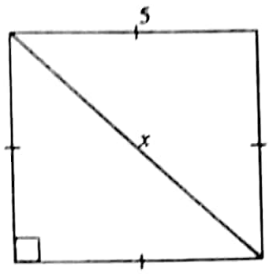


$h = (7\sqrt{2}).(\sqrt{2}) = 14 \quad y = \frac{1}{2}.8.\sqrt{2} = 4\sqrt{2}$

Note:
In a square, the diagonal forms a 45°–45°–90° triangle. Thus, in a square

$$\text{Diagonal} = \text{side}.\sqrt{2}$$

Example:



In a square, diagonal $= (\text{Side}).\sqrt{2}$

$x = 5.\sqrt{2}$

$x = 5\sqrt{2}$

Example:
What is the area of the square whose diagonal is 12?

Solution:
Let S be the side of the square, then

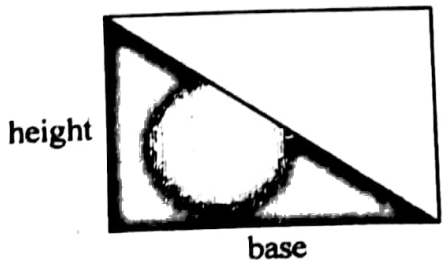
$$\text{Diagonal} = (\text{Side}).\sqrt{2}$$

$$12 = S.\sqrt{2}$$

$$\Rightarrow \quad S = \frac{12}{\sqrt{2}}$$

$$\text{Area of square} = S^2 = \left(\frac{12}{\sqrt{2}}\right)^2 = \frac{144}{2} = 72$$

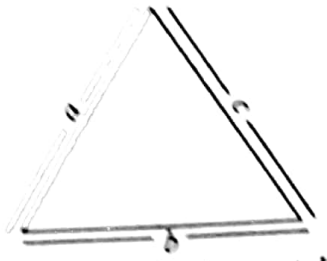
Area of Triangle:
To calculate the area of a triangle, first look at the following rectangle



$$\text{Area of rectangle} = \text{base} \times \text{height}$$

$$\text{Area of triangle} = \frac{1}{2} \times \text{base} \times \text{height}$$

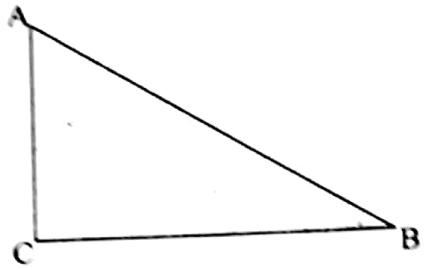
Perimeter of a triangle:
Perimeter of a triangle = sum of lengths of sides



Perimeter of a triangle = $a + b + c$

Triangle Inequality:

In ΔABC, given below



$AB > BC > AC$ and

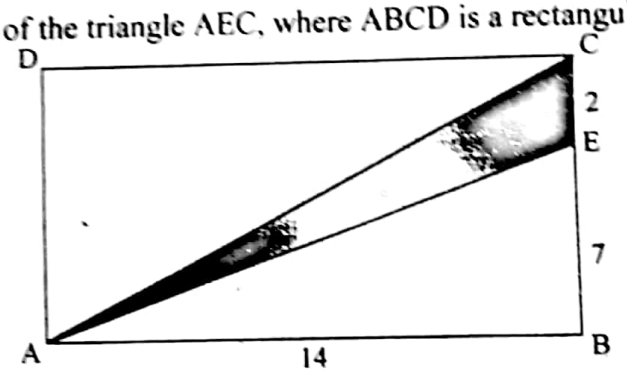
$\angle C > \angle A > \angle B$

These inequalities suggest the following theorems.

1. The perpendicular segment from a point to a line is the shortest distance from the point to the line.
2. **Triangle Inequality Theorem:**
   The sum of the lengths of two sides of a triangle is greater than the length of the third side.

Example:

What is the area and perimeter of the triangle AEC, where ABCD is a rectangular?



Solution:

The area of Rectangle ABCD is

$= 9 \times 14 = 126$

Now area of triangle ABE

$= \frac{1}{2}(14)(7) = 49$

and area of triangle ADC

$= \frac{1}{2}(9)(14) = 63$

Total area of the triangles ABE and ADC

$= 49 + 63 = 112$

Area of ΔAEC = (Area of the rectangle) – (Sun of the area of the triangle)

$= 126 - 112$

$= 14$

Perimeter of ΔAEC

In triangle ABE

$(AE)^2 = (14)^2 + (7)^2$

$= 196 + 49 = 245 \Rightarrow AE = 7\sqrt{5} = 16$

In triangle ADC

$(AC)^2 = (AD)^2 + (BC)^2$

$= (9)^2 + (14)^2 = 81 + 196 = 277 \Rightarrow AC = 17$

Perimeter of ΔAEC

$= AE + EC + CA$

$= 16 + 17 + 2 = 35$

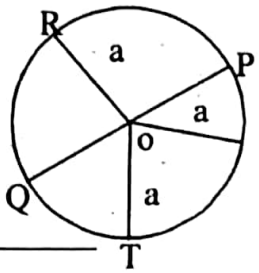
****

Chapter 4

CIRCLES

Circle:

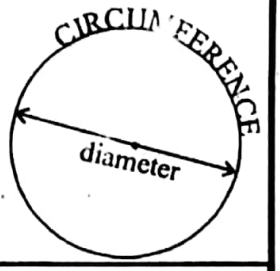
A circle is a set of all points in a plane at a given distance from a fixed point of the plane. The fixed point is the centre of the circle and the given distance is the radius. The adjacent figure is a circle of radius *a* unit whose centre is at the point *O*. The point *P*, *Q*, *R*, *S* and *T* lies on the circle, each *a* unit from *O*. Therefore, the following statement follows from the definition of a circle.



All radii (plural of radius) of the same circle are congruent.

Circumference:

The perimeter of a circle is called its circumference.



Note:

If "*c*" stands for the circumference of the circle and "*d*" is the diameter of the circle, then $\frac{c}{d}$ *(circumference ÷ diameter)* is the same for all circles. Its value cannot stated exactly.

The Greek letter π*(pi)* is used to stand for it.

$\therefore \quad \frac{c}{d} = \pi$

$c = \pi d$

or $\quad c = \pi \times 2 \times r$

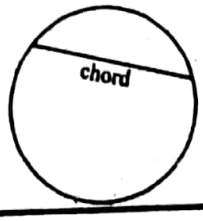
$c = 2\pi r$

π is a special number and is equal to 3.14159..... or $\frac{22}{7}$

Angles and Circles:

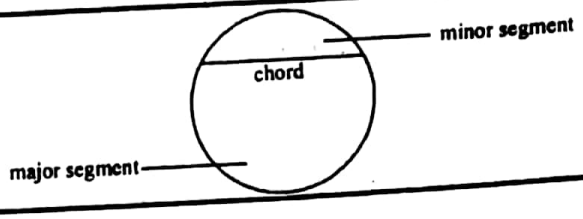
Chord:

A line joining two points on the circumference of a circle is called a chord.



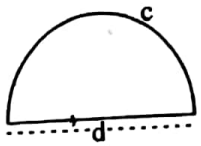
Note:

A chord divides a circle into two segments.



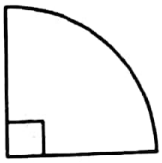
Diameter:
A chord which passes through the centre of the circle is a diameter.

Arc Length of a Circle:
Arc length of a sector of half a circle is



$$c = \frac{\pi d}{2}$$

Arc length of a sector of quarter of a circle is



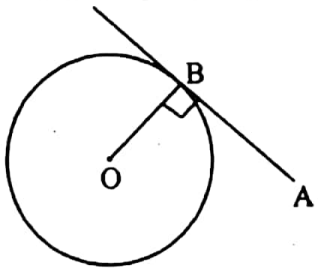
$$c = \frac{\pi d}{4}$$

Semicircles:
A diameter divides a circle into two congruent halves which are called semicircles.

Tangent of a Circle:
A line that intersects the circle in exactly one point is a tangent to the circle. The point of intersection is called the point of tangency.

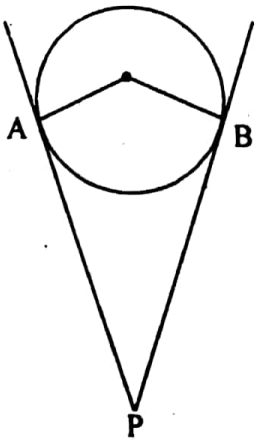
Note:

1. The radius from the centre to the point of tangency is perpendicular to the tangent.



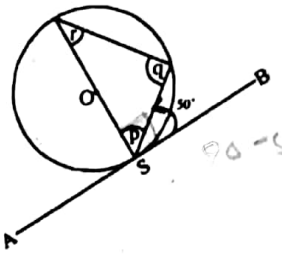
AB is tangent to the circle with centre O. OB is perpendicular to BA.

2. Tangents from the same point are equal



PA = PB

Example 1:
In the given figure, if AB is tangent to the circle. Calculate the sizes of angles, p, q, r.



Solution:
OS is the radius and AB is the tangent. By tangent – radius theorem $\angle OSB = 90°$

$\angle p = 90° - 50° = 40°$

Now $\angle q = 90°$ because angle in a semicircle is right. Now angle p, q and r the angles of triangle.

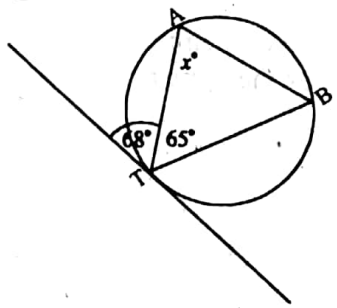
$\therefore \quad \angle p + \angle q + \angle r = 180°$

$\therefore \quad 40° + 90° + r = 180°$

$\therefore \quad r = 180° - 130°$

$r = 50°$

Example 2:
What is the value of x in the following diagram?

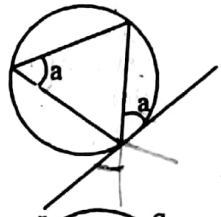


Solution:
In above diagram $\angle TBA = 68°$ because angles in alternate segment are equal

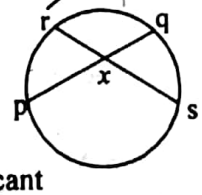
$\therefore \quad x° + 65° + 68° = 180° \Rightarrow x = 47°$

Theorems: Tangents and Secants

1. The angle between a tangent and a chord drawn to the point of contact is equal to the angles in the alternate segment.

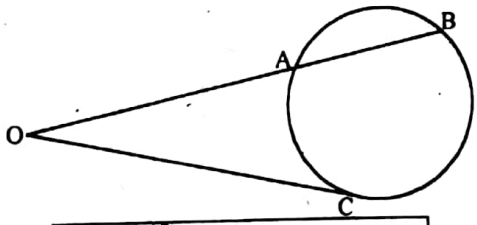


2. The products of the intercepts of two intersecting chords of a circle are equal.



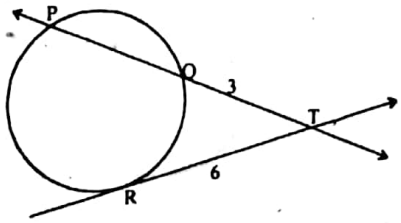
That is: $px \cdot qx = rx \cdot sx$

3. If a tangent and a secant intersect in the exterior of a circle, the square of the tangent segment equals the product of the secant segment and the external secant segment.



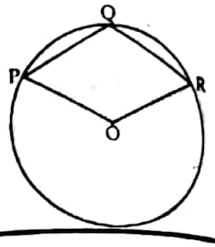
$OC^2 = OA \cdot OB$

Example:
In the following figure. What is the value of TP?



Solution:

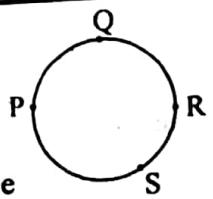
$$(TR)^2 = TQ \cdot TP$$
$$(6)^2 = 3 \cdot TP$$
$$36 = 3 \cdot TP$$
$$\Rightarrow \quad TP = 12$$



Cyclic Quadrilateral:
A quadrilateral which has all its vertices laying on the circumference of a circle is called a cyclic quadrilateral.

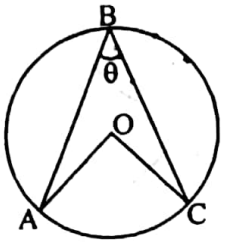
Note:
Opposite angles of a cyclic quadrilateral add up to 180°.

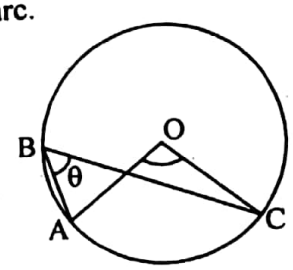
Common Arc Theorem:
If four points on a circle are, in order and
$\widehat{PQ} = \widehat{RS}$ Then $\widehat{PR} = \widehat{QS}$



Central Angle Theorems:

1. The angle subtended at the centre of a circle by an arc is twice the angle subtended at the circumference by the same arc.





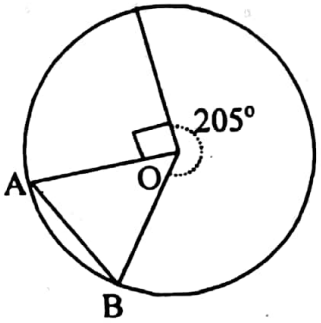
In above, angle AOC = 2 × angle ABC.

2. The angle measured in degree to complete one revolution in a circle is 360°.

Example:
What size angle is subtended at the centre (O) by chord AB?

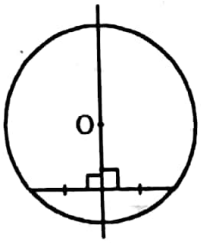
Solution:

$$\angle AOB + 90^\circ + 205^\circ = 360^\circ$$
$$\angle AOB + 295^\circ = 360^\circ$$
$$\angle AOB = 360^\circ - 295^\circ$$
$$= 65^\circ$$

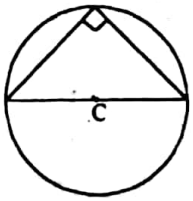


∴ Chord AB subtends an angle of 65° at the centre.

Theorem: A line from the centre of a circle through the mid-point of a chord meets the chord at right angles.



Theorem: Angle In a Semicircle:
An angle in a semicircle is a right angle.



Converse of Theorem:

If a circle passes through the ventricles of a right-angled triangle, then the hypotenuse of the triangle is a diameter of the circle.

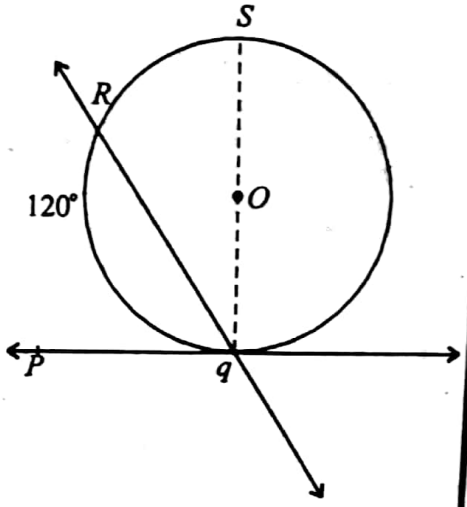
More Angles and Arcs:

Theorem 1:

If a tangent and a secant (or chord) intersect in a point on a circle, the measure of the angle formed is one half the measure of the intercepted arc.

Explanation:

In circle O as shown in the figure, secant QR and tangent PQ intersect at point Q on the circle, forming angle PQR. The above theorem focuses upon the relationship between the measure of this angle and the degree measure of the intercepted arc, $\widehat{QR}$.



According to this theorem, $\angle PQR = \frac{1}{2}(120)$

$$= \frac{1}{2}(\text{Arc } QR)$$

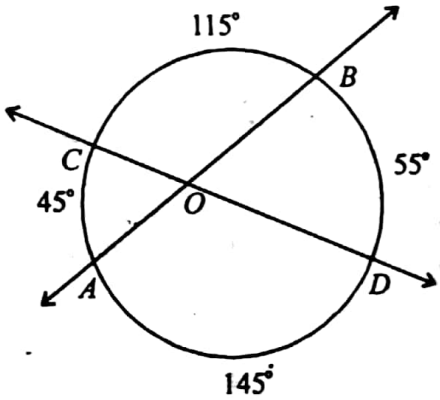
$$= 60^\circ$$

Theorem 2:

If two secants (or chords) intersect in the interior of a circle, the measure of an angle formed is one half the sum of the measures of he arcs intercepted by the angle and its vertical angle.

Explanation:

When two secants AB and CD intersect in the interior of a circle, as circle O shows to the right, two pair of vertical angles are formed. According to the given theorem



$$\angle AOC = \angle DOB = \frac{1}{2}(55^\circ + 45^\circ)$$

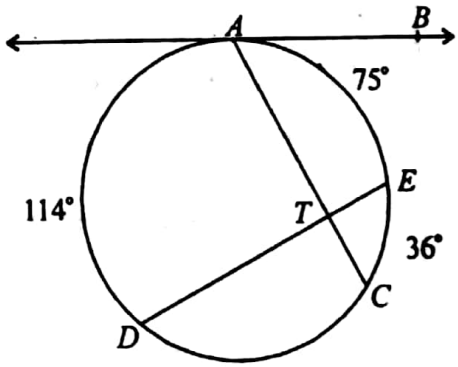
$$= \frac{1}{2}(100) = 50^\circ$$

and $\angle AOD = \angle COB = \frac{1}{2}(145^\circ + 115^\circ)$

$$= \frac{1}{2}(260)$$

$$= 130^\circ$$

Example 1:



Chord AC and DE intersect at T, $\overrightarrow{AB}$ is tangent to the circle at A.

$m\widehat{AD} = 114$, $m\widehat{EC} = 36^\circ$ and $m\widehat{AE} = 75$

a. Find $m\angle CAB$

b. Find $m\angle ATD$

Solution: a. By theorem 1

$$m\angle CAB = \frac{1}{2} m\widehat{AC}$$

$$= \frac{1}{2}(m\widehat{SR} + m\widehat{RT})$$

$$= \frac{1}{2}(75^\circ + 36^\circ)$$

$$= \frac{1}{2}(111)$$

$$= 55.5$$

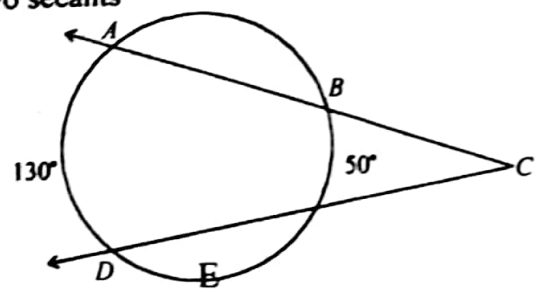
b. By theorem 2

$$m\angle ATD = \frac{1}{2}(m\widehat{EC} + m\widehat{AD})$$
$$= \frac{1}{2}(36° + 114°)$$
$$= \frac{1}{2}(150)$$
$$= 75$$

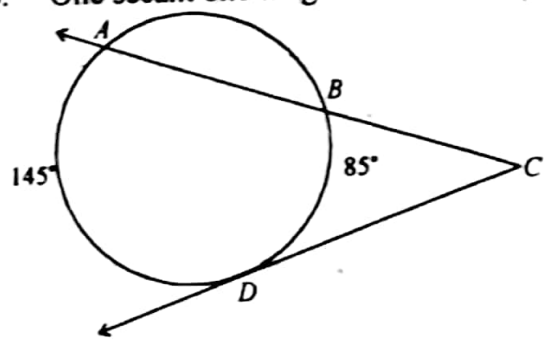
Theorem 3:
If two secants, a tangent and a secant, or two tangents intersects in the exterior of a circle, the measure of the angle formed is one-half the difference of the measures of the intercepted arcs.

Example 2: In each case of the following figure, find $m\angle C$.

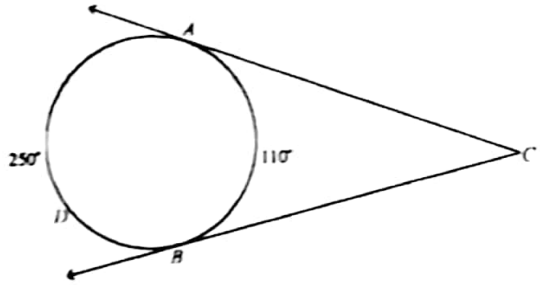
a. Two secants



b. One secant one tangent



c. Two tangents



Solution: a. Applying theorem 3

$$m\angle C = \frac{1}{2}(m\widehat{AD} - m\widehat{BE})$$
$$= \frac{1}{2}(130 - 50)$$
$$= \frac{1}{2}(80) = 40$$

b. Applying theorem 3

$$m\angle C = \frac{1}{2}(m\widehat{AD} - m\widehat{BD})$$
$$= \frac{1}{2}(250 - 110)$$
$$= \frac{1}{2}(140)$$
$$= 70$$

c. Applying theorem 3

$$m\angle C = \frac{1}{2}(m\widehat{ADB} - m\widehat{AB})$$
$$= \frac{1}{2}(250 - 110)$$
$$= \frac{1}{2}(150)$$
$$= 75$$

QUANTITATIVE TESTS

Multiple Choice Questions (MCQs)

Model Test No. 1

Q1. Maria's test scores were 96, 97, 86, 98 and 92. What would he need on his next test to have an average of 94?

(A) 92 (B) 90 (C) 95
(D) 100 (E) 98

Q2. The circumference of a circle whose diameter is 6 inches is approximately:

(A) 22 inches (B) 19 inches (C) 14 inches
(D) 38 inches (E) 16 inches

Q3. The ratio from 5 feet to 3 inches is:

(A) $\frac{3}{5}$ (B) $\frac{5}{3}$ (C) $\frac{3}{60}$
(D) $\frac{1}{20}$ (E) 20

Q4. 15% of 32 equals:

(A) 3.80 (B) 2.50 (C) 4.80
(D) 4 (E) 5

Q5. If $3a - 5 = 3 + 2a$, then $a =$

(A) 8 (B) 9 (C) 10
(D) 12 (E) 6

Q6. The average (arithmetic mean) of $8a + 5$, $-3a + 9$, 0 and $7a - 2$?

(A) $3a + 1$ (B) $3a + 3$ (C) $4a + 1$
(D) $4a + 4$ (E) $12a + 12$

Q7. What is the percent profit made on the sale of 1,000 shares of stock bought at Rs. 10 per share and sold at Rs. 12 per share?

(A) 2% (B) 0.2% (C) 25%
(D) 20% (E) 41%

Q8. $\frac{2}{3} \times 12 =$

(A) 4 (B) 6 (C) 8
(D) 10 (E) 18

Q9. If the radius of the circle is halfed, then its area:

(A) remains same (B) become half (C) become quarter
(D). become double (E) not changed

Q10. If $3(p + 5q) = 24$, then what is the value of q, when $p = 3$?

(A) 1 (B) 5 (C) 9
(D) 3 (E) 7

EXPLANATORY ANSWERS

Q1. (C) Let marks scored by Maria in the next test be x, then

$$\text{Average} = \frac{96 + 97 + 86 + 98 + 92 + x}{6}$$

$$\therefore 94 = \frac{469 + x}{6} \qquad (\because \text{Average} = 94 \text{ given})$$

$$\Rightarrow 94 \times 6 = 469 + x$$

$$\Rightarrow 564 = 469 + x$$

$$\Rightarrow x = 564 - 469$$

$\Rightarrow \quad \boxed{x = 95}$

Q2. (B) The circumference of the circle having radius r is $2\pi r$

Here, $r = \frac{1}{2}$(diameter)

$= \frac{1}{2}(6)$ (since diameter = 6)

$\because \quad r = 3$

Now, circumference $= 2\pi r$

$= 2(3)\pi$

$= 6\pi$

$= 6(3.14)$ ($\because \pi = 3.14$ approx)

$= 18.84$

$= 19$ inches approximately

Hence, best answer is choice B.

Q3. (E) We can set ratio between two quantities if and only if they have same units.

Now, converting 5 feet into inches. Thus

5 feet $= 5 \times 12$ ($\because$ 1 feet = 12 inches)

$\therefore$ 5 feet = 60 inches

Now setting ratio 60 inches to 3 inches, we have

$\frac{60}{3} = \frac{20}{1} = 20$

Hence, best answer is choice E.

Q4. (C) $\because \frac{\text{Part}}{\text{Whole}} = y\%$

Now $\frac{P}{32} = \frac{15}{100}$

$P = \frac{15}{100} \times 32$

$\boxed{P = 4.80}$

Hence, best answer is choice E.

Q5. (A) Here, $3a - 5 = 3 + 2a$

$3a - 2a - 5 = 3 + 2a - 2a$

$a - 5 = 3$

$a = 3 + 5$

$\boxed{a = 8}$

Hence, best answer is choice A.

Q6. (B) Average $= \frac{(8a+5)+(-3a+9)+(0)+(7a-2)}{4}$

$= \frac{8a+5-3a+9+0+7a-2}{4}$

$= \frac{12a+12}{4}$

$\therefore$ Average $= \frac{12(a+1)}{4}$

$= 3(a+1)$

$= 3a + 3$

Hence, best answer is choice B.

Q7. (D) No. of shares = 1000

Purchase price = Rs. 10/share

Price of 100 Shares = 1000×10

= 10,000 rupee

Sale price of shares = Rs. 12/share

Sale price of 1000 shares $= 12 \times 1000$
$= 12000$ rupees

Profit = Sale price – Purchase price
$= 12000 - 10000$
$=$ Rs. 2000

$$\% \text{ profit} = \left(\frac{2000}{10000} \times 100\right)\%$$
$= 20\%$

Hence, best answer is choice D.

Q8. (C) $\frac{2}{3} \times 12$

$= \frac{2}{3} \times (4 \times 3)$

$= 8$

Hence, best answer is choice C.

Q9. (C) Area of the circle $= \pi r^2$

Where r is the radius of the circle. Now if radius of the circle is halfed, then area

$$\text{Area} = \pi\left(\frac{r}{2}\right)^2$$

$$\text{Area} = \frac{\pi r^2}{4}$$

$$4(\text{Area}) = \pi r^2$$

$$\text{Area} - \frac{\text{Area}}{4}$$

$$= \frac{1}{4}(\text{Area})$$

Hence, best answer is choice C.

Q10. (A) $3(p + 5q) = 24$

$3(3 + 5q) = 24$ (Substituting the value of p)

$9 + 15q = 24$

$15q = 24 - 9$

$15q = 15$

$q = \frac{15}{15}$

$\boxed{q = 1}$

Hence, best answer is choice A.

Model Test No. 2

Q1. A number which is divisible by both 6 and 8 is also divisible by:

(A) 7 (B) 5 (C) 11
(D) 9 (E) 24

Q2. If $3p + 2 = 12$, then $p - \frac{1}{3}$ equals:

(A) 10 (B) 3 (C) $\frac{10}{3}$
(D) 4 (E) 12

Q3. If Adil can finish a job in 5 hours and Moeed can finish the same job in 10 hours, how many minutes will it take both of them together to finish the job?

(A) 210 (B) 220 (C) [illegible]
(D) 160 (E) [illegible]

Q4. If the area of rectangle is 12, then its perimeter is:

(A) 6 (B) 7 (C) 8
(D) 12 (E) Cannot be determined from the given information

Q5. The area of the circle is 16π. The length of the diameter of the circle is:

(A) 2 (B) 32 (C) 4
(D) 16 (E) 8

Q6. What is $\frac{1}{5}$% of 5000?

(A) 10 (B) 12 (C) 16
(D) 1000 (E) 5000

Q7. If $p = 2$, then $3^p + (p^3)^2 =$

(A) 18 (B) 45 (C) 42
(D) 70 (E) 73

Q8. Successive discounts of 10% and 15% is equivalent to a single discount of:

(A) 24% (B) 24.5% (C) 23.5%
(D) 22% (E) 25%

Q9. If $2^a . 2^b = 3^c$, then $\frac{a+b}{c} =$

(A) 1.425 (B) 1.585 (C) 1.330
(D) 0.750 (E) 1.750

Q10. Which of the following is closest to the square root of $\frac{1}{2}$?

(A) 0.7 (B) 0.6 (C) 0.8
(D) 0.25 (E) 0.5

EXPLANATORY ANSWERS

Q1. (E) We find the number which is divisible by both 6 and 8 by finding the L.C.M of 6 and 8. Therefore,

2	6–8
3	3–4
4	1–4
	1–1

$\therefore$ L.C.M $= 2 \times 3 \times 4$
$= 24$

Hence, best answer is choice E.

Q2. (B) Given that $3p + 2 = 12$

$\Leftrightarrow \quad 3p = 10$

$\Leftrightarrow \quad \frac{3p}{3} = \frac{10}{3}$

$\Leftrightarrow \quad p = \frac{10}{3}$

$\Leftrightarrow \quad p - \frac{1}{3} = \frac{10}{3} - \frac{1}{3}$

$\Leftrightarrow \quad p - \frac{1}{3} = \frac{10-1}{3}$

$\Leftrightarrow \quad p - \frac{1}{3} = \frac{9}{3}$

$\Leftrightarrow \quad \boxed{p - \frac{1}{3} = 3}$

Hence, best answer is choice B.

Q3. (C) Use the theorem, that

If A can do a piece of work in x days and B can do it in y days, then A and B working together will do the same work in $\frac{xy}{x+y}$ days.

Using this relation, we have

$$\frac{xy}{x+y} = \frac{5\times 10}{5+10}$$

$$= \frac{50}{15}$$

$$= \frac{10}{3}$$

$$= 3\frac{1}{3} \text{ hours}$$

$$= \left(\frac{10}{3}\times 60\right) \text{ minutes} \qquad (\because 1 \text{ hour} = 60 \text{ seconds})$$

$$= (10 \times 20) \text{ minutes}$$

$$= 200 \text{ minutes}$$

Hence, best answer is choice C.

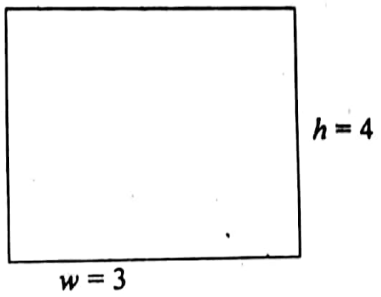
Q4. (E) Area of the rectangle $= wh$

Given the area of the rectangle $= 12$

In this question, some cases arise.

For example:

Case 1: $w = 3$ and $h = 4$, then

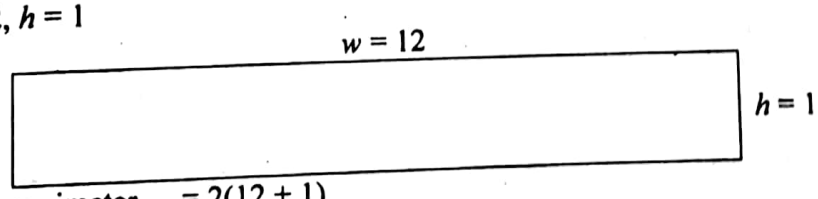


In this case perimeter $= 2(w + h)$

$= 2(3 + 4)$

$= 14$

Case 2: $w = 12$, $h = 1$



In this case, the perimeter $= 2(12 + 1)$

$= 26$

Hence, we cannot determine the exact answer from the given information. So, best answer is choice E.

Q5. (E) Area of any circle $= \pi r^2$ ...(1)

Area of the given circle $= 16\pi$ ... (2)

Comparing (1) and (2), we have

$$\pi r^2 = 16\pi$$

$$r^2 = 16$$

$$r = \pm 4$$

Because r cannot be negative

$\Rightarrow \quad r = 4$

Now, diameter of any circle, $d = 2r$

Hence, Diameter $= 2(4)$ $\quad (\because r = 4)$

$\Rightarrow$ Diameter $= 8$

Hence, best answer is choice E.

Q6. (A) Using the relation

$$\frac{\text{Part}}{\text{Whole}} = y\%$$

$$\frac{P}{5000} = \frac{0.2}{100}$$

$$P = \frac{0.2}{100} \times 5000$$

$$\Rightarrow P = 0.2 \times 50$$

$$P = 10$$

Hence, best answer is choice A.

Q7. (E) $3^p + (p^3)^2$

$= (3)^2 + (2^3)^2 \qquad (\because p = 2)$

$= (3 \times 3) + (2^6)$

$= 9 + 64$

$= 73$

Hence, best answer is choice E.

Q8. (C) Since discounts represents decrease, thus use the following formula:

$$\text{Successive decrease} = \left(-x - y + \frac{xy}{100}\right)\%$$

Here, $x = 10\%$ and $y = 15\%$. Thus

$$\text{Single discount} = \left(-10 - 15 + \frac{(10)(15)}{100}\right)\%$$

$$= \left(-25 + \frac{150}{100}\right)\%$$

$$= \left(\frac{-2500 + 150}{100}\right)\%$$

$$= \left(\frac{-2350}{100}\right)\%$$

$$= -23.5\%$$

The negative sign represents discount (decrease). So neglect it. Hence,

Single discount $= 23.5\%$

Hence, best answer is choice C.

Q9. (B) Since $2^a . 2^b = 3^c$

$\Leftrightarrow \quad 2^{a+b} = 3^c$

Taking log both sides

$\log(2^{a+b}) = \log(3^c)$

$(a + b) \log 2 = c (\log 3)$

$(a + b)(0.3010) = c (0.4771)$

$$\frac{a+b}{c} = \frac{0.4771}{0.3010}$$

$$\Rightarrow \frac{a+b}{c} = 1.5850$$

$$\Rightarrow \frac{a+b}{c} = 1.585$$

Hence, best answer is choice B.

Q10. (A) Square root of $\frac{1}{2} = \sqrt{\frac{1}{2}}$

$= \sqrt{0.5}$

$= 0.707$
$= 0.7$

Hence, best answer is choice A.

****

Model Test No. 3

Q1. At a dairy farm it takes 90 seconds to fill 30 one-gallon jugs of milk. How many minutes does it take to fill 90 jugs of milk?

(A) 4 (B) 4.5 (C) 3
(D) 3.5 (E) 1

Q2. The decimal form of 0.2 percent is:

(A) 0.002 (B) 0.02 (C) 0.2
(D) 2 (E) 20.0

Q3. If $x = -3$ and $y = -1$, then $3x^2 - 2y =$

(A) 25 (B) −25 (C) −29
(D) 29 (E) 83

Q4. What percent of 25 is $\sqrt{25}$?

(A) 50% (B) 25% (C) $33\frac{1}{3}\%$
(D) 20% (E) 75%

Q5. The volume of cube with a surface area of 216 is:

(A) 216 (B) 300 (C) 36
(D) 66 (E) 250

Q6. 20% is equal to the fraction $\frac{?}{30}$?

(A) 60 (B) 150 (C) $\frac{2}{3}$
(D) 600 (E) 6

Q7. If $8a + 8b = 64$, then the average of a and b is:

(A) 4 (B) 16 (C) 2
(D) 8 (E) unsufficient information

Q8. Ahmed earns a commission of 6 percent of his total sales. How much must he sell to yield a commission of Rs. 135?

(A) Rs. 8.10 (B) Rs. 2700 (C) Rs. 2250
(D) Rs. 8100 (E) Rs. 810

Q9. $\frac{15!}{13!\,2!} =$

(A) 1 (B) 0 (C) 105
(D) 210 (E) 0.58

Q10. If $27^x = 9^4$, then $x =$

(A) 2 (B) 8 (C) $\frac{8}{3}$
(D) $\frac{4}{3}$ (E) 3

EXPLANATORY ANSWERS

Q1. (D) We set a proportion, as

Time		Jugs		Time		Jugs
90	:	30	::	x	:	90

$\therefore \frac{90}{30} = \frac{x}{90}$

$\Rightarrow x = 90 \times 3$

$\Rightarrow x = 210$ seconds

$$x = \frac{210}{60} = 3.5 \text{ minutes}$$

Hence, best answer is choice D.

Q2. (A) The decimal form of 0.2 is

$$= \frac{0.2}{100}$$

$$= \frac{2}{1000}$$

$$= 0.002$$

Hence, best answer is choice A.

Q3. (D) Here, $x = -3$ and $y = -1$

$$\therefore\ 3x^2 - 2y = 3(-3)^2 - 2(-1)$$

$$= 27 + 2$$

$$= 29$$

Hence, best answer is choice D.

Q4. (D) Here, $P = \sqrt{25}$, $w = 25$, $y = ?$

$$\frac{P}{w} = \frac{y}{100}$$

$$\frac{\sqrt{25}}{25} = \frac{y}{100}$$

$$y = \frac{\sqrt{25}}{25} \times 100$$

$$y = 5 \times 4$$

$$\boxed{y = 20}$$

Hence, best answer is choice D.

Q5. (A) Surface area of cube $= 6a^2$

$$\therefore\ 6a^2 = 216$$

$$a^2 = \frac{216}{6}$$

$$a^2 = 36$$

$$\boxed{a = 6}$$

Volume of the cube $= a^3$

$$= (6)^3$$

$$= 216$$

Hence, best answer is choice A.

Q6. (E) $20\% = \frac{20}{100}$

$$= \frac{1}{5}$$

$$= \frac{1 \times 6}{30}$$

$$= \frac{6}{30}$$

Hence, best answer is choice E.

Q7. (A) $8a + 8b = 64$

$$8(a + b) = 64$$

$$a + b = \frac{64}{8}$$

$$a + b = 8$$

$$\frac{a+b}{2} = \frac{8}{2}$$

$$\frac{a+b}{2} = 4$$

Hence, best answer is choice A.

Q8. (C) We set a proportion as

Commission		Sales		Commission		Sales
6	:	100	::	135	:	x

$$\therefore \frac{6}{100} = \frac{135}{x}$$

$$6x = 90 \times 3$$

$$x = \frac{135 \times 100}{6}$$

$$x = 2250$$

Hence, best answer is choice C.

Q9. (C) $\frac{15!}{13!2!}$

$$= \frac{15.14.13!}{13!.2!}$$

$$= \frac{15 \times 14}{2 \times 1} = 15 \times 7$$

$$= 105$$

Hence, best answer is choice C.

Q10. (C) $27^x = 9^4$

$$\therefore (3 \times 3 \times 3)^x = (3 \times 3)^4$$

$$\Rightarrow (3^3)^x = (3^2)^4$$

$$\Rightarrow 3^{3x} = 3^8$$

$$\Rightarrow 3x = 8$$

$$\Rightarrow x = \frac{8}{3}$$

Hence, best answer is choice C.

****

Model Test No. 4

Q1. Ali's average score on his first 3 tests is 90. If his average of his last 2 tests is 80, what is his average score for all 5 tests?

(A) 85 (B) 86 (C) 89
(D) 88 (E) 87

Q2. If $3x < 48$ and $2x > 24$, the x could equal which of the following?

(A) 10 (B) 18 (C) 12
(D) 14 (E) 16

Q3. The value of $4a^3 + 6a + 3$ at $a = 2$ is:

(A) 15 (B) 25 (C) 45
(D) 35 (E) None of these

Q4. A discount of 15 percent from a market price produces a net price which is what percent of the market price:

(A) 85% (B) 0.85% (C) 15%
(D) 0.15% (E) 115%

Q5. $\frac{3}{40}$ is the same as:

(A) 0.075 (B) 0.0075 (C) 0.75

$$\frac{a+b}{2} = \frac{8}{2}$$

$$\frac{a+b}{2} = 4$$

Hence, best answer is choice A.

Q8. (C) We set a proportion as

Commission		Sales		Commission		Sales
6	:	100	::	135	:	x

$$\therefore \frac{6}{100} = \frac{135}{x}$$

$$6x = 90 \times 3$$

$$x = \frac{135 \times 100}{6}$$

$$x = 2250$$

Hence, best answer is choice C.

Q9. (C) $\frac{15!}{13!2!}$

$$= \frac{15.14.13!}{13!.2!}$$

$$= \frac{15 \times 14}{2 \times 1} = 15 \times 7$$

$$= 105$$

Hence, best answer is choice C.

Q10. (C) $27^x = 9^4$

$$\therefore (3 \times 3 \times 3)^x = (3 \times 3)^4$$

$$\Rightarrow (3^3)^x = (3^2)^4$$

$$\Rightarrow 3^{3x} = 3^8$$

$$\Rightarrow 3x = 8$$

$$\Rightarrow x = \frac{8}{3}$$

Hence, best answer is choice C.

****

Model Test No. 4

Q1. Ali's average score on his first 3 tests is 90. If his average of his last 2 tests is 80, what is his average score for all 5 tests?

(A) 85 (B) 86 (C) 89
(D) 88 (E) 87

Q2. If $3x < 48$ and $2x > 24$, the x could equal which of the following?

(A) 10 (B) 18 (C) 12
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Q4. A discount of 15 percent from a market price produces a net price which is what percent of the market price:

(A) 85% (B) 0.85% (C) 15%
(D) 0.15% (E) 115%

Q5. $\frac{3}{40}$ is the same as:

(A) 0.075 (B) 0.0075 (C) 0.75

$$\frac{a+b}{2} = \frac{8}{2}$$

$$\frac{a+b}{2} = 4$$

Hence, best answer is choice A.

Q8. (C) We set a proportion as

Commission		Sales		Commission		Sales
6	:	100	::	135	:	x

$$\therefore \frac{6}{100} = \frac{135}{x}$$

$$6x = 90 \times 3$$

$$x = \frac{135 \times 100}{6}$$

$$x = 2250$$

Hence, best answer is choice C.

Q9. (C) $\frac{15!}{13!2!}$

$$= \frac{15.14.13!}{13!.2!}$$

$$= \frac{15 \times 14}{2 \times 1} = 15 \times 7$$

$$= 105$$

Hence, best answer is choice C.

Q10. (C) $27^x = 9^4$

$$\therefore (3 \times 3 \times 3)^x = (3 \times 3)^4$$

$$\Rightarrow (3^3)^x = (3^2)^4$$

$$\Rightarrow 3^{3x} = 3^8$$

$$\Rightarrow 3x = 8$$

$$\Rightarrow x = \frac{8}{3}$$

Hence, best answer is choice C.

****

Model Test No. 4

Q1. Ali's average score on his first 3 tests is 90. If his average of his last 2 tests is 80, what is his average score for all 5 tests?

(A) 85 *(B)* 86 *(C)* 89
(D) 88 *(E)* 87

Q2. If $3x < 48$ and $2x > 24$, the x could equal which of the following?

(A) 10 *(B)* 18 *(C)* 12
(D) 14 *(E)* 16

Q3. The value of $4a^3 + 6a + 3$ at $a = 2$ is:

(A) 15 *(B)* 25 *(C)* 45
(D) 35 *(E)* None of these

Q4. A discount of 15 percent from a market price produces a net price which is what percent of the market price:

(A) 85% *(B)* 0.85% *(C)* 15%
(D) 0.15% *(E)* 115%

Q5. $\frac{3}{40}$ is the same as:

(A) 0.075 *(B)* 0.0075 *(C)* 0.75

(D) 0.1333 (E) 0.0133

Q6. **$0.58 \times 0.14 =$**

(A) 0.812 (B) 8.12 (C) 0.0812
(D) 812 (E) 81.2

Q7. **A coat is on sale for Rs. 120 after a discount of 20 percent. The original price of the coat is:**

(A) Rs. 150 (B) Rs. 180 (C) Rs. 96
(D) Rs. 140 (E) Rs. 144

Q8. $\frac{4^3 - 4^2}{2^2} =$

(A) 0 (B) 2 (C) 4
(D) 12 (E) 16

Q9. **5% of 20% is:**

(A) 10% (B) 1% (C) 0.1%
(D) 100% (E) 110%

Q10. **When −6 is added to −6, the sum is:**

(A) +12 (B) −12 (C) +36
(D) −36 (E) 0

EXPLANATORY ANSWERS

Q1. (B) Average score on first 3 tests $= 90$

Total score $= 90 \times 3$
$= 270$

Average score on last 2 tests $= 80$

Total score $= 80 \times 2$
$= 160$

Total mark obtained $= 160 + 270 = 430$

Average $= \frac{430}{5} = 86$

Hence, best answer is choice B.

Q2. (D) $3x < 48$

$\Rightarrow \frac{3x}{3} < \frac{48}{3}$

$\Rightarrow x < 16$ .....(1)

Now, $2x > 24$

$\Rightarrow \frac{2x}{2} > \frac{24}{2}$

$x > 12$ .....(2)

From (1) and (2), we can write

$12 < x < 16$

$\therefore$ x may be 13, 14 and 15

Hence, best answer is choice D.

Q3. (E) $4a^3 + 6a + 3$ and $a = 2$

$= 4(2)^3 + 6(2) + 3$
$= 4(8) + 6(2) + 3$
$= 32 + 12 + 3$
$= 47$

Hence, best answer is choice E.

Q4. (A) Let the marked price $= 100$

Discount @ 15% $= 15$

Net price $= 100 - 15$
$= 85$

$$\text{\%age net price} = \frac{85}{100}$$
$$= 85\%$$

Hence, best answer is choice A.

Q5. (A) $\frac{3}{40} = 0.075$

Hence, best answer is choice A.

$$\begin{array}{r} 0.075 \\ 40\overline{)300} \\ \underline{280} \\ 200 \\ \underline{200} \\ \times \end{array}$$

Q6. (C) 0.58×0.14

Now, $14 \times 58 = 812$

Since, the decimal will be before four digits, therefore

$0.58 \times 0.14 = 0.0812$

Hence, best answer is choice C.

Q7. () Using the formula

$$\frac{P}{w} = y\%$$
$$\frac{120}{x} = \frac{20}{100}$$
$$x \times 20 = 100 \times 120$$
$$x = \frac{12000}{20}$$
$$x = 600$$

Hence, best answer is choice

Q8. (D) $\frac{4^3 - 4^2}{2^2}$

$$= \frac{(4^2 \times 4) - (4^2)}{4}$$
$$= \frac{4^2(4-1)}{4}$$
$$= \frac{4^2(3)}{4}$$
$$= 4^2 \times 4^{-1}(3)$$
$$= 4^{2-1}(3)$$
$$= 12$$

Hence, best answer is choice D.

Q9. (B) 5% of 20%

20 percent mean 20th part of hundred *i.e.*, 20

Now, 5% of 20

$$= \frac{5}{100} \times 20$$
$$= \frac{100}{100}$$
$$= 1\%$$

Hence, best answer is choice B.

Q10. (B) $-6 + (-6)$

$-6 - 6$ $\quad (\because +(-1) = -)$

$= -(6 + 6)$

$= -(+12)$
$= -12$
Hence, best answer is choice B.

****

Model Test No. 5

Q1. 6 men can do a piece of work in 12 days. How many men are needed to do the work in 18 days?
(A) 2 (B) 6 (C) 3
(D) 5 (E) 4

Q2. What is the sum of 0.629, 4.3 and 2?
(A) 6.929 (B) 6.74 (C) 0.1259
(D) 12.59 (E) 21.56

Q3. $(-4)^2 - 3(-4) =$
(A) −52 (B) 52 (C) 192
(D) −4 (E) 28

Q4. A telecommunication company wants to interlink 5 cities and the links should be between every two cities, how many links will be formed?
(A) 8 (B) 10 (C) 11
(D) 12 (E) 20

Q5. There were 240 seats in the balcony of a theater. The number of seats in each row is 14 more than the number of rows. Find the number of rows:
(A) 6 (B) 4 (C) 8
(D) 10 (E) 24

Q6. If $a = 3$, then what is the value of $(a^2)^3 - a$?
(A) 240 (B) 12 (C) 15
(D) 726 (E) 243

Q7. Munir's test scores were 175, 155 and 210. What is his average?
(A) 180 (B) 540 (C) 135
(D) 210 (E) 270

Q8. 10% of 360 is how much more than 5% of 360?
(A) 9 (B) 36 (C) 5
(D) 18 (E) 48

Q9. Karim knits 72 stitches to the line and uses 1/4 inch of yarn in each of the stitches. How many lines can she knit with 10 yards of yarn?
(A) 10 (B) 30 (C) 40
(D) 20 (E) 50

Q10. A lighthouse blinks regularly 5 times a minute. A neighbouring lighthouse blinks regularly 4 times a minute. If they blink simultaneously, after how many seconds will they blink together again?
(A) 60 (B) 20 (C) 300
(D) 24 (E) 30

EXPLANATORY ANSWERS

Q1. (E) To do a work in 12 days, 6 men are needed or to do a work in 1 day 12×6 men are needed.

So to do the work in 18 days, $\frac{12 \times 6}{18} = 4$ men are needed.

Hence, best answer is choice E.

Q2. (A) To find the sum of 0.629, 4.3 and 2

$$\begin{array}{r} 0.629 \\ 4.300 \\ 2.000 \\ \hline 6.929 \end{array}$$

Hence, best answer is choice A.

Q3. (E) $(-4)^2 - 3(-4)$
$= (-4 \times -4) - [+3 \times (-4)]$
$= +16 - (-12)$
$= +16 + 12$
$= 28$
Hence, best answer is choice E.

Q4. (B) Use the combination formula to solve this problem
$${}^{n}C_r = \frac{n!}{r!(n-r)!}$$
$${}^{5}C_2 = \frac{5!}{2!(5-3)!}$$
$$= \frac{5!}{2!.3!}$$
$$= \frac{5.4.3!}{2!.3!}$$
$$= \frac{5.4}{2.1}$$
$= 10$
Hence, best answer is choice B.

Q5. (D) Total no. of seats $= 240$
Let the no. of rows $= 10$
Now, the number of seats in each row is 14 more than the number of rows. Therefore,
$= (10 + 14)10$
$= (24)(10)$
$= 240$
Thus the number of rows be 10. Hence best answer is choice D.

Q6. (D) Here, $a = 3$, $(a^2)^3 - a = ?$
$(a^2)^3 - a = [(3)^2]^3 - 3$
$= (9)^3 - 3$
$= 729 - 3$
$= 726$
Hence, best answer is choice D.

Q7. (A) Sum of the test score $= 175 + 155 + 210$
$= 540$
$$\text{Average} = \frac{540}{3}$$
$= 180$
Hence, best answer is choice A.

Q8. (D) $$10\% \text{ of } 360 = \frac{10}{100} \times 360$$
$= 36$
$$\text{Now, } 5\% \text{ of } 360 = \frac{5}{100} \times 360$$
$= 18$
Difference $= 36 - 18$
$= 18$
Hence, best answer is choice D.

Q9. (D) $\frac{1}{4}$ inch yarn uses $= 1$ line
1 inch of yarn will use $= 1 \div \frac{1}{4}$

$= 1 \times 4$
$= 4$ lines

12 inch (1 feet) yarn use $= 4 \times 12$
$= 48$ lines

Each stitches uses yarn $= \frac{1}{4}$ inches

72 stitches uses yarn $= \frac{1}{4} \times 72 = 18$ inches

Now set a proportion, we have

Line		Yarn (in inches)		Line		Yarn (in inches)
1	:	18	::	x	:	360

$\Rightarrow \frac{1}{18} = \frac{x}{360}$

$\Rightarrow x = \frac{1}{18} \times 360$

$\Rightarrow x = 20$ lines

Hence, best answer is choice D.

Q10. (A) Since lighthouse blinks 5 times a minute, so the light blinks after every 12 seconds $\left(\frac{60}{5}\right)$. Since, the neighbouring lighthouse blinks 4 times a minute, so it blinks after every 15 seconds $\left(\frac{60}{4}\right)$. Now, they will both blink simultaneously after

3	12–15
4	4–5
5	1–5
	1–1

$= 3 \times 4 \times 5$
$= 60$ seconds

Hence, best answer is choice A.

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Model Test No. 6

Q1. The area of 2-feet wall around a garden that is 30 feet long and 20 feet wide is:

(A) 680 sq. ft (B) 104 sq. ft (C) 1416 sq. ft
(D) 704 sq. ft (E) 216 sq. ft

Q2. Of the 20 people who won prize money, 7 have come forward to claim their winnings. What percent of the people have not yet appeared?

(A) 35% (B) 20% (C) 65%
(D) 70% (E) 42%

Q3. $(x + 2i)(y - i) =$

(A) $x + y - i$ (B) $xy + 2$ (C) $xy + (2y - x)i + 2$
(D) $xy - 2$ (E) $xy + (2y - x)i - 2$

Q4. During a certain week, a post office sold Rs. 280 worth of 14-paisa stamps. How many of these stamps did they sell?

(A) 3900 (B) 2000 (C) 20000
(D) 39200 (E) 20

Q5. If a number is divisible by 102, then it is also divisible by:

(A) 5 (B) 2 (C) 11
(D) 101 (E) 103

Q6. A contractor has to build a bridge in 50 days. Initially, he employed 20 men, but found that only half of the work has been completed in 30 days. How many more men he has to employ to finish the job in

time?

(A) 10 (B) 30 (C) 20
(D) 15 (E) 35

Q7. The sum of five old numbers is always:

(A) even (B) divisible by five (C) divisible by three
(D) a prime number (E) None of these

Q8. Rounded to the nearest tenth, 46.97 would equal:

(A) 46.0 (B) 46.9 (C) 46.10
(D) 47.0 (E) 50

Q9. How many minutes would it take a typist to complete a 300-word letter if he can type $2\frac{1}{2}$ words in 10 seconds?

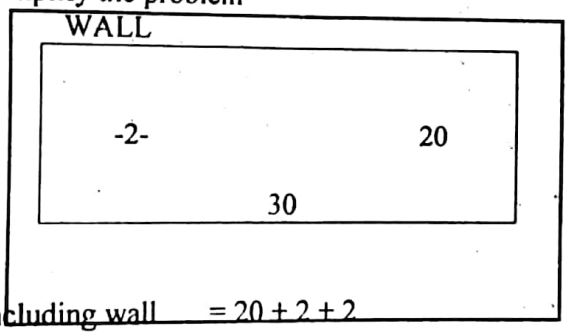
(A) 15 (B) 20 (C) 10
(D) 25 (E) 30

Q10. An hour-long test has 60 problems. If a student completes 30 problems in 20 minutes, how many seconds does he have an average for completing each of the remaining problems?

(A) 70 (B) 80 (C) 60
(D) 90 (E) 100

EXPLANATORY ANSWERS

Q1. (E) We draw a sketch to simplify the problem



Width of the garden including wall $= 20 + 2 + 2$
$= 24$

Length of the garden including wall $= 30 + 2 + 2$
$= 34$

Area of the garden including wall $= 24 \times 34$
$= 816$ sq. ft

Area of the garden without wall $= 20 \times 30$
$= 600$ sq. ft

Area of the wall around the garden $= 816 - 600$
$= 216$ sq. ft

Hence, best answer is choice E.

Q2. (C) Total number of people who won prize money $= 20$
No. of people who claim their winning $= 7$
No. of people who do not claim $= 20 - 7$
$= 13$

%age of people who do not claim $= \frac{13}{20} \times 100$
$= 13 \times 5$
$= 65\%$

Hence, best answer is choice C.

Q3. (C) $(x + 2i)(y - i)$
$= x(y - i) + 2i(y - i)$
$= xy - xi + 2yi - 2(i)^2$
$= xy + 2yi - xi - 2(i)^2$

time?

(A) 10 (B) 30 (C) 20
(D) 15 (E) 35

Q7. The sum of five old numbers is always:

(A) even (B) divisible by five (C) divisible by three
(D) a prime number (E) None of these

Q8. Rounded to the nearest tenth, 46.97 would equal:

(A) 46.0 (B) 46.9 (C) 46.10
(D) 47.0 (E) 50

Q9. How many minutes would it take a typist to complete a 300-word letter if he can type $2\frac{1}{2}$ words in 10 seconds?

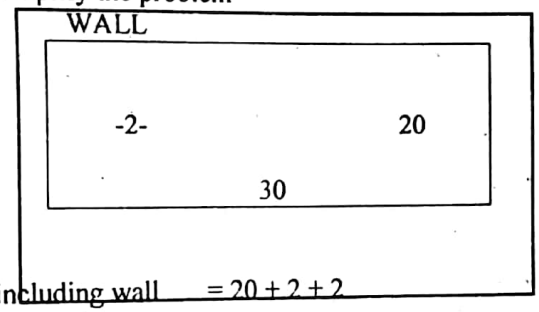
(A) 15 (B) 20 (C) 10
(D) 25 (E) 30

Q10. An hour-long test has 60 problems. If a student completes 30 problems in 20 minutes, how many seconds does he have an average for completing each of the remaining problems?

(A) 70 (B) 80 (C) 60
(D) 90 (E) 100

EXPLANATORY ANSWERS

Q1. (E) We draw a sketch to simplify the problem



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$= 600$ sq. ft

Area of the wall around the garden $= 816 - 600$
$= 216$ sq. ft

Hence, best answer is choice E.

Q2. (C) Total number of people who won prize money $= 20$
No. of people who claim their winning $= 7$
No. of people who do not claim $= 20 - 7$
$= 13$

%age of people who do not claim $= \frac{13}{20} \times 100$
$= 13 \times 5$
$= 65\%$

Hence, best answer is choice C.

Q3. (C) $(x + 2i)(y - i)$
$= x(y - i) + 2i(y - i)$
$= xy - xi + 2yi - 2(i)^2$
$= xy + 2yi - xi - 2(i)^2$

$= xy + (2y - x)i - 2(i)^2$

$= xy + (2y - x)i + 2 \qquad (\because i^2 = -1)$

Hence, best answer is choice C.

Q4. (B) We set a proportion

No. of stamps in 14 paisas $= 1$ stamp

No. of stamps in 1 paisas $= \frac{1}{14}$ stamp

No. of stamps in 28000 paisas $= \frac{1}{14} \times 28000$

$= 2000$ stamps

Hence, best answer is choice B.

Q5. (B) To find the common divisions of 102 are

$102 = 2 \times 51$

In the given option only 2 has been given.

Hence, best answer is choice B.

Q6. (A) Use the formula:

$$\text{Original number of workers} = \frac{\text{No. of more workers} \times \text{Number of days taken by the second group}}{\text{No. of less days}}$$

Let x be the original number of workers, then

$$x = \frac{(x-20)\times 20}{30}$$

$30x = 20x - 400$

$400 = 30x - 20x$

$10x = -400$

$x = -\frac{400}{10}$

$x = -40 \quad \Rightarrow \quad x = 40$ (neglect negative sign)

No. of more men $= 40 - 30 = 10$

Hence, best answer is choice A.

Q7. (E) Sum of five odd number is always odd numbers, hence best answer is choice E.

Q8. (D) Rounding 46.97 to the nearth tenth 46.96 becomes 47.

Hence, best answer is choice D.

Q9. (B) We set a proportion:

Words		Time		Words	Time
$2\frac{1}{2}$	:	10	::	300	x

$$\frac{2\frac{1}{2}}{10} = \frac{300}{x}$$

$\frac{5}{2} \times x = 300 \times 10$

$\frac{5x}{2} = 3000$

$5x = 6000$

$x = 1200$ seconds

$\Rightarrow \quad x = \frac{1200}{60}$ minutes

$\Rightarrow \quad x = 20$ minutes

Hence, best answer is choice B.

Q10. (B) Total no. of problems $= 60$

Total no. of time $= 60$ minutes

Solved problems $= 30$

Remaining problems $= 60 - 30$
$= 30$

Remaining time $= 60 - 20$
$= 40$ minutes

Average time to solve remaining problems $= \frac{40 \times 60}{30}$
$= 80$ seconds

Hence, best answer is choice B.

