

**GOVERNMENT OF ANDHRA PRADESH**  
**COMMISSIONERATE OF EMPLOYMENT & TRAINING, AP, HYDERABAD.**

**Memo No. I2/1772/2015**

**Date: 12.05.2015**

**Sub:** CE&T - Vertical mobility of ITI passed out candidates for lateral entry into II year Diploma Course in Andhra Pradesh – Conduct of Bridge Course – Instructions - Reg.

**Ref:** 1. G.O.Rt.No. 25, Higher Education (T.E.II) Department, dated: 07.01.2014  
2. Letter No. SBTET/B3/1112/2002, dated: 01.04.2014 and 14.5.2014 received from the State Board of Technical Education, AP, Hyderabad.

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In the G.O.1<sup>st</sup> cited, Government has permitted ITI passed outs with 2 years of ITI courses having 60% marks to write the entrance test conducted by the SBTET (copy enclosed). The classes for bridge course for Physics, Chemistry and Mathematics subjects both theory and practicals will be conducted by the Employment & Training Department in the following training institutes.

1. Govt. ITI / DLTC, Srikakulam
2. Govt. ITI, Bobbili
3. Govt. ITI (O), Kancharapalem, Visakhapatnam
4. Govt. ITI, Kakinada
5. Govt. ITI, Eluru
6. Govt. ITI, Vijayawada
7. Govt. ITI, Tenali
8. Govt. ITI (B), Ongole
9. Govt. ITI (B), Nellore
10. Govt. ITI, Tirupati
11. Govt. ITI (M), Kadapa
12. Govt. ITI, Dhone, Kurnool District
13. Govt. ITI (B), Ananthapur

The Principals of the above ITIs are instructed to conduct bridge courses for the subjects (theory and practicals) of Physics, Chemistry and Mathematics in the prescribed syllabus designed by the SBTET (copy enclosed) within the given time frame. The training should commence from 16.05.2015 to 16.06.2015. The tentative exam for bridge courses will be from 17.06.2015 to 20.06.2015. The principals are permitted to admit the qualified ITI passed out candidates to conduct bridge courses for entry into 2<sup>nd</sup> year polytechnic.

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They are instructed to conduct practicals for Physics and chemistry and also conduct the end examination in practicals and send the marks obtained by the candidates to Secretary, SBTET before conducting the entrance test by SBTET.

They are instructed to give wide publicity to train the ITI passed out candidates as prescribed in G.O.Rt. No.25, dated: 07.01.2014. The ATOs, / DTOs / TOs having engineering Degree qualification can be used for conducting bridge courses. The Lecturers from Polytechnics / Intermediate college may also be hired as Guest Lecturers. If practical facility is not provided in ITIs, the principals may identify Intermediate College, Degree College or Polytechnics for conduct of Practical.

Encl: As above

Sd/- D.VARAPRASAD  
COMMISSIONER

To

All the Principals of Govt. / Private ITIs in the AP State.

All the Regional Deputy Directors in the AP State.

All the District Convener Principals - with a request to communicate the same to all the  
Managements of Private ITI's in the State.

Copy submitted to: The Secretary to Govt., LET&F Department, AP Secretariat, Hyderabad.

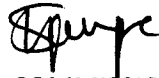
Copy submitted to: The Commissioner, Technical Education, AP, Hyderabad.

Copy submitted to: The Secretary., SBTET, AP, Hyderabad.

Copy submitted to all Sections / Officers in CE& T for information

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for COMMISSIONER  
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**GOVERNMENT OF ANDHRA PRADESH  
ABSTRACT**

Technical Education – Vertical mobility of ITI passed out candidates for lateral entry  
into II year Diploma Course in Andhra Pradesh – Guidelines – Issued.

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**HIGHER EDUCATION (T.E.II) DEPARTMENT**

**G.O.Rt.No. 25**

**Dated: 07-01-2014**

**Read the following:**

1. Govt. Memo. No.16488/ TE.II/2011-1, Dated:25-11-2011.
2. From the Secretary, State Board of Technical Education and Training, A.P., Hyderabad SBTET, A.P., Hyd, Lr.Rc.No.SBTET/B3/1112/2002, dt.31.01.2012.
3. From the Commissioner of Technical Education, A.P., Hyderabad., Lr.No.10062/2008, dt.17.07.2013.
4. From the Advisor, AICTE, New Delhi, Lr.No.PC/AIB-VE/2003, dt.16-12-2003.