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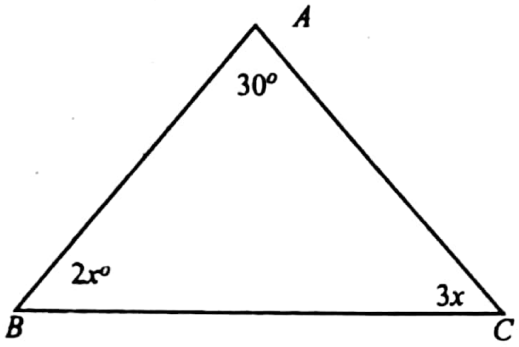
Model Test No. 7

Q1. If it is now March, what month will be after the 100 months from now?

(A) March (B) April
(C) July (D) August

Q2. What is the value of x in the following figure?



(A) 30° (B) 40°
(C) 50° (D) 60°

Q3. What is the value of x if $3^{x+1} = 243$?

(A) 3 (B) 5
(C) 7 (D) 4

Q4. If x is a multiple of 5 and $y = 5x$, then which of the following could be the value of $x + y$?

60
110
50

(A) I only (B) II only
(C) I and II only (D) I and III only

Q5. If Riaz can mow $\frac{3}{4}$ of a lawn each hour, how many lawns can he mowed in k hours?

(A) $\frac{4k}{3}$ (B) $\frac{3k}{4}$
(C) $\frac{2k}{3}$ (D) $\frac{3k}{2}$

Q6. If $2^a = x$ and $2^b = y$, then $xy =$

(A) 9^{a+b} (B) 2^{ab}
(C) 4^{a+b} (D) 2^{a+b}

Q7. If the average (arithmetic mean) of three consecutive integers is M, then which of the following must be true?

I Any one of the three numbers is M
II The average of two of the three numbers is M.
III M is also an integer

(A) I only (B) II only
(C) III only (D) I, II and X

Q8. If $a^2 = 17$, then $(a + 1)(a - 1) = ?$

(A) 15 (B) 12

(C) $\sqrt{18}$ (D) 16

Q9. Which of the following cannot be expressed as the sum of three consecutive integers?

(A) 27 (B) 26

(C) 21 (D) 42

Q10. Ali and Omer share an apartment. If each month Ali pays x dollars and Omer pays y dollars, what percent of the total cost does Ali pay?

(A) $(x + y)100$ (B) $\frac{x}{y}\%$

(C) $\frac{100x}{y}\%$ (D) $\frac{100x}{x + y}\%$

Q11. If $(a - b)^2 = a^2 - b^2$ and $a \neq b$, then which of the following is true?

I $a = 0$

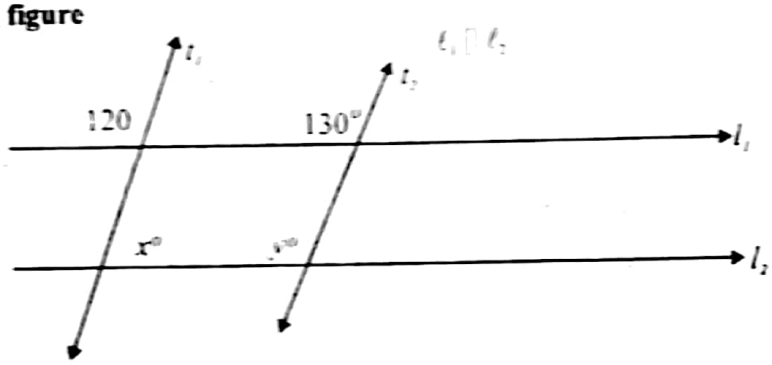
II $b = 0$

III $a = -b$

(A) I only (B) II only

(C) I and II only (D) I and III only

Q12. In the following figure

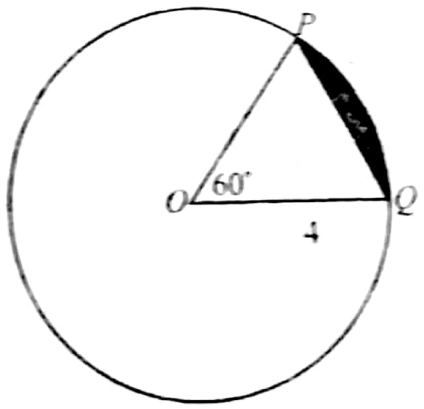


$x + y =$

(A) 230 (B) 210

(C) 110 (D) 190

Q13. In the following figure the radius of the circle is 4, and $m\angle POQ = 60$. What is the perimeter of the shaded region?



(A) $4 + \frac{2\pi}{3}$ (B) $4 + \left(2 + \frac{\pi}{3}\right)$

(C) $4 + \frac{5\pi}{3}$ (D) $4 + \frac{4\pi}{3}$

Q14. If S_1 is the sum of integers from 1 to 60 and S_2 is the sum of the integers from 61 to 100, what is the value of $S_2 - S_1$?

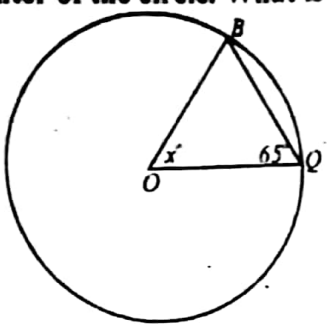
(A) 2500 (B) 2100

(C) 1800 (D) 1390

Q15. If p, q and r are different prime numbers less than 15, what is the greatest possible value of $\frac{p+q}{r}$?

(A) 9 (B) 2
(C) 13 (D) 12

Q16. In the following figure O is the center of the circle. What is the value of x?

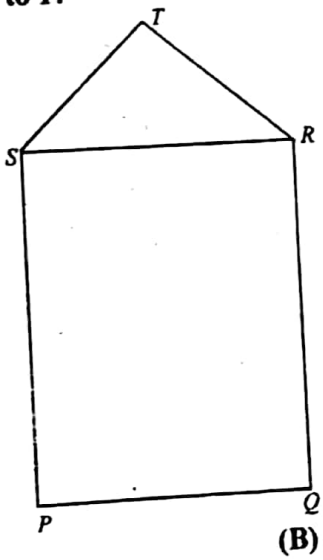


(A) 65° (B) 50°
(C) 45° (D) 35°

Q17. If x is increased by 10% and y is decreased by 10%, the resulting numbers will be equal. What is the ratio x to y?

(A) $\frac{3}{4}$ (B) $\frac{9}{11}$
(C) $\frac{4}{3}$ (D) $\frac{5}{3}$

Q18. In the following figure, the area of the isosceles triangle RST is 8 and the area of the square PQRS is 64. What is the distance from P to T.

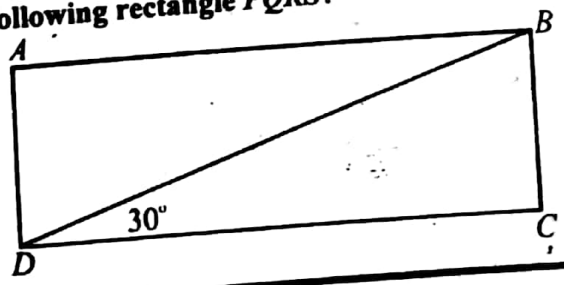


(A) 64 (B) 5
(C) 41 (D) $2\sqrt{29}$

Q19. If $5x + 3 = 3x + 5$, then $x = ?$

(A) 1 (B) 2
(C) $\frac{1}{2}$ (D) $\frac{1}{3}$

Q20. What is the area of the following rectangle $PQRS$?



(A) $25\sqrt{3}$ (B) $16\sqrt{3}$
(C) $12\sqrt{3}$ (D) 64

Explanatory Answers

Q1. (C) In a year there are 12 months, so
100 month $= (12 \times 8) + 4$
$= 96 + 4$
$=$ (March) + April + May + June + July
Explanation: 8 years from now, it will again be March, and 4 months later it will be July.

Q2. (A) In any triangle,
The sum of three angles $= 180^\circ$
$\therefore \quad 30^\circ + 2x + 3x = 180$
$\Rightarrow \quad 5x = 180 - 30$
$\Rightarrow \quad x = \frac{150}{5} \Rightarrow x = 30$

Q3. (D) $3^{x+1} = 243$
$\Rightarrow 3^{x+1} = 3^5$
$\Rightarrow x + 1 = 5$
$\Rightarrow x = 4$

Q4. (A) As x is a multiple of 5, then for any integer n, x can be written as
$$x = 5n$$
Also $y = 5x$
$\Rightarrow x + y = x + 5x \Rightarrow x + y = 6x$
$\Rightarrow x + y = 6(5n) \Rightarrow x + y = 30n$
It means, that $x + y$ is the multiple of 30.
Now, w check I, II and III
(i) Could $x + y = 60$?
Yes, because $x + y = 30(2) \Rightarrow x + y = 30n$
i.e., $(a = 10, b = 50)$
(ii) Could $x + y = 110$?
No, because 110 is not multiple of 30.
(iii) Could $x + y = 50$?
No, because 50 is not multiple of 50.
Therefore, only option A is true.

Q5. (B) Simply multiply $\frac{3}{4}$ by k.
$$\frac{3}{4}(k) = \frac{3k}{4}$$

Q6. (D) $x = 2^a$ and $y = 2^b$ (given)
$xy = 2^a \times 2^b$
$\Rightarrow xy = 2^{a+b}$

Q7. (D) Let the three consecutive numbers be
5, 6 and 7. Its average is
$$M = \frac{5+6+7}{3} = \frac{18}{3} = 6$$
Hence I is true.
Now, $\frac{5+7}{2} = \frac{12}{2} = 6$
Hence, II is true.
Also, III is true.

Q8. (D) $a^2 = 17 \Rightarrow a^2 - 1 = 17 - 1$
$\Rightarrow a^2 - 1 = 16$
$\Rightarrow (a-1)(a+1) = 16$

Q9. (B) Let the three consecutive numbers be x, $x + 1$ and $x + 2$, then their sum $(x) + (x + 1) + (x + 2) = 3x + 3 = 3(x + 1)$ which is multiple of 3. Only 26 is not multiple of 26.

Q10. (D) The total rent is $x + y$, so Ali's share is $\frac{x}{x+y}$. To convert into percentage we multiply $\frac{x}{x+y}$ by 100 and place %age sign.

Q11. (B) $(a - b)^2 = a^2 - b^2$

$a^2 + b^2 - 2ab = a^2 - b^2$

Case I: If $a = 0$, then

$(0)^2 + b^2 - 2(0)(b) = (0)^2 - b^2$

$b^2 = -b^2$

which is not true.

Case II: If $b = 0$, then

$a^2 + b^2 - 2ab = a^2 - 0^2$

$a^2 + (0)^2 - 2a(0) = a^2 - (0)^2$

$\Rightarrow a^2 = a^2$

which is true.

Case III: If $a = -b$, then

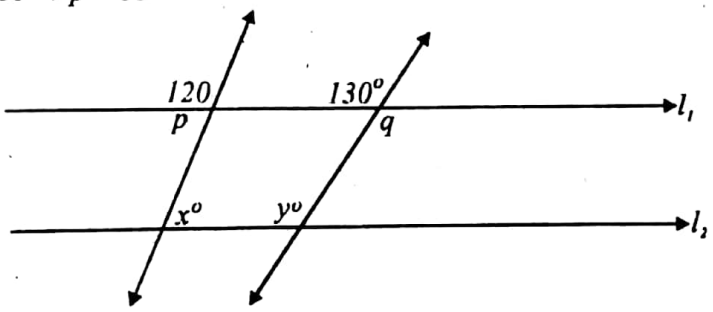
$(-b)^2 + b^2 - (2)(-b)(b) = (-b)^2 - b^2$

$b^2 + b^2 + 2b^2 = b^2 - b^2$

$\Rightarrow \quad 4b^2 = 0$

which is not true.

Q12. (D) Here $120 + p = 180 \Rightarrow p = 60$



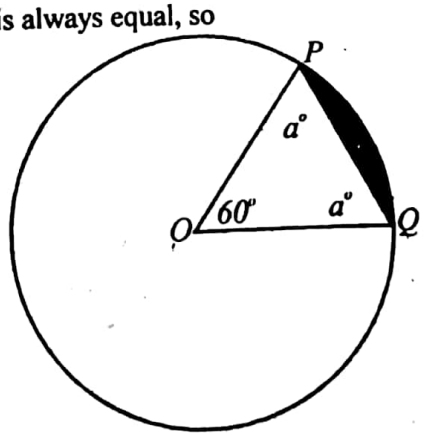
and $q = 130$ (corresponding angles)

Since l_1 and l_2 are parallel, so

$p = x^o = 60$ and $q = y^o = 130$

Hence $x + y = 60 + 130 = 190$.

Q13. (D) Since each radius of a circle is always equal, so



$OP = OQ = 4$

Because, two sides of a triangle. POQ are equal, so their opposite angles must be equal. Let one angle be a^o then the other will also be a^o.

Thus in ΔPOQ

$60^o + a^o + a^o = 180 \Rightarrow 2a^o = 180 - 60$

$$\Rightarrow a^\circ = \frac{120}{2} = 60$$

Thus the length of $\overline{PQ}$ also 4, and the length of arc PQ is

$\frac{60}{360} = \frac{1}{6}$ of the circumference.

Now, circumference, $C = 2\pi r \Rightarrow C = 2\pi(4)$

$\Rightarrow C = 8\pi \Rightarrow \frac{1}{6}C = 8\pi \times \frac{1}{6}$

$= \frac{4\pi}{3}$

Hence the perimeter of the region is

$$4 + \frac{4\pi}{3}$$

Q14. (D) To find the sum of $1 + 2 + 3 + \ldots\ldots\ldots + 60$, use the following formula

$S_1 = \frac{n}{2}\{2a + (n-1)d\}$

Here, $n = 60, a = 1, d = 2 - 1 = 1$

$S_1 = \frac{60}{2}\{2(1) + (60-1)1\}$

$S_1 = 30(2 + 59) \Rightarrow S_1 = 30(61)$

$\Rightarrow S_1 = 1830$

Now, we find the sum of $\{61 + 62 + 63 + \ldots\ldots + 100\}$

Here, $a = 61, n = 40 \quad d = 62 - 61 = 1$

$S_n = \frac{n}{2}\{2a + (n-1)d\}$

$S_2 = \frac{40}{2}\{2(61) + (40-1)1\}$

$S_2 = 20\{122 + 39\} \Rightarrow S_2 = 20(161)$

$\Rightarrow S_2 = 3220$

Now, $S_2 - S_1 = 3220 - 1830$

$= 1390$

Q15. (D) The prime numbers less than 17 are, 2, 3, 5, 7, 11, 13

To make a larger fraction, make the numerator as large and denominator as small. So, Let $p = 13$ and $q = 11$

and $r = 2$ (smallest prime number)

$\therefore \frac{p+q}{2} = \frac{13+11}{2} = \frac{24}{2} = 12$

Q16. (B) Since all the radii of a circle have the same magnitude, thus $OA = OB$. Therefore $m\angle A = m\angle B = 65^\circ$

Hence, $x + m\angle A + m\angle B = 180^\circ$

$x + 65 + 65 = 180$

$x + 130 = 180$

$x = 50$

Q17. (B) $x + \frac{10}{100}(x) = x + 0.1x = 1.1x$

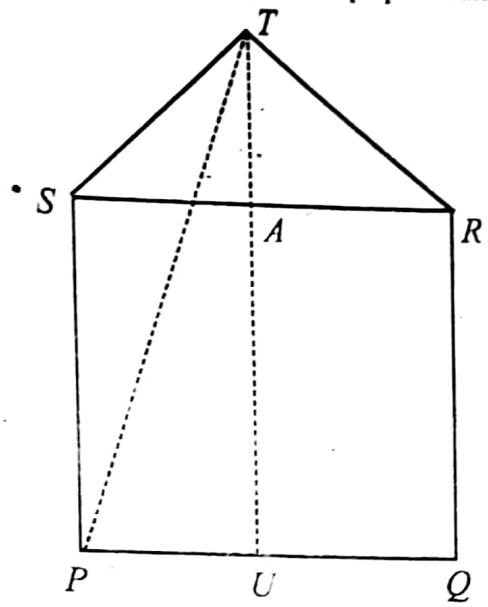
Now $y - \frac{10}{100}(y) = y - 0.1y = 0.9y$

Setting ratio

$1.1x = 0.9y \Rightarrow \frac{x}{y} = \frac{0.9}{1.1}$

$\Rightarrow \quad \frac{x}{y} = \frac{9}{11}$.

Q18. (D) Join the point P to T by line segment. From T draw TU perpendicular on PQ, which cut the line RS at A.



Then $AU = 8$

In $\Delta\ RST$, base = 8 and Area = 8

As Area $= \frac{1}{2}$(base)(Altitude)

$\Rightarrow 8 = \frac{1}{2}(8)AT \Rightarrow AT = \frac{8 \times 2}{8} = 2$

$\Rightarrow TU = TA + AU \Rightarrow TU = 2 + 8 \Rightarrow \boxed{TU = 10}$

Now, In $\Delta\ PTU$

Altitude $PU = 4$ and Base, $TU = 10$

We know, $(PT)^2 = (PU)^2 + (TU)^2$

$\Rightarrow \quad (PT)^2 = (4)^2 + (10)^2 \Rightarrow (PT)^2 = 16 + 100$

$\Rightarrow \quad PT = \sqrt{116} \Rightarrow 2\sqrt{29}$

Q19. (A) $5x + 3 = 3x + 5$

$\Rightarrow \quad 5x - 3x = 5 - 3$

$\Rightarrow \quad 2x = 2$

$\Rightarrow \quad x = 1$

Q20. (B) PR is the hypotenuse of a 30 – 60 – 90 triangle. Thus, QR, the opposite leg of the 30° angle, is 4 (half of PR), and PQ is $4\sqrt{3}$. Then the area of the rectangle $PQRS$

$$4 \times 4\sqrt{3} = 16\sqrt{3}$$

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Part 3 ALGEBRA

Chapter 1

POLYNOMIALS

Polynomial:
A sum of finite number of monomials is called a polynomial. Each monomial is called a term of the polynomial.

Monomial:
A monomial is a variable, or a constant, or a product of constant and one or more variables, with the variables having only non-negative integer in exponents.

Example:
$3x^2y$, $-5xy$, and $-7xy^3$ are monomials.

The algebraic expression

$$4y^{-3} \text{ and } \frac{3}{y}$$

are not monomials, because these expressions have not non-negative integer in exponent, and cannot be written as a product of a constant and a variable with a non-negative integer exponent.

Degree of Monomial:
In any monomial the sum of the exponents of the variables is called the degree of monomial.

Example:
What are the degrees of the monomials
$-3x^2y$, $7x^3y$, $-18xy^2$

Solution:
In algebraic expression $-3x^2y$, the degree of the monomial is 3, because the exponents of x and y are 2 and 1 respectively therefore their sum is $(2 + 1 = 3)$. Similarly the degree of the expressions $7x^3y$ and $-18xy^2$ are 4 and 3 respectively.

Note:
In monomial, the constant is called the numerical coefficient or simply the coefficient of the monomial.
$-3x^2y$, $7x^3y$ and $-18xy^2$ are monomials of coefficient -3, 7, and -18 respectively.

Multiplication of Monomials:
The process of multiplication is illustrated in the following example:

Example:
What is the value of $-5xy^2$, when $x = -2$ and $y = -3$

Solution:
First of all write the coefficient of the monomial, then substitute the value of x and y in monomial. Then evaluate:

$$-5(-2)(-3)^2 = -5(-2)(9) = 90$$

Polynomial:
A sum of a finite number of monomials is called a polynomial. Each monomial in a polynomial is called a term of the polynomial.

Degree of a Polynomial:
The degree of a polynomial is the largest degree of the terms in the polynomial.

What are like terms in a Polynomial?
Terms of polynomial that have exactly the same variables raised to the same powers are called like terms.

Example:
Each of the following is a polynomial:

$$3x^2 + 5,\ 3x^2,\ 2x^2 + 9x - 12,\ -4x^2,\ 7x^2y,\ 9x^2 - 8$$

Explanation:
In above lists of polynomials; $3x^2 + 5$, and $9x^2 - 8$ are called binomial because each polynomial has two terms; the polynomials $3x^2$, $-4x^2$ and $7x^2y$ are monomials; the polynomial $2x^2 + 9x - 12$ is called trinomial because it has three terms. In above list of polynomials $3x^2$ and $-4x^2$ are like terms; similarly $3x^2 + 5$ and $9x^2 - 8$ are like terms, because they have exactly the same variables raised to the same power.

General Form of a Polynomial:
In a single variable x, the general form of a polynomial of degree n is

$a_nx^n + a_{n-1}x^{n-1} + \ldots\ldots\ldots + a_2x^2 + a_1x + a_0$ where n is a non negative integer, and $a_n \neq 0$

Combination of Like Terms in a Polynomial:
The polynomial $4x^2 + 3x + 6x + x^2 + x$ is equivalent to the binomial $5x^2 + 10x$, because like terms are combined in a polynomial. The process of combination is illustrated as:

$$4x^2 + x^2 = 5x^2 \quad \text{and} \quad 3x + 6x + x = 10x$$
$$\therefore \quad 4x^2 + 3x + 6x + x^2 + x = 5x^2 + 10x$$

Remember:
Only like terms in a polynomial can be combined.

Arithmetic Operations on Polynomials:
We use usual law of arithmetic, to add subtract, multiply and divide polynomials.

Addition and Subtraction:
Polynomials are added or subtracted by combining like terms.

Example:

$$(2x^3 + 3x^2 + 7x + 6) + (4x^2 + 3x - 2) - (5x^2 + 4x)$$
$$= 2x^3 + (3x^2 + 4x^2 - 5x^2) + (7x + 3x - 4x) + (6 - 2)$$
$$= 2x^3 + 2x^2 + 6x + 4$$

The rules for adding like terms are:

Rule 1:
If all the terms are positive in a polynomial, then add their coefficients.

Example:
Find the value of $8x^2 + 2x^2 + 7x^2$

Solution:
Here we have to increase 8 like things by 2 and 7 like things of the same kind, and aggregate is 17 of each thing.

Rule 2:
If all the terms in a polynomial are negative add the coefficient numerically and prefix the minus sign to the sum.

Example:
What is the sum of $-4x$, $-x$, $-3x$ and $-7x$

Solution:
In this example the word sum indicates the aggregate of 4 subtractive quantities of like terms. In this case we have to take away successively 4, 1, 3 and 7 like things, therefore the result is the same as taking away $15(4 + 1 + 3 + 7)$ such things in the aggregate.

$\therefore$ The sum of $-4x, -x, -3x, -7x$ is $-15x$.

Rule 3:

If all the terms have not same sign, add together separately the coefficient of all the negative terms and the coefficient of all the positive terms: Then find the difference of those two results, preceded by the sign of the greater, will give the coefficient of the sum required.

Example:

Find the sum of $12x^2 - 3x^2 + 15x^2 - 17x^2$

Solution:

The sum of the coefficient of positive terms is $12 + 15 = 27$

The sum of the coefficient of negative terms is $3 + 17 = 20$

The difference of these is 7, and the sign of the greater is positive: hence the required sum is $7x^2$.

Multiplication of Monomials:

To multiply two simple monomials together, first multiply their coefficients together and prefix their product to the product of the different letters, giving to each letter on index equal to the sum of the indices that letter has in the separate factors.

Example:

What is the product of $5x^2y^3$ and $-3xy^2$

Solution:

$$(5x^2y^3)(-3xy^2) = (5)(-3)(x^2 \times x)(y^3 \times y^2)$$
$$= -15x^3y^5$$

Note:

The product of a monomial by any polynomial is the algebraic sum of the partial products of each term of the polynomial by that monomial.

Example:

Find the product of $2xy^2$ and $(4x^2 + 3y + 7xy)$

Solution:

$$2xy^2(4x + 3y + 7xy) = 8x^3y^2 + 6xy^3 + 14x^2y^3$$

Multiplication of two Binomials:

The procedure of multiplication of two binomials is illustrated as:

1. Multiply each term of the first binomial by each term of the second.
2. When the terms multiplied together have like signs, prefix to the product the sign +, when unlike prefix –.
3. The algebraical sum of the partial products so formed gives the complete product.

Example:

Multiply $(x + 3)$ by $(x - 5)$

Solution: $(x + 3)(x - 5) = x(x - 5) + 3(x - 5)$
$= x^2 - 5x + 3x - 15$
$= x^2 - 2x - 15$

Example:

Find the value of $(x + 2)(x - 3) - (x + 4)(x - 5)$

Solution:

First of all, multiply both pairs of binomials separately, then subtract the second result from the first.

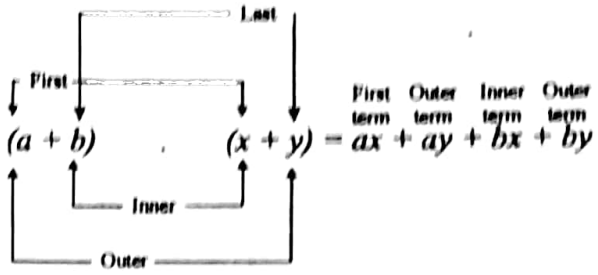
$(x + 2)(x - 3) = x(x - 3) + 2(x - 3) = x^2 - 3x + 2x - 6$
$= x^2 - x - 6$

$(x + 4)(x - 5) = x(x - 5) + 4(x - 5) = x^2 - 5x + 4x - 20$
$= x^2 - x - 20$

Subtracting: $(x^2 - x - 6) - (x^2 - x - 20) = x^2 - x - 6 - x^2 + x + 20$
$= 14$

FOIL Method:

The product of the two binomials can be computed by the FOIL method. This method is illustrated in the following example



Example:

Find the product of $(2x - 3)$ and $(4x + 2)$ using FOIL Method

First Outer Inner Last

$(2x - 3)(4x + 2) = (2x)(4x) + (2x)(2) + (-3)(4x) + (-3)(2)$

$= 8x^2 + 4x - 12x - 6$
$= 8x^2 - 8x - 6$

Important Binomial Formulas:

Following are most important binomial products, those occur frequently in algebra.

1. $(x + y)(x - y) = x^2 - y^2$
2. $(x + y)^2 = x^2 + 2xy + y^2$
3. $(x - y)^2 = x^2 - 2xy + y^2$

Example:

Find each of the following products:

a) $(2a + 3)(2a - 3)$
b) $(a - 5b)^2$

Solution:

a) Using formula $(x + y)(x - y) = x^2 - y^2$
Here $(2a + 3)(2a - 3) = (2a)^2 - (3)^2 = 4a^2 - 9$

b) Using formula $(x - y)^2 = x^2 - 2xy + y^2$
$(a - 5b)^2 = (a)^2 - 2(a)(5b) + (5b)^2 = a^2 - 10ab + 25b^2$

Example:

Given $x + y = 5$, and $x^2 - y^2 = 10$, what is the value of $x - y$?

Solution:

Using the fact $(x + y)(x - y) = x^2 - y^2$

$$(5)(x - y) = 10$$
$$x - y = \frac{10}{5}$$
$$\Rightarrow \quad x - y = 2$$

Example:

Find the value of xy, when $(x + y)^2 = 25$ and $x^2 + y^2 = 3$

Solution:

We know $(x + y)^2 = x^2 + 2xy + y^2$

We can write $(x + y)^2 = (x^2 + y^2) + 2xy$

Substituting the value of $(x + y)^2$, and $x^2 + y^2$ in above

$$25 = (3) + 2xy$$
$$22 = 2xy$$

$$xy = \frac{22}{2}$$

$$xy = 11$$

Division of Polynomial by Monomial:

Division is the inverse of multiplication. The object of division is to find out the quantity called quotient.

Thus $\frac{\text{divided}}{\text{divisor}} = \text{quotient}$

To divide a monomial by a monomial, use distributive law, the index of each letter in the quotient is obtained by subtracting the index of that letter in the divisor from that in the divided. To the result so obtained prefix its proper sign the quotient of the divided by that of divisor.

To divide a polynomial by a monomial, divide each term separately by that monomial, and take the algebraic sum of the partial quotient so obtained.

Example 1:

What is the quotient when $-4x^2y$ is divided by $2x$.

Solution:

The quotient $= \frac{-4x^2y}{2x} = -2xy$

Example 2:

Divide $12x^3 - 6x^2 - 9x$ by $3x$

Solution:

$$\frac{12x^3}{3x} - \frac{6x^2}{3x} - \frac{9x}{3x} = 4x^2 - 2x - 3$$

Evaluating a Polynomial:

To evaluate a polynomial, substitute the given value(s) for the variable(s) and then perform the given operation.

Example:

If $x = 3$, $y = -7$ and $z = -2$, find the value of $x^2 - 26y + 17z$

Solution:

$$x^2 - 26y + 17z = (3)^2 - (26)(-7) + 17(-2)$$
$$= 9 + 182 - 34 = 157$$

Factorising Polynomials:

Writing a polynomial as a product of polynomials of lower degree is called factoring.

When each of the terms which compose a polynomial is divisible by a common factor, the polynomial may be simplified by dividing each term separately by this factor, and enclosing the quotient within brackets; the common factor being placed outside as a coefficient.

Example 1:

Resolve into factors $4x^2 - 20x$

Solution:

The terms of the polynomials $4x^2 - 20x$ have a common factor $4x$;

$$\therefore \quad 4x^2 - 20x = 4x(x - 5)$$

Example 2:

Resolve into factors $x^2 - sx + tx - st$

Solution:

We see that the first two terms contain a common factor x, and the last two terms a common factor t, we enclose the first two terms in one bracket, and the last in another. Thus,

$$x^2 - sx + tx - st = (x^2 - sx) + (tx - st)$$
$$= x(x - s) + t(x - s); \text{ take } (x - s) \text{ common}$$
$$= (x - s)(x + t)$$

Factorising Quadratic Trinomials:

Some trinomials of the form $x^2 + bx + c$ can be factorized by trial and error procedure. This method is the reverse of the FOIL method. This is illustrated in the following example.

Example:

Consider the following binomial expansion:

$$(x + 5)(x + 6) = x(x + 6) + 5(x + 6)$$
$$= x^2 + 6x + 5x + 30$$
$$\therefore \quad x^2 + 11x + 30 = (x + 5)(x + 6)$$

Notice at $11 = 5 + 6$ and $30 = 5 \times 6$

This result can be used to factorize trinomials? For example, to factorize the trinomial $x^2 + 7x + 12$ we need to find two numbers so that:

Product $= 12$ and sum $= 7$

The two numbers are 4 and 3

$4 \times 3 = 12$ and $4 + 3 = 7$

$\therefore x^2 + 7x + 12 = (x + 4)(x + 3)$

Example:

Factorize *i)* $x^2 + 7x - 18$

ii) $m^2 - 9m + 14$

Solution:

i) $x^2 + 7x - 18$

Product $= 9 \times (-2) = -18$

Sum $= 9 + (-2) = 7$

$\therefore \quad x^2 + 7x - 18 = (x + 9)(x - 2)$

ii) $m^2 - 9m + 14$

Product $= (-7)(-2) = 14$

Sum $= (-7) + (-2) = -9$

$\therefore \quad m^2 - 9m + 14 = (x - 7)(x - 2)$

Example:

Find the value of $(10001)^2$

Solution:

$$(10001)^2 = (10000 + 1)^2$$
$$= (10000)^2 + 2(10000)(1) + (1)^2$$
$$= 100000000 + 20000 + 1$$
$$= 100020001$$

Example:

What is the value of $(9999)^2$

Solution:

$$(9999)^2 = (10000 - 1)^2$$
$$= (10000)^2 - 2(10000)(1) + (1)^2$$
$$= 100000000 - 20000 + 1$$
$$= 99980001$$

Algebraic Fraction:

An expression which has a variable in the denominator, is called an algebraic expression. Algebraic fractions are added and subtracted using the same method as for arithmetic fractions. The denominator must be the same before these operations can be carried out.

Example:

Simply *i)* $\frac{3x}{4} + \frac{x}{6}$

ii) $\frac{x + 3}{8} - \frac{x - 4}{4}$

Solution:

i) $\frac{3x}{4}+\frac{x}{6}$

$=\frac{9x+2x}{12}$ (lowest common denominator is 12)

$=\frac{11x}{12}$

ii) $\frac{x+3}{8}-\frac{x-4}{4}$

$=\frac{(x+3)-2(x-4)}{8}=\frac{(x+3)-(2x-8)}{8}=\frac{x+3-2x+8}{8}$

$=\frac{11-2x}{8}$

Multiplication and Division of Algebraic Fractions:

Algebraic fractions are multiplied and divided using the same method as for arithmetic fractions.

Example:

Simply i) $\frac{x}{15}\times\frac{9}{y}$

ii) $\frac{a^2}{2}\div\frac{a^3}{4}$

Solution:

i) $\frac{x}{15}\times\frac{9}{y}=\frac{3x}{5y}$

ii) $\frac{a^2}{2}\div\frac{a^3}{4}$

$=\frac{a^2}{2}\times\frac{4}{a^3}$

$=\frac{2}{a}$

Example:

Simplify $\frac{9x^3-x}{(3x-1)(9x-3)}$, also find the value when x = 39

Solution:

$$\frac{9x^3-x}{(3x-1)(9x-3)}=\frac{x(9x^2-1)}{(3x-1)3(3x+1)}=\frac{x(3x-1)(3x+1)}{3(3x-1)(3x+1)}$$

using $a^2-b^2=(a+b)(a-b)$

$=\frac{x}{3}$

Now when $x = 39$

$=\frac{39}{3}=13$

Example:

Find the value of $\frac{a^2-b^2}{(a-b)}$, when $a = 2.9$ and $b = 9.1$

Solution:

$\frac{a^2-b^2}{a-b}$

$=\frac{(a-b)(a+b)}{(a-b)}=a+b$

$=(2.9+9.1)\quad=12$

Example:

Simply $\frac{e}{4c}\div\frac{eb}{ac}$

Solution:

$\frac{e}{4c}\times\frac{ac}{eb}=\frac{a}{4b}$.

Example:

What is the value of a and b, If $a^2-b^2=36$ and $a+b=6$?

Solution:

$a^2-b^2=36 \Rightarrow (a-b)(a+b)=36$

$\Rightarrow (a-b)(6)=36$ as $a+b=6$

$\therefore a-b=6$ .....(1)

adding $a+b=6$ .....(2)

$2a=12$

$\Rightarrow a=6$

Substituting $a=6$ in (2) we have

$6+b=6,\quad b=0$

$\therefore a=6,\quad b=0$

Example:

Find the value of xy, when $x^2+y^2=58$ and $x^2-y^2=42$

Solution:

adding

$(x^2+y^2)+(x^2-y^2)=2x^2$

$(58)+(42)=2x^2 \Rightarrow 2x^2=50 \Rightarrow x=\pm5$

Substituting $x=\pm5$ in $x^2+y^2=29$

$(5)^2+y^2=29 \Rightarrow y^2=4 \Rightarrow y=\pm2$

$\Rightarrow \boxed{xy=(5)(2)=10}$

Multiple Choice Questions (MCQs)

Q1. **If $x = 235$ and $y = 117$, then $\frac{x^2-y^2}{x-y}=?$**

(A) 118 (B) 100
(C) 115 (D) 352

Q2. **If $x^2-y^2=16$ and $x^2+y^2=34$, which of the following could be the value of xy?**

I 15 II −15 III 45

(A) only I (B) only II
(C) I and II only (D) III only

Q3. **The average of the polynomials, $2x^2+5x-6$, $5x^2-5x-6$ and $30-7x^2$ is:**

(A) 14 (B) 18
(C) 6 (D) 5x

Q4. **What is the value of $x^2+14x+24$, when x = 854?**

(A) 1000 (B) 100,000
(C) 741,296 (D) 742,398

Q5. **If $x^2+y^2=9$ and $(x-y)^2=3$, what is the value of xy?**

(A) 16 (B) 9
(C) 6 (D) 3

Q6. **The value of $(5x+6)(x+12)-(5x-6)(x+3)$ is:**

(A) $2(5x^2+9x)$ (B) 14
(C) 4 (D) 22

Q7. If $\frac{1}{x}+\frac{1}{y}=\frac{1}{z}$ and $xy = z$, what is the average of x and y?

(A) $\frac{1}{2}$ (B) 1

(C) $\frac{x+y+z}{3}$ (D) $\frac{x+y+z}{2}$

Q8. If $p^2 - q^2 = 48$ and $p - q = 12$, what is the average of p and q?

(A) 4 (B) 6

(C) 2 (D) 12

Q9. $\left(\frac{1}{x}+x\right)^2-\left(\frac{1}{x}-x\right)^2=?$

(A) 4 (B) 2

(C) $2\left(\frac{1}{x^2}+x^2\right)$ (D) $2\left(\frac{1+x^2}{x^2}\right)$

Q10. If $\left(x+\frac{1}{x}\right)=81$, then $x^2+\frac{1}{x^2}=?$

(A) 6563 (B) 6561

(C) 6559 (D) 79

Explanatory Answers

Q1. (D) $\frac{x^2-y^2}{x-y}=\frac{(x-y)(x+y)}{x-y}=x+y=235+117=352$

Q2. (C) Adding both equations *i.e.*,

$$x^2+y^2=34$$
$$\underline{x^2-y^2=16}$$
$$2x^2=50 \quad \Rightarrow x^2=25$$
$$\Rightarrow x=\pm 25$$

Now, $x^2+y^2=34 \Rightarrow 25+y^2=34 \Rightarrow y^2=9$

$\Rightarrow y=\pm 3$

Hence, $xy=(-5)(-3)=15=(5)(3)$

and $xy=(-5)(3)=-15=(5)(-3)$

So correct answer is *C*.

Q3. (C) First of all we find the sum of the three polynomials, then divide the answer by 3.

Sum of the three polynomials

$$2x^2+5x-6$$
$$5x^2-5x-6$$
$$\underline{-7x^2 \qquad +30}$$
$$18$$

Now, Average $=\frac{\text{Sum of the three polynomials}}{3}$

$=\frac{18}{3}=6$

Q4. (C) To avoid time consuming calculation, factorize the given polynomial

$x^2+14x+24 = x^2+12x+2x+24 = x(x+12)+2(x+12)$

$=(x+2)(x+12)$

Substituting the value of x in above

$=(854+2)(854+12)=(856)(866)$

$=741{,}296$

Q5. (D) Solving $(x-y)^2=3 \Rightarrow x^2+y^2-2xy=3$

Substituting the value of x^2+y^2 in above

$(x^2+y^2)-2xy=3 \quad \Rightarrow 9-2xy=3$

$\Rightarrow 9-3=2xy \Rightarrow 6=2xy$

$\Rightarrow xy=3$

Q6. (D) $(5x+4)(x+1)-(5x-6)(x+3)=$

$(5x^2+5x+4x+4)-(5x^2+15x-6x-18)$

$(5x^2+9x+4)-(5x^2+9x-18)=4+18=22$

Q7. (A) $\frac{1}{z}=\frac{1}{x}+\frac{1}{y} \Rightarrow \frac{1}{z}=\frac{x+y}{xy} \Rightarrow \frac{1}{z}=\frac{x+y}{z} (\because z=xy)$

$\Rightarrow 1=x+y \Rightarrow \frac{1}{2}=\frac{x+y}{2}$

Hence $\frac{x+y}{2}=\frac{1}{2}$

Q8. (C) $p^2-q^2=38 \Rightarrow (p+q)(p-q)=48$ ...(i)

Now, given that $p-q=12$ ...(ii)

Dividing equation (i) by (ii), we have

$$\frac{(p+q)(p-q)}{(p-q)}=\frac{48}{12}$$

$p+q=4$ ...(iii)

Dividing both sides of equation (iii) by 2, we get

$$\frac{p+q}{2}=\frac{4}{2}=2$$

Q9. (A) Expanding each square of the polynomial, we get

$$\left(\frac{1}{x^2}+x^2+2\right)-\left(\frac{1}{x^2}+x^2-2\right)$$

$$\Rightarrow \left(\frac{1}{x^2}+x^2+2-\frac{1}{x^2}-x^2+2\right)=4$$

Q10. (D) Given $\left(x+\frac{1}{x}\right)^2=81 \Rightarrow x^2+\frac{1}{x^2}+2=81$

$\Rightarrow x^2+\frac{1}{x^2}=81-2 \Rightarrow x^2+\frac{1}{x^2}=79$

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Chapter 2

EQUATION

An equation is a statement that has an equal sign. The parts of an equation to the right and left of the sign of equality are called sides of the equation and are distinguished as the right side and left side.

Highest power of the variable determines the degree of the equation. The letters used for variables in an equation are called unknown quantity. The process of finding the values of variables is called solving the equation. The value so found is called the root or solution of the equation.

Linear Equation:

The equation in which the highest power of the variable is one, is called a simple or linear equation of the first degree.

Example:

$3x = 9$, $2x + 5 = 7$, $x - 7 = 9$

$\frac{x}{2}-\frac{2}{3}=5$ are linear equations

Axioms of Solving Linear Equation:

The process of solving linear equation depends only upon the following axioms:

1. If we add equals in an equation on both sides, the sums are equal.
2. If from equals we take equals the remainders are equal.

3. If equals are multiplied to both sides of an equation the products are equal.
4. If equals are divided by equals then the quotients are equal.

Rules of Solving Linear Equation:

We use following rules to solving a linear equation.

Rule 1:

In a linear equation, any term may be transposed from one side of the equation to the other by changing sign.

Example 1:

Consider a equation

$$-7x + 14 = -3x - 18$$

Transposing $3x + 14 = 7x - 18$

or $18 + 14 = 7x - 3x$

which is the original equation with the sign of some terms are changed.

Example 2:

Solve $3x - 8 = 16$

Solution:

The variable x is multiplied by 3 and then 8 has been subtracted

$$\boxed{x} \xrightarrow{\times 3} \boxed{3x} \xrightarrow{-8} \boxed{3x - 8}$$

Transposing the operations of "×", "–" in other words "undo" or backtrack these two operations, first add 8, and then divide by 3.

$$\boxed{x} \xleftarrow[\div]{} \boxed{3x} \xleftarrow[\div 8]{} \boxed{3x - 8}$$

To keep this equation balance, the same operation must be carried out on both sides of the equation. The process of solving above equation is illustrated simply in two steps as fellows:

$$3x - 8 = 16$$
$$3x - 8 + 8 = 16 + 8$$
$$3x \div 3 = 24 \div 3$$
$$\boxed{x = 8}$$

Steps for Solving Linear Equations:

1. If the equation involves a fraction, first, if necessary, clear the fractions.
2. Transpose all the terms containing the unknown quantity to one side of the equation, and the known quantity to the other side of the equation.
3. Collect the terms on each side.
4. Divide both sides of the coefficient of the unknown variable.
5. Compute for the result.

Example:

Solve (i) $7x - 12 = 3x$ (ii) $\frac{4}{x} = \frac{-1}{3}$

(iii) $\frac{3}{1+x} = \frac{1}{2}$ (iv) $\frac{4}{3+a} + 1 = \frac{1}{3}$

Solution:

(i) $7x - 12 = 3x$

$7x - 3x = 12$

$4x = 12$

$x = 3$

Check

Substituting $x = 3$ in equation $7x - 12 = 3x$

$7(3) - 12 = 3(3)$

$21 - 12 = 9$

$9 = 9$

Solution is correct

(ii) $\frac{4}{x} = \frac{-1}{3}$

Check

Multiplying both sides by $3x$

$\frac{4}{x} \times 3x = \frac{-1}{3} \times 3x$

$12 = -x$

$(-1)(x) \div (-1) = 12 \div (-1)$

$x = -12$

Note: $3x$ is LCD

Substituting $x = -12$ in

$\frac{4}{x} = \frac{-1}{3}$

$\frac{4}{-12} = \frac{-1}{3}$

$\frac{-1}{3} = \frac{-1}{3}$

Solution is correct

(iii) $\frac{3}{1+x} = \frac{1}{2}$

Multiplying both sides by $2(1 + x)$

$\frac{3}{1+x} \times 2(1+x) = \frac{1}{2} \times 2(1+x)$

$6 = 1 + x$

$6 - 1 = 1 + x - 1$

$x = 5$

Check

Substituting $x = 5$ in

$\frac{3}{1+5} = \frac{1}{2}$

$\frac{3}{6} = \frac{1}{2}$

$\frac{1}{2} = \frac{1}{2}$

Solution is correct

Multiple Choice Questions (MCQs)

Q1. If $3x + 9 = 18$, what is the value of $x + 3$?
(A) 3 (B) 6
(C) –3 (D) 36

Q2. If $5x + 12 = 44$, what is the value of $5x - 12$?
(A) 24 (B) 32
(C) 20 (D) 22

Q3. If $3x + 17 = 9 - x$, what is the value of x?
(A) 2 (B) 3
(C) –2 (D) –3

Q4. If $x - 5 = 9$, what is the value of $x^2 - 5$?
(A) 196 (B) 191
(C) 16 (D) 11

Q5. If $at - b = c - dt$, what is the value of t in terms of a, b, c and d?
(A) $\frac{b-c}{a-d}$ (B) $\frac{a}{b}$
(C) $\frac{c}{d}$ (D) $\frac{b+c}{a+d}$

Q6. If $\frac{1}{2}x + \frac{1}{4}x + \frac{1}{8}x = 22$, what is the value of x?
(A) 88 (B) 44
(C) 1 (D) 24

Q7. If $2x - 3 = 15$, what is the value of $(2x - 3)^2$?
(A) 81 (B) 227
(C) ±225 (D) 225

Q8. If $81^{10} = 3^{x-7}$, what is the value of x?

(A) 47 (B) 27
(C) 51 (D) 14

Q9. If $\frac{1}{x-y} = 7$, then $x =$

(A) $x + \frac{1}{7}$ (B) $x - \frac{1}{7}$

(C) $\frac{1}{7} - x$ (D) $\frac{x}{7} - 1$

Q10. If $x = 2t + 5$, and $y = 4t^2$, what is y in terms of x?

(A) $\left(\frac{x-5}{2}\right)^2$ (B) $\frac{x+5}{2}$

(C) $(x-5)^2$ (D) $\frac{x-5}{4}$

Explanatory Answers

Q1. (B) $3x + 9 = 18 \Rightarrow 3(x+3) = 18$ (Taking 3 common from L.H.S)

$\Rightarrow \frac{3(x+3)}{3} = \frac{18}{3} \Rightarrow x + 3 = 6$ (Dividing both sides by 3)

Q2. (C) Given that $5x + 12 = 44$, subtracting -24 on both sides of the given equation, we have $5x + 12 - 24 = 44 - 24$

$\Rightarrow 5x - 12 = 20$

Q3. (C) $3x + 17 = 9 - x \Rightarrow 3x + x = 9 - 17$

$\Rightarrow 4x = -8$

$\Rightarrow x = \frac{-8}{4} = -2$

Q4. (B) $x - 5 = 9 \Rightarrow x - 5 + 5 = 9 + 5$

(adding 5 both sides of the equation)

$\Rightarrow x = 14 \Rightarrow x^2 = (14)^2 = 196$

Now $x^2 - 5 = 196 - 5 \Rightarrow x^2 - 5 = 191$

Q5. (D) $at - b = c - dt \Rightarrow at + dt = b + c$

$\Rightarrow t(a+d) = b + c$

$\Rightarrow t = \frac{b+c}{a+d}$

Q6. (D) $\frac{1}{2}x + \frac{1}{4}x + \frac{1}{8}x = 21$, (taking L.C.M, 8)

$\frac{4x + 2x + x}{8} = 21$, Multiplying both sides by 8, we have

$\frac{7x}{8} \times 8 = 21 \times 8 \Rightarrow 7x = 21 \times 8$

$\Rightarrow x = \frac{21 \times 8}{7}$

$\Rightarrow x = 3 \times 8$

$\Rightarrow x = 24$

Q7. (B) Given that $2x - 3 = 15$

Taking square both sides of the equation, we get

$(2x+3)^2 = (15)^2$

$\Rightarrow (2x+3)^2 = 225$

Q8. (A)

$81^{10} = 3^{x-7}$

$(3 \times 3 \times 3 \times 3)^{10} = 3^{x-7}$

$(3^4)^{10} = 3^{x-7}$

$3^{40} = 3^{x-7}$

$\Rightarrow 40 = x - 7$

$\Rightarrow 40 + 7 = x - 7 + 7$

$\Rightarrow \boxed{x = 47}$

Q9. (B) $\frac{1}{x-y} = 7$, Multiplying both sides of the equation by $(x-y)$, we have

$\frac{1}{x-y} \times (x-y) = 7 \times (x-y)$

$1 = 7x - 7y$

$\Rightarrow 7y = 7x - 1 \Rightarrow y = \frac{7x-1}{7}$

$\Rightarrow y = x - \frac{1}{7}$

Q10. (C) Let $x = 2t + 5$ ...(i) and

$y = 4t^2$ ...(ii)

Solving (i), for t

$x = 2t + 5 \Rightarrow x - 5 = 2t + 5 - 5$

$\Rightarrow x - 5 = 2t \Rightarrow \frac{x-5}{2} = \frac{2t}{2}$

$\Rightarrow \frac{x-5}{2} = t$

Putting the value of t in (ii), we have

$y = 4\left(\frac{x-5}{2}\right)^2$

$y = \frac{4}{4}(x-5)^2 \Rightarrow y = (x-5)^2$

Chapter 3

INEQUALITY

An inequality, or inequation is a statement which involves one of the sign below:

$<$	Less than
$\leq$	Less than or equal to
$>$	Greater than
$\geq$	Greater than or equal to

Examples:

$6x > 52$

$11y \geq -101$

$-3x \leq 8$

$-52w \leq 9$

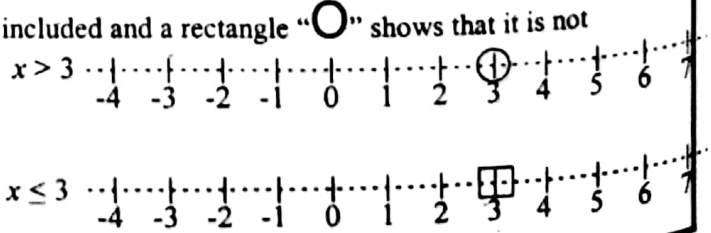
The set of all solutions of an inequality is called the solution set of the inequality. For example the solution of $x + 3 > 5$ is the set of all real numbers greater than 2.

Note:
Equivalent Inequalities have the same solution set.

Representation of Inequality on number line:

Inequalities such as $x > 3$ or $x \leq 3$ can be represented on number line.

In following number line a circle "□" shows that x is included and a rectangle "○" shows that it is not



Note:

1. Any quantity x is said to be greater than another quantity y when $(x - y)$ is positive.

Example:

If $x = 2$ and $y = -3$, thus $x > y$ because $2 - (-3) = 5$ or positive.

2. y is said to be less than x when $y - x$ is negative.

Example:

If $x = 2$ and $y = -3$, than $y < x$ because $-3 - 2 = -5$ or negative.

Properties of Inequalities:

We apply the following properties to solve inequalities.

1. An inequality will still hold after each side has been increased, decreased, multiplied or divided by the same positive quantity

If $x > y$

For example: $x + z > y + z$;

$x - z > y - z$;

$xz > yz$;

$\frac{x}{z} > \frac{y}{z}$

2. In an un-equality any term may be transposed from one side to the other if its sign be changed

If $x - y > z$

For example: $x > z + y$

3. If the sides of an inequality is transposed, then the sign of inequality is reversed

Example: If $x > y$, then evidently $y < x$

4. If both sides of the inequality are multiplied or divided by a negative number, then direction of the inequalities sign is reversed

Example: If $x > y$, then $-x < y$ and

$\therefore -xz < yz$

5. The square of real quantity is positive, therefore it is greater than zero.

Therefore $(x - y)^2$ is always positive

$\therefore (x - y)^2 > 0$

$\therefore x^2 + y^2 > 2xy$

6. If x and y are two positive quantities, then their arithmetic mean $\left(\frac{x+y}{2}\right)$ is greater than their geometric mean $\left(\sqrt{xy}\right)$.

$$\therefore \frac{x+y}{2} > \sqrt{xy}$$

Example:

Solve the following inequalities

(i) $3x - 11 < 13$ *(ii)* $\frac{-x}{2} \leq 2$

Solution:

(i)

$3x - 11 < 13$

$\therefore 3x - 11 + 11 < 13 + 11$ (using property 1)

$\therefore 3x < 24$

$\therefore \frac{3x}{3} < \frac{24}{3}$ (using property 7)

$\therefore x < 8$

(ii)

$\frac{-x}{2} \leq 2$

$\frac{-x}{2} \times 2 \leq 2 \times 2$ (using property 3)

$\therefore -x \leq 4$

$\therefore -x \times -1 \geq 4 \times -1$ (using property 4)

$x \geq -4$

Example: Find the greatest possible value of x, such that arithmetic mean of 5, 7 and x is less than 24.

Solution:

The arithmetic mean of three numbers 5, 7 and x is

$$\frac{5+7+x}{3}$$

By given condition $\frac{5+7+x}{3} < 24$

Now $\frac{(5+7+x)}{3} \times 3 < 24 \times 3$ (using property 1)

$\therefore 12 + x < 72$

$\therefore 12 + x - 12 < 72 - 12$ (using property 1)

$\therefore x < 60$

Thus the greatest possible value of x is 59.

Example:

Solve $\frac{x}{4} - 4 > \frac{x}{5}$

Solution:

$\frac{x}{4} - 4 > \frac{x}{5}$

$\frac{x}{4} - \frac{x}{5} - 4 + 4 > \frac{x}{5} - \frac{x}{5} + 4$ (using property 1)

$\therefore \frac{x}{4} - \frac{x}{5} > 4$

$\therefore \frac{5x - 4x}{20} > 4$

$\therefore \frac{x}{20} > 4$

$\therefore \frac{x}{20} \times 20 > 4 \times 20$ (using property 1)

$\therefore x > 80$

Multiple Choice Questions (MCQs)

Q1. If $xy > 0$ and $x < 0$, which of the following negative?

(A) $-x$ (B) $-y$

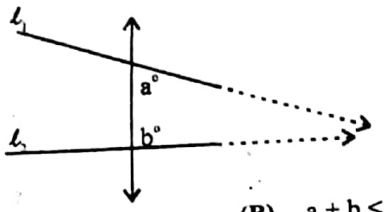
(C) y (D) xy

Q2. If $a > 0$, $b > 0$ and $a - b < 0$, then?

(A) $a < b$ (B) $a + b < 0$

(C) $a > b$ (D) $b - a < 0$

Q3. If lines l_1 and l_2 meet when extended to the right, which inequality best expresses the relationship between a and b?



(A) $a = b$ (B) $a + b < 180$
(C) $a - b > 0$ (D) $b - a > 0$

Q4. **If $a + b > 7$ and $a - b > 5$, then which of the following gives all possible values of a and only possible value of a?**
(A) $a > 6$ (B) $a < 5$
(C) $a > 4$ (D) $a < 7$

Q5. **If $A > B$ an $C < 0$, then which of the following is not true?**
(A) $AC < BC$ (B) $A + C > B + C$
(C) $A - C < B - C$ (D) All of the above

Q6. **If $a = 1$ and $1 > b > 0$, then which of the following statement is true?**
(A) $a = b$ (B) $b > a$
(C) $\frac{1}{b} > a$ (D) $\frac{1}{a} < b$

Q7. **If $a < c$ and $a < b$, assume $a \geq 0$ then which of the following statements are always true?**
(i) $b < c$ (ii) $a < bc$ (iii) $2a < b + c$
(A) only (i) (B) only (ii)
(C) only (iii) (D) (i) and (ii)

Q8. **If $6 - a > 7$, then**
(A) $a > 1$ (B) $a > -1$
(C) $a < -1$ (D) $a < 1$

Q9. **a has to be a whole number such that $0 \leq a \leq 10$. The solution for $a < 4$ and $a \geq 6$ is:**
(A) 5 (B) 7
(C) 3 (D) no solution

Q10. **If $5x > 2$ and $\frac{1}{2}x \leq 4$, list all the possible integral values of x?**
(A) 2, 3, 4, 5, 6 (B) 1, 2, 3, 4, 5, 6, 7, 8
(C) 2, 3 (D) 1

Explanatory Answers

Q1. (C) The product of two numbers > 0 is only possible when either both numbers are positive or both are negative. Since $x < 0$, y must also be negative.

Q2. (A) In this case a and b are both positive ($a > 0$, $b > 0$), but $a - b$ is negative, which is only possible when $a < b$.

Q3. (B) When the lines will be extended to the right. They will make a triangle, and the sum of the angles of the triangle is 180°. Therefore, the sum of the two angles in a triangle is less than 180°.

Q4. (A) Since both inequalities have the same direction, therefore the corresponding sides can be added. Thus,

$$a + b > 7$$
$$a - b > 5$$
$$2a > 12$$
$$\boxed{a > 6}$$

Q5. (C) If $A > B$ and $C < 0$, then multiplication of both sides by C reverses the inequality. Which implies $AC < BC$. Also adding and subtracting in inequality, gives

$A + C > B + C$ and

$A - C > B - C$

But $A - C < B - C$ is not possible.

Q6. (C) Since b is a +ve fraction less than 1, therefore $\frac{1}{b}$ is a positive fraction greater than 1. Hence

$$\frac{1}{b} > a$$

Q7. (C) Statements (i) and (ii) are not always true.

Q8. (C) Given $6 - a > 7$

$\Rightarrow$ $-a > 1$

Dividing both sides by -1. This will reverse the inequality sign

$a < -1$

Q9. (D) Given set is {0,1,2,3,4,5,6,7,8,9,10}, the number $a < 4$ are {0,1,2,3} and the numbers $a \geq 6$ are {6,7,8,9,10}. Since there are no common elements between the last two sets. Therefore, there is no solution of the inequality.

Q10. (B) $5x > 2$ $\frac{1}{2}x \leq 4$

$x > \frac{2}{5}$ $\frac{1}{2}x \times 2 \leq 4 \times 2$

$x \leq 8$

from above the integers greater than $\frac{2}{5}$ and less than and equal to 8 are 1,2,3,4,5,6,7,8

Chapter 4

WORD PROBLEMS

Multiple Choice Questions (MCQs)

Q1. **If 5 is subtracted from a certain number, the result is 7 less than twice the number. What is the number?**

(A) 2 (B) $\frac{1}{2}$
(C) 5 (D) 6

Q2. Three times the first of three consecutive odd integers is 3 more than twice the third. What is the third integer?
(A) 11 (B) 12
(C) 15 (D) 13

Q3. Two-fifth of a certain number is 30. What is the number?
(A) 75 (B) 25
(C) 90 (D) 150

Q4. Saira weights 25 pounds more than Umbar. If together they weigh 205 pounds, what is the weight of Saira?
(A) 90 (B) 105
(C) 115 (D) 135

Q5. If the sum of two numbers is 36, and the larger is three times as larger as the smaller, what is the larger number?
(A) 27 (B) 30
(C) 15 (D) 18

Q6. The sum of integers p and q is 352. The units digits of p is 0. If p is divided by 10, the result is equal to q, what is the value of p?
(A) 30 (B) 230
(C) 320 (D) 32

Q7. A soap factory has 30 packers. Each packer can load $\frac{1}{8}$ of a box in 9 minutes. How many boxes can be loaded in $1\frac{1}{2}$ hours by all 20 packers?
(A) 28 (B) $37\frac{1}{2}$
(C) 35 (D) $35\frac{1}{2}$

Q8. Uzma is 15 years old. Asma is one-third older then Uzma. How many years ago when Asma was twice as old as Uzma is?
(A) 5 (B) 12
(C) 15 (D) 10

Explanatory Answers

Q1. (A) Let the required number be x. Then $x - 5 = 2x - 7$
$\Rightarrow$ $\boxed{x = 2}$. Thus the correct answer is 2.