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**ORDER:**

In the circumstances reported by the Secretary, State Board of Technical Education and Training and the Commissioner of Technical Education, A.P., Hyderabad in the letters 2<sup>nd</sup> & 3<sup>rd</sup> read above respectively, after careful examination of the matter, the Government hereby issue the following guidelines for vertical mobility of ITI passed out candidates for lateral entry into II<sup>nd</sup> year Diploma Course in Andhra Pradesh:-

- I. There should be vertical mobility for ITI pass-outs with two years of ITI courses only.
- II. If these pass-outs have not taken Physics, Chemistry and Mathematics (PCM), even then they should be permitted for the entrance test provided they compete with PCM at the entrance test to be conducted by the SBTET, Hyderabad.
- III. The Labour Employment Training and Factories Department shall conduct the practicals for Physics and Chemistry and also conduct the end examination in practicals and send the marks obtained by the candidates to Secretary, SBTET before conducting the entrance test by SBTET.
- IV. The Classes for bridge course for Physics, Chemistry and Maths will be organized by Labour Employment Training and Factories Department.
- V. The ITI Students with 2 years of courses would be permitted to join the 2<sup>nd</sup> year at the diploma level, but they will have to complete the subjects of the diploma level that they have not taken at the ITI level. The State Board of Technical Education will have to ensure that the Polytechnics arrange extra classes and allow them to sit for the exams. Only those ITI Students, who secure 60% at ITI would be eligible for consideration for lateral entry.
- VI. The number of students eligible for lateral entry would be 10% above the total sanctioned strength of 1<sup>st</sup> year in Polytechnics in that course.
- VII. The rule of reservation as applicable shall be followed for the lateral entry of such candidates.
- VIII. Linkage between courses will have to be worked out by the State Board of Technical Education.

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2. The Secretary, State Board of Technical Education and Training, Commissioner of Technical Education and Commissioner, Employment & Training, A.P., Hyderabad shall take further necessary action in the matter accordingly.

(BY ORDER AND IN THE NAME OF THE GOVERNOR OF ANDHRA PRADESH)

AJAY MISRA  
PRINCIPAL SECRETARY TO GOVERNMENT

To

The Secretary, State Board of Technical Education and Training, A.P., Hyderabad.

The Commissioner of Technical Education, A.P., Hyderabad.

The Commissioner, Employment & Training, A.P., Hyderabad.

The Commissioner, Employment & Training, A.P., Hyderabad.

Copy to:-

The Labour Employment Training and Factories (Emp.) Department.

The Advisor, All India Council of Technical Education,

7<sup>th</sup> Floor, Chanderlok Building, Janpath, New Delhi-110001.

The P.S. to Hon'ble Deputy Chief Minister.

P.S. to Principal Secretary to Government (HE).

SC/SF.

// FORWARDED :: BY ORDER //

SECTION OFFICER

Telegram: "TECHBOARD"

Phone: 23221191/23222692

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING  
ANDHRA PRADESH : : HYDERABAD

From

The Secretary,  
State Board of Technical  
Education and Training,  
7<sup>th</sup> Floor, B.R.K.R.Govt.Offices Building ,  
HYDERABAD – 500 063.

To

The Commissioner of  
Employment and Training,  
Andhra Pradesh,  
HYDERABAD

Lr No.SBTET/B3/1112/2002

Dated: 01-04-2014.

Sir,

Sub: SBTET-AP-Hyderabad – Vertical Mobility of ITI pass-out Students for admission into 2<sup>nd</sup> year Diploma Course in Andhra Pradesh – ITI trades Eligible for lateral entry and Corresponding Diploma courses identified – Syllabus and Model question papers for bridge course prepared- Communicated -Reg.

Ref: G.O. Rt. No. 25 Higher Education (T.E. II ) Department Dt.7.01.2014

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With reference to the subject cited, the following items are herewith forwarded for information and further necessary action.

1. List of ITI Trades **eligible** for lateral entry into diploma courses(Annexure I)
2. List of ITI Trades **not eligible** for lateral entry into diploma courses(Annexure II)
3. Syllabus and Model question papers for Bridge Course (Annexure III)

Yours faithfully,  
Sd/- D. VENKATESWARLU  
SECRETARY

Encl: As above

for SECRETARY

## ANNEXURE I

### ITI Trades eligible for lateral entry into corresponding Diploma course

*(The following ITI Trades are eligible for lateral entry as the entry qualification for all of them is 10<sup>th</sup> class and all are of 2 year duration)*