Q2. (C) Let
x = first integer
$x + 2$ = second integer
$x + 4$ = third integer
$3(x) = 3 + 2(x + 4)$
$3x = 3 + 2x + 8$
$x = 11$
Third integer is $(x + 4) = \boxed{15}$

Q3. (A) Let the number $= x$, then
$\frac{2}{5}x = 30$
$\Rightarrow x = \frac{30 \times 5}{2}$
$\Rightarrow x = 75$

Q4. (C) Let the weight of Saira $= x$
and Umber's weight $= y$
$x - 25 = y$
and $x + y = 205$
$\Rightarrow x - y = 25$
$x + y = 205$
$2x = 230$
$x = \frac{230}{2} = 115$ pound

Q5. (A) Let the smaller number $= x$
Then the larger number $= 3x$
Now $3x + x = 36$
$4x = 36$
$x = 9$
The larger number is $36 - 9 = 27$

Q6. (C) $p + q = 352$ and $\frac{p}{10} = q$
$\Rightarrow p = 10q$
$10q + q = 352 \Rightarrow 11q = 352 \Rightarrow q = 32$
Now $p + 32 = 352 \Rightarrow \boxed{p = 320}$

Q7. (B) 30 packers will load $30 \times \frac{1}{8}$ or $\frac{30}{8}$ boxes in 9 minutes. There are 90 minutes in $1\frac{1}{2}$ hours. So the 30 packers will load $10 \times \frac{30}{8}$ or $37\frac{1}{2}$ boxes in $1\frac{1}{2}$ hours.

Q8. (D) Asma is one-third older or $\frac{1}{3} \times 15 = 5$ years older. Let x be the age of Uzma and $x + 5$ be Asma's age. When Asma was twice the age of Uzma, $2x = x + 5$ or $x = 5$. Uzma was 5 years old and Asma was $x = 5$ or 10 years old, twice Uzma's age. Since Uzma is 15 years old now, Uzma was 5 years old 10 years ago.

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4. Logical Reasoning

Introduction:
The main object of the logical reasoning questions is to test skills in constructing and evaluating arguments. Here, first of all we discuss some basic definitions about logic.

Propositions: A proposition is a statement that is either true or false, but not both.

Example 1: All the following statements are propositions

1. Lahore is the capital of Pakistan.
2. Moscow is the capital of Russia.
3. $2 + 2 = 5$
4. $3 + 3 = 6$

Example 2: All the following sentences are not propositions.

1. Answer this question
2. What time is it?
3. $x + 2 = 5$
4. $a + b = c$

In the above four sentences, sentences 1 and 2 are not propositions because they are not statements. Sentences 3 and 4 are not propositions they are neither true nor false.

How propositions are denoted? Small letters are used to denote propositions, like variables. For this purpose, letters p, q, r, ... are used. When the truth-value of a proposition is true, then it is denoted by T and if the proposition is false, then it is denoted by F.

Argument: An argument is a statement or fact advanced to influence the mind, or a reason urged in support of proposition. An argument is a sequence of two or more phrases, clauses, sentences or statements, one of which is a conclusion, follows the premises. For example:

"There was water in the ground, so it must have been raining."

The first part of the sentence, "There was water in the ground", is called a ***premise***. The conclusion of the sentence, "It must have been raining" is based on the premise. Thus, premise and conclusion altogether form an argument.

Premise: A previous statement or proposition from which another is inferred or follows a conclusion is called premise. As stated above, the sentence, "There was water in the ground", is a premise.

Conclusion: A proposition derived from two previous propositions (the premises) in a syllogism, or a deduction from premises.

Negation of a Proposition:
If p is a proposition, its negation, not p, is denoted $\sim p$ and is defined by the truth table as shown below:

p	$\sim p$
T	F
F	T

Explanation:
1 The negation of true statement is false statement.
2 The negation of false statement is true statement.

Examples: Find the negation of the proposition "Today is Sunday"

Solution: The negation of the given statement is "Today is not Sunday".

Truth Table:
A truth table displays the relationship between the truth-values of propositions. Truth tables are especially variable in the determination of the truth-values of propositions constructed from simpler propositions.

Conjunction:
If p and q are propositions, their conjunction, p and q (denoted $p \wedge q$), is defined by the following truth table:

p	q	$p \wedge q$
T	T	T
T	F	F
F	T	F
F	F	F

Example: Find the conjunction of the propositions, p and q where p is the proposition "Today is Sunday" and q is the statement "It is raining today".

Solution: The conjunction of these propositions, $p \wedge q$ is the proposition "Today is Sunday and it is raining today". This proposition is true on rainy Sunday and is false on any day that is not a Sunday and on Sundays when it not rain.

Disjunction:
If p and q are proposition, their disjunction is p or q denoted $p \vee q$, and is defined by the truth table given below:

Truth Table

p	q	$p \vee q$
T	T	T
T	F	T
F	T	T
F	F	F

Example: A disjunction is true when either of the two propositions in it is true or when both or true. For instance, the inclusive or is being used in the statement.

"Students who have taken physics or statistics can take this class."

Here, we mean that students who have taken both physics and statistics can take the class, as well as the students who have taken just one of the two subjects.

Implication: Let p and q be propositions. The implication $p \rightarrow q$ is the proposition that is false when p is true and q is false and true otherwise. The truth table is shown below

Truth Table

p	q	$p \rightarrow q$
T	T	T
T	F	F
F	T	T
F	F	T

Note:
In the implication $p \rightarrow q$, p is called the ***hypothesis*** (or antecedent or premise) and q is called the ***conclusion*** or ***consequence***.

Example: The implication

"If it is hot today, then we will go to Murree Hills."
is an implication used in normal language. This implication is considered valid unless it is indeed hot today, but we do not go to the Murree Hills. On the other hand, the implication,
"If today is Sunday, then $3 + 7 = 9$" is true everyday except Sunday, even though $3 + 7 = 9$ is false.

Biconditional:

Let p and q be propositions. The biconditional $p \leftrightarrow q$ is the proposition that is true when p and q have the same truth-values and is false otherwise.

Truth Table

p	q	$p \leftrightarrow q$
T	T	T
T	F	F
F	T	F
F	F	T

Model Examples:

Example 1:

Every Friday, Osama has burger for lunch and then goes to the movies. If the statement above is true, which of the following statements must also be true?

I. If it is not Friday, then Osama is not having burger for lunch and is not going to the movies.

II. If Osama has burger for lunch and then goes to the movies, it is Friday.

III. If Osama has burger for lunch, but does not go to the movies, it is not a Friday.

(A) I only
(B) II only
(C) III only
(D) I and II only
(E) II and III only

Explanatory Answer:

This logical reasoning question can be solved by logical symbols.

Let p is the proposition "If it is Friday", q is the proposition "Then Osama has burger" and r is the proposition "and goes to movies". We write the given statement logically

$$p \rightarrow (q \wedge r)$$

Also, the translated form of the given arguments are:

I. $\neg p \rightarrow \neg(q \wedge r)$

II. $(q \wedge r) \rightarrow p$

III. $(q \wedge \neg r) \rightarrow \neg p$

Now, we construct the truth table.

p	q	r	$\neg p$	$\neg r$	$(q \wedge r)$	$\neg(q \wedge r)$	$(q \wedge \neg r)$	$\neg p \rightarrow \neg(q \wedge r)$	$p \rightarrow (q \wedge r)$	$(q \wedge r) \rightarrow p$	$(q \wedge \neg r) \rightarrow \neg p$
T	T	T	F	F	T	F	F	T	T	T	T
T	F	T	F	F	F	T	F	T	F	T	F
T	T	F	F	T	F	T	T	T	F	T	F
T	F	F	F	T	F	T	F	F	T	F	T
F	T	T	T	F	T	F	F	T	T	T	T
F	F	T	T	F	F	T	F	T	T	T	T
F	T	F	T	T	F	T	F	T	T	T	T
F	F	F	T	T	F	T	F	T	T	T	T

The logically equivalence, to the given argument is

$$p \rightarrow (q \wedge r)$$

From above logical table, it is clear that

$$p \rightarrow (q \wedge r) \text{ is equivalent to } (q \wedge \neg r) \rightarrow \neg p$$

Therefore, III is true nor I and II are true. So, the correct choice is C.

Example 2:

The cost of producing mobiles in country X is ten percent less than the cost of producing mobiles in country Y. Even after transportation fees and tariff charges are added, it is still cheaper for a company to import mobiles from country X to country Y than to produce mobiles in country Y.

The statements above, if true, best support which of the following assertions?

(A) The fee for transporting a mobile from country X to country Y is more than ten percent of the cost of manufacturing the mobile in country X.

(B) Importing mobiles from country X to country Y will eliminate ten percent of the manufacturing jobs in country Y.

(C) Labour costs in country X are ten percent below those in country Y.

(D) It takes ten percent less time to manufacture a mobile in country X than it does in country Y.

(E) The tariff on a mobile imported from country X to country Y is less than ten percent of the cost of manufacturing the mobile in country Y.

Explanatory Answer:

Choices C and D give possible partial explanations for the cost difference, but neither is supported by the passage because the cost advantage in X might be attributable to other factors. Choices A and B are both consistent with the information in the passage, but the passage provides no evidence to support them.

Now, if the tariff on importing mobiles from country X to country Y were as high as ten percent or more of the cost of producing mobiles in Y, then, contrary to what the passage says, the cost of importing mobiles from X to Y would be equal to or more than the cost of producing mobiles in Y. Thus, the tariff cannot be that high, and E is the best answer.

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Multiple Choice Questions (MCQs)

Q1. If Fatima was born in NWFP, then she is a citizen of Pakistan. The statement above can be deduced from which of the following statements?

(A) Fatima was born either in NWFP or in Punjab.
(B) Some people born in NWFP are citizen of Pakistan.
(C) Everyone born in Pakistan is a citizen of Pakistan.
(D) Every citizen of Pakistan is resident either of one have the province or of one of the tribal area.
(D) Fatima is a citizen either of Pakistan or of any other country.

Q2. Asif has refused to work hard for the exam preparation; therefore, no more pocket money from his father should be provided to him. Which of the following is an assumption made in the argument above?

(A) Asif is a dull student.
(B) Pocket money of his brother Rafaqit is more.

(C) Money has no importance in Asif's life.
(D) Asif like expensive coloured books.
(D) Asif is a greedy boy, and demand more money from his father.

Q3. Travelling by cars is safer than travelling by planes. About 80% of plane accidents result in death of all passengers, while about 1% of car accidents result in death. Which of the following, if true, would most seriously weaken in the argument above?

(A) Pilots are more trained than car drivers are.
(B) Speed of car is lesser than that of planes.
(C) The number of car accidents is several thousand times higher than the number of plane accidents.
(D) Car carriers less number of passengers.
(D) Planes are inspected by experienced engineers before flying.

Q4. It is true that it is against international law to sell plutonium to countries that do not yet have nuclear weapons. But if United States companies do not do so, companies in other countries will. Which of the following is most like the argument above in its logical structure?

(A) It is true that it is against the police department's policy to negotiate with kidnappers. But if the police want to prevent loss of life, they must negotiate in some cases.
(B) It is true that it is illegal to refuse to register for military service. But there is a long tradition in the United States of conscientious objection to serving in the armed forces.
(C) It is true that it is illegal for a government official to participate in a transaction in which there is an apparent conflict of interest. But if the facts are examined carefully, it will clearly be seen that there was no actual conflict in the defendant's case.
(D) It is true that it is against the law to burglarize people's homes. But someone else certainly would have burglarized that house if the defendant had not done so first.
(D) It is true that company policy forbids supervisors to fire employees without two written warnings. But there have been many supervisors who have disobeyed this policy.

Q5. According to the new office smoking regulations, only employees who have enclosed offices may smoke at their desks. Virtually, all employees with enclosed offices are at the professional level, and virtually all secretaries employees lack enclosed offices. Therefore, secretaries who smoke should be offered enclosed offices. Which of the following is an assumption that enables the conclusion above to be properly drawn?

(A) Employees at the professional level who do not smoke should keep their enclosed offices.
(B) Employees with enclosed offices should not smoke at their desks, even though the new regulations permit them to do so.
(C) Employees at the secretarial level should be allowed to smoke at their desks, even if they do not have enclosed offices.
(D) The smoking regulations should allow all employees who smoke an equal opportunity to do so, regardless of an employee's job level.
(D) The smoking regulations should provide equal protection from any hazards associated with smoking to all employees who do not smoke.

Q6. Before the arrival of Asim a new partner, sales output in Bilal's company Minhas In Reverse Ltd. had been raising by 10% per year on average. Innovations by Asim included computerization of technical processes and reductions in the work force, but annual sales output has only risen by 5% per year. It appears that Asim's innovations have caused the reduction in the annual growth rate. Which of the following, if true, would most seriously weaken the conclusion above?

(A) Asim's innovations were intended as long-term investment and not made for short-term profit growth.
(B) General demand for the product manufactured by the company has declined.
(C) The investment in new machinery entails a provision for depreciation of the cost of the fixed assets, which causes a reduction in profit.
(D) Workers laid off by Minhas In Reverse Ltd. have been hired by a competitor, who is taking an increasing share of the market.
(D) Minhas In Reverse Ltd. does not base increases in the selling price of its products with costs.

Q7. Hamza is a terrible driver. He had ten traffic violations in the past year. Which of the following can be said about the above claim?

(A) Hamza does not know how to drive.
(B) Hamza is an addict of drugs.
(C) It is obvious that everyone make accidents in bad weather.
(D) Something, in this argument is hidden.
(D) The given statement is wrong.

Questions 8-9 refer to the following paragraph.

Selfishness is a principal evil in our society. Every person is concerned with only himself. Personal advancement is the only motivating force in the world today. This does not mean that individual, are not willing to help one another, on the contrary, _____. However, these are only short-term occurrences, which ultimately serve our long-term goal of personal gain.

Q8. To fill in the blank in the above passage, select one of the options from the below mentioned options:

(A) We are always trying to undermine others endeavours.
(B) People always deceive one another.
(C) Even close friends are not trustworthy.
(D) People want power to control others.
(D) There are many occasions when we graciously offer our assistance.

Q9. Which among the following options would most strongly contradict the author's attitude towards society?

(A) The greatest strength of society is altruism.
(B) We must all learn the art of love.
(C) Our short-term actions may contradict our long-term goals.
(D) Morality is the bedrock of a growing community.
(D) The forces of goodwill ultimately triumph over evil.

Q10. Many people do not read the books they purchase. For example, seventeen percent of college students in Pakistan have textbooks, but only forty-five percent of them read more than once a year, and only seventeen percent read more than once a week. Which of the following, if true, costs doubt on the claim that most people read the books they purchase?

(A) Readers often exaggerate about their book reading.
(B) The sale of novels is more than that of other types.
(C) Many people buy books to pretend themselves as a scholar.
(D) Regular book readers are most susceptible to eye diseases.
(D) Reading speed is increased by frequent readings.

Q11. The value of a close examination of the circumstances of an aircraft accident lies not only in fixing blame but in learning lessons.
The above statement first most logically into which of the following types of passages?

(A) A survey of the "scapegoat phenomenon" in modern society.
(B) An argument in favour of including specific details in any academic essay.
(C) An argument against the usefulness of the National Transportation Safety Board.
(D) A brief history of aeronautics.
(D) A description of the causes of a particular aircraft accident.

Q12. In the first message to Congress, Harry Truman said, "The responsibility of the United States is to serve and not dominate the world."

Which of the following is one basic assumption underlying Truman's statement?

(A) The United States is capable of dominating the world.
(B) The United States chooses a serve rather than dominate the world.
(C) World domination is a virtue.
(D) One must be decisive when facing a legislative body for the first time.
(D) The United States, preceding Truman's administration, had been irresponsible.

Q13. A researcher has concluded that women are just as capable as men in math but that their skills are not developed because society expects them to develop other and more diverse abilities.
Which of the following is a basic assumption of the researcher?

(A) Ability in math is more important than ability is more diverse subjects.
(B) Ability in math is less important than ability in more diverse subjects.
(C) Women and men should be equally capable in math.
(D) Women might be more capable than men in math.
(D) Women tend to conform the social expectations.

Q14. Researchers have found an inactive virus in dry bread. In previous experiments, researchers found that inactivated viruses could convert healthy cells into cancer cells. It can be concluded that the use of dry bread can cause cancer. Which one of the following, if true, most seriously weakens the argument?

(A) The result of many studies about the same topic were consistent.
(B) Many other ingredients dry bread can neutralize the effect of inactive virus.
(C) Many of cancer patients confirmed the use of dry bread.
(D) Ten percent of rural population use dry bread.
(D) Inactive virus cannot be killed by any medicine.

Questions 15-16 refer to the following paragraph.

"The sum of behaviour is to retain a man's dignity without intruding upon the liberty of others," stated Sir Francis Bacon. If this is the case, then not intruding upon another's liberty is impossible.

Q15. The conclusion strongly implied by the author's arguments is that:

(A) Retaining one's dignity is impossible without intruding upon another's liberty.
(B) Retaining dignity never involves robbing others of liberty.
(C) Dignity and liberty are naturally exclusive.
(D) There is always the possibility of a "dignified intrusion".
(D) None of the above.

Q16. The author's argument would be weakened if it were pointed out that:

I. Bacon's argument has been misinterpreted out of context.
II. Neither liberty nor dignity can be discussed in absolute terms.
III. Retaining dignity always involves a reducing of liberty.

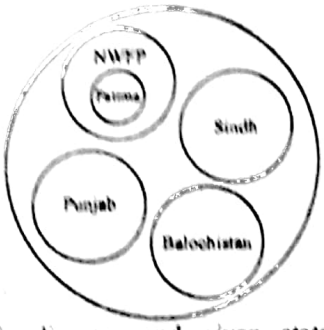
(A) I, II and X
(B) III only
(C) I only
(D) II and III only
(D) I and II only

EXPLANATORY ANSWERS

Q1. (E) Choice "A" indicates, since Fatima was born in NWFP, so Fatima was born either in NWFP or in Punjab, which is falsified. Lets make a Venn diagram to illustrate this question. There are two statements including choice A. These are:

1. If Fatima was born in NWFP, then she is a citizen of Pakistan.
2. Fatima was either in NWFP or in Punjab.

As Pakistan has four provinces and NWFP is one of them. Thus by Venn diagram



By, Venn diagram and given statement, clearly Fatima was born in NWFP. So she did not have any concern with Punjab. Therefore, this argument is invalid because choice A is not relevant to the given statement. Choice B indicates that some people born in NWFP are citizen of Pakistan. This statement may also be rejected because people who was born in Pakistan may also be the citizen of any other country. In the same way, you can reject the choice "C" which says that everyone born in Pakistan is a citizen of Pakistan. The choice "D" is also not relevant to the given statement. The only cue word in the given statement is citizen. Because, any person born in Pakistan may also be the citizen of any other country, so Fatima may be the citizen of any country. Since, Fatima is a citizen either of Pakistan or of any other country. So, this argument is relevant to the given statement, so, you must choose choice (E).

Now, we prove the given problem, logically

Let p be the statement "Fatima was born in NWFP."
Let q be the statement "She is a citizen of Pakistan."
And let r be the statement "Fatima is a citizen of any other country." Then we construct the following truth table:

p	q	r	$p \rightarrow q$	$q \vee r$
T	T	F	T	T
F	T	F	T	T
F	F	T	T	T

Clearly, column IV and V are equal. So correct choice is choice E.

Q2. (E) In choice A, the argument supposed that, since Asif has refused to work hard for the exam, so he is a dull student. This pre-supposition is questionable, since any intelligent person may shrink to work hard in the exam preparation. So, you can reject this option. The argument in choice B is invalid because choice B is not relevant to the given statement. Take a look at the given statements, you will see that there are two statements which are under consideration.

1. Asif has refused to work hard for the exam preparation.
2. No, more pocket money from his father should be provided to him.

The argument in choice C is invalid because choice C is not relevant to the above two statements. Choice D says that "Asif like expensive coloured books" which is not relevant to the given statement. Choice E provides a reason that Asif is a greedy boy and demands more money from his father. Now we can complete a reasonable argument Asif has refused to work hard for the exam preparation, because Asif is a greedy boy and demanded more money from his father, therefore, no more money from his father should be provided to him. Hence, best answer is choice E.

Q3. (C) The question requires you to identify which of the choice is most seriously weaken in the argument given in the argument. Choice A specifies that since pilots are more trained than car drivers are, therefore, about 80% of plane accidents result in death of all passengers. This is a weaken statement since if pilots are trained then travelling by planes is safer than cars. Choice B indicates that the speed of car is lesser than that of planes. It is also weaken statement because, speed can cause of more accidents in case of more traffic, but there is no more traffic faced by planes as compared with cars. Choice C specifies that car accidents is several thousand times higher than the number of plane accident. If this conclusion is accepted then the passengers should be avoided to travel by car. Which is contradiction to the given paragraph. Hence, choice C is the seriously weaken in the argument given above. Choice "D" is not weaken enough since cars carries less number of passenger so the number of death rate is less as compared with planes. Choice "E" also have not related with the given argument. From above discussion, we see that choice C is most seriously weaken in the argument given above. Hence, best answer is choice C.

Q4. (D) The argument in the given passage tells that a certain action contravenes a law, but it presents an excuse for the action by presupposing that someone will inevitably break this law. Only choice D shares all these features and is thus the best answer.

In choice A, an excuse is presented for contravening a stated policy. However, unlike in the passage and choice D, there is no presupposition that the policy will inevitably be contravened. Similarly, choices B and E report that illegal activities have occurred, without presupposing that they inevitably will. Choice C describes a case being one to which the law that is stated is inapplicable.

Q5. (D) The new office smoking regulations allow some employees—those with enclosed offices—but not others the opportunity to smoke at their desks.

Let us assume that the regulations should allow all employees equal opportunity to smoke, those who are currently denied this opportunity should be given it, and so secretaries who smoke should be offered enclosed offices. Therefore, choice D is the best answer.

None of other choices enables the conclusion to be properly drawn. Choice A tends to conflict with the conclusion, unless some enclosed offices are vacant. Choice B supports no conclusion about how secretaries should be treated, and choice C undermines the conclusion. Finally, non-smokers already have equal protection from hazards, so choice E cannot be used to justify making any changes.

Q6. (B) If we want to shift the blame for the reduction in the annual rate of growth of sales

output from Asim's new regime, we must find another reason for the lack of sales. Choices (B) gives us with this alternative, thus weakening the conclusion in the paragraph. Therefore, choice (B) is the appropriate answer. Although, according to choice (C), a cost is incurred in providing depreciation on the new plan and machinery but this does not affect the conclusion drawn. Statement given in the choice (E) is a simple policy statement, or rather lack of policy — that is, that there is no strict relationship between sales price and cost of production.

(D) If argument "A" is true then Hamza should not drive any vehicle, but in the given statement it has mentioned that Hamza is a terrible driver. Neither B nor C clearly relevant to the given statement. Since, there is no any information about Hamza's traffic violation so we cannot conclude any reason from the given arguments. So, you must mark choice D.

8. (E) The incomplete passage calls for an explanation of personal advancement, which produce selfishness evil in our society. Actually, the writer wants to say that although "Selfishness is a principal evil caused by personal advancement in our society but there are many people in our society who help others without any personal advancement and selfishness." Choice E, which states in many occasions we feel happiness and graciously to offer our assistance. So, best choice is choice E.

9. (A) The strong contradiction of the author's attitude in the given paragraph is that the greatest strength of society is altruism. So, best answer is choice A.

10. (C) The given passage concludes that:
People buy books.
They do not read.
o prove the writer's argument in the given paragraph, an example has been given. According to this:
17% of college students in Pakistan have textbooks.
Only 45% of 17% read more than once a week.
17% of 17% read more than once a week.
re, first of all we analyze the above example and then compare it with the given arguments.
the total number of college students be 100. Then,

of students those have textbooks $= \frac{17}{100} \times 100 = 17$

of students those not have textbooks $= 100 - 17$
$= 83$

, no. of students those read books once a week= 45% of 17
$= \frac{45}{100} \times 17$
$= 8$

nd, no. of students those read books more than once a week
$= 17\%$ of 17
$= 3$

rom above supposition, we find that out of 100 college students, only 17 have textbook in which 8 students read once a week and 3 more than once a week. In the given example, we conclude that in Pakistan college students have not interest in their textbooks. But, if we compare it with the argument given in the beginning of the paragraph, that is, "Many people do not read the books they purchase", we find that in case of Pakistan students this argument is true. Now the question is, why the other people purchase the books and do not read it? Take first argument in choice A, according to this argument. Readers often exaggerate about their book reading. If we accept this argument, then the people should not purchase books.. So, this option is not acceptable. Choice B which states that the sale of novels is more than that of other types, is also not acceptable because in case of increase in sale of novels show the reader's interest in reading books. Choice D states that regular books readers are most susceptible to eye disease, if this choice is accepted then people should not purchase books. Similarly, if choice E is accepted then people should read books regularly. From above discussion, we find that:

1. People purchase books.
2. They do not have any interest in reading.

Therefore, we can infer that many people buy books to pretend themselves as a scholar. Thus the best answer is choice C.

Q11. (E) This choice is related most fully to the subject-matter of the original statement.

Q12. (A) Truman's statement is not warranted unless one assumes the United States capability of dominate the world, that assumed capability makes the choice between serving and dominating possible and is thus a basic assumption.

Q13. (E) The researcher concluded that women could be just as capable as men in math but that they develop other abilities because of social pressures. Thus, the researcher assumes that women do conform to social expectations.

Q14. (B) This choice is related most fully to the subject-matter of the original statement.

Q15. (A) Bacon advocates retaining dignity without intruding upon liberty. The author implies that retaining dignity is impossible without intruding upon another's liberty by stating that not intruding upon liberty is impossible (B), (C), and (D) contradict the author's argument, and (E) presents an irrelevant issue.

Q16. (E) I and II only. The author both relies on an interpretation of Bacon's statement and discussed liberty and dignity in absolute terms; I and II subvert such reliance. III supports, reiterates in fact, the author's argument.

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SUBJECT WISE MATTER
CHEMISTRY

BASIC CONCEPTS

1. *The branch of science dealing with structure, composition and changes in matter and laws and principles which govern these changes is called as:*
   a) Chemistry b) Geology
   c) Physics d) Mechanics

2. *Smallest particle of an element which may or may not have independent existence is known as:*
   a) A molecule b) An ion
   c) An atom d) An electron

3. *Matter is defined as anything which occupies space and:*
   a) Molecules b) Mass
   c) Compounds d) Chemicals

4. *The number of atoms present in a molecule determines its:*
   a) Molecularity b) Atomicity
   c) Basicity d) Acidity

5. *When an electron is added to a unipositive ion we get:*
   a) Cation b) Molecule
   c) Neutral atom d) Anion

6. *CO^+ is an example of:*
   a) Stable molecule b) Anionic molecule ion
   c) Cationic molecular ion d) Free radical

7. *The diameter of atoms is of the order:*
   a) 2×10^{-5} m b) 2×10^{-10} m
   c) 2×10^{-2} m d) 2×10^{-3} m

8. *Swedish chemist J. Berzelius determined:*
   a) Atomic density b) Atomic number
   c) Atomic mass d) Atomic volume

9. *Covalent compounds mostly exist in the form of:*
   a) Protons b) Atoms
   c) Neutrons d) Molecules

10. *Atoms and molecules can either gain or lose electrons, forming charged particles called:*
    a) Positrons b) Photons
    c) Ions d) Electrons

11. *Metals tend to lose electrons, becoming:*
    a) Positively charged ions b) Non-metals
    c) Negatively charged ions d) All of above

12. *Non-metals tend to gain electrons, becoming:*
    a) Metals b) Positively charged ions
    c) Negatively charged ions d) (a) and (c)

13. *First atomic theory was put forward by an English school teacher:*
    a) Maxwell b) Newton
    c) Sanger d) John Dalton

14. *Determination of atomic masses and invention of system of writing symbols was made by:*
    a) J. Berzelius b) Democritus
    c) Dalton d) none of above

15. *Atoms can be evident by the use of electron microscope, field ionization microscope and:*
    a) x-rays b) Video camera
    c) Telescope d) Compound microscope

16. *The number of subatomic particles in atoms so far discovered is more than:*
    a) 110 b) 100
    c) 125 d) 90

17. *$C_6H_{12}O_6$ and $C_{12}H_{22}O_{11}$ are:*
    a) Mono-atomic molecules
    b) Diatomic molecules
    c) Poly-atomic molecules
    d) Hetero-atomic molecules

18. *Cl_2, N_2 and O_2 are:*
    a) Diatomic molecules
    b) Hetero-atomic molecules
    c) Poly-atomic molecules
    d) Mono-atomic molecules

19. *He, Ar and Ne are:*
    a) Mono-atomic molecules
    b) Hetero-atomic molecules
    c) Poly-atomic molecules
    d) Diatomic molecules

20. *NH_3, HCl, H_2O, HI are:*
    a) Diatomic molecules
    b) Poly-atomic molecules
    c) Mono-atomic molecules
    d) Hetero-atomic molecules

21. *Haemoglobin contains nearly:*
    a) 10,000 atoms b) 100 atoms
    c) 1000 atoms d) 1 atom

22. *Haemoglobin is 68000 times heavier than:*

a) Oxygen atom b) Nitrogen atom
c) Carbon atom d) Hydrogen atom

23. ***Molecules of high molecular weight usually greater than 10,000 are called:***
a) Macromolecules b) Mega molecules
c) Polymolecules d) Gega molecules

24. ***In molecules kinetic and potential energies are:***
a) Definite b) Moderate
c) Indefinite d) None of above

25. ***Which statement about an atom is true?***
a) The number of neutrons is not equal to the number of electrons.
b) Mass number is less than atomic number.
c) All the elements have only one mass number.
d) Mass number can be equal to the atomic number.

26. ***Which statement about a molecule is incorrect?***
a) Molecules of a substance are similar.
b) Haemoglobin is a homo atomic molecules.
c) Oxygen molecule is a macromolecule.
d) It exists independently.

27. ***A species having positive or negative charge is called:***
a) Electron b) Ion
c) Proton d) Atom

28. ***An ion bearing positive charge is called:***
a) Cation b) Positron
c) Anion d) None of the above

29. ***An ion having negative charge is called:***
a) Anion b) Photon
c) Electron d) Cation

30. ***Formation of a cation is:***
a) Exothermic process b) Non-endothermic process
c) Endothermic process d) None of the above

31. ***Anions are larger than their:***
a) Parent molecules b) Parent atoms
c) Present electrons d) None of above

32. ***Any molecular species having positive charge is called:***
a) Molecular ion b) Atomic ion
c) Micro ion d) Macro ion

33. ***Molecular ions are formed in an instrument called:***
a) Mass thermometer b) Thermocycler
c) Mass spectrophotometer d) Galvanometer

34. ***The mass of a molecular ion can be calculated from its:***
a) c/m ratio b) M/e ratio
c) e/m ratio d) M/c ratio

35. ***The mass of one atom of an element compared with the mass of an atom of carbon taken as 12 is called:***
a) Relative molecular mass
b) Atomic mass
c) Molecular mass
d) Relative atomic mass

36. ***Due to stability and abundance of carbon compounds carbon is taken as:***
a) Element b) Superior
c) Standard d) Substance

37. ***The masses of the atoms are extremely:***
a) Large b) Comparable
c) Small d) Alike

38. ***Relative atomic mass of O is:***
a) 1.00794 a.m.u b) 15.9994 a.m.u
c) 35.453 a.m.u d) 17.674 a.m.u

39. ***Isotopes are sister atoms of same element with similar chemical properties but different:***
a) Atomic structure b) Atomic volume
c) Atomic mass d) Atomic number

40. ***Isotopes of an element are recorded separately in:***
a) Mass spectrometer b) Mass spectrophotometer
c) Calorimeter d) Mass meter

ANSWERS

1.	a	2.	c	3.	b	4.	b
5.	c	6.	c	7.	b	8.	c
9.	d	10.	c	11.	a	12.	c
13.	d	14.	a	15.	a	16.	b
17.	c	18.	a	19.	a	20.	d
21.	a	22.	d	23.	a	24.	a
25.	d	26.	b	27.	b	28.	a
29.	a	30.	c	31.	b	32.	a
33.	c	34.	b	35.	d	36.	c
37.	c	38.	b	39.	c	40.	a

EXPERIMENTAL TECHNIQUES IN CHEMISTRY

1. ***Analytical chemistry is the science of:***
a) Chemical characterization
b) Physical characterization

c) Biological characterization
d) Biochemical characterization

2. ***A complete chemical characterization of a compound must include:***
a) Qualitative analysis b) Chemical analysis
c) Quantitative analysis d) Both (a) and (c)

3. ***Estimation of Na in sea water is an example of:***
a) Numerical analysis b) Qualitative analysis
c) Quantitative analysis d) None of above

4. ***Identification of a substance, determination of its structure and quantitative analysis of its composition are the aspects covered by:***
a) Modern analytical physics
b) Mechanical chemistry
c) Biochemistry
d) Modern analytical chemistry

5. ***The detection of functional group is called:***
a) Numerical analysis b) Qualitative analysis
c) Combustion analysis d) Quantitative analysis

6. ***The sample being analyzed is called:***
a) Electrolyte b) Substance
c) Analyte d) All of above

7. ***The solid remained on filter paper during filtration is called the:***
a) Substance b) Residue
c) Undue d) Filtrate

8. ***The filtration process is used to separate solid from:***
a) Liquid b) Gas
c) Solid d) All of above

9. ***The tip of funnel should be 1 or 2cm larger than the circle of the:***
a) Beaker b) Solid
c) Filter paper d) Liquid

10. ***The tip of the funnel should touch the side of the beaker in order to avoid:***
a) Splashing b) Leakage
c) Mixing d) Contamination

11. ***Selection of filter paper depends upon sizes of particles to be:***
a) Tested b) Filtered
c) Checked d) All of above

12. ***The liquid obtained after passing the mixture through filter paper is termed as:***
a) Extract b) Residue
c) Filtrate d) Sample

13. ***The apex angle of the folded filter paper is slightly greater than:***
a) 60° b) 30°
c) 45° d) 90°

14. ***Without proper suction, filtration is:***
a) Rapid process b) Fague process
c) Slow process d) Useless process

15. ***Fluted filter paper is used to:***
a) Decrease rate of filtration
b) Increase rate of filtration
c) Maintain rate of filtration
d) None of above

16. ***Gooch crucible is made of:***
a) Brass b) Porcelain
c) Bronze d) Gold

17. ***The reagents like $KMnO_4$ and HCl cannot be filtered through Gooch crucible if its base is covered with:***
a) Butterfly paper b) Ordinary paper
c) Flying paper d) Filter paper

18. ***Sintered glass is a porous material used for:***
a) Absorption b) Decoration
c) Filtration d) All of above

19. ***A suitable solvent should dissolve maximum amount of solute at its boiling point and minimum amount at:***
a) Freezing point b) Room temperature
c) Boiling point d) Sea level temperature

20. ***95% ethanol is called:***
a) Rectified ether b) Diesel
c) Rectified spirit d) Petrol

21. ***The solution left after the formation of crystals is called:***
a) Residue b) Filtrate
c) Mother liquor d) None of these

22. ***Which one of the following substances is not used as drying agent in desiccators***
a) Silica gel b) $CaCl_2$
c) Phosphorous pentaoxide d) NaCl (50%)

23. ***Which one of the following substances is used as decolourizing agent***
a) Asbestos b) Animal charcoal
c) conc. H_2SO_4 d) Silica gel

24. ***Direct conversion of solid into vapours is called:***
a) Crystallization b) Sublimation
c) Obligation d) Vapourization

25. ***Naphthalene, iodine and NH_4 can:***
a) Sublime b) Both (a) & (c)
c) Crystallize d) None of above

26. ***In a better method, the process of sublimation is carried out in a:***
a) Hot finger b) Normal finger
c) Cold finger d) Small finger

27. ***Which of the following substances is not sublime material?***
a) Potash alum b) Ammonium chloride
c) Benzoic acid d) Iodine

28. ***Which of the following method is used to obtain iodine present in the water***
a) Sublimation b) Chromatography
c) Solvent extraction d) Filtration

29. ***Solvent extraction method is a particularly useful technique for separation when the product to be separated is:***
a) Volatile and thermally unstable
b) Volatile and thermally stable
c) Non-volatile and thermally unstable
d) Non-volatile and thermally stable

30. ***Solvent extraction is an unstable, Process and it is controlled by:***
a) The amount of solute
b) Distribution law
c) The amount of solvent used
d) Law of mass action

31. ***The most common laboratory example of solvent extraction is:***
a) Alcohol extraction b) Petrol extraction
c) Phenol extraction d) Ether extraction

32. ***The other name for distribution law is:***
a) Dispersive law b) Partition law
c) Separation law d) Avogadro's law

33. ***In CCl_4 solvent I_3 shows:***
a) Blue colour b) Brown colour
c) Purple colour d) Pink colour

34. ***The comparative rates at which solutes move in paper chromatography depend on:***
a) Size of the chromatographic tank
b) Temperature of the experiment
c) R_f value of the solute
d) The size of paper used

35. ***To help diagnose, illness, doctors often need to know which amino acids are present in urine or blood, which method is commonly used to separate and identify amino acids:***
a) Distillation b) Filtration
c) Chromatography d) Sublimation

36. ***The components of which mixture can be separated by chromatography:***
a) Blue and red inks b) NaCl and $CaCl_2$
c) Sand and naphthalene d) I_2 and water

37. ***In chromatography, the point at which solvent maximum rises called:***
a) Solvent front b) Base line
c) Element d) Chromatogram

38. ***Chromatography involves the distribution of a solute between:***
a) Two stationary and two mobile phases.
b) A stationary and a mobile phase
c) Two mobile phases
d) Two stationary phases

39. ***Chromatography in which stationary phase is a liquid is called:***
a) Adsorption chromatography
b) Column chromatography
c) Descending chromatography
d) Partition chromatography

40. ***Chromatography in which stationary phase is a solid is called:***
a) High Pressure liquid chromatography (HPLC)
b) Paper chromatography
c) Partition chromatography
d) Adsorption chromatography

ANSWERS

1.	a	2.	d	3.	c	4.	d
5.	b	6.	c	7.	b	8.	a
9.	c	10.	a	11.	b	12.	c
13.	a	14.	c	15.	b	16.	b
17.	d	18.	c	19.	b	20.	c
21.	c	22.	d	23.	b	24.	c
25.	a	26.	c	27.	a	28.	c
29.	a	30.	b	31.	d	32.	b
33.	c	34.	c	35.	c	36.	a
37.	a	38.	b	39.	d	40.	d

GASES

1. ***Which of the following is the simplest form of matter?***
a) Gaseous state b) Liquid state
c) Solid state d) All of above

2. ***Which statement about gases is not correct?***
a) They spread throughout the vessel.
b) Pressure is due to collision.
c) There are larger spaces between the molecules.
d) Molecules are arranged regularly.

3. ***The movement of gas molecules from a region of high pressure to vacuum is called:***
   a) Evaporation b) Effusion
   c) Conduction d) Diffusion

4. ***All gases can be compressed by:***
   a) Keeping constant pressure
   b) Decreasing pressure
   c) Increasing pressure
   d) None of the above

5. ***Gases exert pressure on walls of container because the gas molecules:***
   a) Obey gas laws.
   b) Have definite volume.
   c) Collide with the walls of container.
   d) Collide with each other.

6. ***Gases of air, always remain in random motion and do not settle due to:***
   a) Difference in molecular masses of air gases.
   b) Difference in partial pressure of gas molecules.
   c) Unequal number of different gas molecules.
   d) Elastic collision of gas molecules.

7. ***The rate of diffusion of a gas is:***
   a) Inversely proportional to its density
   b) Inversely proportional to square root of its molecular mass
   c) Directly proportional to molecular mass
   d) Directly proportional to its density

8. ***In gases and liquids, temperature is the measure of:***
   a) Average translational kinetic energies of molecules.
   b) Average vibrational kinetic energies of molecules.
   c) Average rotational kinetic energies of molecules.
   d) None of above.

9. ***In solids, the temperature is the measure of:***
   a) Rotational kinetic energies
   b) Translational kinetic energies
   c) Vibrational kinetic energies
   d) None of above

10. ***Cooling happens under the Joule Thomson Effect due to sudden:***
   a) Contraction b) Absorption
   c) Expansion d) All of above

11. ***Gases show uniform behaviour towards their:***
   a) Internal conditions b) External conditions
   c) Internal and external d) None of above conditions

12. ***Liquids are less common than:***
   a) Solids b) Plasmas
   c) Gases d) All of above

13. ***The intramolecular forces in gases are:***
   a) Weak b) Normal
   c) Very weak d) Strong

14. ***The relationships between volume of a given amount of gas and the prevailing conditions of temperature and pressure are:***
   a) Charle's law b) Graham's law
   c) Boyle's law d) Gas laws

15. ***In Boyle's law which of the following pair remains constant:***
   a) Temperature and quality of a gas.
   b) Pressure and quality of a gas.
   c) Temperature and pressure.
   d) Temperature and quantity of a gas.

16. ***In Boyle's law which of the following pair is variable:***
   a) Temperature and quantity of a gas.
   b) Pressure and Volume
   c) Volume and quantity of a gas.
   d) Pressure and quantity of a gas.

17. ***For a gas obeying Boyle's law if pressure is doubled, the volume becomes:***
   a) Remains constant b) Double
   c) One half d) None of above

18. ***Boyle's law is represented as:***
   a) $P \propto 1/T$ b) $V \propto 1/P$
   c) $V \propto P$ d) $P \propto 1/V$

19. ***According to Boyle's law, which parameters give a straight line parallel to x-axis, when we plot a graph between:***
   a) V and T b) P and V
   c) P and 1/V d) P and PV

20. ***Boyle's law does not fail even:***
   a) Temperature is extremely high.
   b) Pressure is extremely high.
   c) Mixture of gases is taken.
   d) All of above

21. ***A graph between P and 1/V at constant temperature and number of moles of a gas meets the:***
   a) y-axis b) x-axis
   c) origin d) none of above

22. ***A graph between P and PV at constant temperature and number of moles is parallel to:***
   a) y-axis b) z-axis
   c) x-axis d) pressure axis

23. ***The product of pressure and volume remains constant when temperature and quantity of***

gas is:
a) Zero b) Variable
c) Kept constant d) None of above

24. *The ratio of volume to temperature on Kelvin scale is constant according to:*
a) Charle's law b) Newton's law
c) Coulomb's law d) Boyle's law

25. *The graph between pressure and volume at constant temperature for a gas is:*
a) Isobaric b) Isothermal
c) Isotherm d) None of above

26. *The density of a gas is directly proportional to pressure, inversely proportional to temperature and directly proportional to:*
a) Viscosity b) Molar mass
c) Momentum d) All of above

27. *If absolute temperature of a gas is doubled and the pressure is reduced to one half, the volume of the gas will be:*
a) Remain unchanged b) Doubled
c) Reduced d) Increased four times

28. *Absolute temperature of a gas is proportional to:*
a) Rotational Kinetic energy
b) Translational Kinetic energy
c) Vibrational Kinetic energy
d) Potential energy

29. *The highest temperature at which a substance can exist as a liquid is called its:*
a) Critical temperature b) Zero temperature
c) Absolute temperature d) None of above

30. *Keeping the temperature constant, if the gas is expanded:*
a) Kinetic energy of molecules will increase.
b) Number of gas molecules increases.
c) Temperature will increase.
d) Pressure will decrease.

31. *At constant temperature when pressure of a gas is plotted against volume, the cure is:*
a) Slanting straight line
b) Parabolic
c) Straight line, parallel to pressure axis
d) Of neither type

32. *A gas is heated in such a way that its volume and absolute temperature both are doubled. The pressure of the gas:*
a) Becomes 4 times b) Becomes half
c) Becomes 2 times d) Remains same

33. *If the number of gas molecules are doubled in a certain volume the pressure is:*
a) Increased to four times
b) Remains unchanged
c) Doubled
d) Decreased to half

34. *At same temperature which substance has high kinetic energy:*
a) Liquid water
b) N_2 gas in a container
c) Solid piece of iron
d) Solution of alcohol and water

35. *Which one of the following gases has lowest density at room temperature?*
a) NH_3 b) Ne
c) N_2 d) CO

36. *Which one of the following values of R gas constant is not correct?*
a) 1.987 cal K^{-1} mol^{-1}
b) 8.313 Nm K^{-1} mol^{-1}
c) 62400 dm^3 atm K^{-1} mol^{-1}
d) 0.0821 atm dm^3 K^{-1} $mole^{-1}$

37. *Which of the following equations is for ideal gas?*
a) PV = dRT b) PR = nTP
c) PM = nRT d) PV = nRT

38. *If R, T, M, V and P are gas constant, temperature, molar mass, volume and pressure then density is given by:*
a) M/V b) RT/M
c) PM/RT d) V/M

39. *General gas equation can be derived by combining:*
a) Maxwell's law, Coulomb's law and Avogadro's law.
b) Boyle's law, coulomb's law and Charles law.
c) Boyle's law, Maxwell's law and Avogadro's law.
d) Boyle's law, Charlie's law and Avogadro's law.

40. *The value of general gas constant R is derived from:*
a) Newton's Cooling law b) Maxwell's law
c) Avogadro's law d) Charle's law

ANSWERS

1.	a	2.	d	3.	b	4.	c
5.	c	6.	d	7.	b	8.	a
9.	c	10.	c	11.	b	12.	d
13.	c	14.	d	15.	d	16.	b

17.	c	18.	b	19.	d	20.	c
21.	c	22.	d	23.	c	24.	a
25.	c	26.	b	27.	d	28.	b
29.	a	30.	d	31.	b	32.	d
33.	c	34.	b	35.	a	36.	c
37.	d	38.	c	39.	d	40.	c

LIQUIDS & SOLIDS

1. ***Chloroform and acetone are soluble in each other due to:***
   a) Instantaneous dipole interactions.
   b) Dipole-dipole interactions.
   c) Intermolecular hydrogen bonding.
   d) All of above

2. ***Force of attraction between atoms of He is:***
   a) London dispersion forces
   b) Hydrogen bonding
   c) Coordinate covalent bond
   d) Covalent bond

3. ***The only forces are London dispersion forces among the:***
   a) Atoms of He in gaseous state at high temperature.
   b) Molecules of water in liquid state.
   c) Molecules of solid I_2.
   d) Molecular of hydrochloric acid gas

4. ***The density of water decreases, when it is freezed at 0°C because of:***
   a) Change of bond lengths.
   b) Change of bond angles.
   c) Cubic structure of ice.
   d) Empty spaces present in the structure of ice.

5. ***Which one of the following is the weakest intermolecular force:***
   a) Dipole induced dipole forces
   b) Ionic dipole forces
   c) Electrostatic forces between ions
   d) Dipole-dipole forces

6. ***The gases can be converted into liquids by:***
   a) Increasing the pressure only.
   b) Lowering temperature and increasing pressure.
   c) Increasing pressure and bringing temperature below critical point.
   d) Lowering temperature only.

7. ***The intermolecular forces in liquids are:***
   a) Negligible b) Very weak
   c) Very strong d) Reasonably strong

8. ***London dispersion forces are also called:***
   a) Hydrogen bonding
   b) Debye forces
   c) Van der Waal's forces
   d) Instantaneous dipole-induced dipole forces.

9. ***In a group on going downward, polarizability generally:***
   a) Decreases b) Increases
   c) Remains constant d) Negligible

10. ***Hydrocarbon molecules with large chain lengths experience:***
    a) Weaker attractive forces
    b) Stronger attractive forces
    c) Repulsive forces
    d) No attractive forces

11. ***HF has exceptionally low acidic strength due to:***
    a) Smaller size of fluorine.
    b) Strong polar bond between H and F.
    c) Electronegativity of fluorine.
    d) Strong hydrogen bonding.

12. ***Polypeptide chains are coiled about one another into a spiral by:***
    a) Ionic bonds b) Covalent bonds
    c) Van der Waal's forces d) Hydrogen bonds

13. ***The strongest forces are:***
    a) Debye forces
    b) London dispersion forces
    c) Dipole-dipole attraction
    d) Hydrogen bonding

14. ***Debye forces are present in one of the following pairs:***
    a) Na^+ ion and water b) Argon and water
    c) Argon and Na^+ ion d) Ne and Water

15. ***Hydrogen bonding is present between the molecules of:***
    a) NH_3 b) H_2O
    c) HF d) All of above

16. ***H_2S is a gas while H_2O is liquid at room temperature. It is due to:***
    a) Less intermolecular forces in water.
    b) Covalent bond in H–O in water molecules.
    c) Hydrogen bonding in water molecules.
    d) Ionic characters in water molecules.

17. ***Evaporation of water is possible at:***
    a) Above 100°C b) 0°
    c) 100° d) At temperatures

18. ***Rate of evaporation and rate of condensation at equilibrium:***

a) Become very low b) Become very high
c) Become equal d) Can never be equal

19. ***At sea level and at 100°C the vapour pressure of water in an open system is:***
a) 1000 mm Hg b) 760 mm Hg
c) 730 mm Hg d) 670 mm Hg

20. ***A liquid on evaporation causes:***
a) Heating effect b) Cooling effect
c) Suffocation d) All of above

21. ***Escape of high energy molecules from the surface of a liquid is called:***
a) Sublimation b) Distillation
c) Condensation d) Evaporation

22. ***Which of the following liquids has low vapour pressure at 25°C:***
a) Diethyl ether b) Acetone
c) Water d) Ethyl alcohol

23. ***The boiling point of NH_3 is maximum among the hydrides of group V elements due to:***
a) Enhanced electronegative character of Nitrogen.
b) Pyramidal structure of NH_3.
c) Very small size of Nitrogen.
d) Enhanced electropositive character of Nitrogen.

24. ***Heat of vapourization for liquids with strong dipole-dipole forces will have:***
a) Negligible values b) Reasonably high values
c) Very high values d) Very low values

25. ***Trend of boiling point of halogens from fluorine to iodine is that it:***
a) Decreases b) Is negligible
c) Increases d) Remains constant

26. ***Liquids have low boiling point provided:***
a) Very high vapour pressure.
b) Very low vapour pressure.
c) Low vapour pressure at given temperature
d) High vapour pressure at given temperature.

27. ***Molar heat of vapourization of water is:***
a) 40.6 KJ/mole b) 140.6 KJ/mole
c) 14.06 KJ/mole d) 18 KJ/mole

28. ***Boiling point for water under 23.7 torr external pressure is:***
a) 25°C b) 98°C
c) 200°C d) 100°C

29. ***Water may boil at 120°C when external pressure is:***
a) 700 mm Hg b) 1489 mm Hg
c) 100 mm Hg d) 760 mm Hg

30. ***Boiling point of a liquid will be:***
a) Same as at sea level and high altitudes.
b) Higher at high altitudes.
c) Equal to atmospheric pressure.
d) Lower at high altitudes.

31. ***Cooking time reduces in a pressure cooker because:***
a) Boiling point of water rises.
b) A large flame is used.
c) Vapour pressure of liquid reduces.
d) That is uniformly distributed.

32. ***Boiling Point of a liquid is high when:***
a) Hydrogen bonding is present.
b) Hydrogen bonding is absent.
c) Dipole moment is zero.
d) Intermolecular forces are weak.

33. ***Boiling point of a liquid depends upon:***
a) Type of burner used for boiling
b) External pressure
c) Amount of liquid
d) Shape of container of the liquid

34. ***In the industrial purification of glycerine, its boiling point is reduced from 290°C to 120°C by:***
a) Slow heating of a liquid
b) Fast heating of a liquid
c) Decreasing external pressure
d) Increasing external pressure.

35. ***Many organic compounds and biological tissues behave as:***
a) Liquid crystals b) Ionic crystals
c) Solid crystals d) Amorphous structures

36. ***Which is not the use of liquid crystals?***
a) Skin thermography
b) Energy supply in electrical devices
c) Liquid crystal display
d) Temperature senses

37. ***Oscillographic and TV displays also use:***
a) Solid crystal screens b) Liquid crystal screens
c) Amorphous solid screens d) None of above

38. ***Amorphous solids are characterized by:***
a) Undergoing clean cleavage when cut with knife.
b) Having perfect arrangement of atoms.
c) Possessing small regions of orderly arrangement of atoms.
d) Having sharp melting point.

39. ***Which one of the following is pseudosolid?***
a) Glass b) NaCl
c) CaF_2 d) All of above

40. ***Hydrocarbons which generally have high molecular masses, exist in:***
a) Gaseous form b) Vapours from
c) Liquid form d) Solid form

ANSWERS

1.	c	2.	a	3.	c	4.	d
5.	a	6.	c	7.	d	8.	d
9.	b	10.	b	11.	d	12.	d
13.	d	14.	b	15.	d	16.	c
17.	d	18.	c	19.	b	20.	b
21.	d	22.	c	23.	a	24.	b
25.	c	26.	a	27.	a	28.	a
29.	b	30.	d	31.	a	32.	a
33.	b	34.	c	35.	a	36.	b
37.	b	38.	c	39.	a	40.	d

ATOMIC STRUCTURE

1. ***Neutron was discovered by:***
a) Chadwick b) Bohr
c) Rutherford d) Plank

2. ***The e/m value for positive rays is maximum for:***
a) Oxygen b) Nitrogen
c) Helium d) Hydrogen

3. ***The nature of positive rays depend on:***
a) Nature of discharge tube
b) Nature of resident gas
c) Nature of electrode
d) All of the above

4. ***Which of the following was discovered first:***
a) Charge to mass ratio of electrons
b) Mass of electron
c) Charge of electron
d) All of above at same time

5 ***Which of the following particles has longest wavelength, if they have same speed:***
a) Proton b) Neutron
c) Electron d) Positron

6. ***Maximum potential energy that an electron can have within the atom is:***
a) Equal to zero b) Less than zero
c) Greater than zero d) Infinite

7. ***Alpha rays consist of:***
a) Neutrons b) Helium nucleus
c) Protons d) Hydrogen nucleus

8. ***Charge to mass ratio of electron was discovered by:***
a) Millikan b) Rutherford
c) J. J. Thomson d) Chadwick

9. ***When an electric current is passed through discharge tube at low pressure, cathode rays are emitted from cathode these rays consist of:***
a) Alpha rays b) Negative particles
c) Electromagnetic rays d) Positive particles

10. ***Charge of an electron is:***
a) 1.6×10^{-19} C b) 9.1×10^{-34} C
c) 1.7588×10^{11} C d) 6.62×10^{-34} C

11. ***Mass of simple electron is:***
a) 9.1×10^{31} kg b) 9.1×10^{-30} kg
c) 1.66×10^{-31} kg d) 9.1×10^{-31} kg

12. ***The charge over mass ratio of electron is:***
a) 1.6×10^{-1} C Kg^{-1} b) 9.1×10^{-31} C
c) 1.7588×10^{11} C Kg d) 6.62×10^{-34} C Kg^{-1}

13. ***Charge on electron was discovered by:***
a) Millikan b) Crook
c) Neil Bohr d) Rutherford

14. ***Proton was discovered by:***
a) Chadwick b) J. J. Thomson
c) Millikan d) Goldstein

15. ***Which one of the following particles has a mass 1/1836 time, that of hydrogen?***
a) Neutron b) Proton
c) Electron d) Positron

16. ***Negatively charged particle nature of cathode rays was first demonstrated in 1895 by:***
a) Millikan b) J. Perrin
c) Hittrof d) J. J. Thomson

17. ***With the reference of e/m ratio of anode rays, the e/m ratio of cathode rays is:***
a) Greater b) Same
c) Smaller d) Not fixed

18. ***Which one of the following statements is true about discovery of neutrons?***
a) These particles were formed by the bombardment of α-particles on Beryllium.
b) These particles are formed by the splitting of α-particles.
c) These particles were discovered by natural radioactivity.
d) None of above

19. ***Anode is the surface on which probability of finding electron is:***
a) 50% b) Less than 10%
c) More than 95% d) Zero

20. ***The experimental evidences for the existence of atomic nucleus comes from:***

a) Line spectrum of hydrogen.
b) Magnetic bonding of cathode rays.
c) Millikan oil drop experiment.
d) Scattering of alpha particles by thin metal foil.

21. ***When alpha particles are bombarded over Be_4^9 atoms, neutrons are released along with:***
a) $_8O^{17}$ b) $_{13}Al^{27}$
c) $_6C^{12}$ d) $_{15}P^{30}$

22. ***The Rutherford experiment of using a stream of alpha particles on a piece of gold foil proved that:***
a) Atom had neutrons.
b) Atom had electrons.
c) Atom had a great empty space in it.
d) Atom was a solid sphere.

23. ***Which of the following observations was seen by Rutherford when alpha particles were bombarded over gold foil?***
a) Alpha particles were deflected over the angle of 90°.
b) Alpha particles were captured by the gold atoms.
c) Majority of alpha particles were deflected slightly from their path.
d) Majority of alpha particles passed through foil without deflection.

24. ***The mass of alpha particle is equal to:***
a) That of one electron.
b) That of one proton.
c) That of one hydrogen.
d) Four times the mass of one proton.

25. ***Rutherford's model of atoms failed because:***
a) It did not account for stability of the atom.
b) The atom did not have a nucleus and electrons.
c) It did not account for attraction between protons and neutrons.
d) There is actually no space between nucleus and the electrons.

26. ***Max Planck proposed quantum theory in:***
a) 1800 b) 1900
c) 2000 d) 1860

27. ***Quantum theory explained:***
a) Emission of radiations
b) Absorption of radiations
c) Both emission and absorption of radiations
d) None of above

28. ***According to Planck energy travels in a discontinuous manner and it is composed of large number of tiny discrete units called:***
a) Photons b) Planta
c) Quanta d) Particles

29. ***The value of Planck's constant 'h' is:***
a) 6.62×10^{-23} Joule second
b) 6.022×10^{-23} Joule second
c) 6.625×10^{-34} Joule second
d) 6.625×10^{-34} Joule

30. ***According to Planck, in case of light, the quantum of energy is often called:***
a) Quantum b) Deutron
c) Photon d) Proton

31. ***Wavelength is the distance between two adjacent crests or troughs and expressed in:***
a) A° b) A° or nm
c) Nm d) μm

32. ***Greater the wavelength associated with the photon:***
a) Greater is its energy.
b) Smaller is its energy.
c) Its energy will be variable.
d) Its energy will remain constant.

33. ***Energy of a photon is related to:***
a) Wave number b) Wavelength
c) Frequency d) All of above

34. ***Greater the wave number of photons:***
a) Greater is the energy associated with them.
b) Smaller is the energy associated with them.
c) Its energy will be variable.
d) Its energy will remain constant.

35. ***Splitting of spectral lines when atoms are subjected to strong electric field is called:***
a) Photoelectric effect b) Stark's effect
c) Compton's effect d) Zeeman's effects

36. ***The velocity of photon is:***
a) Dependent on its source.
b) Equal to square of its amplitude.
c) Dependent on its wavelength.
d) Independent of its wavelength.