Sl. No.	ITI Trades eligible for lateral entry	Name of the Diploma course
01	a) Spinning Technician b) Weaving Technician c) Textile Mechatronics d) Textile Wet Processing Technician	Diploma in Textile Technology
02	a) Spinning Technician b) Weaving Technician c) Textile Mechatronics d) Textile Wet Processing Technician	Diploma in Textile Technology (MPEC)
03	a) Mechanic Medical Electronics b) Mechanic & Consumer Electronics c) Instrument Mechanic d) Information Technology & Electronics System Maintenance e) Mechanic Radio & TV f) Mechanic cum Operators Electronics Communication System g) Mechanic Industrial Electronics h) Mechanic Computer Hardware i) Electronics Mechanic	Diploma in Electronics & Communication Engineering
04	a) Surveyor b) Draughtsman (Civil)	Diploma in Civil Engineering
05	a) Maintenance Mechanic (Chemical plant) b) Attendant Operator (Chemical plant) c) Laboratory Assistant (Chemical plant) d) Instrument Mechanic (Chemical plant)	Diploma in Chemical Engineering
06	a) Maintenance Mechanic (Chemical plant) b) Attendant Operator (Chemical plant) c) Laboratory Assistant (Chemical plant) d) Instrument Mechanic (Chemical plant)	Diploma in Chemical Engineering (Plastics & Polymers)
07	a) Maintenance Mechanic (Chemical plant) b) Attendant Operator (Chemical plant) c) Laboratory Assistant (Chemical plant) d) Instrument Mechanic (Chemical plant)	Diploma in Chemical Engineering (Petro Chemicals)

P.T.O.

08	a) Maintenance Mechanic (Chemical plant) b) Attendant Operator (Chemical plant) c) Laboratory Assistant (Chemical plant) d) Instrument Mechanic (Chemical plant)	Diploma in Chemical Engineering ( Oil Technology)
09	a) Maintenance Mechanic (Chemical plant) b) Attendant Operator (Chemical plant) c) Laboratory Assistant (Chemical plant) d) Instrument Mechanic (Chemical plant)	Diploma in Chemical Engineering ( Suger Technology)
10	a) Fitter b) Turner c) Machinist d) Machinist (Grinder) e) Marine Fitter f) Tool and Die Maker (Press tools, Jigs &Fixtures) g) Mechanic Mechatronics (Fitting & Measurement) h) Mechanic Mining Machinery i) Vessel Navigator j) Tool & Die Maker(Dies&Moulds) k) Draughtsman (Mechanical) l) Mechanic (Refrigeration & Air Conditioner) m) Mechanic Machine Tools Maintenance n) Operator Advanced Machine Tools	Diploma in Mechanical Engineering
11	Mechanic Motor Vehicle	Diploma in Automobile Engineering
12	a) Electroplator b) Lift Mechanic c) Electrician	Diploma in Electrical Electronics Engineering
13	Radiology Technician (Radio Diagnosis & Radio Therapy)	Diploma in Bio Medical Engineering
14	Architectural Draughtsmanship	Diploma in Architectural Assistantship

**NOTE:-** ITI candidates taking lateral entry into II year Diploma shall have to study first year Engineering subjects of the relevant diploma course as additional subjects(s)

Sd/- D. VENKATESWARLU  
SECRETARY

## ANNEXURE II

List of ITI Trades not eligible for Lateral Entry

**(The following ITI Trades are not eligible for lateral entry for the reason(s) stated against each course)**

Sl.No	Name	Remarks
1	Architectural Assistant	2 Semester course
2	Building Maintenance	1 Semester
3	Carpenter	2 Semester course
4	Domestic Painter	2 Semester course
5	Excavator Operator(Mining)	1 Semester course Entry qualification is 8 <sup>th</sup> class
6	Foundryman	2 Semester course Entry qualification is 8 <sup>th</sup> class
7	Gold Smith	2 Semester course Entry qualification is 8 <sup>th</sup> class
8	Industrial Painter	2 Semester course
9	Interior Decoration and Designing	2 Semester course
10	Marine Engine Fitter	2 Semester course
11	Mason (Building Constructor)	2 Semester course Entry qualification is 8 <sup>th</sup> class
12	Mech. Communication Equipment Maintenance	2 Semester course
13	Mech. Repair & Maintenance of Heavy Vehicles	2 Semester course
14	Mech. Repair & Maintenance of Light Vehicles	2 Semester course
15	Mech. Repair & Maintenance of Two Wheelers	1 Semester Course
16	Mechanic (Diesel)	2 Semester course
17	Mechanic (Tractor)	2 Semester course Entry qualification is 8 <sup>th</sup> class
18	Mechanic Agricultural Machinery	Entry qualification is 8 <sup>th</sup> class
19	Mechanic Auto Electrical and Electronics	1 Semester Course
20	Mechanic Lens/Prism Grinding	2 Semester course
21	Painter General	Entry qualification is 8 <sup>th</sup> class
22	Physiotherapy Technician	2 Semester course