37. ***Bohr's model of atom explains spectrum of:***
a) H like species only
b) H atom only
c) H and H like species
d) None of above

38. ***Transition from various energy levels to the lowest energy level gives:***
a) P-fund series b) Lyman series
c) Balmer series d) Paschen series

39. ***P-fund, Bracket and Paschen series lie in:***
a) Infrared region b) Ultra violet region
c) Visible region d) Microwave region

40. ***Balmer series lie in:***
a) Radio-wave region b) Visible region
c) Ultraviolet region d) Infrared region

ANSWERS

1.	a	2.	d	3.	b	4.	a
5.	c	6.	b	7.	b	8.	c

9.	b	10.	a	11.	d	12.	c
13.	a	14.	d	15.	c	16.	b
17.	a	18.	a	19.	d	20.	d
21.	c	22.	c	23.	d	24.	d
25.	c	26.	b	27.	c	28.	c
29.	c	30.	c	31.	b	32.	b
33.	d	34.	a	35.	b	36.	c
37.	c	38.	b	39.	a	40.	b

CHEMICAL BONDING

1. ***The force which holds together two or more atoms or ions to form a large variety of compounds is called:***
   a) A chemical bond b) An ionic bond
   c) A covalent bond d) A coordinate bond

2. ***The theory of chemical bonding has been a major problem of:***
   a) Modern Physics b) Modern Chemistry
   c) Modern Biology d) Mechanics

3. ***Chemical reactivity of elements depends upon their characteristic:***
   a) Shape b) Colour
   c) Electronic configurations d) Sizes

4. ***Which of the following elements is not stable:***
   a) Xe b) Ar
   c) Kr d) Li

5. ***Elements combine together due to inherent tendency to stabilize themselves by:***
   a) Losing electron b) Sharing electrons
   c) Gaining electrons d) All of above

6. ***Which of the following is a noble gas:***
   a) Ne b) Cl_2
   c) H_2 d) N_2

7. ***The tendency of atoms to attain a maximum of eight electrons in the valence shell is known as:***
   a) Duplet rule b) Triad rule
   c) Octet rule d) Tetrad rule

8. ***In the chemical combination of sodium and hydrogen to form NaH:***
   a) Hydrogen atom gains an electron
   b) Sodium atom gains an electron
   c) Both the atoms snare the electron
   d) None of above

9. ***In the chemical combination of hydrogen and fluorine to form HF:***
   a) Sodium atom donates major share of its electrons
   b) Hydrogen atom donates the major share of its electrons.
   c) Both the atoms share the electrons equally.
   d) None of above

10. ***Which of the following compound is not formed according to octet rule:***
   a) KrF_2 b) XeF_2
   c) XeO_3 d) SF_6

11. ***According to modern theory of chemical bonding, atoms form bonds as it leads to a:***
   a) Increase in energy b) No energy change
   c) Decrease in energy d) First decrease then increase in energy

12. ***When two hydrogen atoms approach each other:***
   a) Forces of attraction operate
   b) Forces of repulsion operate
   c) Forces of attraction and repulsion operate simultaneously
   d) Nothing happens

13. ***The bond length between atoms of hydrogen in the hydrogen molecules is:***
   a) 7.54 nm b) 0.0754 nm
   c) 0.754 nm d) 0.00754 nm

14. ***Which of the following has smaller size:***
   a) Fe^{+3} b) Fe^{+2}
   c) Fe^{+1} d) Fe

15. ***In a group of periodic table, atomic radii:***
   a) Remains some
   b) Increases
   c) First decreases then increases
   d) Decreases

16. ***In a period of periodic table, atomic radii:***
   a) Decreases b) Increases
   c) Remains same d) First decreases then increases

17. ***Which statement is true for Na and Na^+:***
   a) Size of Na is smaller than Na^+
   b) Size of Na is greater than Na^+
   c) Both have same properties
   d) Both have equal size

18. ***As the nuclear charge increases, the pull on the electrons is increased and size of an atom:***
   a) Decreases b) Remains same
   c) Increases d) Is negligible

19. ***The radius of the ion while considering it to be spherical in shape is called:***
   a) Covalent radii b) Atomic radii
   c) Ionic radii d) Both (a) and (c)

20. ***The decrease in radius is larger for:***
   a) Monovalent ions b) Trivalent ions
   c) Divalent ions d) Atoms

21. ***The increase in size of the anion is due to:***

a) Increase in electron-electron repulsion
b) Increase in valence shell electrons
c) Decrease in valence shell electrons
d) Both (a) and (b)

22. ***The covalent radius of Cl atom is:***
a) 99.4 pm b) 176.7 pm
c) 38 pm d) 76 pm

23. ***CsF is an ionic compound because:***
a) High I.P of Cs and high EA of F
b) High I.P of Cs and low EA of F
c) Low I.P of Cs and high EA of F
d) Low I.P of Cs and low EA of F

24. ***Molecular orbitals are filled with the available electrons according to:***
a) Hund's rule b) Pauli's exclusion principle
c) Aufbau principle d) All of above

25. ***An ionic compound will dissolve in water only if:***
a) Hydration energy is low and lattice energy is low.
b) Hydration energy is high and lattice energy is very high.
c) Hydration energy is high and lattice energy is low.
d) Hydration energy is low and lattice energy is high.

26. ***A chemical bond between two atoms having the difference of electronegativity 1.7 then which statement is correct:***
a) Zero ionic character
b) Bond is 50% ionic and 50% covalent.
c) Bond is 100% ionic.
d) Bond is 50% covalent.

27. ***Which of the following compound has ionic bond in it:***
a) NH_3 b) H_2O
c) HCl d) NaF

28. ***Which of the following is most electronegative element:***
a) Cl b) N
c) O d) F

29. ***The energy that is required to remove an electron from an atom is called:***
a) Heat of vaporization b) Ionization potential
c) Electronegativity d) Electron affinity

30. ***The tendency of bonded atom in a molecule to attract shared pair of electrons is called:***
a) Lattice energy b) Ionization potential
c) Electronegativity d) Electron affinity

31. ***Which of the following element has highest ionization potential:***
a) Rb b) K
c) Li d) Na

32. ***In what area of periodic table, would you expect the most electronegative element:***
a) Lower left b) Middle
c) Upper left d) Upper right

33. ***In a group of periodic table, ionization energy:***
a) Increases b) Decreases
c) Remains same d) First increases then decreases

34. ***The strongest bond is:***
a) C = C b) C – C
c) C ≡ C d) All are equally strong

35. ***Which of the following is not correct:***
a) Triple bond has greater bond energy than double bond.
b) Polar bond is greater than non-polar bond.
c) Sigma bond is stronger than pi bond.
d) Single bond is shorter than double bond.

36. ***In which of the following pairs, do the elements form a compound by sharing electrons:***
a) Potassium and bromine
b) Neon and oxygen
c) Lithium and iodine
d) Carbon and chlorine

37. ***Molecular orbital theory explains well:***
a) Bond order of molecules
b) Stability of molecules
c) Paramagnetic nature of molecules
d) All of above

38. ***The expected geometrical shape of molecules which have sp^3 hybridization is:***
a) Tetrahedral b) Pyramidal
c) Trigonal planar d) Linear

39. ***Which of the following compounds have ionic, covalent and coordinate bond in it:***
a) H_2O b) KBr
c) NH_4Cl d) NH_3

40. ***Which of the following species has highest bond order:***
a) O_2^- b) O_2
c) O_2^{-2} d) O_2^+

ANSWERS

1.	a	2.	b	3.	c	4.	d
5.	d	6.	a	7.	c	8.	a
9.	b	10.	d	11.	c	12.	c
13.	b	14.	a	15.	b	16.	a

17.	b	18.	a	19.	c	20.	b
21.	d	22.	a	23.	c	24.	d
25.	c	26.	b	27.	d	28.	d
29.	b	30.	c	31.	c	32.	d
33.	b	34.	c	35.	d	36.	d
37.	d	38.	a	39.	c	40.	d

THERMOCHEMISTRY

1. ***The study of heat changes accompanying a chemical reaction is known as:***
   a) Thermochemistry b) Biochemistry
   c) Physical chemistry d) Analytical chemistry

2. ***If an endothermic reaction is allowed to take place very rapidly in air, the temperature of the surrounding air:***
   a) Remains constant b) Decreases
   c) Increases d) Fluctuates rapidly

3. ***In endothermic reactions, the heat contents of the:***
   a) Products equal to the reactants .
   b) Reactants more than that of products.
   c) Products more than that of reactants.
   d) Both (b) and (c)

4. ***The majority of reactions which give stable products are:***
   a) Exothermic b) Isothermal
   c) Endothermic d) Both (a) and (c)

5. ***It is noticed that energy in the form of heat is either evolved or absorbed as a result of a:***
   a) Physical change b) Chemical change
   c) Biological change d) All of above

6. ***In a chemical change, the energy in the form of heat will either be evolved or absorbed and this is called:***
   a) Endothermic reaction b) Heat of products
   c) Exothermic reaction d) Heat of reaction

7. ***The energy units in which heat changes usually expressed in SI-system are:***
   a) Joule b) Calorie
   c) Kilo Joule d) Both (a) and (c)

8. ***The subject matter of first law of thermochemistry is based on:***
   a) First law of Thermochemistry
   b) First law of Thermodynamics
   c) Second law of Thermochemistry
   d) Second law of Thermodynamics

9. ***A process which takes place on its own without any outside assistance and moves from a non-equilibrium state towards an equilibrium state is termed as:***
   a) Spontaneous process b) Natural process
   c) Non-spontaneous process d) Both (a) and (b)

10. ***Which one of the following is not related to spontaneous process***
    a) Unidirectional b) Real
    c) Irreversible d) Artificial

11. ***Neutralization of a strong acid with a strong base is:***
    a) Natural acid base reaction
    b) Artificial acid base reaction
    c) Spontaneous acid base reaction
    d) Both (a) and (c)

12. ***When a piece of zinc is added to the copper sulphate solution, _____ colour of solution disappear.***
    a) Pink b) Purple
    c) Blue d) Brown

13. ***The reaction of Zinc with copper sulphate solution is an example of:***
    a) Oxidation reduction reaction
    b) Spontaneous reaction
    c) Spontaneous redox reaction
    d) Non-spontaneous reaction

14. ***A reaction will also be called a spontaneous if:***
    a) It does not need energy to start with.
    b) It needs energy to carry the whole process.
    c) It needs energy at the end of reaction.
    d) It needs energy to start with.

15. ***Burning of coal and hydrocarbon in air are examples of:***
    a) Non-spontaneous reaction
    b) Spontaneous reaction
    c) Natural reaction
    d) Both (b) and (c)

16. ***Some non-spontaneous processes can be made to take place by supplying energy to the system from:***
    a) Internal source b) Any source
    c) External source d) All of above

17. ***By state, we mean the:***
    a) Reaction of a system b) Scope of system
    c) Condition of a system d) None of above

18. ***When no work is done by the system:***
    a) The volume of system decreases.
    b) The volume of system increases.
    c) The volume of system does not change.

d) None of above

19. ***When a system absorbs energy, the sign of ΔE is:***
a) Neither positive nor negative
b) Negative
c) Positive
d) None of above

20. ***Work is a:***
a) State function b) Only function
c) Non-state function d) State function

21. ***The real or imaginary surface separating the system from the surroundings is called:***
a) Imaginary line b) Boundary
c) Real line d) All of above

22. ***One mole of oxygen confined in a cylinder fitted with a piston is an example of:***
a) Surroundings b) System and surrounding
c) System d) State function

23. ***Reaction between Zn and $CuSO_4$ can be called a system under:***
a) Surrounding b) Observation
c) System d) None of above

24. ***By comparing both initial and final states of the system, we can describe the change taking place in the:***
a) Surrounding b) Both (a) and (c)
c) System d) None of above

25. ***A state function is a:***
a) Microscopic property b) Macroscopic property
c) Unique property d) Both (a) and (c)

26. ***Which one of the following is not a state function?***
a) Heat b) Temperature
c) Pressure d) Volume

27. ***The kinetic energy is due to:***
a) Translational movements
b) Rotational movements
c) Vibration movements
d) All of above

28. ***Potential energy accounts for:***
a) All types of attractive forces present in system
b) Kinetic energy
c) Rotational energy
d) Vibrational energy

29. ***The total of all the possible kinds of energies of the system is called its:***
a) External energy b) Both (a) and (c)
c) Internal energy d) None of above

30. ***The change in internal energy of the system is a:***
a) State b) State function
c) Function d) None of above

31. ***Heat is:***
a) Not a property of the system
b) A property of a system
c) State function
d) None of above

32. ***Heat evolved or absorbed by the system is represented by a symbol:***
a) p b) q
c) h d) l

33. ***The SI unit of work is:***
a) Calorie b) Joules
c) Kilo Joule d) m^2

34. ***The kind of work most commonly encounter in chemistry is:***
a) Pressure volume work b) Home work
c) Ordinary work d) School work

35. ***Internal energy of the system is an:***
a) Extensive property b) Inclusive property
c) Exclusive property d) None of above

36. ***The increase in internal energy of a system can result in:***
a) Physical change b) Chemical change
c) Both (a) and (b) d) None of above

37. ***Heat evolved by a system is given:***
a) Negative sign b) Any sign
c) Positive sign d) Criss cross sign

38. ***Energy of universe remains constant. It is called:***
a) First law of Thermodynamics
b) Second law of Thermodynamics
c) First law of Thermochemistry
d) Second law of Thermochemistry

39. ***First law of thermodynamics is represented as:***
a) $\Delta E = q + w$ b) $\Delta E = q + RT$
c) $\Delta E = q + \Delta p$ d) $\Delta E = \Delta H$

40. ***Which of the following statements is contrary to the first law of thermodynamics***
a) In an adiabatic process the work done is independent of its path.
b) Continuous production of mechanical work without supplying equivalent amount of heat is possible.
c) One form of energy can be transferred into an equivalent amount of other kinds of energy.
d) Energy can neither be created nor destroyed.

ANSWERS

1.	a	2.	b	3.	c	4.	a
5.	b	6.	d	7.	d	8.	b
9.	d	10.	d	11.	d	12.	c
13.	c	14.	d	15.	d	16.	c
17.	c	18.	c	19.	c	20.	c
21.	b	22.	c	23.	b	24.	c
25.	b	26.	a	27.	d	28.	a
29.	c	30.	b	31.	a	32.	b
33.	b	34.	a	35.	a	36.	c
37.	a	38.	a	39.	a	40.	b

CHEMICAL EQUILIBRIUM

1. ***A reaction is reversible because:***
   a) Products are stable.
   b) Reactants are reactive.
   c) Products are reactive.
   d) Reactants are stable.

2. ***What happens when a reaction is at equilibrium and more reactant is added:***
   a) Forward reaction rate is increased.
   b) Forward reaction rate is decreased.
   c) Backward reaction rate is increased.
   d) Equilibrium remains unchanged.

3. ***The rate of a chemical reaction is directly proportional to product of molar concentration of reacting substance. It is called:***
   a) Law of conservation of energy
   b) Law of mass action
   c) Rate law
   d) Active mass rule

4. ***A chemical reaction A $\longrightarrow$ B is said to be in equilibrium when:***
   a) Rate of transformation of A to B is equal to B to A.
   b) 50% reactant has been changed to B.
   c) Conversion of A to B is 50% complete.
   d) Complete conversion of A to B has taken place.

5. ***The rat of reaction:***
   a) Remains same as reaction proceeds
   b) May decrease or increase as reaction proceeds
   c) Increases as reaction proceeds
   d) Decreases as reaction proceeds

6. ***Law of mass action was given by:***
   a) Guldberg and Waage
   b) Berkeley and Hartly
   c) Ramsay and Reyleigh
   d) Berthelot

7. ***In a chemical reaction equilibrium is said to have been established when:***
   a) Rate of opposing reactions are equal.
   b) Rate constants of opposing reactions are equal.
   c) Opposing reactions stop.
   d) Concentration of reactants and products are equal.

8. $H_2 + I_2 \rightleftharpoons 2HI$
   In the above equilibrium system, if the concentration of reactants at 25°C is increased, the value of K_c will:
   a) Remains constant b) Increases
   c) Decreases
   d) Depends upon nature of reactants

9. $N_2 + 3H_2 \rightleftharpoons 2NH_3$
   For the above reaction the relationship between K_C and K_P will be:
   a) $K_P = K_C RT$ b) $K_P = K_C(RT)^{-1}$
   c) $K_P = K_C(RT)^{-2}$ d) $K_C = K_P$

10. ***The correct relation between K_C and K_P is:***
    a) $K_P = K_C\left[\frac{P}{N}\right]^{\Delta n}$ b) $K_C = K_P(RT)^{\Delta n}$
    c) $K_P = K_C(RT)^{\Delta n}$ d) $K_P = K_C(RT)^{\Delta n}$

11. $N_2O_4 \rightleftharpoons 2NO_2$
    1 mol of N_2O_4 was decomposed according to given equation in 1dm³ container. At equilibrium x mole of N_2O_4 have dissociated. What is the value of K_C:
    a) $\frac{2x}{(1-x)^2}$ b) $\frac{4x^2}{(1-x)}$
    c) $\frac{4x}{(1-x)}$ d) $\frac{2x}{(1-x)}$

12. $N_2 + O_2 \rightleftharpoons 2NO$
    The unit of K_C for this reaction will be:
    a) No unit b) $mol^{-2}\ dm^{-3}$
    c) $mol^{-1}\ dm^{-3}$ d) $mol^{-2}\ dm^{+3}$

13. $N_2 + 3H_2 \rightleftharpoons 2NH_3$
    The unit of K_C for this reaction will be:
    a) $mol^2\ dm^{-6}$ b) $mol^{-2}\ dm^{+6}$
    c) $mol\ dm^{-3}$ d) $mol^{-1}\ dm^{+3}$

14. ***For what value of K_C almost forward reaction is complete:***
    a) $K_C = 10^{30}$ b) $K_C = 10^{-30}$
    c) $K_C = 0$ d) $K_C = 1$

15. ***In a particular reaction for the value $K_C = 1 \times 10^{-25}$ which statement is correct:***
    a) Almost forward reaction is complete.
    b) Amount of reactant is negligible as compared to product.
    c) Amount of product is negligible as compared to reactant.
    d) Amount of product is equal to amount of

reactant.

16. ***Almost forward reaction is complete when value of K_C is:***
   a) Neither larger nor very small
   b) Very small
   c) Very large
   d) Negligible

17. ***If K_C of a reaction is very large, it indicates that equilibrium occurs:***
   a) With the help of a catalyst.
   b) With no forward reaction.
   c) At a low product concentration.
   d) At a high product concentration.

18. $N_2O_4 \rightleftharpoons 2NO_2$

   For the above reaction, which of the following expression of K_C is correct:

   a) $K_C = \frac{[N_2O_4]}{[NO_2]^2}$ b) $K_C = \frac{[N_2O_4]}{[NO_2]}$

   c) $K_C = \frac{[N_2O]^2}{[N_2O_4]}$ d) $K_C = \frac{[N_2][O_4]}{[NO_2]}$

19. ***In an exothermic reversible reaction increase in temperature shift the equilibrium to:***
   a) Remains unchanged b) Product side
   c) Reactant side d) None of above

20. ***A large value of K_C means that at equilibrium:***
   a) Less reactants and more products
   b) Reactants and products in same amounts
   c) More reactants and less products
   d) None of above

ANSWERS

1.	c	2.	a	3.	b	4.	a
5.	d	6.	a	7.	a	8.	a
9.	c	10.	c	11.	b	12.	a
13.	b	14.	a	15.	c	16.	c
17.	d	18.	c	19.	c	20.	a

SOLUTIONS

1. ***Every sample of matter with uniform properties and a fixed composition is called a:***
   a) Solid b) Liquid
   c) Phase d) Gas

2. ***A solution is a homogeneous mixture of two or more kinds of different:***
   a) Molecular substances b) Covalent substances
   c) Ionic substances d) Both (a) and (c)

3. ***The substance which is present in large quantity is called a:***
   a) Solute b) Solvent
   c) Solution d) None of above

4. ***The substance which is present in small quantity is called as:***
   a) Solution b) Solvent
   c) Solute d) None of above

5. ***Solutions containing relatively lower concentrations of solute are called:***
   a) Concentrated solutions b) Lighter solutions
   c) Dilute solutions d) None of above

6. ***In which type of following solutions we don't know the total volume of the solution:***
   a) Percentage weight/weight
   b) Percentage weight/volume
   c) Percentage volume/volume
   d) Percentage volume/weight

7. ***In which of the following solutions the total volume of solution may not be necessarily equal to sum of volumes of solute and solvent?***
   a) Percentage volume/volume
   b) Percentage volume/weight
   c) Percentage weight/volume
   d) Percentage weight/weight

8. ***The number of moles of solute dissolved per dm^3 of the solution is called:***
   a) Normality b) Molarity
   c) Molality d) None of above

9. ***The number of moles of solute in 1000g (1 kg) of the solvent is called:***
   a) Molality b) Molarity
   c) Normality d) Mole fraction

10. ***As compared to molar solution, in the molal solution the quantity of solvent is:***
   a) Comparatively lesser
   b) More or less equal
   c) Comparatively greater
   d) Very large

11. ***To calculate volume of the solvent, we need to know, the:***
   a) Density of solute b) Normality of solute
   c) Mass of solute d) Molarity of solute

12. ***Molarity of pure water is:***
   a) 33.3 b) 55.5
   c) 44.4 d) 66.6

13. ***A solution of glucose is 10%. The volume to which 1g mole of it dissolved will be:***
   a) 8.1 dm^3 b) 1.7 dm^3
   c) 1.8 dm^3 d) 6.1 dm^3

14. ***(A) is one molar NaCl solution and (B) is 1 molal NaCl solution:***
- a) A and B are of same strength.
- b) A is more concentrated than B.
- c) B is more concentrated than A.
- d) None of above

15. ***A solution of sucrose is 34.2%. The volume of solution containing one mole of solute:***
- a) 342 cm^3
- b) 1000 cm^3
- c) 500 cm^3
- d) 242 cm^3

16. ***10g of NaOH has been dissolved per dm^3 of solution. The molarity of solution is:***
- a) 0.025 M
- b) 1.5 M
- c) 0.1 M
- d) 0.25 M

17. ***10g of NaOH has been dissolved per kg of solvent. The molality of solution is:***
- a) 0.25 m
- b) 1.5 m
- c) 0.5 m
- d) 2.5 m

18. ***The sum of mole per cent of all the components of solution is always equal to:***
- a) Less than 100
- b) One
- c) 100
- d) 10

19. ***The ratio of moles of a particular component of solution to total moles of all components of solution is:***
- a) Mole fraction
- b) Molality
- c) Molarity
- d) Normality

20. ***5g of glucose is dissolved for 100 cm^3 of solution. The percentage of solution is:***
- a) 5% v/w
- b) 5% v/v
- c) 5% w/v
- d) 5% w/w

ANSWERS

1.	c	2.	d	3.	b	4.	c
5.	c	6.	d	7.	a	8.	b
9.	a	10.	c	11.	a	12.	b
13.	c	14.	c	15.	b	16.	d
17.	a	18.	c	19.	a	20.	c

ELECTROCHEMISTRY

1. ***Electrochemistry is concerned with the conversion of electrical energy into chemical energy in:***
- a) Galvanic cell
- b) Electrolytic cell
- c) Voltaic cell
- d) Both (a) and (c)

2. ***The conversion of chemical energy into electrical energy requires:***
- a) Electrolytic cell
- b) Galvanic cell
- c) Voltaic cell
- d) Both (b) and (c)

3. ***Most metals are conductors of electricity because of the:***
- a) Light weight
- b) Immobility of the electrons
- c) Lustrous surfaces
- d) Relatively free movement of their electrons

4. ***Metallic conduction is also called as:***
- a) Ionic conduction
- b) Protonic conduction
- c) Electronic conduction
- d) Super conduction

5. ***Electrolytes in the form of solution or in the fused state have the ability to conduct:***
- a) Light
- b) Electricity
- c) Ions
- d) Electrons

6. ***Ionization is the process in which ionic compounds when fused or dissolved in water split up into charged particles called:***
- a) Atoms
- b) Electrons
- c) Protons
- d) Ions

7. ***Electrolysis is used for:***
- a) Manufacture of caustic soda
- b) Refining of copper
- c) Electroplating
- d) All of above

8. ***In an electrolytic cell, the electrons flow from:***
- a) Cathode to anode or opposite
- b) Cathode to anode
- c) Anode to cathode
- d) Radom flow

9. ***When aqueous NaCl is electrolyzed, which of the following ions get discharged at anode:***
- a) H^+
- b) Na^+
- c) OH^-
- d) Cl^-

10. ***In electrolytic cells, the chemical changes may be:***
- a) Either spontaneous or non-spontaneous
- b) Always spontaneous
- c) Always non-spontaneous
- d) More spontaneous and less non-spontaneous

11. ***Which of the following cannot conduct electricity:***
- a) NaCl fused
- b) $NaCl_{(aq)}$
- c) $NaCl_{(solid)}$
- d) Both (b) and (c)

12. ***During electrolysis, the reaction that takes place at cathode is:***
- a) Reduction
- b) Both (a) and (c)
- c) Oxidation
- d) No reaction

occurs

13. ***During electrolysis, electrons are:***
   a) Lost by anions and gained by cations
   b) Gained by anions and lost by cations
   c) Gained only
   d) Lost only

14. ***The function of salt bridge is:***
   a) To increase movement of ions
   b) To increase the emf of cell
   c) To decrease the temperature
   d) To maintain electrical neutrality.

15. ***Which of the following yield both hydrogen and chlorine on electrolysis:***
   a) Electrolysis of acidified water
   b) Electrolysis of molten NaCl
   c) Electrolysis of aqueous NaCl
   d) Electrolysis of saline water

16. ***Which of the following correctly describes the process occurring at the electrodes when molten NaCl is electrolyzed:***
   a) No reaction at anode, reduction at cathode.
   b) No reaction at cathode, oxidation at anode.
   c) Oxidation at anode, reduction at cathode.
   d) Oxidation at cathode, reduction at anode.

17. ***What are the products of electrolysis of aqueous sodium chloride at two electrodes:***
   a) Chlorine at anode and oxygen at cathode.
   b) Hydrogen at anode and chlorine at cathode.
   c) Chlorine at anode and hydrogen at cathode.
   d) Chlorine at anode and sodium at cathode.

18. ***Sodium can be obtained by:***
   a) Electrolysis of acidified water.
   b) By heating NaCl and water at 100°.
   c) Electrolysis of molten sodium chloride.
   d) Electrolysis of aqueous sodium chloride.

19. ***A cell in which electric current is produced as a result of spontaneous redox reaction is called:***
   a) Dry cell b) Electrolytic cell
   c) Galvanic cell d) Half cell reaction

20. ***A cell which produces electrical current by an oxidation reduction reaction is known as:***
   a) Electrolytic cell b) Voltaic cell
   c) Reversible cell d) Standard cell

ANSWERS

1.	b	2.	d	3.	d	4.	c
5.	b	6.	d	7.	d	8.	c
9.	d	10.	c	11.	c	12.	a
13.	a	14.	d	15.	c	16.	c
17.	c	18.	c	19.	c	20.	b

REACTION KINETICS

1. ***A white precipitate of silver chloride immediately formed on addition of:***
   a) Silver nitrate solution to sodium chloride solution.
   b) Silver chloride solution to sodium nitrate solution.
   c) Silver nitrate solution to potassium chloride solution.
   d) Silver nitrate solution to hydrogen chloride solution.

2. ***Which of the following reactions occur at moderate rate:***
   a) Rusting of iron
   b) Chemical weathering of stone work of buildings by acidic gases in atmosphere.
   c) Hydrolysis of an ester
   d) Fermentation of sugars

3. ***All reactions occur in:***
   a) A single step b) A series of steps
   c) Two steps d) Both (a) and (b)

4. ***The rate determining step is the:***
   a) Slowest step b) Fastest step
   c) Moderate step d) Both (a) and (b)

5. ***Which of the following will affect the rate:***
   a) First step of reaction
   b) Last step of reaction
   c) Rate determining step
   d) Fastest step

6. ***It is common observation that rates of chemical reactions differ:***
   a) Greatly b) A little bit
   c) Moderately d) Do not differ

RATE OF REACTION

7. ***Which of the following may affect the rate constant (K) for a reaction:***
   a) Change in concentration
   b) Change in pressure
   c) Change in pH
   d) Change in temperature

8. ***The change in concentration of reactant or product per unit time is called:***
   a) Rate constant b) Rate of reaction
   c) Rate equation d) Rate law

9. ***Rate of a chemical reaction depends upon:***
   a) The number of total collisions per second.

b) Number of molecules taking part in a chemical reaction.
c) Number of fruitful collisions per second.
d) Number of fruitless collisions per second.

10. ***Which statement is true about order of reaction:***
a) Order of reaction can only be determined by an experiment.
b) Order of reaction can be determined from a balance equation only.
c) Order of reaction increases by increasing temperature.
d) Order of reaction must be in whole number and not in fraction.

11. ***The unit of rate constant K is $mole^{-1}\ dm^3\ s^{-1}$ for a chemical reaction, the order of reaction is:***
a) 3 b) 0
c) 1 d) 2

12. ***Hydrolysis of ethyl-acetate (ester) has order of reaction:***
a) 3 b) 2
c) 1 d) 0

13. ***If rate law of an equation is written as $\frac{-dx}{dt} = K[A][B]$?***
a) Reaction is independent of the concentration of A and B.
b) Product is decreasing with passage of time.
c) Reactant is decreasing with passage of time.
d) Reactant is increasing with passage of time.

14. ***The example of a photochemical reaction is photosynthesis has order of reaction:***
a) 1 b) 2
c) 0 d) 3

15. ***Rate law of an equation is obtained:***
a) From a balanced equation
b) Can be calculated theoretically as well as determined experimentally.
c) It is only calculated theoretically.
d) Experimentally

16. ***A pseudo uni-molecular reaction has order of reaction:***
a) 3 b) 2
c) 1 d) 0

17. ***A zero order reaction is one in which:***
a) Rate is not affected by changing concentration of reactants.
b) Concentration of reactant do not change with passage of time.
c) Reactants do not react.
d) One reactant s in large excess.

18. ***The rate equation for a reaction is Rate = K[A]. What are units of K?***
a) $mol^{-1}\ dm^3\ s^{-1}$ b) $mol\ dm^{-3}\ s^{-1}$
c) $mol\ dm^{-3}$ d) s^{-1}

19. ***The unit of the rate constant is the same as that of rate of reaction in:***
a) Third order reaction
b) Second order reaction
c) First order reaction
d) Zero order reaction

20. ***Half life period of a first order reaction is independent of:***
a) Presence of catalyst b) Conditions of temperature
c) Initial concentration of the compound
d) All of above

21. ***If the rate of decay of radioactive isotope decreases from 200 cpm to 25 cpm after 24 hours, what is its half life:***
a) 8 hours b) 6 hours
c) 4 hours d) 3 hours

22. ***The rate of reaction between two specific time intervals is called:***
a) Instantaneous rate of reaction.
b) Average rate of reaction.
c) Rate of a reaction.
d) Minimum rate of a reaction.

23. ***Dilatometer method is useful for the reaction that involve:***
a) Small volume changes in solutions
b) Change in refractive indices
c) Where reactants absorb U.V, visible or infrared radiation
d) Ionic species

24. ***The rate of reaction:***
a) Decreases as the reaction proceeds
b) Increases as the reaction proceeds
c) May decrease or increase as the reaction proceeds
d) Remains same as the reaction proceeds

ANSWERS

1.	a	2.	c	3.	d	4.	a
5.	c	6.	a	7.	d	8.	b
9.	c	10.	a	11.	d	12.	c
13.	c	14.	c	15.	d	16.	c
17.	a	18.	d	19.	d	20.	c
21.	a	22.	b	23.	a	24.	a

******

PERIODIC CLASSIFICATION OF ELEMENTS & PERIODICITY

1. ***Keeping in view the size of atoms, which order is the correct one?***
(a) Mg > Sr (b) Ba > Mg
(c) Lu > Ce (d) Cl > I

2. ***Mark the correct statement:***
(a) Na^+ is smaller than Na atom.
(b) Na^+ is larger than Na atom.
(c) Cl^{-1} is smaller than Cl atom.
(d) Cl^- (ion) and Cl (atom) are equal in size.

3. ***Mark the correct statement:***
(a) All lanthanides are present in the same group.
(b) All halogens are present in the same period.
(c) All the alkali metals are present in the same group.
(d) All the noble gases are present in the same period.

4. ***Which statement is incorrect?***
(a) All the metals are good conductor of electricity.
(b) All the metals are good conductor of heat.
(c) All the metals form positive ions.
(d) All the metals form acidic oxides.

5. ***Which statement is correct?***
(a) Hydrogen resembles in properties with I-A, IV-A and VII-A elements.
(b) Hydrogen resembles in properties with II-A, IV-A and V-A elements.
(c) Hydrogen resembles in properties with II-A, IV-A and VI-A elements.
(d) Hydrogen resembles in properties with II-A, III-A and VII-A elements.

6. ***Mark the correct statement:***
(a) The ionization energy of calcium is lower than that of barium.
(b) The ionization energy of calcium is lower than that of magnesium.
(c) The ionization energy of calcium is higher than that of beryllium.
(d) The ionization energy of calcium is lower than that of strontium.

7. ***Mark the correct statement:***
(a) Electron affinity is a measure of energy required to remove the electron.
(b) Ionization energy is a measure of energy asked by removing an electron.
(c) Electron affinity is a measure of energy required to excite an electron.
(d) Electron affinity is measure of energy released by removing an electron.

8. ***Mark the incorrect statement:***
(a) Metallic character increases down the group.
(b) Metallic character increases along a period.
(c) Metallic character decreases along a period.
(d) Metallic character remains the same down the group.

9. ***Mark the correct statement:***
(a) Melting points of halogens decreases down the group.
(b) Melting points of halogens increase down the group.
(c) Melting points of halogens remain the same throughout the group.
(d) Melting points of halogens first increase and then decrease down the group.

10. ***Mark the correct statement:***
(a) Covalent character of metal halides increases from left to right in a period.
(b) Boiling points of Group IV-A hydrides decrease down the group.
(c) Ionic character of hydrides increases from left to right in a period.
(d) The basicity of group II-A oxides decreases on descending the group.

11. ***Modern Periodic Table is based upon periodic function:***
(a) Atomic mass (b) Mass number
(c) Nuclide number
(d) Atomic number

12. ***Newland's gave law:***
(a) Triad's law (b) Octaves law
(c) Periodic law
(d) Modern periodic law

13. ***The element not known till Mendleev tabulated his periodic table:***
(a) Carbon (b) Hydrogen
(c) Aluminium (d) Germanium

14. ***Which one was the problem associated with Mendleev periodic table?***
(a) Systematic study
(b) Grouping of alkali metals with coinage metals
(c) Prediction of unknown
(d) Introduction of elements groups and periods

15. ***Element with higher oxidation state form oxides:***
(a) Acidic (b) Basic
(c) Amphoteric (d) Peroxides

16. ***Period Number 6 contains elements in it:***
(a) 2 (b) 8
(c) 18 (d) 32

17. ***Sodium belongs to block of periodic table:***
(a) s-block (b) p-block

(c) d-block (d) f-block

18. *Properties of metals are:*
(a) Malleable and ductile
(b) Form basic oxides
(c) Tarnish in air
(d) All are true

19. *Atomic radius changes from top to bottom in a group:*
(a) Increases (b) Decreases
(c) Remains same
(d) Sometimes increases & decreases

20. *Ionization energy of sodium is (KJ/mol):*
(a) 503 (b) 513
(c) 523 (d) 524

Answers

No	Ans	No	Ans	No	Ans	No	Ans	No	Ans
1	b	2	a	3	c	4	d	5	a
6	b	7	b	8	c	9	B	10	a
11	d	12	b	13	d	14	B	15	a
16	d	17	a	18	d	19	A	20	b

S-BLOCK ELEMENTS

1) *Which one of the following does not belong to alkaline earth metals?*
(a) Be (b) Ra
(c) Ba (d) Rn

2) *The oxides of beryllium are:*
(a) acidic (b) basic
(c) amphoteric (d) none of these

3) *Which ion will have the maximum value of heat of hydration?*
(a) Na^+ (b) Cs^+
(c) Ba^{+2} (d) Mg^{+2}

4) *Which one of the following is not an alkali metal?*
(a) Francium (b) Caesium
(c) Rubidium (d) Radium

5) *Which of the following sulphates is not soluble in water?*
(a) Sodium sulphate
(b) Potassium sulphate
(c) Zinc sulphate
(d) Barium sulphate

6) *The element caesium bears resemblance with:*
(a) Ca (b) Cr
(c) Both of the above
(d) Non of the above

7) *Chile saltpetre has the chemical formula:*
(a) $NaNO_3$ (b) KNO_3
(c) $Na_2B_4O_7$ (d) $Na_2CO_3.H_2O$

8) *The mineral $CaSO_4.2H_2O$ has the general name:*
(a) gypsum (b) dolomite
(c) calcite (d) epsom salt

9) *Down's cell is used to prepare:*
(a) sodium carbonate
(b) sodium bicarbonate
(c) sodium metal
(d) sodium hydroxide

10) *Which element is deposited at the cathode during the electrolysis of brine in Nelson's cell?*
(a) H_2 (b) Na
(c) Cl_2 (d) O_2

11. *Carbonates of alkaline earth metals decomposes to respective metal:*
(a) oxides (b) nitrates
(c) sulphates (d) CO_2

12. *All alkali metals react with acetylene to form acetylides except:*
(a) Li (b) Na
(c) K (d) Rb

13. *Which are being formed by alkali metals?*
(a) oxides (b) nitrides
(c) carbides (d) peroxides

14. *Which oxide is insoluble?*
(a) Li_2O (b) Na_2O
(c) K_2O (d) BaO

15. *Down's cell is used to prepare:*
(a) sodium (b) sodium hydroxide
(c) calcium (d) magnesium

16. *Diaphragm cell is used to prepare:*
(a) sodium (b) sodium hydroxide
(c) calcium (d) magnesium

17. *Decomposition of carbonates of alkaline earth metals produce gas:*
(a) N_2 (b) Oxide
(c) CO_2 (d) CO

18. *Maximum shielding effect is observed in:*
(a) Li (b) Be
(c) Mg (d) Ca

19. *Which is plaster of paris?*
(a) $CaSO_4.H_2O$ (b) $(CaSO_4)_2.H_2O$
(c) $CaSO_4.2H_2O$ (d) $CaSO_4.3H_2O$

20. *Which is insoluble carbonate?*
(a) KCO_3 (b) $CaCO_3$
(c) Na_2CO_3 (d) K_2CO_3

Answers

No	Ans	No	Ans	No	Ans	No	Ans	No	Ans
1	d	2	b	3	d	4	d	5	d
6	d	7	b	8	a	9	c	10	a
11	a	12	a	13	d	14	a	15	a
16	b	17	c	18	d	19	B	20	b

GROUP IIIA & IVA ELEMENTS

1. *Which metal is used in the thermit process because of its activity?*
a) Iron b) Copper

c) Aluminium d) Zinc

2. *Aluminium oxide is:*
a) Acidic oxide b) Basic oxide
c) Amphoteric oxide
d) None of these

3. *Chemical composition of colemnite is.*
a) $Ca_2B_6O_{11}.5H_2O$
b) $CaB_4O_7.4H_2O$
c) $Na_2B_4O_7.4H_2O$
d) $CaNaB_5O_9.8H_2O$

4. *Which element forms an ion with charge 3+?*
a) Beryllium b) Aluminium
c) Carbon d) Silicon

5. *Which electronic configuration corresponds to an element of Group III-A of the periodic table?*
a) $1s^2,2s^2,2p^6,3s^2,3p^1$
b) $1s,2s^2,2p^6,3s^2,3p^6,4s^2$
c) $1s^2,2s^2,2p^6$
d) $1s^2,2s^2,2p^6,3s^2,3p^3$

6. *Which element among the following belongs to Group IV-A of the periodic table?*
a) Barium b) Iodine
c) Lead d) Oxygen

7. *Boric acid cannot be used:*
a) as antiseptic in medicine
b) for washing eyes
c) in soda bottles
d) for enamels and glazes

8. *Which of the following elements is not present abundantly in earth's crust?*
a) Silicon b) Aluminium
c) Sodium d) Oxygen

9. *Tincal is a mineral of:*
a) Al b) B
c) Si d) C

10. *Chief ore of aluminium is:*
a) Na_3AlF_6 b) $Al_2O_3.2H_2O$
c) Al_2O_3 d) $Al_2O_3.H_2O$

11. *What is the formula of asbestos?*
(a) $CaMg_3(SiO_3)_4$ (b) $CaSiO_3$
(c) Na_2SiO_3 (d) $Mg_3H_2(SiO_3)_4$

12. *What is going to replace the petroleum?*
(a) Silica (b) Silicates
(c) Silicones (d) Silicon

13. *Which is litharge or massicot?*
(a) PbO (b) Pb_2O
(c) Pb_3O_4 (d) PbO_2

14. *What is chrome yellow?*
(a) PbO (b) Pb_2O
(c) $PbCrO_4$ (d) Pb_3O_4

15. *Borax is hydrated:*
(a) Penta (b) deca
(c) Hepta (d) octa

16. *Silicon atom is hybridized:*
(a) sp (b) sp^2
(c) sp^3 (d) dsp^2

17. *Which is not the form of silica?*
(a) Amethyst quartz (b) Rose quartz
(c) Smoky (d) None of these

18. *Pb has inert pair of electrons:*
(a) One (b) two
(c) Three (d) four

19. *Which is used in navigational equipments?*
(a) B (b) Be
(c) Mg (d) Al

20. *Which is used to remove air bubbles from metals?*
(a) B (b) Be
(c) Mg (d) Al

Answers

No	Ans	No	Ans	No	Ans	No	Ans	No	Ans
1	c	2	c	3	a	4	b	5	a
6	c	7	c	8	c	9	b	10	b
11	a	12	c	13	a	14	c	15	b
16	c	17	d	18	b	19	d	20	d

GROUP IV-A & VI-A ELEMENTS

1. *Out of all the elements of group V-A, the highest ionization energy is possessed by:*
(a) N (b) P
(c) Sb (d) Bi

2. *Among group V-A elements, the most electronegative element is:*
(a) Sb (b) N
(c) P (d) As

3. *Oxidation of NO in air produces:*
(a) N_2O (b) N_2O_3
(c) N_2O_4 (d) N_2O_5

4. *The brown gas formed when metal reduces HNO_3 is:*
(a) N_2O_5 (b) N_2O_3
(c) NO_2 (d) NO

5. *Laughing gas is chemically:*
(a) NO (b) N_2O
(c) NO_2 (d) N_2O_4

6. *Out of all the elements of group VI-A the highest melting and boiling points is shown by the element:*
(a) Te (b) Se
(c) S (d) Pb

7. *SO_3 is not absorbed in water directly to or H_2SO_4 because:*
(a) the reaction does not go to completion.
(b) the reaction is quite slow.
(c) the reaction is exothermic.
(d) SO_3 is insoluble in water.

8. *Which catalyst is used in contact process?*

(a) Fe_2O_3 (b) V_2O_5
(c) SO_3 (d) Ag_2O

9. *Which of the following species has the maximum number of unpaired electrons?*
(a) O_2 (b) O_2^+
(c) O_2^- (d) O_2^{-2}

10. *Which has garlic like odour?*
(a) N_2O (b) NO
(c) NO_2 (d) P_2O_5

11. *Reaction of HNO_3 with very dilute Zinc and at low temperature gives:*
(a) H_2 (b) NO
(c) NO_2 (d) NH_4

12. *Tungsten and uranium are turned to an reaction with HNO_3:*
(a) Oxides (b) Chlorides
(c) Nitrides (d) Nitrates

13. *NO_2 forms acidic solution:*
(a) Red (b) Blue
(c) Green (d) Brown

14. *Aqua Regia has ratio of conc. HCl and HNO_3:*
(a) 1 : 2 (b) 1 : 3
(c) 1 : 4 (d) 2 : 3

15. *Which phosphorus is the most poisonous?*
(a) White (b) Red
(c) Black (d) All

16. *Nitrogen is present in atmosphere by weight:*
(a) 75% (b) 76%
(c) 77% (d) 78%

17. *Which are metalloid?*
(a) Nitrogen and phosphorous (b) Arsenic and antimony
(c) Phosphorous and arsenic (d) Antimony and bismuth

18. *Calcium carbonate contains oxygen in it:*
(a) 48% (b) 50%
(c) 53% (d) 60%

19. *Sulphuric acid is used:*
(a) As fertilizers (b) As dehydrating agent
(c) As oxidizing agent (d) All above

20. *Which is aqua regia?*
(a) HCl : NO (b) HCl : HNO_3
(c) HCl : H_2SO_4 (d) H_2SO_4 : HNO_3

Answers

No	Ans	No	Ans	No	Ans	No	Ans	No	Ans
1	A	2	b	3	c	4	c	5	b
6	A	7	b	8	b	9	a	10	d
11	D	12	a	13	b	14	b	15	a
16	d	17	b	18	a	19	d	20	b

THE HALOGENS & THE NOBLE GASES

1. *Which of the following hydrogen halide is the weakest acid in solution?*
(a) HF (b) HBr
(c) HI (d) HCl

2. *Chlorine heptoxide (Cl_2O_7) reacts with water to form:*
(a) Hypochlorous acid
(b) Chloric acid
(c) Perchloric acid
(d) Chlorine and oxygen

3. *Hydrogen bond is the strongest between the molecules of:*
(a) HF (b) HCl
(c) HBr (d) HI

4. *Which halogen will react spontaneously with $Au_{(s)}$ to produce Au^{3+}?*
(a) Br_2 (b) F_2
(c) I_2 (d) Cl_2

5. *The anhydride of $HClO_4$ is:*
(a) ClO_3 (b) ClO_2
(c) Cl_2O_5 (d) Cl_2O_7

6. *Bleaching powder may be produced by passing chlorine over:*
(a) Calcium carbonate
(b) Hydrated calcium sulphate
(c) Anhydrous calcium sulphate
(d) Calcium hydroxide

7. *Which is the strongest acid?*
(a) HClO (b) $HClO_2$
(c) $HClO_3$ (d) $HClO_4$

8. *Which halogen occurs naturally in a positive oxidation state?*
(a) Fluorine
(b) Chlorine
(c) Bromine
(d) Iodine

9. *An element that has a high ionization energy and tends to be chemically inactive would most likely to be:*
(a) an alkali metal
(b) a transition element
(c) a noble gas
(d) a halogen

10. *Which of the following represents the correct electronic configuration of the outermost energy level of an element of zero (VIIIA) group in the ground state?*
(a) s^2p^2 (b) s^2p^4
(c) s^2p^5 (d) s^2p^6

11. *Astatine belongs to group:*
(a) I-A (b) II-A
(c) III-A (d) VII-A

12. *The most reactive elements are:*
(a) Group IV-A (b) Group V-A
(c) Group VI-A (d) Group VII-A

13. *Half life period of astatine is:*
(a) 8.1 Hrs (b) 8.2 Hrs
(c) 8.3 Hrs (d) 8.4 Hrs

14. *The only non-metal in liquid form is:*
(a) S (b) Cl
(c) Br (d) P

15. *Which halogen has lustrous shining?*
(a) F_2 (b) Cl_2
(c) Br_2 (d) I_2

16. *Smell of halogens is:*
(a) Fruity (b) Sweet
(c) Irritating (d) Rotten egg

17. *Which halogen has maximum Van-der Waal's forces?*
(a) F_2 (b) Cl_2
(c) Br_2 (d) I_2

18. *Oxidation state of fluorine is:*
(a) +1 (b) +2
(c) -1 (d) -2

19. *Which has the least oxidizing power?*
(a) F_2 (b) Cl_2
(c) Br_2 (d) I_2

20. *Which halogen can oxidize all the other halogens into free halogens from their compounds?*
(a) F_2 (b) Cl_2
(c) Br_2 (d) I_2

Answers

No	Ans	No	Ans	No	Ans	No	Ans	No	Ans
1	a	2	c	3	a	4	d	5	d
6	d	7	d	8	d	9	c	10	d
11	d	12	d	13	c	14	c	15	d
16	d	17	d	18	c	19	d	20	a

TRANSITION ELEMENTS

1. *Which of the following is non-typical transition element?*
(a) Cr (b) Mn
(c) Zn (d) Fe

2. *Which of the following is a typical transition metal?*
(a) Sc (b) Y
(c) Ra (d) Co

3. *f-block elements are also called:*
(a) Non-typical transition elements.
(b) Outer transition elements.
(c) Normal transition elements.

4. *The strength of binding energy of transition elements depends upon:*
(a) Number of electron pairs.
(b) Number of unpaired electrons.
(c) Number of Neutrons.
(d) Number of protons.

5. *Group VI-B of transition elements contains:*
(a) Zn, Cd, Hg (b) Fe, Ru, Os
(c) Cr, Mo, W (d) Mn, Te, Re

6. *Which is the formula of tetra-ammine chloronitro platinum (IV) sulphate?*
(a) $[Pt(NH_3)_4(NO_2)]SO_4$
(b) $[PtNO_2Cl(NH_3)_4]SO_4$
(c) $[PtCl(NO_2)(NH_3)_4]SO_4$
(d) $[Pt(NH_3)_4(NO_2)Cl]SO_4$

7. *The percentage of carbon in different types of iron products is in the order of:*
(a) Cast iron > wrought iron > steel
(b) Wrought iron > steel > cast iron
(c) Cast iron > steel > wrought iron
(d) Cast iron = steel > wrought iron

8. *The colour of transition metal complexes is due to:*
(a) d-d transitions of electrons.
(b) Paramagnetic nature of transition elements.
(c) Ionization.
(d) Loss of s-electrons.

9. *Coordination number of Pt in* $[PtCl(NO_2)(NH_3)_4]^{2-}$ *is:*
(a) 2^- (b) 4
(c) 1 (d) 6

10. *The total number of transition elements is:*
(a) 10 (b) 14
(c) 40 (d) 50

11. *Which is non typical transition element?*
(a) Ni (b) Co
(c) Y (d) Fe

12. $[Ti(H_2O)_6]^{+3}$ *ion absorbs colour:*
(a) Blue (b) Yellow
(c) Green (d) Red

13. *Coordination sphere may be:*
(a) Cationic (b) Anionic
(c) Neutral (d) All above

14. *Rusting can be avoided by:*
(a) Making alloys (b) Tin or Zinc plating
(c) Use of enamel (d) All of these

15. *During oxidation in* $K_2Cr_2O_7$, *Cr VI changes to Cr:*
(a) I (b) II
(c) III (d) V

16. *Solubility of* $KMnO_4$ *at higher temperature is:*
(a) 5% (b) 7%
(c) 15% (d) 25%

17. *Maximum variable oxidation state is of:*
(a) Mn^{+2} (b) Fe^{+3}
(c) Cr^{+1} (d) a & b

18. *Content of carbon in steel is:*
(a) 0.12 to 0.25% (b) 0.25 to 2.5%
(c) 3.0 to 3.5% (d) 4.0 to 4.5%

19. *Property of transition element is:*
(a) Low m.p & b.p (b) Parramagnetism
(c) Oxidation state (d) Low binding energies

20. *Oxalic acid oxidizes to:*
(a) CO (b) CO_2
(c) Oxalates (d) None of these

Answers

Sr.	Ans	Sr.	Ans	Sr.	Ans	Sr.	Ans	Sr.	Ans
1	c	2	b	3	d	4	a	5	c
6	d	7	d	8	b	9	b	10	b
11	c	12	d	13	c	14	b	15	c
16	C	17	a	18	a	19	b	20	d

FUNDAMENTAL PRINCIPLES OF ORGANIC CHEMISTRY

1. *The state of hybridization of carbon atom in methane is:*
(a) sp^3 (b) sp^2
(c) sp (d) dsp^2

2. *In t-butyl alcohol, the tertiary carbon is bonded to:*
(a) Two hydrogen atoms
(b) Three hydrogen atoms
(c) One hydrogen atom
(d) No hydrogen atom

3. *Which set of hybrid orbitals has planar triangle shape?*
(a) sp^3 (b) sp
(c) sp^2 (d) dsp^2

4. *The chemist who synthesized urea from ammonium cyanate was:*
(a) Berzelius (b) Kolbe
(c) Wohler (d) Lavoisier

5. *Linear shape is associated with which set of hybrid orbitals?*
(a) sp (b) sp^2
(c) sp^3 (d) dsp^2

6. *A double bond consists of:*
(a) Two sigma bonds
(b) One sigma and one pi bonds
(c) One sigma and two pi bonds
(d) Two pi bonds

7. *Ethers show the phenomenon of:*
(a) Position isomerism
(b) Functional group isomerism
(c) Metamerism
(d) Cis-trans isomerism

8. *Select from the following which one is alcohol?*
(a) $CH_3–CH_2–OH$
(b) $CH_3–O–CH_3$
(c) CH_3COOH
(d) $CH_2–CH_2–Br$

9. *Fossil fuels consist of:*
(a) Coal (b) Natural gas
(c) Petroleum (d) All of these

10. *Geological survey of Pakistan estimates about billion tons of coal in Pakistan:*
(a) 182 (b) 183
(c) 184 (d) 185

11. *Major component of natural gas is:*
(a) Ethane (b) Ethene
(c) Propane (d) Methane

12. *At present oil refineries in Pakistan are:*
(a) One (b) Two
(c) Three (d) Four

13. *Cracking products are:*
(a) Only alkanes (b) Only alkenes
(c) Alkanes and alkenes (d) Alkynes

14. *Types of cracking are:*
(a) Thermal (b) Catalytic
(c) Steam (d) All a, b, c

15. *Tetraethyl lead causes disease:*
(a) Typhoid (b) Respiratory
(c) Stomach (d) Muscular

16. *The general formula of saturated alicyclic hydrocarbons is:*
(a) C_nH_n (b) C_nH_{2n}
(c) C_nH_{2n+2} (d) C_nH_{2n-1}

17. *Diversity of organic compounds in millions is:*
(a) Four (b) Five
(c) Six (d) Seven

18. *General formula of carboxylic acids is:*
(a) RCOH (b) RCOR
(c) RCOOR (d) R-OH

19. *Linear geometry is present in:*
(a) Sp^3 (b) Sp^2
(c) Sp (d) d^2sp^3

20. *Angle 120° is observed in molecules:*
(a) CH_4 (b) CH_3-CH_3
(c) CH≡CH (d) CH_2=CH_2

Answers

No	Ans	No	Ans	No	Ans	No	Ans	No	Ans
1	a	2	d	3	c	4	c	5	a
6	b	7	c	8	a	9	d	10	c
11	d	12	d	13	c	14	d	15	b
16	b	17	c	18	d	19	c	20	d

ALIPHATIC HYDROCARBONS

1. *Preparation of vegetable ghee involves:*
(a) Halogenation
(b) Hydrogenation
(c) Hydroxylation
(d) Dehydrogenation

2. *Formula of chloroform is:*
(a) CH_3Cl (b) CCl_4
(c) CH_2Cl_2 (d) $CHCl_3$

3. *The presence of a double bond in a compound*

is the sign of:
(a) Saturation (b) Unsaturation
(c) Substitution (d) None

4. *Vinyl acetylene combines with HCl to form:*
(a) Polyacetylene
(b) Benzene
(c) Chloroprene
(d) Divinyl acetylene

5. *The addition of unsymmetrical reagent to unsymmetrical alkene is in accordance with the rule:*
(a) Hund's rule
(b) Markownikov's rule
(c) Pauli's Exclusion Principle
(d) Auf bau Principle

6. *Synthesis rubber is made by polymerization of:*
(a) Chloroform
(b) Acetylene
(c) Divinyl acetylene
(d) Butene

7. *β-β'-dichloroethyl sulphide is commonly known as:*
(a) Mustard gas
(b) Laughing gas
(c) Phosgene gas
(d) Bio-gas

8. *When methane reacts with Cl_2 in the presence of diffused light the products obtained are?*
(a) Chloroform only
(b) Carbon tetrachloride only
(c) Chloromethane and dichloromethane
(d) Mixture of a, b, c

9. *Which one of the following gases is used for artificial ripening of fruits?*
(a) Ethane (b) Ethyne
(c) Methane (d) Propane

10. *Reaction of ethenes with $KMnO_4$ gives:*
(a) Ozonide (b) Glyoxal
(c) Glycol (d) Oxalic acid

11. *Which decolourizes the colour of Br_2?*
(a) CH_4 (b) CH_3-CH_3
(c) CH_3-CH_2-CH_3 (d) CH_2=CH_2

12. *Which is symmetrical alkene?*
(a) $CH{\equiv}C{-}CH_2$ (b) $CH{\equiv}CH$
(c) $CH_3{-}C{\equiv}C{-}CH_3$ (d) (b) and (c)

13. *Free radical mechanism of halogenation of alkanes follow step:*
(a) Initiation (b) Propagation
(c) Termination (d) All of these

14. *Alkanes have functional group:*
(a) —X (b) —OH
(c) —COH (d) No functional group

15. *Which is the more reactive?*
(a) Alkanes (b) Alkenes
(c) Alkynes (d) Benzene

16. *Acetylene can be converted into—while passing through a Cu–tube at 300°C:*
(a) Glyoxal (b) Vinyl acetylene
(c) Vinyl alcohol (d) Benzene

17. *Odour of alkyne is:*
(a) Fruity (b) Odourless
(c) zarlic like (d) Irritating

18. *Alkene general formula:*
(a) C_nH_{2n+2} (b) C_nH_{2n}
(c) C_nH_{2n-2} (d) C_nH_{2n+1}

19. *Alkyne is:*
(a) CH_3-CH_3 (b) CH_4
(c) CH_2=CH_2 (d) C_2H_2

20. *Alkanes are gases:*
(a) C_1–C_4 (b) C_5–C_{10}
(c) C_{11}–C_{15} (d) C_{10}–C_{20}

Answers

No	Ans	No	Ans	No	Ans	No	Ans	No	Ans
1	b	2	d	3	b	4	c	5	b
6	b	7	a	8	d	9	b	10	c
11	d	12	d	13	d	14	d	15	b
16	d	17	c	18	c	19	d	20	a

AROMATIC HYDROCARBONS

1. *The benzene molecule contains.*
(a) Three double bond
(b) Two double bond
(c) One double bond
(d) Delocalized π electron charge

2. *Aromatic hydrocarbons are the derivatives of:*
(a) normal series of paraffins
(b) alkene
(c) benzene (d) cyclohexane

3. *Which of the following acid can be used as a catalyst in Friedel Craft's reactions?*
(a) $AlCl_3$ (b) HNO_3
(c) $BeCl_2$ (d) NaCl

4. *Benzene cannot undergo:*
(a) substitution reactions
(b) addition reactions
(c) oxidation reactions
(d) elimination reactions

5. *Amongst the following, the compound that can be most readily sulphonated is:*
(a) toluene (b) benzene
(c) nitrobenzene (d) chlorobenzene

6. *During nitration of benzene, the active nitrating agent is:*
(a) NO_3^{-1} (b) NO_2^{+}
(c) NO_2^{-1} (d) HNO_3

7. *Acylation of benzene to produce aliphatic aromatic ketones is known as:*
(a) Friedel Craft's reaction

(b) benzene condensation
(c) hydroformylation
(d) Clemmensen reduction

8. ***Benzene reacts with Cl_2 in sunlight to give the end product:***
(a) $C_6H_6Cl_6$ (b) C_6H_6Cl
(c) $O-C_6H_4Cl_2$ (d) $P-C_6H_4Cl_2$

9. ***Which of the following is explosive?***
(a) Trinitrophenol (b) Nitrophenol
(c) Nitromethane (d) Nitrobenzene

10. ***Which compound is the most reqctive one?***
(a) benzene (b) ethene
(c) ethane (d) ethyne

11. ***Among the following, poly cyclic compound is:***
(a) styrene
(b) cumene
(c) naphthalene
(d) xylene

12. ***Benzene can be obtained from***
(a) $H_3C \equiv CH_3$
(b) chlorobenzene
(c) $CH_2 = CH_2$ and butadiene
(d) all

13. ***The electrophile in aromatic sulphonation is:***
(a) H_2SO_4
(b) HSO_4^-
(c) SO_3
(d) SO_3^+

14. ***Aromatic compounds burn with sooty flame cause:***
(a) They have high percentage of hydrogen.
(b) They have a ring structure.
(c) They have high percentage of carbon.
(d) They resist reaction with air.