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23	Plastic Processing Operator	2 Semester course
24	Plumber	2 Semester course Entry qualification is 8 <sup>th</sup> class
25	Pump Operator-cum-Mechanic	2 Semester course
26	Rubber Technician	2 Semester course
27	Sanitary Hardware Fitter	1 Semester course Entry qualification is 8 <sup>th</sup> class
28	Sheet Metal Worker	2 Semester course Entry qualification is 8 <sup>th</sup> class
29	Stone Processing Machines Operator	2 Semester course
30	Stone Mining Machine Operator	2 Semester course
31	Welder (Gas and Electric)	2 Semester course
32	Wireman	Entry qualification is 8 <sup>th</sup> class
33	All Non-Engineering Trades except Architectural Draughtsmanship	Either 1 semester or 2 semester duration  (Note : Though the course <b>DENTAL LABORATORY TECHNICIAN</b> is of 2 yr duration for which entry qualification is 10 <sup>th</sup> Class Pass, <b>no relevant diploma course</b> is being offered by SBTET, AP, Hyderabad

Sd/- D. VENKATESWARLU  
SECRETARY

**Syllabus for Bridge Course**  
**Mobility of ITI pass students to 2<sup>nd</sup> Year Diploma Course**

**Subject : Chemistry**

**Total Periods : 60**

**Time Schedule**

<u>Sl.No</u>	<u>Major Topic</u>	<u>No. of Periods</u>	<u>Weight age of marks</u>	<u>No. of short Questions</u>	<u>No. of long Questions</u>
1.	Fundamentals of Chemistry	9	14	1	1
2.	Solutions	6	04	1	Nil
3.	Acids And Bases	6	09	1	1/2
4.	Electro Chemistry	8	14	1	1
5.	Corrosion	8	14	1	1
6.	Water Technology	8	14	1	1
7.	Polymers	7	09	1	1/2
8.	Environmental Studies	8	14	1	1
	<b>Total</b>	<b>60</b>	<b>92</b>	<b>8</b>	<b>6</b>

**1. Fundamentals of Chemistry:**

- 1.1 Fundamental particles of an atom-electron, Proton and neutron. (Charge and mass only)
- 1.2 Definition of atom and molecule.
- 1.3 Atomic number and mass number.
- 1.4 Electronic Configuration of elements. (Atomic numbers 1-30)
- 1.5 Salient features of modern periodic table- groups and periods.
- 1.6 Definition of ionic bond and covalent bond.
- 1.7 Distinguish between ionic compounds and covalent compounds.

**2. Solutions:**

- 2.1 Define solution, solute and solvent.
- 2.2 Types of solutions.

- 2.3 Define and explain Molarity.
- 2.4 Define and explain Normality.
- 2.5 Numerical problems on Molarity and Normality.

### **3. Acids and Bases:**

- 3.1 Explain Arrhenius theory of Acids and Bases.
- 3.2 Explain Bronsted-lowry theory of Acids and Bases.
- 3.3 Explain Lewis theory of Acids and Bases.
- 3.4 Define pH, explain pH scale.
- 3.5 Define Buffer solution, Applications of Buffer solutions.

### **4. Electro Chemistry:**

- 4.1 Define conductor, insulator, electrolyte and non-electrolyte.
- 4.2 Arrhenius theory of electrolytic dissociation.
- 4.3 Define electrolysis, explain electrolysis of fused NaCl.
- 4.4 Explain Faraday's laws of electrolysis.
- 4.5 Define electrochemical equivalent and chemical equivalent.
- 4.6 Numerical problems bases on Faraday's laws of electrolysis.
- 4.7 Mention applications of electrolysis.

### **5. Corrosion:**

- 5.1 Define Corrosion.
- 5.2 Factors influencing the rate of Corrosion.
- 5.3 Understand the concept of electrochemical theory of Corrosion.
- 5.4 Mechanism of Rusting of Iron.
- 5.5 Prevention of Corrosion-Protective coatings, sacrificial anode process and impressed voltage process.