15. ***The conversion of n-hexane into benzene by heating in the presence of Cr_2O_3 is called:***
(a) Isomerization
(b) Aromatization
(c) Dealkylation
(d) Rearrangement

16. ***Simplest aromatic compound is:***
(a) bezene (b) Toluene
(c) aniline (d) Phenol

17. ***Ratio of carbon to hydrogen in aromatic compounds is:***
(a) Low than alkanes (b) High than alkanes
(c) Low than alkenes not high than alkanes (d) High than alkenes

18. ***Kekule structures contributed towards actual structure of benzene:***
(a) 60% (b) 70%
(c) 80% (d) 90%

19. ***Resonance energy of benzene is (in KJ mol^{-1}):***
(a) 120 (b) 150
(c) 170 (d) 180

20. ***Benzene gives reactions generally:***
(a) electrophilic substitution (b) addition
(c) synthesis (d) addition and electrophilic substitution

Answers

No	Ans	No	Ans	No	Ans	No	Ans	No	Ans
1	d	2	c	3	a	4	d	5	a
6	b	7	d	8	b	9	a	10	d
11	c	12	b	13	c	14	c	15	b
16	A	17	a	18	c	19	b	20	d

ALKYL HALIDES

1. ***In primary alkyl halides, the halogen atom is attached to a carbon which is attached to how many carbon atoms?***
a) Two b) Three
c) One d) Four

2. ***The reactivity order of alkyl halides for a particular alkyl group is:***
a) F> Cl>Br>I (b) Cl>Br>F>I
c) I>Br>Cl>F (d) Br>I>Cl>F

3. ***When CO_2 is made to react with ethyl magnesium iodide, followed by hydrolysis, the product formed is:***
a) Propane (b) Propanoic acid
c) Propanal (d) Propanol

4. ***Grignard reagent is reactive due to:***
a) the presence of halogen atom
b) the presence of Mg atom
c) the polarity of C – Mg bond
d) none of above.

5. ***SN_2 reactions can be best carried out with:***
a) Pri. alkyl halide b) Sec. Alkyl halide
c) Ter. Alkyl halide d) All the three

6. ***Elimination bimolecular reactions involve:***
a) First order kinetics
b) Second order kinetics
c) Third order kinetics
d) Zero order kinetics

7. ***For which mechanisms, the first step involved is the same:***
a) E_1 and E_2 b) E_2 and SN_2
c) E_2 and E_1 d) E_1 and SN_1

8. ***Alkyl halides are considered to be very reactive compounds towards nucleophiles, because:***
a) They have an electrophilic carbon
b) They have an electrophilic carbon and good

leaving group.
c) They have an electrophilic carbon and a bad leaving group.
d) They have a nucleophilic carbon and a good leaving group.

9. ***The rate of E_1 reaction depends upon:***
a) The concentration of substrate
b) The concentration of nucleophile
c) The concentration of substrate as well as nucleophile
d) None of the above

10. ***Which one of the following is not a nucleophile?***
a) H_2O b) H_2S
c) BF_3 d) NH_3

11. ***General formula of alkyl halide is:***
(a) R—X (b) R—OH
(c) R—COH (d) R—COOH

12. ***General formula of alkyl halide is:***
(a) $C_nH_{2n+2}X$ (b) $C_nH_{2n+1}X$
(c) $C_nH_{2n}X$ (d) C_nH_nX

13. ***Best method of preparation of alkyl halide from alcohols is by its reaction with:***
(a) HX (b) $SOCl_2$
(c) PX_5 and PX_3 (d) All

14. ***Alkyl halides are reactive:***
(a) high (b) medium
(c) less (d) least

15. ***SN_2 reaction has order of reaction:***
(a) first (b) second
(c) third (d) zero

16. ***E_2 has molecularity:***
(a) one (b) two
(c) three (d) half

17. ***Metal used in the preparation of Grignard's reagent is:***
(a) Ca (b) Na
(c) Mg (d) Zn

18. ***Reaction of Grignard's reagent with CO_2 gives:***
(a) aldehyde (b) pri–alcohol
(c) sec–alcohol (d) carboxylic acid

19. ***Reaction of which with Grignard's reagent gives primary alcohol:***
(a) formaldehyde (b) aldehyde
(c) ketones (d) acetone

20. ***Primary carbon attaches with other hydrogen atoms directly:***
(a) one (b) two
(c) three (d) at least one or more than it

Answers

No	Ans	No	Ans	No	Ans	No	Ans	No	Ans
1	c	2	c	3	b	4	c	5	a
6	b	7	d	8	b	9	a	10	c
11	a	12	b	13	e	14	a	15	a
16	b	17	c	18	e	19	b	20	d

ALCOHOLS, PHENOLS & ETHERS

1. ***Which compound shows more hydrogen bonding?***
(a) C_2H_6 (b) C_2H_5Cl
(c) $CH_3—O—CH_3$ (d) C_2H_5OH

2. ***Which compound shows maximum hydrogen bonding with water?***
(a) CH_3OH (b) C_2H_5OH
(c) $CH_3—O—CH_3$ (d) C_6H_5OH

3. ***Which compound is more soluble in water?***
(a) C_2H_5OH (b) C_6H_5OH
(c) CH_3OCH_3 (d) n-Hexanol

4. ***Which compound will have the maximum repulsion with water?***
(a) C_6H_6 (b) C_2H_5OH
(c) $CH_3CH_2CH_2OH$ (d) $CH_3—O—CH_3$

5. ***Ethanol can be converted into ethanoic acid by:***
(a) Hydrogenation (b) Hydration
(c) Oxidation (d) Fermentation

6. ***Which enzyme is not involved in the fermentation of starch?***
(a) Diastase (b) Zymase
(c) Urease (d) Invertase

7. ***Which compound is called a universal solvent?***
(a) H_2O (b) CH_3OH
(c) C_2H_5OH (d) $CH_3—O—CH_3$

8. ***Methyl alcohol is not used:***
(a) as a solvent (b) as an anti-freezing agent
(c) as a substitute for petrol
(d) for denaturing of ethyl alcohol

9. ***Rectified spirit contains alcohol about:***
(a) 80% (b) 85%
(c) 90% (d) 95%

10. ***According to Lewis concept ethers behave as:***
(a) acid (b) base
(c) acid as well as a base (d) None of them

11. ***Phenols are derivative of:***
(a) alkanes (b) alkenes
(c) alkynes (d) benzene

12. ***Alcohols are derivatives of:***
(a) alkanes (b) alkenes
(c) alkynes (d) benzene

13. ***Derivative of water is:***

(a) alcohols (b) phenols
(c) ether (d) All of these

14. *Dow's method is used to prepare:*
(a) Methanol (b) Ethanol
(c) Ether (d) Phenol

15. *Which is not property in ether:*
(a) very weak hydrogen bonding (b) High b.p
(c) slightly soluble (d) inflammable

16. *Methanol is prepared from CO and H_2 using catalyst:*
(a) ZnO (b) Cr_2O_3
(c) Pt (d) Ni

17. *Taste of lower alcohols is:*
(a) sweet (b) bitter
(c) our (d) salty

18. *Oxidation of ter–alcohol gives:*
(a) aldehyde (b) formaldehyde
(c) ketone (d) alkenes
(e) alkanes

19. *Alcohols can be distinguished using test:*
(a) Lucas (b) Tollen's
(c) Kolb's (d) William's

20. *Ethyl alcohol prepared during fermentation is pure:*
(a) 10% (b) 11%
(c) 12% (d) 13%

Answers

No	Ans	No	Ans	No	Ans	No	Ans	No	Ans
1	d	2	a	3	b	4	a	5	c
6	c	7	a	8	c	9	d	10	b
11	d	12	a	13	d	14	d	15	d
16	d	17	d	18	c	19	a	20	c

ALDEHYDES & KETONES

1. *The carbon of a carbonyl group is:*
(a) sp hybridized
(b) sp^2 hybridized
(c) sp^3 hybridized
(d) none of these

2. *Formalin is:*
a. 10% solution of formaldehyde in water.
b. 20% solution of formaldehyde in water.
c. 40% solution of formaldehyde in water.
d. 60% solution of formaldehyde in water.

3. *Which of the following will have the highest boiling point?*
(a) Methanal (b) Ethanal
(c) Propanal (d) 2–Hexanone

4. *Ketones are prepared by the oxidation of:*
(a) Primary alcohol
(b) Secondary alcohol
(c) Tertiary alcohol
(d) None of these

5. *Acetone reacts with HCN to form a cyanohydrin. It is an example of:*
(a) Electrophilic addition
(b) Electrophilic substitution
(c) Nucleophilic addition
(d) Nucleophilic substitution

6. *Which of the following compounds will not give iodoform test on treatment with I_2/NaOH?*
(a) Acetaldehyde (b) Acetone
(c) Butanone (d) 3–Pentanone

7. *Which of the following compounds will react with Tollen's reagent?*
(a) $CH_3CO H$
(b) $CH_3CO CH_3$
(c) CH_3COOH
(d) $CH_3CO CH_2CH_3$

8. *Cannizzaro's reaction is not given by:*
(a) Formaldehyde
(b) Acetaldehyde
(c) Benzaldehyde
(d) Trimethyl acetaldehyde

9. *Which of the following reagent will react with both aldehyde and ketones?*
(a) Grignard's reagent
(b) Tollen's reagent
(c) Fehling's reagent
(d) Benedict's reagent

10. *Aldehydes are oxidized to give:*
(a) Primary alcohol (b) Sec–alcohol
(c) Ter–alcohol (d) Carboxylic acid

11. *Carboxyl compounds have functional group:*
(a) R–C–X (b) R–CH=O
(c) RCOR (d) all

12. *The homologous series of aldehydes and ketones have general formula:*
(a) $C_nH_{2n}O$ (b) C_nH_nO
(c) $C_nH_{2n-1}O$ (d) $C_nH_nO_n$

13. *Formula of acetone is:*
(a) HCHO (b) CH_3CHO
(c) CH_3OCH_3 (d) $CH_3OC_2H_5$

14. *Reaction of Grignard's reagent with*

formaldehyde gives:
(a) pri–alcohol (b) sec–alcohol
(c) ter–alcohol (d) carboxylic

15. ***Reaction of Grignard's reagent with aldehydes other than formaldehyde gives: Reaction of Grignard's reagent with formaldehyde gives:***
(a) pri–alcohol (b) sec–alcohol
(c) ter–alcohol (d) carboxylic

16. ***Reaction of Grignard's reagent with ketones gives: Reaction of Grignard's reagent with formaldehyde gives:***
(a) pri–alcohol (b) sec–alcohol
(c) ter–alcohol (d) carboxylic

17. ***Iodoform test is given by:***
(a) Formaldehyde and higher ketones (b) Formaldehyde
(c) Acetaldehyde and methyl ketones (d) Acetaldehyde

18. ***Aldehydes and ketones can be prepared from alcohols by their:***
(a) reduction (b) oxidation
(c) decomposition (d) synthesis

19. ***Common names of aldehydes are given by corresponding:***
(a) ketone (b) alcohol
(c) carboxylic acid (d) ester

20. ***Cannizzaro's reaction is type of reaction:***
(a) self oxidation–Reduction reaction (b) disproportion reaction
(c) addition (d) a and b

Answers

No	Ans	No	Ans	No	Ans	No	Ans	No	Ans
1	b	2	c	3	d	4	b	5	c
6	d	7	d	8	b	9	a	10	d
11	d	12	a	13	c	14	a	15	b
16	C	17	c	18	b	19	c	20	d

CARBOXYLIC ACID

1) ***Acetic acid is manufactured by:***
(a) distillation (b) fermentation
(c) ozonolysis (d) esterification

2) ***A carboxylic acid contains:***
(a) a hydroxyl group
(b) a carboxyl group
(c) a hydroxyl and carboxly group
(d) a carboxyl and aldehyde group

3) ***Which acid is used in the manufacture of synthetic fibre?***
(a) Formic acid (b) Oxalic acid
(c) Carbonic acid (d) Acetic acid

4) ***Which following derivative cannot be prepared directly from acetic acid?***
(a) Acetamide (b) Acetyl chloride
(c) Acetic anhdride (d) Ethyl acetate

5) **Which reagent is used to reduce a carboxylic group to an alcohol?**
(a) H_2/Ni (b) H_2/Pt
(c) $NaBH_4$ (d) $LiAlH_4$

6) ***The solution of which acid is used for seasoning of food?***
(a) Formic acid (b) Acetic acid
(c) Benzoic acid (d) Butanoic acid

7) ***Organic compouunds X and Y react together to form organic compound Z. What types of compounds can X, Y and Z be?***

	X	Y	Z
(a)	Alcohol	Ester	Acid
(b)	Acid	Ester	Alcohol
(c)	Ester	Alcohol	Acid
(d)	Alcohol	Acid	Ester

8) ***An aqueous solution of an organic compound reacts with sodium carbonate to produce carbon dioxide gas. Which one of the following could be the organic compound?***
(a) $CH_2 = CH - CH_3$
(b) $CH_3 - CHO$
(c) $CH_3COOC_2H_5$
(d) $CH_3 - CH_2 - COOH$

9) ***Which of the following is not a fatty acid?***
(a) Propanoic acid (b) Acetic acid
(c) Phthalic acid (d) Butanoic acid

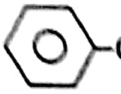
10) ***Acetamide is prepared by:***
(a) heating ammonium acetate
(b) heating methyl cyanide
(c) heating ethyl acetate
(d) the hydrolysis of methyl cyanide

11. ***A carboxylic acid with one carboxyl group:***
(a) monocarboxylic acid (b) dicarboxylic acid
(c) tricarboxylic acid (d) polycarboxylic acid

12. ***A compound containing carboxyl group in them are called:***
(a) ketone (b) ether
(c) carboxylic acids (d) aldehyde

13. ***A carboxylic acid containing Ar group in it is called:***
(a) aromatic carboxylic acid (b) aliphatic carboxylic acid

(c) dicarboxylic acid (d) carboxylic acid



is an example of carboxylic acid:

(a) aromatic carboxylic acid (b) aliphatic carboxylic acid
(c) dicarboxylic acid (d) carboxylic acid

5. ***In preparation method of carboxylic acids from alkyl halide always carboxylic acid formed which have carbon atoms:***
(a) one less than in R—X (b) one more than in R—X
(c) equal to in R—X (d) double to R—X

16. ***Which is not carboxylic acid with pungent smell?***
(a) formic acid (b) acetic acid
(c) ethanoic acid (d) butyric acid

17. ***Carboxyl group has functional group in it:***
(a) one (b) two
(c) three (d) four

18. ***Carboxylic acids react with acids releasing gas from it:***
(a) H_2O as steam (b) CO
(c) CO_2 (d) O_2

19. ***Active metals react with carboxylic acids releasing gas:***
(a) CO (b) CO_2
(c) H_2O as steam (d) H_2

20. ***Acetic acid reacts with PCl_5 giving:***
(a) acetamide (b) acetyl chloride
(c) alcohol (d) ether

Answers

No	Ans	No	Ans	No	Ans	No	Ans	No	Ans
1	b	2	b	3	d	4	a	5	d
6	b	7	d	8	d	9	a	10	a
11	a	12	c	13	a	14	a	15	b
16	d	17	b	18	c	19	d	20	b

MACROMOLECULES

1. ***In which of these processes are small organic molecules made into macromolecules?***
(a) The cracking of petroleum fractions
(b) The fractional distillation of crude oil
(c) The polymerization of ethane
(d) The hydrolysis of proteins

2. ***Which of these polymers is an addition polymer?***
(a) Nylon-6, 6 (b) Polystyrene
(c) Terylene (d) Epoxy resin

3. ***Which of these polymers is a synthetic polymer?***
(a) Animal fat (b) Starch
(c) Cellulose (d) Polyester

4. ***Plastics are a pollution problem because many plastics:***
(a) Are made from petroleum
(b) Are very inflammable
(c) Burn to produce toxic fumes
(c) Decompose to produce toxic products

5. ***The fibre which is made from acrylonitrile as monomer:***
(a) PVC (b) Rayon fibre
(c) Acrylic fibre (d) Polyester fibre

6. ***A polymeric substance that is formed in the liquid state and then hardened to a rigid solid is called a:***
(a) Fibre (b) Plastic
(c) Varnish (d) Polyamide resin

7. ***Vegetable oils are:***
(a) Unsaturated fatty acids
(b) Glycerides of unsaturated fatty acids
(c) Essential oils obtained from plants

8. ***Which one of the following elements is not present in all proteins?***
(a) Carbon (b) Hydrogen
(c) Nitrogen (d) Sulphur

9. ***Which one of the following is a water soluble vitamin?***
(a) Niacin (b) Riboflavin
(c) Trypsin (d) Ascorbic acid

10. ***Which one of the following enzymes brings about the hydrolysis of fats?***
(a) Urease (b) Maltase
(c) Zymase (d) Lypase

11. ***The reaction between fat and NaOH is called:***
(a) Esterification (b) Hydrogenolysis
(c) Fermentation (d) Sponification

12. ***Which one of the following statements about glucose and sucrose is incorrect?***
(a) Both are soluble in water
(b) Both are naturally occurring
(c) Both are carbohydrates
(d) Both are disaccharides

13. ***Which behaves as insulator for animals body?***
(a) carbohydrates (b) proteins
(c) fats (d) skin

14. ***The steroids of fungi and yeast are called:***
(a) vitamin D (b) vitamin D_2
(c) ergosterol (d) cholesterol

15. *An oil or fat with no double bond have iodine number:*
(a) zero (b) 100%
(c) 50% (d) minimum

16. *Which property is not present in lipids?*
(a) liquid (b) solid or semi solid
(c) soluble in water (d) form emulsion

17. *Which is the derived lipid?*
(a) common fats (b) vitamin–D
(c) common oils (d) spinolipids

18. *Major food factors are:*
(a) fats and oils (b) carbohydrates
(c) proteins (d) All of these

19. *Factors affecting denaturation of proteins:*
(a) change in temp and pH (b) strong reducing agent
(c) strong oxidizing agent (d) All of these

20. *The high molecular weight materials which yield on hydrolysis the amino acids is called:*
(a) carbohydrates (b) lipids
(c) fatty acids (d) proteins

No	Ans	No	Ans	No	Ans	No	Ans	No	Ans
1	c	2	b	3	d	4	c	5	c
6	B	7	b	8	c	9	c	10	d
11	d	12	d	13	c	14	c	15	a
16	c	17	b	18	d	19	d	20	d

COMMON CHEMICAL INDUSTRIES IN PAKISTAN

11. *Cement is a combination of mainly:*
(a) calcarious (b) argillaceous
(c) calcarious and argillaceous (d) Al_2O_3

12. *Major component in cement is:*
(a) SiO_2 (b) Lime
(c) Al_2O_3 (d) MgO

13. *Composition of clay in cement is:*
(a) 25% (b) 50%
(c) 75% (d) 80%

14. *Pakistan in the beginning was a country:*
(a) industrial (b) chemical
(c) agrarian (d) technological

15. *Which is not nitrogeneous fertilizers?*
(a) $(NH_4)_2HPO_4$ (b) NH_4NO_3
(c) urea (d) calcium phosphate

16. *Major fertilizers with micro–nutrients are:*
(a) Nitrogeneous (b) Phosphatic
(c) Potash (d) a, b, c

17. *The strength of economy of a country is measured with respect to production of:*
(a) Medicines (b) Cement
(c) Fertilizers (d) Paper

18. *A colloidal gel is:*
(a) 3Ca, Al_2O_3 (b) $CaSO_2.2H_2O$
(c) $3CaAl_2O_3.3CaSO_4.2H_2O$ (d) $3Ca.Al_2O_3.6H_2O$

19. *Setting time of cement is controlled by adding:*
(a) Epsom (b) Gypsom
(c) $CaCO_3$ (d) $CaCl_2$

20. *75% plant nutrients are present in the fertilizer:*
(a) urea (b) NH_4NO_3
(c) NH_3 (d) $(NH_4)_2HPO_4$

No	Ans	No	Ans	No	Ans	No	Ans	No	Ans
1	c	2	c	3	d	4	d	5	b
6	b	7	c	8	b	9	a	10	d
11	c	12	b	13	a	14	c	15	d
16	d	17	d	18	d	19	b	20	d

ENVIRONMENTAL CHEMISTRY

1. *The pH range of the acid rain is:*
a) 7-6.5 b) 6.5-6
c) 6-5.6 d) less than 5

2. *Peroxyacetylnitrate (PAN) is an irritant to human beings and it affects:*
a) eyes b) ears
c) stomach d) nose

3. *The range of UV-B is:*
a) 320 to 400 nm b) 200 to 280 nm
c) 280 to 320 nm d) 50 to 400 nm

4. *A single chloride free radical can destroy bow many ozone molecules?*
a) 100 b) 100000
c) 10000 d) 10

5. *Fungicides are the pesticides which:*
a) control the growth of fungus
b) kill insects
c) kills plants
d) kill herbs

6. *DDT is a:*
a) fungicide b) insecticide
c) herbicide d) all

7. **The main pollutant of leather tanneries in the waste water is due to the *salt of:***

a) lead
b) chromium (VI)
c) copper
d) chromium (III)

8. ***In purification of potable water the coagulant used is:***
a) nickel sulphate
b) copper sulphate
c) barium sulphate
d) aluminium sulphate

9. ***The temperature in the incineration process has a range:***
a) 900 to 1000°C b) 650 to 1100°C
c) 950 to 1300°C d) 500 to 900°C

10. ***Newspaper can be recycled again and again by how many times?***
a) 2 b) 3
c) 4 d) 5

11. ***Chloroform is carcinogenic:***
(a) heart (b) lungs
(c) liver (d) kidney

12. ***Which is used as a coagulant:***
(a) Ferric salts (b) Potash alum
(c) a and b both (d) chlorine

13. ***Water is purified by the process:***
(a) aeration (b) coagulation
(c) chlorination (d) All of these

14. ***BOD is the oxygen demand with in day(s):***
(a) four (b) two
(c) three (d) five

15. ***Factors affecting quality of water:***
(a) D.O (b) BOD
(c) COD (d) all a, b, c

16. ***Contamination of water of tanning industries is due to:***
(a) Cr(III) (b) Cr(VI)
(c) Mn(III) (d) Mn(VII)

17. ***Forms of waste products:***
(a) heat (b) smoke
(c) solid (d) All of these

18. ***How much pesticides have been synthesized at present?***
(a) four thousand (b) six thousands
(c) eight thousand (d) ten thousands

19. ***A single free chlorine radical can destroy ozone molecules upto:***
(a) 100000 (b) 100
(c) 1000 (d) 10000

20. ***Depletion of ozone is more during the month:***
(a) Jan–March (b) April–Jun
(c) July–Aug (d) Sept–Nov

21 ***Unit of ozone is:***
(a) Debye (b) Dobson
(c) esu (d) Coulumb

22. ***Main cause of reducing map is:***
(a) combustion of coal (b) NO and NO_2
(c) un-burnt hydrocarbons (d) All of these

23. ***Coal contains sulphur in it:***
(a) 1–3% (b) 1–6%
(c) 1–9% (d) 1–12%

24. ***Volcanoes produce SO_2:***
(a) 47% (b) 57%
(c) 67% (d) 77%

25. ***Reason of pollution are:***
(a) Population and urbanization (b) transportation
(c) industrialization (d) All of these

26. ***Nitrogen in the atmosphere is:***
(a) 78% (b) 21%
(c) 0.9% (d) 0.03%

27. ***The layer of earth around the earth is called:***
(a) Atmosphere (b) Hydrosphere
(c) Lithosphere (d) Biosphere

28. ***Components of environment are:***
(a) Atmosphere (b) Hydrosphere
(c) Lithosphere (d) All of these

29. ***Atmosphere thickness is (in km) around the earth:***
(a) 10 km (b) 100 km
(c) 1000 km (d) 1500 km

30. ***The rigid rocky part of earth crust called lithosphere extends upto a depth of:***
(a) 10 km (b) 100 km
(c) 1000 km (d) 1500 km

Answers

No	Ans	No	Ans	No	Ans	No	Ans	No	Ans
1	d	2	a	3	d	4	b	5	a
6	b	7	b	8	d	9	a	10	d
11	c	12	c	13	d	14	d	15	d
16	b	17	d	18	d	19	a	20	d
21	b	22	a	23	c	24	c	25	d
26	a	27	a	28	d	29	c	30	b

****

PHYSICS

MEASUREMENTS

1. ***Silicon can be obtained from:***
(A) Lead (B) Uranium
(C) An isotope of oxygen (D) Sand

2. ***Light year is a unit of:***
(A) Time (B) Distance
(C) Velocity (D) Intensity of light

3. ***1 gm-cm^{-3} is equal to:***
(A) 10^3 kg-m^{-3} (B) 10^{-3} kg-m^{-3}
(C) 1 kg-m^{-3} (D) 10^6 kg- m^{-1}

4. ***Which one is the least multiple:***
(A) Pico (B) Femto
(C) Nano (D) Atto

5. ***Significant figures in 0.0010 are:***
(A) Four (B) Three
(C) Two (D) One

6. ***Resistance of a wire has been calculated by $R = \frac{V}{I}$ as 6.2 Ω with 8% uncertainty. Then the result in ohms will be recorded as:***
(A) 6.2 ± 8 (B) 6.2 ± 4
(C) 6.2 ± 2 (D) 6.2 ± 0.5

7. ***Addition of 2.189 kg, 0.089 kg, 11.8 kg and 5.32 kg gives the rounded off answer as:***
(A) 19.398 (B) 19.400
(C) 19.4 (D) 19.3

8. ***Which quantity has different dimensions:***
(A) Work (B) Pressure
(C) Energy (D) Torque

9. ***The quantity having dimension of ML^2T^{-2} will have SI unit of:***
(A) Watt (B) Newton
(C) Joule (D) Metre

10. ***The time taken by light to travel from Moon to Earth is:***
(A) 80 sec (B) 500 sec
(C) 1.802×10^4 sec (D) Aerophysics

ANSWERS

1.	D	2.	B	3.	A	4.	D	5.	C
6.	D	7.	C	8.	B	9.	C	10.	A

VECTORS & EQUILIBRIUM

1. ***Which is correct?***
(A) $\vec{A} = \frac{A}{\hat{A}}$ (B) $\hat{A} = \frac{A}{\vec{A}}$
(C) $A = \frac{\vec{A}}{\hat{A}}$ (D) $A = \frac{\hat{A}}{\vec{A}}$

2. ***The direction of a vector in space is specified by:***
(A) One angle (B) Two angles
(C) Three angles (D) None of above.

3. ***Distance AB between the points A (2,3,4) and B (-5,6,7) is given by:***
(A) $7\hat{i} + 9\hat{j} + 11\hat{k}$ (B) $-7\hat{i} - 9\hat{j} - 11\hat{k}$
(C) $-3\hat{i} - 3\hat{j} - 3\hat{k}$ (D) $-7\hat{i} + 3\hat{j} + 3\hat{k}$

4. ***If $\vec{A} = 2\hat{i} + 3\hat{j} - 4\hat{k}$, then its magnitude will be:***
(A) $\sqrt{-3}$ (B) $\sqrt{-1}$
(C) -1 (D) $\sqrt{29}$

5. ***Which one is correct?***
(A) $A\cos\theta = \frac{\vec{A}.\vec{B}}{B}$ (B) $A\cos\theta = \frac{B}{\vec{A}.\vec{B}}$
(C) $A\cos\theta = \frac{\vec{B}}{A.B}$ (D) $A\cos\theta = \frac{\vec{A}.\vec{B}}{\vec{B}}$

6. ***Work done by the force $3\hat{i} + 2\hat{j}$ for a distance $4\hat{i} + 5\hat{j}$ will be:***
(A) 12 units (B) 22 units
(C) 32 units (D) 42 units

7. ***The product of mass and velocity gives momentum of certain body. This product is called:***
(A) Dot product (B) Cross product
(C) Simple product (D) None of these

8. ***Magnitude of torque acting on a body determines:***
(A) Linear acceleration (B) Angular acceleration
(C) Mass (D) Moment arm

9. ***Torque is also called:***
(A) Momentum (B) Linear inertia
(C) Moment of a force (D) Mass

10. ***The perpendicular distance from the axis of rotation to the line of action of force is called:***
(A) Moment arm (B) Moment of a force

(C) Torque (D) None of these

ANSWERS

1.	C	2.	C	3.	D	4.	D	5.	A
6.	B	7.	C	8.	B	9.	C	10.	A

MOTION & FORCE

1. ***When brakes are applied to a fast moving car, the passengers will be thrown:***
(A) Forward (B) Backward
(C) Downward (D) None of these

2. ***The direction of acceleration of a body moving in a straight line is:***
(A) Along $\Delta\vec{V}$ (B) Perpendicular to $\Delta\vec{V}$
(C) Towards origin (D) None of these

3. ***Consult page 50 of your text and tick the correct statement:***
(A) Velocity of x-rays is greater than velocity of light (B) Velocity of light is less than velocity of radio waves
(C) Velocity of light, x-rays and radio waves is the same (D) None of above is correct

4. ***The law of conservation of linear momentum is valid for:***
(A) Atoms only (B) Molecules only
(C) Other systems only (D) All of them

5. ***If V denotes volume of the liquid coming out of a pipe per second, v its velocity and A as area of the pipe, then the correct formula will be:***
(A) $V = v \times A$ (B) $v = V \times A$
(C) $A = v \times V$ (D) None of these

6. ***If m means mass of gases ejected per second from a rocket and v shows the change in velocity, then mv is named as:***
(A) Force (B) Energy
(C) Work (D) Impulse

7. ***Range of the projectile is the same for the following pair of angles:***
(A) 0° and 45° (B) 35° and 55°
(C) 15° and 60° (D) 30° and 75°

8. ***For maximum horizontal range, the angle of projection must be:***
(A) 0° (B) 45°
(C) 60° (D) 90°

9. ***At the highest point, we can claim that:***
(A) Resultant velocity is zero (B) Only horizontal component of velocity is zero,
(C) Only v_y is zero (D) Nothing of above

10. ***A projectile is thrown at an angle of 30° with horizontal with a velocity of 980 m sec^{-1}. The time of flight to reach the highest point of its trajectory is:***
(A) 50 sec (B) 100 sec
(C) 150 sec (D) 250 sec

ANSWERS

1.	A	2.	A	3.	C	4.	D	5.	A
6.	A	7.	B	8.	B	9.	C	10.	A

WORK & ENERGY

1. ***Work done along a closed path in a gravitational field is:***
(A) Maximum (B) Minimum
(C) Zero (D) Unity

2. ***Tick the conservative force:***
(A) Tension in a string (B) Air resistance
(C) Elastic spring force (D) Frictional force

3. ***A body of weight 1 N has a kinetic energy of 1 Joule when its speed is:***
(A) 1.46 m sec^{-1} (B) 2.44 m sec^{-1}
(C) 3.42 m sec^{-1} (D) 4.43 m sec^{-1}

4. ***When two protons are brought closer potential energy of both of them:***
(A) Increases (B) Decreases
(C) Remains same (D) None of these

5. ***The velocity given to a body to go out of the influence of Earth's gravity is known as:***
(A) Terminal velocity (B) Orbital velocity
(C) Escape velocity (D) None of these

6. ***One KWh is equal to:***
(A) 3.6×10^2 J (B) 3.6 KJ
(C) 3.6×10^1 KJ (D) 3.6 MJ

7. ***The consumption of energy by a 1000 watt heater in half an hour is:***
(A) 5 Kwh (B) 0.5 Kwh
(C) 2.5 Kwh (D) 3.2 Kwh

8. ***Biomass includes:***
(A) Crop residue (B) Natural vegetation
(C) Animal dung (D) All of these

9. ***Root out the conventional source of energy:***
(A) Energy from (B) Hydroelectric

biomass energy
(C) Geothermal energy (D) None of these

10. *Ethanol (alcohol) is a type of:*
(A) Electric fuel (B) Bio fuel
(C) Nuclear fuel (D) None of these

ANSWERS

1.	C	2.	C	3.	D	4.	A	5.	C
6.	D	7.	B	8.	D	9.	B	10.	B

CIRCULAR MOTION

1. *Conventionally the angular velocity is directed at an angle of:*
(A) 90° to the axis of rotation (B) 30° to the axis of rotation
(C) 0° to the axis of rotation (D) None of the above

2. *If a toy car moves with a uniform speed of 2 m/sec in a circle of 0.4 m radius. His angular velocity in rev/sec is:*
(A) 10π (B) 0.8
(C) 0.2π (D) None

3. *Thirty-six degrees is equal to:*
(A) $\frac{\pi}{5}$ (B) $\frac{\pi}{8}$
(C) $\frac{\pi}{12}$ (D) $\frac{\pi}{6}$

4. *The relation between τ, I and α is as follows:*
(A) $\tau = I^2 \alpha$ (B) $\alpha = \tau I$
(C) $I = \alpha \tau$ (D) $\tau = I \alpha$

5. *If a gymnast sitting on a rotating stool with his arms outstretched, brings his arms towards the chest, then its angular velocity will:*
(A) Increase (B) Decrease
(C) Remain constant (D) None of these

6. *The net force acting on a 100 kg man standing in an elevator accelerating downward with $a = 9.8\ m\ sec^{-2}$ comes out to be:*
(A) 980 N (B) 580 N
(C) 1380 N (D) Zero

7. *A ball tied at one end of the string is swung in a vertical circle of radius r under action of gravity. The net force towards centre at the top most point is:*
(A) T – W (B) T + W
(C) W – T (D) None of these

8. *The number of "Earth stations" which transmit signals to satellites and receive signals from them are:*
(A) 3 (B) 24
(C) 126 (D) 200

9. *INTELSAT operates at frequencies 4, 6, 11, 14 having unit of:*
(A) KHz (B) MHz
(C) GHz (D) BHz

10. *Einstein's theory about gravity is better than Newton's because it gave explanation of:*
(A) Inverse square law (B) Bending of light
(C) Both A and B (D) None of above

ANSWERS

1.	C	2.	A	3.	A	4.	D	5.	B
6.	D	7.	B	8.	D	9.	C	10.	C

FLUID DYNAMICS

1. *The property of fluids due to which they resist their own flow is called:*
(A) Drag force (B) Surface tension
(C) Viscosity (D) None of these

2. *Density of a fluid is defined as:*
(A) Its volume to mass ratio (B) Product of volume and mass
(C) Its mass of volume ratio (D) None of these

3. *Stoke's law holds for:*
(A) Motion through free space (B) Motion through viscous medium
(C) Bodies of all shapes (D) None of these

4. *Fog droplets are suspended in air when their weight is balanced by:*
(A) Force of gravity (B) Upward thrust due to air
(C) Surface tension (D) None of these

5. *The equation of continuity is defined as $A_1v_1 = A_2v_2$. Unit of A_1v_1 is:*
(A) Cubic meter (B) Cubic meter per second
(C) Square meter per second (D) None of these

6. *Turbulent flow is:*
(A) Unsteady and regular (B) Steady and irregular
(C) Unsteady and irregular (D) None of these

7. *Unit of density to mass ratio is:*

(A) m^3 (B) m^{-3}
(C) $kg\text{-}m^{-3}$ (D) None of these

8. *Volume of a cylinder can be found by:*
(A) $\frac{4}{3}\pi r^3$ (B) $\pi r^2 l$
(C) Length × breadth × height (D) None of these

9. *Normally, the blood pressure (torr unit) in a healthy human body varies from:*
(A) 200 to 100 (B) 150 to 70
(C) 120 to 80 (D) 100 to 60

10. *Inflatable bag is a part of:*
(A) Sphygmomanometer (B) Stethoscope
(C) Thermometer (D) None of these

ANSWERS

1.	C	2.	C	3.	B	4.	B	5.	B
6.	C	7.	C	8.	B	9.	C	10.	A

OSCILLATIONS

1. *When quarter of a cycle is completed, the phase of vibration is:*
(A) 90° (B) 180°
(C) 45° (D) 360°

2. *Distance covered during one vibration of an oscillating body in terms of amplitude A is:*
(A) A (B) 2 A
(C) 3 A (D) 4 A

3. *A body of mass 0.031 kg attached to one end of a spring of spring constant 0.3 N/m, then time period of spring mass system will be:*
(A) 1.5 sec (B) 2.0 sec
(C) 2.3 sec (D) 2.5 sec

4. *The time period of a simple pendulum is independent of its:*
(A) Length (B) Mass
(C) Value of g (D) Both A and B

5. *If time period of a pendulum is doubled by increasing its length, then its frequency will:*
(A) Also be doubled (B) Become half
(C) Become one fourth (D) Becomes four times

6. *The string of a simple pendulum should be:*
(A) Heavy (B) Extensible
(C) Inextensible (D) None of these

7. *Second's pendulum is the pendulum whose time period is:*
(A) 1 second (B) 2 seconds
(C) 3 seconds (D) None of these

8. *An object undergoes SHM. Its maximum speed occurs when its displacement from equilibrium position is:*
(A) Maximum (B) Half of its maximum value
(C) Zero (D) None

9. *Free oscillations are always produced by:*
(A) An applied force (B) Gravitational force
(C) Restoring force and inertia (D) Inertia only

10. *If the waves produced in a microwave oven are of wave-length 12 cm, then their frequency will be:*
(A) 2500 MHz (B) 0.25 MHz
(C) 2500 KHz (D) None of these

ANSWERS

1.	A	2.	D	3.	B	4.	B	5.	B
6.	C	7.	B	8.	C	9.	C	10.	A

WAVES

1. *The square root of 0.4 is _____.*
(A) Greater than 0.4 (B) Smaller than 0.4
(C) Equal to 0.4 (D) None of them

2. *Wavelength and time period T are related to the velocity v of the wave as:*
(A) $\lambda = \frac{T}{v}$ (B) $\lambda = \frac{v}{T}$
(C) $\lambda = Tv$ (D) None of these

3. *The ratio of speed of sound in hydrogen to the speed of sound in oxygen is:*
(A) 4:1 (B) 1:4
(C) 8:1 (D) 1:8

4. *If the atmospheric pressure is doubled, the speed of sound:*
(A) Increases by 61 $cm\ sec^{-1}$ (B) Decreases by 61 $cm\ sec^{-1}$
(C) Remains constant (D) None of these

5. *Two identical tuning forks vibrate at 256 c/sec. After loading one of them, 6 beats /sec are heard when forks are sounded together. The period of the loaded fork is:*
(A) 2×10^{-3} sec (B) 3×10^{-3} sec
(C) 4×10^{-3} sec (D) 0.006 sec

6. *The effect of loading the prongs of a tuning fork with wax is to:*
(A) Increase the frequency (B) Decrease the frequency
(C) Maintain the original (D) All of these

frequency

7. *Given for (cylindrical) metal wire, $\rho = 10^3$ kg/m^3, diameter = 2mm, ℓ = 32 cm, find out its mass:*
(A) 1 gram (B) 10 gms
(C) 100 gms (D) 1 kg

8. *The wavelength of sound produced by an open end organ pipe in nth mode is:*
(A) $\frac{2l}{n}$ (B) $2nl$
(C) 2n + 1 (D) None of these

9. *In which case, Doppler's effect is used:*
(A) Radar (B) Sonar
(C) To find speed of stars (D) All of these

10. *As an empty test tube is filled with water, frequency of the air column:*
(A) Decreases (B) Remains same
(C) Increases (D) None of these

ANSWERS

1.	A	2.	C	3.	A	4.	C	5.	C
6.	B	7.	A	8.	A	9.	D	10.	C

PHYSICAL OPTICS

1. *Frequency of red colour as compared to that of violet colour is:*
(A) Equal (B) Smaller
(C) Greater (D) None of these

2. *Phase change of 180° is equivalent to a path difference of:*
(A) 2λ (B) λ
(C) $\lambda/2$ (D) $\lambda/4$

3. *Conditions for interference are that the two sources should be coherent and:*
(A) At a far off distance (B) Close together
(C) Coinciding (D) None of these

4. *To find wavelength of light by his experiment, Newton utilized:*
(A) Principle of phase change (B) Snell's law
(C) Bragg's law (D) Both A and C

5. *Wavelength of light can be found by means of Michelson Interferometer using the formula:*
(A) $\lambda = \frac{2m}{L}$ (B) $\lambda = \frac{L}{2m}$
(C) $\lambda = \frac{m}{2L}$ (D) $\lambda = \frac{2L}{m}$

6. *A grating has 5000 lines per centimeter. Then grating element will be given as:*
(A) 2×10^{-6} m (B) 2×10^{8} m
(C) 2×10^{-10} m (D) 2×10^{-4} m

7. *Diffraction effect is:*
(A) More for a round edge (B) More for a sharp edge
(C) Less for a sharp edge (D) None of these

8. *In Bragg's equation, d represents:*
(A) Grating element (B) Slit separation
(C) Interplaner spacing (D) None of these

9. *X-ray diffraction has been used in studying the:*
(A) Crystal structure (B) Haemoglobin
(C) Double helix structure of DNA (D) All of these

10. *Which of the following cannot be polarized:*
(A) Ultraviolet rays (B) Sound waves
(C) Radio waves (D) X-rays

ANSWERS

1.	B	2.	C	3.	B	4.	A	5.	D
6.	A	7.	B	8.	C	9.	D	10.	B

OPTICAL INSTRUMENTS

1. *With age, least distance of distinct vision:*
(A) Increases (B) Decreases
(C) Is not affected (D) None is correct

2. *Conventionally, all the distances p, q, f are measured from _____ of the lens.*
(A) Focus (B) Optical centre
(C) Edges (D) None of these

3. *The image of an object 5 mm length is only 1 cm high. The magnification produced by lens is:*
(A) 1 (B) 0.2
(C) 2 (D) 0.1

4. *Resolving power in mth order diffraction for grating is given by:*
(A) $R = \frac{N}{m}$ (B) $R = \frac{m}{N}$
(C) $R = N \times m$ (D) None of these

5. *The working of compound microscope is based on the principle of:*
(A) Reflection (B) Refraction
(C) Both A and B (D) None of these

6. *A spectrometer is used to study:*
(A) Working of a telescope (B) Working of collimator

(C) Construction of turn-table and circular scales (D) Spectra

7. *The magnifying power of an astronomical telescope increases with:*
(A) Decreasing f_e (B) Increasing f_e
(C) Increasing f_o (D) None of these

8. *In Michelson's experiment, the rotational mirror and plane mirror were mounted on:*
(A) The same mountain (B) Different mountains
(C) One on the mountain and the other on the ground (D) None of these

9. *A material having high refractive index has:*
(A) Low density (B) High density
(C) Zero density (D) None of above

10. *Multi-mode step index fibre has diameter of:*
(A) Above 50 μ m (B) Below 50 μ m
(C) About 50 μ m (D) None of these

ANSWERS

1.	A	2.	B	3.	C	4.	C	5.	B
6.	D	7.	B	8.	B	9.	B	10.	C

HEAT & THERMODYNAMICS

1. *Avogadro number is known as number of molecules in:*
(A) One kg of a substance (B) Unit volume of a substance
(C) One mole of a substance (D) None of these

2. *The nature of thermal radiation is similar to:*
(A) Ultraviolet rays (B) Light rays
(C) Both of them (D) None of them

3. *In which process, the change in internal energy of the system is zero:*
(A) Isochoric process (B) Isobaric press
(C) Adiabatic process (D) Isothermal process

4. *If A is the area of the piston and Δy is the distance moved by the piston, then change in volume is expressed by:*
(A) $\frac{A}{\Delta y}$ (B) $\frac{\Delta y}{A}$
(C) $A + \Delta y$ (D) $A\Delta y$

5. *Carnot cycle is:*
(A) Reversible (B) Irreversible
(C) Sometimes A, sometimes B (D) None of these

6. *The efficiency of a practical heat engine:*
(A) Can be 100% (B) Cannot be 100%
(C) Is always zero (D) None of these

7. *Number of spark plugs needed in diesel engine is:*
(A) Four (B) Five
(C) Six (D) None of these

8. *No entropy change is associated with:*
(A) Isothermal process (B) Adiabatic process
(C) Isobaric process (D) None of them

9. *Only those processes are probable to take place for which entropy of the system:*
(A) Increases (B) Remains constant
(C) Both A and B are correct (D) None of above

10. *When heat is added to the system, the entropy change is:*
(A) Positive (B) Negative
(C) Zero (D) None of these

ANSWERS

1.	C	2.	C	3.	D	4.	D	5.	A
6.	B	7.	D	8.	B	9.	C	10.	C

ELECTROSTATICS

1. *If the distance between two charges is doubled, the force between them will become:*
(A) Double (B) Half
(C) Three times (D) One fourth
(E) One third

2. *The value of ε_o in Coulomb's law is:*
(A) $9 \times 10^9\ Nm^2 C^{-2}$ (B) $8.85 \times 10^{-12}\ C^2 N^{-1} m^{-2}$
(C) $8.85 \times 10^{-12}\ Nm^2 C^{-2}$ (D) $9 \times 10^9\ C^2 N^{-1} m^{-2}$
(E) None of these

3. *The SI unit of constant k in Coulomb's law is:*
(A) $Nm^2 C^{-2}$ (B) $C^2 N^{-1} m^{-2}$
(C) $C^2 N^{-2} m^{-2}$ (D) $Nm^{-2} C^2$
(E) None of these

4. *Two charges are located respectively at positions $\vec{r_1} = 3.0\hat{j}$ and $\vec{r_2} = 4.0\hat{i}$ w.r.t. certain reference point. The distance between the charges is:*
(A) Zero (B) $4\hat{i} + 3\hat{j}$
(C) $4\hat{i} - 3\hat{j}$ (D) $12\hat{k}$
(E) None of these

5. ***Origin of the electric and the gravitational forces:***
(A) was known in 1911 A.D.
(B) was known in 1811 A.D.
(C) was known in 1711 A.D.
(D) is still unknown
(E) was known in 1611 A.D.

6. ***The concept of electric field theory was introduced by:***
(A) Michael Faraday (B) Newton
(C) Dalton (D) Kepler
(E) Einstein

7. ***Michael Faraday is known by his work on:***
(A) Nuclear strong force (B) Gravitational force
(C) Nuclear weak force (D) Electric force
(E) None of these

8. ***There are two charges of $1\mu C$ and $5\mu C$ placed at certain distance. The ratio of the forces acting on each other will be:***
(A) 1 : 5 (B) 1 : 1
(C) 5 : 1 (D) 1 : 25
(E) None of these

9. ***Electric field strength is defined as:***
(A) Work done on unit charge
(B) Force exerted on unit charge
(C) Distance covered by unit charge
(D) Power exerted by unit charge
(E) None of these

10. ***Electric intensity at a place due to a charged conductor is a:***
(A) Scalar quantity
(B) Vector quantity
(C) Semi-vector and semi-scalar
(D) Dimensionless quantity
(E) Both (A) and (D) are true

11. ***The intensity at a point due to a charge is inversely proportional to:***
(A) Amount of charge (B) Size of the charge
(C) Distance between charge and the point
(D) Square of the distance from the charge
(E) None of these

12. ***The SI unit of charge is:***
(A) Ampere (B) Watt
(C) Coulomb (D) Volt
(E) Joule

13. ***The electric field lines start from:***
(A) Positive charge (B) Negative charge
(C) Either (A) or (B) (D) Neutron
(E) An atom

14. ***Electric lines of force:***
(A) Intersect each other (B) Are always parallel
(C) Are always anti-parallel (D) Never intersect
(E) None of these

15. ***If a field force of 1N acts on a test charge of $1\ \mu C$, then the strength of electric field at that point is:***
(A) 1 N/C (B) 1 N/μC
(C) 10^7 N/C (D) 10^6 N/C
(E) Both (A) and (D)

Answers

1.	D	2.	B	3.	A	4.	C
5.	D	6.	A	7.	D	8.	B
9.	B	10.	B	11.	D	12.	A
13.	A	14.	D	15.	E		

CURRENT ELECTRICITY

1. ***Most practical applications of electricity involve:***
(A) Charges at rest (B) Charges in motion
(C) Electrons at rest (D) Atoms in motion
(E) Molecules in motion

2. ***The current that flows through the coil of a motor causes:***
(A) Its shaft to revolve (B) Its brushes to rotate
(C) Motor to move (D) Its shaft to rotate
(E) None of these

3. ***SI unit of current describes the flow of charge at the rate of:***
(A) One ampere per second
(B) One coulomb per second
(C) One electron per second
(D) 6.25×10^{18} electrons per second
(E) Both (B) and (D)

4. ***In case of metallic conductors, the charge carriers are:***
(A) Protons (B) Electrons
(C) Antiprotons (D) Positrons
(E) Both (A) and (B)

5. ***The charge carriers in an electrolyte are:***
(A) Positive ions (B) Negative ions
(C) Either (A) or (B) (D) Both (A) and (B)
(E) Neither (A) nor (B)

6. ***In gases, the charge carriers are:***
(A) Electrons (B) Positive ions

(C) Negative ions (D) Both (A) and (C)
(E) Both (A) and (B)

7. ***The conventional current is the name given to current due to flow of:***
(A) Positrons (B) Positive charges
(C) Negative charges (D) Both (A) and (C)
(E) None of these

8. ***A current of 1 ampere is passing through a conductor. The charge passing through it in half a minute is:***
(A) One Coulomb (B) 0.5 Coulomb
(C) 30 Coulombs (D) 2 Coulombs
(E) None of these

9. ***The positive charge moving in one direction is equivalent in all external affects to a:***
(A) Negative charge moving in the same direction.
(B) Positive charge moving in the opposite direction.
(C) Negative charge moving in the opposite direction.
(D) Positive charge moving in the same direction.
(E) None of these

10. ***In a metal, the valence electrons are:***
(A) Attached to individual atoms
(B) Not attached to individual atoms
(C) Free to move within the metal
(D) Both (A) and (C)
(E) Both (B) and (C)

11. ***The free electrons in metals:***
(A) Are in random motion and their speed depends upon temperature.
(B) Move in a particular direction.
(C) Move with speed of light.
(D) Move such that their speed does not depend upon temperature.
(E) None of these

12. ***The rate at which the free electrons pass through any section of a metallic wire from right to left is:***
(A) Greater than the speed at which they pass from left to right
(B) Less than the speed at which they pass from left to right
(C) The same at which they pass from left to right
(D) Any of above
(E) None of these

13. ***If the ends of a wire are connected to a battery, an electric field E will be set up at:***
(A) The ends of the wire only
(B) Mid point of the wire only
(C) Every point within the wire
(D) At nodes only
(E) None of these

14. ***The magnitude of drift velocity is of the order of:***
(A) 10^{-6} ms^{-1} (B) 10^{-3} ms^{-1}
(C) 10^{3} ms^{-1} (D) 10^{6} ms^{-1}
(E) None of these

15. ***The term drift velocity is used when the ends of a wire are:***
(A) Connected to a laser source
(B) Connected to a voltage source
(C) Not connected to a voltage source
(D) At different values of potential
(E) Both (B) and (D)

Answers

1.	B	2.	D	3.	E	4.	B
5.	D	6.	E	7.	B	8.	C
9.	B	10.	E	11.	A	12.	C
13.	C	14.	B	15.	E		

ELECTROMAGNETISM

1. ***When some compass needles are placed on a card board along a circle with the centre at the wire, they will:***
(A) Point in the direction of N-S
(B) Set themselves tangential to the circle
(C) Point in the direction of E-W
(D) Point in the direction of S-E
(E) None of these

2. ***In the region surrounding a current carrying wire:***
(A) A magnetic field is set up
(B) The lines of force are elliptical
(C) Direction of lines of force depends upon direction of current
(D) Both (A) and (C)
(E) All of these

3. ***A current carrying conductor sets up its own:***
(A) Electric field (B) Nuclear field
(C) Magnetic field (D) All of these
(E) Both (A) and (C)

4. ***It is customary to represent a current flowing towards the reader by a symbol:***
(A) (x) (B) (+)
(C) (.) (D) (–)
(E) (+)

5. ***The direction of force on a current carrying conductor placed in a magnetic field is that***

of:
(A) Length of conductor (B) Magnetic field
(C) $\vec{L} \times \vec{B}$ (D) $\vec{L} \cdot \vec{B}$
(E) None of these

6. ***The pointer of a magnetic compass:***
(A) Is affected only by permanent magnets
(B) Aligns itself parallel to the applied magnetic field
(C) Vibrates in the magnetic field of the current
(D) Aligns itself perpendicular to the magnetic field
(E) Both (C) and (D)

7. ***Magnetic field is a:***
(A) Vector quantity (B) Scalar quantity
(C) Scalar as well as vector quantity (D) Neither (A) nor (B)
(E) Any of (A) or (B)

8. ***The direction of magnetic lines of force around a current carrying wire is given by:***
(A) Faraday's law (B) Head to tail rule
(C) Right hand rule (D) Both (A) and (B)
(E) None of these

9. ***If a copper rod carries a direct current, the magnetic field associated with the current will be:***
(A) Only inside the rod (B) Only outside the rod
(C) Both inside and outside the rod
(D) Neither inside nor outside the rod
(E) None of these

10. ***The force on a current carrying conductor of length $\vec{L}$ placed in a magnetic field $\vec{B}$ depends upon:***
(A) Angle between $\vec{L}$ and $\vec{B}$
(B) Current passing through the conductor
(C) Length and magnetic field
(D) Both (A) and (C) only
(E) All of these

11. ***Magnetic lines of force:***
(A) Cannot intersect at all (B) Intersect at infinity
(C) Intersect within magnet
(D) Intersect at neutral points
(E) None of these

12. ***The strength of magnetic field around a straight conductor:***
(A) Is same every where around the conductor
(B) Obeys inverse square law
(C) Is directly proportional to the square of distance from the conductor
(D) All are true
(E) None of these

13. ***A current is passed through a straight wire. The magnetic field established around it has its lines of force:***
(A) Circular and endless (B) Oval in shape and endless
(C) Straight (D) Parabolic
(E) All are true

14. ***If current carrying conductor is placed perpendicular to the magnetic field, it will experience a force:***
(A) Zero (B) ILB cos α
(C) ILB (D) Both (A) and (B)
(E) Both (B) and (C)

15. ***The direction of force experienced by a current carrying conductor placed in a magnetic field B is found by:***
(A) Dot product at $\vec{L}$ and $\vec{B}$
(B) Cross product of $\vec{L}$ and $\vec{B}$
(C) Right hand rule
(D) Both (B) and (C)
(E) Both (A) and (C)

16. ***If $\vec{A}$ is vector area and $\vec{B}$ is the magnetic field, the magnetic flux is mathematically defined as:***
(A) $\vec{A} \cdot \vec{B}$ (B) $\vec{A} \times \vec{B}$
(C) $\vec{B} \cdot \vec{A}$ (D) Both (A) and (B)
(E) Both (A) and (C)

17. ***Vector area $\vec{A}$ is a vector whose direction:***
(A) Is along the surface element
(B) Perpendicular to surface element
(C) At an angle 60° to the surface element
(D) Depends upon the direction of magnetic field
(E) None of these

18. ***If the field is directed along the normal to the area, then flux is:***
(A) Maximum (B) Equal to zero
(C) Equal to BA (D) Minimum
(E) Both (A) and (C)

19. ***The unit of magnetic induction $\vec{B}$ is:***
(A) Weber (B) Web m^{-2}
(C) Newton/amp. metre (D) Newton/metre
(E) None of these

20. ***Magnetic induction is defined as flux per unit area of the surface which is:***
(A) Parallel to $\vec{B}$ (B) Perpendicular to $\vec{B}$
(C) At an angle 60° (D) Any of A or B

to B
(E) Both (A) and (C)

Answers

1.	A	2.	D	3.	E	4.	C
5.	C	6.	B	7.	A	8.	C
9.	C	10.	C	11.	A	12.	E
13.	A	14.	C	15.	D	16.	E
17.	B	18.	E	19.	B	20.	B

ELECTROMAGNETIC INDUCTION

1. ***The current produced by moving a loop of wire across a magnetic field is called:***
(A) Direct current (B) Magnetic current
(C) Alternating current (D) Induced current
(E) None of these

2. ***An emf is set up in a conductor when it:***
(A) Is kept in a magnetic field
(B) Is kept in an electric field
(C) Moves across a magnetic field
(D) Both (A) and (B)
(E) None of these

3. ***An induced current can be produced by:***
(A) Constant magnetic field
(B) Changing magnetic field
(C) Varying electric field
(D) Constant electric field
(E) None of these

4. ***The phenomenon of generation of induced emf is called:***
(A) Electrostatic induction (B) Magnetic induction
(C) Electromagnetic induction
(D) Electric induction (E) Both (A) and (D)

5. ***The induced current in a conductor depends upon:***
(A) Resistance of the loop
(B) Speed with which the conductor moves
(C) Any of these
(D) Both (A) and (B)
(E) None of these

6. ***The induced current in the loop can be increased by:***
(A) Using a stronger magnetic field
(B) Moving the loop faster
(C) Replacing the loop by a coil of many turns
(D) All above
(E) Both (A) and (B)

7. ***In magnet-coil experiment, emf can be produced by:***
(A) Keeping the coil stationary and moving the magnet
(B) Keeping the magnet stationary and moving the coil
(C) Relative motion of the loop and magnet
(D) Any one of above
(E) All above

8. ***Michael Faraday and Joseph Henry belong respectively to:***
(A) USA and England (B) England and France
(C) England and USA (D) USA and France
(E) None of these

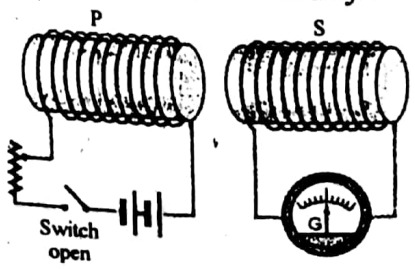
9. ***The magnitude of induced emf depends upon the:***
(A) Rate of decrease of magnetic field
(B) Rate of change of magnetic field
(C) Rate of increase of magnetic flux
(D) Constancy of magnetic field
(E) None of these

10. ***When there is no relative motion between the magnet and coil, the galvanometer indicates:***
(A) No current in the circuit
(B) An increasing current
(C) A decreasing current
(D) A constant current
(E) Either (B) or (C)

11. ***Instead of moving the coil towards a magnet, the magnet is moved towards the coil with the same speed. The galvanometer shows current:***
(A) Of same magnitude in the same direction
(B) Of different magnitude in the same direction
(C) Of same magnitude but in opposite direction
(D) Of different magnitude in the opposite direction
(E) None of these

12. ***A coil of constant area is placed in a constant magnetic field. An induced current is produced in the coil when:***
(A) The coil is distorted (B) The Coil Is Rotated
(C) The coil is neither distorted nor rotated
(D) Both (A) and (B) (E) None of these

13. ***Consider the circuit shown in Fig. If the switch of the coil P is suddenly closed:***



(A) A momentary current is induced in the coil S.
(B) Galvanometer needle suddenly deflects but do not return to zero.
(C) Galvanometer needle suddenly deflects and returns to zero.
(D) Both (A) and (C)
(E) Galvanometer needle remains unaffected.