### **6. Water Technology:**

- 6.1 Define Hard water and Soft water.
- 6.2 Understand temporary and permanent hardness and the compounds causing hardness.
- 6.3 State the disadvantages of using hard water in industries.
- 6.4 Mention units of hardness.
- 6.5 Know the essential qualities of Drinking water.

**7. Polymers:**

- 7.1 Basic concepts of Polymerization.
- 7.2 Methods of Polymerization (a) Addition Polymerization of ethylene (b) Condensation Polymerization of Phenol and formaldehyde. (Only flow chart, no chemical equations)
- 7.3 Define the term Plastics.
- 7.4 Distinguish between Thermoplastics and Thermosetting plastics with examples.
- 7.5 Advantages of plastics over traditional materials.

**8. Environmental Studies:**

- 8.1 Define and understand the terms Atmosphere, Biosphere, Pollutant, Contaminant, Receptor, Sink, Particulates, Dissolved Oxygen, Threshold limit value (TLV), BOD and COD.
- 8.2 Define Air pollution.
- 8.3 State the causes of Air pollution.
- 8.4 Effects of Air pollution on human beings, Green House effect, Ozone depletion and Acid rains.
- 8.5 Methods of control of Air pollution.
- 8.6 Define Water pollution.
- 8.7 State the causes of Water pollution.
- 8.8 Mention the effects of Water pollution.
- 8.9 Methods of control of Water pollution.

**Model Question Paper**

State Board of Technical Education and Training. AP. Hyderabad.  
Bridge Course Examination

**Subject: Chemistry**

**Max Marks: 50**

**Section-A**

**4×5=20 marks**

Answer any five of the following:

1. Write the electronic configuration of the element copper (Cu) (Atomic Number-29) and chromium (Cr) (Atomic No.24).
2. Define the terms Solute , Solvent and Solution.
3. Define pH. Give the pH scale.
4. Mention any three applications of Electrolysis.
5. What is Rusting? Give the chemical name and chemical formula of Rust.
6. Define Soft water and Hard water. Give examples.
7. Write any three advantages of plastics.
8. Define Air pollution and Water pollution.

**Section-B**

**10×3=30 marks**

Answer any three of the following:

9. (a) Write differences between ionic compounds and covalent compounds.  
(b) What are groups and periods? How many groups and periods are there in modern periodic table?
10. (a) Explain Arrhenius theory of acids and bases.  
(b) Distinguish between Thermoplastics and Thermosetting plastics.
11. (a) State and explain Faraday's laws of electrolysis.  
(b) Define the terms conductor, insulator, electrolyte and electrolysis.
12. (a) List out the factors influencing the rate of corrosion.  
(b) Explain sacrificial anode method and impressed voltage method of prevention of corrosion.
13. (a) What are the disadvantages of using hard water in industries.  
(b) List the essential qualities of drinking water.
14. (a) Write a brief note on Green house effect.  
(b) Explain the methods of control of air pollution.

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**Proposed PHYSICS syllabus of Bridge course for vertical mobility of ITI students  
Into 2<sup>nd</sup> year Diploma through lateral entry.**

-----TIME SCHEDULE-----

S.No.	Major Topics	Periods	Weightage	Short Type	Essay Type
1	Units and Dimensions	5	4	1	-
2	Elements of Vectors	8	14	1	1
3	Kinematics and Friction	8	14	1	1
4	Simple Harmonic motion and Sound	8	4	1	-
5	Heat and Thermodynamics	8	14	1	1
6	Properties of Matter	8	14	1	1
7	Electricity and Magnetism	8	14	1	1
8	Modern Physics	7	14	1	1
	<b>Total</b>	<b>60</b>	<b>92</b>	<b>8</b>	<b>6</b>

**1. Units and Dimensions:**

Physical quantity- Fundamental and Derived quantities- Define Unit- Fundamental and Derived units- Systems of units- SI units- Base, Supplementary and Derived units of SI system and their symbols- Advantages of SI system- Dimensions and Dimensional formula- Method of writing dimensional formulae of some simple quantities-List some Dimensionless quantities -Principle of Homogeneity of dimensions-Mention the uses and limitations of dimensional analysis.

**2. Elements of Vectors:**

Concept of Scalars and Vectors- Type of Vectors- Proper vector, null vector, equal vectors, negative vector, coplanar vector, collinear vectors, unit vector, position vector- Resolution of vectors- Scalar components and vector components- Addition of vectors which are parallel and anti-parallel- Triangle law, Parallelogram law statements- State the expressions for magnitude and direction of the resultant- Polygon law of vectors- Definition of Dot product- Work done by a force as example- Definition of Cross product- Moment of force as an example- Direction of vector product by Right handed screw rule and Right hand thumb rule-**Simple problems on parallelogram law.**

### 3. Kinematics and Friction:

State the equations of motion of a body in a straight line- Acceleration due to gravity- Equations of motion for a freely falling body- Derive the expressions for maximum height, time of ascent, time of descent, time of flight- **simple problems.**

Definition of Friction- Causes of friction- 3 types of friction- Difference between static and limiting frictions- Laws of limiting friction- Coefficients of friction- Methods of reducing friction.

List the advantages and disadvantages of friction.

### 4. Simple Harmonic motion and Sound:

Periodic motion- SHM- Conditions of SHM- Examples of SHM- Meaning of displacement, amplitude, time period, frequency with reference to Simple Pendulum- State the expression for Time period of Simple pendulum- Laws of Simple pendulum-Discuss  $l-T^2$  graph- Seconds pendulum.

Musical sound and Noise- Noise pollution- Effects of noise pollution – Methods of minimizing noise pollution- Beats and Applications of Beats.

### 5. Heat and Thermodynamics:

Expansion of Gases– Boyle's law- Shape of PV graph- Absolute zero- Absolute scale of temperature- Charles I and II laws on absolute scale- Derivation of ideal gas equation- Gas constant and universal gas constant- SI Units and dimensional formula of universal gas constant- Different forms of Gas equation-**Simple problems on Boyle's law, Charles law and Gas equation.**

Internal energy- External energy- Derive the expression for external energy- Isothermal process, Adiabatic process- Differences between them- Statement of I and II laws of thermodynamics.

### 6. Properties of Matter:

Elasticity- Elastic and plastic bodies – Examples- Stress and Strain- SI units and dimensional formulae of stress and strain- Hooke's law- Modulus of elasticity- Name 3 types of moduli of elasticity- Derive the expression for Young's modulus.

Surface tension - Examples- Units and dimensional formula- Capillarity- Examples of capillary action- State the formula for surface tension.

Viscosity – Examples–Derive the Newton's formula for viscous force- Coefficient of viscosity- Definition and SI units- Effect of Temperature on viscosity of liquids and gases.

## 7. Electricity and Magnetism:

Ohm's law- Ohmic and Non Ohmic conductors- Examples- Derive the expression for specific resistance- SI unit of specific resistance- Statement of two Kirchhoff's laws- Principle of Wheatstone's bridge and explain the condition of balance- **Simple problems on Wheatstone's bridge.**

Natural and Artificial magnets- Properties of a bar magnet- Coulomb's inverse square law- Magnetic field- Uniform and non-uniform magnetic fields-Definition and expression for magnetic induction (B) and its SI units-Moment of Couple on a Bar magnet placed in a uniform magnetic field- Derive the expression  $\tau = MB \sin\theta$  ; Meaning of magnetic moment of the magnet- State the expressions for Magnetic induction field strengths on axial and equatorial lines and compare the expressions for the field strengths- **Simple problems on Coulomb's law.**

## 8. Modern Physics:

Photo electric effect-Einstein's photoelectric equation-Laws of photo electric effect- Photo electric cell- Applications.

Optical fibers- Critical angle - Total internal reflection- Conditions for Total internal reflection- Simple explanation of working of optical fiber using Total internal reflection- Types of Optical fibers- Applications of Optical fibers.

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**Model Paper( Applied Science )**

**Part – I (PHYSICS) Time:( 1 ½ hour)**

**Section – A (Answer any five)**

**5 x 4= 20 m**

1. Define dimensional formula and mention any two dimensionless quantities.
2. What are Scalars and Vectors? Give some examples.
3. A stone is projected upwards with a velocity of 19.6 m/s. Calculate the time of ascent.
4. State the conditions of Simple harmonic motion.
5. State and explain Boyle’s law.
6. Define Stress and Strain.
7. Write the properties of a bar magnet.
8. Explain photoelectric effect with a figure.