14. ***Referring to above figure, current in the coil P grows from zero to its maximum value:***
(A) At the instant the switch is closed
(B) At the instant the switch is opened
(C) When switch is kept open
(D) All of above
(E) Neither of above

15. ***Referring to above figure, current in coil P falls from its maximum value to zero:***
(A) At the instant the switch is closed
(B) At the instant the switch is opened
(C) When switch is kept open
(D) When switch is kept closed
(E) None of these

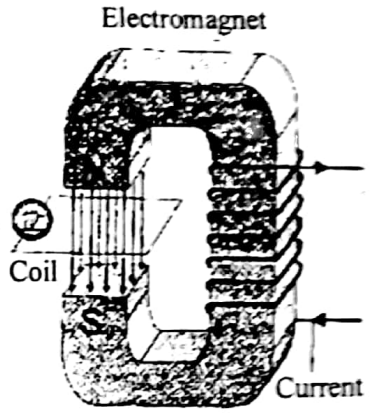
16. ***Referring to above figure, due to change in current in the coil P, the change in magnetic flux:***
(A) Is associated with coil P
(B) Is associated with coil S
(C) Causes an induced current in coil S
(D) All of these
(E) None of these

17. ***Referring to above figure, a changing current in coil P can be produced:***
(A) At the instant the switch is closed
(B) At the instant the switch is opened
(C) With the help of rheostat
(D) All of these
(E) None of these

18. ***In order that no emf should be induced in a flat loop of wire placed in a changing magnetic field, the angle between $\vec{B}$ and $\vec{\Delta A}$ should be:***
(A) 0° (B) 45°
(C) 90° (D) 135°
(E) 180°

19. ***The unit of induced emf is:***
(A) Volt (B) Nm/As
(C) Joule $coul^{-1}$ (D) Both (A) and (C)
(E) All of these

20. ***Consider the Fig. where the coil is placed in the magnetic field of an electromagnet. The magnetic flux through the coil is changed by:***



(A) Keeping both the coil and the electromagnet stationary
(B) By passing a constant current through the electromagnet
(C) By changing the current passing through the electromagnet
(D) Both (A) and (B)
(E) Both (A) and (C)

Answers

1.	D	2.	C	3.	B	4.	C
5.	D	6.	D	7.	E	8.	C
9.	B	10.	A	11.	C	12.	D
13.	D	14.	A	15.	B	16.	D
17.	D	18.	C	19.	E	20.	C

ALTERNATING CURRENT

1. ***Alternating current can be transmitted:***
(A) To long distance (B) At very high cost
(C) At very low cost (D) Both (A) and (C)
(E) Both (A) and (B)

2. ***Alternating current is produced by a voltage source which polarity:***
(A) Remains the same (B) Reverses after period T
(C) Keeps on reversing with time
(D) Reverses after every time interval T/2
(E) Both (C) and (D)

3. ***Nowadays, most of the electrical energy is produced by A.C. generators using:***
(A) Hydal water (B) Geothermal energy
(C) Solar energy (D) Biomass
(E) Both (B) and (D)

4. ***The time interval during which the voltage source changes its polarity once is known as:***
(A) Time period T (B) Half the time period
(C) Quarter the time period

(D) Two third of the time period (E) None of these

5. ***The most common source of alternating voltage is:***
(A) Motor (B) Transformer
(C) AC generator (D) Both (A) and (C)
(E) Both (A) and (B)

6. ***The output V of an A.C. generator at any instant is given by:***
(A) $V = V_o \sin \omega t$ (B) $V = V_o \sin \frac{2\pi}{t} T$
(C) $V = V_o \sin \frac{2\pi}{T} t$ (D) Both (A) and (C)
(E) Both (A) and (B)

7. ***Using $\theta = \omega t$ and $\omega = \frac{2\pi}{T}$, the angle through which the coil of A.C. generator rotates, when $t = \frac{T}{2}$ is:***
(A) zero (B) $\pi/2$
(C) π (D) $3\pi/2$
(E) 2π

8. ***Using $V = V_o \sin \omega t$ and $\omega = 2\pi/T$, the value of alternating voltage V when $t = 3T/4$ is:***
(A) V_o (B) $-V_o$
(C) $V = 0$ (D) Both (A) and (B)
(E) Both (A) and (C)

9. ***The wave form of alternating voltage is the graph between:***
(A) Voltage along x-axis and time along y-axis
(B) Current and time
(C) Voltage along y-axis and time along x-axis
(D) Voltage and current
(E) Either (B) or (D)

10. ***The waveform of alternating voltage is a:***
(A) Square (B) Rectangular
(C) Saw-tooth (D) Sinusoidal
(E) None of these

11. ***The instantaneous value of voltage or current can have any value between:***
(A) Positive maximum value + V_o and negative maximum value $-V_o$
(B) Positive maximum value $+V_o$ and zero
(C) Zero and negative maximum value $-V_o$
(D) Any of these
(E) None of these

12. ***The entire waveform of sinusoidal voltage is actually a set of all the:***
(A) Average values which exist during a period T/2
(B) Instantaneous values which exist during a period T
(C) Peak-to-peak values
(D) RMS values
(E) None of these

13. ***RMS value of voltage is:***
(A) $\frac{V_o}{\sqrt{2}}$ (B) $\frac{V_o}{2}$
(C) $1.41\ V_o$ (D) $0.5\ V_o^2$
(E) Either (B) or (D)

14. ***The highest value reached by the voltage or current:***
(A) In quarter cycle is called instantaneous value
(B) In half cycle is called peak-to-peak value
(C) In one cycle is called peak value
(D) In half cycle is called instantaneous value
(E) None of these

15. ***The sum of positive and negative peak values (i.e., p-p value) is called:***
(A) Instantaneous value (B) Peak value
(C) RMS value (D) Peak-to-peak value
(E) None of these

16. ***The peak-to-peak value of alternating voltage is:***
(A) $2V_o$ (B) V_o
(C) $\frac{V_o}{2}$ (D) $4V_o$
(E) None of these

17. ***The average value of alternating voltage over a complete cycle is:***
(A) $0.7\ V_{max}$ (B) Zero
(C) $0.707\ V_{max}$ (D) $1.414\ V_{max}$
(E) Either (A) or (C)

18. ***Peak value of alternating current is:***
(A) One of its instantaneous values
(B) Equal to its RMS value
(C) The same as its peak-to-peak value
(D) Both (B) and (C)
(E) None of these

19. ***The instantaneous value of alternating current may be:***
(A) The same as its RMS value
(B) Greater than its RMS value
(C) The same as its peak value
(D) Any of these
(E) None of these

20. ***The RMS value of alternating voltage is:***
(A) 0.7 times the peak value
(B) 0.5 times the peak value
(C) 0.7 times the instantaneous value
(D) Equal to maximum voltage
(E) None of these

Answers

1.	D	2.	E	3.	A	4.	A
5.	C	6.	D	7.	C	8.	B
9.	C	10.	D	11.	A	12.	B
13.	A	14.	C	15.	D	16.	A
17.	B	18.	A	19.	C	20.	A

PHYSICS OF SOLIDS

1. ***Crystalline solids are in the form of:***
   (A) Metals (B) Ionic Compounds
   (C) Ceramics (D) Both (A) and (B)
   (E) All of these

2. ***The solids are classified as:***
   (A) Metals (B) Crystalline
   (C) Amorphous (D) Polymeric
   (E) All except A

3. ***Zirconia is classified as:***
   (A) Ceramic solid (B) Ionic Compound
   (C) Metal (D) Either (A) or (B)
   (E) Either (B) or (C)

4. ***Each atom in a metal crystal vibrates about a fixed point with an amplitude that:***
   (A) Decreases with rise in temperature
   (B) Is not affected by rise in temperature
   (C) Increases with rise in temperature
   (D) Both (B) and (C)
   (E) None of these

5. ***The transition from solid to liquid is actually from:***
   (A) Order to disorder (B) Disorder to order
   (C) Order to order (D) Disorder to disorder
   (E) None of these

6. ***The transition from solid state to liquid state is:***
   (A) Abrupt (B) Slow
   (C) Continuous (D) Discontinuous
   (E) Both (A) and (D)

7. ***The force which maintains the strict long-range order between atoms of a crystalline solid is the:***
   (A) Nuclear force (B) Cohesive force
   (C) Adhesive force (D) Coulomb force
   (E) None of these

8. ***The word amorphous means:***
   (A) Without any structure (B) With Definite Structure
   (C) Regular arrangement of molecules (D) Both (B) and (C)
   (E) None of these

9. ***Amorphous solids:***
   (A) Have definite melting point
   (B) Are called glassy solids
   (C) Have no definite melting point
   (D) Both (B) and (C)
   (E) Both (A) and (C)

10. ***An ordinary glass gradually softens into a 'paste-like' state before it becomes a very viscous liquid. It happens almost at:***
    (A) 800°C (B) 500°C
    (C) 300°C (D) 100°C
    (E) None of these

11. ***The pattern of a crystalline solid is:***
    (A) One dimensional (B) Two dimensional
    (C) Three dimensional (D) Either (A) or (B)
    (E) None of these

12. ***In a cubic crystal, all the sides meet at:***
    (A) 60° (B) 90°
    (C) 109° (D) 30°
    (E) 10°

13. ***The arrangement or molecules or atoms in a crystalline solid can be studied by using:***
    (A) Chemical methods (B) Neutrons
    (C) X-ray techniques (D) Copper atoms
    (E) Both (A) and (B)

14. ***A unit cell is the smallest basic structure which is:***
    (A) One dimensional (B) Two dimensional
    (C) Three dimensional (D) Four dimensional
    (E) None of these

15. ***Tick the one which is not a crystalline solid:***
    (A) Zirconia (B) Glass
    (C) Copper (D) Ceramic solid
    (E) An ionic compound

16. ***The temperature at which the vibrations become so great that structure of the crystal breaks up, is called:***
    (A) Critical temperature (B) Temperature of vaporization
    (C) Melting point (D) Both (A) and (C)
    (E) Both (A) and (B)

17. ***The whole structure obtained by the repetition of unit cells is called:***
    (A) Crystal lattice (B) Amorphous solid
    (C) Polymeric solid (D) Polystrene
    (E) None of these

18. ***The pattern of NaCl particles have a shape which is:***
    (A) Cubic (B) [illegible]

cubic

(C) Simple cubic (D) Face centred
(E) Both (A) and (C)

19. *In crystalline solids, atoms are held about their equilibrium positions depending upon the strength of:*
(A) Adhesive forces (B) Nuclear forces
(C) Inter atomic cohesive force (D) Electromagnetic force
(E) None of these

20. *The smallest three dimensional basic structure is called:*
(A) An atom (B) Unit cell
(C) Crystal lattice (D) Polymer
(E) None of these

Answers

1.	E	2.	E	3.	A	4.	C
5.	A	6.	E	7.	B	8.	A
9.	D	10.	A	11.	C	12.	B
13.	C	14.	C	15.	B	16.	C
17.	A	18.	E	19.	C	20.	B

ELECTRONICS

1. *Computer chips are made from:*
(A) Iron (B) Silicon
(C) Helium (D) Strontium
(E) Aluminium

2. *Silicon is one of the most commonly used:*
(A) Conductor (B) Dielectric
(C) Insulator (D) Semiconductor
(E) Both (B) and (C)

3. *The huge advances in electronics over the recent past are due to discovery and use of:*
(A) Conductors (B) Insulators
(C) Semiconductors (D) Iron
(E) Heavy water

4. *The use of chips in electrons is described in the form of:*
(A) Yellow boxes (B) Black boxes
(C) Red boxes (D) White boxes
(E) Orange boxes

5. *Crystal of germanium or silicon in its pure form at absolute zero acts as:*
(A) A conductor (B) A semiconductor
(C) An insulator (D) Both (A) and (C)
(E) Both (A) and (B)

6. *At room temperature, crystal of germanium, in its pure form, act as:*
(A) A conductor (B) A semiconductor
(C) An insulator (D) Both (A) and (C)
(E) None of these

7. *Atomic number of germanium atom and number of valence electrons in it are respectively:*
(A) 32, 4 (B) 4, 32
(C) 14, 4 (D) 22, 3
(E) 4, 14

8. *All the valence electrons present in a crystal of silicon are bound in their orbits by:*
(A) Ironic bond (B) Covalent bond
(C) Molecular bond (D) Both (A) and (B)
(E) Both (B) and (C)

9. *An outer most orbit represents stable configuration if it possesses:*
(A) 4 electrons (B) 8 electrons
(C) 12 electrons (D) 16 electrons
(E) No electron

10. *A p-type crystal is:*
(A) Neutral as a whole (B) Impurity added crystal
(C) Pure crystal (D) Both (A) and (B)
(E) Positively charged

11. *Majority charge carriers in the p-region of p-n junction are:*
(A) Electrons (B) Positrons
(C) Holes (D) Neutrons
(E) None of these

12. *Whenever a covalent bond breaks, it creates:*
(A) An electron (B) A hole
(C) An electron-hole pair (D) A positron
(E) All of these

13. *The impurity in the germanium is usually in the ratio of:*
(A) $1 : 10^4$ (B) $1 : 10^8$
(C) $1 : 10^{12}$ (D) $1 : 10^{16}$
(E) None of these

14. *When phosphorus is added as an impurity in germanium, there is an increase in:*
(A) Free electrons in Ge (B) Holes in Ge
(C) Positrons in Ge (D) Both (A) and (B)
(E) Both (B) and (C)

15. *A hole in p-type may be due to:*
(A) Trivalent impurity (B) Breaking of some covalent bond
(C) Pentavalent impurity (D) Germanium
(E) Either (A) or (B)

16. *Depletion region is the region around the p-n junction and:*
(A) Bs chargeless (B) Contains electrons as

(C) Contains protons as charge carriers (D) Contains holes as charge carriers
(E) None of these

17. ***Depletion region contains:***
(A) Protons (B) Positive ions
(C) Negative ions (D) Both (B) and (C)
(E) Both (A) and (C)

18. ***A potential difference is developed across the depletion region of p-n junction due to:***
(A) Positive ions (B) Negative ions
(C) Both (A) and (B) (D) Excess of electrons
(E) Excess of protons

19. ***As a result of diffusion, a region is formed around the p-n junction which is a:***
(A) Chargeless region (B) Positively charged region
(C) Negatively charged region (D) Depletion region
(E) Both (A) and (D)

20. ***Potential barrier across the p-n junction:***
(A) Starts further diffusion of electrons into p-region
(B) Stops further diffusion of electrons into n-region
(C) Stops further diffusion of electrons into p-region
(D) All of these
(E) None of these

Answers

1.	B	2.	D	3.	C	4.	B
5.	C	6.	B	7.	A	8.	B
9.	B	10.	A	11.	C	12.	C
13.	B	14.	A	15.	E	16.	A
17.	D	18.	C	19.	E	20.	C

DAWN OF MODERN PHYSICS

1. ***The concept of direction is purely:***
(A) Absolute (B) Relative
(C) Relative to stars always (D) Relative to the sun always
(E) None of these

2. ***All motions are:***
(A) Relative to a person (B) Relative to the instrument observing it
(C) Absolute (D) Both (A) and (B)
(E) None of these

3. ***A body at rest remains at rest unless:***
(A) A balanced force produces motion in it
(B) An unbalanced force produces acceleration in it
(C) An unbalanced force does not produce acceleration in it
(D) A balanced force produces acceleration in it
(E) None of these

4. ***Strictly speaking, the earth is:***
(A) An accelerated frame of reference
(B) A non-inertial frame of reference
(C) An inertial frame of reference
(D) A non-accelerated frame of reference
(E) Both (A) and (B)

5. ***The special theory of relatively treats the problems involving:***
(A) Inertial frames of reference
(B) Non-inertial frames
(C) Non-accelerated frames
(D) Both (A) and (C)
(E) Both (B) and (C)

6. ***The general theory of relativity treats the problems involving frames of reference which are:***
(A) Inertial
(B) Accelerating with respect to one another
(C) Accelerating with respect to a particular star
(D) Moving with uniform velocity
(E) None of these

7. ***The special theory of relativity is based on:***
(A) Four postulates (B) Three postulates
(C) Two postulates (D) One postulate
(E) None of these

8. ***There is no way to detect:***
(A) Absolute uniform motion (B) Accelerated motion
(C) State of rest (D) State of motion
(E) None of these

9. ***Time:***
(A) Is an absolute quantity (B) Is relative
(C) Depends upon motion of frame of reference (D) All above
(E) None of these

10. ***The symbol to be used in relativity problems denotes:***
(A) Dilated time (B) Proper time
(C) Life time (D) Half life
(E) None of these

11. ***Practically the quantity $\frac{v}{c}$ is always:***
(A) Less than one (B) Equal to one
(C) Greater than one (D) All of these
(E) None of these

12. ***Tick the correct statement:***
(A) t_o is always less than t (B) m_o is always greater than m
(C) l_o is always less than l (D) Both (A) and (C)
(E) Both (B) and (C)

13. ***Due to relative motion of observer and the frame of reference of events, time always:***
(A) Dilates itself (B) Contracts itself
(C) Stretches itself (D) Both (A) and (C)
(E) None of these

14. ***The dilation of time applies to the timing processes which are:***
(A) Physical (B) Chemical
(C) Biological (D) All of these
(E) None of these

15. ***Aging process of the human body:***
(A) Becomes slow by motion at very high speed
(B) Becomes fast at very high speed
(C) Is not affected when its speed becomes extremely large
(D) All of these are true
(E) None is true

16. ***As compared to the distance measured by an observer on Earth, the distance from Earth to a star measured by an observer in a moving spaceship would seem:***
(A) Smaller (B) Larger
(C) Same (D) Much larger
(E) None of these

17. ***Mass of an object:***
(A) Is a varying quantity (B) Depends upon the speed of object
(C) Indicates its inertia (D) All above
(E) None of these

18. ***Earth's orbital speed is:***
(A) $30\ ms^{-1}$ (B) $30\ kms^{-1}$
(C) $3 \times 10^4\ ms^{-1}$ (D) Both (A) and (C)
(E) Both (B) and (C)

19. ***Tick the correct relativistic equation/s:***
(A) $m_o = m\sqrt{1-\frac{v^2}{c^2}}$ (B) $l_o = l_o\sqrt{1-\frac{v^2}{c^2}}$
(C) $m = \frac{m_o}{\sqrt{1-\frac{v^2}{c^2}}}$ (D) All of these
(E) Both (B) & (C)

20. ***The ratio of speed of light to the orbital speed of Earth is:***
(A) 10^4 (B) 10^3
(C) 10^2 (D) 10^5
(E) $10^6\ kms^{-1}$

Answers

1.	B	2.	D	3.	B	4.	E
5.	D	6.	B	7.	C	8.	A
9.	D	10.	B	11.	A	12.	D
13.	D	14.	D	15.	A	16.	A
17.	D	18.	E	19.	D	20.	A

ATOMIC SPECTRA

1. ***The first series which was identified in the spectrum of hydrogen is called:***
(A) Lyman series (B) Balmer series
(C) Paschen series (D) Brackett series
(E) Pfund series

2. ***Balmer series was identified in:***
(A) 1685 (B) 1785
(C) 1885 (D) 1985
(E) 1585

3. ***Atoms of hydrogen gas can be excited by passing electric current through it when the gas is filled into the discharge tube at a pressure which is:***
(A) Less than atmospheric pressure
(B) Much less than atmospheric pressure
(C) Greater than atmospheric pressure
(D) Much greater than atmospheric pressure
(E) Both (C) and (D)

4. ***Balmer series lies in that region of electromagnetic wave spectrum which is called:***
(A) Visible region (B) Invisible region
(C) Infra-red region (D) Ultraviolet region
(E) None of these

5. ***The natural arrangement of colours in the spectrum of white light spectrum is:***
(A) VIBGYOR (B) ROYBGIV
(C) ROYBIGV (D) BIGROYV
(E) None of these

6. ***The range of wavelengths of colours in the visible colours is:***
(A) 410 nm to 456 nm (B) 10 nm to 56 nm
(C) 410 nm to 656 nm (D) 910 nm to 956 nm
(E) None of these

7. *Tick the incorrect statement:*
(A) $R_H = 1.097 \times 10^7 m^{-1}$ (B) $h = 6.62 \times 10^{-34}$ Js
(C) $\lambda_{red} = 656$ nm (D) $\lambda_{violet} = 700$ nm
(E) $\lambda_{blue} = 434$ nm

8. *The results of spectra obtained by Balmer were expressed in 1896 by:*
(A) Bohr (B) Rydberg
(C) Planck (D) Rutherford
(E) Coulomb

9. *The process of formation of spectrum is called:*
(A) Interference (B) Spectroscopy
(C) Dispersion (D) Reflection
(E) Both (A) and (D)

10. *The value of Rydberg's constant is:*
(A) $1.0974 \times 10^{-7} m^{-1}$ (B) $1.0974 \times 10^7 m^{-1}$
(C) $1.0974 \times 10^4 cm^{-1}$ (D) $1.0974 \times 10^{10} cm^{-1}$
(E) None of these

11. *Spectrum represents the number of component colours present in certain light in terms of:*
(A) Wavelength (B) Frequency
(C) Energy (D) Both (A) and (B)
(E) All of these

12. *Tick the series which lies in the visible region:*
(A) Lyman series (B) Balmer series
(C) Paschen series (D) Brackett series
(E) Pfund series

13. *Tick the series which lie/s in the infra-red region:*
(A) Pfund series (B) Brackett series
(C) Paschen series (D) All of these
(E) None of these

14. *The spectral series found in the infrared region is/are:*
(A) Paschen series (B) Brackett series
(C) Pfund series (D) Both (A) and (B)
(E) All of these

15. *Lyman series in the spectrum of hydrogen exists in the:*
(A) Infra-red region (B) Visible region
(C) Ultraviolet region (D) Both (A) and (B)
(E) None of these

16. *The spectrum emitted from hydrogen filled discharge tube is:*
(A) Line spectrum (B) Discrete spectrum
(C) And spectrum (D) Absorption spectrum
(E) Both (A) and (B)

17. *The general formula which includes all the series of hydrogen spectrum is given by:*
(A) $\lambda = \frac{1}{R_H}\left(\frac{1}{p^2} - \frac{1}{n^2}\right)$ (B) $\lambda = \frac{1}{R_H}\left(\frac{1}{n^2} - \frac{1}{p^2}\right)$
(C) $\frac{1}{\lambda} = R_H\left(\frac{1}{p^2} - \frac{1}{n^2}\right)$ (D) $\frac{1}{\lambda} = R_H\left(\frac{1}{n^2} - \frac{1}{p^2}\right)$
(E) None of these

18. *In the general formula for spectral series, if we put p = 2, we get the formula for:*
(A) Lyman series (B) Balmer series
(C) Paschen series (D) Pfund series
(E) Brackett series

19. *The formula of Brackett series can be obtained by putting in the general formula, the value of n equal to:*
(A) One (B) Two
(C) Three (D) Four
(E) Five

20. *An electron of the hydrogen atom in the second orbit is called its:*
(A) Ground state (B) Excited state
(C) Ionized state (D) Any of these
(E) None of these

Answers

1.	B	2.	C	3.	B	4.	A
5.	A	6.	C	7.	D	8.	B
9.	B	10.	B	11.	E	12.	B
13.	D	14.	E	15.	C	16.	E
17.	C	18.	B	19.	D	20.	B

NUCLEAR PHYSICS

1. *Neutron was suggested to be in the nucleus by:*
(A) Rutherford in 1920 (B) Bohr in 1913
(C) Dirac in 1928 (D) Anderson in 1932
(E) None of these

2. *Neutron was discovered by:*
(A) Rutherford in 1920 (B) Chadwick in 1932
(C) Bohr in 1913 (D) Compton in 1927
(E) None of these

3. *The ratio of the radii of an atom and its nucleus is roughly equal to:*
(A) 10^5 cm (B) 10^5
(C) 10^5 m (D) 10^{-5} m

(E) 10^{-5} mm

4. ***Nucleon means:***
(A) Only electrons (B) Only neutrons
(C) Only protons (D) Both (A) and (C)
(E) Both (B) and (C)

5. ***Charge and mass of a proton are respectively:***
(A) zero, 1.673×10^{-27} kg (B) 1.673×10^{-27} coul, 1.6×10^{-19} kg
(C) 1.6×10^{-19} coul, 1.673×10^{-27} kg (D) 9.1×10^{-31} kg, 1.67×10^{-27} coul
(E) 1.67×10^{-19} coul, 1.6×10^{-19} kg

6. ***Mass of neutron is exactly:***
(A) 1.675×10^{-27} kg (B) 9.1×10^{-31} kg
(C) 1.67×10^{-19} kg (D) 1.6×10^{-19} kg
(E) Either (C) or (D)

7. ***In the unit of unified mass scale, the mass of an electron is:***
(A) 1.007276u (B) 1.008665u
(C) 0.00055u (D) 0.000055u
(E) None of these

8. ***Unified mass scale means that atomic mass is expressed in:***
(A) Kg (B) Gram
(C) Atomic mass unit (D) u only
(E) Both (C) and (D)

9. ***The figure 1.007276u shows the mass of an:***
(A) Atom (B) Positron
(C) Electron (D) Neutron
(E) Proton

10. ***In a neutral atom, the number of protons are always:***
(A) Greater than number of neutrons
(B) Smaller than the number of electrons
(C) Equal to the number of neutrons
(D) Equal to number of electrons
(E) Greater than number of electrons

11. ***Nucleus of a hydrogen atom may contain:***
(A) One neutron only (B) Two protons and one neutron
(C) Two protons and two neutrons (D) Any of above
(E) One proton only

12. ***Nucleus of a hydrogen atom may contain:***
(A) One proton only (B) One proton and one neutron
(C) One proton and two neutrons (D) Any of these
(E) None of these

13. ***Tick the correct symbol:***
(A) $^{1}_{1}H$ (B) $^{1}_{3}He$
(C) $^{3}_{2}He$ (D) Both (A) and (C)
(E) Both (A) and (B)

14. ***The particle which is 7000 times more massive than the electron is called:***
(A) Proton (B) γ-ray
(C) α-particle (D) Meson
(E) Neutron

15. ***The ratio of number of protons and the number of neutrons is:***
(A) Almost one in lighter elements
(B) Greater than one in heavy elements
(C) Smaller than one in heavy elements
(D) Both (A) and (C)
(E) Both (A) and (B)

16. ***The nuclei of an element having the same charge number but different mass numbers are called:***
(A) Isobars (B) Isotopes
(C) Isomers (D) Isobaric
(E) Isothermal

17. ***The ordinary hydrogen is:***
(A) Denoted by $^{2}_{1}H$ (B) Called Protium
(C) Denoted by $^{1}_{1}H$ (D) Both (B) and (C)
(E) Both (A) and (B)

18. ***Tritium has:***
(A) One electron, two neutrons and one proton
(B) One electron, one proton and one neutron
(C) One electron, two protons, one neutron
(D) Two electrons, one proton, one neutron
(E) None of these

19. ***Deuterium and triton are respectively the names of:***
(A) Nucleus and atom of hydrogen
(B) Atom and nucleus of helium
(C) Atom and nucleus of hydrogen
(D) Nuclei of hydrogen atom
(E) None of these

20. ***The isotope/s of hydrogen is/are:***
(A) Protium (B) Deuterium
(C) Tritium (D) Both (A) and (B)
(E) All of these

Answers

1.	A	2.	B	3.	B	4.	E
5.	C	6.	A	7.	C	8.	E
9.	E	10.	D	11.	E	12.	D
13.	D	14.	C	15.	D	16.	B
17.	D	18.	A	19.	C	20.	E

****

COMPUTER SCIENCE

Multiple Choice Questions (MCQs)

1. ***The shortest period of time is a***
   (a) millisecond (b) nanosecond
   (c) picosecond (d) microsecond
   Ans. (c) picosecond

2. ***An organic chip is called a***
   (a) storage chip (b) biochip
   (c) microchip (d) silicon chip
   Ans. (b) biochip

3. ***One Megabyte is equivalent to***
   (a) 2^{10} bytes (b) 2^{20} bytes
   (c) 2^{30} bytes (d) none of these
   Ans. (b) 2^{20} bytes

4. ***A person who gains illegal access to a computer system:***
   (a) hacker (b) worm
   (c) software (d) zapper
   Ans. (a) hacker

5. ***When the control unit directs the ALU to perform an operation on the data, the machine cycle is involved in its***
   (a) first step (b) third step
   (c) second step (d) fourth step
   Ans. (b) third step

6. ***A type of computer that is faster because it has fewer instructions:***
   (a) symbolic (b) RISC
   (c) ASCII-8 (d) ROM burner
   Ans. (b) RISC

7. ***An emerging technology that provides nonvolatile memory chips is***
   (a) flash memory (b) PROM
   (c) CMOS (d) CISC
   Ans. (a) flash memory

8. ***Tool to change PROM chips are called***
   (a) chip kits (b) RAM burners
   (c) PROM burner (d) none of these
   Ans. (d) none of these

9. ***Assuming 8 bit for data, 1 bit for parity, 1 start bit and 2 stop bits, the number of characters that 1200 BPS communication line can transmit is:***
   (a) 10 CPS (b) 120 CPS
   (c) 12 CPS (d) None of these
   Ans. (c) 12 CPS

10. ***The widely used code in data communication is***
    (a) a bit ASCII (b) 7 bit ASCII
    (c) EBCDIC (d) none of these
    Ans. (b) 7 bit ASCII

11. ***If a processor does not have direct and unassisted access to data items, these items are said to be:***
    (a) Off line (b) Time Shared
    (c) On line (d) None of these
    Ans. (a) Off line

12. ***Rearranging data in a new sequence is known as:***
    (a) Updating (b) Batching
    (c) Sorting (d) Summarising
    Ans. (c) Sorting

13. ***Which of the following is not a component of telecommunications?***
    (a) sender (b) office device
    (c) medium (d) receiver
    Ans. (b) office device

14. ***In Time Division Multiplexing***
    (a) Time is doubled between bits of a byte
    (b) Time slicing at CPU level takes place
    (c) Total time available in the channel is divided between several users and each user is allotted a time slice
    Ans. (d) None of above

15. ***Point of Sale terminal to***
    (a) Terminals associated with MICR
    (b) Smart terminal
    (c) Terminal associated with OCR
    (d) None of above
    Ans. (c) Terminal associated with OCR

16. ***A bootstrap is:***
    (a) the flat cable that connects the CPU to the printer
    (b) the flat cable from the disk controller card to the disk 8drive
    (c) additional memory device
    (d) a small initialization program to start up the computer
    Ans. (d) a small initialization program to start up the computer

17. ***Data verification is a process of:***
    (a) rechecking the data entered by one person through re-entry by another person
    (b) entering data on two different media and comparing them
    (c) checking whether the instructions in a program are in proper order
    (d) checking the computer results with manual outputs
    Ans. (a) rechecking the data entered by one person through re-entry by another person

18. ***An A/D converter does the conversion from***
    (a) Digital to analog
    (b) Analog to digital
    (c) Voltage to ampere

(d) Direct to alternate current
(b) Analog to digital

Ans. (b) Analog to digital

19. Program maintenance means
(a) Maintaining a program exactly the way it was initially developed
(b) Changing a program due to changes in the organization
(c) Adopting an altogether new program
(d) Removing the errors from a program

Ans. (b) Changing a program due to changes in the organization

20. A conceptual error in a program is a/an
(a) Logical error
(b) Execution error
(c) Syntactical error
(d) None of the above

Ans. (a) Logical error

21. Implementation of a program involves
(a) Compilation of the program
(b) Debugging the program
(c) Testing the program with data
(d) All of the above

Ans. (d) All of the above

22. Temporary storage areas within the CPU are called
(a) ROMs
(b) Registers
(c) Accumulators
(d) Address

Ans. (b) Registers

23. Distribution data entry means that data can be
(a) Entered at different location where it originates
(b) Sent to different locations from a central place.
(c) Access from different places known as distribution points
(d) Distributed through a network

Ans (a) Entered at different location where it originates

24. Excess-3 code is known as
(a) Weighted code
(b) cylic redundancy code
(c) self complementing
(d) algebraic code

Ans. (c) self complementing

25. A computer has a word length of 32 bits. The maximum address that can be generated is:
(a) 2^{32} (b) $2^{32} - 1$
(c) $2^{32} - 1$ (d) None of these

Ans. (b) $2^{32} - 1$

26. Which of the following is associated with optics:
(a) Winchester (b) RAM
(c) CD-ROM (d) none of these

Ans. (b) RAM

27. The number 7F00 in Hexadecimal when multiplied by 61 is:
(a) 7F16 (b) 167F00
(c) 7F006 (d) None of these

Ans. (d) None of these

28. The output of a sequential circuit depends upon
(a) present input (b) past inputs
(c) both a and b (d) none of a and b

Ans. (c) both a and b

Note:
(In sequential circuits, the output depends not only on the present input but also on the past history of the inputs.)

29. Which of the following descriptions relates to a floppy diskette:
(a) 9-track 1600 BPI
(b) double-sided double density
(c) 33 Mhz – zero-wait time
(d) 40 MB capacity

Ans. (b) double-sided double density

30. A parallel interface:
(a) transmit one bit at a time
(b) transmit one or more bits at a time using a single wire
(c) transmit 8 or more bits at a time using as many wires
(d) cannot be used to connect a printer to a PC

Ans. (c) transmit 8 or more bits at a time using as many wires

31. Pick out the CORRECT statement:
(a) In a positional number system, each symbol represents the same value irrespective of its position.
(b) The highest symbol in a position number system has a value equal to the number of symbols in the system.
(c) It is not always possible to find the exact binary number equivalent to a decimal number with a fraction.
(d) Each hexa-decimal digit can be represented as a sequence of three binary symbols.

Ans. (c) It is not always possible to find the exact binary number equivalent to a decimal number with a fraction.

32. Which of the following is NOT correct?
(a) A memory location is identified by a unique number called its address.
(b) The content of a memory location does not change its address.
(c) Entering data into a memory location does

not change its address.

(d) A memory location can hold only a data item and not a program instruction.

Ans. (d) A memory location can hold only a data item and not a program instruction.

33. *Error reports are an example of:*

(a) scheduled report
(b) on-demand reports
(c) exception reports
(d) external reports

Ans. (c) exception reports

34. *Computer follows a simple principle called GIGO which means:*

(a) Garbage input good output
(b) garbage in garbage out
(c) great instructions great output
(d) good input good output

Ans. (b) garbage in garbage out

35. *When the control unit gets an instruction it is called*

(a) E-mail (b) machine time
(c) I-time (d) ALU time

Ans. (c) I-time

36. *Which of the following is not hardware:*

(a) Magnetic tap (b) Printer
(c) VDU terminal (d) Assembler

Ans. (d) Assembler

37. *Pick out the wrong definition:*

(a) Access time – time needed to access the output
(b) EDP – acronym for Electronic Data Processing
(c) COBOL – a language used for business data processing
(d) Control unit – heart of a computer

Ans. (a) Access time – time needed to access the output

38. *The lowest level of management is concerned with:*

(a) Operational information
(b) Traditional information
(c) Long term planning
(d) Strategic information

Ans. (b) Traditional information

39. *Which of the following is not hardware"*

(a) Magnetic tape
(b) VDU terminal
(c) Hard disk
(d) Assembler

Ans. (d) Assembler

40. *Pick out the wrong definition:*

(a) Access time – time needed to access the output
(b) EDP – acronym for Electronic Data Processing
(c) COBOL – a language used for business 1data processing
(d) Control unit – heart of a computer

Ans. (a) Access time – time needed to access the output

41. *By word processing we mean*

(a) Processing only words and not the number
(b) String manipulation
(c) A method of providing facility of text processing
(d) A software game for playing with words like "Hang man"

Ans. (c) A method of providing facility of text processing

42. *In computer science, by information we mean:*

(a) Any output coming out form computer
(b) Processed data put in intelligent form
(c) A report printed by computer
(d) Plural of data

Ans. (c) A report printed by computer

43. *Office automation systems are aiming at*

(a) Reducing the bulk of information on paper into condensed form in magnetic medium so that data can be processed with fast speed
(b) Putting robot types of machines
(c) Automating every thing in office
(d) Producing the systems which reduces burden from the managers minds

Ans. (c) Automating every thing in office

44. *Conferencing in relation to computer systems means*

(a) Transfer of documents electronically via computers linked to each other
(b) Getting hooked to an international network of computers
(c) Having unauthorized access to computer data
(d) On-line meanings using computers linked to each other

Ans. (d) On-line meanings using computers linked to each other

45. *A dump terminal signifies that*

(a) It has lower IQ compared to an intelligent terminal
(b) It can not be used as an independent computer
(c) It does not have a keyboard connected to it.

(d) It belongs to first generation computers

Ans. (b) It can not be used as an independent computer

46. *Ergonomics is the study of*

(a) Cost relationship between computer hardware and software
(b) Different computer operating systems
(c) Gradation of various computer professionals
(d) Human aspect of the environment around the computer system

Ans. (d) Human aspect of the environment around the computer system

47. *An application package is used to*

(a) Meet specific needs of a user
(b) Run the computer system better
(c) Run the compiler smoothly
(d) Enable operating system control hardware better

Ans. (a) Meet specific needs of a user

48. *The part of the computer system which performs the house keeping functions is called*

(a) Interpreter (b) Compiler
(c) Operating system (d) Assembler

Ans. (c) Operating system

49. *For creating and editing legal documents which application package would be most useful?*

(a) Spreadsheet
(b) Word processing
(c) Graphics
(d) Communication

Ans. (b) Word processing

50. *The concept of sending/receiving text etc, on computer networks is called*

(a) On-line database
(b) Electronic mail
(c) Teleconferencing
(d) Teleprinting

Ans. (b) Electronic mail

51. *When a bank teller uses a computer terminal to know the balance in a customer's account it is an example of*

(a) On-line updating
(b) Off-line processing
(c) On-line query
(d) On-line processing

Ans. (c) On-line query

52. *A computer program written in a high level language is called a*

(a) Source program
(b) object program
(c) Machine language program
(d) None of the above

Ans. (a) Source program

53. *Object program is*

(a) A program written in machine language
(b) A program to be translated into machine language
(c) The translation of a high-level language into machine language
(d) None of the above

Ans. ***(c) The translation of a high-level language into machine language***

54. *The presence of both data and its related instructions in an object is*

(a) C++ (b) encapsulation
(c) orientation (d) inheritance

Ans. (b) encapsulation

55. *In preparing a program, one should first*

(a) plan the solution
(b) code the program
(c) document the problem
(d) define the problem

Ans. (d) define the problem

56. *The first Apple computer was built in*

(a) a garage (b) a warehouse
(c) an apartment (d) a factory

Ans. (a) a garage

57. *During the development of a program, drawing a flowchart is a means to*

(a) plan the solution
(b) code the program
(c) define the problem
(d) analyze the problem

Ans. (a) plan the solution

58. *An English-like language that one can use as a program design tool is*

(a) BASIC (b) pseudocode
(c) PL/I (d) Pascal

Ans. (a) BASIC

59. *In preparing a program, desk-checking and translation are example of*

(a) coding (b) planning
(c) testing (d) documenting

Ans. (c) testing

60. *The process of detecting, locating, and correcting logic errors is called*

(a) desk-checking (b) translating
(c) debugging (d) documenting

Ans. (c) debugging

61. *Comments in the program itself are part of*

(a) compiling (b) translating
(c) linking (d) documenting

Ans. (d) documenting

62. ***A COBOL program has how many divisions***
(a) four (b) two
(c) five (d) seven
Ans. (a) four

63. ***The first high-level language to be introduced was***
(a) COBOL (b) FORTRAN
(c) Pascal (d) Ada
Ans. (b) FORTRAN

64. ***The ability of an object to interpret a message using its own methods is called***
(a) polymorphism (b) encapsulation
(c) inheritance (d) messaging
Ans. (a) polymorphism

65. ***The language named for a French mathematician is***
(a) C (b) Ada
(c) Pascal (d) Modula-3
Ans. (c) Pascal

66. ***Specifying the kind of input, processing, and output required for a program occurs when***
(a) planning the solution
(b) flowcharting the problem
(c) coding the problem
(d) defining the problem
Ans. (d) defining the problem

67. ***Error messages provided by a compiler are called***
(a) bug (b) diagnostic
(c) translations (d) mistakes
Ans. (b) diagnostic

68. ***After stating the solution to a problem in pseudocode, the next step would be***
(a) testing the program
(b) coding the program
(c) documenting the program
(d) translating the program
Ans. (b) coding the program

69. ***The highest-level language are called***
(a) 4GLs (b) high-level
(c) assembly (d) natural
Ans. (d) natural

70. ***To activate an object, send***
(a) a message (b) an instance
(c) a method (d) an attribute
Ans. (a) a message

71. ***Popular object-oriented languages:***
(a) Pascal, Modula-3
(b) C++, Smalltalk
(c) LOGO, PROLOG
(d) COBOL, BASIC
Ans. (b) C++, Smalltalk

72. ***Software that translates assembly language into machine language is***
(a) a binary translator
(b) a compiler
(c) an assembler
(d) a link-loader
Ans. (c) an assembler

73. ***A standardized business language is***
(a) CODASYL (b) BASIC
(c) COBOL (d) Ada
Ans. (c) COBOL

74. ***In developing a program, documentation should be done***
(a) as the last step
(b) throughout the process
(c) only to explain errors
(d) only during the design phase
Ans. (b) throughout the process

75. ***A fourth-generation language used for database retrieval:***
(a) high-level language
(b) assembly language
(c) query language
(d) procedural language
Ans. (c) query language

76. ***A language designed to generate routing business reports is***
(a) COBOL (b) LISP
(c) RPG (d) ALGOL
Ans. (c) RPG

77. ***The lowest level of programming language is***
(a) nonprocedural language
(b) assembly language
(c) BASIC
(d) machine language
Ans. (d) machine language

78. ***An assembly language uses***
(a) English words (b) mnemonic codes
(c) 0s and 1s (d) binary digits
Ans. (b) mnemonic codes

79. ***The language Smalltalk is***
(a) procedural oriented
(b) document oriented
(c) problem oriented
(d) object oriented
Ans. (d) object oriented

80. ***An operating system is a***
(a) set of users
(b) form of time-sharing
(c) set of programs
(d) supervisor program
Ans. (c) set of programs

81. ***In multiprogramming, two or more programs***

can be executed
(a) by optimizing compiler
(b) with two computers
(c) simultaneously
(d) concurrently
Ans. (d) concurrently

82. ***Time-sharing of resources by users is usually***
(a) based on time slices
(b) based on input
(c) event-driven
(d) operated by spooling
Ans. (a) based on time slices

83. ***Management of an operating system is handled by***
(a) by interpreter
(b) the supervisor program
(c) utility program
(d) the CPU
Ans. (b) the supervisor program

84. ***The process of allocating main memory to programs and keeping the programs in memory separate from each other is called***
(a) memory protection
(b) memory management
(c) virtual storage
(d) real storage
Ans. (b) memory management

85. ***UNIX is an example of a(n)***
(a) memory management
(b) generic operating system
(c) NOS
(d) utility program
Ans. (b) generic operating system

86. ***The technique in shared systems that avoid interspersed printout from several programs is***
(a) paging (b) queuing
(c) slicing (d) spooling
Ans. (d) spooling

87. ***The technique whereby part of the program is stored on disk and is brought into memory for execution as needed is called***
(a) memory allocation
(b) interrupts
(c) virtual storage
(d) prioritized memory
Ans. (c) virtual storage

88. ***An operating system used exclusively with the manufacturer's computer***
(a) DOS (b) proprietary
(c) UNIX (d) NOS
Ans. (b) proprietary

89. ***A portable operating system:***
(a) generic (b) backup
(c) allocated (d) utility
Ans. (a) generic

90. ***Another name for an operating environment is***
(a) page (b) layer
(c) shell (d) supervisor
Ans. (c) shell

91. ***Loading the operating system into a personal computer is called***
(a) booting (b) prompting
(c) interrupting (d) paging
Ans. (a) booting

92. Which one of the following is a graphical shell?
(a) UNIX (b) page
(c) utility program (d) GUI
Ans. (d) GUI

93. ***In multiprogramming, the process of confining each program to certain defined limits in memory is called***
(a) spooling
(b) time-sharing
(c) program scheduling
(d) memory protection
Ans. (d) memory protection

94. ***The corresponding memory spaces for pages are called***
(a) page utility (b) page frames
(c) page blocks (d) page modules
Ans. (b) page frames

95. ***The time between the user's request and the computer's reply***
(a) concurrent time
(b) response time
(c) allocation time
(d) event time
Ans. (b) response time

96. ***An on-screen picture:***
(a) page (b) NOC
(c) icon (d) spool
Ans. (c) icon

97. ***Take-a-turn time-sharing:***
(a) spooling
(b) interfacing
(c) round-robin scheduling
(d) prompting
Ans. (c) round-robin scheduling

98. ***Page frames are typically***
(a) 1K or 2K bytes
(b) 3K or 4K bytes
(c) 2K or 3K bytes
(d) 2K or 4K bytes
Ans. (d) 2K or 4K bytes

99. The memory area for programs with highest priority:
(a) frames (b) foreground
(c) page table (d) default drive
Ans. (b) foreground

100. Programs waiting to be run are kept on disk in
(a) page frames (b) the background
(c) shells (d) queues
Ans. (d) queues

101. Prewritten standard file-handling programs are called
(a) pull-down menus
(b) pages
(c) supervisors
(d) utilities
Ans. (d) utilities

102. The signal that the computer is awaiting a command from the user:
(a) prompt (b) time slice
(c) event (d) interrupt
Ans. (a) prompt

103. Another name for virtual memory is
(a) virtual page (b) foreground
(c) background (d) utility
Ans. (a) virtual page

104. NOS refers to
(a) the default drive
(b) booting
(c) operating system for a network
(d) round-robin scheduling
Ans. (c) operating system for a network

105. Testing of each individual program or module is called
(a) program testing
(b) volume testing
(c) system testing
(d) unit testing
Ans. (d) unit testing

106. The preliminary investigation of a systems project is also called a(n)
(a) analysis survey
(b) systems design
(c) feasibility study
(d) evaluation
Ans. (c) feasibility study

107. The people who will have contact with the system, such as employees and customers, are
(a) programmers (b) system analysts
(c) users (d) client
Ans. (c) users

108. The SDLC is defined as a project involving
(a) two phases (b) four phases
(c) three phases (d) five phases
Ans. (d) five phases

109. Phase one of a system project involves
(a) a system survey
(b) data gathering
(c) a system analysis
(d) questionnaires
Ans. (a) a system survey

110. The person who fills the role of change agent is the
(a) system user (b) system analyst
(c) administrator (d) client
Ans. (b) system analyst

111. The scope and true nature of the problem is determined during
(a) the second phase
(b) the preliminary investigation
(c) the system development
(d) the system analyst
Ans. (b) the preliminary investigation

112. A chart of positions and departments within an organization is
(a) a data flow diagram
(b) a project management report
(c) an organization chart
(d) a Gantt chart
Ans. (c) an organization chart

113. In a data flow diagram, a destination for data outside the system is called a
(a) vector (b) file
(c) source (d) sink
Ans. (d) sink

114. In the course of a systems project, systems design
(a) follows systems analysis
(b) follows development
(c) precedes systems analysis
(d) is the fourth phase
Ans. (a) follows systems analysis

115. Positioning of headings and columns for the report format, considered during system design, might use
(a) a record layout
(b) an organization chart
(c) a decision table
(d) a printer spacing chart
Ans. (d) a printer spacing chart

116. Programming and testing are elements of
(a) system analysis
(b) system development
(c) implementation

(d) system design
Ans. (b) system development

117. Data gathering and data analysis take place
(a) after the system survey
(b) after system analysis
(c) during system design
(d) during evaluation
Ans. (a) after the system survey

118. The kind of interview where all questions are planned in advance is called
(a) preplanned (b) structured
(c) observation (d) unstructured
Ans. (b) structured

119. The entire new system is used by a portion of the users:
(a) direct conversion
(b) pilot conversion
(c) file conversion
(d) parallel conversion
Ans. (b) pilot conversion

120. A systems analyst would observe the flow of data and interrelations of people within an organization during
(a) detail design
(b) preliminary design
(c) systems analysis
(d) a system survey
Ans. (c) systems analysis

121. Use to ensure that no alternative is overlooked during data analysis
(a) data flow diagram
(b) organization chart
(c) Gantt chart
(d) decision table
Ans. (d) decision table

122. The phase following detail design is
(a) preliminary investigation
(b) implementation
(c) system development
(d) system conversion
Ans. (c) system development

123. Scheduling deadlines and milestones can be shown on a
(a) system survey (b) decision table
(c) prototype (d) Gantt chart
Ans. (d) Gantt chart

124. Turning an entire project over to an outside firm for development is called
(a) auditing
(b) outsourcing
(c) preliminary investigation
(d) prototype
Ans. (b) outsourcing

125. The person who requests study or work on a system is the
(a) client (b) analyst
(c) change agent (d) user
Ans. (a) client

126. Super computers are usually designed to process complex scientific applications and the computational speed of the system is most important. Each address in the CRAY-1 holds
(a) 16 bits of information
(b) 32 bits of information
(c) 48 bits of information
(d) 64 bits of information
(e) 128 bits of information
Ans. (d) 64 bits of information

127. In EBCDIC (extended binary coded decimal interchange code) each character is denoted by
(a) 3 bits (b) 4 bits
(c) 5 bits (d) 8 bits
Ans. (d) 8 bits

128. Computer follows a simple rule called GIGO, GIGO stands for
(a) good input, good output
(b) great instructions, great output
(c) garbage in, garbage out
(d) gated input, gated output
Ans. (c) garbage in, garbage out

129. Retaining data for future reference is called
(a) storing
(b) sorting
(c) memorizing
(d) outputting
(e) programming
Ans. (a) storing

130. The term 'word' in computer terminology refers to
(a) bit formed into groups
(b) coded instructions
(c) memory size
(d) language used
(e) stored instructions.
Ans. (a) bit formed into groups

131. A group of electronic, magnetic, or mechanical devices that store data is called
(a) register (b) address
(c) program (d) software
Ans. (a) register

132. In ADC the analog voltage signal is compared with the signal from a
(a) pulse generator

(b) flip-flop
(c) stair case generator
(d) register

Ans. (c) stair case generator

133. *The faster type of ADC is*
(a) time interval
(b) parallel
(c) closed loop
(d) successive

Ans. (b) parallel

134. *Most of the errors in computer system could be attributed due to*
(a) virus
(b) programming errors
(c) hardware problems
(d) data entry errors

Ans. (d) data entry errors

135. *The five basic parts of a computer system are*
(a) hardware, software, memory, VDU, and magnetic tape
(b) store, arithmetic and logic unit, control unit, input device, and output device
(c) CPU, ALU, software, firmware, and operating system
(d) data bus, control lines, address bus, memory, and printer

Ans. (b) store, arithmetic and logic unit, control unit, input device, and output device

136. *A typical microcomputer has 64 K memory. It has 65,536 registers, each register storing 1 byte. Each register is called*
(a) memory location
(b) address
(c) byte
(d) word

Ans. (a) memory location

137. *Pick up wrong statement regarding analog computers*
(a) Initial conditions during integration operation are imposed in an analog computer during reset mode.
(b) Differentiators is analog circuit are not popular, because they are incapable of handling noisy ramp signals
(c) Memory or storage is an essential component of an analog computer
(d) Repetitive operations of analog computers are done to get a display on oscilloscope.

Ans. (c) Memory or storage is an essential component of an analog computer

138. *Diodes are used in analog computer circuit as*
(a) phase shifter (b) rectifier
(c) binary logic (d) limiter

Ans. (d) limiter

139. *The factors contributing to static errors in analog computer are*
(a) Finite amplifier gain and dielectric absorption in capacitors
(b) Amplifier fall off and phase shift at high frequency
(c) Shunt capacitance of input or feedback resistance and leakage resistance of input or feedback capacitance
(d) Drift voltage in the amplifier and current into the amplifier input and incorrect values of input and feedback impedance.

Ans. (d) Drift voltage in the amplifier and current into the amplifier input and incorrect values of input and feedback impedance.

140. *A computer processes information*
(a) as directed by the operator
(b) automatically
(c) at once
(d) gradually and eventually

Ans. (b) automatically

141. *Which of the following IC logic family has maximum fan out capacity?*
(a) TTL (b) DTL
(c) MOS (d) CMOS

Ans. (d) CMOS

142. *How many input leads will be required for a chip containing four two-input NOT gates?*
(a) 7 (b) 14
(c) 12 (d) 13

Ans. (b) 14

143. *An error in a computer hardware and software is called a bug. Another name for it is*
(a) glitch (b) hacker
(c) virus (d) pixel

Ans. (a) glitch

144. *The correct order of data hierarchy is*
(a) bit-byte-record-field-file-data base
(b) bit-byte-record-field-file-data base
(c) bit-byte-file-record-field-data base
(d) bit-byte-field-record-file data base

Ans. (d) bit-byte-field-record-file-data base

145. *The act of reading new data into a register*
(a) erases the previous contents of the register
(b) is usually not possible
(c) is possible only when the register is an accumulator
(d) is possible only when the register is an accumulator or instruction register

Ans. (a) erases the previous contents of the register

146. *Pick up the false statement*

(a) computers can manipulate both numeric and non-numeric symbols
(b) computer errors can usually be traced to faulty programs or inaccurate input data
(c) The faster or informational raw materials represented by numeric and non-numeric symbols are called information
(d) The space in the primary storage section is divided into four areas: input, working storage, output and program storage

Ans. (c) The faster or informational raw materials represented by numeric and non-numeric symbols are called information

147. Pick up the correct statement about computers
(a) Computers process data with human intervention after the program has been fed
(b) All comparisons are made in the control section
(c) The arithmetic-logic section of the CPU selects, interprets and executes the program steps
(d) Computers have the built-in ability to obey different types of instructions.

Ans. (d) Computers have the built-in ability to obey different types of instructions.

148. In computer terminology, the term wetware stands for
(a) artificial intelligence
(b) any organic intelligence
(c) molecular biology
(d) molecular scale computer

Ans. (b) any organic intelligence

149. Which of the following is termed ad minimum error code?
(a) Binary code
(b) Gary code
(c) Excess 3-code
(d) Octal code
(e) Decimal code.

Ans. (b) Gary code

150. A collection of software that controls the overall operation of a computer is called
(a) application software
(b) programming language
(c) system software
(d) operating system

Ans. (d) operating system

151. Computer program consists of
(a) instructions
(b) data
(c) both (a) and (b)
(d) low level language

Ans. (d) low level language

152. The correct processing unit
(a) is operated from the control panel
(b) is controlled by the auxiliary storage unit
(c) is controlled by input data as it enters the system
(d) controls all input, output, and processing

Ans. (d) controls all input, output, and processing

153. Which of the following is the example of sequential circuit
(a) flip-flop
(b) counter
(c) shift register
(d) accumulator

Ans. (c) shift register

154. Popular application of flip-flop are
(a) counters
(b) shift registers
(c) transfer registers
(d) all of above

Ans. (d) all of above

155. Pick up the wrong statement
(a) the information stored in random access memory can be changed by overwriting the new information.
(b) the information stored in read only memory can't be changed by overwriting the new information
(c) the information can be written in any location of random access memory
(d) computers use sequential access type main memory

Ans. (d) computers use sequential access type main memory

156. Micro processor is based on
(a) thermionic values
(b) transistors
(c) integrated circuits
(d) single integrated circuit or chip

Ans. (d) single integrated circuit or chip

157. Real time computing is possible because of the following number of storage locations
(a) storage capability
(b) high speed
(c) accuracy
(d) versatility

Ans. (b) high speed

158. Storage of 1K means that it has following number of storage locations
(a) 1000 (b) 964
(c) 1024 (d) 1032

Ans. (c) 1024

159. The term 'baud' is a measure of the
(a) speed at which data travels over a communications line
(b) capacity of memory
(c) error detection/correction capability of computer system
(d) instruction execution time
Ans. (a) speed at which data travels over a communications line

160. A bootstrap is
(a) a memory device
(b) an input/output device
(c) a device to support computer
(d) a small initialization computer program to start up an inactive computer
Ans. (d) a small initialization computer program to start up an inactive computer

161. An interface is basically a component that
(a) tests the system
(b) corrects the errors in programs
(c) allows two incompatible entities with one another
(d) enhances the capability of a system/equipment
Ans. (c) allows two incompatible entities with one another

162. Debug is a term denoting
(a) error correction process
(b) writing of instructions in developing a new program
(c) fault detection in equipment
(d) determine useful life
Ans. (a) error correction process

163. A 64 k-bit word computer has
(a) 64 × 1000 bits
(b) 64 × 1012 bits
(c) 64 × 1020 bits
(d) 64 × 1024 bits
Ans. (d) 64 × 1024 bits

164. Simulation is a process in which
(a) computer is used to control a process
(b) computer gathers data for later processing
(c) full capacity of the computer is utilized
(d) the computer system and program are used to produce actions similar to those in a real physical system
Ans. (d) the computer system and program are used to produce actions similar to those in a real physical system

165. Real time systems
(a) are effective in process control
(b) process transactions by means of direct-access devices
(c) process data in manner similar to batch processing systems
(d) are not possible to achieve
Ans. (a) are effective in process control

166. A collection of related fields in data organizing is called
(a) group (b) register
(c) file (d) record
Ans. (d) record

167. A collection of logically related data elements that can be used for multiple processing needs is called
(a) data base (b) file
(c) registers (d) organizing
Ans. (a) data base

168. Which file processing will be suited to obtain up-to-the-minute information is response to inquires from on line station without delay
(a) random access or on-line
(b) sequential
(c) batch
(d) serial
Ans. (a) random access or on-line

169. Characteristic of digital computer are
(a) versatile and large memory
(b) speed and accuracy
(c) ease of communication, simulation and automation
(d) all of the above
Ans. (d) all of the above

170. Which of the following is not a hardware
(a) compiler (b) CPU
(c) memory unit (d) chip
Ans. (a) compiler

171. Pickup the wrong statement – A digital computer can read/write data from/on
(a) punched cards and tapes
(b) magnetic disks and tapes
(c) floppy disk
(d) printer
Ans. (d) printer

172. The sequence of instruction telling the machine to perform a particular sequence of operation is called
(a) program (b) hardware
(c) algorithm (d) debugging
Ans. (a) program

173. Pick up wrong the definition
(a) Byte – is a unit having a group of eight bit (binary digit)
(b) Channel – is a path to carry information

from source to destination or *vice versa*

(c) Compiler – is a computer program which translates the written high level language understandable by the computer

(d) File – is a cover used to cover records in computers.