**Section – B (Answer any Three)**

**3 x 10 =30m**

- 9.a) Define Equal vectors and Negative vector. (4)  
 b) Define dot product, cross product and give one example each. (6)
- 10.a) Define Friction. Mention different types of friction. (5)  
 b) State the laws of limiting friction. (5)
- 11.a) Derive the Ideal gas equation. (6)  
 b) Pressure and volume of a gas at certain temperatures are 72 cm and 15 litres respectively. Find its volume if the pressure is reduced by 10 cm at the same temperature. (4)
- 12.a) Define Viscosity and give any two examples. (4)  
 b) Derive Newton’s formula for Viscous force. (6)
- 13.a) Explain the principle of Wheatstone’s bridge with a figure. (6)  
 b) In a balanced Wheatstone’s bridge, values of resistances are p=10, q=5 and r=4 ohms. Find the value of fourth resistance. (4)
- 14.a) Explain the terms ‘ Critical angle’ and ‘Total internal reflection. (6)  
 b) Write any 4 applications of Optical fibers. (4)

## Applied Science practicals

### PROPOSED APPLIED SCIENCE PRACTICAL SYLLABUS OF BRIDGE COURSE FOR ITI STUDENTS.

- Applied Science practicals consists of PART-A ( Physics ) and PART-B (Chemistry).
- PART-A and PART-B are compulsory.
- This may be included in 4<sup>th</sup> semester course work.
- Marks allotment: Total 60 marks: PART-A- 30 marks and PART-B- 30 marks.

Recommended No. of periods: PART-A :8classes and PART-B :8 classes each of 3 hours duration.

16 x 3 = 48 periods.

### Syllabus PART-A (PHYSICS)

#### 1. Vernier Calipers:

- (a) To measure the length and diameter of a cylinder and calculate its volume.
- (b) To measure the diameter of a sphere and calculate its volume and surface area.

#### 2. Screw gauge:

- (a) To determine the thickness of glass plate and diameter of a wire.
- (b) To determine the area of cross-section of a given wire by measuring its radius.

#### 3. Simple pendulum:

To determine the value of acceleration due to gravity and to draw  $l-T^2$  graph.

#### 4. Boyle's law Verification:

To experimentally verify Boyle's law using Quill tube method.

#### 5. Velocity of sound in air:

To determine the velocity of sound in air at room temperature and to calculate its value at 0°C using two tuning forks.

### Syllabus for PART-B (CHEMISTRY)

1. Introduction to Volumetric analysis.
2. Preparation of standard Sodium carbonate solution.
3. Estimation of Hydrochloric acid using standard Sodium carbonate solution.
4. Estimation of Mohr's salt solution using standard Potassium permanganate solution.
5. Determination of Total hardness of water using standard EDTA solution.

## **Model paper for Applied Science Lab Examination**

### **Applied Science PART-A and PART-B.**

Duration:  $1^{1/2} + 1^{1/2} = 3$  Hours.

Total marks:  $30 + 30 = 60$ .

Minimum marks: 30/60.

**Note: One question from each section as allotted by the examiner is compulsory.**

#### **PART-A ( PHYSICS )**

1. Determine the volume of the given cylinder using Vernier calipers.
2. Determine the area of cross-section of the given wire using screw gauge.
3. Find the value of acceleration due to gravity using simple pendulum.
4. Verify Boyle's law using Quill's tube method.
5. Determine the velocity of sound in air at  $0^{\circ}\text{C}$  using Resonance apparatus.

#### **PART-B( CHEMISTRY )**

6. Prepare 0.05N standard solution of Sodium Carbonate solution in 250 ml volumetric flask.
7. Determine the Molarity and estimate the amount of Hcl present in 1 liter solution using 0.01M  $\text{Na}_2\text{CO}_3$  solution.
8. Find the molarity and estimate the amount of Ferrous Ammonium Sulphate ( Mohr's salt) present in 250 ml by using 0.02M, Potassium permanganate ( $\text{KMnO}_4$ ) solution.
9. Determine the total hardness of the given water sample using 0.02N EDTA solution.

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**Syllabus for Bridge Course**  
**Mobility of ITI pass students to 2<sup>nd</sup> yr Diploma Course**

**Subject : Mathematics**

**Total periods : 90**

**Time Schedule**

S.No	Major Topic	No. of periods	Weightage of Marks	No. of Short Questions	No. of Long Questions
1	Algebra	30	54	06	02
2	Trigonometry	20	41	01	03
3	Coordinate Geometry	15	22	02	01
4	Calculus	25	39	03	02
	Total	90	156	12	08

**Algebra**

- 1) Elementary algebra: Addition, subtraction, multiplication, division of algebraic expressions of the form  $ax+b, cx-d$  etc.
- 2) Removal of brackets of algebraic expressions.
- 3) Ratio and proportion of numbers.
- 4) Algebraic identities and simple examples related to them.
- 5) Function notation, definition with examples.
- 6) Definition of a surd simplification and rationalization of compound surd.
- 7) Definition of a quadratic equation, properties, nature of roots and finding roots.
- 8) Definition of a matrix, order of a matrix, types of matrices, multiplication of a matrix by a scalar, addition, subtraction, multiplication of matrices of order  $2 \times 2$  and  $3 \times 3$ . Transpose of a matrix, definition of determinant of a square matrix with simple examples.
- 9) Partial fractions of first and second type with examples.

## **Trigonometry**

- 1) Introduction, definition of trigonometric functions, Identities, Trigonometric ratios, their values and simple examples.
- 2) Definition of compound angle, multiple angle and submultiple angles, formulae related to them with simple examples.
- 3) Transformations, sum and product formulae with examples.
- 4) Inverse trigonometric functions, definition, properties with examples.

## **Co-ordinate Geometry**

- 1) Definition, notation of a point in the plane, distance between two points with examples. Types of triangles formed with three points, section formula with examples Internally and externally. Slope of the line joining two points.
- 2) Straight line, finding its slope, types of straight lines with examples.

## **Calculus**

- 1) Limit of a function, evaluation of limits of standard forms and related simple examples.
- 2) Definition of derivative of a function, differential coefficient, first principle, standard forms of derivatives and examples.
- 3) Differentiation of the functions of the form  $u+v$ ,  $u-v$ ,  $uv$ ,  $u/v$  with examples.

**MODEL QUESTION PAPER**

Max Marks:100

Time:3hrs

**PART:A (40marks)**

Answer any 8 Questions. Each carries 5 marks.

- 1) Simplify  $(x+y-2z)+(2x-y+3z)-(x-2y+z)$
- 2) Expand  $(2a-b+3c)^2$
- 3) Rationalise the denominator of  $(\sqrt{3}-\sqrt{11})/(\sqrt{3}-\sqrt{2})$
- 4) Solve  $x^2-5x+3=0$
- 5) If  $A = \begin{bmatrix} 1 & -1 & 0 \\ -2 & 3 & 4 \\ 0 & -3 & 7 \end{bmatrix}$ , find  $A+A^T$
- 6) Resolve  $2x/(x-1)(x+2)$  into partial fractions
- 7) If  $\tan A=1/2$ ,  $\tan B=1/3$ , Find  $\tan (A+B)$
- 8) Find the co-ordinates of a point which divides the line joining the points  $(-1,2)$  and  $(-2,-3)$  internally in the ratio 2:3
- 9) Find the equation of the straight line passing through the point  $(1,2)$  and having slope -1
- 10) Evaluate limit  $[\sin(3\theta)]/5\theta$   
 $\theta \rightarrow 0$
- 11) limit  $(\sqrt{1+x} - 1)/x$   
 $x \rightarrow 0$
- 12) Differtiate  $(e^x \log x)$  with respect to x.

**PART- B (60 marks)**

Answer any 5 questions, each carries 12 marks.

- 11) If  $A = \begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix}$   $B = \begin{bmatrix} -1 & 0 \\ 1 & -2 \end{bmatrix}$ , find a)  $AB$     b)  $B^T A$
- 12) If  $A = \begin{bmatrix} 1 & 0 & -2 \\ 3 & -5 & 6 \\ -1 & 0 & 1 \end{bmatrix}$ ,  $B = \begin{bmatrix} -1 & 2 & 3 \\ -4 & 1 & 0 \\ 0 & -2 & 1 \end{bmatrix}$  find a)  $A+2B$     b)  $2A-B$
- 13) If  $\sin A=3/5$ ,  $\cos B=1/3$ , find a)  $\tan(A-B)$     b)  $\sin(A+B)$
- 14) Prove that a)  $\sin 70^\circ - \sin 50^\circ = \sin 10^\circ$     b)  $\cos \theta + \cos(120^\circ + \theta) + \cos(120^\circ - \theta)$
- 15) Prove that a)  $\tan^{-1}(1/5) = \sin^{-1}(1/\sqrt{26})$     b)  $\cos(\cos^{-1}(1/2) + \sin^{-1}(\sqrt{3}/2)) = -1$
- 16) Find the equation of a straight line a) having intercepts -2, -3 on the coordinate axes  
b) passing through the point  $(1,2)$  and  $(-3,4)$
- 17) Evaluate a)  $d/dx (x \cos 2x)$   
b)  $d/dx (ax+b/cx+d)$
- 18) Evaluate a)  $d/dx (x^5 - e^{3x} - \log x + \tan x)$     b)  $d/dx (\tan^{-1}(2x/1-x^2))$