Ans. (d) File – is a cover used to cover records in computers.

174. *Flow chart is diagrammatic representation*

(a) indicating the events of physical system

(b) indicating the events occurring in the logical sequence and showing the inter-relation between them

(c) of a chart indicating the flow of the process

(d) of debugging program

Ans. (b) indicating the events occurring in the logical sequence and showing the inter-relation between them

175. *FORTRAN is an acronym for*

(a) formula transducer

(b) formula translator

(c) for translating high level language

(d) formula translator

Ans. (b) formula translator

176. *Pick up the wrong definition*

(a) Off-line – is a system peripheral equipment not controlled by CPU

(b) On-line – is system in which peripheral equipment is in direct contact with CPU

(c) Peripherals – are hardware under the control of CPU, like punched card readers, tapes, drums, disk, output devices

(d) PL/I is the acronym Peripheral Listing/Index.

Ans. (d) PL/I is the acronym Peripheral Listing/Index.

177. *A computer programmer*

(a) enters data into computer

(b) does total planning and thinking for a computer.

(c) changes flow charts into instructions

(d) provides solutions to complex problems

Ans. (b) does total planning and thinking for a computer.

178. *Terminal is a*

(a) device used to give supply to a computer

(b) point at which data may leave or enter the computer

(c) ending point in a program

(d) point where wires are interconnected

Ans. (b) point at which data may leave or enter the computer

179. *Error in computer results could be due to*

(a) encoding of data

(b) transmission of data

(c) manipulation of data

(d) all of the above

Ans. (d) all of the above

180. *Register is a*

(a) set of capacitors used to register input instructions in a digital computer

(b) set of paper tapes and cards put in a file

(c) temporary storage unit within the CPU having dedicated or general purpose use

(d) part of the auxiliary memory

Ans. (c) temporary storage unit within the CPU having dedicated or general purpose use

181. *Accumulator is a*

(a) storage battery which supplies the necessary power to the system

(b) hardware which stores one of the operand to be manipulated by the ALU

(c) hardware which stores memory in the memory unit

(d) hardware used to link the control unit with I/O unit

Ans. (b) hardware which stores one of the operand to be manipulated by the ALU

182. *The computer system where only two states exist, either conducting or non-conducting is called*

(a) on line computer system

(b) bilateral system

(c) flip-flop system

(d) binary system

Ans. (d) binary system

183. *The data obtained by counting are called*

(a) digital data

(b) continuous data

(c) analog data

(d) discrete data

Ans. (d) discrete data

184. *Which type of computer operates by directly counting numbers*

(a) special purpose (b) analog

(c) digital (d) hybrid

Ans. (c) digital

185. *A group of characters that are treated as a single entity*

(a) bit (b) byte

(c) word (d) address

Ans. (c) word

186. *A string of binary digits treated as a unit is called a*
(a) bit (b) byte
(c) word (d) character
Ans. (b) byte

187. *A built in number that identifies a location in storage*
(a) character (b) word
(c) byte (d) address
Ans. (d) address

188. *Each address in storage has a _____ number*
(a) discrete (b) character
(c) unique (d) general
Ans. (c) unique

189. *An address location holds _____ data item at a time*
(a) one (b) new
(c) word (d) discrete
Ans. (a) one

190. *It combines the desirable features of both analog and digital computer*
(a) general purpose computer
(b) special purpose computer
(c) discrete computer
(d) hybrid computer
Ans. (d) hybrid computer

191. *Pick up the false statement regarding storage location*
(a) Each address in storage must have a unique number
(b) A computer byte is a group of characters that are treated as a single entity
(c) A string of binary digits treated as a unit is called a byte
(d) A group of binary digits, or bits is used to represent a character in primary storage
(e) An address is a built-in number that identifies a location in storage.
Ans. (b) A computer byte is a group of characters that are treated as a single entity

192. *Pick up the false statement*
(a) A general purpose computer is one that can store different programs
(b) Analog computers do not compute directly with numbers, rather, they measure continuously variable physical magnitudes
(c) An advantage of fixed word length computers is that they make efficient use of available primary storage space
(d) A special purpose computer lacks versatility
Ans. (c) An advantage of fixed word length computers is that they make efficient use of available primary storage space

193. *Which of the following type computer can store one alphanumeric character in each numbered storage location*
(a) bit addressable
(b) byte addressable
(c) fixed word-length addressable
(d) variable word-length addressable
Ans. (b) byte addressable

194. *Both the Arithmetic Logic Unit and the control section have special-purpose storage location called*
(a) adders (b) registers
(c) accumulators (d) RAM
Ans. (b) registers

195. *Although different computers use different processing techniques, the ALU is every computer must be able to*
(a) manage two data words and the result
(b) select and interpret instructions
(c) advance the sequence register
(d) control the decoder
Ans. (a) manage two data words and the result

196. *A basic instruction that can be interpreted by a computer generally has*
(a) an instruction register and an address register
(b) an operand and an address
(c) a decoder and an accumulator
(d) all of the above
Ans. (b) an operand and an address

197. *The following registers, respectively are used for selecting an instruction, reading into the register, and interpreting*
(a) sequence, instruction, decoder
(b) accumulator, storage, address
(c) decoder, address, instruction
(d) accumulator, address, decoder
(e) decoder, instruction, sequence
Ans. sequence, instruction, decoder

198. *Compiler is the*
(a) name given to the computer operator
(b) part of digital machine to store the information
(c) translator of source program to object program
(d) part of arithmetic logic unit
(e) operator of Boolean Algebra
Ans. (c) translator of source program to object program

199. *The binary addition, (1 + 1) will result in*
(a) 0

(b) 1
(c) 0 with no carry
(d) 0 with 1 carry
(e) 1 with 1 carry

Ans. (d) 0 with 1 carry

200. *Which of the following circuit is known as half adder?*
(a) EXCLUSIVE AND circuit
(b) Flip-flop circuit
(c) INCLUSIVE OR circuit
(d) EXCLUSIVE OR circuit
(e) NAND circuit

Ans. (d) EXCLUSIVE OR circuit

201. *Which of the following function is referred as the complementary?*
(a) $(A + B) + C = A + (B + C) = A + B + C$
(b) $(AB)C = A(BC) = ABC$
(c) $A + B = B + A$
(d) $A(B + C) = (AB) + (AC)$
(e) $AB = BA$

Ans. (d) $A(B + C) = (AB) + (AC)$

202. *Which of the following statement is false?*
(a) $\overline{AB} = \overline{A} + \overline{B}$
(b) $\overline{A + B} = \overline{A.B}$
(c) $\overline{AB} = \overline{A}\ \overline{B}$
(d) $A + A = A$
(e) $A(B + C) = AB + AC$

Ans. (c) $\overline{AB} = \overline{A}\ \overline{B}$

203. *The minimum form of the expression. (A + B)(A + B + C) will be*
(a) $A + \overline{C}B$
(b) $A + \overline{B}C$
(c) $A\overline{C} + B$
(d) $A + \overline{B}C$
(e) $A + B\overline{C}$

Ans. (d) $A + \overline{B}C$

204. *A flip-flop is a*
(a) monostable device
(b) bistable device
(c) astable device
(d) oscillatory device
(e) synchronous device

Ans. (b) bistable device

205. *The output impedance of an ideal operational amplifier is*
(a) infinity (b) zero
(c) 1 ohm (d) 10 ohms

Ans. (b) zero

206. *The input impedance of an ideal operational amplifier is*
(a) zero (b) infinity
(c) 1 ohm (d) 100 ohms

Ans. (b) infinity

207. *The gain of an ideal amplifier must be*
(a) infinity (b) zero
(c) unity (d) 10^{10}

Ans. (a) infinity

208. *Pick up wrong statement*
(a) buffer is a temporary storage device
(b) the hardware that stores data CPU is called external storage media
(c) the portion of CPU that stores program and receive information (data) from input devices is called internal storage
(d) the hardware of CPU that stores programmed instructions is called main memory
(e) registers have nothing to do with CPU

Ans. (e) registers have nothing to do with CPU

209. *Pick up the wrong statement*
(a) a program that operates a computer to imitate another computer is called Emulator Program
(b) a supervisor program to controls the traffic within the computer system is called Executive Program
(c) an executive program to control traffic within the computer system is called Supervisor Program
(d) a program written to operate a CPU manually is called Manual program
(e) a program which performs the routine work of a computer like information transfer merging files, data separation is called Utility Program.

Ans. (d) a program written to operate a CPU manually is called Manual program

210. *An intelligent terminal is a terminal that*
(a) translates intelligence for the business computer
(b) uses a computer for organizing data
(c) manages CPU in a sequential order
(d) converts input into a computer readable form
(e) feed input to output

Ans. (b) uses a computer for organizing data

211. *The following truth table is for*

Inputs	Outputs

1	0	1
0	1	1
1	1	1

(a) NAND
(b) NOR
(c) OR
(d) EXCLUSIVE OR
(e) NOT

Ans. (d) EXCLUSIVE OR

212. *The time required to access one word is called the memory cycle time. This is a fixed time for modern computer and is of the order of*
(a) 1 pieco second to 200 pieco second
(b) 1 nano second to 250 nano second
(c) 300 nano second to 1 micro second
(d) 5 micro second to 200 micro second
(e) 1 milli second to 5 milli second

Ans. (c) 300 nano second to 1 micro second

213. *Choose the incorrect statement about microcomputer, minicomputers*
(a) A microcomputer can be placed on a single silicon chip
(b) A minicomputer can have more processing capability than a mainframe model
(c) A microcomputer chip performs the arithmetic logic and control functions of a microcomputer
(d) ROM chips may be used in micros to permanently store program instructions
(e) Most micro use rigid disk storage device rather than floppy disk drives.

Ans. (e) Most micro use rigid disk storage device rather than floppy disk drives.

214. *The smallest logical data entity in organizing data for computer processing is*
(a) file (b) field
(c) record (d) data base

Ans. (b) field

215. *Storing records one after another in a file in an ascending or descending order determined by the record key is called*
(a) sequential processing
(b) serial processing
(c) batch processing
(d) all of the above

Ans. (d) all of the above

216. *In which processing method any file record can be directly located and updated without the need to read preceding file records*
(a) batch (b) serial
(c) random (d) sequential

Ans. (c) random

217. *A group of related characters that are treated as a single unit is called*
(a) data (b) information
(c) field (d) record

Ans. (c) field

218. *The use of computes to create, view, edit, store, retrieve, and print text materials is called*
(a) word processing
(b) line printing
(c) data processing
(d) typing

Ans. (a) word processing

219. *Computer performs following operation on data*
(a) storage/retrieval
(b) calculation
(c) logic/comparison
(d) all of the above

Ans. (d) all of the above

220. *The data gathering vehicle that permits high-volume anonymous answers:*
(a) observation
(b) unstructured interview
(c) questionnaire
(d) structured interview

Ans. (c) questionnaire

221. *In the preliminary design phase, the analyst may prepare alternative*
(a) candidates
(b) organization charts
(c) questionnaires
(d) decision tables

Ans. (a) candidates

222. *A set of software tools for automated design is called*
(a) prototypes
(b) data flow diagrams
(c) CASE
(d) Gantt charts

Ans. (c) CASE

223. *A plan to trace data to its source is called*
(a) an audit trail (b) a vector
(c) sampling (d) volume testing

Ans. (a) an audit trail

224. *The active cell:*
(a) current cell (b) formula
(c) range (d) cell address

Ans. (a) current cell

225. *A preprogrammed formula:*
(a) function (b) range
(c) graph (d) cell

Ans. (a) function

226. ***A chart that represents only one value for each variable:***
(a) function (b) pie
(c) line (d) bar

Ans. (b) pie

227. ***Business quality graphics:***
(a) stacked bar (b) analytical
(c) legend (d) presentation

Ans. (d) presentation

228. ***Intersection of a row and column:***
(a) active address (b) cursor
(c) formula (d) cell

Ans. (d) cell

229. ***The result of a formula in a cell:***
(a) label (b) range
(c) value (d) displayed value

Ans. (d) displayed value

230. ***Text information in a cell:***
(a) label (b) formula
(c) value (d) cell address

Ans. (a) label

231. ***A dot or symbol on a line graph:***
(a) label (b) variable
(c) data point (d) axis

Ans. (c) data point

232. ***Summarizes information related to a graph:***
(a) plot area (b) label
(c) title (d) axis

Ans. (c) title

233. ***Computer-prepared art:***
(a) cell (b) clip art
(c) analytical (d) range

Ans. (b) clip art

234. ***The set of choices on the screen is called a(n)***
(a) menu (b) editor
(c) reverse video (d) template

Ans. (a) menu

235. ***A program that provides synonyms is called a(n)***
(a) indexing program
(b) editing program
(c) form letter program
(d) thesaurus program

Ans. (d) thesaurus program

236. ***A program that can identify unnecessary words and wordy phrases is called a(n)***
(a) pull-down menu
(b) headers
(c) block
(d) halftone

Ans. (d) halftone

237. ***A program that can identify unnecessary words and wordy phrases is called a(n)***
(a) indexing program
(b) grammar/style program
(c) form letter program
(d) thesaurus program

Ans. (b) grammar/style program

238. ***The feature that keeps track of the right margin is***
(a) find and place (b) ragged right
(c) word wrap (d) right justify

Ans. (c) word wrap

239. ***If using verification with the find and replace feature, this is called***
(a) verified replace
(b) questionable replace
(c) conditional place
(d) "what-if" replace

Ans. (c) conditional place

240. ***The feature that allows viewing any part of a document on the screen is***
(a) searching (b) pasting
(c) scrolling (d) editing

Ans. (c) scrolling

241. ***The command to transfer text to another location without deleting it from its original location is***
(a) scroll (b) copy
(c) search (d) move

Ans. (b) copy

242. ***Ragged right means the right margin is set to be***
(a) uneven (b) even
(c) variable (d) wide

Ans. (a) uneven

243. ***Spelling checker programs use***
(a) tab settings (b) pagination
(c) function keys (d) a dictionary

Ans. (d) a dictionary

244. ***Computer people who design, write, test, and implement programs are***
(a) programmers
(b) computer operators
(c) data entry operators
(d) system analysts

Ans. (a) programmer

245. ***Computer users who are not computer professionals are sometimes called***
(a) librarians
(b) peripheral users
(c) information officers
(d) end-users

Ans. (d) end-users

246. ***People who prepare data for processing are***

(a) programmer
(b) librarians
(c) printers
(d) data entry operators

Ans. (d) data entry operators

247. Parallel processing is normally under
(a) Batch Processing Mode
(b) On-line processing mode
(c) Batch and Online mode
(d) None of above

Ans. (c) Batch and Online mode

248. The factor not necessary for calculating the storage capacity of a disk is
(a) Track density
(b) Recording density
(c) Diameter of the disk
(d) None of above

Ans. (c) Diameter of the disk

249. The sequential organization is most suitable for
(a) Master files on direct access devices
(b) Master files in a batch processing environment
(c) Transaction files
(d) None of the above

Ans. (b) Master files in a batch processing environment

250. Which of the following storage devices that cannot support both direct
(a) Magnetic drum
(b) Magnetic Tape
(c) Magnetic disk
(d) none of the above

Ans. (b) Magnetic Tape

251. Assembly languages, or symbolic languages, use
(a) binary code
(b) abbreviations for instructions
(c) numbers
(d) English words

Ans. (b) abbreviations for instructions

252. COBOL and FORTRAN are examples of
(a) machine languages
(b) high-level languages
(c) assembly languages
(d) obsolete languages

Ans. (b) high-level languages

253. Personal computers that can use software designed for the IBM PC are called
(a) cores (b) emulators
(c) clones (d) unbundled

Ans. (c) clones

254. The leading software manufacturer is
(a) Apple (b) IBM
(c) MITS (d) Microsoft

Ans. (d) Microsoft

255. Another name for available-for-purchase software is
(a) secondary software
(b) system software
(c) packaged software
(d) peripheral software

Ans. (c) packaged software

256. A system whereby computers and data storage are placed in dispersed location is known as
(a) centralized processing
(b) summarizing
(c) packaged software
(d) distributed data processing

Ans. (d) distributed data processing

257. Which of the following is an acronym for a computer department?
(a) MIS (b) PDA
(c) CPU (d) LAN

Ans. (a) MIS

266. Relativity permanent data is contained in
(a) a field (b) a transaction
(c) memory (d) a master file

Ans. (d) a master file

267. A limitation of magnetic tape as a method of storing data is that it is
(a) not reusable
(b) relatively expensive
(c) organized sequentially
(d) not portable

Ans. (c) organized sequentially

268. Before a sequential file can be updated the transactions must first be
(a) numbered (b) labeled
(c) sorted (d) updated

Ans. (c) sorted

269. Hashing, to get an address, is the process of applying a formula to a
(a) key (b) record
(c) file (d) character

Ans. (a) key

270. When all access and processing is done in one location, a computer system is said to be
(a) networked (b) distributed
(c) centralized (d) linked

Ans. (c) centralized

271. Using computers to design and manufacture products is called
(a) inscribing (b) detailing
(c) CAD/CAM (d) imaging

Ans. (c) CAD/CAM

272. *Entering data into the system as a by-product of the activity that generates the data is called*
(a) source data automation
(b) CAD/CAM
(c) a discrete word system
(d) MICR entry

Ans. (a) source data automation

273. *The rate of screen refreshment is called*
(a) pixel speed (b) raster rate
(c) bit-map speed (d) scan rate

Ans. (d) scan rate

274. *Magnetic characters are produced on your bank checks by*
(a) bar code reader (b) MICR inscribers
(c) mice (d) microfiche

Ans. (b) MICR inscribers

275. *"Mark sensing" is another term for*
(a) MICR (b) OMR
(c) POS (d) VGA

Ans. (b) OMR

276. *OCR-A is a*
(a) plotter (b) wand reader
(c) standard typeface (d) bar code

Ans. (c) standard typeface

277. *POS terminals are similar to*
(a) calculators
(b) UPCs
(c) touch-tone telephones
(d) cash register

Ans. (d) cash register

278. *A computer crime in which money is embezzled in small amount over time is*
(a) the salami technique
(b) the Trojan Horse
(c) blue-collar crime
(d) data diddling

Ans. (a) the salami technique

279. *A computer dedicated to screening access to a network from outside the network:*
(a) hot site (b) cold site
(c) vaccine (d) firewall

Ans. (d) firewall

280. *One safeguard against theft or alteration of data is the use of*
(a) DES
(b) identical passwords
(c) the Trojan Horse
(d) data diddling

Ans. (a) DES

281. *The legislation that prohibits government agencies and contractors from keeping secret personal files on individuals:*
(a) Federal Privacy Act
(b) Fair Credit Reporting Act
(c) Computer Abuse Act
(d) Freedom of Information Act

Ans. (a) Federal Privacy Act

282. *A student who managed to modify her grades before they were entered into the computer file could be said to be*
(a) piggybacking
(b) using the salami technique
(c) data diddling
(d) altering stored data

Ans. (c) data diddling

283. *Computer crimes are usually*
(a) easy to detect
(b) prosecuted
(c) blue-collar crimes
(d) discovered accidentally

Ans. (d) discovered accidentally

284. *The "what you are" criterion for computer system access involves*
(a) a badge (b) biometrics
(c) a password (d) a magnetized card

Ans. (b) biometrics

285. *The key factor in a computer installation that has met with disaster is the*
(a) equipment replacement
(b) loss of hardware
(c) insurance coverage
(d) loss of processing ability

Ans. (d) loss of processing ability

286. *In anticipation of physical destruction, every computer organization should have a*
(a) biometrics scheme
(b) disaster recovery plan
(c) DES
(d) set of active badges

Ans. (b) disaster recovery plan

287. *Software piracy include*
(a) badge theft
(b) copyrighting
(c) program duplication
(d) data alteration

Ans. (c) program duplication

288. *Authorization to make multiple software copies is called*
(a) piggybacking (b) site licensing
(c) scavenging (d) copy protection

Ans. (b) site licensing

289. *Secured waste, auditor checks, and applicant screening all aid*
(a) data security
(b) built-in software protection

(c) license protection
(d) piracy detection

Ans. (a) data security

290. *The weakest link in any computer system is the*
(a) people in it (b) hardware
(c) password (d) software

Ans. (a) people in it

291. *A device that prevents electrical problems from affecting data files:*
(a) site license (b) Trojan Horse
(c) hot site (d) surge protector

Ans. (d) surge protector

292. *One form of build-in software protection for data is*
(a) secured waste
(b) applicant screening
(c) user profiles
(d) auditor checks

Ans. (c) user profiles

293. *A clip-on identification card with an embedded chip to signal its wearer's location:*
(a) antivirus (b) active badge
(c) site license (d) consortium

Ans. (b) active badge

294. *An empty shell in which a company may embedded chip to signal its wearer's location:*
(a) restoration site (b) cold site
(c) hot site (d) hardware

Ans. (b) cold site

295. *A program written when the programmer is employed by an organization is owned by*
(a) the programmer
(b) no one
(c) the state
(d) the organization

Ans. (d) the organization

258. *Booting is a process in which*
(a) user programs are bought in memory
(b) I/O files are collected and organized on disk
(c) a portion of the operating system is loaded into memory
(d) None of above

Ans. (c) a portion of the operating system is loaded into memory

259. *The purpose of an application program is to:*
(a) convert program written in high level language to machine level language.
(b) meet specific user needs.
(c) allow the operating system to control resources better
(d) make off-line equipment run better.

Ans. (b) meet specific user needs.

260. *A system is which activities are processed as and when they occur is called:*
(a) Transaction processing system
(b) Expert system
(c) Management information system
(d) Decision support system.

Ans. (a) Transaction processing system

261. *Word processing, electronic filing and electronic mail are part of*
(a) Office automation
(b) Electronic typewriter
(c) Electronic Industry
(d) None of the above

Ans. (a) Office automation

262. *To be computer literate, it is not necessary for you to know*
(a) how to program a computer
(b) how to use a computer
(c) what computers can and can't do
(d) how to repair a computer

Ans. (d) how to repair a computer

296. *Security protection for personal computers includes*
(a) internal components
(b) locks and cables
(c) software
(d) all of these

Ans. (d) all of these

297. *The secret words or numbers to be typed in on a keyboard before any activity can take place are called*
(a) biometric data (b) data encryptions
(c) passwords (d) private words

Ans. (c) passwords

298. *Another name for an antivirus:*
(a) vaccine (b) worm
(c) Trojan Horse (d) DES

Ans. (a) vaccine

299. *Another name for free software:*
(a) encrypted software
(b) copy protected software
(c) public domain software
(d) shareware

Ans. (c) public domain software

300. *A virus that replicates itself is called a*
(a) bug (b) worm
(c) vaccine (d) bomb

Ans. (b) worm

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MATH

FUNCTIONS AND LIMITS

FUNCTIONS

Q1. If the value of the sphere, $v = \frac{4}{3}\pi r^3$, then the which of the following statement is true?
A r is the function of v
B v is the function of π
C π is independent variable
D None of these

Q2. A function from A to B is denoted by
A $f: A \longrightarrow B$
B $f: B \longrightarrow A$
C $f \longrightarrow A : B$
D $f \longrightarrow A \longrightarrow B$

Q3. If a variable y dependents on a variable x in such a way that each value of x determines exactly one value of y, then we say that
A x is a function of y
B y is a function of x
C y is independent variable
D x is real valued function

Q4. The domain of $y = \sqrt{x^2 - 9}$ is
A R
B $(0, +\infty)$
C $(-\infty, -3) \cup (3, +\infty)$
D $(0, \infty)$

Q5. In the function $f: A \longrightarrow B$, the elements of A are called
A images
B pre-images
C ranges
D parameters

Q6. The domain the function: $f(x) = x^2$ is given by
A R
B Set of all non-negative Real numbers
C R^-
D None of these

Q7. The domain of the function $\frac{x}{x^2 - 4}$ is given by
A R
B $R + 2$
C $[R - (\pm 2)]$
D $R - 4$

Q8. If the domain of the function $f: x \longrightarrow 2x^2 + 1$ is $\{-1,2,3\}$, the range of the function is
A $\{3,2,5\}$
B $\{1,3,9\}$
C $\{-1,-2,-3\}$
D $\{3,9,19\}$

Q9. The image of 5 under f of the function $f: x \longrightarrow 3x + \frac{5}{x}$ $x \neq 0$, is
A 16
B 14
C 25
D 15

Q10. _____ invented a symbolic way to write the statement "y is a function of x" as $y = f(x)$
A Leibniz
B Newton
C Euler
D None of these

Q11. If $f(x) = x^3 - 2x^2 + 4x - 1$, then $f(1 + x) =$
A $x^3 - x^2 + 2x + 3$
B $x^3 - 3x + 2x + 3$
C $x^3 + x^2 + 3x + 2$
D $2x^3 - 2x^2 - 7x + 4$

Q12. The domain of the function $f(x) = \sqrt{\frac{1 - |x|}{2 - |x|}}$ is
A $(-\infty, \infty) - [-2,2]$
B $[-1,1] \cup (-\infty, -2) \cup (2, \infty)$
C $(-\infty, \infty) - [-1,1]$
D $[-\infty, \infty] \cup [-2,2]$

Q13. Every relation, which can be represented by a linear equation in two variables, represents a
A Relation
B Cartesian product
C Function
D Graph

Q14. The value of x which is unchanged by the mapping in the function defined by $f: x \longrightarrow x^2 + 5x - 5$ for $x > 0$ is
A 1
B 5
C −5
D −1

Q15. In the function $f: p \longrightarrow 3p + \frac{5}{p}$, $p \neq 0$, what is the possible value of p whose image is 8?
A 1 and 5

B 2 and 5

C 1 and $\frac{5}{3}$

D -1 and $\frac{3}{5}$

Q16. If $f(x) = x^3 + 2x^2 - 1$, what is the value of $\frac{f(a+h)-f(a)}{h}$?

A $3h^2 + (3a + 2h) + a^2 + 3a$

B $h^2 + (3a - h)2 + 2a^2 + 3a$

C $h^2 + (2a + 3)h + 3a^2 - 4a$

D $h^2 + (3a + 2) + 3a^2 + 4a$

Q17. If x is an image of y under the function f. This can be written as

A $y = f(x)$

B $f(x) = 0$

C $x = f(y)$

D $f(y) = 0$

Q18. If $f(x) = \cos x$, what is the value of $\frac{f(a+h)-f(a)}{h}$?

A $-\frac{2\sin\left(\frac{a+2h}{2}\right)\sin\left(\frac{h}{2}\right)}{h}$

B $-\frac{2}{h}\left(2a+\frac{h}{2}\right)\sin\left(\frac{h}{2}\right)$

C $-\frac{h\sin\left(\frac{2a+h}{2}\right)\sin\left(\frac{2}{h}\right)}{2}$

D $-\frac{2}{h}\left(a+\frac{h}{2}\right)\sin\left(\frac{h}{2}\right)$

Q19. What is domain of the function $g(x) = \sqrt{x^2 - 4}$?

A $\Re$

B Z^-

C $[0, \infty)$

D $(-\infty, -2)\cup[2,\infty)$

Q20. What is range of the function $g(x) = |x - 3|$?

A $[-\infty, 3)$ B $(-\infty, \infty)$

C $(-\infty, 3]$ D $[0, \infty)$

Q21. The range of the function $g(x) = \sqrt{x^2 - 4}$ is:

A $[0, \infty)$ B $(0, \infty]$

C $(0, \infty)$ D $(0, -\infty)$

Q22. What is the domain of the function $f(x) = \sqrt{x - 3x^2}$?

A $\left(0, \frac{1}{3}\right)$ B $\left[0, \frac{1}{3}\right]$

C $\left(0, -\frac{1}{3}\right)$ D $R + \frac{1}{3}$

Q23. The domain of the function $h(x) = \sqrt{\frac{x-1}{x+1}}$ is:

A $[-\infty, -2] \cup [1, \infty]$ B $[-\infty, -2) \cup (1, \infty]$

C $(-\infty, -2) \cup [1, \infty)$ D $(-\infty, -2) \cup [1, \infty]$

Q24. The domain of the function $f(x) = \sqrt{x-3} + \sqrt{12-x}$ is:

A $(3, 12)$ B $[3, 12]$

C $\Re$ D $\Re - 9$

Q25. The largest possible range of the function $y = \sqrt{x}$ is:

A $(0, \infty]$ B $[0, \infty)$

C $(0, \infty)$ D $[0, \infty]$

Q26. The largest possible domain of the function: $y = \sqrt{x-3}$, is:

A $(3, \infty)$ B 12

C $(3, 12)$ D $[3, \infty)$

Q27. For $f(x) = x^2 + x$, what is the value of $f(a) + f(-a)$ in terms of a?

A $3a^2$ B $2a^2$

C $2a$ D $-7a$

Q28. For $f(x) = x^2 + px + 1$, if $f(3) = 3$ then p =

A $\frac{3}{7}$ B $-\frac{2}{3}$

C $-\frac{7}{5}$ D $-\frac{7}{3}$

Q29. In the function $y = 2x - 3$, what is the pre-image of 11?

A 11 B 7

C 5 D 2

Q30. The largest domain for the function $y = \frac{1}{\sqrt{2-x}}$ is:

A $(-\infty, 2)$ B $[-\infty, 2]$

C $(-\infty, -2]$ D $(\infty, 2]$

Q31. If $f(x) = x^3 - 3x^2 + 5x - 1$, then $f(-\sqrt{2})$ =

A $7 + 7\sqrt{2}$ B $3 + 3\sqrt{2}$

C $-7 - 7\sqrt{2}$ D $-3 - 3\sqrt{2}$

Q32. The common range for the functions with rule $f(x) = \sqrt{4 - x^2}$ and $g(x) = 1 + \sqrt{x}$ is:

A $(1, 2)$ B $[1, 2]$

C $(1, 2]$ D $[2, 3]$

Q33. Express the perimeter P of square as a

function of its area A?

A $P = 4\sqrt{A}$ B $P = \sqrt{A}$

C $P = 2A$ D $P = \frac{\pi}{\sqrt{A}}$

Q34. Express the volume V of a cube as a function of the area A of its base:

A $V = (A)^{3/2}$ B $V = \frac{3}{2}A$

C $V = 3(A)^2$ D $V = \frac{3}{4}A^2$

Q35. If $f(x) = x^3 - x$, which of the following is not true?

A $f(1) = f(0)$ B $f(2) = f(-2)$

C $f(1) = f(-1)$ D $f(-a) = -f(a)$

Q36. Express the area A of a circle as a function of its circumference C.

A $P = 4\pi A$ B $P = 2\sqrt{A}$

C $P = \frac{1}{4\pi}C^2$ D $P = 4A$

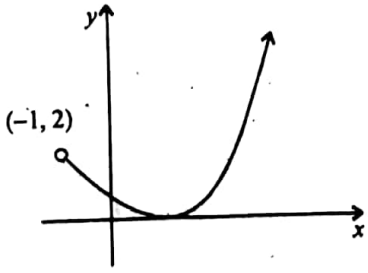
Q37. Which of the following is not the rule for a function?

A $f(x) = 4 \pm 3x$ B $f(x) = \sqrt{-x}$

C $f(x) = \sqrt{x}$ D $f(x) = 5$

GRAPHS OF ALGEBRAIC FUNCTIONS

Q38. the domain and range of the function graphed are, respectively:



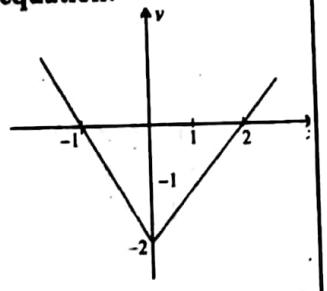
A $(\Re^+, 1)$ and $(\Re^-, 2)$

B $(-1, \propto)$ and $[0, \propto)$

C $(-1, 0)$ and $[0, 2)$

D $(0, \propto)$ and $(-1, 2]$

Q39. This graph could have equation:



A $f(x) = \begin{cases} x-2, x>0 \\ x+1, x \le 0 \end{cases}$

B $f(x) = \begin{cases} x-2, & x>0 \\ -2x-2, x \le 0 \end{cases}$

C $f(x) = \begin{cases} -2x-1 & x>0 \\ -2x+1 & x \le 0 \end{cases}$

D $f(x) = \begin{cases} x-3 & x<0 \\ 2x-1 & x \ge 0 \end{cases}$

Q40. The graph shown has the rule:

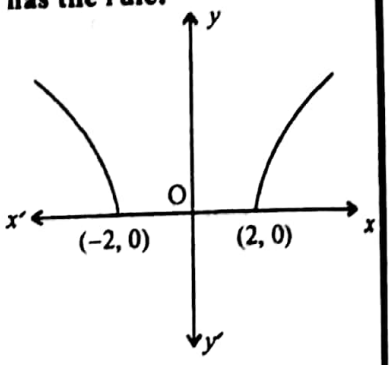
A $y = |3x+4|$

B $y = \frac{x^2-9}{x-3}$ $x \ne 3$

C $y = \begin{cases} x+1 & \text{for } x \le 1 \\ 2x-3 & \text{for } x > 1 \end{cases}$

D $y = |x-1|$

Q41. The graph shown has the rule:



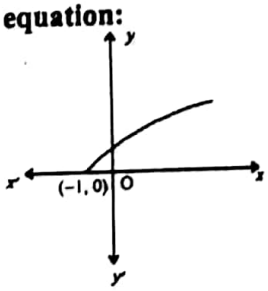
A $f(x) = \sqrt{x^2-4}$

B $f(x) = |x^2-4|$

C $f(x) = |2x-2|$

D $f(x) = 2|x-2|$

Q42. This graph could have equation:



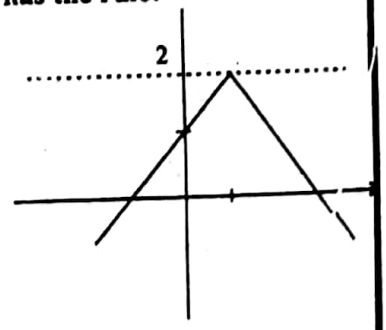
A $f(x) = \sqrt{x-1}$

B $f(x) = \sqrt{x+1}$

C $f(x) = 3|x-1|$

D $f(x) = |2(x-1)|$

Q43. The graph shown has the rule:



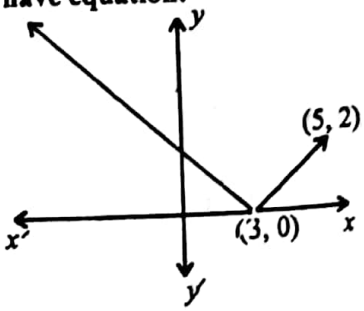
A $y = 2 - \sqrt{x-1}$

B $y = 2 - \sqrt{x+1}$

C $y = 2 + |x+1|$

D $y = 2 - \sqrt{(x-1)^2}$

Q44. This graph could have equation:



A $y = |x-3|$

B $y = \sqrt{x-3}$

C $y = |3(x-1)|$

D $y = -3|x-1|$

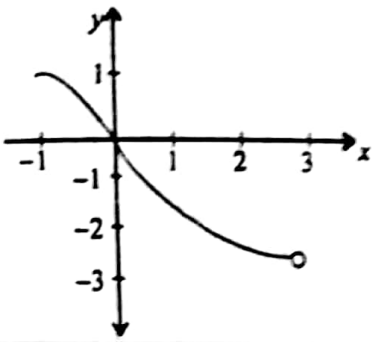
Q45. The domain of the function whose graph is shown is:

A $(-1, 3)$

B $[-1, 3)$

C $(1, 3]$

D $[-3, 1)$



TYPES OF FUNCTIONS

Q46. A function, in which the variable appears as exponent is called:

A an identity function
B a logarithmic function
C an exponential function
D a rational function

Q47. $\sin hx =$

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

Q48. $\sin h^{-1}x =$

A $ln(x + \sqrt{x^2 - 1})$
B $\frac{1}{2}ln\left(\frac{1+x}{1-x}\right)$
C $ln(x - \sqrt{x^2 - 1})$
D $ln(x + \sqrt{x^2 + 1})$

Q49. $\csc hx =$

A $\frac{2}{e^x - e^{-x}}$
B $\frac{1}{2}(e^x + e^{-x})$
C $\frac{e^x - e^{-x}}{e^x + e^{-x}}$
D $\frac{1}{2}ln\left(\frac{x+1}{x-1}\right)$

Q50. $\csc h^{-1}x =$

A $ln(x + \sqrt{x^2 - 1})$
B $ln(x + \sqrt{x^2 + 1})$
C $ln\left(\frac{1}{x} + \frac{\sqrt{1-x^2}}{x}\right)$
D $ln\left(\frac{1}{x} + \frac{\sqrt{1+x^2}}{|x|}\right)$

Q51. $\cos hx =$

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

Q52. $\cot h^{-1}x =$

A $ln(x + \sqrt{x^2 - 1})$
B $ln(x - \sqrt{x^2 + 1})$
C $\frac{1}{2}ln\left(\frac{1+x}{1-x}\right)$
D $\frac{1}{2}ln\left(\frac{x+1}{x-1}\right)$

Q53. $\sec hx =$

A $\frac{2}{e^x + e^{-x}}$
B $\frac{e^x - e^{-x}}{e^x + e^{-x}}$
C $\frac{e^x + e^{-x}}{e^x - e^{-x}}$
D $\frac{2}{e^x - e^{-x}}$

Q54. A function of the form $\frac{P(x)}{Q(x)}$ is called:

A Rational Function
B Logarithmic Function
C Exponential Function
D Hyperbolic Function

Q55. The Domain of the function $y = \tan x$, is:

A $\Re$
B $\{x : x \in \Re$ and $x \neq n\pi\}$
C $\{x : x \in \Re$ and $x \neq (2n+1)\frac{\pi}{2}\}$
D $[-1, 1]$

Q56. The domain of the function $y = \csc x$, is:

A $\Re$
B $[-1, 1]$
C $\{x : x \in \Re$ and $x \neq (2n+1)\frac{\pi}{2}\}$
D $\{x : x \in \Re$ and $x \neq n\pi\}$

Q57. $xy = 2$ is:

A a constant function
B an identity function
C an improper function
D implicit function

Q58. A function f is said to be an even if $f(-x) =$

A 0
B 1
C $f(x)$
D $-f(x)$

Q59. A function f is said to be an odd if $f(-x) =$

A 0
B 1
C $f(x)$
D $-f(x)$

Q60. $f(x) = \sin x$ is:

A an odd function
B an even function
C an implicit function
D an exponential function

Q61. $f(x) = \cos x$ is:

A an odd function
B an even function
C an implicit function
D an exponential function

Q62. $f(x) = x^3$ is:

A an odd function
B an even function
C an implicit function
D a quadratic function

Q63. $\cos h^2x + \sin h^2x =$

A $\sin h\, 2x$
B 1
C $\cos h\, 2x$
D 0

Q64. $f(x) = \sin x + \cos x$ is:

A an even function
B an odd function
C an even and implicit function
D neither even nor a odd

Q65. $f(x)=\dfrac{x-1}{x+1}, x\neq -1$ is:

A an even function
B an odd function
C an even and implicit function
D neither even nor a odd

Q66. $f(x)=\dfrac{x^3-x}{x^2+1}$ is:

A an even function
B an odd function
C an even and implicit function
D neither even nor a odd

Q67. $f(x)=3x^4-2x^2+7$ is:

A an even function
B an odd function
C an even and implicit function
D neither even nor a odd

Q68. $f(x)=\dfrac{3x}{x^2+1}$ is:

A an even function
B an odd function
C an even and implicit function
D neither even nor a odd

Q69. $\cot h^2x-1=$

A $\sec h^2x$
B $\text{Tan}\, h^2x$
C $\csc h^2x$
D $\cos h^2x$

ANSWERS

MULTIPLE CHOICE QUESTIONS

1.	D	2.	A	3.	B	4.	C	5.	B
6.	A	7.	C	8.	D	9.	A	10.	C
11.	C	12.	B	13.	C	14.	A	15.	C
16.	D	17.	C	18.	D	19.	D	20.	D
21.	A	22.	B	23.	C	24.	B	25.	B
26.	D	27.	B	28.	D	29.	B	30.	A
31.	C	32.	B	33.	A	34.	A	35.	B
36.	C	37.	A	38.	B	39.	B	40.	D
41.	A	42.	B	43.	D	44.	A	45.	B
46.	C	47.	D	48.	D	49.	A	50.	D
51.	C	52.	D	53.	A	54.	A	55.	C
56.	D	57.	D	58.	C	59.	D	60.	A
61.	B	62.	A	63.	C	64.	D	65.	D
66.	B	67.	A	68.	B	69.	C		

BASIC CONCEPTS & DEFINITIONS

FUNCTIONS

Q1. Let f be a real valued function continuous in the interval $(x, x_1) \subseteq D_f$ (the domain of f), then $\dfrac{f(x_1)-f(x)}{x_1-x}$ represents:

A Instantaneous rate of change
B Average rate of change
C Differential coefficient
D none of these

Q2. $\lim\limits_{\delta x\to 0}\dfrac{f(x+\delta x)-f(x)}{\delta x}$ equals:

A $f(\delta x)$
B $f(x)$
C $f'(x)$
D $-f'(x)$

Q3. If $x\in D_f$ and $f'(x)$ exists, then f is said to be:

A zero at x
B differentiable at x
C continuous at x
D none of these

Q4. $\lim\limits_{\delta x\to 0}\dfrac{f(3+\delta x)-f(3)}{\delta x}$ equals:

A δx
B $f'(3)$
C $f'(x)$
D $f'(\delta x)$

Q5. If $y=x^n$ then $\dfrac{dy}{dx}$ equals:

A nx
B x^{n-1}
C nx^{n-1}
D n

Q6. If $f(x)=c$ then $f'(x)$ equals:

A 1
B 0
C cx
D c

Q7. If $y=x^2$ then $\dfrac{dy}{dx}$ equals:

A $2x$
B $\dfrac{x}{2}$
C $2x^3$
D $\dfrac{x^3}{2}$

Q8. If $y=\dfrac{1}{x^2}$ then $\dfrac{dy}{dx}$ equals:

A $-2x$
B x^{-3}
C $-\dfrac{2}{x^3}$
D $-2x^3$

Q9. The derivative of $\sqrt{x}$ at $x=a$ is:

A $\dfrac{1}{2a}$
B $\dfrac{2}{\sqrt{a}}$
C $2\sqrt{a}$
D $\dfrac{1}{2\sqrt{a}}$

Q10. If $f(x)=x^{\frac{2}{3}}$ then $f'(x)$ at $x=8$ equals:

A 8
B $\dfrac{1}{8}$
C $\dfrac{1}{3}$
D $\dfrac{2}{3}$

Q11. $\dfrac{d}{dx}(x^3+2x+3)=$

A x^2+2
B $3x+2$
C $3x^2+5$
D $3x^2+2$

Q12. If $y = x^m$ then $\frac{dy}{dx}$ equals:

A mx B $\frac{x}{m}$
C mx^{m-1} D xm^{m-1}

Q13. If $f(x) = x^5 + x^3 + x$ the value of $f'(1)$ is:

A 0 B 8
C 5 D 9

Q14. The derivative of $\frac{1}{x^m}$ is:

A $\frac{x^{m+1}}{m}$ B $m(x)^{m-1}$
C $(m-1)x^{-m}$ D $-\frac{m}{x^{m+1}}$

Q15. The derivative of $\frac{2}{x^4}$ is:

A $-8(x)^5$ B $-\frac{8}{x^5}$
C $5x^{-3}$ D $-8x^{-3}$

Q16. The derivative of $x^{\frac{3}{2}}$ is:

A $\frac{3}{2}x^{\frac{1}{2}}$ B $\frac{3}{2}x^{-\frac{1}{2}}$
C $\frac{3}{2}x^{\frac{5}{2}}$ D $3(x)^{-\frac{1}{2}}$

Q17. The derivative of $x^{\frac{5}{2}}$ is:

A $\frac{5}{2}x^{-\frac{3}{2}}$ B $-\frac{5}{2}x^{\frac{3}{2}}$
C $\frac{5}{2}x^{\frac{3}{2}}$ D $-\frac{1}{2}x^{\frac{15}{2}}$

Q18. The derivative of $(x+4)^{1/3}$ is:

A $\frac{1}{3}(x+4)^{-\frac{3}{2}}$ B $\frac{1}{7(x+4)^{\frac{1}{5}}}$
C $\frac{1}{3(x+4)^{\frac{2}{3}}}$ D $\frac{1}{3}(x+4)^{-2}$

Q19. If $f(x) = x^{-100}$ the value of $f'(1)$ is:

A 100 B −100
C 0 D −101

Q20. If $f(x) = \frac{1}{(ax+b)^n}$ then $f'(x)$ equals:

A $n(ax+b)^{n+1}$ B $n^{n-1}(ax+b)$
C $\frac{na}{(ax+b)^{n+1}}$ D $\frac{(n-1)(n)(ax+b)^{n-}}{2}$

Q21. The derivative of $\frac{x^4+3x^2}{2x}$ is:

A $\frac{3x^2+3}{2}$ B $\frac{x^4+6x^2}{8}$
C $\frac{4x^3+5x}{5}$ D $\frac{4x^3+6x}{2}$

Q22. $\frac{d}{dx}(ax+b)^n =$

A $n(ax+b)^{n-1}.a$ B $a(ax+b)^n$
C $n-1(ax+b)^n$ D $a(n-1)(ax+b)^n$

Q23. If $y = \frac{x^4+x}{x^2}$ then $\frac{dy}{dx}$ equals:

A $4x^5 + \frac{1}{x^3}$ B $\frac{2x^3+1}{x^2}$
C $2x - \frac{1}{x^2}$ D $2x$

Q24. If $y = (4-9x^4)^{\frac{1}{2}}$, then $\frac{dy}{dx}$ equals:

A $-18x^3(4-9x^4)^{-\frac{1}{2}}$ B $2(4-9x^4)^{-\frac{1}{2}}$
C $\frac{1}{2}(4-9x^4)^{-\frac{1}{2}}$ D $-\frac{9}{2}(4-9x^4)^{-\frac{1}{2}}$

Q25. If $y = (3x^4-2)^4$ then $\frac{dy}{dx}$ equals:

A $48x^3(3x^4-2)^3$ B $12x^3(3x^4-2)^3$
C $12x^4(3x^4-2)^3$ D $4x^3(2x^3-2)^3$

Q26. If $y = 3x^2 + 2x - \frac{4}{x^2}$, then $\frac{dy}{dx}$ equals:

A $x^3 + x^2 - \frac{4}{x}$ B $x^3 + x^2 + \frac{4}{x}$
C $6x + 2 + \frac{8}{x^3}$ D $6x + 2 + \frac{8}{x}$

Q27. $\frac{d}{dx}\left(\frac{1}{(az-b)^7}\right) =$

A $-\frac{7}{(z-b)^8}$ B $\frac{-7}{(az-b)^6}$
C $\frac{7a}{(az-b)^8}$ D $-\frac{7a}{(az-b)^8}$

Q28. $\frac{d}{dt}(3t+2)^{-2} =$

A $\frac{6}{(3t+2)^2}$ B $\frac{-6}{(3t+2)}$

C $-\frac{6}{(3t+2)^3}$ D $\frac{6}{(3t+2)^3}$

Q29. $\frac{d}{dx}\{cf'(x)\} =$

A $cf'(x)$ B $\frac{c}{f'(x)}$

C $f'(x)$ D c

Q30. $\frac{d}{dx}\{f(x) \pm g(x)\} =$

A $f'(x)+g'(x)$ B $\frac{f'(x)}{g'(x)}$

C $f'(x) \pm g'(x)$ D $f'(x).g'(x)$

ANSWERS

MULTIPLE CHOICE QUESTIONS

1.	B	2.	C	3.	B	4.	B	5.	C
6.	B	7.	A	8.	C	9.	D	10.	C
11.	D	12.	C	13.	D	14.	D	15.	B
16.	A	17.	C	18.	C	19.	B	20.	C
21.	A	22.	A	23.	C	24.	A	25.	A
26.	C	27.	D	28.	C	29.	A	30.	C

INTEGRATION

FUNDAMENTAL OF INTEGRATION

Q1. An integral of $\frac{1}{x}dx$ is:

A $\frac{1}{x^2}$ B $-\frac{1}{x^2}$

C $\frac{1}{\ln x}$ D $\ln x$

Q2. $\int f(x)$ is known as:

A definite integral B indefinite integral

C fixed integral D multiple integral

Q3. The integral of 10^{-x} is:

A $\frac{10^{-x+1}}{-x+1}$ B $-x\,10^{-x+1}$

C $-\frac{1}{\log 10}\log 10^{-x}$ D $-\frac{1}{\log 10}10^{-x}$

Q4. $\int a^u du$ is equal to:

A $\ln|u|$ B $\ln|a^u|$

C a^{a^u} D $\frac{a^u}{\ln a}$

Q5. $\int e^x dx$ is equal to:

A $\ln x$ B $\frac{1}{e^x}$

C e^x D $\ln e^x$

Q6. $\int e^{ax} dx$ is equal to:

A $\frac{1}{a}e^{ax}$ B $\frac{1}{x}e^{ax}$

C $\frac{1}{e^{ax}}.a$ D $\tan^{-1}\frac{1}{ax}$

Q7. $\int \frac{x}{\sqrt{4+x^2}}dx$ is equal to:

A $\frac{2}{\sqrt{4+x^2}}$ B $2\sqrt{4+x^2}$

C $\frac{\sqrt{4+x^2}}{2}$ D $\sqrt{4+x^2}$

Q8. The integral of $3x^5\,dx$ is:

A $15x^4$ B $\frac{x^6}{2}$

C $\frac{1}{6}x^5$ D $\frac{x^5}{\ln 3}$

Q9. $\int\sqrt{x^2-2x^4}\,dx$ equals:

A $-\frac{1}{6}(1-2x^2)^{3/2}$ B $\frac{2}{3}(1-2x)^{3/2}$

C $\frac{x^3}{3}-\frac{2x^5}{5}$ D $\tan^{-1}\sqrt{x^2-2x^4}$

Q10. $\int(e^x+1)^3e^x dx$ equals:

A $\frac{(e^x+1)^4}{A}$ B $\ln\frac{e^x}{e^x+1}$

C $e^{2x}+e^x$ D $\frac{4}{(e^x+1)^4}$

Q11. $\int\frac{dx}{e^x+1}$ equals:

A $\ln|e^x+1|$ B $x-\ln(1+e^x)$

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

Q12. $\int(\sqrt{x}+1)^2$ equals:

A $\frac{1}{2}\sqrt{x}+x+c$ B $\frac{1}{2}x^2+\frac{4}{3}x^{3/2}+x+c$

C $\frac{1}{2}\sqrt{x}+x^2+c$ D $\sqrt{x}+\frac{3}{2}x^2+c$

Q13. $\int\frac{e^{2x}+e^x}{e^x}dx$ equals:

A $\frac{1}{2}e^{2x}+e^{x}$ B $e^{x}+x+c$

C $\frac{1}{2}e^{2x}+\ln x$ D $\ln e^{x}+c$

Q14. $\int\frac{\sqrt{y}(y+1)}{y}dy\ (y>0)$ equals:

A $\frac{2}{3}y^{3/2}+2y^{1/2}+c$ B $\frac{2}{3}y^{3/2}+c$

C $\frac{1}{2}y^{-1/2}+\frac{2}{\sqrt{y}}+c$ D $\frac{2}{3}y^{-1/2}+\frac{2}{\sqrt{y}}+c$

Q15. $\int\frac{1}{\sqrt{x}(\sqrt{x}+1)}dx$ equals:

A $\ln(\sqrt{x}+1)$ B $2\ln(\sqrt{x}+1)$

C $\ln\frac{\sqrt{x}}{(\sqrt{x}+1)}$ D $\ln\frac{1}{x+1}$

Q16. $\int\frac{dx}{\sqrt{x+1}-\sqrt{x}}$ equals:

A $\frac{2}{3}(x+1)^{3/2}+x^{3/2}$ B $\ln\sqrt{(x+1)}-\sqrt{x}$

C $\frac{1}{(\sqrt{x+1}-\sqrt{x})^{2}}$ D $\frac{2}{3}(x+1)^{3/2}+\frac{2}{3}x^{3/2}$

Q17. The integral of $\frac{1}{ax+b}$ is:

A $\mathrm{Tan}^{-1}(ax+b)$ B $\ln|(ax+b)|$

C $\ln|ax|$ D $\frac{1}{a}\ln|(ax+b)|$

Q18. The integral of $(ax+b)^{n}$ is:

A $\frac{(ax+b)^{n+1}}{(n+1)}$ B $\frac{1}{a}\frac{(ax+b)^{n+1}}{(n+1)}$

C $\ln\frac{1}{(ax+b)}$ D $\frac{(ax+b)^{n+1}}{b(n+1)}$

Q19. $\int(a-2x)^{\frac{3}{2}}dx$ is equal to:

A $\frac{2(a-2x)^{5/2}}{5}$ B $\frac{3}{2}\sin^{-1}(a-2x)$

C $\frac{5}{2}\ln(a-2x)^{5/2}$ D $-\frac{1}{5}(a-2x)^{5/2}$

Q20. $\int\frac{dx}{(2x+3)^{4}}$ is equal to:

A $\frac{-3}{2}(2x+3)^{-3}$ B $-\frac{1}{6(2x+3)^{3}}$

C $\frac{1}{3(2x+3)^{3}}$ D $\frac{1}{2}\ln(2x+3)$

Q21. $\int\frac{x^{2}}{1-2x^{3}}dx$ is equal to:

A $\ln(1-2x^{3})$ B $-\frac{1}{2}\ln|1-2x^{3}|$

C $-\frac{1}{6}\ln|(1-2x^{3})|$ D $\frac{-1}{(1-2x^{3})^{2}}$

INTEGRATION BY SUBSTITUTION

Q22. $\int\sec^{2}(ax+b)dx$ is equal to:

A $\tan^{2}(ax+b)$ B $\frac{1}{a}\tan^{2}(ax+b)$

C $\frac{1}{a}\tan(ax+b)$ D $\tan(ax+b)$

Q23. $\int\sin(ax+b)dx$ is equal to:

A $\frac{1}{2a}\cos(ax+b)$ B $-\frac{1}{a}\cos(ax+b)$

C $\frac{1}{a}\cos(ax+b)$ D $\frac{1}{a}\ln(ax+b)$

Q24. $\int\frac{1}{ax+b}dx$ is equal to:

A $\sin^{-1}(ax+b)$ B $\frac{1}{a}\sin^{-1}(ax+b)$

C $\frac{1}{a}\sin(ax+b)$ D $\frac{1}{a}\ln|ax+b|$

Q25. $\int\tan(ax+b)\,dx$ is equal to:

A $\frac{1}{a}\ln|\sec(ax+b)|$ B $\frac{1}{a}\tan^{-1}(ax+b)$

C $\frac{1}{a}\mathrm{cosec}^{2}|(ax+b)|$ D $\frac{1}{a}\ln|\cos(ax+b)|$

Q26. $\int\mathrm{cosec}^{2}(ax+b)dx$ is equal to:

A $\frac{1}{a}\cot^{2}(ax+b)$ B $\frac{1}{a}\cot(ax+b)$

C $-\frac{1}{a}\ln|\cot(ax+b)|$ D $\frac{1}{a}\tan(ax+b)$

Q27. $\int\cot(ax+b)dx$ is equal to:

A $\frac{1}{a}\ln|\cot(ax+b)|$ B $\frac{1}{a}\ln|\cos(ax+b)|$

C $-\frac{1}{a}\ln|\cos(ax+b)|$ D $\frac{1}{a}\ln|\sin(ax+b)|$

Q28. $\int e^{\lambda x+\mu}dx$ is equal to:

A $e^{\lambda x+\mu}$ B $(\lambda x+u)e^{\lambda x+\mu}$

C $\frac{1}{\lambda x+\mu}e^{\lambda x+\mu}$ D $\frac{1}{\lambda}e^{\lambda x+\mu}$

Q29. $\int a^{\lambda x+\mu}dx$ is equal to:

A $\frac{1}{\lambda x+\nu}a^{\lambda x+\mu}$ B $\frac{1}{\lambda x}e^{\lambda x+\mu}$

C $\frac{1}{a}\ln . a^{\lambda x+\mu}$ D $\frac{1}{\lambda \ln a} . a^{\lambda x+\mu}$

Q30. $\int \operatorname{cosec}(ax+b)dx$ is equal to:

A $\frac{1}{a}|\sin^{-1}(ax+b)|$

B $-\frac{1}{a}|\sin^{-1}(ax+b)|$

C $\frac{1}{a}\ln|\sin(ax+b)|$

D $\frac{1}{a}\ln|\operatorname{cosec}(ax+b)-\cot(ax+b)|$

INTEGRATION BY PARTS

Q31. If $u = x^2$, $dv = \sin x$, then $\int x^2 \sin x$ is equal to:

A $-x^2\cos x + 2\cos x$
B $x^2\cos x + 2x\sin x + 2\cos x$
C $-x^2\cos x + 2x\sin x - 2\cos x$
D $-x^2\cos x + 2x\sin x + 2\cos x$

Q32. If $du = \frac{dx}{\sqrt{1-x^2}}$ and $v = x$, then $\int arc\sin x\, dx$ is equal to:

A $x+\sqrt{1-x^2}$ B $-x-\sqrt{1-x^2}$

C $x-\sqrt{1-x^2}$ D $x\sin^{-1}x+\sqrt{1-x^2}$

Q33. If $du = 3x^2\, dx$ and $V = \frac{1}{2}e^{2x}$, then $\int x^3e^{2x}\, dx$ is equal to:

A $\frac{x^3e^{2x}}{2}-\frac{3x^2e^{2x}}{4}+\frac{3}{4}xe^{2x}-\frac{3}{8}e^{2x}$

B $\frac{x^3e^{2x}}{3}-\frac{x^2e^{2x}}{2}+\frac{4}{3}xe^{2x}-\frac{8}{3}e^{2x}$

C $\frac{x^3e^{2x}}{5}-\frac{1}{3}x^2e^{2x}+\frac{1}{3}xe^{2x}-\frac{5}{8}e^{-2x}$

D none of these

Q34. If $u = x$ and $dv = -\sin x$, then $\int x\cos dx$ is equal to:

A $x\cos x+\sin x$ B $\cos x + x\sin x$

C $x\cos x + x\sin x$ D $x\sin x - \cos x$

Q35. $\int xe^x dx$ is equal to:

A $-xe^x+e^x$ B $\frac{x}{e^{-x}}-e^x$

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

Q36. If $u = \ln x$ and $v = x^5$, then $\int x^5\ln x$ is equal to:

A $\frac{x^6}{6}\ln x-\frac{x^6}{36}$ B $\frac{1}{\ln x}\frac{x^6}{6}-\frac{x^6}{36}$

C $\frac{1}{\ln x}\frac{x^6}{36}-\frac{x^6}{6}$ D $\frac{6}{x^6}\ln x-\frac{x^6}{36}$

Q37. $\int x\sin x dx$ is equal to:

A $\frac{\sin x}{x}+\cos x$ B $\sin x-\frac{\cos x}{x}$

C $x\cos x+\sin x$ D $-x\cos x+\sin x$

Q38. $\int \tan^{-1}x\, dx$ is equal to:

A $\frac{\tan^{-1}x}{x}+\ln\sqrt{1+x^2}$ B $x\tan^{-1}x-\ln\sqrt{1+x^2}$

C $x\tan^{-1}x+\ln\sqrt{1+x^2}$ D $x\tan^{-1}x+\frac{1}{\ln(1+x^2)}.2$

Q39. $\int \log x\, dx$ is equal to:

A $\frac{\log x}{x}-x$ B $x\log x - x$

C $x\log x + x$ D $x\log x-\frac{1}{x}$

Q40. $\int\frac{1+x}{(2+x)^2}e^x\, dx$ is equal to:

A $\frac{2+x}{e^x}$ B $\frac{e^x}{2+x}$

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

Q41. $\int\frac{x}{\sin^2 x}dx$ is equal to:

A $x\cot x+\ln|\sin x|$ B $-x\cot x-\ln|\sin x|$

C $x\cot x-\ln|\sin x|$ D $x.\tan x-\ln|\sec x|$

Q42. If $du = 2(\ln x)\frac{1}{x}dx$, then $\int(\ln x)^2dx$ is equal to:

A $x(\ln x)-2\{x\ln x-x\}$ B $[x(\ln x)]^2-2\{x\ln x-$

C $x(\ln x)^2 - 2\{x\ln x - x$ D $x(\ln x) - 2[x\ln x - x]^2$

INTEGRATION BY PARTIAL FRACTION

Q43. $\int \frac{2}{x^2 - a^2}$ is equal to:

A $\frac{1}{a}\ln|x^2 - a^2|$ B $\frac{1}{2a}\ln\left|\frac{x-a}{x+a}\right|$

C $\frac{1}{a}\ln\left|\frac{x-a}{x+a}\right|$ D $\ln\left|\frac{x-a}{x+a}\right|$

Q44. If $A = 2$, $B = -1$ and $C = 3$, then $\int \frac{5x^2 + 9x + 6}{(x^2 - 1)(2x + 3)}dx$ is equal to:

A $2\ln|x - 1| + 3\ln(2x + 3)$

B $2\ln|x^2 - 1| - \ln|2x + 3| + 3$

C $2\ln|x - 1| - \ln|x + 1| + \frac{3}{2}\ln|2x + 3|$

D $2\ln|x - 1| - \ln|x + 1| + 3\ln|2x + 3|$

Q45. $\int \frac{2x}{x^2 - a^2}dx$ is equal to:

A $2\ln|x - a| + \ln|x + a|$ B $2\ln|x + a| + 3\ln|x - a|$

C $\ln|x^2 - a^2|$ D $\ln\left|\frac{x+a}{x-a}\right|$

Q46. $\int \frac{(a-b)x}{(x-a)(x-b)}dx$ is equal to:

A $x\ln|x - a| + x\ln|x - b|$

B $\ln|x - a| - \ln|x - b|$

C $a\ln|x - a| + b\ln|x - b|$

D $a\ln|x - a| - b\ln|x - b|$

Q47. If $A = \frac{3}{2}$, $B = 1$ and $C = \frac{1}{2}$ then $\int \frac{2x^2}{(x-1)^2(x+1)}dx$ is equal to:

A $\frac{3}{2}\ln(x - 1)^2 + \frac{1}{2}\ln|x + 1| + \ln|x + 1|$

B $\frac{3}{2}\ln(x - 1) + \frac{1}{2}\ln|x + 1| - \ln|x + 1|$

C $\frac{3}{2}\ln(x - 1) + 2\ln|x + 1| - \frac{1}{x - 1}$

D $\frac{3}{2}\ln(x - 1) + \frac{1}{2}\ln|x + 1| - \frac{1}{x - 1}$

Q48. $\int \frac{dx}{x^2 - 4}$ is equal to:

A $\frac{1}{2}\ln|x - 2| - \frac{1}{2}\ln|x + 2|$

B $\frac{1}{4}\ln|x - 2| - \frac{1}{2}\ln|x + 2|$

C $\frac{1}{4}\ln\left|\frac{x-2}{x+2}\right|$

D $\frac{1}{2}\ln\left|\frac{x-2}{x+2}\right|$

Q49. $\int \frac{dx}{x^2 - 9}$ is equal to:

A $\frac{1}{3}\ln\left|\frac{x+3}{x-3}\right|$ B $\frac{1}{a}\ln\left|\frac{x-3}{x+3}\right|$

C $\frac{1}{6}\ln\left|\frac{x+3}{x-3}\right|$ D $\frac{1}{6}\ln\left|\frac{x-3}{x+3}\right|$

Q50. $\int \frac{dx}{x^2 + 7x + 6}$ is equal to:

A $\frac{1}{6}\ln\left|\frac{x+6}{x+1}\right|$ B $\frac{1}{5}\ln\left|\frac{x+1}{x+6}\right|$

C $\ln\left|\frac{x+1}{x+6}\right|$ D $\frac{1}{5}\ln\left|\frac{x+6}{x+1}\right|$

THE DEFINITE INTEGRAL

Q51. $\int_1^2 (x^2 + 1)dx$ is given by:

A 10 B $\frac{12}{3}$

C 22 D $\frac{10}{3}$

Q52. $\int_{-1}^1 (x^{1/3} + 1)dx$ is given by:

A 2 B $\frac{2}{3}$

C $\frac{3}{2}$ D $\frac{1}{2}$

Q53. $\int_1^2 \frac{x}{x^2 + 2}dx$ is given by:

A $\sqrt{2}$ B $\frac{1}{\sqrt{2}}$

C $\ln\sqrt{2}$ D $\frac{1}{\ln\sqrt{2}}$

Q54. $\int_0^3 \frac{dx}{x^2+a}$ is given by:

A $\frac{1}{12}$ B $\frac{\pi}{12}$

C $-\frac{1}{12}$ D $-\frac{\pi}{12}$

Q55. $\int_1^2 \ln x\, dx$ is given by:

A $\ln 2 - 1$ B $2\ln 2 - 1$

C $1 - 2\ln 2$ D $1 - \ln 2$

ANSWERS

MULTIPLE CHOICE QUESTIONS

1.	D	2.	B	3.	D	4.	D	5.	C
6.	A	7.	D	8.	B	9.	A	10.	A
11.	B	12.	B	13.	B	14.	A	15.	B
16.	D	17.	D	18.	B	19.	D	20.	B
21.	C	22.	C	23.	B	24.	D	25.	A
26.	C	27.	D	28.	D	29.	D	30.	D
31.	D	32.	D	33.	D	34.	B	35.	B
36.	A	37.	D	38.	B	39.	B	40.	B
41.	A	42.	C	43.	D	44.	C	45.	C
46.	C	47.	D	48.	C	49.	D	50.	B
51.	D	52.	A	53.	C	54.	B	55.	B

ANALYTIC GEOMETRY

DISTANCE AND RATIO FORMULA

Q1. The Cartesian system of coordinates was introduced by:

A Euler B Euclid

C Descrates D MacIrean

Q2. The points (3, 1), (–2, –3) and (2, 2) are the vertices of:

A equilateral triangle B isosceles triangle

C right–angled triangle D rhombus

Q3. The points (5, 2)(–2, 3)(–3, –4) and (4, –5) are the vertices of:

A rhombus B parallelogram

C rectangle D square

Q4. The quadrilateral with the vertices (–3, –2), (2, –1) (3, 4) and (–2, 3) is a:

A square B rectangle

C rhombus D parallelogram

Q5. The points (–1, 3), (3, 0) and (3, 0) are the vertices of:

A right–angled triangle B isosceles triangle

C equilateral triangle D square

Q6. The points (0, –1), (2, 1), (0, 3) and (–2, 1) are the corner of:

A square B rhombus

C parallelogram D rectangle

Q7. Three points (–2, 2) (8, –2) and (–4, 3) are vertices of a:

A isosceles triangle B right–angled triangle

C equilateral triangle D rectangle

Q8. In ΔABC the mid points of AB and AC are (3, 5) and (–3, –3) respectively, then the length of the side BC is:

A 15 B 10

C 30 D 20

Q9. If points A(6, –1), B(1, 3) and C(x, 8) are such that AB = BC, then x =

A 3, 5 B –3, 5

C 3, –5 D –3, –5

Q10. If the distance between (3, 4) and (x, 2) is 8, then x =

A $3 \pm 2\sqrt{15}$ B $2 - 3\sqrt{15}$

C $3 \pm \sqrt{15}$ D 10

Q11. x-axis divides the line segment joining points (2, –3) and (5, 6) in the ratio:

A 2 : 1 B 2 : 1

C 1 : 2 D –1 : 2

Q12. If points (–1, h), (3, 2) and (7, 3) are collinear then h =

A 3 B 4

C 0 D None of these

Q13. If points (x, 2 – 2x), (–x + 1, 2x), (–4 – x, 6 – 2x) are collinear then x =

A (1, 2) B (2, 3)

C (1, 0) D $-1, \frac{1}{2}$

Q14. If B(1, 3) and C(–2, 7) are the coordinates of the base of isosceles triangle ABC, the coordinates of A is:

A $\left(\frac{5}{6}, 6\right)$ B $\left(5, \frac{5}{6}\right)$

C (1, 6) D $\left(\frac{5}{6}, 5\right)$

Q15. If a point (p, q) is equidistant from the points (5, 3) and (–2, –4), then $p + q =$

A -1 B 1
C 3 D -3

Q16. The distance between the point $(a, 0)$, $(0, a)$ is:

A $a\sqrt{2}$ B $2a^2$
C $\frac{1}{2}a$ D 0

Q17. The points $(a, 0)$, $(0, b)$ and $(3a, -2b)$ are:

A collinear
B vertices of a isosceles triangle
C corner of a right-angled triangle
D none of these

Q18. If the point (x, y) be equidistant from the point $(a + b, b - a)$ and $(a - b, a + b)$, then $bx =$

A y B ay
C a D $\frac{1}{a}$

Q19. The points trisecting the join of A(–1, 4) and $B(6, 2)$ are:

A $\left(\frac{2}{3},\frac{4}{5}\right);\left(\frac{5}{3},\frac{4}{3}\right)$ B $\left(\frac{4}{3},\frac{11}{3}\right);\left(\frac{5}{3},\frac{2}{3}\right)$
C $\left(-\frac{1}{3},\frac{1}{2}\right);\left(\frac{2}{3},-\frac{1}{4}\right)$ D $\left(\frac{4}{3},\frac{10}{3}\right);\left(\frac{11}{3},\frac{8}{3}\right)$

Q20. The points trisecting the join of (1, –2) and (–4, 4) are:

A $-\frac{1}{3}, 0$ B $-\frac{5}{3}, 2$
C option a and b D none of these

Q21. If the points (a, b), (x, y) and $(a - x, b - y)$ are collinear, then $ay =$

A bx B $b - y$
C $a - x$ D x

Q22. The medians of a triangle are:

A collinear B concurrent
C perpendicular D zero

Q23. Bisectors of angles of a triangle are:

A collinear B concurrent
C perpendicular D zero

Q24. If (x, y) are the coordinates of a point P, then the first number of the ordered pair is called:

A ordinate B abscissa
C quadrant D Cartesian

Q25. The coordinates of three vertices of a rectangle are (5, 7) (2, –2) and (8, 4), the fourth vertex is:

A $\left(\frac{1}{2},\frac{2}{3}\right)$ B $\left(\frac{-3}{4},\frac{11}{2}\right)$
C $\left(\frac{1}{5},-\frac{7}{2}\right)$ D None of these

Q26. If A(1, 4), B(3, 0), C(2, 1) are vertices of ΔABC, then the length of median through C is:

A 1 B 2
C $\sqrt{2}$ D $\sqrt{3}$

Q27. Co-ordinates of points dividing the joins of point (x_1, y_1) and (x_2, y_2) internally in the ratio $K_1 : K_2$ are:

A $\left(\frac{K_1x_1 + K_2x_2}{K_1 + K_2}, \frac{K_1y_1 + K_2y_2}{K_1 + K_2}\right)$

B $\left(\frac{K_1x_2 + K_2x_1}{x_1 + x_2}, \frac{K_1y_2 + K_2y_1}{x_1 + x_2}\right)$

C $\left(\frac{K_1x_1 + K_2x_2}{x_1 + x_2}, \frac{K_1y_1 + K_2y_2}{x_1 + x_2}\right)$

D $\left(\frac{K_1x_2 + K_2x_1}{K_1 + K_2}, \frac{K_1y_2 + K_2y_1}{(K_1 + K_2)}\right)$

Q28. Co-ordinates of points dividing the joins of points (x_1, y_1) and (x_2, y_2) externally in the ratio $K_1 : K_2$ are:

A $\frac{K_1x_2 - K_2x_1}{K_1 - K_2}, \frac{K_1y_2 - K_2y_1}{K_1 - K_2}$

B $\frac{K_1x_2 - K_2x_1}{K_1 - K_2}, \frac{K_1y_2 + K_2y_1}{K_1 - K_2}$

C $\frac{K_1x_1 - K_2x_2}{K_1 - K_2}, \frac{K_1y_1 + K_2y_2}{K_1 - K_2}$

D $\left(\frac{K_1x_1 + K_2x_2}{x_1 - x_2}, \frac{K_1y_1 + K_2y_2}{x_1 - x_2}\right)$

Q29. The distance of a point $(x \cos \theta, x \sin \theta)$ from origin is:

A x B $x \tan \theta$
C $-\tan \theta$ D $-\cot \theta$

Q30. The in-centre of triangle whose vertices are (0, 0) (5, 12) and (16, 12) is:

A (9, 7) B (2, 7)
C (9, 2) D (7, 9)

Q31. The centroid of a ΔABC whose vertices are (x_1, y_1) (x_2, y_2) and (x_3, y_3) is:

A $\left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$

B $\frac{-(x_1+x_2+y_2)}{3}, \frac{-(y_1+y_2+y_3)}{3}$

C $\left(\frac{x_1+y_1}{2}, \frac{x_2+y_2}{2}\right)$

D $\left(\frac{(x_1+x_2)-(x_2-x_3)}{3}, \frac{(y_1+y_2)-(y_2-y_3)}{3}\right)$

Q32. The two vertices of a triangle are (–2, 4) and (5, 4). If its centroid is (5, 6), then third vertex is:

A (–10, 12) B (12, –10)
C (12, 10) D (10, 12)

Q33. The coordinates of a point which trisects segment joining (0, 0) and (9, 12) are:

A (4, 3)(8, 6) B (4, 3)(6, 8)
C (3, 4)(6, 8) D (3, 4)(8, 6)

Q34. If midpoints of the sides of a triangle are (1, –1), (–4, –3) and (–1, 1), then coordinates of the vertices of the triangle are:

A (–6, –1)(–4, 2), (–2, 3) B (–2, –5)(–6, –1)(4, 3)
C (–6, –1)(–4, –3)(5, 2) D (–1, 0)(–6, –1)(4, 3)

Q35. If the points $\left(2, -\frac{3}{2}\right)\left(-3, \frac{7}{2}\right)$ and $\left(x, -\frac{9}{2}\right)$ are collinear, then $x =$

A 5 B $\frac{7}{2}$
C 6 D 3

ANSWERS

MULTIPLE CHOICE QUESTIONS

1.	D	2.	B	3.	B	4.	B	5.	A
6.	A	7.	B	8.	D	9.	B	10.	A
11.	C	12.	D	13.	D	14.	A	15.	B
16.	A	17.	A	18.	B	19.	D	20.	C
21.	A	22.	B	23.	B	24.	B	25.	B
26.	A	27.	D	28.	A	29.	A	30.	D
31.	A	32.	C	33.	C	34.	B	35.	A

LINEAR INEQUALITIES AND LINEAR PROGRAMMING

LINEAR INEQUALITIES

Q1. Order (or sense) of an inequality is changed by multiplying or dividing its each side by a:

A zero B one
C negative constant D non-negative constant

Q2. Multiplying each side of an inequality by (–1), will:

A not effect B change the sign
C become zero D not defined

Q3. Which of the following interval is the solution of the inequality $x < \frac{3}{2}$?

A $\left(-\infty, \frac{3}{2}\right)$ B $\left(+\infty, \frac{3}{2}\right)$
C $\left(+\infty, -\frac{3}{2}\right)$ D $\left(+\infty, -\frac{3}{2}\right)$

Q4. The graph of the linear equation of the form $ax + by = c$ is a line which divided the plane into:

A Two similar regions B Two disjoint regions
C Four equal parts D One region

Q5. The set of ordered pairs (x, y) such that $ax + by < c$, and (x, y) such that $ax + by > 0$, are called:

A Linear Inequalities B Feasible regions
C Half planes D Boundary

Q6. A _____ divides the plane into left and right half planes.

A Vertical line B Horizontal line
C Non-vertical line D Inequality

Q7. The linear equation $ax + by = c$ is called _____ of the inequality $ax + by \geq c$.

A Associated equation B Non-associated equation
C Disjoint equation D Feasible equation

Q8. Which of the following ordered pair is a solution of the inequality $x + 2y < 6$?

A (0, 3) B (2, 2)
C (6, 0) D (1, 1)

Q9. For graphing a linear inequality, solid line is drawn if the inequality involves the symbols:

A > or < B ≥ or ≤
C = or ≠ D = or >

Q10. A point of a solution regions where two of its boundary lines intersect, is called:

A Vertex of the solution B Feasible point
C Point of inequality D Null point of the solution region

Q11. The corner point of the boundary lines, x

$-2y = 6$ and $2x + y = 2$ is:

A (2, 6) B (6, 2)
C (−2, 2) D (2, −2)

Q12. The corner point of the boundary lines, $x - 2y = 6$ and $x + 2y = 10$ is:

A (8, 1) B (1, 8)
C (6, 10) D (3, 5)

Q13. The graph of $y > 0$ is the upper–half of:

A y-axis B x-axis
C 1st and 4th quadrant D 2nd and 3rd quadrant

CIRCLE

INTRODUCTION TO CONIC

Q1. The set of all points in the plane that are equally distant from a fixed point is called a:

A parabola B ellipse
C hyperbola D circle

Q2. If a plane passes through the vertex of the cone, then the intersection is:

A an ellipse B a parabola
C a hyperbola D a point circle

Q3. A cone is generated by all lines through a fixed point and the circumference of:

A a circle B an ellipse
C a hyperbola D none of these

Q4. The fixed point which lies on the axis of the cone is called its:

A axis B apex
C plane D diameter

Q5. The surface generated by lines, consists of two parts, called:

A vertex B apex
C nappes D axis

Q6. The lines that form the cone are called its:

A generators B circular cone
C nappes D conics

Q7. If the cone is cut by a plane perpendicular to the axis of the cone, then the section is a:

A circle B ellipse
C hyperbola D parabola

Q8. The vertex of the cone is also called:

A nappes B axis
C rulings D apex

Q9. The generators of a cone are also called:

A rulings B apex
C nappes D ellipse

Q10. If the cutting plane is slightly tilted and cuts only one nappe of the cone, the resulting section is:

A an ellipse B a circle
C a hyperbola D a parabola

Q11. If the intersecting plane is parallel to a generator of the cone, but intersects its one nappe only, the curve of intersection is:

A a circle B an ellipse
C a parabola D a hyperbola

Q12. If the cutting plane is parallel to the axis of the cone and intersects both of its nappes, then the curve of intersection is:

A an ellipse B a circle
C a parabola D a hyperbola

Q13. The familiar plane curves, namely circle, ellipse, parabola and hyperbola are called:

A cones B conics
C nappes D apex

Q14. To study conics, Pappus used the method of:

A analytic geometry B solid geometry
C Euclidean geometry D none of these

Q15. Apollonius was a:

A rocket B Muslim scientist
C Greek mathematicians D method of finding conics

EQUATION OF THE CIRCLES

Q16. The centre and radius of the circle $5x^2 + 5y^2 + 24x + 36y + 10 = 0$ are:

A $(\frac{12}{5}, \frac{18}{5}), \frac{\sqrt{324}}{5}$ B $(\frac{-12}{5}, \frac{-18}{5}), \frac{\sqrt{418}}{5}$
C $(\frac{-24}{5}, \frac{-18}{5}), \frac{\sqrt{418}}{5}$ D $(\frac{24}{5}, \frac{18}{5}), \frac{\sqrt{324}}{5}$

Q17. The equation: $x^2 + y^2 + 2gx + 2fy + c = 0$, represents:

A pair of lines B a circle
C a general second degree equation D a hyperbola

Q18. A second degree equation in which coefficients of x^2 and y^2 are equal and there is no product term xy represents:

A a parabola B a circle

C an ellipse D a pair of lines

Q19. The equation of the circle whose centre is (–3, 5) and having radius 7 is:

A $(x-3)^2+(y+5)^2=7$ B $(x+3)^2+(y+5)^2=7$

C $(x-3)^2+(y-5)^2=7^2$ D $x^2+y^2+6x-10y-15=0$

Q20. If three non-collinear points through which a circle passes are known, then we can find the:

A variables x and y B value of x and c

C three constants f, g and c D inverse of the circle

Q21. If centre of the circle is the origin, then equation of the circle is:

A $x^2+y^2=0$ B $2gx+2fy-c=0$

C $x^2+y^2=r^2$ D $gx+fy-\frac{c}{2}=0$

Q22. The equation: $x^2+y^2+2gx+2fy+c=0$, degenerates to a point circle if:

A $g^2+f^2-c<0$ B $g^2+f^2-c>0$

C $g^2+f^2+c=0$ D $g^2+f^2-c=0$

Q23. The equation of the circle with centre at (5, –2) and radius 4 is:

A $x^2+y^2+5x-2y+16=0$ B $x^2+y^2-5x-2y-16=0$

C $x^2+y^2-2x+5y+10=0$ D $x^2+y^2-10x+4y+13=0$

Q24. The centre and radius of the circle $4x^2+4y^2-8x+12y-25=0$ are:

A $\left(-1,\frac{-3}{2}\right),\sqrt{\frac{19}{2}}$ B $(1,2),\frac{-3}{2}$

C $\left(1,\frac{-3}{2}\right),\sqrt{\frac{19}{2}}$ D $\left(1,\frac{-2}{3}\right),\sqrt{\frac{17}{2}}$

Q25. The radius of the circle $x^2+y^2-6x+4y+13=0$, is:

A 1 B 2

C 0 D None of these

Q26. The centre and radius of the circle $5x^2+5y^2+14x+12y-10=0$ are:

A $\left(\frac{7}{5},\frac{-6}{5}\right),\frac{3\sqrt{3}}{2}$ B $\left(\frac{2}{3},\frac{-3}{2}\right),\frac{3\sqrt{3}}{\sqrt{5}}$

C $\left(-\frac{7}{5},\frac{6}{5}\right),\frac{3\sqrt{3}}{\sqrt{5}}$ D $\left(\frac{-7}{5},\frac{-6}{5}\right),\frac{3\sqrt{3}}{\sqrt{5}}$

Q27. Equation of the circle having the join of $A(x_1,y_1)$ and $B(x_2,y_2)$ is:

A $(x-y_1)(x-y_2)+(x_2-x_1)(x_2-y_1)=0$

B $(x-x_1)(x-x_2)+(y-y_1)(y-y_2)=0$

C $x^2+y^2-2gx_1-2fy_1=c$

D $x_1^2+y_1^2-2gx_2-2fy_2-c=0$

Q28. The area of the circle centred at (1, 2) and passing through (4, 6) is:

A 10π B 25π

C 5π D $\frac{25}{2}\pi$

Q29. The equation of the circle which passes through (4, 5) and whose centre is (2, 2) is:

A $x^2+y^2+2x+2y=0$ B $x^2+y^2+2x-4y-5=0$

C $x^2+y^2-4x-4y-5=0$ D $x^2+y^2+4x+4y-5=0$

Q30. The equation $ax^2+by^2+2hxy+2gx+2fy+c=0$ represent a circle, iff:

A $f=g, c=0$ B $a=b, h=0$

C $f=g, h=0$ D $h=g, c=0$

Q31. Equation of the circle passing through $A(3,-1)$, $B(0,1)$ and having centre at $4x-3y-3=0$, is:

A $x^2+y^2+4x-3y-3=0$ B $x^2+y^2-15x-18y+17=0$

C $x^2+y^2+3x-y+1=0$ D None of these

Q32. The general equation of a circle $x^2+y^2+2gx+2fy+c=0$, contains:

A Three independent variables

B Two independent constants

C Three independent parameters

D Three independent constants

Q33. Parametric equation of circle: $x^2+y^2+r^2$, are

A $r_1=x\cos\theta$, $r_2=y\sin\theta$ B $x=r\cos\theta$, $y=r\sin\theta$

C $x=r\sin\theta_1$, $y=r\sin\theta_2$ D $x=r_1\cos\theta$, $y=r_2\sin\theta$

Q34. The radius of the circle $2x^2+2y^2-4x+12y+11=0$ is:

A $\sqrt{4.5}$ B $\sqrt{11}$

C $\sqrt{29}$ D $\sqrt{15}$

Q35. The equation $x^2+y^2+2gx+2fy+c=0$ represents a circle whose centre is:

A (g,f) B $(-g,-f)$

C $(2g,2f)$ D $(-2f,-2g)$

Q36. The equation $x^2 + y^2 + 2gx + 2fy + c = 0$ represents a circle whose radius is:

A $\sqrt{f^2 - g^2 - c}$ B $\sqrt{f^2 + g^2 + c^2}$

C $\sqrt{g^2 + f^2 - c}$ D $\sqrt{g^2 + f^2 - c^2}$

Q37. If a circle passes through the points (2, −1), (2, 3) and (4, −1), then its radius is:

A $\sqrt{5}$ B $\sqrt{2}$

C 2 D none of these

Q38. The centre of the circle $ax^2 + ay^2 = bx + cy$ is:

A $\left(\frac{b}{a}, \frac{c}{a}\right)$ B $\left(\frac{b}{2a}, \frac{c}{2a}\right)$

C $\left(-\frac{b}{2a}, -\frac{c}{2a}\right)$ D $\left(\frac{b}{2b}, \frac{a}{2c}\right)$

Q39. The radius of the circle $7x^2 + 7y^2 - 4x - y - 3 = 0$, is:

A $\frac{14}{\sqrt{101}}$ B $\frac{\sqrt{101}}{96}$

C $\frac{7}{\sqrt{101}}$ D $\frac{\sqrt{101}}{14}$

Q40. The radius of the circle $x^2 + y^2 + 8x - 2y - 8 = 0$, is:

A 5 B $\sqrt{2}$

C $\sqrt{5}$ D $\sqrt{3}$

Q41. The centre and radius of the circle $2x^2 + 2y^2 - 3x + 2y + 1 = 0$ are:

A $\left(\frac{1}{4}, -\frac{1}{2}\right); \frac{\sqrt{3}}{2}$ B $\left(-\frac{3}{2}, \frac{1}{2}\right); \sqrt{2}$

C $\left(\frac{3}{4}, -\frac{1}{2}\right), \frac{\sqrt{5}}{4}$ D $\left(-\frac{2}{3}, \frac{1}{3}\right); \frac{1}{\sqrt{2}}$

Q42. The centre and radius of the circle $3x^2 + 3y^2 + 6x - 3y - 2 = 0$ are:

A $\left(\frac{1}{2}, -1\right): 6$ B $(3, -1): \frac{\sqrt{7}}{2}$

C $\left(1, -\frac{1}{2}\right): \frac{13}{2}$ D $\left(-1, \frac{1}{2}\right); \frac{\sqrt{69}}{6}$

Q43. The equation of the circle with centre (2, 7) passes through the point (−3, −5), is:

A $x^2 + y^2 - 4x - 14y - 116 = 0$

B $x^2 + y^2 + 4x + 14y - 116 = 0$

C $x^2 + y^2 - 4x + 14y + 116 = 0$

D $x^2 + y^2 + 4x - 14y + 116 = 0$

Q44. If the line joining (2, 1) to (6, 5) is a diameter of the circle, then equation of the circle is:

A $x^2 + y^2 + 8x - 6y - 17 = 0$ B $x^2 + y^2 - 8x - 6y + 17 = 0$

C $x^2 + y^2 - 8x + 6y + 17 = 0$ D $x^2 + y^2 - 3x - 2y + 13 = 0$

Q45. If the equation $(x - a)^2 + (y - b)^2 = c^2$ represents a circle, then:

A $a \neq 0$ B $b \neq 0$

C $c \neq 0$ D $a \neq 0, b \neq 0, c \neq 0$

CONDITION FOR CIRCLES THAT TOUCH

Q46. The circles $x^2 + y^2 - 6x + 5 = 0$ and $x^2 + y^2 - 8x + 7 = 0$ touch each other, the point of contact is:

A (6, 0) B $(\frac{6}{7}, 0)$

C (1, 0) D none of these

Q47. Two circles $(x - a)^2 + (y - b)^2 = c^2$ and $(x - b)^2 + (y - a)^2 = c^2$ touch each other, if:

A $(a - b)^2 = 2c^2$ B $(a - b)^2 = c^2$

C $(a + b)^2 = 2c^2$ D $(a + b)^2 = c^2$

Q48. The point of contact of the circles $x^2 + y^2 - 6x - 6y + 10 = 0$ and $x^2 + y^2 = 2$ is:

A (−3, 2) B (1, 3)

C (−2, −1) D None of these

Q49. The circles $x^2 + y^2 - 4x + 6y + 8 = 0$ and $x^2 + y^2 - 10x - 6y + 14 = 0$:

A touch internally B touch externally

C Intersect D do not touch

Q50. If the two circles $x^2 + y^2 + 2gx + 2fy = 0$ and $x^2 + y^2 + 2g'x + 2f'y = 0$, touch each other, then:

A $gf = gf'$ B $ff' = gg'$

C $gf = g'f'$ D None of these

ANSWERS

MULTIPLE CHOICE QUESTIONS

1.	D	2.	D	3.	A	4.	B	5.	C

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

CONIC SECTION
PARABOLA

Q1. The point where the axis meets the parabola is called:
A Directrix B Focus
C Chord D Vertex

Q2. If (0, 4) and (0, 2) are vertex and focus of the parabola respectively, then the equation of the parabola is:
A $x^2 = 4y - 32$ B $x^2 = 8y - 32$
C $y^2 = 16x$ D $x^2 + 8y = 32$

Q3. The vertex of the equation $y^2 = 4ax$ is:
A $(2, -2)$ B $(1, 1)$
C $(0, 0)$ D $(2, 2)$

Q4. The line through the focus and perpendicular to the directrix is called _____ of the parabola.
A axis B focal chord
C tangent D latus rectum

Q5. e is a:
A Variable B Positive constant
C Positive variable D Directrix

Q6. If the focus lies on the y-axis with coordinates $F(0, a)$ and directrix of the parabola is $y = -a$, then equation of parabola is:
A $y^2 = -4ax$ B $x^2 = 4ay$
C $x^2 = -4ay$ D $y^2 = 4ax$

Q7. A line joining two distinct points on a parabola is called a _____ of the parabola.
A chord B tangent
C lust rectum D directrix

Q8. If the focus is $F(0, -a)$ and directrix is the line $y = a$, then equation of the parabola is:
A $x^2 = -4ay$ B $y^2 = 4ax$
C $y^2 = -4ax$ D $x^2 = 4ax$

Q9. If (2, 0) is the vertex and y-axis is the directrix of the parabola, then its focus is:
A $(2, 2)$ B $\left(2, \frac{1}{2}\right)$
C $(4, 0)$ D $\left(\frac{1}{2}, 2\right)$

Q10. $y = 0$ of the parabola $y^2 = 4ax$ is the:
A equation of directrix B equation of the tangent
C equation of axis D equation of latus rectum

Q11. A chord passing through the focus of a parabola is called a:
A Focal chord B Latus rectum
C Tangent D Directrix

Q12. The distance of point $P(x, y)$ from focus in a parabola $y^2 = 4ax$, is:
A $2a$ B a
C $x + a$ D $x - a$

Q13. The equation of the parabola with Focus $(-3, 0)$ and directrix $x = 3$, is:
A $y^2 = 12x$ B $y^2 = 6x$
C $y^2 = -12x$ D $y^2 = -\frac{4}{3}x$

Q14. The equation of the parabola, whose directrix is $y = 1$, length of the latus-rectum is 8 and opens down word, is:
A $x^2 - 2hx + 8y + 8 + h^2 = 0$ B $x^2 - h^2 + 2hx - 8y - 8 = 0$
C $x^2 + 8y + 2hx + h^2 - 8 = 0$ D None of these

Q15. The equation of the parabola having its focus at the origin and directrix is parallel to y-axis is:
A $x^2 = -2a\left(y - \frac{a}{2}\right)$ B $y^2 = -2ax$
C $x^2 = -2ay + \frac{a^2}{2}$ D $y^2 = -2a\left(x - \frac{a}{2}\right)$

Q16. The equation of the parabola, having directrix $x = -2$, focus $(2, 2)$ is:
A $(x + 2)^2 = 4y$ B $(y - 2)^2 = 8x$
C $(x - 2)^2 = 2y$ D $(x - 2)^2 = 8y$

Q17. What is the equation of the parabola with vertex $(0, 0)$ and contains a point $(8, 1)$?
A $y^2 = 64x$ B $x^2 = 64y$
C $x^2 = 8y$ D $y^2 = \frac{1}{8}x$

Q18. The equation of the parabola with Focus $(2, 2)$ and directrix $x = 6$, is:
A $y^2 - 4y + 4x + 28 = 0$ B $x^2 - 4y + 4x - 28 = 0$

C $y^2 + 8y - 4x - 28 = 0$ D $y^2 - 8y - 2x + 28 = 0$

Q19. The equation of the parabola with vertex (0, 0) and Focus (0, –4) is:

A $y^2 = -16x$ B $x^2 = -16y$

C $y^2 = -8x$ D $y^2 = -\frac{1}{2}x$

Q20. What is the equation of the parabola with vertex (0, 0) and Focus (2, 0)?

A $y^2 = 8x$ B $x^2 = -16y$

C $x^2 = -8y$ D $y^2 = -8x$

Q21. The coordinates of the point on parabola $y^2 = 8x$ whose distance from focus is 4, are:

A (2, 4) and (2, –4) B (4, 2) and (4, –2)

C (1, 4) and (1, –4) D (4, 1) and (4, –1)

Q22. If the vertex of the parabola is the origin and directrix is $x + 5 = 0$, then its latus rectum is:

A 10 B 5

C 0 D 20

Q23. The conic is a parabola, when:

A $e > 1$ B $e < 1$

C $e = 1$ D $e = 0$

Q24. What is the axis of the parabola $y^2 = 4ax$?

A $x = 0$ B $y = 0$

C $x = a$ D $y = 0$

Q25. The axis of the parabola $x^2 = 4ay$ is:

A $y = 0$ B $x = 0$

C $x = -a$ D $y = a$

Q26. The parabola $y^2 + 2y + x = 0$ lie in _____ quadrant.

A first B second

C third D fourth

Q27. The vertex of the parabola $x^2 + 4x + 2y - 7 = 0$, is:

A $\left(-2, \frac{11}{2}\right)$ B $\left(2, -\frac{11}{2}\right)$

C (4, –7) D (–4, 7)

Q28. The point which is closet to the focus of a parabola is:

A vertex B chord

C focus D directrix

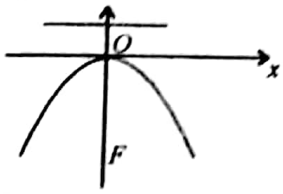
Q29. This is the graph of:

A $y^2 = -4ax$

B $y^2 = 4ax$

C $x^2 = -4ay$

D $x^2 = 4ay$



Q30. This is the graph of:

A $y^2 = 4ax$

B $x^2 = 4ay$

C $y^2 = -4ax$

D $x^2 = -4ay$

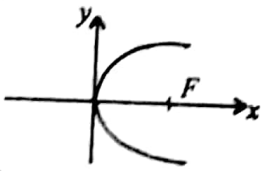
Q31. This is the graph of:

A $y^2 = 4ax$

B $x^2 = 4ay$

C $y^2 = -4ax$

D $x^2 = -4ay$



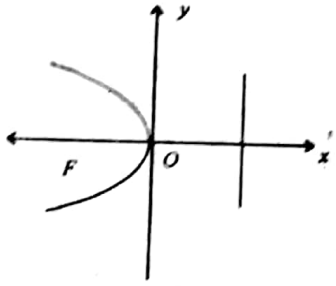
Q32. This is the graph of:

A $y^2 = 4ax$

B $y^2 = -4ax$

C $x^2 = 4ay$

D $x^2 = -4ay$



Q33. The curve of the parabola $y^2 = -4ax$ is symmetric with respect to:

A x-axis

B y-axis

C Both x and y-axis

D None of these

Q34. The latus rectum of the parabola $x^2 = -4ay$ is:

A $x = a$ B $y = -a$

C $x = -a$ D $y = a$

Q35. The axis of the parabola $y^2 = 4ax$, is:

A $x = a$ B $y = -a$

C $x = 0$ D $y = 0$

Q36. If $e > 1$, then the conic, is:

A Ellipse B Parabola

C Hyperbola D None of these

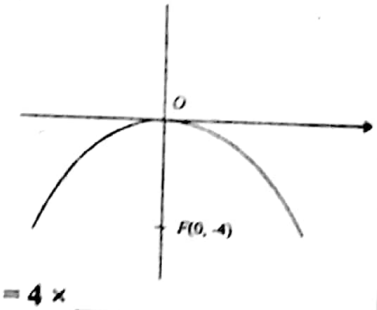
Q37. This is the graph of:

A $y^2 = 4y$

B $y^2 = -16x$

C $x^2 = -4y$

D $x^2 = -16y$



Q38. Latus rectum = 4 × _____

A focal distance of the vertex

B chord

C focus

D $\frac{1}{2}$

Q39. Which shape of the following objects are

approximately parabolic axis?

A Sound reflectors B Electric current
C Inverse reflect D None of these

Q40. Which shape of the following objects are approximately parabolic arcs?

A Light reflectors B Force
C Weight of the pendulum D None of these

Q41. Coordinates of the focus of the parabola $x^2 - 4x - 8y - 4 = 0$ are:

A (0, 2) B (0, 1)
C (2, 0) D (1, 2)

Q42. Locus of the middle points of all chords of the parabola $y^2 = 4ax$, which are drawn through the vertex is:

A $x^2 = 2y$ B $y^2 = 4x$
C $x^2 = 4y$ D $y^2 = 2x$

Q43. Co-ordinate of a point on the parabola $y^2 = 8x$ whose focal distance is 4 are:

A (2, 4) B (–2, –4)
C (–2, 4) D (2, –4)

Q44. Every point on the parabola $y^2 = 2x - 1$ is equidistant from the y-axis and the point:

A $\left(1, \frac{1}{2}\right)$ B (1, 0)
C $\left(2, \frac{1}{2}\right)$ D $\left(\frac{1}{2}, 0\right)$

Q45. The length of the latus rectum of the parabola $y^2 = 4ax$ is $4a$, the other form of the parabola with latus rectum $4a$ is:

A $y^2 = -4ax$ B $y^2 = \frac{1}{4}ax$
C $y^2 = -8ax$ D $y^2 = -16ax$

Q46. The eccentricity of parabola is:

A 1 B 0
C Greater than 1 D Less than 1

Q47. The locus of mid point of focal chord of parabola is:

A a circle B a parabola
C an ellipse D Hyperbola

Q48. The locus of intersection of perpendicular tangents to the parabola $y^2 = 4ax$ is:

A Axis of the parabola
B Focal chord of the parabola
C The tangent at vertex of the parabola
D A directrix of the parabola

Q49. Equation of the tangent to the parabola $x^2 = 16y$ at (8, 4) is:

A $x + y + 8 = 0$ B $x - y - 8 = 0$
C $x + y + 4 = 0$ D None of these

Q50. The coordinates of a point on the parabola $y^2 = 8x$ whose focal distance is 4, are:

A $(1, \pm 2\sqrt{2})$ B $\left(\frac{1}{2}, \pm 2\right)$
C $(2, \pm 4)$ D None of these

Q51. The equation of the parabola with vertex at the origin and having its axis along the x-axis and passing through (1, –4) is:

A $y^2 = -16x$ B $y^2 = 16x$
C $x^2 = -16y$ D $x^2 = 16y$

ELLIPSE

Q52. The equation of the ellipse having centre at (0, 0), focus at (0, –3) and one vertex at (0, 4) is:

A $\frac{y^2}{9} + \frac{x^2}{1} = 1$ B $\frac{y^2}{16} + \frac{x^2}{7} = 1$
C $\frac{x^2}{16} + \frac{y^2}{7} = 1$ D None of these

Q53. The eccentricity of ellipse $4x^2 + 9y^2 = 36$ is:

A 1 B $\frac{\sqrt{5}}{3}$
C 6 D $\frac{\sqrt{3}}{5}$

Q54. Length of the Latus rectum of the ellipse $4x^2 + 9y^2 = 36$, is:

A $\frac{4}{3}$ B 3
C $\frac{9}{5}$ D 7

Q55. The vertices of the ellipse $\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$, $a > b$ are:

A $(0, \pm b)$ B $(\pm a, 0)$
C $(+b, 0)$ D $(0, \pm a)$

Q56. The length of minor axis in the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1, a > b$ is:

A $2b$ B 2a
C $2ab$ D None of these

Q57. The length of the major axis in the ellipse $\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1, a > 6$ is:

A $2a$ B $2b$
C $a^2 - b^2$ D $\frac{2b^2}{a}$

Q58. The distance from the foci of $P(x_1, y_1)$ on

the ellipse $\frac{x^2}{9}+\frac{y^2}{25}=1$ are:

A $5\pm\frac{4}{5}x_1$ B $4\pm\frac{5}{4}y_1$

C $4\pm\frac{5}{4}y_1$ D $5\pm\frac{4}{5}y_1$

Q59. The length of the latus rectum of an ellipse is $\frac{1}{3}$ of the major axis, its eccentricity is:

A $\left(\frac{3}{4}\right)^2$ B $\sqrt{\frac{2}{3}}$

C $\frac{2}{3}$ D $\frac{4}{3}$

Q60. The eccentricity of the ellipse $9x^2+5y^2-30y=0$ is:

A $\frac{3}{4}$ B $\frac{4}{3}$

C $\frac{2}{3}$ D $\frac{1}{3}$

Q61. The equation of the ellipse with centre at origin and foci on x-axis is:

A $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ B $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

C $\frac{y^2}{a^2}+\frac{x^2}{b^2}=1$ D $\frac{y^2}{a^2}-\frac{x^2}{b^2}=-1$

Q62. The equation of the ellipse with centre at origin and foci on y-axis is:

A $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ B $ax^2+by^2=-1$

C $\frac{y^2}{a^2}-\frac{x^2}{b^2}=1$ D $\frac{y^2}{a^2}+\frac{x^2}{b^2}=1$

Q63. What is the centre of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$?

A (1, 1) B (−1, −1)

C (0, 0) D (0, 1)

Q64. What is the centre of the ellipse $\frac{x^2}{b^2}+\frac{y^2}{a^2}=1$?

A (0, 0) B (1, 1)

C (−1, −1) D (−1, 1)

Q65. The equation of the ellipse referred to its axis as the axis of coordinates with latus rectum 8 and eccentricity $\frac{1}{\sqrt{2}}$ is:

A $3x^2+4y^2=48$ B $4x^2+3y^2=48$

C $4x^2+3y^2=24$ D $6y^2+2x^2=24$

Q66. If the latus rectum is equal to one-half of its minor axis of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$, the its eccentricity is:

A $\frac{1}{2}$ B $\frac{1}{\sqrt{2}}$

C $\frac{\sqrt{3}}{2}$ D $\frac{2}{\sqrt{3}}$

Q67. The sum of the focal distance from any point on the ellipse $9x^2+16y^2=144$ is:

A 18 B 32

C 8 D 16

Q68. The foci of the ellipse $\frac{(x+1)^2}{9}+\frac{(y+2)^2}{25}=1$ are:

A (−1, 2), (6, 1) B (−1, −2), (1, 6)

C (−1, 2) (−1, −6) D None of these

Q69. If eccentricity of ellipse becomes zero, then it takes the form of:

A a parabola B a straight line

C a circle D None of these

Q70. What is the equation of ellip 8, if Foci $(-3\sqrt{3}, 0)$ and vertices $(\pm 6, 0)$?

A $\frac{y^2}{9}+\frac{x^2}{25}=1$ B $\frac{x^2}{9}+\frac{y^2}{4}=1$

C $\frac{x^2}{36}+\frac{y^2}{9}=1$ D $\frac{x^2}{9}+\frac{y^2}{6}=1$

Q71. If (5, 1), (−1, 1) = 1vertices and (3, 1), (1, 1) are foci of an ellipse, then the equation of the ellipse is:

A $\frac{x^2}{4}+\frac{y^2}{9}=1$ B $\frac{(x-1)^2}{9}+\frac{(y-2)^2}{8}=1$

C $\frac{x^2}{9}+\frac{y^2}{8}=1$ D $\frac{(x-2)^2}{9}+\frac{(y-1)^2}{8}=1$

Q72. If $(\pm 3, 0)$, and 10 are foci and length of the minor axis of an ellipse respectively, then its equation is:

A $\frac{x^2}{34}+\frac{y^2}{25}=1$ B $\frac{x^2}{36}+\frac{y^2}{25}=1$

C $\frac{y^2}{34}+\frac{x^2}{25}=1$ D $\frac{y^2}{36}+\frac{x^2}{25}=1$

Q73. If (0, −1), (0, −5) are foci and 6 is the length of major axis of an ellipse, then its equation is given by:

A $\frac{(x+3)^2}{9}+\frac{y^2}{5}=1$ B $\frac{x^2}{9}+\frac{y^2}{5}=1$

C $\frac{x^2}{9}+\frac{y^2}{25}=1$ D $\frac{(y+3)^2}{9}+\frac{x^2}{5}=1$

Q74. In an ellipse the distance between its foci is 6 and its minor axis is 8. Then its eccentricity is:

A $\frac{3}{5}$ B $\frac{1}{2}$

C $\frac{4}{5}$ D $\frac{1}{\sqrt{52}}$

Q75. The eccentricity of the ellipse $9x^2 + 5y^2 - 30y = 0$ is:

A $\frac{3}{4}$ B $\frac{2}{3}$

C $\frac{1}{3}$ D $\frac{1}{2}$

ANSWERS

MULTIPLE CHOICE QUESTIONS

1.	D	2.	D	3.	C	4.	A	5.	B
6.	B	7.	A	8.	A	9.	C	10.	C
11.	A	12.	C	13.	C	14.	A	15.	D
16.	B	17.	D	18.	C	19.	B	20.	A
21.	A	22.	D	23.	C	24.	B	25.	B
26.	D	27.	A	28.	A	29.	C	30.	B
31.	A	32.	B	33.	A	34.	B	35.	D
36.	C	37.	D	38.	A	39.	A	40.	A
41.	C	42.	D	43.	D	44.	B	45.	A
46.	C	47.	B	48.	D	49.	C	50.	C
51.	B	52.	B	53.	B	54.	A	55.	D
56.	A	57.	A	58.	D	59.	B	60.	C
61.	B	62.	D	63.	C	64.	A	65.	A
66.	C	67.	C	68.	C	69.	C	70.	C
71.	D	72.	A	73.	D	74.	A	75.	B

VECTORS

BASIC OF VECTORS

Q1. A directed line segment from a point A to a point B is denoted by:

A $\overline{AB}$ B $\widehat{AB}$

C $\overrightarrow{AB}$ D $\underline{AB}$

Q2. If $u = xi + yj$, then $|u| =$

A x^2+y^2 B $(x^2+y^2)^2$

C x^2-y^2 D $\sqrt{x^2+y^2}$

Q3. A _____ quantity is one that possesses both magnitude and direction.

A scalar B vector

C segment D none of these

Q4. The magnitude of vector $a = 2i - 7j$ is

A $\sqrt{23}$ B $\sqrt{43}$

C 3 D $\sqrt{53}$

Q5. The magnitude of vector $a = i - 3j + 5k$ is:

A 3 B $\sqrt{35}$

C $\sqrt{17}$ D 35

Q6. A vector of magnitude 6 and with direction opposite to $i - 2j + 2k$ is:

A $-2i + 4j - 4k$ B $-6i + 12j - 4k$

C $6i - 12j + 12k$ D $\frac{2}{3}i - \frac{4}{3}j + \frac{4}{3}k$

Q7. If $a = 3i - 5j + k$ then a vector which is not perpendicular to a is:

A $2i + j - k$ B $i - j - 8k$

C $\frac{1}{35}(3i - 5j + k)$ D $-3i + 5j + 34k$

Q8. The modulus of $12 - 5i$ is:

A 7 B 13

C $\sqrt{7}$ D 119

Q9. If $a = 2i + 3j - 4k$, $b = -i + 2j - 2k$ and $c = -3j + 4k$, then $a - 2b - c$ equals:

A $4i + 2j - 4k$ B $2j - 4k$

C $-4j + 4k$ D $-3i + 7j - 12k$

Q10. If $\underline{u} = 2\underline{i} - 7\underline{j}$, $\underline{v} = \underline{i} - 6\underline{j}$ and $\underline{w} = -i + j$, then $\underline{u} + \underline{v} - \underline{w}$ equals:

A $i - j + 3k$ B $\underline{i} - 2\underline{k}$

C $4\underline{i} - 14\underline{j}$ D $4i - 7\underline{j}$

Q11. If $\underline{u} = [3, -4]$, then modulus of $\underline{u}$ is:

A 5 B $5i$

C -5 D $\sqrt{5}$

Q12. If $\underline{u} = 2\underline{i} - 7\underline{j}$, $\underline{v} = \underline{i} - 6\underline{j}$ and $\underline{w} = -\underline{i} + \underline{j}$, then $2\underline{u} - 3\underline{v} + 4\underline{w}$ equals:

A $8\underline{i} - 3\underline{j}$ B $3i - 5\underline{j}$

C $2\underline{i} - 3j$ D $-3\underline{i} + 8\underline{j}$

Q13. If $\underline{u} = 2\underline{i} - 7\underline{j}$, $\underline{v} = \underline{i} - 6\underline{j}$ and $\underline{w} = -\mathrm{i} + \underline{j}$, then $\frac{1}{2}\underline{u} + \frac{1}{2}\underline{v} + \frac{1}{2}\underline{w}$ equals:

A $\underline{i} - 6\underline{j}$ B $3\underline{i} - 5\underline{j}$

C $3\underline{i} + 4j$ D $\underline{i} - 2\underline{j}$

Q14. If G is the centroid of the triangle, then $GA + GB + GC =$

A 0 B 1

C -1 D 3

Q15. The unit vector in the direction of the vector $v = 2\underline{i} + 6j$ is:

A $\frac{1}{\sqrt{40}}i + \frac{3}{\sqrt{40}}j$ B $\frac{6}{\sqrt{40}}i + \frac{2}{\sqrt{40}}j$

C $2i + 3j$ D $\frac{1}{\sqrt{10}}i + \frac{3}{\sqrt{10}}j$

Q16. The unit vector in the direction of $a - b$, where $a = 3\underline{i} - 5\underline{j} - 2k$, and $b = 2\underline{i} - 3\underline{j} - 4\underline{k}$, is:

A $\frac{1}{\sqrt{65}}(5\underline{i} - 2\underline{j} - 6\underline{k})$ B $\underline{i} - 2\underline{j} + 2\underline{k}$

C $\frac{1}{3}(\underline{i} - 2\underline{j} + 2\underline{k})$ D None of these

Q17. The modulus of a vector $\underline{i} - \underline{j} + k$ is:

A $\sqrt{3}$ B 1

C $\sqrt{2}$ D ∞

Q18. Unit vector of a vector $\underline{u}$ is defined by $\hat{\underline{u}} =$

A $\frac{u}{|u|}$ B $\frac{|u|}{u}$

C $\underline{u} - |\underline{u}|$ D $\frac{|\underline{u}| - \underline{u}}{u}$

Q19. If m and n be two scalars, then $(m + n)\underline{a} =$

A 0 B $m + n$

C $m\underline{a} + n\underline{a}$ D $ma - m\underline{a}$

Q20. A and B are defined by the position vectors $a = i + 3j - k$ and $b = i + 2j + 2k$ and let $c = \overrightarrow{AB}$ then $\hat{c} =$

A $\frac{1}{\sqrt{10}}(-i + 2k)$ B $\frac{1}{\sqrt{10}}(j - 2k)$

C $\sqrt{10}(i + 2j + 2k)$ D $\frac{1}{\sqrt{10}}(-j + 3k)$

Q21. If $a = 5i + 2j$, then $|a| =$

A $\sqrt{13}$ B $\sqrt{7}$

C $\frac{1}{\sqrt{13}}$ D $\sqrt{29}$

Q22. If $a = 5i + 2j$, $b = 2i - 3j$, then $|a + 2b| =$

A $\sqrt{21}$ B $\sqrt{97}$

C $\sqrt{39}$ D None of these

Q23. If $c = 2i + j + k$ and $d = -i + 4j + 2k$, then $[c - d] =$

A $\sqrt{7}$ B $\sqrt{41}$

C $\sqrt{19}$ D $2\sqrt{7}$

Q24. If $A = [5, 1]$, $B = [0, 4]$, $C = [-1, 0]$ and $\overrightarrow{AB} = \overrightarrow{CD}$, then D =

A $[-6, 3]$ B $[3, -6]$

C $[1, -6]$ D $[2, -3]$

Q25. If $A = [5, 1]$, $B = [0, 4]$, $C = [-1, 0]$, and $\overrightarrow{AE} = -\overrightarrow{BC}$, then $E =$

A $[5, 6]$ B $[6, 5]$

C $[-5, 2]$ D $[2, -5]$

Q26. If $A = [5, 1]$, $B = [0, 4]$, $C = [-1, 0]$ and $\overrightarrow{AB} = 2\overrightarrow{GC}$, then G =

A $\left[\frac{3}{2}, \frac{-3}{2}\right]$ B $\left[-\frac{3}{2}, \frac{3}{2}\right]$

C $\left[\frac{1}{2}, \frac{-1}{2}\right]$ D $\left[-\frac{5}{2}, \frac{5}{2}\right]$

Q27. If $A = [1, 4, 3]$ and $B = [2, -1, 5]$ then the mid point M of AB is:

A $[1, 1, 1.5]$ B $[2, 2, 1.5]$

C $[1.5, 1.5, 4]$ D None of these

Q28. If $a = 2i + 2j$, $b = 3i - j$ and $c = 4i + 5j$, then $3b - a - 2c =$

A $-i - 15j$ B $i + 15j$

C $1 - 3j$ D None of these

Q29. If $|a| = 3$, $|b| = 4$, and $|a + b| = 5$, then $|a - b| =$

A 4 B 6

C 5 D 3

Q30. If $|a| = |b| = |a + b| = 1$, then $|a - b|$ is equal to:

A 1 B $\sqrt{3}$

C $\sqrt{2}$ D 7

Q31. The positive real number which is the measure of the length of a vector is called the:

A Unit vector B Modulus

C Inverse D None of these

Q32. Vector addition is:

A Commutative B Associative

C Commutative and Associative D None of these

Q33. If $\underline{a}$ and $\underline{b}$ are two vectors then $a + b =$

A $b + a$ B $b - a$

C ab D $\hat{a}b$

Q34. If $A = (2, 5)$, $B = (-1, 1)$ and $C = (2, -6)$, then $2\overrightarrow{CB} - \overrightarrow{CA} =$

A $6i + 2j$ B $-6i + 3j$

C $2i - 6j$ D $i - j$

Q35. If $\underline{v} = [3, -4]$, then unit vector $\underline{u}$ in the direction of $\underline{v}$ is:

A $[3, 5]$ B $[2, 3]$

C $\left[\frac{3}{5}, \frac{-4}{5}\right]$ D $\left[\frac{2}{3}, \frac{-5}{3}\right]$

Q36. If $A(-2, -3)$, $B(1, 4)$ and $C(0, -5)$ are the coordinates of parallelogram $ABCD$ respectively, then coordinates of D is:

A $(-3, 12)$ B $(2, 3)$
C $(5, 1)$ D $(2, 1)$

Q37. If $\underline{u} = 2\underline{i} + 3\underline{j} + \underline{k}$ and $\underline{v} = 4\underline{i} + 6\underline{j} + 2\underline{k}$, then $\underline{u} + 2\underline{v} =$

A $6\underline{i} + 3\underline{j} + 7\underline{k}$ B $3\underline{i} + 19\underline{j} + 5\underline{k}$
C $10\underline{i} + 11\underline{j} - 37\underline{k}$ D $10\underline{i} + 15\underline{j} + 5\underline{k}$

Q38. If $\underline{u} = 2\underline{i} + 3\underline{j} + \underline{k}$, $\underline{v} = 4\underline{i} + 6\underline{j} + 2\underline{k}$ and $\underline{w} = -6i - 9\underline{j} - 3k$ then $\underline{u}$, $\underline{v}$ and $\underline{w}$ are:

A Parallel B Equal
C Perpendicular D None of these

Q39. $\underline{O}$, (0, 0) is called:

A Position vector B Free vector
C Unit vector D Null vector

Q40. The vector $i = [1, 0]$ is called unit vector along:

A x-axis B y-axis
C z-axis D both x and y-axis

Q41. Vector $\underline{j} =$

A [1, 0] B [0, 1, 0]
C [0, 0, 1] D None of these

Q42. The vector $k = [0, 0, 1]$ is called unit vector along:

A x-axis B y-axis
C z-axis D None of these

Q43. If $\underline{r} = [x, y, z]$ and $[\underline{r}] = r$, then unit vector in the direction of the vector $\underline{r}$ is:

A $\left[\frac{x}{r}, \frac{y}{r}, \frac{z}{r}\right]$ B $x\underline{i} + y\underline{j} + z\underline{u}$
C $\sqrt{x^2 + y^2 + z^2}$ D None of these

Q44. If $a = i + j$, $b = j + k$, $c = k + i$, a unit vector parallel to $a + b + c$ is:

A $\frac{(i + j + k)}{\sqrt{3}}$ B $\frac{(i + j + k)}{2\sqrt{3}}$
C $2i + 2j + 2k$ D $\sqrt{3}(i + j + k)$

Q45. If the sum of two unit vectors is a unit vector then the magnitude of their difference is:

A $\sqrt{2}$ B $\sqrt{3}$
C 1 D None of these

Q46. If $a \neq$, $b \neq 0$ and $|a + b| = |a - b|$, then vectors a and b are:

A Parallel to each other B Perpendicular to each other
C Inclined at 60° D Neither parallel nor perpendicular

Q47. The position vectors of points A and B are $i + j - k$ and $2i - j + k$ respectively, then $|AB| =$

A 2 B 3
C 4 D 5

Q48. If vectors $(i + j + k)$, $(5i + 3j - 3k)$ and $(2i + 5j + 9k)$ are the position vectors of the vertices of any triangle then its perimeter is:

A $15 + \sqrt{157}$ B $\sqrt{15} + \sqrt{157}$
C $15 - \sqrt{157}$ D $\sqrt{15} + 157$

Q49. The unit normal vector to the line joining $i - j$ and $2i + 3j$ towards origin is:

A $\frac{-4i + j}{\sqrt{17}}$ B $\frac{2i + 3j}{\sqrt{2}}$
C $\frac{i - i}{\sqrt{14}}$ D $\frac{4i - j}{\sqrt{17}}$

Q50. If $a = 2i + 5j$ and $b = 2i - j$, then unit vector along $a + b$ is:

A $\frac{i + j}{\sqrt{2}}$ B $\sqrt{2}(i + j)$
C $i + j$ D None of these

ANSWERS

MULTIPLE CHOICE QUESTIONS

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

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